DREAM STAY

design tools for the built environment:
imagination as an escape from reality

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PREFACE

This thesis is the result of the research I have conducted during my graduation project at the Explore Lab studio. The conclusions form the starting point and design tools of my design project. The research and design combined, result in gaining the title Master of Science at Architecture, Urbanism and Building Sciences.

The research and design project are based on my fascination for healthcare architecture and design for children. This fascination for healthcare has developed itself during an internship and has influenced my choice of courses and graduation topic throughout my master. The studio Explore Lab has made it possible to continue research regarding this fascination and focuses on the translation of research into practical design tools.

First, I would like to thank my research mentor Luc Willekens. Without his guidance and never-ending enthusiasm this research would not have been possible. I grew really attached to our weekly conversations and I am happy that they could continue in my design project. Furthermore, I would like to thank my tutors Robert Nottrot and Ype Cuperus for their guidance regarding my design project.

This graduation project would not have been the same without the endless conversations with my co-explorers at Architecture and the insights I gained during my research for the WKZ (Wilhelmina Children's Hospital) at the faculty of Industrial Design. I would like to thank Quiel Beekman for her guidance and my group members Jelmer, Jiska, Myrthe, Nora and Rebekka for the amazing project and fun I had during the JMP project. I would like to thank Daan, Jelle, Karin, Kelly and Nora for the correcting and reading of my text. And last, but not least, I would like to thank my parents, Daniël and especially Jelle for their endless support and understanding during not only my graduation but my entire study in Delft.

Delft, January 2018

SUMMARY

Being ill and possible admission to a hospital or other healthcare centre cause stress and anxiety for children [1-4]. Research shows how children under the age of 7, are more vulnerable to stress and anxiety [5-8]. This has not only a negative influence on the psychological well-being of a child, it also increases the risk of health problems later in life [9, 10] and delays a child's cognitive, motoric and social development [5]. By reducing stress and anxiety in children, their psychological well-being will be fostered. Also, their healing process will be influenced positively and their development will continue [11, 12]. To reduce stress and anxiety, different distraction methods have proven to be effective [11-13]. This research sets out to explore the possibility to integrate the distraction with the built environment (parts of the physical environment, constructed by humans). Through distraction a child can forget about its surroundings and/or illness and focus on something else. The latter can be achieved by stimulating the imagination of a child. The imagination is defined as: *The act or power of pretending an image, situation, or activity as something that is not directly experienced by one at a specific moment.* For this research, the following research question has been formulated:

In what way can activities, in which the imagination of children is active, be translated into generic properties, which can be used to design the built environment, stimulating the imagination of children aged 3 to 6 years?

By providing the right elements certain behaviour can be stimulated [14-16]. The generic properties formulated in this research will be used as a design tool to describe elements which, when present at a site, can stimulate the imagination of children. This design tool is used in the design of a prevention and treatment centre for obese or overweight children.

The generic properties are derived from the analyses of spatial elements, present during activities, in which the imagination is active. Children aged 3 to 6 years spend a large part of their time playing. Through play they develop their motoric, social and cognitive skills, including their imagination [17-20]. Therefore, the first activity is playing. In addition, not all children in healthcare institutions are able to play, therefore also an activity, which does not ask for physical activity, is studied: perceiving art.

Play behaviour is studied by conducting observational studies at different play areas, marking which elements are afforded in a child's play and analysing these elements for spatial characteristics. These elements are expanded by analysing several playgrounds, designed by Aldo van Eyck. In addition, with a semi-formal interview information was gathered about the fantasy worlds, children would create in addition to their play. The interviews gathered intel about when, where and why they had created their world. The spatial elements defined in the stories and analysis of playgrounds, are also analysed to determine generic spatial characteristics. The second activity, perceiving art, is studied by analysing different artworks for their spatial characteristics. The results of the analyses are combined with the results of a literature study regarding the perception of space by children, and have resulted in a set of generic properties.

First, a **place** must be created. This is a place where a child their imagination is stimulated by engaging in imagination-stimulating activities. This place is created by the **composition** of different **elements** and can be on an object or in-between different objects, varying in scale from object-size to room-size. The elements creating this place are organised, taking their **number & variety, scale** and **interrelationship** in consideration. To stimulate imagination activating behaviour, the composition or place should have certain characteristics. First, the composition of elements should result in a certain framework of information and second, the elements, part of the composition, should be defined by certain properties.

The following generic properties, apart from number & variety, scale and interrelationship, help describing the different elements and composition of an imagination-stimulating place. The first properties, **height**- and/or **planar differences**, define the different elements or a part of it. Furthermore, elements which are characterised by **loose materials** and/or **contrast** should be present. The property **loose materials** includes elements which are small and light enough for a child to be picked up or moved around. **Contrast** describes the contradiction between the properties of different spaces. Finally, the elements or composition should support **enclosure** and/or **manipulation**. If an element provides **enclosure**, the element provides some sort of shelter. By **manipulation** a child can adapt or adjust an element.

As mentioned, by creating a **framework** of information with the composition, the imagination gets stimulated. By leaving some information out, the user will become curious and eager to fill in the blanks. The framework can be created through the **composition** of elements, creating certain lines of sight and excluding other parts. This composition can either be two- or three dimensional. Another way of creating a framework, is through the **abstraction** of a topic. Information regarding the context and/or shape or representation is left out.

The composition of a place should meet one or all characteristics to stimulate the imagination.

1. Caldas, Pais-Ribeiro, & Carneiro, 2004.
2. Carney, et al., 2003.
3. Coyne, 2006.
4. Eisen, et al., 2008,
5. Aley, 2002.
6. Blom, 1958.
7. McGrath, & Huff, 2001.
8. Salmela, Salanternä, & Aronen, 2010.
9. Rees, et al., 2004.
10. Kopec, & Sayre, 2004.
11. Shepley, Fournier, & McDougal, 1998.
12. Ulrich, et al., 2008.
13. Koller, & Goldman, 2012.
14. Lockton, n.d.
15. Lockton, Harrison, & Stanton, 2010a.
16. Lockton, Harrison, & Stanton, 2010b.
17. Haiat, Bar-Mor, & Shochat, 2003.
18. Piaget, & Inhelder, 2000.
19. Piaget, 1962.
20. Lillard, 2015.

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0. INTRODUCTION

0.1 INCENTIVE

The introduction includes several paragraphs describing the incentive to this research, the research lay-out, methodology and sign posting. The first paragraph describes the relevance of this research and describes research which has been conducted earlier in relation to the focus of this thesis.

The second paragraph describes the research. This paragraph starts with the definition of the framework and focus of this research. To do so, literature regarding the built environment, imagination and spatial cognition is used. This section is concluded in the layout of this research. The layout presents the main question and sub questions leading to the conclusion. The second paragraph ends with the description of the methodologies used.

This chapter ends with a sign posting, explaining what topic will be addressed in which chapter.

1. Caldas, Pais-Ribeiro & Carneiro, 2004.
2. Carney, et al., 2003.
3. Coyne, 2006.
4. Eisen, et al., 2008.
5. Aley, 2002.
6. Blom, 1958.
7. McGrath & Huff, 2001.
8. Salmela, Salanternä, & Aronen, 2010.
9. Eiser, 1985.
10. Forsner, Jansson & Sørlie, 2005a.
11. Forsner, Jansson & Sørlie, 2005b.
12. Sartain, Clarke, & Heyman, 2000.
13. Rees, et al., 2004.
14. Kopec & Sayre, 2004.

Children experience stress and anxiety due to being ill and possible admission to a hospital or other healthcare centre [1-4]. Research shows that pre-school aged children (children under the age of 7) are more vulnerable to the stress and anxiety [5-8]. Amongst others, they are afraid of mutilation, the uncertainty of what might happen, loss of control and autonomy and they fear separation from their parents [5-8]. In addition, children do not completely understand what causes their illness yet, and they experience the illness and the treatment as a form of punishment for bad behaviour or as a form of magic [9].

In the end, the illness itself is also a major source of fear and discomfort. Children in the research of Forsner, Jansson and Sørolie [10, 11] describe the illness as suffocant and they feel lost in our 'healthy' world.

> *"(...) they did not seem to recognize their body, it was not what is used to be. (...) Excluded and dissociated from the meaning of life from their own perspective, they were trapped in the sick body" [10: p. 317]*

The children in the research of Forsner et al. [10, 11] all suffered from short term diseases and were only hospitalised once. To them, the illness and hospitalisation was more of a change than to children who are hospitalised more often because of a chronical or long-term disease. Sartain, Clarke and Heyman [12] interviewed children with a chronical disease, which means they were ill for over three months and had to visit the hospital repetitively. Also, these children described their disease as limiting. They felt controlled by the disease and not able to, for example, play and run like other kids.

Stress and anxiety, caused by the illness, treatment and admission to a healthcare centre, do not only have a negative influence on the psychological well-being of a child. Moreover, it also increases the risk of health problems in later life [13, 14] and delays a child's cognitive, motoric and social development [5]. By reducing stress

and anxiety in children, their psychological well-being will be fostered. In addition, the healing process of the children will be influenced positively and their development will continue [15, 16]. The latter formulates the motivation of this research.

Concerning the reduction of stress and anxiety, research has focussed on different causes: the illness itself, treatment and the healthcare institutions. Regarding the illness and treatment, according to pedagogue A. Boekraad (personal communication, October 5, 2017) research and practice focus on limiting the stress and anxiety by explaining exactly to a child what will happen and providing distraction [17]. Distraction techniques can be both active and passive [17]. Active techniques involve active participation of a child (and sometimes another person) to engage in a distracting activity such as playing games or to perform a relaxation exercise. With the latter children are guided in breathing exercises or asked to think about a different, pleasant situation and let their mind wander. Passive techniques include distraction with images, music, or tv. These distraction methods often include the active participation of another party and are often not integrated in the design of the healthcare institution but an addition to the lay-out. Considering the scope of this research, the integration of distraction in the built environment of a healthcare institution is researched.

The past 35 years, research has explored the possibility to increase the psychological wellbeing with the physical environment. Studies describe different environmental factors which are beneficial to the reduction of stress and anxiety within children and other patients due to hospitalization. Each of these studies has investigated the effect of specific design interventions. Interventions such as the reduction of noise, presence of daylight, single-bed rooms, presence of family, privacy, the use of colour, art and greenery have proven to have a beneficial effect on the psychological wellbeing of patients and therefore their healing process [4, 15, 18, 19]. These interventions relate to a form of comfort [10], relying on the simple idea to help people forget about their current situation and surroundings. To help children in their healing process, also a form of comfort should be established. This comfort can be achieved by distracting a child and helping them to think of a different place or situation [15, 20, 21]. With the distraction of a child, their imagination is challenged and stimulated.

4. Eisen, et al., 2008.
10. Forsner, Jansson & Sørlie, 2005a.
15. Ulrich, et al., 2008.
16. Shepley, Fournier & McDougal, 1998.
17. Koller & Goldman, 2012.
18. Shepley, & Pasha, 2013.
19. Joseph, 2006.
20. Bailey, 2002.
21. Schweitzer, Gilpin & Frampton, 2004.
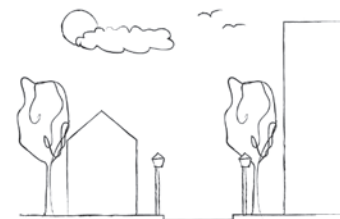
0.2 RESEARCH

Fig. 0.1   The environment

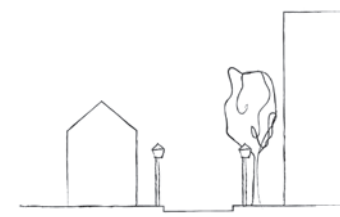Fig. 0.2   The physical environment

Fig. 0.3   The built environment

22. Bell, et al., 2001.
23. Roof & Oleru, 2008.
24 'imagination', n.d.

To increase the healing process and limit a negative impact of stress and anxiety on a child's psychological wellbeing and cognitive, motoric and social development, this research sets out to explore in what way the imagination of children can be stimulated by the built environment. This concerns children between the ages of 3 to 6 years old.

Regarding the scope of this research, only the role of the built environment is included. The built environment is part of the physical environment. The physical and social or cultural environment form the entire environment [22], see Fig. 0.1 to Fig. 0.3. The built environment includes all elements which are constructed by humans [23].

Within different fields of works, the interpretation of the term imagination differs. As described in the previous section, in this research, a child should be distracted from the current situation by helping him or her to think of another, pleasant, situation or event. Therefore, imagination is, in this research, defined as: *The act or power of pretending an image, situation, or activity as something that isn't directly experienced by one at a specific moment.* This definition is adapted from the definition given by the Merriam Webster dictionary [24]. Chapter "1.1 Imagination in Children" further explains the formulation of this definition further.

Stimulating behaviour
To determine how imagination can be stimulated by the built environment, the research will reason from the perspective of environmental psychology. Environmental psychology discusses the interrelationship between users and the environment. Bell et al. defines environmental psychology as *"the study of the molar relationships between behaviour and experience and the built and natural environments"* [22: 6]. In other words, the environment influences the users, and they influence the environment in turn. Environmental psychology, in contrast to classic psychology, considers the perception of space to be a

holistic process. The holistic approach studies the impact of the whole environment as one, instead of trying to separate it into smaller components and stimuli [22: 60-61]. This approach has a strong relationship to Gestalt perception. This theory from Gestalt psychology is based on the idea that *"the whole is different from solely a simple sum of its component parts"* [22: 62].

Within the field of environmental psychology, two theories exist on how the experience of a space is established, concerning the interrelationship of the perceiver and its surroundings. First, the systems approach describes how the environmental stimuli are perceived by a person and combined with his or her personality result in an experience, as illustrated in Fig. 0.4. The second approach is the transactional approach. This approach considers, in contrast to the system approach, that the total experience of the environment cannot be separated into different parts (the sensory perception and the emotional and cultural perception). Within this approach different theories describe the relation of a human being to the environment. An example of a transactional approach is Barker's Ecological psychology. This approach considers the relation of behaviour and environment as a two-way-street [22: 61, 124], see Fig. 0.5.

In this research, the systems approach is elaborated on. Bell et al. describe an eclectic model on the perception of space, created from different theories from the field of environmental psychology [22]. Others have also studied the perception of space from an architectural and design point of view and have created models describing this process [25-27]. Regarding the scope of the research, as described before, the models have been simplified to the relevance of this study and are shown in Fig. 0.6. The perception of space by a person is influenced by both the environment and personal values. This perception has influence on the behaviour of the person and the behaviour influences, again, the perception and the environment.

Although the influence of the environment on our behaviour is considered as a holistic principle, within the field of environmental psychology, different theories try to describe the relationship of different aspects of the environment on our perception. For example, the effect of noise, presence of greenery and more [15, 22]. This research focuses, as mentioned before, on the aspects of the built environment and tries to determine what stimuli
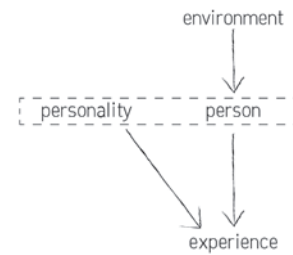

Fig. 0.4   The systems approach

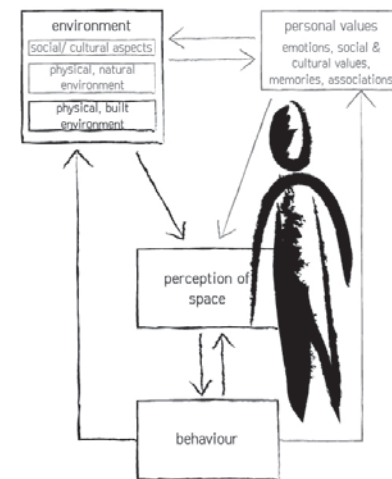Fig. 0.5   Baker's Ecological psychology

Fig. 0.6   Simplified model of spatial perception

15. Ulrich et al., 2008.
22. Bell et al., 2001.
25. Maleki-Tabrizi, 2017.
26. Maleki-Tabrizi, 2013.
27. Jacobs, 2006

28. Lockton, Harrison & Stanton, 2010a.
29. Lockton, Harrison & Stanton, 2010b.
30. Lockton, n.d.
31. Center for Active Design, 2010.
32. Miedema, 2017.

should be present to support specific types of behaviour. This assumption has been widely used in product design. The researcher Dan Lockton believes that by providing certain elements, hiding them or making them less obvious to use, certain behaviour will be supported or suppressed. In his design toolkit for behavioural change several methods are described. For example, by providing default options, the default option will be more likely to be chosen or by using warnings certain behaviour is discouraged [28-30].

The idea that by providing the right elements desired behaviour can be stimulated, has also been used within the field of architecture. This is shown in case studies of the Center for Active Design in their Active Design Guidelines [31]. These guidelines describe how elements should be designed to increase, for example, the walkability of a city. By providing supportive functions (such as seating, drinking fountains, and restrooms) alongside the pathways different user groups will be encouraged to use it. Other studies describe how other healthy behaviour can be encouraged [32]. By providing healthy choices before the less healthy ones, people are encouraged to choose the former. For example, by placing stairs at a prominent place instead of placing them behind the elevator or escalator.

To conclude, the goal of this research is to formulate a set of generic properties for the built environment which can be used as a design tool. This design tool can be used to create an environment which will stimulate certain behaviour and therefore contributes to the stimulation and activation of a child's imagination. To determine how the imagination can be stimulated, the research will consider the stimulation of activities whereby the imagination is active in children aged 3 to 6 years.

0.2.1 RESEARCH LAYOUT

The research goal results in the following research question:

In what way can activities, in which the imagination of children is active, be translated into generic properties, which can be used to design the built environment, stimulating the imagination of children aged 3 to 6 years?

The research is divided into a few steps. Each of these steps discusses a different topic of the main question by answering several sub-questions. In Fig. 0.7 each of these sub-topics is shown and the research methods which are used to address this topic is listed. The methodology and questions used in this research are explained and elaborated on in the next section.

In the first step of this research (1, see Fig. 0.7), literature provides an overview of the development of imagination in children and imagination-stimulating activities. At the same time (2), the way a child perceives a space is described by reviewing literature. Each of the imagination-stimulating activities is described and researched separately in the following research (3). Literature studies provides a background to the research on each of the activities. The first activity is playing. In this research, the children are observed during their play and a spatial analysis is conducted on elements supporting this behaviour. Furthermore, children's fantasy worlds, used in their play, are analysed. The analysed worlds are obtained from literature and interviews. Finally, different artworks are analysed. This results in a set of generic properties, which can be used as a design tool.
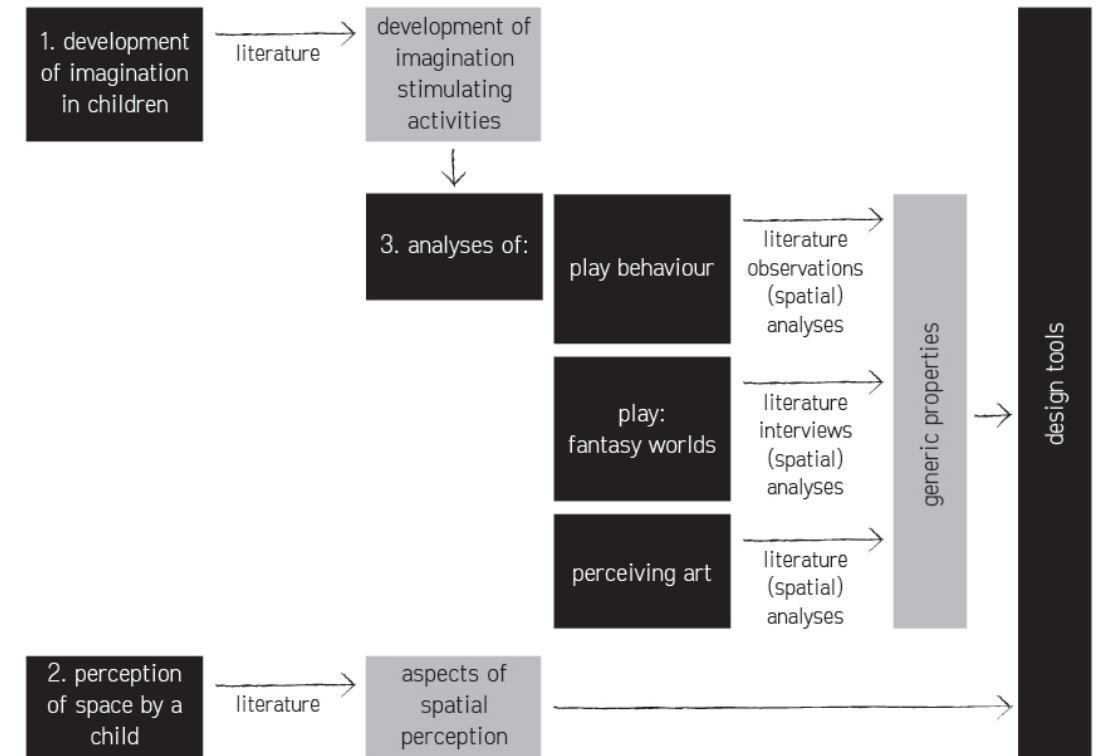
Fig. 0.7   Lay-out research structure

0.2.2 METHODOLOGY

The research consists of literature studies, observations, interviews and (spatial) analyses. Each of these methods are described below and explained what questions are answered with this method.

Literature studies
In the first step (see Fig. 0.7), the literature provides an overview of the emergence and development of imagination in children. In the study, the following questions were answered: *How does the imagination of children emerge and develop during the first six years of a child's life? What activities stimulate the imagination of children aged 3 to 6?*

The development of imagination is part of the cognitive development of a child [33]. Therefore, the work of the psychologists Jean Piaget and Lev Vygotsky is reviewed. These two psychologist are two leading researchers of cognitive development in children [33, 34]. Piaget describes the cognitive development of a child in four different stages. His theory states that cognitive development is the product of social transmission. Moreover, the Vygotskian view states how an individual develops themselves in result of interaction with the social and cultural environment in which he or she grows up [33: 16-17]. Work of these two psychologists has been studied. Not all the work of Vygotsky is translated from Russian to English. Therefore, secondary literature has also been reviewed.

Since the development of imagination is closely related to the cognitive development and therefore the education of young children, imagination has been studied from within the educational field and especially from the perspective of Waldorf schools [35]. According to the Waldorf approach, a child learns in their elementary school years through the language of the imagination [36]. The philosopher Rudolf Steiner is the founder of the Waldorf Schools [35]. As Vygotsky related cognitive development to social and cultural interaction, Steiner sees a spiritual nature as the essence and developmental force working within children [35].

From the overview on the development of the imagination, two activities in which the imagination is active, are determined: Playing and experiencing art. Children aged

33. Bee & Boyd, 2004.
34. Bakhurst, Cole, Middleton, 1988.
35. Van Alphen, 2011.
36. Barnes, 1991

37 Haiat, Bar-Mor & Shochat, 2003.
38. Piaget & Inhelder, 2000.
39. Piaget, 1962.
40. Lillard, 2015.

3 to 6 engage a large time of their life in play. Through play, they develop their cognitive, motoric and social skills [37-40]. Amongst others, the imagination of a child is developed and trained through play. Part of the goal of this research is to prevent delay in the development of children caused by stress from illness or admission to healthcare facilities. Hence, this research focuses mainly on play. Not only the imagination of a child develops through this activity, but also other cognitive, motoric or social skills develop through play. Furthermore, since the research concerns children who cannot always move around due to illness or other limitations, the perception of art is also explored. In "1. Imagination", the development of the imagination and each of the imagination-activating activities is described.

Secondly (see Fig. 0.7), the following question is answered through literature studies: *How does a child, aged 3 to 6, perceive the built environment?* The perception of space has been studied in many fields. For this research, the studies done within the field of psychology and architecture are considered. A topic within the field of psychology, relevant to the perception of space, is related to spatial cognition. Regarding spatial cognition of children, the cognitive development plays an important role in the perception of space. Therefore, again work by Jean Piaget and Lev Vygotsky is considered.

Within the field of architecture, several architects have studied the influence of the built environment on the perception of space. In this research work of the architects Peter Zumthor, Juhani Pallasmaa and Gernot Böhme has been reviewed. The insights from the field pf psychology and architecture are combined in "2. Perception".

Each of the imagination-activating activities, which have been described in "1. Imagination", are illustrated in an additional literature study. With these studies the following questions are answered: *What kind of behaviour can be recognized as children's play? How do children, aged 3 to 6, experience art? What characteristics or subjects of art do children, aged 3 to 6 like?*

Play is also part of the cognitive development of children. Therefore, to illustrate the playing behaviour, literature of Piaget and Vygotsky has been considered. These psychologists relate play to cognitive (and imagination) development. Part of the research includes spatial analyses of best practices. These best practices are areas

that are designed to invite children to play. To these areas belong the playgrounds designed by the Dutch architect Aldo van Eyck. Van Eyck designed over 800 playgrounds in Amsterdam. These playgrounds were designed as safe play areas and were designed in relation to the surroundings. Aldo van Eyck did not only design the lay-out of the play areas, but also the equipment placed at the playground [41].

The way a child perceives art, is studied by the researcher Parsons. Cognitive development also plays a role when perceiving art. Aspects from the theories by Piaget and Vygotsky on cognitive development are used to explain perception of art by a child.

Structural observations & spatial analysis
In the third part (see Fig. 0.7), the imagination-activating activities will be analysed. Through structured observations, the activity 'play' is studied. The goal of this research is to obtain information which can be used to create a set of generic properties of the built environment that will invite a child to engage in play behaviour. Therefore, the following questions are answered in the observations: *What objects or locations are preferred by children to play with or on? What are the affordances of objects a child uses in his or her play? What are spatial characteristics of elements, supporting these affordances?*

To answer these questions several observations are conducted. With an observational study a researcher is able to obtain information about the world and specific issues, with the intent to guide behaviour. Within observational studies two types exists: structured and unstructured observations. Unstructured observations are often used when a research goal is not yet determined and to explore research problems. A structured observation can be more- or less-structured. A more-structured observation is specifically designed to obtain quantitative data, and a less-structured observation obtains qualitative data [42, 43: 43-47].

The first question can be answered by mapping when, where and how many children are playing with or on different objects at a play area. This involves a quantitative answer and will be answered by conducting a more-constructed observation. The observation proceeds as follows: Each observation lasts one hour. During this hour, every 10 minutes dots are placed on a map, according to the location where children play, see Fig. 0.8. This shows

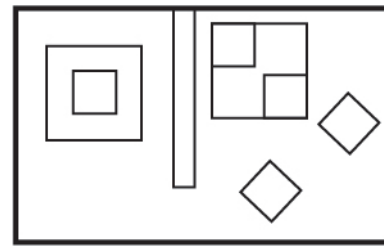| ● 00:10:00 | ● 00:40:00 |
| ● 00:20:00 | ● 00:50:00 |
| ● 00:30:00 | ● 01:00:00 |

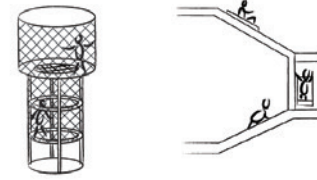Fig. 0.8 Floor plan play area, dot colours and time indication.

Fig. 0.9 Sketches of behaviour performed during observation

what objects or elements were used by children, aged 3 to 6, in their play. "3.1 Typologies of Play" describes what behaviour is defined as play in this research.

The second question is answered with an additional less-structured observational study. During this observation the qualitative affordances of the children to objects are determined. The affordance to an object is the meaning or purpose of an object, granted by a person. It shows the possibilities of how a child interacts with objects. The affordance is person specific, since everybody can use an object in a different way [44, 45].

James J. Gibson introduced the concept of affordances in his ecological approach to perception. This concept offered a new approach to the problem of accounting for meaning in perceptual experience. Gibson defines the affordances to the environment as *"what it [the environment] offers to the animal, what it provides or furnishes, either for good or ill" (Gibson (1979), p. 127 in Heft, p 3).*

To determine the affordances of children, at every location the objects used in the children's play is observed more closely, trying to determine exactly how the children play with it or on it. This is done by making sketches of the performed behaviour, see figure Fig. 0.9.

Both types of observations are performed as a non-participatory and direct observation. This means that during the observations no interaction occurred between the observer and playing children and no recording devices were used to collect the data. To ensure that the playing behaviour of the children would not be influenced by the presence of the observer, the situation was observed from a small distance.

There are many places a child can play. In this research, a subdivision is made between places that are designed for playing and places that are not. The first will be referred to as the planned playground, the latter as the accidental playground. Using this categorization and making a difference between inside and outside play, six different play areas can be determined:

The planned playground; inside
    (planned, inside playground)

41. Lefaire & De Roode, 2002.
42. Foster, 2006.
43. Rietmeijer & Tromp, 1989.

44. Mak, 2016.
45. Heft, 1989.

The planned playground; outside, in an urban lay-out
    (planned, outside urban playground)
The planned playground; outside, a nature playground
    (planned, outside nature playground)
The accidental playground; inside
    (accidental, inside playground)
The accidental playground; outside, in an urban lay-out
    (accidental, urban playground)
The accidental playground; outside, in a nature lay-out
    (accidental, nature playground)

Due to the time limit, size and goal of this research, the playgrounds selected for this research are all in the area of Delft, The Hague and Rotterdam. Also, due to the time limit, each of the categories will only be observed twice, at different locations. This will result in a total of 12 observations. The size of this study and time limit prevents a specific selection of children. Therefore, children, present at selected play areas, will be observed. At the outside playgrounds and the planned inside playground, a minimum of 5 children should be present before the observation is started. The accidental, inside playground forms an exception. This observation will be conducted at a private location, in somebody's home. Therefore, the observation will be planned with a family.

Within this research, only 'healthy' children are observed. However, being ill has an influence on how a child engages in physical activity. First, there are physical aspects of the disease or treatment such as nausea, pain or a lack of energy that cause a child to withhold from physical activity. Furthermore, psychological aspects such as a lack of motivation, anxiety, stress or lack of confidence have a negative effect. Also, finally, the organizational restraints of the institution influence the amount and type of physical activity [46, 47]. This research focuses on the influence of the built environment and therefore, the organizational restraints are ignored. The dimensions and type of elements will be adjusted according to the physical capabilities of a child, the same way the dimensions will vary between children of different ages. According the psychological aspects, a child can, due to the disease, lack motivation to move around and play. However, also ill children enjoy activities such as play. Between the ages of 3 to 6, a child engages mostly in play [40]. Interviews and observations of ill children prove how ill children enjoy 'normal' activities just as much or even more, since they help them forget about the illness [6, 11, 37]. Since play is an important aspect of the development of a child,

6. Blom, 2001.
11. Forsner, et al., 2005b.
37. Haiat, Bar-Mor & Shochat, 2003.
40. Lillard, 2015.
46. Boon, et al., 2016.
47. Götte et al., 2014.

41. Lefaire & De Roode, 2002.
48. Hermans & Vanermen, 2006
49. Van Wageningen, 2004.
50. Sanders & Stappers, 2012.
51. Andere tijden, 2010a.
52. Andere tijden, 2010b.
53. Cohen & MacKeith, 1991.

an environment is created to stimulate ill or disabled children to engage in play. An example is the snoezel space [48, 49: 54]. These spaces help children with a disability or autism to fight stress and anxiety by introducing a room with a balanced stimulation of the senses and invite them to explore, play and relax [48].

The resulting objects, used in children's play, are analysed to determine a set of generic properties. These properties form a spatial summary or the spatial essence of characteristics that support a specific behaviour performed by the children in their play. The analysis performed is based on methodologies used in other design studies. Sanders and Stappers [50: 197-204] describe how data can be analysed. Their process describes several steps that lead to a generic, abstract description. These steps involve a process of labelling, finding similarities, grouping, and, again, labelling. For example, the spatial analysis shows spatial characteristics as hut, hole and roof. These elements can be grouped, based on a similarity: enclosure. This process is repeated over and over. By sketching, the spatial characteristics are marked in the different elements. Second, these characteristics are labelled, the latter is done making use of tables.

Analyses best practices
Apart from the playgrounds part of the observation, also several playgrounds of the Dutch Architect Aldo van Eyck are analysed. As mentioned, Aldo van Eyck designed over 800 playgrounds. Not only the lay-out of the playground in relation to the surroundings was determined, also the different objects at the playground are designed by Aldo van Eyck [41, 51, 52]. The playgrounds and elements are analysed in a similar way as the playgrounds used in the observations. The essence and spatial characteristics of the different elements, but also the spatial relation of an object to its surroundings have been made explicit.

Interviews & analysis
Research of Cohen and MacKeith introduces several activities in which the imagination becomes active in children, see "2. Perception" for more information. The creation of fantasy worlds is one of the activities which are addressed in this research. Children under 7 years old create these fantasy worlds as an addition to their play [53]. In addition to the chapter Play, ten fantasy worlds are analysed. Six of these ten worlds were described in the research of Cohen and MacKeith. Information on the other four worlds is obtained through semi-formal

interviews with children who played or still play within the world. For an imaginary world to be part of the research, they had to meet six requirements:

1. A child should be able to distinguish the real from the imagined.
2. A child must be interested in a certain world for months or years.
3. A child had to be proud and consistent about the world.
4. A child had to feel that the world 'mattered' to them.
5. The child should have stared this world and become significant to him or her before reaching the age of 7.
6. The world should have been included in the child's play.

Each of these worlds has been analysed to determine when and where a child would engage in the play with their fantasy worlds. The physical locations that were part of their play are analysed on their spatial characteristics, like the analysis of the playgrounds. These features are added to the list of properties of the observed playgrounds.

Analysis
The second activity whereby the imagination is activated involves the experience of art. To art belong at lot of different types of work. Examples are music, theatre, paintings, sculptures, photography, film and more. Since the research focuses on the effect of the *built* environment, only art which has a static, spatial result, has been selected. To this selection belong sculptures, paintings, photography and other installations. Music, theatre and film are excluded from this analysis.

Similar to the analysis of the elements at the playground, the spatial characteristics of the different artworks are determined. Next, the different characteristics will be grouped based on common properties to create an overview of all characteristics. These characteristics will be compared with the properties determined in "3. Play".

Several museums in the Netherlands offer special exhibitions for children. From these collections, different work is selected for this research. Museums that have been taken into consideration are the *Gemeente Museum* in The Hague and the *Stedelijk Museum* in Amsterdam, which offer special lessons and tours for preschool

54. Villa Zebra, n.d.
55. Pronk, 2011.
56. Museum Boijmans van Beuningen, 2017.
57. De Koning, n.d.
58. Amsterdam, 2017.
59. Eliasson, 2009.
60. Museum Boijmans van Beuningen, 2016.

aged children. For the analysis, work is selected that is part of these workshops and tours. For example, work of Mondriaan, Tinguely and Klein. In addition, Museum *Boijmans van Beuningen* in Rotterdam and *Villa Zebra* both offer a complete exhibition especially for children. Villa Zebra is a museum in Rotterdam, which has an exhibition, *Zelf!*, especially for children aged 3 to 6 years. This interactive installation is designed by Studio MAKY and combines work of several different artists such as Ingrit Verwer and Peter de Boer [54, 55]. Museum Boijmans van Beuningen had a temporary exhibition for children, called *Alles Kids* [56]. From this exhibition work of amongst others Monet, Netscher, Dijkstra, Kelly and Picasso is selected.

In addition, also work of Krijn de Koning and Olafur Eliasson is added. To these two artists, the experience of the environment is central to the work they create. Krijn de Koning mostly creates sculptures that offer the possibility to interpret and use the site in a different way. Furthermore, colour is an important aspect in his work. Part of his work is exhibited in the Stedelijk Museum in Amsterdam. The designs, which are used in this analysis, are an element on a school playground in Utrecht and work from the Stedelijk Museum [57, 58]. Olafur Eliasson creates sculptures, photography, film, or installations in which he uses the natural. With these pieces, he wants to create consciousness about the environment and the influence of the users [59, 60]. In this research the installation *'Notion motion'*, present in the Boijmans van Beuningen in Rotterdam, is analysed.

The (spatial) analysis results in the definition of generic properties, describing architectural factors stimulating the imagination of a child.

0.2.3 SIGN POSTING

The steps, described above form the base of this research report. The first chapter of this report addresses the first step. "1. Imagination" provides an overview of how the imagination of a child emerges and develops between the ages of 3 to 6 and what activities activate the imagination. From this overview three activities are explored throughout this research: playing, perceiving art and creating fantasy worlds. Each of these activities is described and analysed in a different chapter of this report.

"2. Perception" describes what aspects of the built environment influence the spatial perception of a child. This chapter is part of the background literature.

The third chapter of this report is "3. Play". This chapter first provides background on the imagination-stimulating activity 'play'. The part "3.1 Typologies of Play" gives an overview of the existing typologies of play in literature. Furthermore, "3.2 Aldo van Ecyk" summarizes the ideology of Aldo van Eyck. His work is analysed as one of the best practices. Following this literature overview, in the section "3.3 Observations", a summary of the results of observations at 12 different playgrounds and the analysis of objects in these areas supporting the play are shown. The results of all observations can be found in Appendix "A. Observations". The section "3.4 Analyses Best Practices" will add to this with an analysis of different play grounds, designed by Aldo van Eyck. Section "3.5 Analyses Play - Fantasy Worlds" adds to chapter 3 the analysis of the spatial characteristics of locations where children would introduce their own fantasy worlds into their play. The questions used in the interviews are listed in Appendix "B. Questions Interview Fantasy Worlds". Chapter 3 is concluded with a summary of the results of the first part of this research.

"4. Art" continues with the analysis of perceiving art. Section "4.1 Art Perception" explains how children perceive and understand an artwork and how this capability develops over time. In "4.2 Analysis", an analysis of 21 artworks, selected from exhibitions, appropriate for children, is provided. The results of the analyses are summarized in section "4.3 Summary Art".

The thesis is concluded with a chapter combining all the generic properties resulting from the analyses. This can be found in "5. Conclusion / Discussion".

I. IMAGINATION

1.1 IMAGINATION IN CHILDREN

Chapter 1 describes the emergence and development of the imagination in children up to the age of 7 years. Therefore, the term imagination is first defined. Next, the emergence and development of the imagination, as defined in this research, in children is illustrated. Imagination has been described in many fields. Theories from the psychology regarding cognitive development, and education are explored. Considering cognitive development, theories from Vygotsky and Piaget are described in this chapter [1, 2]. Also work of Rudolf Steiner is introduced. Steiner used the concept of imagination to the benefit of education. Steiner, founder of the Waldorf schools, has described the development of the child in relation to his education method. In the Waldorf approach, a child learns during the first years through his or her imagination [3]. Joan Almon, a Waldorf school teacher, defines how the imagination emerges [4, 5].

Finally, all activities in which the imagination is active are listed.

1. Vygotsky, 1930 [2004].
2. Piaget, 1962.
3. Barnes, 1991.
4. Van Alphen, 2011.
5. Almon, 1994.
6. 'imagination', n.d.

1. Almon defines this as the emergence of a child's fantasy.

In the introduction, the following definition of the term imagination has been introduced: *The act or power of pretending an image, situation, or activity as something that isn't directly experienced by one at a specific moment.* This definition derives from the definition given by the Merriam Webster Dictionary: *"The act or power of forming a mental image of something not present to the senses or never before wholly perceived in reality"* [6].

First, the Merriam Webster Dictionary acknowledges two aspects of imagination. Namely, the ability to imagine something that isn't directly experienced by a person at that moment, and second, the ability to imagine something that has never been perceived. In this research, the first ability of imagination is relevant. By imagining something that isn't present, a child will be able to escape the healthcare setting and illness. The first part of the definition *"forming a mental image"* assumes that a person is capable to create a mental image. As the literature on the cognitive development and development of imagination confirms, this is a skill that develops over time. However, if not completely developed, it doesn't exclude the possibility to pretend something to be something else.

Different theories have been used to describe the emergence and development of the imagination in children. Each of these researchers uses their own terminology and defines imagination as something else. In the text, the definition, as described above, is used. Therefore, the terminology might not always correspond with what can be found in the literature. The differences are marked and explained in footnotes.

Development of the imagination
From the age of 2, a child can consider an object, person, or situation as something else and therefore the imagination is born. This ability has been observed by Almon in her students[1]. This skill mainly shows in a child's play [5]. For example, a child is capable to include objects in his or her

play, which represent something else.

Piaget also recognizes this type of play behaviour, which he refers to as symbolic play [2: 110-113]. This type of play starts to occur, according to Piaget, when a child develops symbolic function. At this point a child starts to use symbolism [7: 158, 8]. According to Piaget, this type of play starts at an early age (from 9 months on) in a form of imitation. For example, at 12 months, a child can use an empty cup when pretending to drink. By playing, a child will develop the skill symbolic function into symbolic thought. At this point, around the age of 2, a child starts to use objects to stand for something else altogether [2: 118-142, 7: 158, 9], see Fig. 1.1.

Vygotsky does also relate the ability to use the imagination to play [1, 10]. One of the differences between the theories of Piaget and Vygotsky is the role of play and the origin of imagination. According to Piaget, a child uses his or her play to further develop the skill of symbolic thought. Whilst Vygotsky states that play creates a situation in which imaginative behaviour can emerge [8]. This difference is illustrated in Fig. 1.2.

The theories of Almon, Piaget, and Vygotsky agree on the fact that play provides the opportunity to further develop a child's imagination [1, 5, 9, 11, 12]. Between the ages of 2 to 7 a child plays 'out-loud' [5, 11]. This egocentric speech is a kind of speech that is not addressed to other people. According to Vygotsky, this speech is used by children to regulate their own behaviour and forms a form of social communication [11]. Around the age of 6 to 7, this speech and play 'internalizes' and from that point on, a child can create a mental image of something not present to the senses[2] [6, 11]. Vygotsky labels this as the emergence of a child's self-consciousness. According to Vygotsky, at the same time the creative imagination[3] of a child is born. This type of imagination includes the ability to create a mental image or set of images that isn't a reproduction of something that has been experienced before [11].

Imagination in children
The development of the imagination illustrates the role of play. During this activity, the imagination is most active. This and other imagination-stimulating activities have also been defined by psychiatrist Stephen MacKeith and psychologist David Cohen. MacKeith and Cohen studied the imaginary worlds, or Paracosms, of children [13]. In their book *The Development of Imagination*, an overview
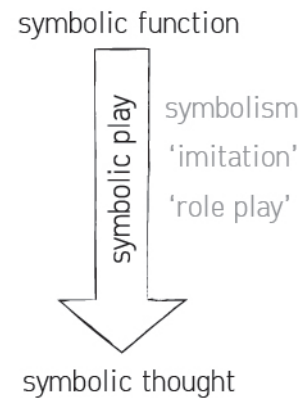
Fig. 1.1   Development symbolic thought from symbolic function through symbolic play
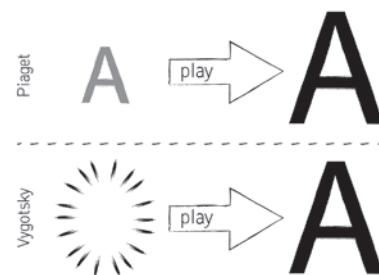
Fig. 1.2   The role of play in the development of imagination according to Piaget and Vygotsy. The A represents the ability to use imagination. In the case of Piaget, a simpler form of this ability is already present and play provides the opportunity to develop it further. Whilst, in the case of Vygotsky, play creates a situation from where play can emerge.

2. Almon defines this moment as the emergence of a child's imagination.

1. Vygotsky, 1930 [2004].
2. Piaget, 1962.
5. Almon, 1994.
7. Bee & Boyd, 2004.
8. Gaskins & Göncü, 1988.
9. Gajdamaschko, 2006.
10. Petrović-Sočo, 2013.
11. Smolucha & Smolucha, 1986.
12. Ayman-Nolley, 1988.
13. Cohen & MacKeith, 1991.
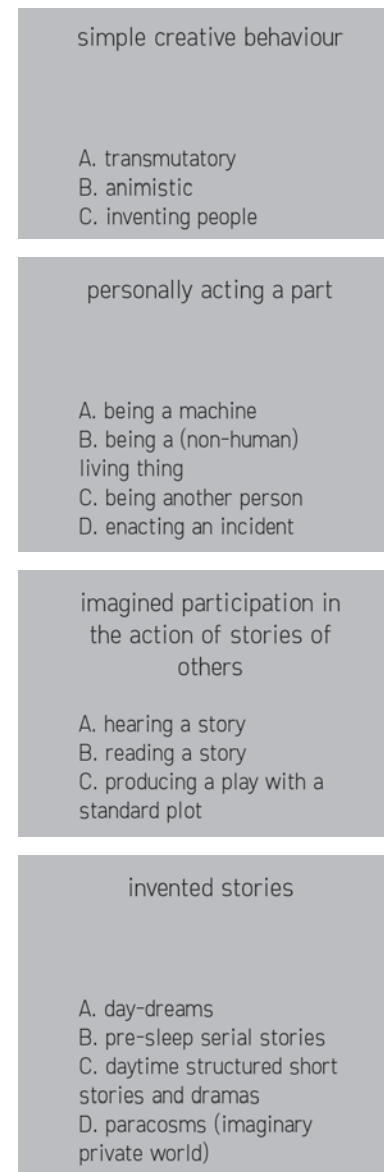
Fig. 1.3   Activities which activate the imagination.

of different activities that show a child's imagination at certain ages is given. The different activities are listed in Fig. 1.3 [13].

Between the ages 3 to 6 years, almost all the activities, described in Fig. 1.3, are present. The activities *inventing stories before sleep* or *inventing structured short stories and dramas* only appear when around the ages of 7 to 12. In addition, *imagining an imaginary private world* is seldom to all children [13].

This research focuses on three imagination-stimulating activities and on behaviour, which includes active participation for the children. The first activity is play since, as the research shows, this activity plays an important role in the development of a child's imagination.

Activities, which belong to the category which includes active behaviour, are 'Simple creative behaviour', 'Personally acting a part', and 'Invented stories', see Fig. 1.3. The category 'Imagined participation in the action of others' describes passive creative behaviour. These passive activities won't be included in this research.

The categories 'simple creative behaviour' and 'personally acting a part' are both related to play behaviour and therefore included in the research. Another different activity, which is investigated in this research, is 'Invented stories.' To this category belong activities such as day-dreaming and creating fantasy worlds, or paracosms, see Fig. 1.3. The research of MacKeith and Cohen included 57 descriptions of fantasy worlds, created by children, of which 38 are published in *The Development of Imagination: The Private Worlds of Childhood*. Most of the children under 7 years old (seven out of nine) would create these fantasy worlds as an addition to their play and they would act out the stories they created [13]. This corresponds with Vygotsky's theory in which children learn to create imaginary situations in their head around the age of 6-7 years old.

Moreover, play as imagination-stimulating behaviour usually includes physical activity. Since this research focuses on ill children who aren't always capable to engage in all kinds of physical activity, behaviour that include less exercise is also studied.

According to researchers such as Vygotsky, our imagination is active while being creative [1, 14]. While

3. Vygotsky uses the term imagination to describe this creative process.

1. Vygotsky, 1930 [2004].
13. Cohen & MacKeith, 1991.
14. Smith, 1904.

being creative, different kinds of artworks can be created. And, when perceiving an artwork, as a spectator, the imagination becomes active again [15: 65-67, 16: 31]. Since this research involves the influence of the built environment on the activation of the imagination, the focus doesn't lie on the creation of art, but on the latter part: the perception of art.

To summarize, the activities that activate a child's imagination and are considered in this research are play behaviour, in which a child can engage in their own fantasy world or not, and the perception of art.

15. Disanayake, 1990.
16. Parsons, 1987
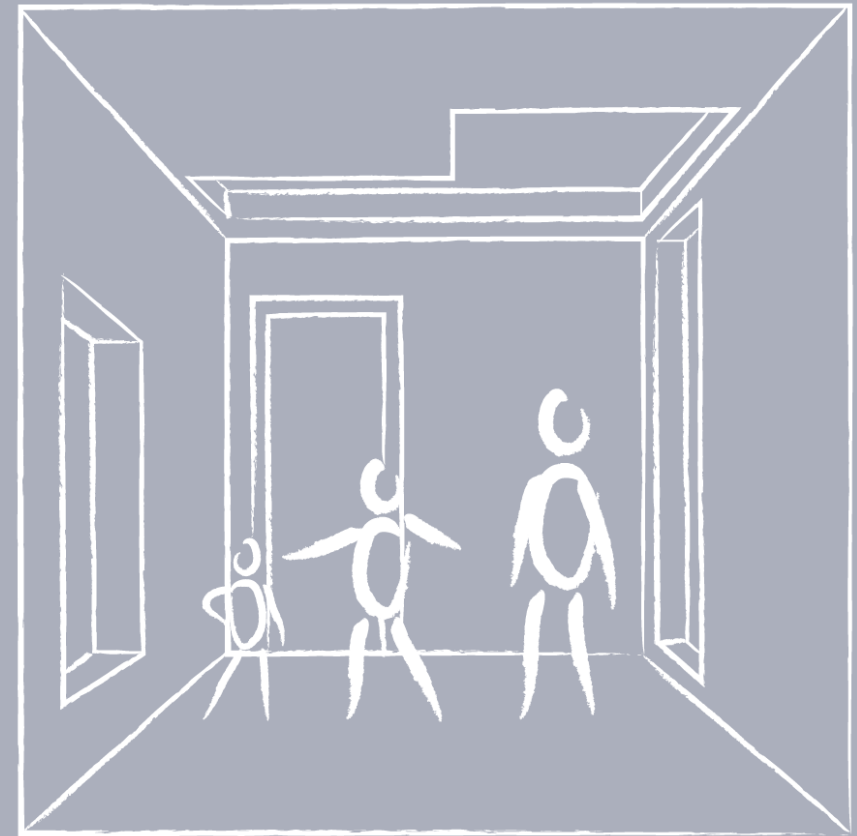
2. PERCEPTION

2.1 ARCHITECTS AND ATMOSPHERES

The introduction has described how, from the point of view of an environmental psychologist, a person perceives a space. Fig. 2.1 shows a summary of this perception process. The perception of space by a person is influenced by both the environment and personal values. This perception has influence on the behaviour of the person and the behaviour influences, again, the perception and the environment.

In this research, only the perceived built environment is considered. According to literature, what of the built environment plays an important role in the spatial perception, or cognition, by a child, is described in this chapter. The difference between an adult and child originate from their development. Therefore, the physical and cognitive development of children up to the age of 6 is studied as well.
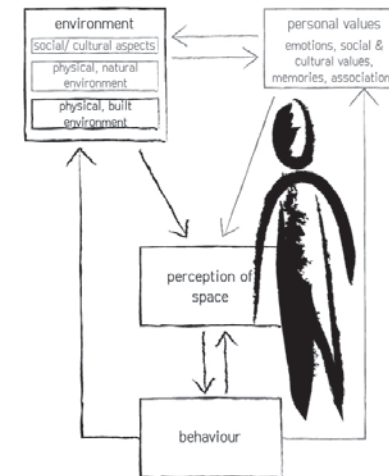
Fig. 2.1   Schematic view of the perception of space

1. Haptic comes from *haptesthai*, this is Greek for 'sense of touch'.

1. Zumthor, 2006.
2. Böhme, 2014.
3. Borch, 2014.
4. Pallasmaa, 2014.
5. Bachelard, 1969.
6. Havik, Teerds, & Tielens, 2013.
7. Pallasmaa, 2012.

Within the field of architecture, architects believe that the perception of space is strongly related to the perception of an atmosphere of a space [1-3]. The architect Böhme states: *"The notion of atmosphere always concerns a spatial sense of ambience. [...] Atmospheres fill spaces; they emanate from things, constellations of things and persons"* [2: 43]. Recent years, a trend has developed towards an atmospheric design of space and different architects have studied and presented their work on how they believe an atmosphere can be created. The architects Juhani Pallasmaa, Peter Zumthor and Gernot Böhme all have their own view on spatial perception. In this chapter, the three views are described.

Haptic architecture
As mentioned in the theories from environmental psychology, different architecture theorists agree that the perception of space, or atmosphere, is a complex process. It is a bodily, multi-sensory process in which all Aristotelian senses are active [1-6]. The Finnish architect and theorist Juhani Pallasmaa recognizes how the experience of space is a bodily experience, in which all our senses are aroused. To Pallasmaa, our sense of vision has become more dominant over the years in contemporary architecture and stresses how, as a counter-reaction, haptic[1] architecture is needed [3, 4, 7]. In conclusion, Pallasmaa emphasizes the value of materiality to create haptic architecture. Natural, man-made materials tell a story and contain a sense of time. To the characteristics of materials belong aspects as texture and density.

Apart from the five Aristotelian senses, Pallasmaa names other aspects in our environment which contribute to spatial perception [4: 19, 7: 43-77]. For example, the contrast between shadows and illumination creates a focus in a space [7: 50-52]. Pallasmaa, like environmental psychologists, writes how the experience of space, and therefore architecture and the built environment, is an interaction of our body with the environment. Pallasmaa describes in *The Eyes of the Skin* how we move through

the landscape. Unconsciously, our muscle movements and need to find stability are remembered by our body. By remembering the way our muscles react to the environment, we become aware of the space around us [7: 64-68].

While we move around, not only the movement is felt, but we also unconsciously keep comparing the balance and scale of the elements in the space around us to our body. Pallasmaa uses the presence of shadows to illustrate how the contrast between light and dark plays an important role in the experience of space. Similar, the presence of a feeling of gravity makes us aware of the earth and dream of levitation and flight [7: 69-72].

Creating atmospheres
Peter Zumthor approaches every design assignment from an atmospheric point of view. Like Pallasmaa, Zumthor pleads for a type of architecture that pays attention to all senses and not only sight. He tries to create in every design an atmosphere with the architecture that fits the assignment. In his lecture *Atmospheres*, Zumthor introduces several aspects of his designs which he sees as important to create a certain atmosphere. Themes are *the body of architecture; material compatibility; sound; temperature of a space; surrounding objects; between composure and seduction; tension between interior and exterior; levels of intimacy;* and *lighting* [1]. Although, Zumthor explains how highly sensitive and individual these aspects of the design are [1: 10-21], from these themes several general characteristics can be extracted.

The aspects of contrast and composition are characteristics which reappear in different themes that Zumthor presents. For example, in the theme *material compatibility*, Zumthor describes the interrelationship of different materials and their characteristics in the design. Also, the *surrounding objects; tension between interior and exterior;* and t*he light on things* describe respectively the composition of different objects, the creation of inside and outside and how they relate to one another. For example, is there a border and how is it created? *The light on things* illustrates how the presence or absence of light are key elements in creating an atmosphere. The presence of light at certain parts and the composition of elements are partly responsible for the movement or lingering of users in space. In the theme *between composure and seduction*, Zumthor explains how he wants to create a calming effect in his spaces that makes the user want to stay and

1. Zumthor, 2006.
7. Pallasmaa, 2012.

2. Böhme, 2014.
6. Havik, Teerds, & Tielens, 2013.
8. Freundschuh & Egenhofer, 1997.
9. Tversky, et al., 1999.
10. Kitchin & Blades, 2002.

experience a place or to move forward and discover other parts of the building.

As composition is an important aspect of all Zumthor's themes, the relation of oneself to the space and the objects is another aspect which comes forward. The theme, *levels of intimacy*, includes the proximity and distance of objects to one another and to the body of the person experiencing the space.

Composition on a city-scale
The German theorist Gernot Böhme recognises the importance of composition in the creation of an atmosphere and the relation of our body to the structural space [2]. Böhme has studied the use of atmosphere on a larger, city-sized scale. He describes how the composition and arrangement of objects and non-materials factors such as light and music, create parts of the atmosphere. The interaction and personal impression of a space evolves from the rhythm and collection of materials, their aging, detail and relation to each other, to the place and to other buildings [6]. Apart from these environmental elements, Böhme discusses the role of the people moving around in the city, space or social context. Concerning the built aspects of the environment, Böhme believes how the sound and acoustics of a space play a large role in the city [2: 43-51]. The interaction of our body to the environment is not merely the perception of space, but also the sensation of the entire body.

Composition & dimensions
Looking into the aspects, which play an important role in creating an atmosphere, determined by Pallasmaa, Zumthor and Böhme, the following similarities are discovered. The *composition* of different elements play an important role to these three. An aspect of this composition is the use of contrast in the arrangement, and the scale and dimensions in relation to a person or space. The *dimensions* of an object or environment in relation to a person and the experience, has also been studied in psychology regarding the cognition, or perception, of a space. Freundschuh and Egenhofer have created a classification of different levels in which a person experiences a space [8]. To determine these different types of space, existing models were analysed. This classification is often implemented and used in research covering the cognition of space [9, 10: 5]. Their classification describes six scales, from a manipulable object space to a map space. Each of these scales is

described in the background paragraph on page 47.

The use of *contrast* in creating an atmosphere translates in the presence of light and shadow, or the use of different materials and texture, interior and exterior. *Texture*, *detail*, and the aging of *materials* has also explicitly been mentioned by Zumthor, Pallasmaa, and Böhme in the creation of an atmosphere. In contrast to how the use of different objects or shapes is not elaborated on.

8. Freundschuh & Egenhofer, 1997.

Six sizes of environmental spaces [8]

1. Manipulable object space covers space which can be very small and manipulable or adaptable. One does not need to move around to experience this space. Objects smaller than a human body belong to this category.

2. Non-manipulable object space is space which cannot be adapted and requires movement or locomotion to explore. To this category belong objects larger than the human body, but smaller than a room or building.

3. Environmental space is in its characteristics similar to non-manipulable objects. However, these spaces can be the size of a room or any space inside a building, neighbourhoods and city-sizes spaces.

4. Geographic space represents all spaces which cannot be manipulated and are too large to be explored by movement or locomotion. To this category belong country-sized spaces and the universe.

5. Panoramic space includes spaces which are non-manipulable and are small- to large-sized spaces which do not require locomotion to explore and experience them. To this category belong views in a room, an auditorium, a field and from a scenic overlook.

6. Map space is similar to panoramic space. However, to this category belong maps which are a representation of an area to provide information which can easily be processed and managed.

2.2 SPATIAL PERCEPTION OF CHILDREN

11. Piaget & Inhelder, 2000.
12. Bladergroen, 1969.
13. Bartolotta & Schulman, 2010.

Up till now, the literature used in this research to describe how a person perceives a space is related to adults. However, the way a child perceives a space differs from adults, since their development is not completed yet. The development of a child consists out of a physical and mental development [11, 12]. To the physical development belongs the motoric development, but also the bodily development. The mental development can be separated in cognitive, social-emotional and linguistic development [13]. Although the distinguishing of these development domains is used in literature, there is a constant interaction between the mental and physical domains during the development [13]. Regarding the cognition of the built environment, specific aspects of the physical and mental development are broadly discussed. A brief overview of milestones in the physical and cognitive development is provided. In this paragraph, social-emotional and linguistic development are excluded, due to the lack of relevance of this development to the perception of the built environment by a child.

In this paragraph, literature of Piaget and Vygotsky on cognitive development has been studied. Also, literature on the motoric development of the psychologists Bee and Boyd, Bladergroen and Berlotta and Schulman has been used.

2.2.1 PHYSICAL AND MOTORIC DEVELOPMENT

In the growth of a child, two phases of intensive growth can be distinguished. The first phase occurs during the first 6 years and the other occurs between the ages of 6 to 11 for boys and 6 to 12 for girls. During the first year, a child grows significantly more, than later in life [12]. Fig. 2.2 to Fig. 2.4 show an overview of the average length of children between the ages of 2 to 6 [14]. The dimensions are the average of Dutch boys and girls [15-18].

Motoric development
Within motoric development, the development of gross and fine motor skills is distinguished. Gross motor skills involve large muscles and movements such as walking, sitting upright or jumping. Fine motor skills involve smaller muscles and movements, such as the use of our fingers or the tongue. These movements involve more manipulative skills. From the start, a child engages in both gross and fine motoric movements. However, the gross motoric skills develop first. At the age of 3, a child runs easily, can walk up and down the stairs using one foot per step, ride a tricycle and a child can pick up and hold small objects such as a crayon. Around the age of 5 to 6, a child has developed good gross motoric skills, whilst their fine motoric skills are not yet completely developed. A child draws and writes with stiffness and it needs great concentration to do so [13: 40-41, 19: 110-111]. Fig. 2.5 shows an overview of the main milestones in the gross and fine motoric development [13: 40-41, 19: 110-111].
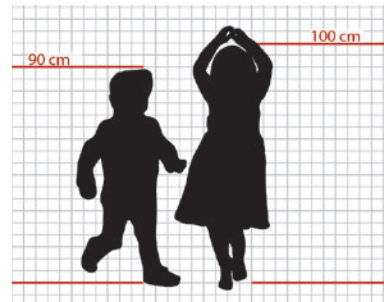
Fig. 2.2   Child height: 2 & 3 year old
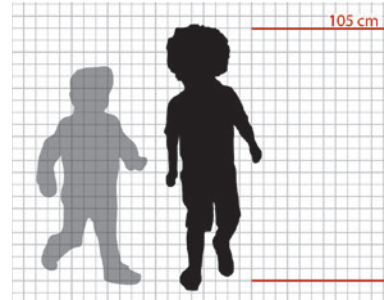
Fig. 2.3   Child height: 4 year old
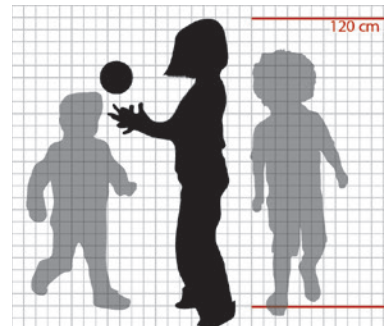
Fig. 2.4   Child height: 6 year old
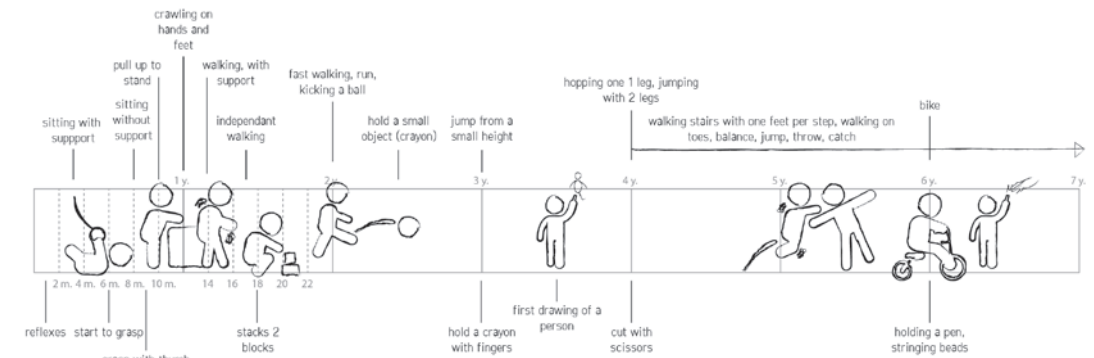
Fig. 2.5   Milestones motoric development child

2.2.2 COGNITIVE DEVELOPMENT

Cognitive development involves the growth of perception, memory, imagination, comprehending information, organizing and using knowledge, conception, judgment and reason. The studies of the psychologist Piaget and Vygotsky on cognitive development of children form two of the most significant theories [13: 36, 19: 16-18].

Piaget suggests how people learn through interaction with the environment and how learning is a process of restructuring knowledge. This process of restructuring knowledge is called adaptation. Two activities belong to adaptation: assimilation and accommodation [11, 13: 36-37, 19: 17, 20]. More information on adaptation, assimilation, and accommodation can be found n the background below.

The way a child thinks is based on what he or she knows. Every time, something new is experienced, a disequilibrium is created. People use schemas to describe and understand the world. Each schema contains information to a certain element. When a disequilibrium is created, the information of a new experience does not match with the information stored in existing schemas. To re-establish a balance, the process of adaptation is started. To this process belong two actions: assimilation and accommodation. Assimilation is the absorption of new information to existing schemas. Accommodation is the process of modifying information in existing schemas [13: 36-37, 19: 148-149, 20].

12. Bladergroen, 1969.
13. Bartolotta & Schulman, 2010.
14. Dattner, 1969.
15. TNO, 2010a.
16. TNO, 2010b.
17. TNO, 2010c.
18. TNO, 2010d.
19. Bee & Boyd, 2004.

11. Piaget & Inhelder, 2000.
13. Bartolotta & Schulman, 2010.
19. Bee & Boyd, 2004.
20. Piaget, 1962.

Vygotsky's theory is not as complete as the theories of Piaget. Since Vygotsky died at the age of 38, he could not finish his work completely. Vygotsky's theory differs from the theory of Piaget in the role of the social and cultural environment and language in the development of a child. According to Vygotsky the cognitive development differs between culture, whereas Piaget thinks it is mostly universal. Vygotsky stresses how the cognitive development is influenced by social interaction and guided learning within the zone of proximal development [21-26]. Proximal development is explained in Fig. 2.6.
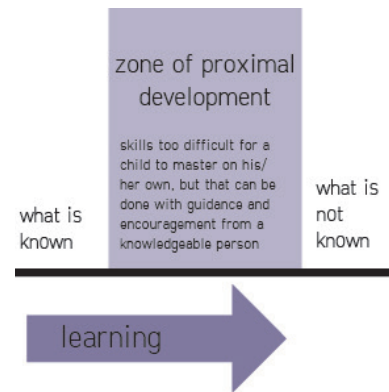
As Vygotsky relates the process of development to guided learning, Piaget states how children learn most from individual exploration. Piaget divides the developmental process in stages and distinguishes four stages of development. The first stage is the sensorimotor stage and lasts the first two years. This stage is followed by the preoperational stage, between the ages of 2 to 7 years. The third stage is the concrete operational stage and lasts up to the age of 12. The final stage is the formal operational stage [11: 96-99, 20: 118-119, 287]. Regarding the age group of this research (3 to 6 years old), the processes of cognitive development in the preoperational stage is elaborated more on. See Fig. 2.7 for an brief overview of the different stages.

Both Piaget's and Vygotsky's developmental theories include the role of play during childhood. Play forms a platform for children to develop and explore their skills. For example, play functions as a tool to develop their imagination skills (see "1. Imagination") [11, 20, 27].

Preoperational stage
The second stage starts around the age of 2 and ends at the age of 7 or 8 [11: 96-99]. This stage begins with the introduction of symbolic thought (see "1. Imagination"). With symbolic thought, a child can represent the reality using abstract concepts and symbols. This ability develops further during the preoperational stage and results for example in the ability to manipulate images which are not in the immediate context [11: 51, 20: 118-119, 27]. During this first stage, a child has trouble taking the viewpoints of others and thinks egocentric. However, at the end of the second stage a child starts to develop a sense of self [11, 13: 38, 19: 154-156, 20: 72-74, 277-284]. With this sense, for example, a child is able to understand that he or she is the brother or sister of his or her sibling [11: 128-129].

Fig. 2.6   Proximal development

11. Piaget & Inhelder, 2000.
13. Bartolotta & Schulman, 2010.
19. Bee & Boyd, 2004.
20. Piaget, 1962.
21. Ayman-Nolley, 1988.
22. Gaskins & Göncü, 1988.
23. Vygotsky, 1930 [2004].
24. Vygotsky, 1967.
25. Lucy, 1988.
26. Bakhurst, Cole, & Middleton, 1988.
27. Piaget, 1951.

Fig. 2.7   Piaget´s developmental stages

The lack of a sense of self during the preoperational stage includes the inability to distinguish the psychical from the physical world. A child is not able to define the limits between himself and the external world. Therefore, the child also regards a large number of objects to be alive, which are for us inert. This way of perceiving objects is called animism: a child attaches human feelings, thought, and intentions to inanimate objects [20: 250-255, 27: 169-170, 28: 155]. Piaget differentiates two stadia of animism. From 2 to 5, animism is obvious to children, no questions are asked. From 5 to 7, animism is still present but questioned. Children ask weather something is dead or alive and if it has a conscious or not [27: 208-212].

Up to the age of 5, according to Piaget, a child engages in magical thinking. According to Piaget, a child would make several mistakes in their thinking process during the day. The children would for example link to wrong effect and cause. This shows in the example of the believe that their actions or thoughts could change reality in a way which is not possible. Also, the concept of animism is an example of magical thinking and the inability to understand the concept of dead [27, 29: 258-272].

This magical thinking and animism results in a different interaction of a child with its environment. To a child a space is more alive and therefore the child 'interacts' with the space in a more personal way. The development of their skills combined with magical thinking results in a form of interaction which includes all senses. A child is more dependent on their touch than their vision. As an adult can determine the properties of items only by looking at it, a child has to touch it (either with its mouth or other body parts) to gain the same information [30]. The continuous interaction with the world results in a curious attitude in the child. It feels the need to explore the environment and therefore develop and explore its' skills [20: 105-119, 30].

11. Piaget & Inhelder, 2000.
20. Piaget, 1962.
27. Piaget, 1951.
28. Verhofstadt-Deneve, Vyt, & Van Geert, 2003.
29. Piaget, 1930.
30. Kennedy, 1991.
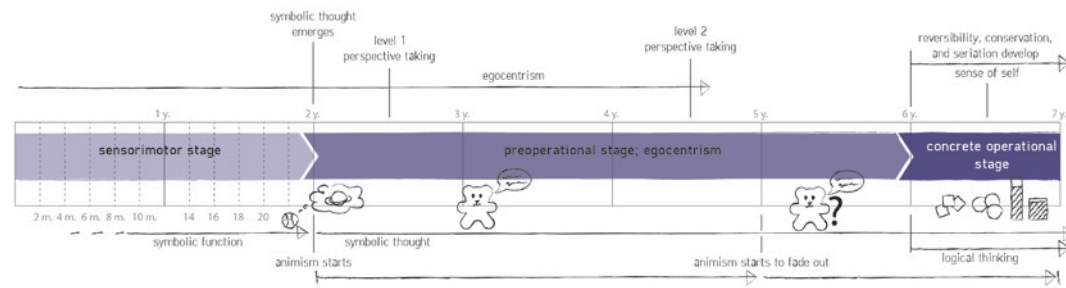
Fig. 2.8 Cognitive development child

23. Vygotsky, 1930 [2004].
24. Vygotsky, 1967.
31. Smolucha & Smolucha, 1986.

space; such as the start of logical thinking, the awareness of self and the ability to think abstractly [23, 24, 31]. Fig. 2.8 provides an overview of the milestones of the cognitive development of a child.

Concrete operational stage
The first two stages are called the prelogical stages. This means that a child is not yet able to think logically. This ability develops in the third, concrete operational stage. During this stage, a child starts to develop abstract thought and the ability to make rational judgements. Together with the sense of logic, a child also develops a sense of time, seriation, and classification. Seriation is the ability to mentally arrange objects by their characteristics, such as size or colour. Classification is the capability to group objects based on their similarities [11: 96-97,100-103, 13: 38, 19: 149, 20: 287-290]. In the preoperational stage, a child also lacks a sense of conservation and reversibility. These skills also develop in the third, concrete operational stage. Conservation is the understanding that something does not change in quantity even though the appearance changes. Reversibility is the ability to understand that an object can change and return to their original shape, such as clay [11: 19-21, 96-100].

Formal operational stage
From the ages of 12 and up, a child is in the final stage of Piaget and the cognition of a child is fully developed. A child can consider multiple points of views and a concept of abstraction is fully evolved and can be incorporated in logical thinking [13: 38]. A child is also capable to think about things which he or she has not really experienced and conclude from this. A child can create a hypothesis. In the concrete operational stage, a child would need to draw pictures to solve problems, whereas in the formal operational stage, a child can solve these problems in his or her head [11: 140-144, 19: 149].

As mentioned, Piaget and Vygotsky differ in opinion on the role of language, culture and social interaction on the cognitive development. However, Vygotsky marks the same developmental milestones in the perception of

11. Piaget & Inhelder, 2000.
13. Bartolotta & Schulman, 2010.
19. Bee & Boyd, 2004.
20. Piaget, 1962.
30. Kennedy, 1991.

2.3 SUMMARY PERCEPTION OF CHILDREN

1. Zumthor, 2006.
2. Böhme, 2014.
3. Borch, 2014.
4. Pallasmaa, 2014.
6. Havik, Teerds, & Tielens, 2013.
7. Pallasmaa, 2012.
13. Bartolotta & Schulman, 2010.
15. TNO, 2010a.
16. TNO, 2010b.
17. TNO, 2010c.
18. TNO, 2010d.
19. Bee & Boyd, 2004.
20. Piaget, 1962.
30. Kennedy, 1991.

Summarizing the previous paragraphs, the following characteristics can be defined as having an impact on the perception of space by a child.

Composition & scale
Out of the analysis of literature, written about the theories of the architects Zumthor, Pallasmaa and Böhme, the term **composition** is deducted. The term composition is general to describe the use of different aspects and elements in a space. To illustrate: the composition of a space does not only include the placement and number of different objects in the built environment, but also their dimensions, relation to each other, the space and the people around them. Also, the different materials and other details used in the objects are placed in a composition. Again their size, number and other characteristics influence the total composition of the element. Therefore, composition includes the complete overview of a space or city, but also the details of the singular object in the space [1-4, 6, 7].

When composing a space with objects for children, aged 3 to 6 years, their difference in horizon should be taken in consideration. Furthermore, their body dimensions change over the years. In general, a child increases more than 20 cm in height in between the ages of 3 to 6. In combination with the height increase, the arm reach, chair height and weight change over the course of 3 years [15-18]. Therefore, the sizes and dimensions (or **scale**) of objects and elements placed in a space should be adapted to bodily dimensions, but also by their motoric abilities. A child of 3 years old can walk, run and jump, but has to develop these capabilities more: jumping with two legs, hopping on one leg, cycling, throwing something further and more [13, 19]. In general, a child has to practice his or her balance and develop strength. The development of a child's motoric and cognitive skills results over the years in an expansion of his or her world and an explorative attitude towards it [20, 30].

Contrast & detail

Zumthor and Pallasmaa repeated in their writings one aspect of the composition of a space: **contrast**. This feature can be recognized in the presence and absence of light and shadows, the use of different materials, the border between inside and outside and more. Zumthor also uses this feature to describe explorative behaviour of people in space; making them eager to move forward and explore the space, alternating these spaces with calming and relaxing surroundings, making people linger [1, 7].

The use of materials has been mentioned for another reason by Zumthor, Pallasmaa and Böhme: the textural, and narrative character of this feature. The materials of a building age and therefore tell a story. The texture and characteristics of the material play an important role in defining the character of the space [1-4, 6, 7].

Animism & self-centred

A child between the ages of 3 to 6, cannot see him- or herself separated from the environment and has trouble separating fantasy from reality. Therefore, the child addresses all elements in the environment as living things. To adults inanimate objects, are given human characteristics, such as feelings, thoughts and interactions. This influences the interaction of a child with his or her environment. This interaction is more personal and includes all senses. Whereas an adult can determine the properties of an object only by looking at it, a child is more eager to touch and interact with the object before gaining the same information [20, 27, 29, 30].

Another result of the fact that a child cannot distinguish a difference between the world and him- or herself, is that the child will have trouble seeing something from another viewpoint than his or her own.

1. Zumthor, 2006.
2. Böhme, 2014.
3. Borch, 2014.
4. Pallasmaa, 2014.
6. Havik, Teerds, & Tielens, 2013.
7. Pallasmaa, 2012.
20. Piaget, 1962.
27. Piaget, 1930.
29. Piaget, 1930.
30. Kennedy, 1991.
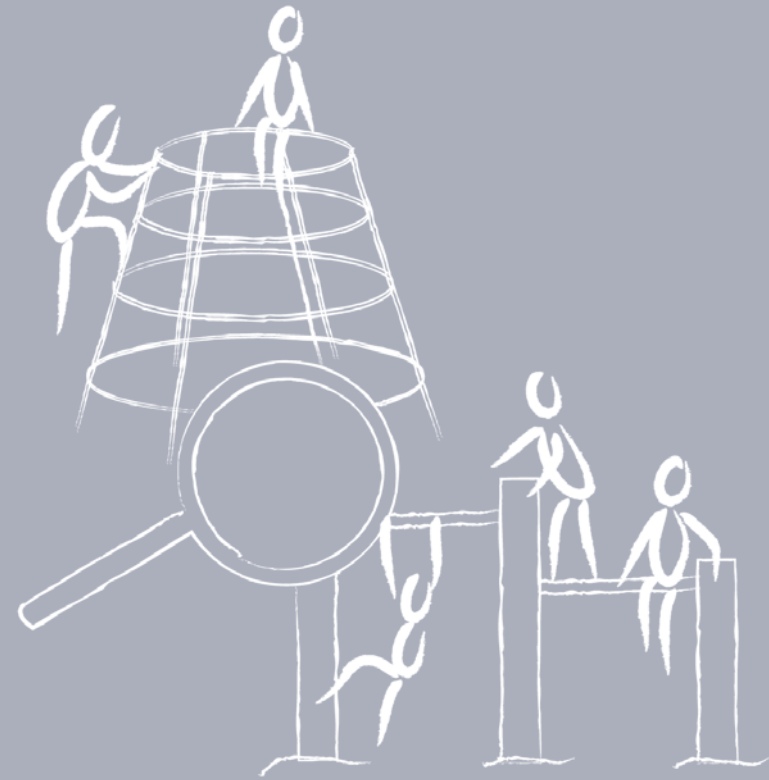
3. PLAY

3.1 TYPOLOGIES OF PLAY

In chapter 3 the first two paragraphs involve an overview of literature studies. First, an overview of what kinds of behaviour are part of a child's play. This overview is a summary of literature of Piaget, Vygotsky and Rubin. The second paragraph provides an overview of Van Eyck's theory on designing a playground.

Paragraph three, four and five, provide an overview of the results of observations and (spatial) analyses. The third paragraph gives a summary of the observations conducted at different playgrounds and a spatial analysis of objects and elements used by children in their play. The fourth paragraph shows the results of a spatial analyses of five playgrounds designed by Van Eyck. Paragraph number five includes the analysis of several fantasy worlds. The stories of different worlds are summarised and spatial aspects are named. The results of all analyses are combined in the sixth paragraph and spatial generic properties are formulated.

1. Lillard, 2015.
2. Donnelly & Robinson, 2006.
3. Piaget, 1962.
4. Vygotsky, 1967.
5. Rubin, 2001.

Play is an activity in which the imagination becomes active. Between the ages of 3 to 6, play is the main activity that activates the imagination and is important to the development of not only the imagination, but also all other cognitive functions [1, 2]. However, defining play is hard, since play is sometimes hard to distinguish from other behaviour. For example, a group of children play soccer on the street or two children pretend to be maids and do all sorts of household chores. Most people would consider these types of behaviour as play. However, when a game of soccer on the street develops into a soccer match of the junior league and later into professional soccer, where becomes play work? Play is sometimes defined through the type of behaviour a child engages in. In other studies, play is defined by the goal of the behaviour [1]. In this chapter, the theories on play of Piaget and Vygotsky are discussed. Both have studied the cognitive development of children and the role plays in this development [1, 3, 4]. In addition, also work of Kenneth Rubin has been studied. This psychologist has studied children and their behaviour, such as different types of play they engage in [5].

3.1.1 PIAGET

Piaget defines play by the goal of the behaviour [3]. Piaget formulates in his theory on cognitive development four stages that all children go through in their development, see "2.2 Spatial Perception of Children". Each of these stages has its own characteristics and developmental milestones [6: 16, 147-149, 7], see Fig. 3.1. Piaget considers play as an instrument to explore and develop different skills during childhood [3: 110-113, 118-119, 142]. Though, the children engage in play because of the pleasure that is gained by mastering skills [1, 3: 113, 8]. During the first few years of a child's cognitive development, a child engages in three types of play: *Sensorimotor play, Symbolic play,* and *Game with rules.* Each of these types of games develops from one into another. After a new type of play has developed, the other does not completely disappear, only a new skill has been added to the play [3: 110-113]. Each of these forms of play is discussed in relation to the cognitive development and the sequence in which they develop.

Sensorimotor play
The first type of play is present during the first cognitive developmental stage: the *Sensorimotor stage.* This stage occurs during the first two years of a child's life. Over the course of this stage, a child gains knowledge through their sensory and motor skills [6: 151, 7: 3]. Sensorimotor play is therefore focussed on gaining mastery of their own body and its movements. These types of games are called Practice games. These games occur during the first two years but do not disappear completely. Whenever something new has to be learned, they tend to reappear and disappear after saturation [3: 113-114].

Symbolic play
At the end of the first cognitive stage, symbolic thought emerges in a child [3: 118-119, 7: 51], see "2.2 Spatial Perception of Children". This introduces the second stage: the *Preoperational stage* [6: 149, 7]. This symbolic thought is introduced by ritualized behaviour. This type of behaviour consists of actions in which the meaning is separated from the actual action [1]. For example, in an observation of Piaget, a 11 months old girl bangs with her hand on the water, first by accident, later repetitively to create different sounds [3: 94]. As a child's sensory and motor skills are practiced in Sensorimotor play, symbolic thought is practiced in *Symbolic play* [3: 118-

sensorimotor stage

0-2 years

preoperational stage

3-6 years

concrete operational stage

7-11 years

formal operational stage

>12 years
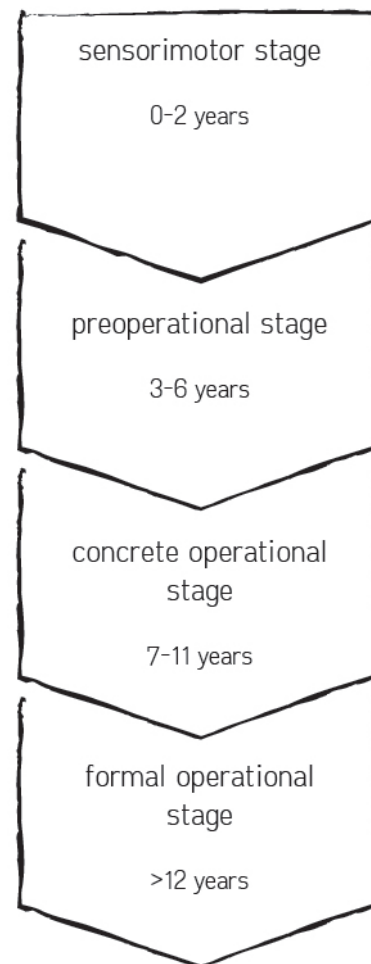
Fig. 3.1   Piaget's stages of cognitive development

1. Lillard, 2015.
3. Piaget, 1962.
6. Bee & Boyd, 2004.
7. Piaget & Inhelder, 2000.
8. Gaskins & Göncü, 1988.
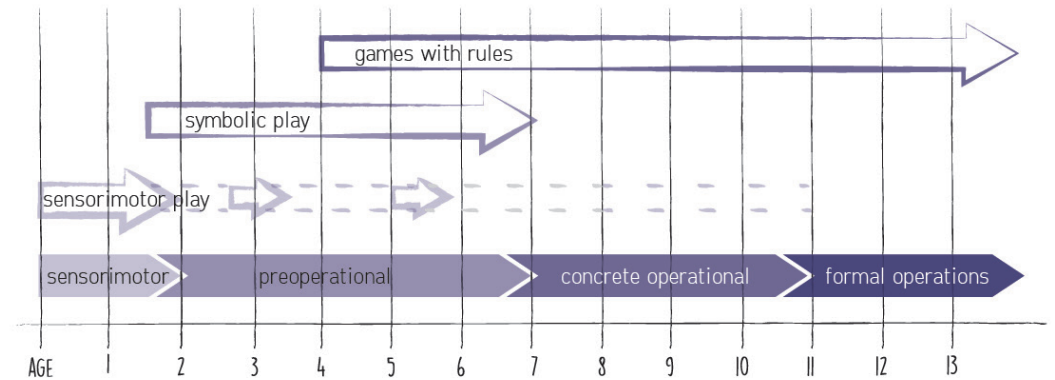
Fig. 3.2   Development of different types of play, Piaget.

119]. Symbolic play occurs during the preoperational stage which is present from the age of 2 until the age of 7. In Symbolic play, a child practices to attach a different meaning to an object and to use symbolism. They will start to use objects as a substitute in their play, engage in make-believe games, and play out different roles [1, 3, 6: 158, 8].

Games with rules
At the last few years of the Preoperatoinal stage, between the ages of 4 to 7, a child starts to engage with games dominated by rules and regulations. This type of play continues after this stage, in the Concrete Operational stage from 7 to 11 years and even after this stage. Around the start of *Games with rules*, a child starts to engage social relationships. This play is used to explore the 'rules' behind these relationships [3: 142-143]. The rules that define the play emerge from symbols from within the social context, such as the rules of a tennis game. Other rules arise spontaneously, when a child makes up a new game [1, 6: 149-167, 7: 127].

Fig. 3.2 shows the development of play in relation to the cognitive developmental stages of Piaget.

Continuation of the Piagetian theory
Smilansky, who worked together with Jean Piaget, continued with Piaget's theory and has expanded the three types of play from Piaget into four typologies. The typologies are on many levels similar to Piaget's categories [1].

The first type of play is Functional play. This type of play

1. Lillard, 2015.
3. Piaget, 1962.
6. Bee & Boyd, 2004.
7. Piaget & Inhelder, 2000.
8. Gaskins & Göncü, 1988.

consists out of simple repetitive muscle movements with or without objects [5, 9]. This type of play is the first to occur, like Piaget's Sensorimotor play, and continues to occur occasionally, whenever something new has to be learned [9]. The second type is Constructive play. By manipulating objects something can be constructed or created. According to Smilansky, this type of play includes the visual result of a child's play. The third category of play is Dramatic play. During Dramatic play, a child might use objects or elements as something else, or plays a different role [9]. The latter two are related to what Piaget defines as symbolic play. Drawing, which is considered to be construction play by Smilansky, is for Piaget an early form of the mental image[1] and a form of symbolic play [7: 54, 63-68]. The fourth type is called Games with Rules. During this type of play, children follow, understand and create rules for their play [9].

Rubin
Rubin has studied the work of Piaget and Smilansky to create his own *Play Observation Scale*. In this model Rubin defines different types of play and describes how these can be recognized in relation to observational studies [5]. Rubin defines two categories of play: cognitive and social play. These two categories appear next to each other during play. The social category has been derived from the study of Parten [10] and describes the participation of a child during play. To this categorization belong the stages of unoccupied, solitary, onlooker, parallel, associative and cooperative play [5]. The categories, describing participation in play, are *Solitary play* (a child plays alone), *Parallel play (*a child plays alone but next to other) and *Cooperative* or *Group play* (a child plays in a group). The cognitive play categories correspond with the categories defined by Smilansky and Piaget: *Functional (or sensorimotor) play, Constructive play, Dramatic (or pretend) play* and *Games with rules* [5].

Rubin, Fein, and Vandenberg created an overview of these different types of cognitive play and the sequence they appear in. In figure Fig. 3.3, a summary is given [6].

5. Rubin, 2001.
6. Bee & Boyd, 2004.
7. Piaget & Inhelder, 2000.
9. Smilansky, 1968.
10. Parten, 1933.

1. A mental image is the representation of the physical environment in a person's mind.
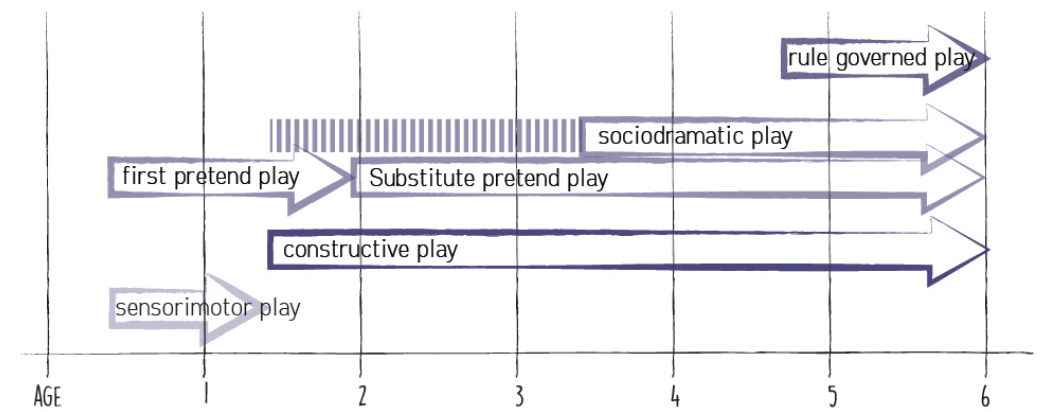
Fig. 3.3   Development of Play, figure made after Rubin, Fein and Vandenburg in [6, p. 158].

According to the observational studies of Rubin, Fein and Vandenberg, play starts around the age of 12 months. This is in contradiction to what Piaget and other researches define as play. Piaget and Uzigiris described how a child starts to examine objects with their mouth at 2 months and around 3 months also visually [1, 11]. This type of behaviour is considered as Sensorimotor play by Uzigiris and Piaget. Rubin and Lillard categorize this type of behaviour *Exploratory behaviour*, in which the children examine their skills, objects and other situations. This type of behaviour is not defined as play [1, 5].

1. Lillard, 2015.
5. Rubin, 2001.
11. Uzgiris, 1967.

3.1.2 VYGOTSKY

In contrast to Piaget, Vygotsky defines play by the type of behaviour which is performed [4, 8]. He recognizes only one type of play: *Pretend play*. This type of play has three features according to Vygotsky[12]:

1. Children create an imaginary situation;
2. Children take on and act out roles;
3. Children follow a set of rules determined by those specific roles.

To Vygotsky, this type of play is part of the cognitive developmental process of a child. In pretend play, a child learns to separate the imagined from the reality. By pretend play, a child develops abstract thought [4, 8]. In addition, according to the features of pretend play, a child also learns to play different roles, often those older than themselves. By doing so, a child learns to take the perspectives corresponding to those roles and to behave according to their norms [1, 12]. This definition of play corresponds to Piaget's Symbolic play and Games with rules.

1. Lillard, 2015.
4. Vygotsky, 1967.
8. Gaskins & Göncü, 1988.
12. Bodrove & Leong, 2015.

functional play

Play, directed to gain knowledge about the bodies skills and limits, with and without objects.
Similar to: Exploratory play and Physical or locomotor play.

pretend play

This type of play involves assigning a different meaning to objects, situations, or other activities. This type of play can be divided into different stages: first pretend, substitute pretend and sociodramatic play.

Similar to: Dramatic play and symbolic play.

construction play

Play, consisting out behaviour which is related to creating, collecting, or destroying work.

rule based play

Play organized by rules.

Fig. 3.4   Overview typologies of play present in children aged 3 to 6 years old.

1. Lillard, 2015.
3. Piaget, 1962.
7. Piaget & Inhelder, 2000.
9. Smilansky, 1968.

3.1.3 PLAY IN CHILDREN, 3—6 YEARS OLD

According to the theories described above, all children between the ages of 3 to 6 engage in play. However, what kind of behaviour is defined as play, differs per category. The theories above describe a few typologies. However, other authors describe also other stages and types of play. For example, Lillard also introduces Rough-and-Tuble play and exploratory play [1]. However, the theories of Piaget and Smilansky are commonly used and provide a complete overview of the different types of behaviour a child engages in during play.

Therefore, in this research play is defined according to the theories described above. A child engages in the following types of play, between the ages of 3 to 6: Pretend play, Creation play and Rule based play. Functional play is considered here separately. Whereas Functional play can still occur later during life, however, this occurs less often and usually in combination with the other types of play. In Fig. 3.4 an overview of these types of play is provided.

As mentioned in "1. Imagination", when a child engages in play, they train their imagination. According to Piaget and Vygotsky, this happened mostly during Pretend play (or Symbolic play). However, according to Piaget, a new type of play develops from the initial one. The initial type does not disappear completely, and a new skill is added [3, 7]. For example, when Rule based play is present, a child also engages in Symbolic (or Pretend) and even Sensorimotor play (or Functional play). Therefore, not only Pretend play belongs to imagination activating play, but also Rule based play and some kind of Functional play. Furthermore, Creation play is a type of play, not separately distinguished by Piaget, but defined by Smilansky [9]. To Piaget, behaviour present in Creation play either relates to symbolic play (or pretend play) when a child is stacking blocks to represent a bridge for example. On the other hand, behaviour, relating to creation play, is not considered as play at all [3: 117].

In short, when children engage in play, they train their imagination. Therefore, when observing children aged 3 to 6 years old, engaging in activities that can be defined as Pretend, Creation, Functional or Rule based play, the assumption is made that their imagination is active during all types of play.
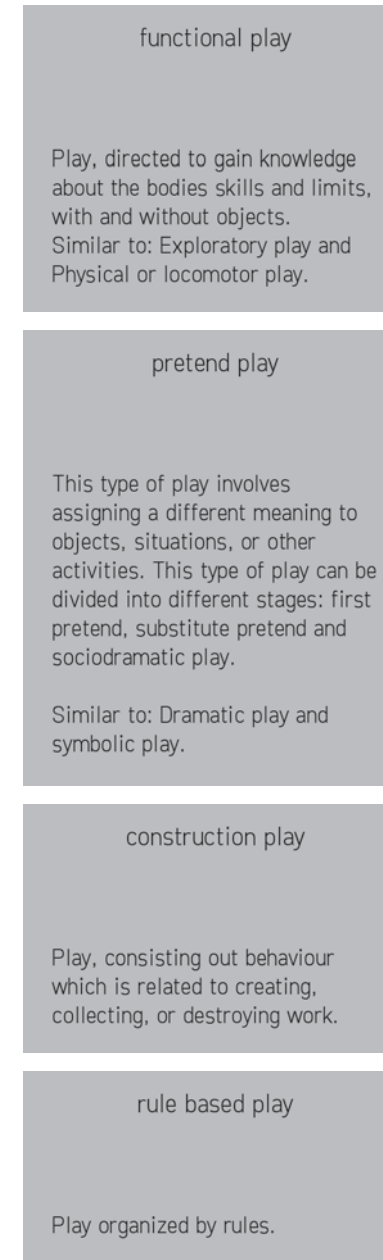
3.2 ALDO VAN ECYK

Fig. 3.5   Concrete climbing mountain [2: 46-47]

Fig. 3.6   Stepping stones [6: 68-69]

Fig. 3.7   Sandpit [2: 18-19]

1. Fuchs, 2002.
2. Van Lingen & Kollarova, 2016.
3. Andere Tijden, 2010 [film].
4. Lefaivre, 2002.

From 1947, as a young architect, Aldo van Eyck, designed a large number of playgrounds in the city of Amsterdam. These playgrounds served as safe, shelter play areas for the children of the city. The assignment came from the Urban Development Department of Amsterdam's Department of Public Works. After Van Eyck started his own company, he continued designing playgrounds [1, 2: 12-17, 28-29, 3]. Aldo van Eyck designed in total at least 860 playgrounds in Amsterdam [3, 4: 24-25].

Van Eyck was part of the CIAM (Congrès Internationaux d'Architecture Moderne, French for International Congress of Modern Architecture) and co-founder of Team Ten. After World War II, the Dutch housing stock was falling short. The General Expansion Plan of Cor van Eesteren was to resolve this shortage. The plan was created by the top-down, functionalistic, function-dividing CIAM approach. The design for the playgrounds of Van Eyck contradicts to this strategy. Van Eyck wanted to create a site-specific design, interstitial and polycentric after Lefaivre's words [4].

Design playgrounds
The goal of the city planning was to provide every neighbourhood in Amsterdam with a playground. Therefore, the playgrounds were placed in various parks and on traditional squares. In addition, demolition sites too, formally hidden by fences and used as garbage dumbs, were new locations for Van Eyck's playgrounds. As mentioned, Van Eyck's design was very much influenced by the characteristics of the site. Therefore, each playground was unique [2: 28-33, 3].

Van Eyck's playgrounds were more open than others without fences and without supervision. Van Eyck related the compositions of play equipment to the surroundings and balanced all different elements, from the play equipment to the greenery. Van Eyck developed his syntactic insight, by studying the compositions and proportions of Mondriaan. The composition of the

different objects on the playground was not hierarchic or symmetrical. None of the objects was placed in the centre. By placing all elements decentralized, the entire playground was activated and used by the children [2: 28-33, 3, 5]. As van Eyck designed the playgrounds, he started with the design of the sandpit. The sandpit could have different geometrical shapes and have concrete play stones as working tables for the children. Apart from this big, massive shape the playground had smaller round, concrete stones which could function as seats, stepping stones or collecting tables. These concrete constructions are contrasted by the slim, steel, climbing frames and horizontal bars. Other objects that are often present at van Eyck's playgrounds are the concrete climbing mountains, balance bars and the tourniquet. Except for the latter, all of Van Eyck's equipment was immobile [2, 5]. Fig. 3.5 to Fig. 3.11 show the different play equipment which Van Eyck has designed. Apart from the play equipment, the benches, greenery and different floor tiling were also part of the playground's design [2: 32-33, 6].

Design play equipment
Van Eyck has closely designed the dimensions of the elements to allow the children to play and develop their (motoric) skills. The designs of Van Eyck were tested in cooperation with his own children. This way Van Eyck tried to minimize the risks and optimise the dimensions to provide the children with the possibility to climb and clamber on the objects. According to Van Eyck the stable and elementary shapes of the play equipment should not only invite a child to play the way he or she wants, they should also trigger the imagination. The equipment should not be 'real' like a phonebooth, a couch or in the shape of a fantasy animal. The abstract shapes of his equipment have an urban character and stimulate the imagination. They stimulate a child to use an object in their own way [5].

Composition in Van Eyck's work
Van Eyck payed special attention to the composition of his designs. As mentioned the organisation of the different elements at the playground were planned so the entire playground was used. In his design, not only the elements were important, also the space in between these objects was an important aspect of the playground to support all sorts of play. Van Eyck called this concept the in-between space. In relation to the composition, Van Eyck introduced also other concepts, such as the concept of twin phenomena. Twin phenomena describe the relation

Fig. 3.8   Climbing frame [2: 26-27]

Fig. 3.9   Horizontal bars [7]
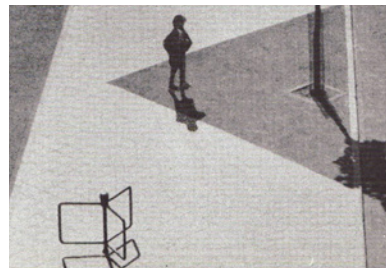
Fig. 3.10   Tourniquest [8]

Fig. 3.11   Balance bar [6: 91]

2. Van Lingen & Kollarova, 2016.
6. Lefaivre & De Roode, 2002.
9. Leupen et al., 2010

between opposites (open-closed, light-dark, high-low, multiple-single). In Van Eyck's compositions every unit could both function on its own, and in a bigger entity [2: p. 32-33, 6, 9: 96].

2. Van Lingen & Kollarova, 2016.
3. Andere Tijden, 2010, [film].
5. Strauven, 2002.
6. Lefaivre & De Roode, 2002.
7. Andere Tijden, 2010, [web page].
8. Artbooks, 2015.

3.3 OBSERVATIONS
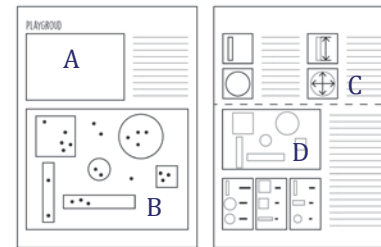
Fig. 3.12 Lay-out results observations

Fig. 3.13 Scale A: an object is smaller than a child, a child could pick it up and/or alter it

Fig. 3.14 Scale B: an object about the size of the child, it can't be picked up and is smaller than a room
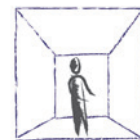
Fig. 3.15 Scale C: an object about the size of a room

At six different categories of play areas, children's play is observed. These areas differ in planned or accidental playgrounds, inside or outside and urban or nature areas. At each of these play areas an observation is conducted.

In this chapter, the observation of a planned, inside playground is used as an example to show how the results of the observations are processed. The results of the other observations are listed in the Appendix "A. Observations" (page 153). The paragraph "3.3.2 Summary Results Observations" (page 82) provides a summary of the results of the different observations. Fig. 3.12 shows how the results are presented.

Each play area is shortly introduced in part A, including details of the observation itself: when and where it was held and what environmental aspects influenced the observations such as the weather or other interruptions. Part B shows the first part of the results of the observation. During a structured observation, play behaviour, belonging to the categories *Pretend play, Construction play, Functional play* or *Rule based play* is marked. Each observation lasted one hour. Every 10 minutes, dots were placed on a map, according to the location where children were playing. Part C shows the different objects, afforded by the children in their play. An overview of the way children played at a certain element and its spatial characteristics is provided in small sketches and explanatory text.

A scale is added to provide more detail to the spatial characteristics of the different objects. Fig. 3.13 to Fig. 3.15 show these different scales. The definition of these scales is deducted from the scale defined by Freundschuh and Egenhofer [1], already mentioned in chapter "2. Perception". These researchers defined a space typology explaining the different levels a person experiences a space. Existing models were analysed to determine these different types of space. This classification is often implemented and used in research covering the cognition

1. Freundschuh & Egenhofer1997.

of space [2, 3: 5].

Six classification scales belong tTo the model of Freundschuh and Egenhofer [1], see paragraph "2.2 Spatial Perception of Children". Due to the relevance, only the first three are considered in this research. The first scale, scale A, covers objects smaller than a child, which can be held, picked up, or adjusted. For example, to this scale belong different toys, twigs, or small grips. The second scale, scale B, introduces bigger objects, which can not be picked up or adjusted. Locomotion is needed to experience an object of this scale. The third scale, scale C, includes the environmental space. These are spaces, inside-building-sized or even bigger, city-sized spaces. A child needs to move around to experience the space completely.

The final part of the results, part D, shows an analysis of the number of children, playing at or around objects during the observation.

An overview of the results of the different observations is provided in Appendix A. At each location, at six moments, the play behaviour was observed. In general, each observation took one hour. However, in some cases the observation took longer since the play behaviour was paused for some reason. This information is described in part A of the results.

Also, each category has been observed twice, except in the case of the accidental, outside, urban playground. Unfortunately, it was not possible to create a second situation in which the children could be observed for one hour. Therefore, the results of the second observation consist out of an overview of behaviour spotted at different locations in Delft, Amsterdam, and The Hague. Fig. 3.16 to Fig. 3.25 provide an overview of all 10 locations.

1. Freundschuh & Egenhofer1997.
2. Tversky, et al., 1999.
3. Kitchin & Blades, 2002.

Fig. 3.16 Indoor playground Avontura, Delft

Fig. 3.17 Indoor playground Bungelland, Rotterdam

Fig. 3.18 Playground Scheveningse bosjes, The Hague

Fig. 3.19 Playground Frederik Hendrikplein, The Hague

Fig. 3.20 Nature playrgound Speeldernis, Rotterdam

Fig. 3.21 Living room, The Hague

Fig. 3.22 Street, Danckertsstraat, The Hague

Fig. 3.23 Collection of streets, The Hague, Delft & Amsterdam

Fig. 3.24 Park, Delftse Hout, Delft

Fig. 3.25 Beach, Noorderstrand, The Hague

3.3.1 PLANNED, INSIDE PLAYGROUND: AVONTURA

3.26

Avontura is an indoor play area in Delft. The observation only covered a part of the playground to keep the scale of the area feasible for the observation. The area is created by three large play structures, a seating area and two smaller objects.

The observation was conducted on a Wednesday afternoon between 12:45 and 13:45. The sun was shining bright.

measuring moments
- 1
- 2
- 3
- 4
- 5
- 6

parent
collecting materials
playing with objects
moving around during play
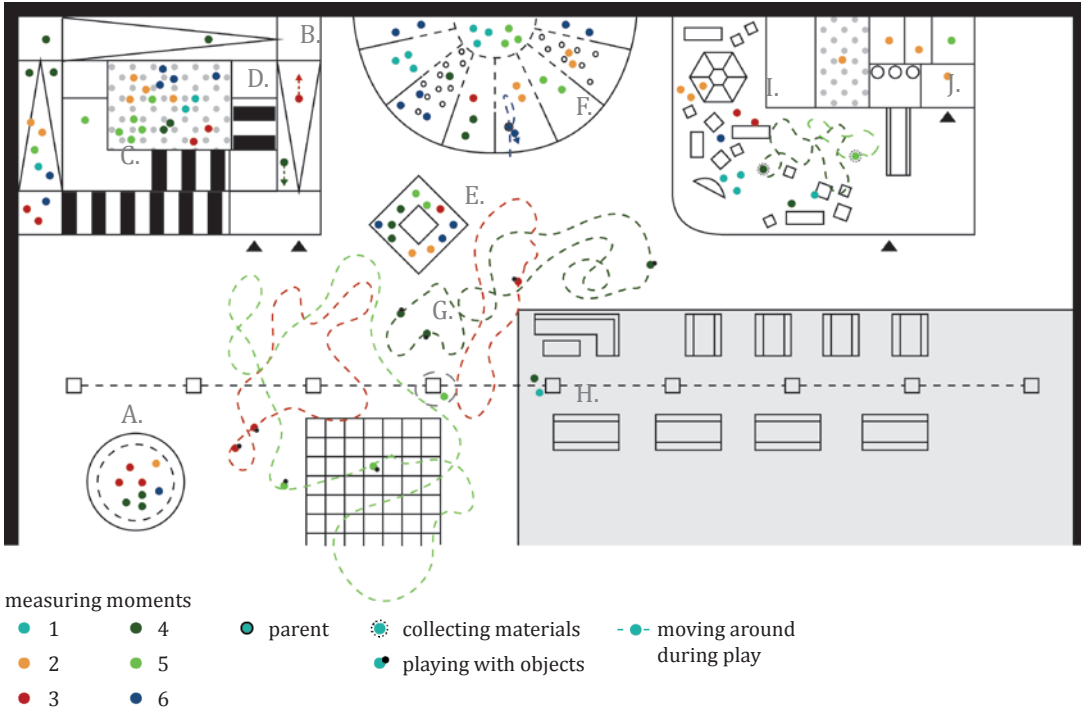
Fig. 3.27 Observation results Avontura

OBSERVED BEHAVIOUR

3.28

A. Climbing tower

climbing, standing, sitting at the different levels

3.29

height differences, in steps (scale B to overcome C)
edges (scale A)
platform, sheltered (scale C)

3.30

B. Slide

sliding down, climbing up the ramp; either over the normal ramp or on the small edges

3.31

height difference, gradually (scale C)
small edge (scale A; foot wide)

3.32

C. Ball box

throwing balls at each other or at other targets, burry themselves in the balls

3.33

loose objects, portable (scale A)

3.34

D. Foam stairs

climbing

3.35

height difference, in steps (scale B to overcome C)
edges (scale A)

3.36

E. Game table

all sorts of board games

3.37

play equipment (scale B)

3.38

F. Climbing mountain

Climbing via the grips or run up and down, jumping and sommersaulting, sitting or standing on the top

3.39

height difference, gradually (scale C)
grips (scale A)
bouncing material
platform, sheltered (scale B)

G. By-Tricycle

cycling around and racing

3.40

play equipment (scale B)
open space (scale C)

3.41

H. Contruction

climbing

3.42

height difference, in steps
(scale B)
edges (scale A)

3.43

I. Foam blocks

climbing, sliding, collecting,
moving, stacking blocks

3.44

loose objects, portable
(scale A)
height difference, gradually
(scale B)
top platform

3.45

J. Layered cage

climbing, sitting at the
different levels, sliding
down

3.46

height difference, platforms
(scale B to overcome C)
sheltered space (scale B&C)
height difference, gradually
(scale C)

3.47

The climbing mountain (F), the ball box and the area around the box (C) were most used during the observation. Also, during the entire observation, children played on the ramp with sledges (B). Whilst, for example, in the layered cage (A) less than 5 children played during the observation and at the climbing mountain more than 25. Fig. 3.49 provides an overview of the number of children playing on the different elements during the entire observation. Interesting, the ball box on the other side of the play area, next to the Layered cage, was played in less often than the one located in between the ramps.
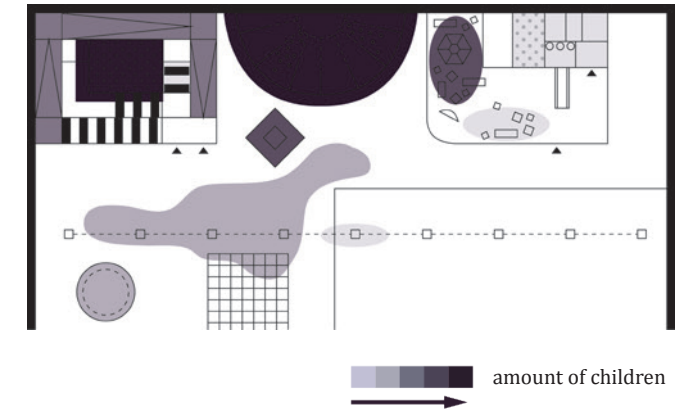
amount of children

Fig. 3.48 Number of children playing at different objects
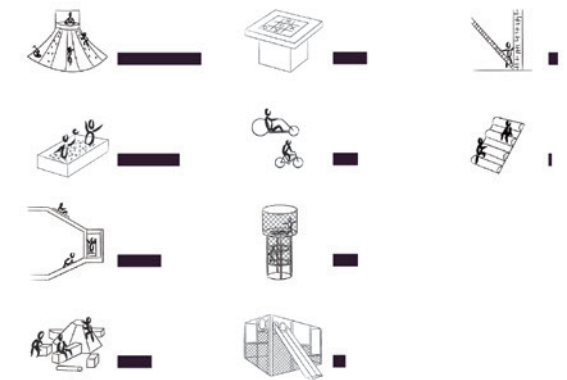
Fig. 3.49 Relative amount of children playing at objects

3.3.2 SUMMARY RESULTS OBSERVATIONS

To conclude the first part of the research, the results conducted in the observations are summarized. A complete overview of all results is provided in Appendix "A. Observations". The spatial characteristics are determined and labelled. They are grouped by similarities and labelled again.

Play space
The spatial analyses include all kinds of areas where a child can engage in play. This play space can be on an object, or in between different objects, see Fig. 3.50. These objects can either be designed as play objects, such as a play house or slide (Fig. 3.53), or used in the design to create a play area, such as lines in the pavement or small walls and fences, see Fig. 3.52. Moreover, objects, not directly designed for play, are used to create a play area. To this category belong elements such as (street) furniture, cars or bushes, see Fig. 3.53. To create a space for play, the organisation of all kinds of elements and objects is key. The organisation includes the number and variety of objects placed at an area, their mutual distances and the ratio between the dimensions of different elements and other aspects.

Elements creating a play space
Once a play area is composed by different elements, the spatial characteristics of this place and the elements itself become important. Summarizing the characteristics of the elements, as observed, the following features are often recognized. Like the spaces where children are playing, the different objects and elements at these places can be described by their spatial characteristics. The different elements that are part of the observations can be described by a variety in height and/or differences in surfaces (e.g. colour, materials, lines and more).

Furthermore, many objects at play areas are shaped in a way that a space is created which is closed off from the rest of the area. Examples are huts, tubes, the placement of furniture and more. This includes spaces that are completely closed off to places that are only covered by a single wall or roof, see Fig. 3.54.

Many play areas contain moveable objects. These are objects which can be lifted, moved, or adapted by the children. Examples are lego blocks, sand, twigs and paper.
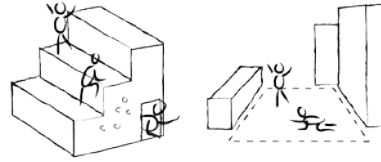
Fig. 3.50 (left) On an object, (right) in between objects

Fig. 3.51 Play area on objects, designed for play

Fig. 3.52 Play area created by fences

Fig. 3.53 Play area created by street furniture

Fig. 3.54 Levels of enclosure

Fig. 3.55 Objects featuring manipulation
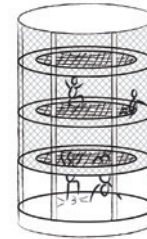
Fig. 3.56 Climbing tower: height differences, manipulation, enclosure

Fig. 3.57 Sidewalk: height differences, planar composition

To this type of elements especially the size and weight is important. Other objects invite children to interact with them on a larger scale than a piece of paper or sand. Examples are swings, trampolines, cushions, flexible branches, or chains see Fig. 3.55. Each of these elements can be moved by a child.

The results of the observations provide an overview of the preference of children to certain objects. Regarding these preferences, no specific type of the element seems to be more popular than another. Although, objects that obtain a large variety in height differences, movable or manipulable objects seem to be used more often in a child's play. This variety includes both a large diversity of for example height differences as a diversity of both height differences and movable objects. For example, a variety of height differences or different types of scales are preferred, such as the climbing tower in Fig. 3.56. Also, the presence of height difference, scales and manipulation are popular. Fig. 3.57 shows a sidewalk showing both height difference and planar difference.

3.4 ANALYSES BEST PRACTICES
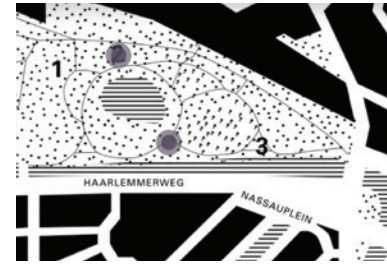
Fig. 3.58 Playgrounds in the Westerpark

Fig. 3.59 Playgrounds in the Vondelpark

This chapter includes the analysis of four playgrounds of Aldo van Eyck in Amsterdam. Two of these playgrounds are located in the Westerpark and two are located in the Vondelpark. Fig. 3.58 and Fig. 3.59 provide an overview of the locations. These playgrounds are chosen, to provide an overview of the different playgrounds designed by Van Eyck , as complete as possible.

Each playground is analysed separately. The paragraphs *Playgrounds Westerpark* and *Playgrounds Vondelpark* provide an overview of the elements, part of the playgrounds, and how the surroundings influence the layout of the playground.

The final paragraph *Spatial Analysis Play Equipment* provides an overview of the spatial characteristics of the different elements designed by Aldo van Eyck.

The playgrounds of Aldo van Eyck have been restored and/or new play equipment is added to the playground. In the analysis only the play equipment, designed by Aldo van Eyck, is considered.

3.4.1 PLAYGROUNDS WESTERPARK

3.60
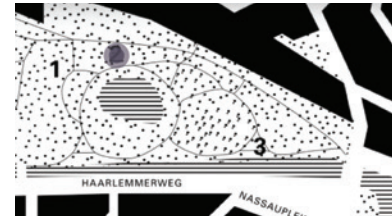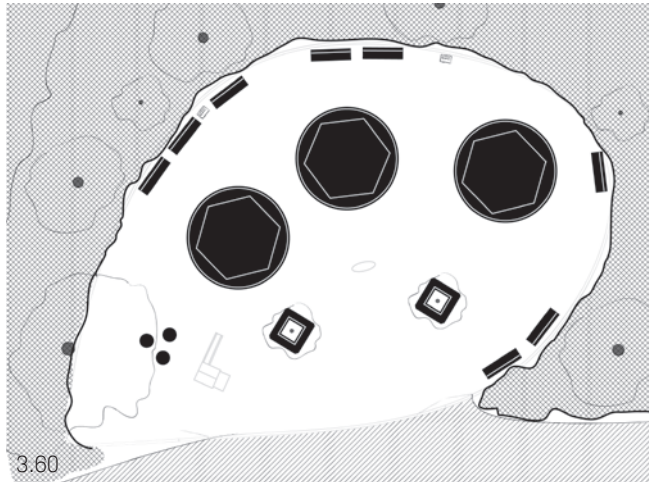
Fig. 3.61 Playground Westerpark I

The playground at the Westerpark, Fig. 3.61, exists out of both elements designed by Aldo van Eyck and new elements. The elements designed by Aldo van Eyck are three sandpits and a set of steppingstones.

Fig. 3.69 Playground Westerpark II

The second playground at the Westerpark, see Fig. 3.69, is still according Van Eyck's design. The playground is not only used by children but also often included in people's workouts.

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The playground is shaped by the greenery, benches and the passing, pedestrian pathway, see Fig. 3.66. In the current design, a small fence is placed around the playground. Van Eyck's design did not include this fence.

Along the border of the play area several benches are placed, also around two trees, in the middle of the playground, two sets of benches are located. All provide an overview over the entire playground, since all elements, are not higher than 30 cm, see Fig. 3.67.

The playground is shaped around the three large sandpits (A in Fig. 3.68), with hexagonal benches in them. The lower, left corner is connected to the rest of the play area by the placement of three stepping stones (B). These stepping stones vary in height (20 and 30 cm). See Fig. 3.68.

The playground is located at the intersection of three pathways. These roads create a triangle-shaped play area, see Fig. 3.72 and 3.73.

In the centre, a climbing frame is placed (C in Fig. 3.75). The three corners of the intersection provide place for several stepping stones (B). The steppingstones vary in height between 20 and 50 cm, see Fig. 3.75.

Along the sides of the intersection, a few seating places are realized, providing an overview of the entire playground. However, the climbing frame blocks the view due to its' height, see Fig. 3.74.

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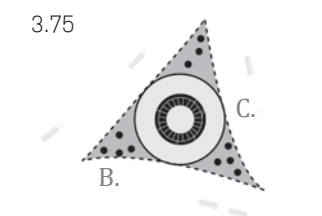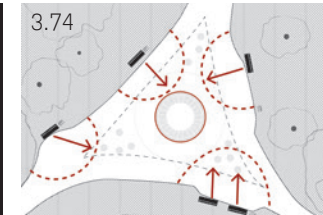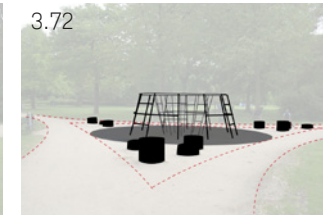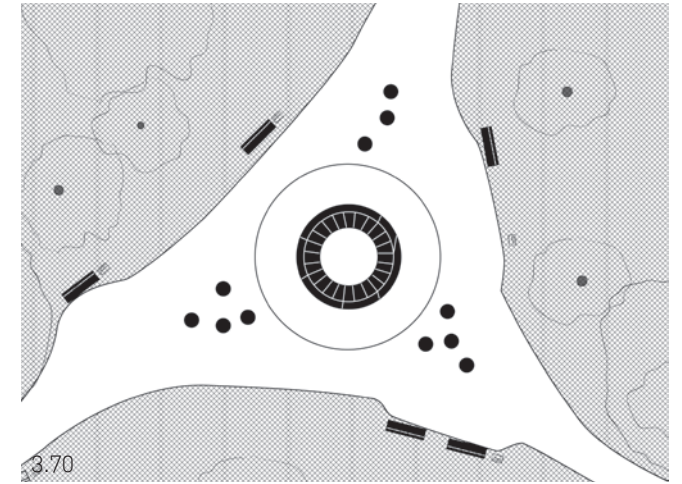
3.4.2 PLAYGROUNDS VONDELPARK

3.76
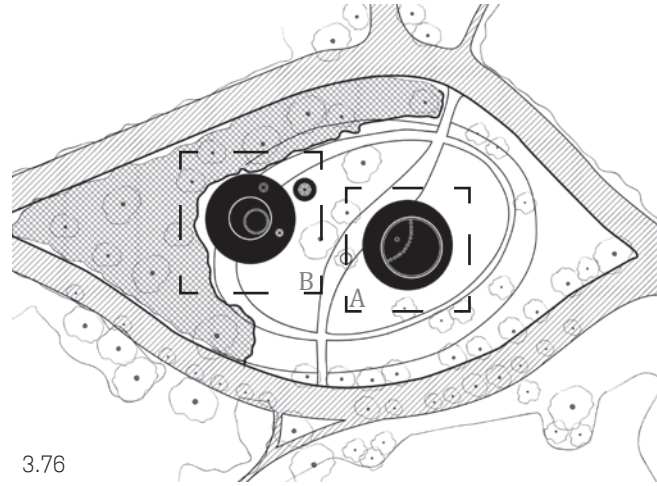
Fig. 3.77 Playground Vondelpark I

This playground in the Westerpark, Fig. 3.77, can be divided into two different play areas. On the right side, there is the water basin with steppingstones. On the left side, there is play area with new elements and elements designed by Van Eyck, Fig. 3.76.

The total play area is created by the roads of the park and the greenery located around it, see Fig. 3.78. The play area exists out of two circular playgrounds. The two areas are connected by a circular walking path and a path connecting the two ends. See the hatched paths in Fig. 3.78.

Playground A: Water basin
This playground overlaps the pathway, see Fig. 3.81 and 3.82. The placement of benches, a small concrete wall, and differentiating floor tiling shape the circular playground. The water basin is located just outside of the centre of the circular play area, see Fig. 3.81. Inside the water basin, steppingstones (B), placed in an arch, connect two sides, Fig. 3.84.

The benches along sides the play area provide an overview of the entire area. The elements in the basin aren't higher than the basin itself, see Fig. 3.80 and 3.83.

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3.84

B.
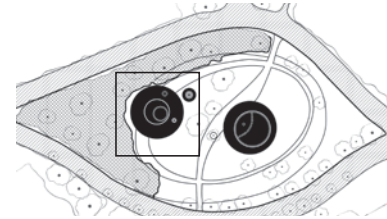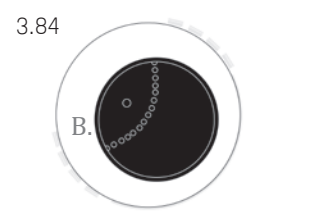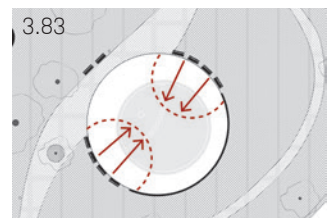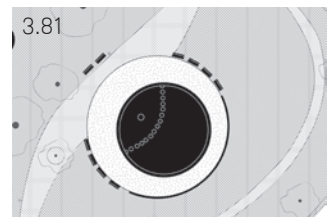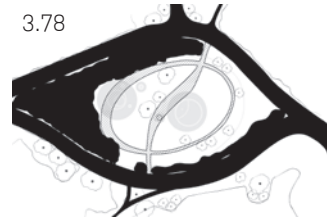
Fig. 3.85 Playground B, Vondelpark I

Playground B: Sand
Fig. 3.85 shows the floorplan of the left part of this playground. The objects at this playground, designed by Aldo van Eyck are a sandpit and two climbing frames, excluding the one upside down, see Fig. 3.86.

The circular play area is surrounded by greenery and grass fields. In addition, the pathway crossing this playground, divides the playground into three different areas: the paved pathway, hatched in Fig. 3.86 and 3.89, a sand area where a climbing frame (C in Fig. 3.91) is located, and a paved area surrounding the sandpit (A). The second climbing frame (C) is placed outside of the main circle, see Fig. 3.91. This second climbing frame relates to the other objects by using the same kind of pavement as the area around the sandpit, see Fig. 3.86.

Concerning the location of the benches, this climbing frame, outside of the main circle, is located in some kind of blind spot, Fig. 3.91.

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3.89

3.90

3.91

A.

C

C.

3.92
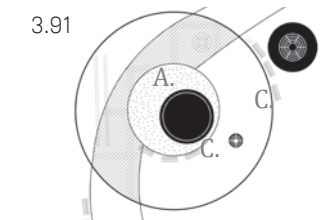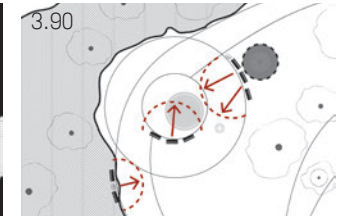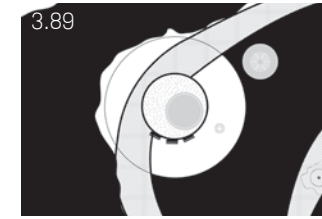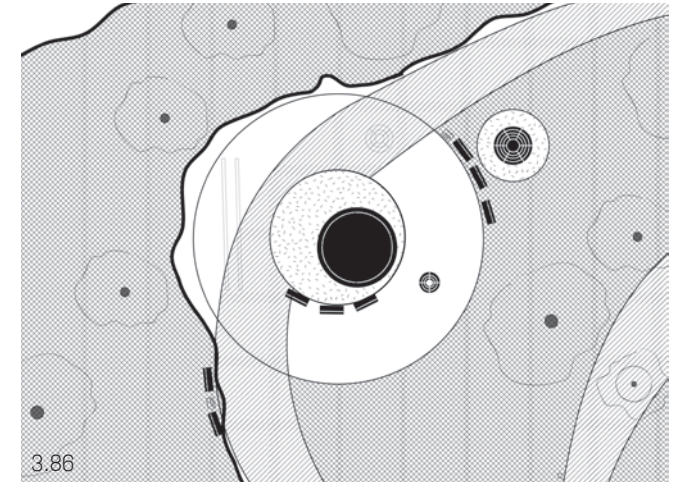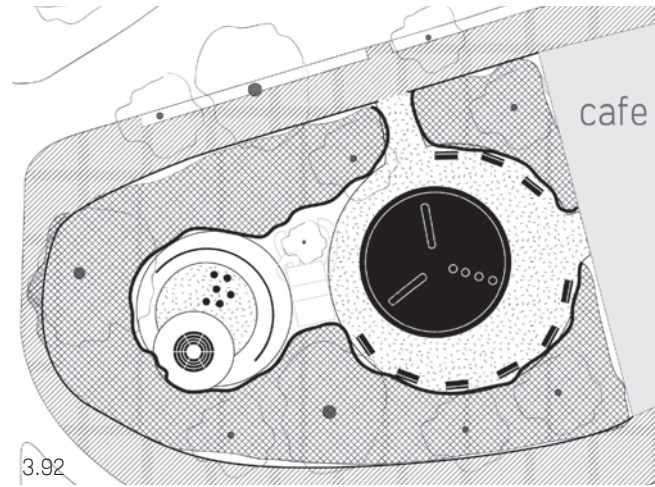
Fig. 3.93 Playground Vondelpark I

This playground is located next to an entrance of the Vondelpark, Fig. 3.93. Adjacent to the play area is a cafe, hatched grey in figure 3.92. The playground exists out of two circular parts. The two are separated by new play equipment.

3.94

3.95

3.96

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3.98

3.99

3.100

The road and pedestrian pathways shape the play area. The greenery and cafe on the right side enclose the play areas, Fig. 3.98. Two large circles form the playground. The first circle houses a round sandpit (A in Fig 3.100), placed just outside of the centre. The second is divided into three smaller circles, each housing a different kind of play object. In the smallest one, a climbing frame (C) is located. In the circle next to it, stepping stones (B) are placed. Finally, following the main circle, summersaulting frames (D) encloses the whole (Fig. 3.100).

The two circular parts are connected to each other, using the same kind of pavement, Fig. 3.92. Also, the pavement of the circle with the summersaulting frames is the same as the pavement of the circle with the climbing frame. Around the sandpit, multiple benches are placed. However, around the second part, no seating arrangements are present (Fig. 3.99).

3.4.3 SPATIAL ANALYSIS PLAY EQUIPMENT

3.101

Westerpark

3.102

Vondelpark

3.103

Vondelpark
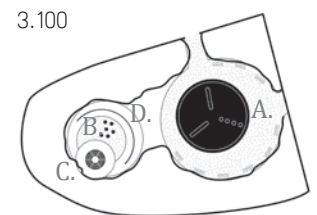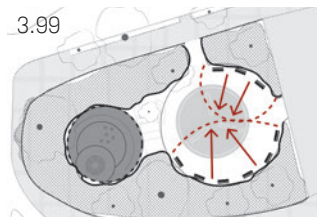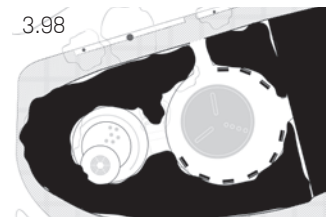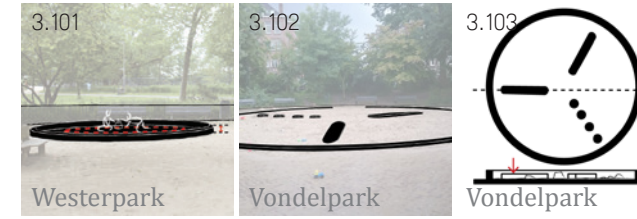
Sandpit (A)

height differences (scale B),
platforms (scale B)
loose elements (scale B)
open space (scale C)

3.104

Westerpark

3.105

Vondelpark
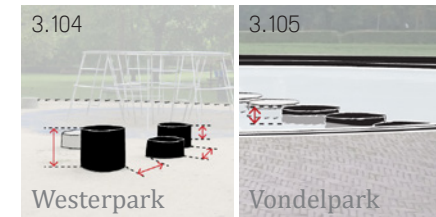
Stepping stones (B)

height differences (scale B),
platforms (scale B)
elements and their spacing

3.106

Westerpark

3.107

Vondelpark
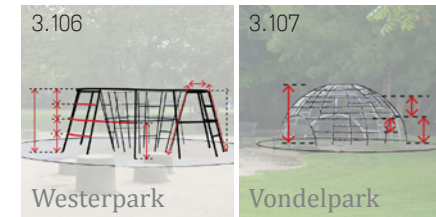
Climbing frame (C)

height differences, in steps
(scale B)
bars (scale A)

3.108

Vondelpark
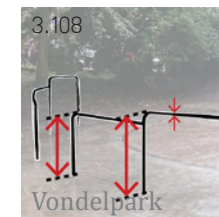
Summersaulting frame (D)

height differences (scale B)
bars (scale A)

3.5 ANALYSES PLAY — FANTASY WORLDS

1. Cohen & MacKeith, 1991.

Children under 7 years old, usually create their private fantasy worlds, as an addition to their play and act their stories out [1]. In this paragraph, these worlds of children are analysed. In this chapter four of these worlds are extensively analysed. Information on these worlds is gathered through a semi-formal interview. The questions, leading this interview are listed in Appendix "B. Questions Interview Fantasy Worlds" (page 191). The names of the children have been altered to assure anonymity to the respondents.

In the analysis has been determined what spatial characteristics could influence the creation and the 'use' of this world. The following question is answered with the analysis. *When and where did a child engage in play with their world? What are characteristics of places that were included in the children's play?*

The information on the worlds has been obtained long after the worlds have been created. All of the have already passed their childhood.

Cohen & MacKeith
This chapter is concluded with a summary of seven worlds, described in the study of MacKeith and Cohen [1]. In *The Development of Imagination: The Private Worlds of Childhood* Cohen and MacKeith describe 38 worlds of childen. Of these 38 worlds, eight are created at an age under 7 years old. Six of these eight worlds were used in the children's play. The other two formed a place where the children would go before sleep and wander around.

In this summary, the main topic of this world, possible reasons to create the world and ways in which the world was integrated in the child's play are included.

3.5.1 LUUK — LORD OF THE STRONGHOLD

3.109
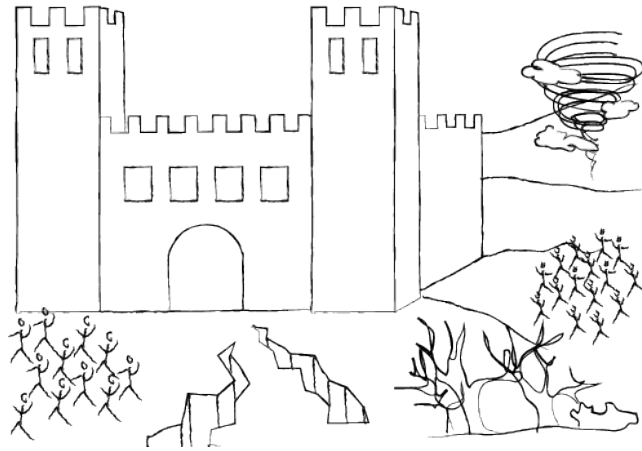
Luuk's fantasy world evolved around a castle. From the ages of 4 to 7/ 8, he would use this world during his play. Every time Luuk engaged in his game, he would prepare his castle for a threat. This could be preparation for a battle with an enemy or a natural disaster. His play was only about the preparations, as far as Luuk can remember, there has been never any confrontation.

Luuk was about four years old, when he started with his world. His worlds evolved around a castle. During his play, Luuk would **build** a castle and prepare this structure for battle or any other thread. The **materials** Luuk used in his play, depended of the place where he played. There were two locations: at home and in the allotment garden that his parents owned. In the garden, Luuk would use **wood, twigs** and **other garden waste** present to build a physical structure, which then became his castle. At home, he used **pillows, linen** and **furniture** to construct some sort of **hut**.

At the garden complex, the play of Luuk was much more evolved and included more elements. The **area** was much bigger than the rooms at home and there were **more materials** and other stuff Luuk was allowed to use in his play. At home, his parents or sitter would watch him and prevent him from opening the kitchen cabinets to grab flour to create for example a magical powder.

While playing, there was always **'something'** that represented the castle. This could be something that was constructed that moment, but also something that was left from previous games.

3.110

3.111

3.112

3.5.2 MAUD — OLLIS AND ZWALLA

3.115
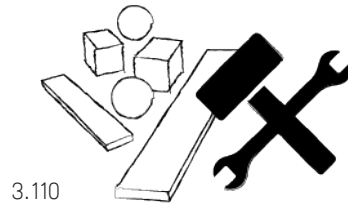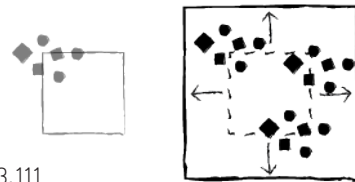
Maud created two fantasy friends when she was three years old. Ollis was one year older than she was and already went to school. Zwalla was Ollis' younger brother and was only two years old. She played with them for a whole year, up until the moment Maud could go to school herself.

3.113

3.114

When Maud was three years old, she really wanted to go to school. During her play, she invented two friends: Ollis and Zwalla. She only played with when **no other friends** were around. Maud's play evolved around school. Ollis already went to school and would take Maud with him. While they were at school, they would sing and play all day long. The school Maud and Ollis would go to, was some sort of grandstand with benches where children could sit on.

Maud played with Ollis and Zwalla when she was **at home** or **in the garden**. During her 'schooldays' she would draw, play games, or do anything she would usually do alone or with friends. Maud did not only play at home with Ollis and Zwalla. Whenever her mom would ask her to go **somewhere else**, she would ask if Ollis and Zwalla could come along.

3.5.3 JULIA – ALTERNATIVE TREE HOUSE

3.116
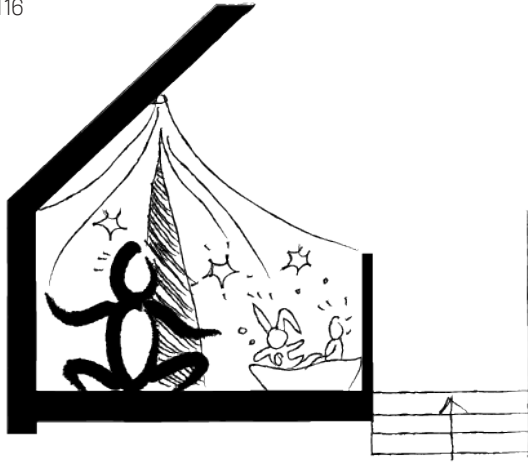
During her childhood, Julia always wanted to build a treehouse, like the ones she read about in children's books. However, at her parent's house it wasn't possible to build one. As an alternative, Julia created a hut out of bed sheets, pillows and anything else she fount appropriate. Inside her hut was her world, where she was in charge and could play with her stuffed animals. Julia created her world when she was 6 years old and played with it until the age of 8.

When Julia was 6 years old, she created a world in which she could play with her dolls and stuffed animals. The world she created was not a specific place or on a specific location, however it was her own world in which she was in charge. The stuffed animals and dolls would play out different roles and together with them Julia would think out all kinds of adventures and stories.

Whenever Julia wanted to play in her world, she would create a **physical hut**. This hut derived from the idea of a **tree house**, the ones she would read about in children's books. Julia always wanted a tree house, however, at her parent's place this wasn't possible. As an alternative, she would create a hut out of **bed sheets and pillows** in the hallway in front of her room, see Fig. 3.117. The hut was located next to the stairs underneath the slope of the roof.

The hut Julia build could d**iffer in shape and size**. However, all her dolls and stuffed animals would be placed in the **same row on top of a pillow** before and after her play. Also, the hut was **separated** from the rest of the hallway by a small curtain which functioned as a gate to her world.

Occasionally, if a friend was over, this friend was invited to build the hut and play with the dolls.
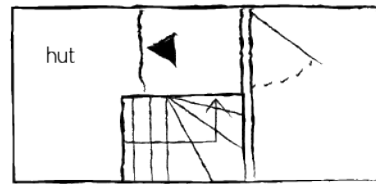
Fig. 3.117   Lay-out of Julia's hut at the top of the stairs, next to her bedroom.
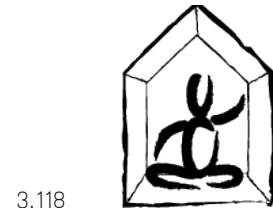
3.118
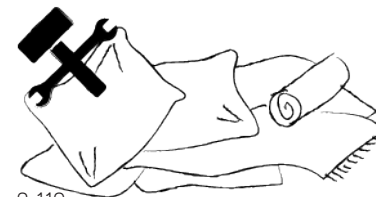
3.119
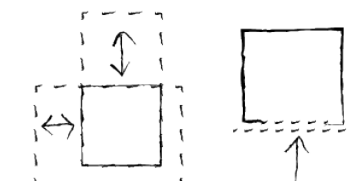
3.120

During her childhood, Julia created a second world when she played with her doll house. The house itself was too small for her play. Therefore, she created a garden around the premises. To do so, she used the carpet her doll house was placed one. Julia thinks she was about 7 years old when this play started but cannot remember when she stopped playing with the doll house and the garden around it.

Fig. 3.121   Carpet after the urban plan of Rem Koolhaas

3.122

3.123

3.5.4 JULIA – GARDEN ARCHITECT

3.124
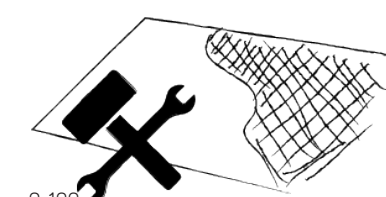
Julia played a great deal with her doll house and the imaginary garden around it. She remembered that the doll house was standing in her room on a carpet. This **carpet** represented the **border** of the garden around the doll house. The carpet represented an abstract design of an urban plan of the architect Rem Koolhaas, see Fig. 3.121. The design existed of all sorts of **lines** and **geometric figures**. The threads of this carpet could be pushed from one side to another to create a **colour difference**. This way Julia could draw entire maps of a garden around her doll house.

Every time, Julia played with her doll house, she would design a different garden. Though one red dot on the carpet, represented always the same element. Unfortunately, she cannot remember what it represented.

The family that lived in the doll house was always the same. To the family belonged a father, mother, daugther and son.

3.5.5 FANTASY WORLDS COHEN AND MACKEITH

HOLLY – HOLY CAT KINGDOM

Holly created a world named Branmail, to which access only could be obtained by scaling to a certain height. Apart from Holly, all inhabitants were cats. Of all the families living in Branmail, Holly was friends with one specific family, existing of a father, elder daughter and younger siblings. Holly thought of stories and **acted them out**. Holly herself was some sort of anti-heroine. Holly created Branmail when she was about 3 years old and it faded when she was 6 years old.

3.125

JANE – (TWO WORLD JANE)

Jane got inspired by the **cracks in the ceiling** of her grandfathers' house to create an imaginary world, of which she drew maps. She planned the social organisation of the city, while drawing entire road and cities maps. At one point, she started considering traffic control and pedestrian flows. Within her world, all sort of inhabitants lived. Jane was fond of two boys and created adventures and stories, which she **acted out**. Jane created the world when she was 6 and it ended when she was 13 years old.

3.126

BERYL – MOHAWKS AND WOLVES

Beryl created an imaginary island, which expanded over the years. She was interested in the nature and imaginary creatures. Beryl herself lived somewhere on the island and travelled around together with her two companions: a wolf-dog and Arab mare. She thought of all sort of stories and **acted them out**. Beryl created her world when she was about 5. It reached its zenith between 9 and 16, after the age of 16 it faded.

3.127

DAN AND PETER – 'POSSUMBUL' WORLDS

Dan and Peter are cousins who started Possumbul world together. Dan was the principal creator. The two were monarchs in the world. The world was based on possible actions and very realistic. They created an entire country. At a young age, the two boys would **build** the cities out of **blocks and other toys**. Later, they would **draw maps** showing all the streets, rivers, and parks. Dan and Peter engaged in their world from the age of 5 until the age of 12.
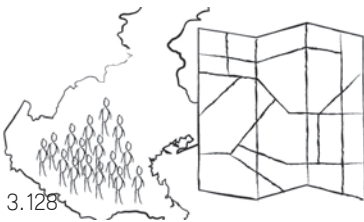
3.128

ROSALIND – MAKING UP FOR MOTHER?

Rosalind had two imaginary friends: Jean and Robert. The two boys would **accompany her in real life**. She imagined her toys to have human characteristics and to be the children of Robert and her. Rosalind invented her two companions when she was 4 or 5. When she was 10, she created together with her younger sister an imaginary island where Robert and Jean came to live. During her youth, Rosalind's mother died. She thinks that the imaginary world helped her **cope with the loss**.

3.129

JACK – STILL AND ISLAND?

Jack is fond of trams. During his youth Jack created multiple worlds, revolving around trolley busses and trams. The first was inspired by the **market garden**, owned by his father, next to their house. The **pathways** in the market **represented roads**, where trolley busses and trams would go. Jack named the different parts of the city. He would lay the different lines and parts of the city out in the **living room**.
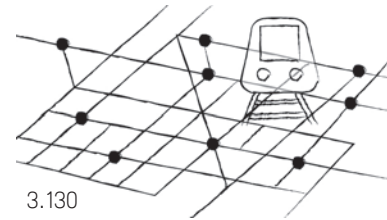
3.130

3.6 SUMMARY PLAY
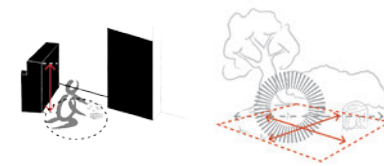
Fig. 3.131   Play in the in-between-space, observation accidental, inside play area
Fig. 3.132   Play in the in-between-space, observation planned, outside, nature playground
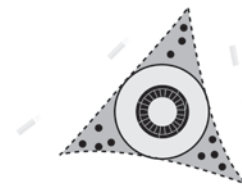
Fig. 3.133   Use of play equipment to shape the playground
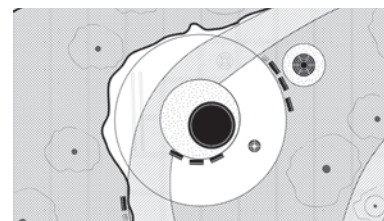
Fig. 3.134   Use of pavement to shape the playground

Fig. 3.135   Decentralised composition playground Vondelpark

The different analysis result in an overview of all spatial characteristics of elements which shape play areas. The spatial characteristics are labelled, grouped, summarized and abstracted to a set of generic properties which can be used to describe places that invite children to play.

The spatial analyses of different play areas include all kinds of play spaces for a child. Therefore, the first generic property describes a **place** (Fig. 3.136). This property is confirmed by the analysis of the characteristics of locations and circumstances in which a child engages in play which are about around a fantasy world. All fantasy worlds include play; To facilitate this play, again a place is needed. The place is created by the placement and organisation of elements. This place can be on an object or in between them, see figure Fig. 3.131 and Fig. 3.132. Therefore, the composition of different elements is key. Hence, the second and third generic property are **composition** (Fig. 3.136) and **elements** (Fig. 3.137). The analysis of Van Eyck's playgrounds shows how the designs are shaped by different play equipment, such as climbing frames and sandpits, but also benches and greenery. The playground at the Westerpark is an example of this, see Fig. 3.133. Other than three-dimensional elements, also the two-dimensional elements (or planar differences) were employed by using different types of pavement, see Fig. 3.134. These results introduce two other generic properties which can be used to describe elements: **height** and **planar differences** (Fig. 3.137 & Fig. 3.138). The analysis of the playgrounds of Van Eyck also shows how most of the areas have a decentralized composition, this means that none of the elements, used to create a playground, is placed in the centre, see Fig. 3.135.

The composition of elements is key to create a place. To describe the composition of the elements, several aspects should be taken into consideration. The **variety & number** of elements, the **scale** (Fig. 3.139) of these elements and, to connect the different elements together, the **interrelationship** (Fig. 3.139) of one element to another.

Also, the composition of different elements or an element in itself can be described by other generic properties. The first is **enclosure** (Fig. 3.140). As mentioned, an area for children to play can either be on top of an object or element or play in between elements, at a sheltered place. Another property is **manipulation** (Fig. 3.140). The results of the spatial analyses introduce a type of element at a play area which invites a child to interact with objects and even change this object. In this case manipulation is not only the possibility to connect elements or split them up. Examples are craft paper or threads in a carpet, which contribute to the creation of Julia's fantasy world. However, the feature manipulation also includes elements which invite children to interact with objects on a larger scale. Examples are swings, trampolines, but also cushions, flexible branches, or chains in between pillars.

Regarding the latter, to stimulate play, an area should contain materials and objects which can be moved (considering size and weight) and adapted by the children. This feature results in the following property: **loose materials** (Fig. 3.141). The properties manipulation and loose materials are confirmed by the story of Luuk and both stories of Julia. These illustrate how the presence of loose materials are important to create a physical representation of the fantasy world. Also, Julia remembers how the bed sheets in her tree house created the right amount of separation of the rest of the house to start her play.

Finally, the garden world of Julia is specifically created on a carpet with all sorts of abstract shapes on it. These planar differences have invited Julia to use it in the creation of her world. The research of Cohen and MacKeith also describes a world which was inspired by planar differences. In this case the girl, Jane, got inspired by the cracks and patterns in the ceiling. These two examples introduce another generic property: **abstraction** (Fig. 3.141).

Fig. 3.142 provides an overview of these properties. The term **composition** is not only a generic property. To the properties **height difference**, **planar difference**, **elements** and **enclosure**, it is also some sort of general or 'umbrella' term. However, also the property **variety** is closely related to this feature. For example, Van Eyck's steppingstones vary in height and distance to each other. These variety and **scale** differences create a play area that invites children to balance, jump, sit or climb on the stones.
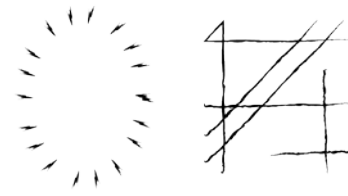
Fig. 3.136 Generic properties place and composition.
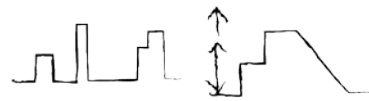
Fig. 3.137 Generic properties: elements and height differences.
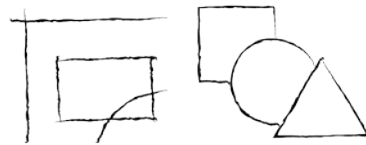
Fig. 3.138 Generic properties: planar differences and variety & number.
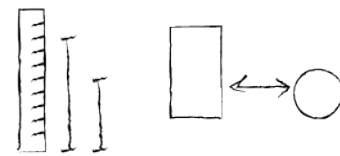
Fig. 3.139 Generic properties: scale and interrelationship.
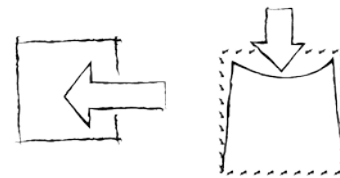
Fig. 3.140 Generic properties: enclosure and manipulation.

Fig. 3.141 Generic properties: loose materials and abstraction.
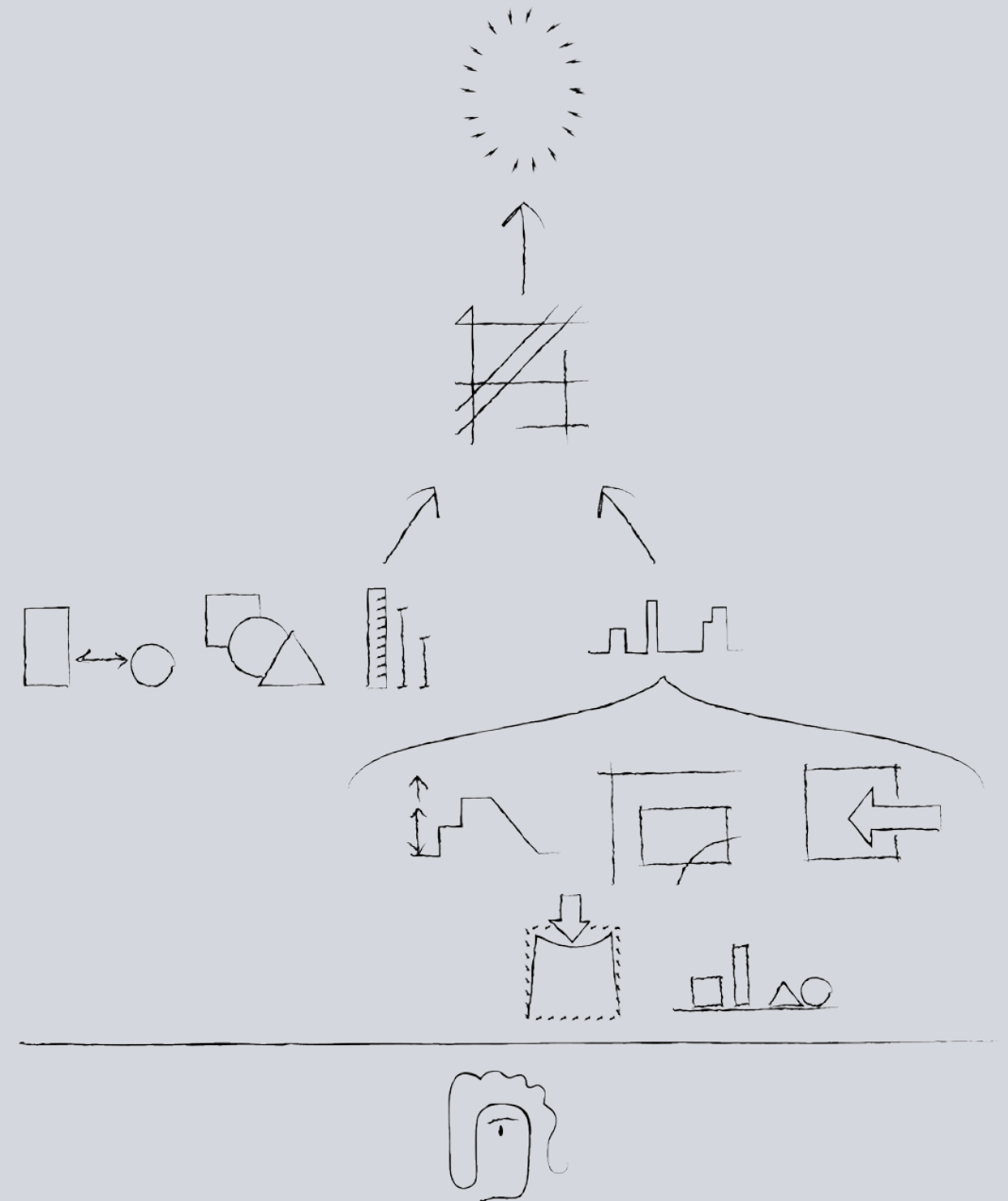
Fig. 3.142 Generic properties in relation to composition and the creation of a place to play: the composition is created by elements and the organisation of these elements, based on interrelationships, variety and scale. The elements can be described by the properties: height differences, planar difference, enclosure, manipulation and loose materials. Abstraction is one generic property that does not directly relate to the term composition.
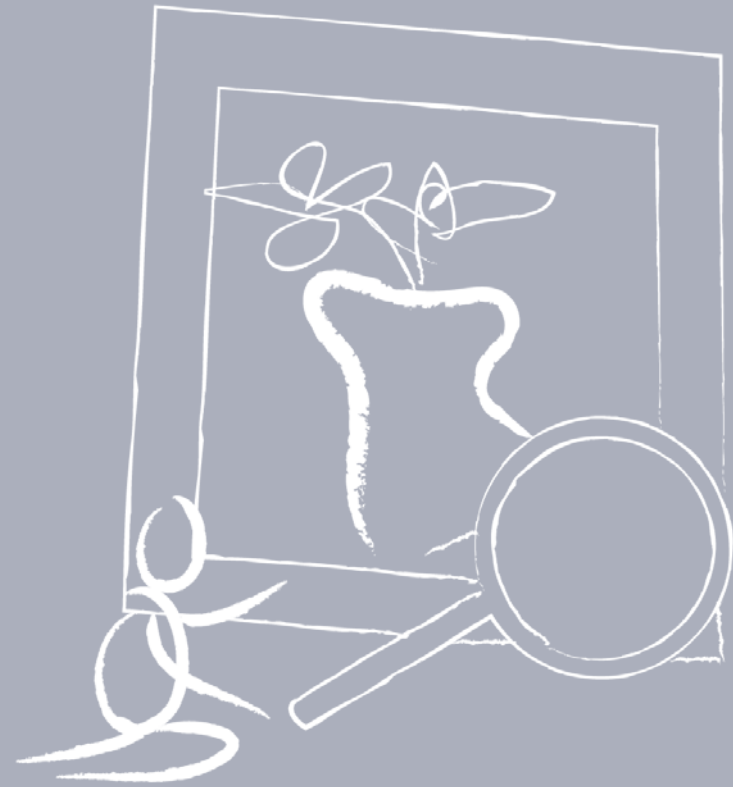
4. ART

4.1 ART PERCEPTION

Chapter 4 includes an overview of the way a child perceives art between the ages of 3 to 6. The models of Parsons and Housen are discussed in relation to the cognitive development of a child.

In the following paragraph the analyses of different artworks are presented. The work is chosen from different exhibitions and museums appropriate for children under the age of 7. The analyses mark the main characteristics of the different art pieces, which can be translated into (spatial) generic properties. The third paragraph provides a summary of these results.

1. Disanayake, 1990.
2. Parsons, 1987.
3. Cohen & MacKeith, 1991.
4. Winner & Gardner, 1988.

The final activity in which the imagination becomes active is during the perception of art. Art is the artist's translation and representation of the world in a piece of work. The way an artist represents his or her work, varies in many ways and many styles [1]. The perception and experience of art brings us pleasure and enjoyment [1: 65-67, 2]. Michael Parsons states how part of the enjoyment is exploring, associating and wondering about the work [2: 31]. It stimulates the imagination [2, 3]. This paragraph evolves around the perception of art by children aged 3 to 6. First literature of Michael Parsons has been reviewed. Parsons's research explores how children perceive art and how this perception evolves. In addition, a link has been made between the literature of Parsons and literature on cognitive development, as described in chapter "2. Perception".

Stages of understanding art
Art stimulates our imagination, in children of all ages [2: 1-14, 3: 18-19]. Parsons has conducted research on how children perceive art. He interviewed a large number of children and adults about different paintings and used this information to define five stages of aesthetic development. Parsons relates the perception of art to a process of understanding the artwork. The stages are not directly related to a certain age, but to a level of development. *"Each stage understands paintings more adequately than the previous one"* [2, p. 20]. The first stage is called *Favouritism* and lasts in children usually until the age of 6. Elementary schoolchildren usually reason at stage two: *Beauty and Realism*. After stage two, the stage a person is in, is determined by the experience with art. The third stage is called *Expressiveness* and is followed by *Style and Form*. The last stage is called *Autonomy*. In this last stage, a viewer criticises not only the work as a particular artistic tradition, but criticises the tradition itself. Art is seen as a way to raise questions instead of providing the truth [2: 20-26, 4].

Abigail Housen also developed a model with

developmental stages of aesthetic understanding. Her theory corresponds on many levels with the theory of Parsons. For example, both theorists agree on the idea that the development of aesthetic understanding corresponds with cognitive development and develops into stages, which follow each other in a fixed sequence and can't be skipped [2: 20-21, 5, 6: 15, 7]. Also in line with cognitive development, see chapter "2. Perception", "2.2.2 Cognitive Development" (page 51) [8: 13, 9: 277-284], both theorist mark a decline of egocentrism and an increase in self-reflective effectivity [2: 30-31, 6: 14]. Furthermore, as the stages pass by a viewer develops the ability to separate a good painting from a painting that is liked. To an expert a good painting is not necessarily a painting that he or she likes [2: 20-25, 5, 6].

This research covers a group of children between the ages of 3 to 6. According to Parsons these children could be either in the first or second stage of art perception. However, Parsons emphasizes how the age does not always correspond with a certain stage. This is illustrated by other researcher, who linked the first two stages to different ages. According to Winner and Gardner [4] most of the children are up to the age of 5 in the first stage. In addition, Cohen and MacKeith [3] related the first stage to children up to an age of 9 years old. Although the opinions differ, the first two stages of Parsons are more broadly examined than the last three stages. In addition, Housen describes five stages which correspond for a large part with the five stages or Parsons. Knowledge of these two is combined and summarized in the following section.

Parsons's favouritism
During the first stage, egocentrism is still present in the child and he or she is only aware of his or her point of view. A child is often aware of the subject and what it represents, but allows associations and memories freely to enter their response. The child has *"an intuitive delight in most paintings, a strong attraction to color, and a freewheeling associative response to subject matter"* [2, p. 22]. During this stage, rarely, a child does not like a painting. The concept of good and bad art is lacking [2: 22, 26-36, 4, 5].

The first stage Housen defines is the *Acountive Stage*, this stage is dominated by concrete, random observations about the content, subject matter or colour of a work of art. As Parsons states, the judgement of a painting is related to a person's preference [6: 9,13-14].
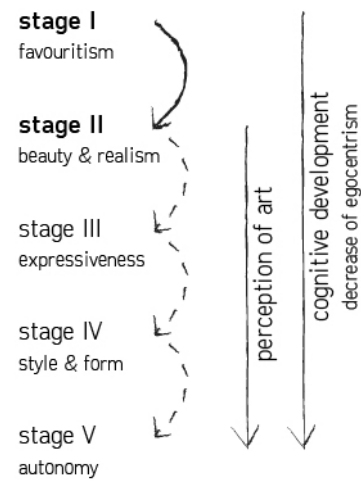
Fig. 4.1　Sequence of stages of art perception (Parsons). The development of stage I into stage II is only caused by the cognitive development of the child. The other stages can only be reached by perceiving art.

Fig. 4.2　Piacasso, girl before a mirror.

2. Parsons, 1987.
3. Cohen & MacKeith, 1991.
4. Winner & Gardner, 1988.
5. Mockrocks, 1993.
6. Housen, 1999.
7. Housen, 1983.
8. Piaget & Inhelder, 2000.
9. Piaget, 1962.

2. Parsons, 1987.
4. Winner & Gardner, 1988.
6. Housen, 1999.
8. Piaget & Inhelder, 2000.
9. Piaget, 1962.
10. Piaget, 1951
11. Piaget, 1930.
12. Picasso, 1932.

Parsons's beauty and realism
During the second stage, the idea of the subject becomes dominant. The painting is judged by their realism and if it is beautiful. *"It just looks like the real thing"* [2, p. 22]. A child develops the ability to like a painting based on the quality of the content instead based on the presence of his or her favourite colour or animal on it [2: 22-23, 39-58, 124-132, 4]. Also, a child becomes more and more skilled to acknowledge the viewpoint of others, explained by the degrease of egocentrism [8, 9].

Housen describes the second stage as the *Constructive Stage*. This stage is also very like Parsons' Beauty and Realism stage as the viewer in this stage is mainly interested in realistic representation. Occasionally a viewer starts to create a distance between him or herself and the work, and develop and interest in the artist's intention [6: 9-10,13-14].

Cognitive development & Piaget
As a child moves from the first stage to the second stage of Parsons and Housen, a child develops a new way of looking at art. This development from one stage into another is, according to Parsons the only development that is caused by the aging and development of the child itself. According to Parsons, a person only addresses the other stages of art perception, whenever he or she experiences art over and over. Considering a child's own development, due to a decrease in egocentrism, a child is capable to review the artwork not only from his or her point of view, but also from the artist's point of view. Furthermore, as described by Piaget, a child under the age of 7 has a magical way of thinking. This magical thinking results in the inability to separate reality from fantasy [10, 11: 258-272]. This way of thinking is also detected by Parsons and Housen. Parsons calls it *"a freewheeling associate response to subject matter"* [2, p. 22]. A child freely interprets what he or she sees and after a simple, concrete observation, a story unwinds in their mind. Housen illustrates this '*idiosyncratic*' thinking with an example of the response of a viewer to a Picasso's "girl before a mirror" (Fig. 4.2) [6: 9-10, 13-14, 12].

"...um, looks like there' s a lady right here... looks like she is a man right here and looks like they might be living in a castle, they might be rich or something, and they're all dressed up, they just got back from a party..." [6, p. 9]

4.2 ANALYSIS

1. Villa Zebra, n.d.
2. Pronk, 2011
3. Museum Boijmans van Beuningen, 2017.
4. de Koning, 2017.
5. Amsterdam, 2017.
6. Eliasson, 2009.
7. Boijmans van Beuningen, 2016.

This part of the research focusses on the experience of art. As the research focusses on the effect of the built environment, only art, which has a still, spatial result, has been analysed. To this selection belong sculptures, paintings, photography and other installations. Music, theatre and film are excluded from this analysis. The work that is used is chosen from exhibitions and work, which are appropriate for children aged 3 to 6 years old.

Work has been selected from the Art collections of the Gemeente Museum in The Hague and the Stedelijk Museum in Amsterdam, which offer special lessons and tours for preschool aged children. In addition, Museum Boijmans van Beuningen in Rotterdam and Villa Zebra both offer a complete exhibition especially for children. Villa Zebra is a museum in Rotterdam, which has an exhibition, Zelf!, especially for children aged 3 to 6 years [1, 2]. Museum Booijmans van Beuningen had a temporary exhibition for children, called Alles Kids [3].

In addition, also work of Olafur Eliasson and Krijn de Koning has been added. Eliasson and de Koning both have designed artworks in which the experience of the environment is central to the work. The designs, which are used in this analysis, are an element on a school playground in Utrecht and work from the Stedelijk Museum in Amstedam [4, 5]. Olafur Eliasson creates sculptures, photography, film or installations in which he uses aspects from nature. With these pieces, he wants to create consciousness about the environment and the influence of the users [6, 7]. In this research the installation 'Notion motion', present in the Boijmans van Beuningen in Rotterdam, is analysed.

To the different work belong photographs, paintings, sculptures and complete installations. For the analyses, the work is sorted by a topic. These topics are based on the subject of the artworks: human/animal/being, (geometric) shape, objects, scenery and installation.

4.2.1. HUMAN/ ANIMAL/ BEING

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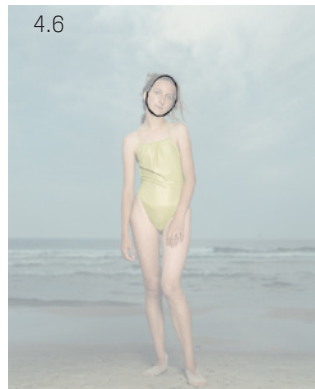
To this category belongs the work of Mike Kelley (4.3), Caspar Netscher (4.4), Francesco Fanelli (4.5), Rineke Dijkstra (4.6), Jean Tinguely (4.10), Panamarenko (4.11), Picasso (4.12) and Niki de Saint Phalle (4.13). The subject of the work is a person, animal, or other being.

The work of Netscher (4.4), Fanelli (4.5), Dijkstra (4.6) and Picasso (4.12) all show an image of a person or animal which can be recognized as such. The work of Tinguely (4.10), Panamarenko (4.11) and Niki de Saint Phalle (4.13) all represent some being which **cannot be categorized** as a specific type of being at first sight. The work of Mike Kelley, both shows an image of the artist himself, which can be recognized as such, and images of toys or stuffed animals. Whether the stuffed animals represent some animals, or any beings is debatable, like the work of Tinguely or Panamarenko.
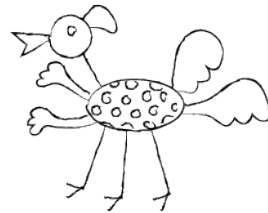
Fig. 4.7   Not recognizable

Each of these portraits or sculptures shows **little context** to the subject displayed. Only the work of Netcher and Dijkstra provide some background due to the scenery where the image is taken.

Fig. 4.8   Storyline unknown

The work which is presented varies not only in topic but also in style, medium, use of materials, colours and techniques. There is a **large variety** of colour, detail or texture in the different artworks. Within different artworks, in the variety of for example colours **contrast** between different parts is introduced to make notice to certain elements or topics in the artworks. For example, the green bathing suite contrasts the blue of the background (Fig. 4.6).
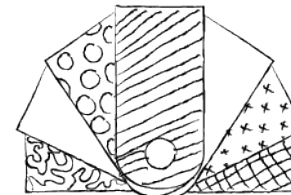
Fig. 4.9   Variety detail, colour, shapes and texture

Fig. 4.14   Contrast

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4.2.2. GEOMETRIC SHAPE

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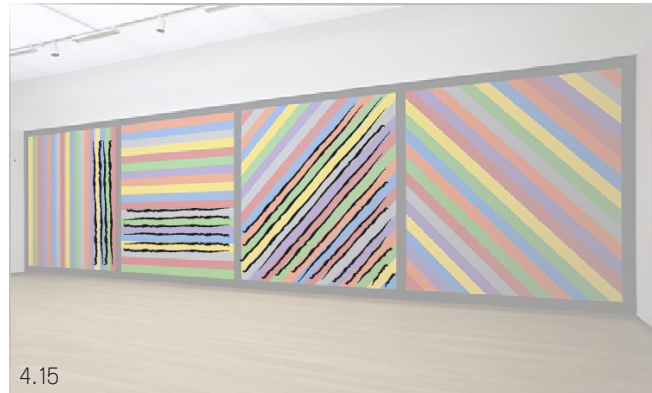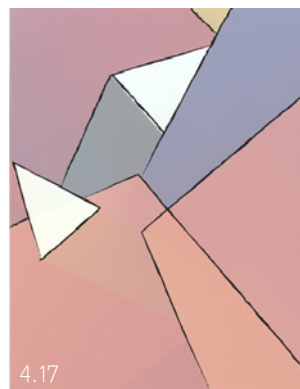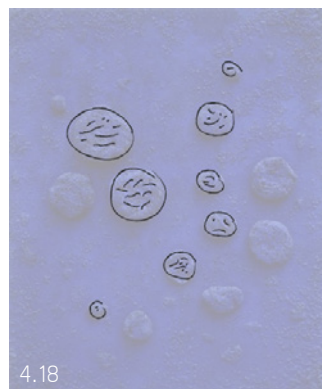
To this category belongs the work of Sol Lewitt (4.15), VANDERHEYDEN (4.16), Shiana Shahbazi (4.17), Yves Klein (4.18) and Piet Mondriaan (4.19). The work exists out of simple, geometric shapes or lines.

The work of these artists is a representation of reality by mere **geometric shapes and lines**. The topic which is represented **is not directly recognizable** and the spectator is invited to speculate about the topic, meaning and more. All the work differs in the use and **variety** in colour, type of shapes, size and texture. Within different artworks, **contrast** between different parts is introduced to make notice to certain elements or topics in the artworks.
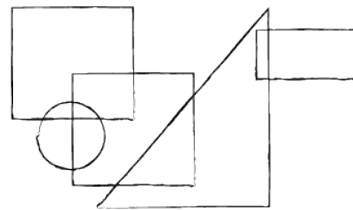
Fig. 4.20 Geometric shapes
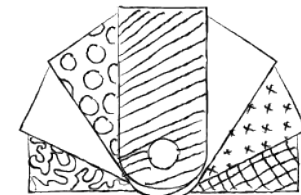
Fig. 4.21 Variety in detail, colour, shapes and texture

Fig. 4.22 Contrast
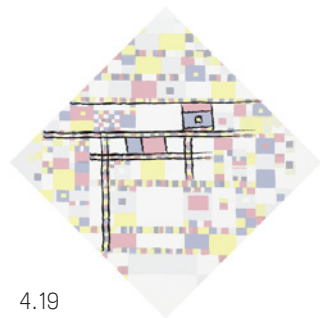
4.2.3. OBJECT

To this category belongs the work of Bruce Nauman (4.25) and Krijn de Koning (4.26 and 4.27). The subject of these sculptures is not a living thing, but an object or item.

The work is a spatial representation of the architect's vision. All three installations are meant to be explored by **moving** around through the artwork and at some points even **touching** the artwork. The dimensions of these three projects are designed to the purpose.

Fig. 4.23 Moving around the artwork

The work of Krijn de Koning in the Stedelijk Museum (4.26) invites the spectator to move around not only by creating holes in walls, like in Nauman's work (4.25), but also by providing a **limited view** through these holes, arousing curiosity. Nauman's work also **changes the view** of the spectator whenever he or she is moving around in the installation.
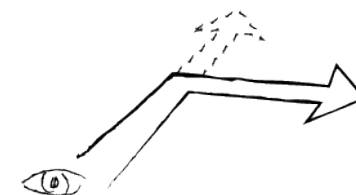
Fig. 4.24 Change in view
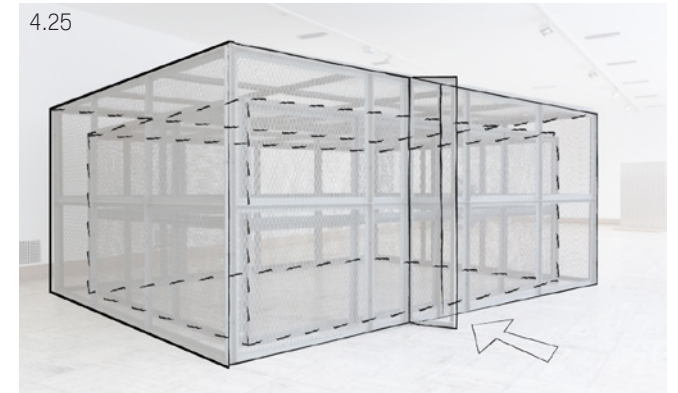
4.25
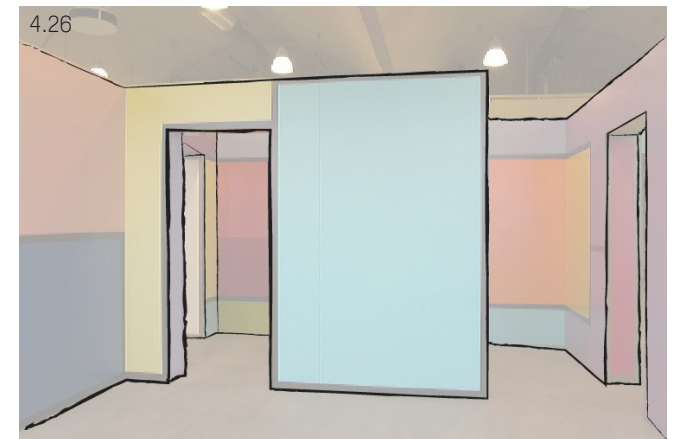
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4.2.4. SCENERY

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To the category Scenery belongs work of Monet (4.28), Alfred Sisley (4.29) and Jacopo del Sellaio (4.30). Each of the artworks shows not only animals, people, or other living things, but also the context, nature, and surroundings. To these artworks the context is also important.

The nature and context of the artwork forms an important aspect in the work of Monet (4.28) and Sisley (4.29). The latter (4.29) does also show a few figures. The vague contours and small size of the figures keeps the spectator from identifying the people and lets them **wonder about the storyline or location** the painting shows. In the work of Jacopo del Sellaio the figures play a more important role and del Selllaio uses the nature and surroundings as background to the story of Orpheus.

Fig. 4.31 Storyline unknown

The paintings all vary in the use of colour, shapes, techniques and other details.
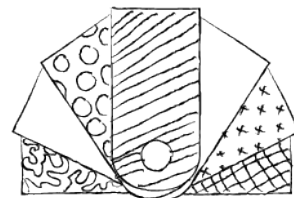
Fig. 4.32 Variety in colour, detail, shapes and texture

4.2.5. INSTALLATION IN SPACE

To this category belongs the installation 'Zelf!' of Villa Zebra (4.35 and 4.36) and the installation 'notion motion' of Olafur Eliasson (4.37). These art pieces belong to this category since they include the entire room as part of the artwork and they all are based on the interaction of the user.

Both of the artworks have an **interactive** character and they invite the spectator to move around and move more. By opening the cabinets of the installation 'Zelf!', users discover different sceneries, which one can **play** with, interact with and **explore**.

Fig. 4.33 Interactive/ moving around

Also, the installation 'notion motion' invites the spectator the move around to step on planks, which are connected to the installation and trigger the movement of the water which is projected on the walls. By stepping on different images, the reflection **changes** over and over.
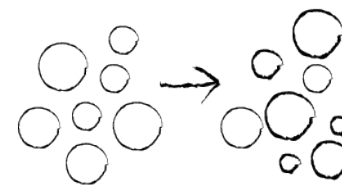
Fig. 4.34 Change in scenery

4.35

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4.37

4.3 SUMMARY ART

Fig. 4.38 Netscher, family in a park

Fig. 4.39 Niki de Saint Phalle, Murten

Fig. 4.40 Sisley, Un verger au printemps

Reviewing the different art pieces results in a set of characteristics and properties which are described in paragraph "4.2 Analysis". Summarizing all these properties results in a set of properties which can later, in chapter "5. Conclusion / Discussion", be linked to the generic properties, described in chapter "3. Play".

First of all, two properties which are key to the creation of any artwork are the **abstraction** of what is shown and the **composition** of different aspects of the artworks. Each of these aspects contributes to the total experience of the art piece by different spectators.

The property **abstraction** is defined as omitting information in what is shown in relation to the reality. The different works, which have been analysed, show different levels of abstraction. For example, the figures in the painting of Netscher (see Fig. 4.38) can be recognizable as people of a certain age. Whilst, the sculpture of Niki de Saint Phalle (see Fig. 4.39) shows some sort of being, which is not directly recognizable as a being of a certain kind. Also, looking at the work of Netscher, several people can be distinguished and by their clothing, position and expression some assumptions can be made. Whilst, in the work of Sisley (see Fig. 4.40) the figures are only vaguely distinguishable. Summarizing all the different ways the artworks are abstracted, two main topics of abstraction can be recognized: the absence of a background or context to the subject and the abstraction of the shape of what is represented.

Fig. 4.41 shows an example of the abstraction of the context of what is shown. The photographs show portraits of different stuffed animals and a man. Who they are and why they are is left to the imagination. Another example of the abstraction of context is the work of Jacopo del Sellaio, see Fig. 4.42. In this scenery, part of the story of Orpheus is displayed, however, some parts are left out and anyone who does not know the story can freely wonder about the events shown in the painting. These two examples show

also two different levels of the abstraction of context.

VANDERHEYDEN (Fig. 4.43) created an abstract image of a horizon, using only colour areas. His work is an example of the abstraction of the shape and representation of a topic. In his work, what is displayed is abstracted to only orthogonal shapes and colours. Another example of this type of abstraction is the sculpture of Tinguely (Fig. 4.44). The abstraction of the topic of this sculpture is to a point that someone maybe can recognize the legs, head and body of the creature, but more details are left to the imagination.

As mentioned, the way an image is abstracted varies not only in topic but also to a level. Fig. 4.45 provides an overview of the levels of abstraction, regarding the two topics.

In the case any art work, the **composition** of the different elements plays an important role. The composition of elements determines the lay-out of the work and therefore the impact of the work on the spectator. Aspects which determine the composition of an artwork are the variety of different colours shapes or images and patterns, or the number and dimensions of the different elements. The use and placement of these aspects and the relation of the aspects to one another result in a certain composition.

Abstraction and composition result in some sort of framework, which provides a certain part of information to the spectator. By leaving information out, a spectator is triggered to wonder about what is missing: either by thinking about different possibilities or by moving around to explore other parts of the framework. An example of the latter is the work of Krijn de Koning (see Fig. 4.46), in which the lines of sight through the different doors guide

Fig. 4.41 Kelley, Ahh...Youth!

Fig. 4.42 Del Sellaio, Orpheus

Fig. 4.43 VANDERHEYDEN, horizon

Fig. 4.44 Tinguely, Gismo

Fig. 4.46 De Koning, Four walls, five doors

Fig. 4.47 Eliasson, Notion motion

Fig. 4.48 De Koning, 3VSO

the spectator. Also, the work of Olafur Eliassion (see Fig. 4.47) creates some sort of frame. When first entering the hall, a single reflection is seen. However, by stepping on a hinge this framework is changed. Each hinge causes a different change and therefore results in a new frame.

The work of Krijn de Koning (see Fig. 4.46) illustrates another property, apart from abstraction, which is part of the creation of an artwork: **contrast**. By creating a contrast in colours (Fig. 4.38 and Fig. 4.42), shapes (Fig. 4.47 and Fig. 4.48) or other aspects of the composition, the attention of the spectator can be guided through the work.

The influence of the composition and abstraction on the stimulation of the imagination and movement around a room or object is shown in Fig. 4.49.

Other work of Krijn de Koning (see Fig. 4.48) and the installatio 'Zelf!', invite a child to engage in behaviour which is closely related to play behaviour.

Fig. 4.45 Level of abstraction, regarding context and representation

Fig. 4.49 Stimulation of the imagination by providing a framework of information

5. CONCLUSION / DISCUSSION

5.1. CONCLUSION

This chapter includes both the conclusion of discussion to this research. The conclusion summarizes the findings and results of all research (observations, analyses of playgrounds and artworks and literature studies) which has resulted in a set of generic properties and can be used as a tool in a design.

The discussion reflects on the research methods used in this research and the influence of the limits of these methods and this research on the final conclusion. The research ends with a recommendation for future research.
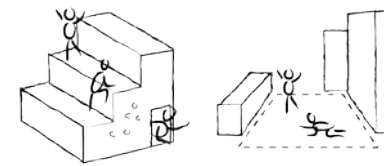
Fig. 5.1 (left) On an object, (right) in between objects
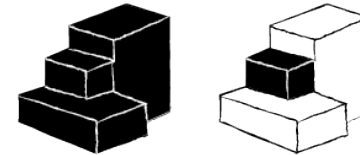
Fig. 5.2 Element as an object (left), elements, part of an object (right).

interrelationship

variety

scale

organisation

composition

elements
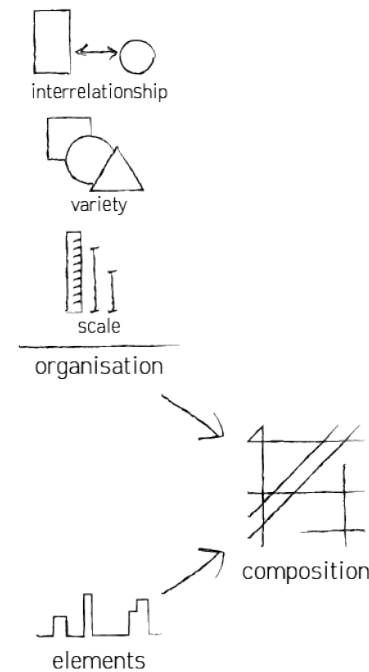
Fig. 5.3 Properties resulting in a composition

The main question answered in this research was:

In what way can activities, in which the imagination of children is active, be translated into generic properties, which can be used to design the built environment, stimulating the imagination of children aged 3 to 6 years?

Answering this question in this research has resulted in the formulation of a set of generic properties and characteristics which describe a space. These properties and characteristics can be used as a design tool to shape the built environment in such a way that it stimulates the imagination in children, aged 3 to 6 years.

Defining a place
The generic properties are derived from the analysis of play behaviour, playgrounds, fantasy worlds and the analysis of art. These generic properties describe a place which stimulates the imagination of a child. The results of the observations and analyses of different play areas define a place as the **composition** of elements. This place can be both on an object and in between objects, see Fig. 5.1. The scale of these places differs between object-size and room-size. The elements describing a place can be both an object as a whole, but can also be a smaller part of an object, see Fig. 5.2.

The analyses of different play areas and artworks have resulted in a set of generic properties which can be used to describe the composition of a place. First, the composition is the organisation of different **elements**. The **number & variety** of these elements play a role in the composition, as well as the **scale** of the different elements. Finally, the **interrelationship** of one element to another element or a person, using it, is part of the creation of a composition. A summary of these properties is shown in Fig. 5.3.

To stimulate the imagination of a child, the place must meet one or both of the following requirements. At the

place, certain **elements** must be present as a part of the composition. Secondly, the place must provide a certain **framework** of information. Both requirements have evolved from the spatial analyses of the different play areas, fantasy worlds and artworks. This is summarised in Fig. 5.6, whilst each of the requirements is explained in the following sections.

Elements stimulating the imagination

To stimulate the imagination, the elements present have one, or more, of the following properties: the elements are defined by **height differences, planar differences**, the presence of **loose materials**, and/or **contrast**, and/or the elements support **enclosure** and/or **manipulation**. Each of these elements is the result of the composition of smaller parts, as described above. Therefore, the properties listed above are also deployed when describing an element, part of a composition, stimulating the imagination. Fig. 5.4 provides an overview of these generic properties.

The properties **height** and **planar differences** shape either the entire object or divide the element in smaller parts. **Loose materials** include the presence of items, small and/or light enough for a child to pick them up and move them around. **Contrast** includes the contradiction between properties of elements, but also the properties of different spaces. It can be used to describe all sorts of characteristics, such as lighting, materials, openness of a space and more. This results in the relation of light-dark, open-closed, high-low or inside-outside. Furthermore, **enclosure** describes the property of an element or set of elements to provide some sort of shelter. Finally, the property **manipulation** describes the possibility to adapt or adjust an element. This also includes elements which invite children to interact with objects on a scale smaller and bigger than a child.

Creation of a framework

One of the requirements of a place to stimulate the imagination is linked to the creation of a **framework**, as is described in the results of the analysis of art pieces. A framework only shows a certain part of the situation and leaves some information out. By leaving or hiding parts, curiosity and therefore the imagination is triggered. A framework can be created with the **composition** of a place. The composition results from the placement and organisation of elements, creating certain lines of sight and excluding other parts from the view. This framework can be fixed, as in the case of a painting or with a view
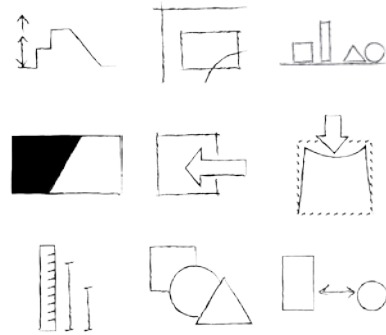
Fig. 5.4 Generic properties describing elements at an imagination-stimulating place (left to right, top to bottom): height difference, planar difference, loose materials, contrast, enclosure, manipulation, scale, number & variety, and interrelationship.

abstraction of context

abstraction of representation
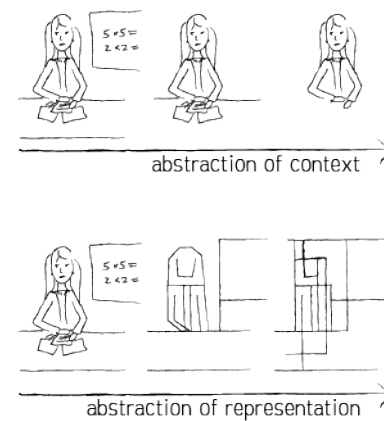
Fig. 5.5 Abstraction of context and representation

from a window. However, it can also change, due to the interaction of the user with the space by opening doors, changing windows and more. This way a spectator is challenged to explore and move around.

Another property, which results in the creation of a framework, is **abstraction**. This property results in leaving out information regarding not only the context (or lines of sight) but also shape or representation of the subject, see Fig. 5.5.

Fig. 5.6 provides an overview of the two generic properties, or requirements a place needs to meet to create a framework and in result stimulate the imagination of a child. Fig. 5.7 shows an overview of the generic properties that describe elements and the composition of an imagination-stimulating place.
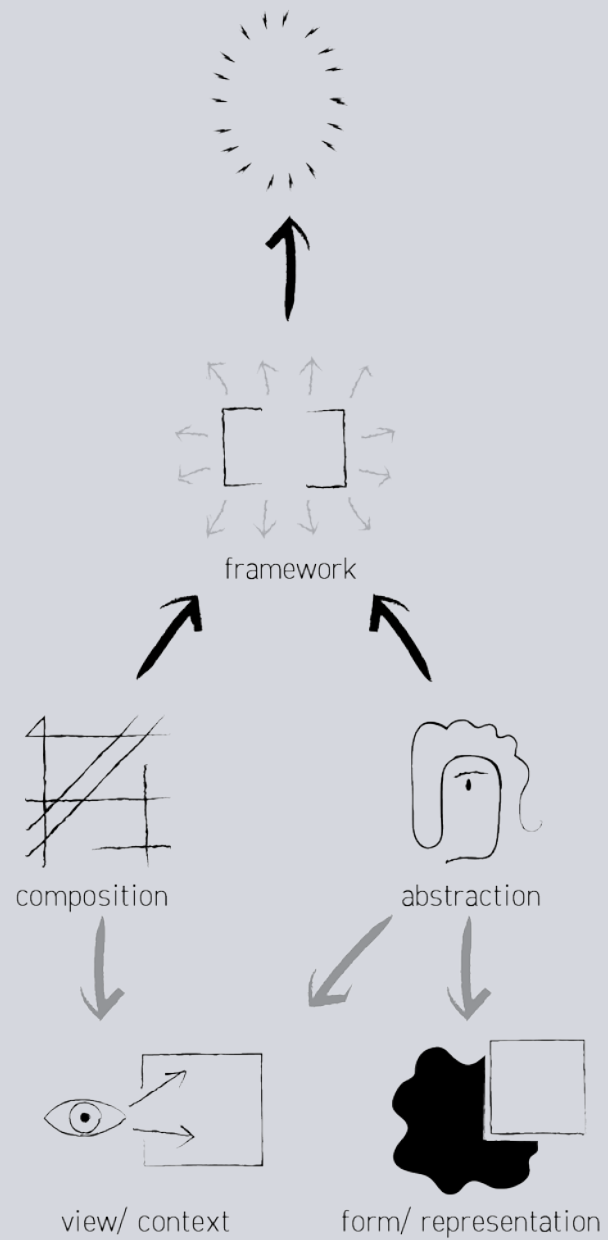
framework

composition

abstraction

view/ context

form/ representation

Fig. 5.6   Creating a imagination-stimulating place by formulating a framework, either by composition or abstraction
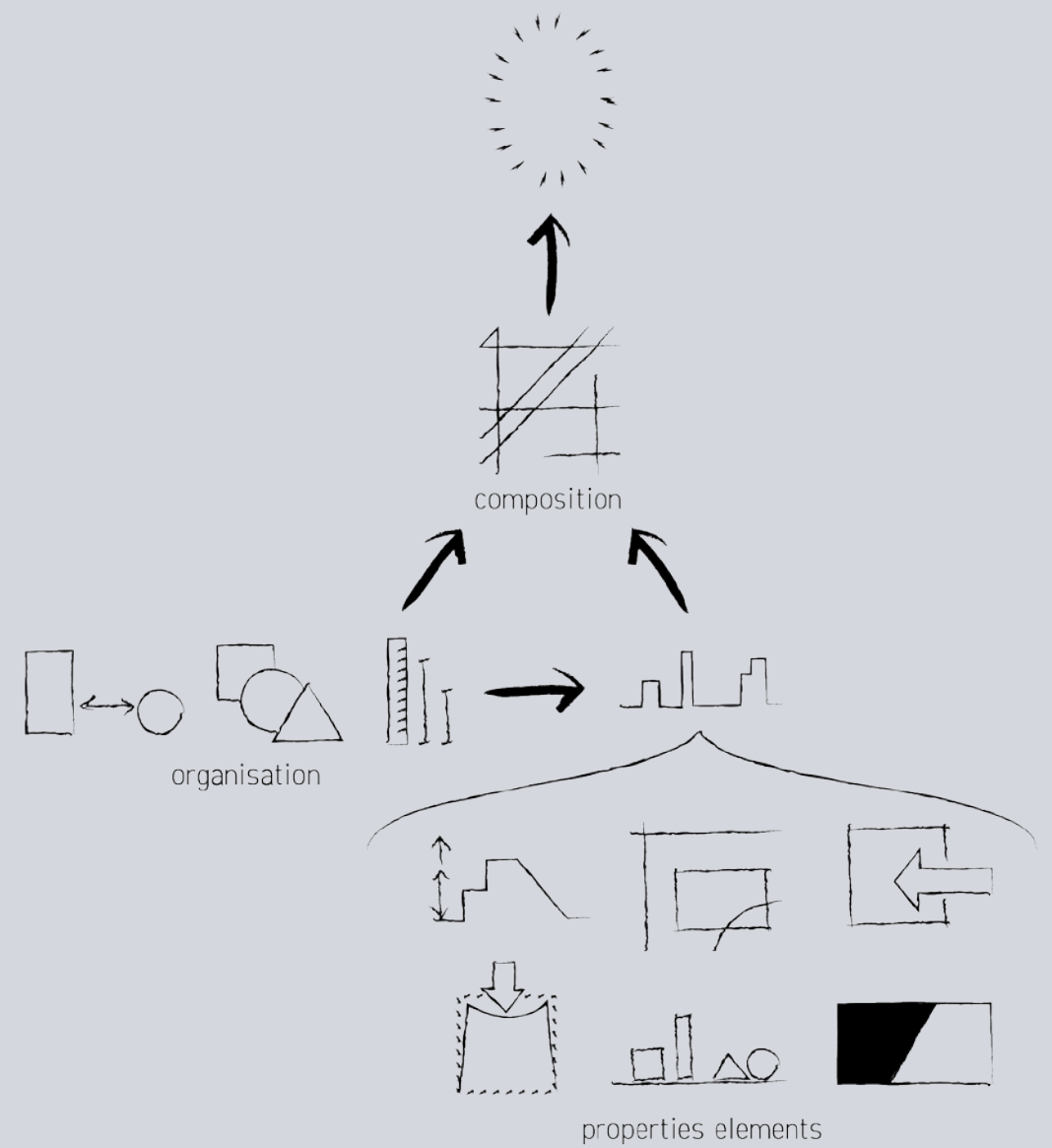

composition

organisation

properties elements

Fig. 5.7   The composition is the result of the organisation of different elements. The organisation is defined by interrelationship, number & variety and scale. The element's properties and interrelation can be described by height differences, planar differences, enclosure, manipulation, loose materials and contrast.

5.2. DISCUSSION

This research formulates a set of design tools existing of generic properties, which can be used in the design of the built environment to create a place which stimulates the imagination of a child. In the research different methodologies have been used: literature research, observations, interviews and (spatial) analyses.

Literature research
The literature research forms the background of the research and covers an extensive overview of the child's development. This background has been necessary to provide the required knowledge to formulate the right sub-questions. However, the literature regarding the role of play in a child's development is only covered by theories formulated by Piaget and Vygotsky. A broader literature study regarding the topic play could result in a better definition of behaviour related to play. The limits of the definition influenced the course of the observations.

Observational studies
The observational studies have been designed to obtain the right information to answer the sub-questions. Prior to the observations, a concept definition and categorization of play behaviour has been formulated. However, regarding this categorization, within the observations it was sometimes hard to distinguish the different types of play behaviour. This difficulty was caused by the distance from the place where the children played to the observation spot. Within the limits of this research it was not possible to create a different situation where the children could be observed from a closer range.

The limits of this research resulted in a difficulty to observe at a close range. This is caused by the fact that almost all observations were not pre-arranged regarding the participation of children. This means that there was no knowledge which children would be present at a play area during the observation. The pre-arrangement of different observations could not have been made due to the time delay it would cause, limiting the number

of observations which could be performed during the research. Furthermore, since the play area was not pre-arranged as such, the children could be observed in their 'natural' environment, where the play that occurred was spontaneously. Therefore, the observations are conducted with the limitations regarding the composition of the group children. The group is selected by estimating the age of the children and whether they would fit the research group.

In addition, the children observed were all healthy children. The research (both observations, and literature research) included only healthy children. In the introduction the assumption has been made that ill children will react to the environment similar as healthy children, regarding play behaviour. However, the physical and mental barriers experienced by an ill child should not be ignored. The environment should be inviting to play and move around, not discouraging. Therefore, the environment should be designed for a specific target group, considering their limits, caused by the disease. These limits influence the spatial dimensions of the elements used to create an imagination-stimulating environment. However, the concept of the stimulation of the curiosity and imagination by leaving information out applies to all children.

The problem regarding the organisation of the observations also influenced the way some observations were executed. The research lay-out includes 12 observations, at 12 different playgrounds. To create an observation with the preferred number of children at a planned playground was quite easy. However, the accidental play areas (play areas not designed for play) gave more problems. First, it was hard to find a place where children were playing in an urban environment. Secondly, the duration of the observation was a constraint. The fact that it was hard to find a place where children were playing, can be explained by the possible dangers that are present in an urban setting related to traffic. Regarding the accidental, outside, nature playground, the latter was not a problem. The locations used in the research were all areas which were closed off from traffic and other dangers. Furthermore, these playgrounds also included a place to stay for accompanying adults. Aldo van Eyck mentions how this is an important aspect when designing a playground to reassure that the children will stay there for a while [1-3].

1. Lefaivre, 2002.
2. Lefaivre, & De Roode, 2002.
3. Van Lingen, & Kollarova, 2016.

4. Cohen, & MacKeith, 1991.
5. Sanders & Stappers, 2012.
6. Miedema, 2017.
7. Center for Active Design, 2010.

Furthermore, due to organisational complications and time limitations, it was not possible to observe at a second accidental, indoor playground and a planned, outside, nature playground.

In addition, to observe children play at an accidental, inside play area, such as a living room, a number of children had to be asked to participate. Due to the lack of families that were willing to participate in the research, only one observation has been conducted with a smaller group of children than preferred.

Interviews
The interviews that have been conducted had the purpose to provide information which could be used in the spatial analysis. The questions are derived from questions used in the research of Cohen & MacKeith [4] on the inventory of different fantasy worlds. All the people interviewed about their childhood fantasy worlds were adults. This resulted in the fact that most of the memories on their fantasy world had faded away, resulting in a limited amount of data which could be used in the analysis. To create a more complete overview of data, the analysis also should have included fantasy worlds of children, aged 3 to 6 years old.

The results of the interviews did not all provide characteristics of the environment where the child engaged in play. Though, the characteristics mentioned, confirmed what was already seen during the observations.

Spatial analyses
The results of the research used to formulate the conclusion are derived from the spatial analysis of all data gathered in observations, interviews, and best practice designs. The spatial analyses are based on the labelling, grouping, and abstracting of data as described in methodologies used in other design studies [5]. However, the abstracting of similarities is largely based on own interpretations of the data. The different steps in the research methodology are broadly described in the introduction, to reassure a repetition of the research, with similar results. However, the interpretation within the methodology creates a limit to this research.

Stimulating behaviour
Apart from the limitations that derive from the methodology, the scope of the research presents another limitation. In the introduction, a few assumptions have been made regarding the influence of the environment

on behaviour of its' users: When presenting certain elements that support certain behaviour, that behaviour is likely to occur. Studies of Miedema [6] and the Center for Active Design [7] both base their theory and designs on this quality. However, to validate the influence of certain elements on the imagination, a test case should be designed. By creating an environment, based on the generic properties of this research, it can be tested whether children will engage in play or not.

3. Van Lingen, & Kollarova, 2016.
8. Andere Tijden, 2010.
9. Strauven, F., Miskende parels in het stadsweefsel 2002.
10. Zumthor, 2006.
11. Pallasmaa, 2014.
12. Böhme, 2014.
13. Borch, 2014.
14. Pallasmaa, 2012.
15. Havik, Teerds, & Tielens, 2013.
16. Disanayake, 1990.
17. Leupen et al., 2010.

5.2.1 RESULTS

Although the methodology used in this research might rely on the interpretation of the researcher, the concluding design tool shows a promising first step towards something that can be used when designing an imagination-stimulating space.

The tool bases the stimulation of the imagination on two main aspects, the presence of certain elements and their composition, and the creation of a framework through the composition of elements and abstraction. The properties composition and abstraction have been defined as key facets in the design of an area. Literature of different architects, such as Zumthor and Pallasmaa, confirms the role of the composition of elements in the experience of space and influence on behaviour [3: 28-33, 8-15]. Research of different architects, described in chapter 2 [10-15], proposes several characteristics which describe the composition: scale, number & variety and interrelationships. In addition, these architects emphasize the importance of materials in the composition of a space. This property has not been specifically mentioned in the conclusion. The variety, number and organisation (or composition) of materials influences the planar differences of an element. Therefore, materials are, as an abstraction, gathered in the property planar differences. The role of the second property, abstraction, is confirmed by Van Eyck and by research on the role of art [9, 16]. The property contrast has not only been introduced by different architects to stimulate movement and curiosity [10, 14]. Aldo van Eyck introduces this term in his research too as 'twin phenomena' [2, 3, 17: 96].

Aldo van Eyck stresses the importance of the composition when creating a place, directed to play [8, 9]. In his designs, Van Eyck introduces 'the in-between' space which refers to the open space in between objects or elements that provide room for any kind of play.

The elements creating this composition have been described by certain generic properties to stimulate play and the imagination. These properties are derived from the spatial analysis of this research. Moreover, these properties have been described, with other words, in other research.

Not only Aldo van Eyck has described the design of

playgrounds, also other researchers have described important aspects of play areas to stimulate certain play behaviour. The presence of plan differences has been described by Van Eyck [3], but also by Karsten [18] when describing children's playgrounds. The presence of markings on the ground can be interpreted by children and used in their play. Also, the presence of height differences stimulates motoric development [9] and invites for play [19].

Richard Dattner has described what elements should be present when designing a playground for children to engage in play that supports their cognitive and motoric development, but also their symbolic (or pretend) play. Dattner describes the properties number & variety, manipulation, loose materials and enclosure. He explains how the presence and variety of (natural) materials, which can be picked up, moved around and adapted or adjusted, stimulate the creation of objects which can be used in their play. Also, small places where a child can hide in are a delight for children's play [20]. The latter is also introduced in a pattern, used when designing for children, by Christopher Alexander [21].

To stimulate the imagination Dattner stresses the role of creation within play and elements to support this type of behaviour. The importance of different properties within the stimulation of the imagination is not investigated in this thesis. Therefore, future research should explore the importance and hierarchy of different properties when stimulating the imagination.

3. Van Lingen, & Kollarova, 2016.
9. Strauven, F., Miskende parels in het
18. Karsten, 2005.
19. Rojas del Alamo, 2004.
20. Dattner, 1969.
21. Alexander. 1977.

5.2.2 OTHER FINDINGS

Typologies in play
During the observations, the four play-categories mentioned in the literature can be recognized: *Functional play, Pretend play, Creation play* and *Rule Based play*.

1. Functional play: Play directed to gain knowledge about the bodies skills and limits, with and without objects
2. Pretend play: Involves assigning a different meaning to objects, situations or other activities.
3. Construction play: Existing out behaviour which is related to creating, collecting or destroying work.
4. Rule Based play: Organized by rules, either made-up or existing.

The spatial analysis of the play areas show how *Functional play* usually happens on or around an object. The space between the objects usually takes no part in the play apart from movement from one object to another. *Pretend, Creation* and *Rule Based play* all make use of the space between the objects and the objects. In *Creation play* a child creates, destroys or collects materials usually at a certain location. The materials can be gathered at that specific location and all over the play area. *Pretend* and *Rule Based play* can happen all over the area, while the children are moving around, but also at a specific location.

Whilst the behaviour a child performs during the different types of play can be the same, the goal of that certain type of behaviour determines what kind of play a child is engaged in. For example, while a child is collecting water for its creation it squats on a tree trunk while trying to reach for the water with a bucket, keeping balance. At this moment, a child is engaged in *Creation play*. However, when a child is balancing across a beam with only the goal to reach the other side, a child is engaged in *Functional play*.

During the observations, children also often would hide in, behind or under objects. For example, when two boys were waiting for their mother to come out of a building, they hid themselves behind a small wall and jumped out when their mother would pass by. This type of behaviour cannot be categorized as *Functional, Creation, Pretend*, or *Rule Based play*. Therefore, a new category of play

is defined; A type of play which is directed to a specific action and location: **Shelter play**. Often, children tend to crawl into smaller places and hide.

Shelter play is closely related to both the activity and specific characteristics of objects supporting this play. Namely, these objects should provide shelter, or some sort of coverage. *Functional, Creation, Pretend* and *Rule Based play* are also related to the activity and an object. However, the characteristics of the objects are not specifically related to one type of object or any object for that matter

22. Lillard, 2015.
23. Piaget, 1962.
24. Bodrove & Leong, 2015.
25. Gaskins & Göncü, 1988.
26. Vygotsky, 1967.

5.2.3 FUTURE

Future research
This research provides a promising step towards a design tool which can be used to stimulate the imagination. To elaborate on this tool, in future research other aspects should be incorporated, such as the typologies of play and the hierarchy of the different generic properties.

During the observations, all behaviour, in this research defined as play, was included. However, Pretend or Symbolic Play relates the most to imaginative behaviour. Piaget defines this type as play by behaviour in which the meaning of actions has separated from the actual meaning (see "3. Play") [22, 23]. Also, Vygotsky only regards this type of behaviour as play [24-26]. Future research should focus on the stimulation of this type of play with the environment. In addition, regarding the different types of play, the definition and role of shelter play should be elaborated on.

As mentioned in paragraph "5.2.1 Results" to stimulate the imagination Dattner stresses the role of creation within play and elements to support this type of behaviour. The importance of different properties within the stimulation of the imagination is not investigated in this thesis. Therefore, future research should explore the importance and hierarchy of different properties when stimulating the imagination.

Finally, the scope of this research was focused on the physical, built environment. The role of other aspects of the physical and social environment were excluded. Future research should investigate the role of these environmental aspects on the stimulation of the imagination.

Design implementation
The generic properties defined in this research will be implemented in the design of a prevention and treatment centre for obese or overweight children. The properties will serve as design guidelines to create an environment which will help the children forget about the healthcare setting and their illness by stimulating their imagination. In addition, it will support play behaviour and movement by stimulating curiosity as part of their treatment.

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LIST OF FIGURES

Figures and images are created by the author herself, unless stated otherwise.

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APPENDIX

A. OBSERVATIONS

PLANNED, INSIDE PLAYGROUND: BUNGELLAND

A.1

Bunggelland is an indoor play area in Rotterdam. The observation only covered a part of the playground to keep the scale of the area feasible for the observation. The play area is divided in different layers of play equipment. The plans provide an overview of the ground floor and the level above.

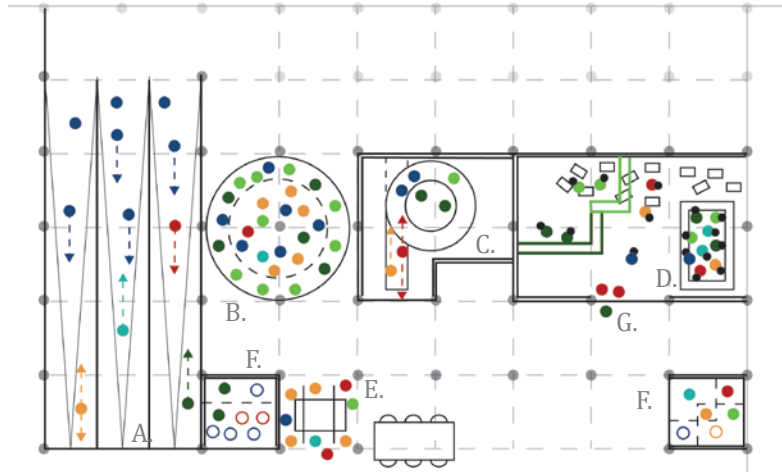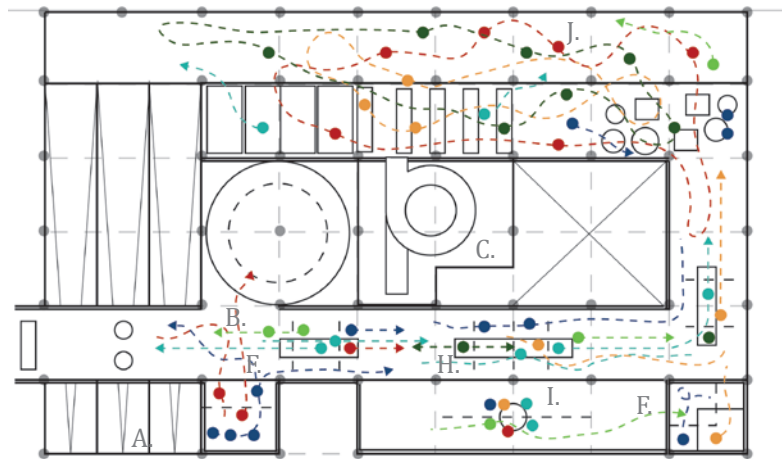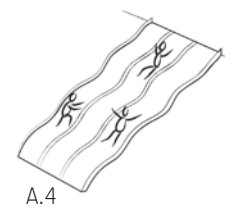*The observation was conducted on a Tuesday afternoon between 14:20 and 15:20. It was sunny outside.*

Fig. A.2   Ground floor

Fig. A.3   First floor

measuring moments
- 1   - 4
- 2   - 5
- 3   - 6
- parent
- ○ child was up- and downstairs
- - ●- moving around during play
- ● playing with objects

A. Slide

A.4

sliding, climbing up the ramp, using the edges to walk up

A.5
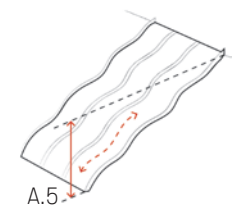
height differences, gradually (scale C)
small edges (scale A)

B. Climbing tower

A.6
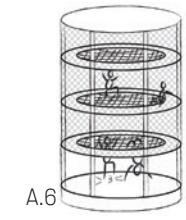
climbing up, jumping at the foam cushion at the bottom, sitting on the different levels, hanging down

A.7
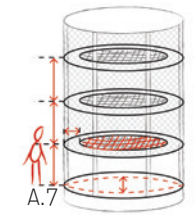
height difference, in steps (scale B to overcome C)
bouncing material
platforms (scale B)
offering shelter (scale B&C)

C. Curved slide

A.8
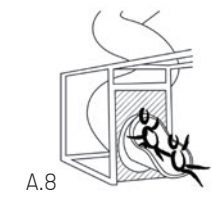
sliding down, using tunnel to climb up

A.9
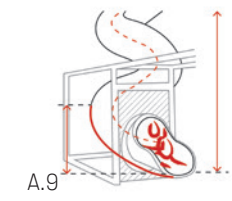
height difference, gradually, (scale C)
sides (scale B)
offering shelter (scale B)

D. Building blocks

A.10
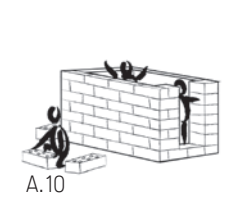
building and stacking blocks, hiding in the built structures

A.11
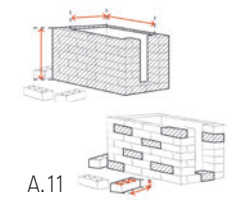
offering shelter (scale B)
loose materials, portable (scale A)

E. Game table

A.12

table soccer

A.13
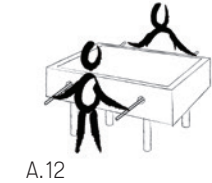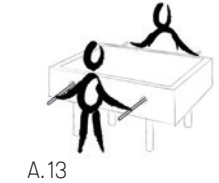
play equipment (scale B)

F. Layered tower

A.14
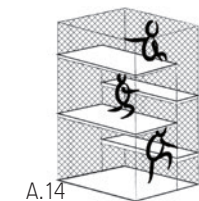
climbing up and down the platforms, sitting, laying down, staying on a level

A.15
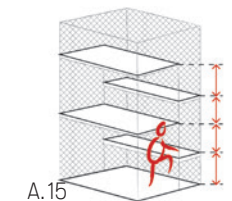
height difference, in steps (scale B to overcome C)
platforms, sheltered (scale B & C)

A.16

G. Structure

balancing on the structure, haning from the bars, stretching

A.17

height differences, in steps (scale B)
small edges (scale A)
bars (scale A)

A.18

H. Rope bridge

balancing on the different bars, walking or running across

A.19

height difference (scale B)
hinges
bars (scale B)

A.20

I. Small zip line

jumping on and of the ball, sliding from one side to another, swinging

A.21

height difference (scale B)
hinges

A.22

H. Parcours

jumping, running over the different elements, rolling, ducking, sitting

A.23

height differences (scale A and B)
open space (scale C)
bouncing material
hinges

The climbing tower (B) and parcours (J) were played on most during the observation. Almost all objects were played with or on during the entire observation. Only the layered towers (F) and the construction of one of the cages (G) were sporadically introduced in a child's play.

Fig. A.24 and Fig. A.25 provide an overview of the number of children playing on the different elements during the entire observation.

amount of children
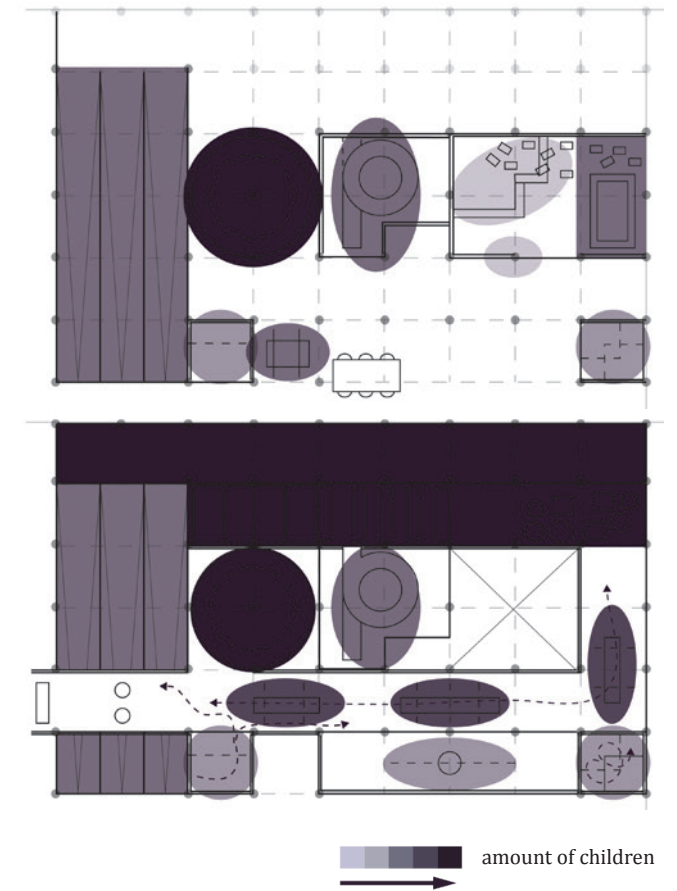
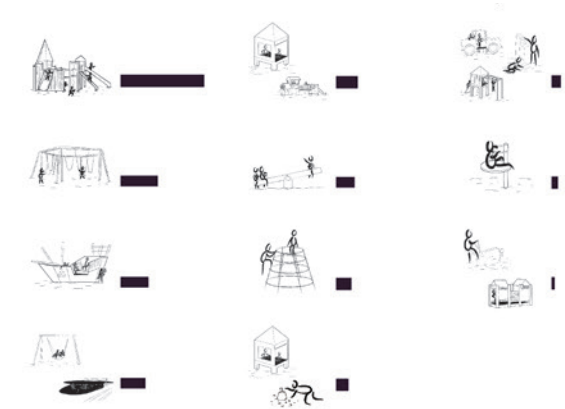Fig. A.24　　Number of children playing at different play areas
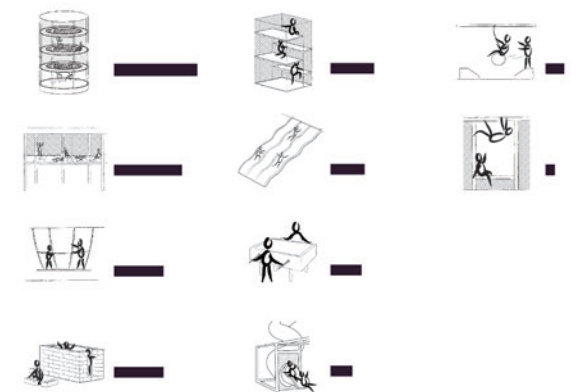
Fig. A.25　　Number of children playing at different play objects during the observation. Ranging from most to least played at.

PLANNED, OUTSIDE, URBAN PLAYGROUND: SCHEVENINGSE BOSJES

A.26

This public playground is located in the Scheveningse bosjes (the Scheveningse forest) in The Hague. The entire playground is on a sand plain and surrounded by greenery. The playground can be reached by a pedestrian pathway (hatched dark grey in Fig. A.27).

The observation was conducted on a Wednesday afternoon between 13:30 and 14:30. The weather was sunny with a little rain.
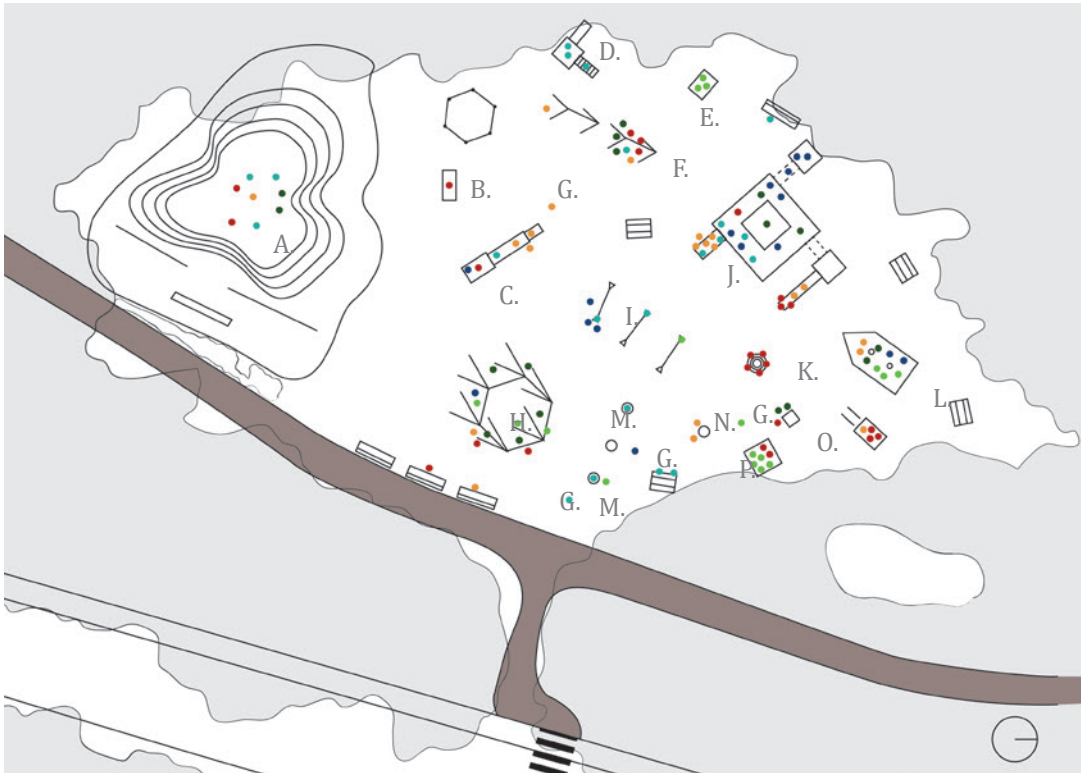
Fig. A.27   Floor plan

measuring moments

- 1
- 2
- 3
- 4
- 5
- 6

A. Skate ramp

running up and down, sliding

A.28

A.29
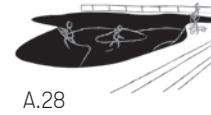
height differences, gradually (scale C)
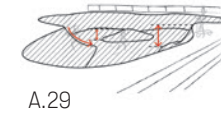
B. Play hut

hiding, sitting in the small hut, playing (board) games

A.30

A.31

height differences (scale B)
offering shelter (scale C)
play equipment (scale B)

C. Play train

hiding, crawling, balancing, sliding

A.32

A.33

walls, shelter (scale B & C)
height differences, gradually and in steps (scale B)
hinges
bars (scale B)

D. Hut on poles

climbing, swinging, hiding out

A.34
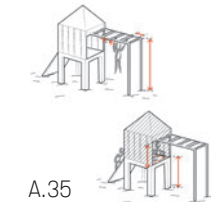
A.35

height differences (scale B&C)
bars (scale A)
walls, shelter (scale C)
grips (scale A)

E. Seesaw car

seesaw, sitting

A.36

A.37

hinges/ spring
seating (scale B)
shelter (scale B)

F. Big swing

swinging while seated, lying down, standing, pushing, jumping

A.38

A.39

hinges
platform (scale B)

A.40

G. Playing in the sand

Collecing, pushing sand, making heaps

A.41

open space (scale C)
loose materials, portable (scale A)

A.42

H. Swings

Swinging, throwing

A.43

Hinges
Platforms (scale B)

A.44

I. Seesaw

Seesaw

A.45

Hinges
platform (scale B)

A.46

J. Playing castle

Sliding, climbing, hiding, sitting, collecing sand

A.47

height differences,
gradually & in steps (scale B to overcome C)
walls, shelter (scale B & C)
loose materials, portable (scale A)

A.48

K. Climbing frame

Climbing, sitting on top

A.49

Height differences, in steps (scale B)
bars (scale A)

A.50

L. Playing ship

Climbing, hiding, sitting

A.51

Height differences (scale B to overcome C)
walls, shelter (scale B & C)

A.52

M. One-person merry-go-round

Swinging, rotating

A.56

Hinge
platform (scale B)

A.53

N. Small bulldozer

Collecing, moving, carrying sand

A.57

Play equipment (scale A)
Loose materials, portable (scale A)

A.54

O. Water pump

collecing water, splashing

A.58

Loose materials (scale A)

A.55

P. Play house

sitting, hiding

A.59

height difference (scale B)
walls, shelter (scale C)

amount of children

Fig. A.60   Number of children playing at different play areas
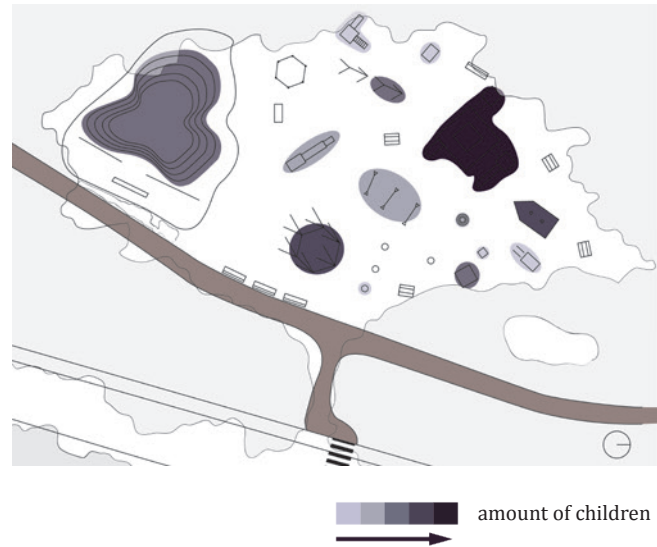
The children played most on the play castle (J) and boat (L) and with the swings (F and H). Though the playing castle and boat were played with most, the other play huts were less popular. No children were playing with the somersaulting frames. Other objects that were played less with are the one-person merry-go-rounds (M) and the small scaled bulldozer (N). In addition, the children, playing with the seesaw (I), played all by themselves and tried to seesaw on their own by jumping up and down.
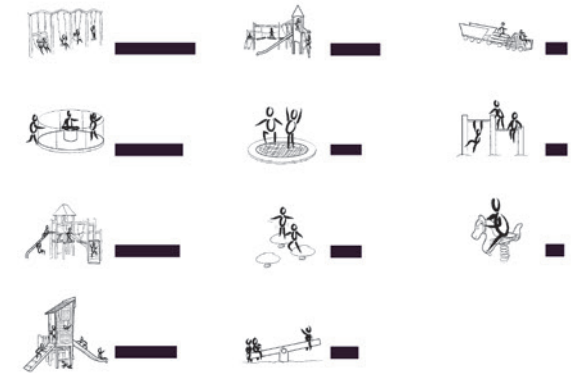

Fig. A.61   Number of children playing at different play objects during the observation. Ranging from most to least played at.

PLANNED, OUTSIDE, URBAN PLAYGROUND: FREDERIK HENDRIKPLEIN

A.62

The playground at the Frederik Hendrikplein in The Hague, is located at the start of an important shopping street. The playground is surrounded by greenery.

The observation was conducted between 13:50 and 14:50 on a Wednesday afternoon. The sun was shining bright.
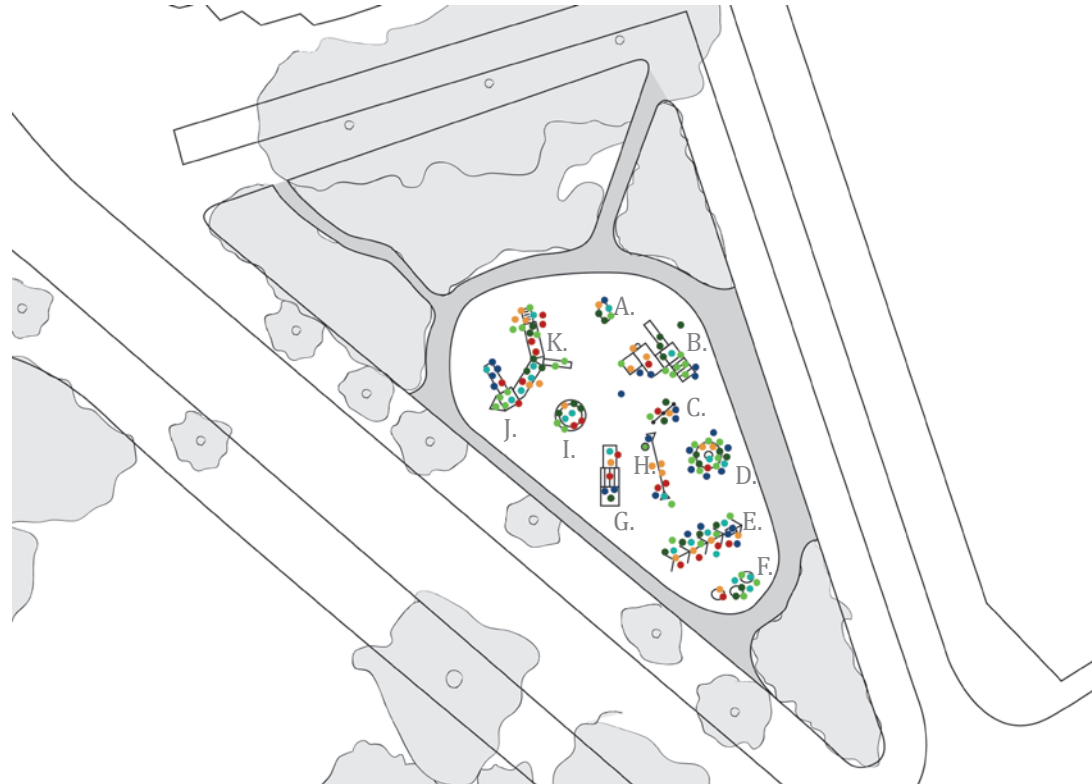
Fig. A.63   Floor plan

measuring moments
- 1
- 2
- 3
- 4
- 5
- 6
- parent

A.64

A. Horse seesaw

seesaw

A.65

spring
platform (scale B)

A.66

B. Play hut

Climbing up along the stairs or platforms, sliding down or climbing up along the slide, sitting in or under the hut.

A.67
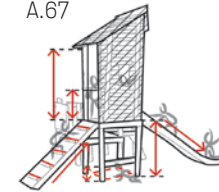
height differences, in steps and gradually (scale A to overcome B and B)
walls, shelter (scale C)

A.68

C. Summersauling bars

swinging, hanging from the bars, sitting on the bars, climbing

A.69

height differences, in steps (scale A and B)
bars (scale A)

A.70

D. Merry-go-round

running, rotating, sitting

A.71
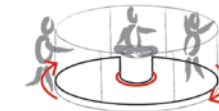
rotating hinge
platform (scale B)

A.72

E. Swings

swinging, sitting, twirling

A.73

hinges
platforms (scale A and B)

A.74

F. Bouncing stones

jumping, balancing

A.75

springs
platforms (scale B)

A.76

G. Play train

sitting on the train

A.77

height differences, in steps
(scale B)
walls for shelter (scale B)

A.78

H. Seesaw

seesaw, jump

A.79

hinge
platform (scale B)

A.80

I. Trampoline

jump, rund on the spot

A.81

bouncing or springy
materials
platform, area (scale B)

A.82

J. Playing castle I

climbing, sliding, hiding,
balancing

A.83

height   differences,
gradually   and   in   steps
(scale B)
walls and roof for shelter
(scale B)

A.84

K. Playing castle II

climbing,   hanging,
swinging, balancing

A.85

height differences, in steps
(scale B)
hinges
bars (scale A and B)
grips and holes (scale A)

During the observation, all objects on the playground were included in the children's play. The swings (E), merry-go-round (D) and all playing castles and huts (B, J and K) were most used in the children's play. Also on this playground, most of the children (except for two children) were playing with the seesaw alone (H). In several cases, a parent would intervene and help their children play with the seesaw.

During the entire observation almost all the time all object were included in the children's play. However, the objects that were played the least with are the summersaulting frames (C) and horse seesaw (A). These objects were also only played with during 5 out of 6 measuring moments.
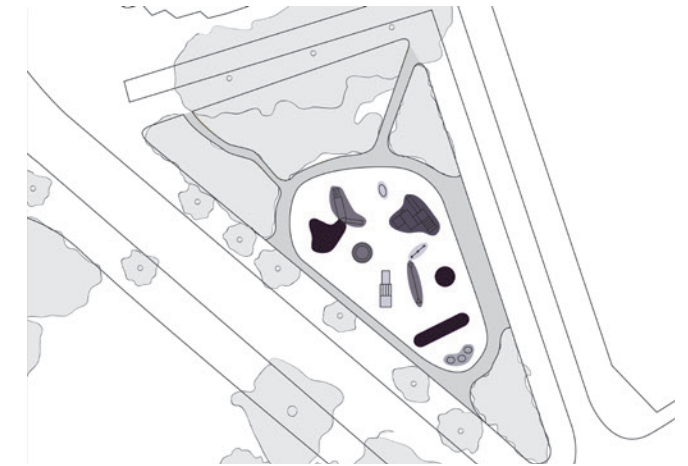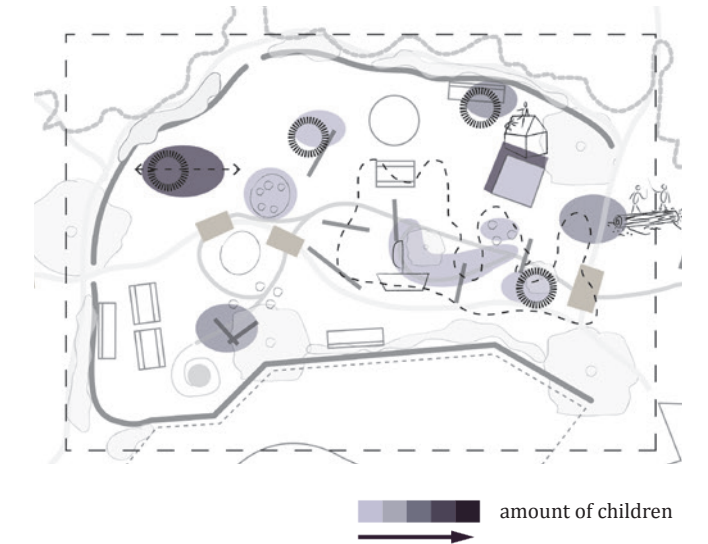
amount of children

Fig. A.86   Number of children playing at different play areas

Fig. A.87   Number of children playing at different play objects during the observation. Ranging from most to least played at.

PLANNED, OUTSIDE, NATURE PLAYGROUND: SPEELDERNIS

A.88

The Speeldernis is a nature playground in Rotterdam. Almost all equipment is made out of natural objects, found at the location. The play area that was observed is especially designed for children up to the age of 6 years old. The elements at the playgrounds support the development of their gross motoric skills.

The observation was conducted on a Monday afternoon between 16: 05 and 17:05. It was cloudy with occasional sunshine.
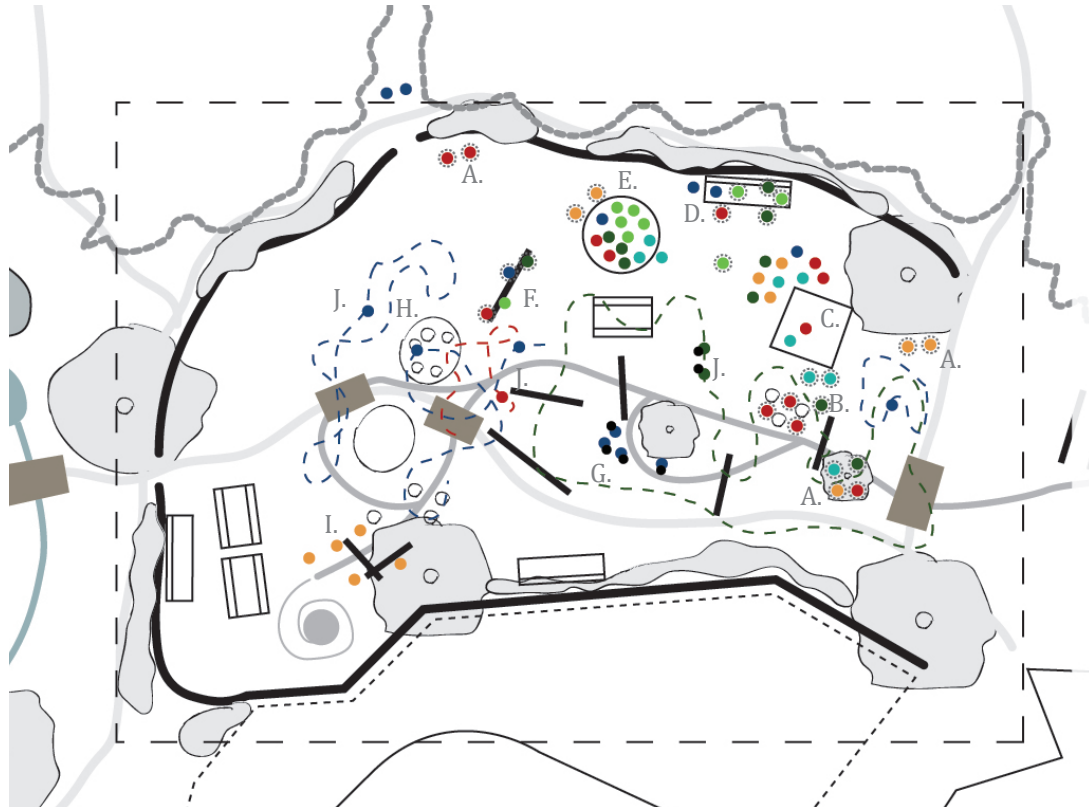
Fig. A.89   Floor plan

measuring moments
- 1
- 2
- 3
- 4
- 5
- 6

parent
collecting materials
playing with objects
moving around during play

A.90

A. Collecting materials

stacking, carrying, building, picking

A.91

open space (scale C)
loose materials (scale A)

A.92

B. Climbing trunks

Climbing, balancing, stepping, jumping

A.93

height differences, in steps and gradually (scale B)
platforms (scale A)

A.94

C. Playing hut

Climbing, sitting, balancing, hiding

A.95

height differences, in steps and gradually (scale B to overcome C)
grips (scale A)
walls for schelter (scale C)

A.96

D. Collecting materials

stacking, carrying, building, picking
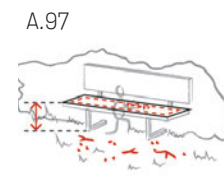
A.97

open area (scale C)
loose materials (scale A)
platform (scale B)
height difference (schale B)

A.98

E. Swing

swinging, lying down, standing, sitting
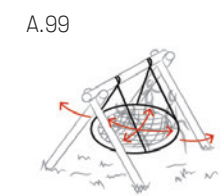
A.99

hinges
platforms (scale B)

A.100

F. Tree-trunk

sitting, collecting materials
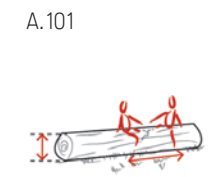
A.101

height difference (scale A)
platform (scale B)
loose materials (scale A)

G. Boat

Playing with toy boats

A.102

A.103

play equipment (scale A)
open area (scale C)

H. Willow hut

sitting, climbing, hanging

A.104

A.105

height differences (scale A
to overcome B)
edges (scale A)
walls for shelter (scale C)

I. Climbing trees

climbing, balancing

A.106

A.108

hieght differences (scale A
to overcome B)
bars (scale B)
edges (scale A)

J. Exploring

running around, playing
with branches, balanding,
climbing

A.107

A.109

open space (scale C)
height differences (scale A
and B)
bars (scale B)

K. Collecting

running, walking around,
collecting materials

A.110

A.111

open space (scale C)
loose materials (A)

During the observation, the swing (E) and play house (C) were most popular by the kids at the playground. Though these objects were used most in the children's play, most children engaged in collecting behaviour in which they moved around the entire plot and collected loose materials such as pebbles, twigs and leaves. The children used different objects as collecting spots and different areas where they would get their materials from (A, B, D, F and K). The children played the least with/ in the willow huts (H).

amount of children

Fig. A.112   Number of children playing at different play areas

Fig. A.113   Number of children playing at different play objects during the observation. Ranging from most to least played at.

ACCIDENTAL, INSIDE PLAYGROUND: LIVING ROOM

A.114

In the living room the observation of an accidental playground was conducted. The living room is located on the first floor and connected to the open kitchen.

Two boys were observed on a Thursday morning between 9:15 and 10:20. Between 9:35 and 10:00 the observation was paused, due to a break in the play behaviour, because of the visit of a contractor. It was cloudy with occasional sunshine.
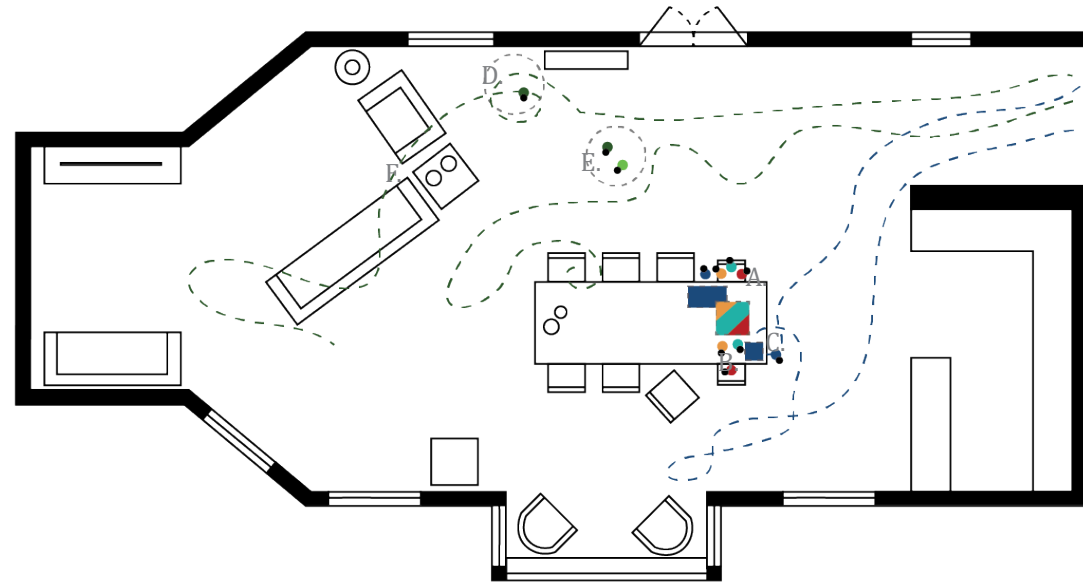
Fig. A.115 Ffloor plan

measuring moments
- 1
- 2
- 3
- 4
- 5
- 6
- parent
- playing with objects
- moving around during play

A.116

A. Board game

playing a board game, inventing new rules

A.117
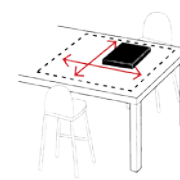
play equipment (scale A)
Surface (scale B)

A.118

B. Chair

balancing, rocking

A.119

height differences (scale B)
surfaces (scale B)
bar (scale A)

A.120

C. Arts & Crafts

drawing, cutting, gluing, taping, colouring

A.121

play equipment, loose materials (sale A)
surface (scale B)

A.122

D. Lego

sitting, playing with toys

A.123
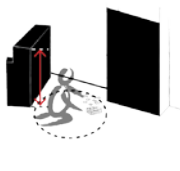
open area (scale B)
objects providing shelter (scale B)
play equipment (scale A)

A.124

E. Marble track

building, stacking

A.125
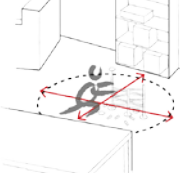
open area (scale B)
play equipment (scale A)

A.126

F. Parcours

climbing, sitting, balancing, throwing, running

A.127

height differeces (scale B)
surfaces (scale A & B)
open area (scale C)
play equipment (scale A)

amount of children
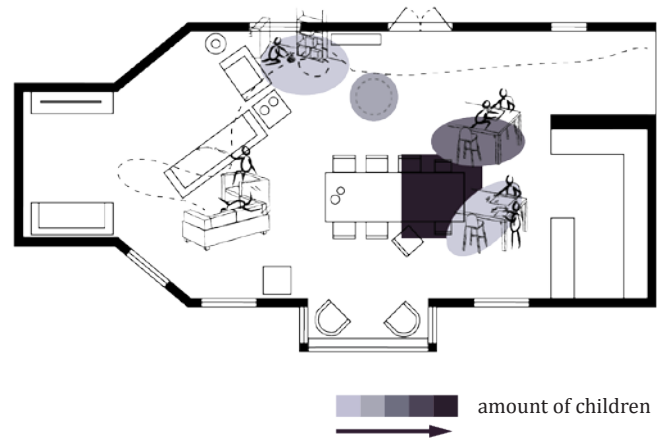
Fig. A.128   Number children playing at different play areas during
the entire observation

During the observation, the two boys were playing most at and around the dinner table (A, B and C), see Fig. A.128. During the observation, half of the time, the boys were engaged in a board game (A). The boys followed the rules of the game and introduced now and then a new, self-invented rule.

The children engaged in different types of play: Rule-based play (A), Functional play (B & F), Construction play (C & E) and Pretend play (D & E).

- Functional play
- Creation play   Pretend play
- Rule Based play   other play

Fig. A.129   Types of play occurring at different areas

ACCIDENTAL, OUTSIDE, URBAN PLAYGROUND: DANCKERTSSTRAAT, THE HAGUE

A.130

At the Danckersstraat in The Hague, play behaviour was observed at an accidental, outside, urban play area.

The behaviour was observed over the course of a few hours on a Friday afternoon. The children were alternating between inside and outside. Outside, they played different games. The sun was shining. The children, drawn in the image below, correspond with the children playing during the observation.

Fig. A.131   Street view

A.132
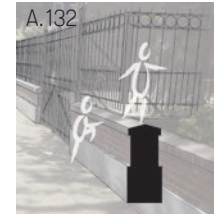
A. Wall climbing

climbing, balancing

A.133
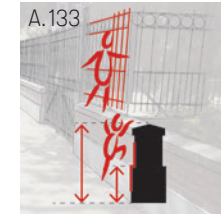
height differences (scale B)
ridges (scale A)
bars (scale A & B)

A.134

B. Soccer

shooting, running, diving, catching, balancing

A.135

open area (scale C)
elements their spacing (scale B)
play equipment (scale A)

A.136

C. Chalk drawing

drawing, sitting

A.137
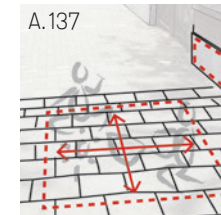
open area (scale C)
surface (scale C)
play equipment (scale A)

A.138
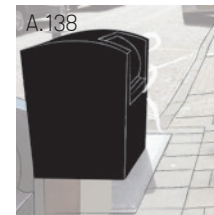
D. Scare

sitting, squating, hiding

A.139
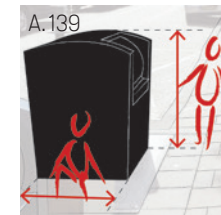
element & area around it (scale B and C)
height differences (scale B)

A.140

E. Scootering

balancing, kicking, running

A.141

open area (scale C)
play equipment (scale B)

Fig. A.142   Elements used most in the children's play

The objects, most introduced in the children's play, are the walls with fences. These walls were used to climb (A) on, to play soccer against (B), served as a surface to draw on (E), and creates, together with the curb and cars a space for the children to play.

ACCIDENTAL, OUTSIDE, URBAN PLAYGROUND: COLLECTION

A.147

The observations at accidental, outside, urban playgrounds were no conventional observations due to the organisational difficulties. Over the course of a few weeks, different types of play behaviour were observed at different locations. Each of these locations is shown in a plan (see Fig. A.143 to Fig. A.146). The letters are used to indicate specific behaviour and correspond with the letters used next to the photographs.

Interestingly, most of the children's play included fences or walls.
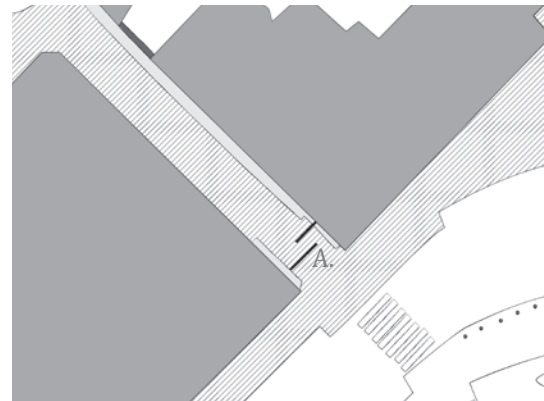
Fig. A.143   Floor plan street in Scheveningen
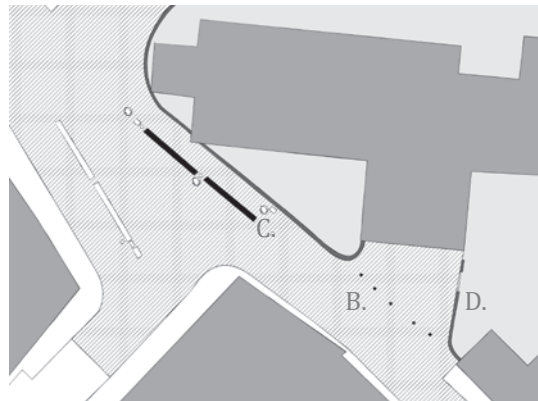
Fig. A.144   Floor plan square in Scheveningen
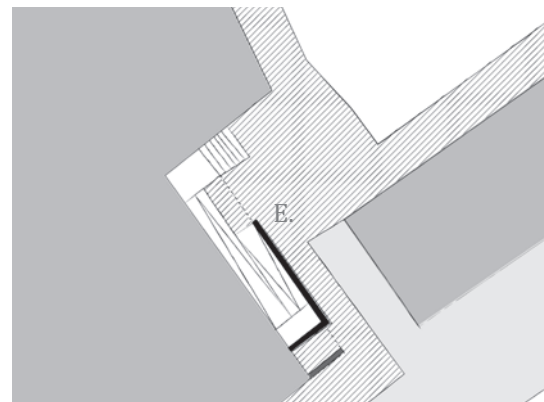
Fig. A.145   Floor plan in Delft

Fig. A.146   Floor plan square in Amsterdam

A.148

A. Fence

swinging, climbing, hanging, balancing

A.149

height differences (scale B), bars (scale A)

A.150

B. Leapfrog

jumbing, sitting, balancing, climbing

A.151
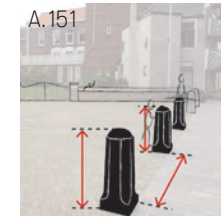
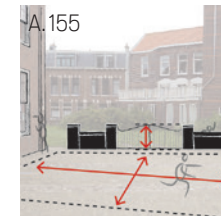height differences (scale B) objects and their spacing (scale B to C)

A.152

C. Climb-bench

climbing, balancing

A.153
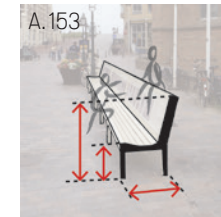
height differences (scale B) platform (scale A & B)

A.154
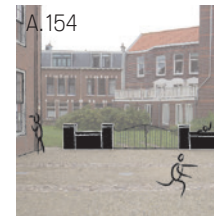
D. Hide & seek

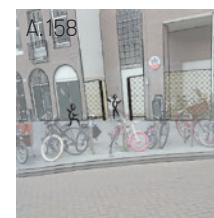running, squating, jumping, siting, hiding

A.155

height differences (scale B) elements and their spacing (scale B) open area (scale C)

A.156

E. Peek a Boo!

hiding, ducking, squating

A.157

height differences (scale B) width (scale B) surrouding space (scale C)

A.158

F. Soccer

running, kicking, shooting, diving, catching

A.159

open space (scale C) elements and their spacing (scale B) play equipment (scale A)

ACCIDENTAL, OUTSIDE, NATURE PLAYGROUND: DELFTSE HOUT

A.160

The Delftse Hout is a nature park with a large lake in the middle, surrounded by grass fields and sand beaches. The area that has been observed included both a part of the lake, beach, and grass fields.

The observation was conducted between 15:05 and 16:05 on a Wednesday. The sun was shining.

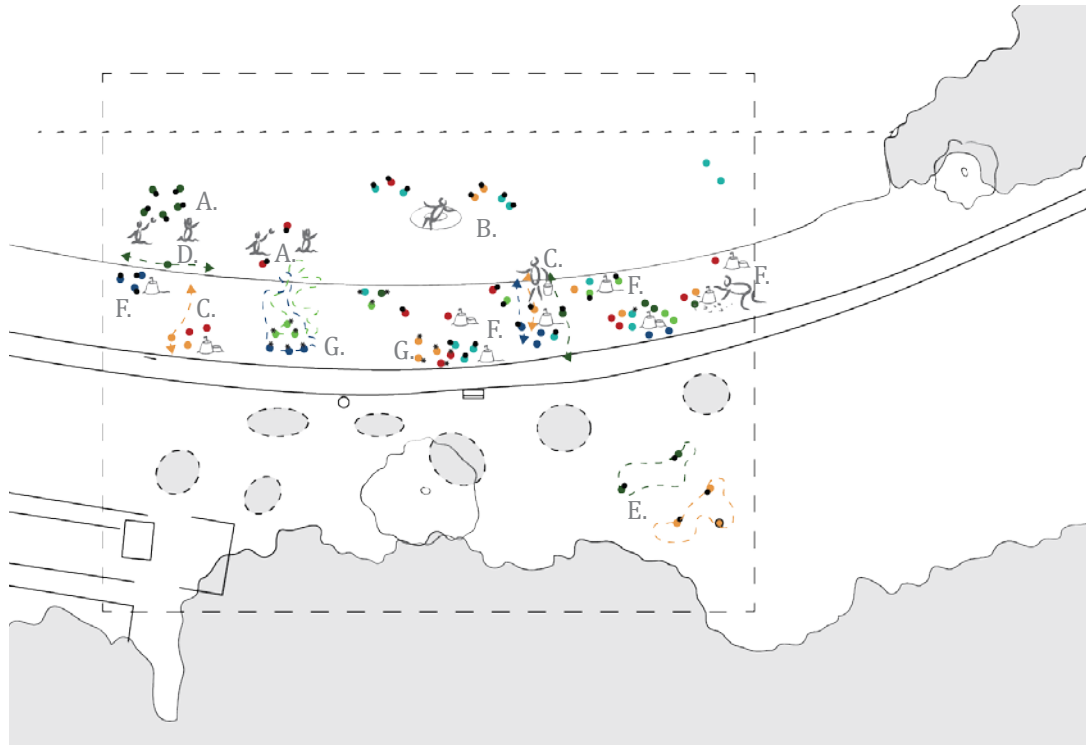*The dotted grey areas represent places where people sat in the grass.*

Fig. A.161   Floor plan

measuring moments

- 1
- 2
- 3
- 4
- 5
- 6

- parent
- collecting materials
- playing with objects
- moving around during play
- burrying oneself

A.162

A. Water ball sports

swimming, floating, throwing, catching

A.163

open space (scale C)
play equipment (scale A)

A.164

B. Floating

swimming, floating

A.165

open space (scale C)
play equipment (scale B)

A.166

C. Collecting

carrying, collecting, walking, picking

A.167

open space (scale C)
loose materials (scale A)
play equipment (scale A)

A.168

D. Splashing

jumping, running, walking, kicking

A.169

open space (scale C)
water

A.170

E. Soccer

running, kicking, catching, diving

A.172

open space (scale C)
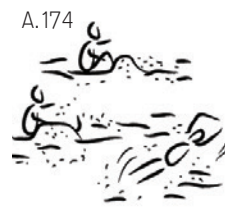elements and their spacing (scale B)
play equipment (scale A)

A.171

F. Building sand castles

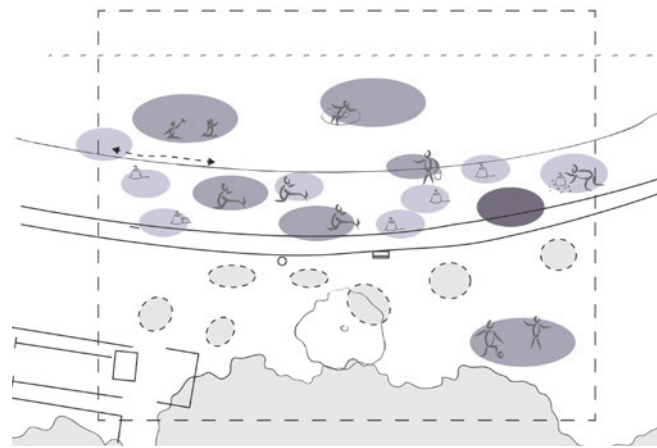building, collecting, stacking, digging

A.173

open space (scale C)
loose materials (scale A)
(play equipment (scale A))

A.174   G. Covering in sand   A.175   open space (scale C)
                                                                                                loose materials (scale A)
                            digging, rolling, burrying,
                            throwing

During the observation, most of the children were playing in the sand. The least was played at the grass field. Of all the activities, happening in the sand, most of the children were either building and digging sandcastles, or covering themselves in sand (F & G). This was done by digging holes, placing sand on top of them or rolling through the sand.

amount of children

Fig. A.176   Number of children playing at different play areas
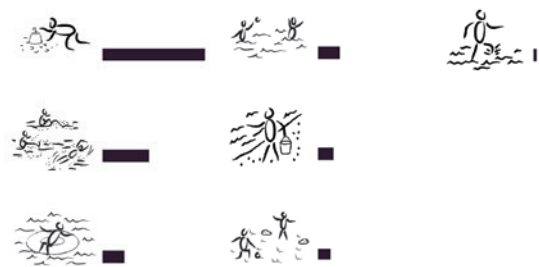
Fig. A.177   Number of children playing at different play objects during the observation. Ranging from most to least played at.

ACCIDENTAL, OUTSIDE, NATURE PLAYGROUND: NOORDERSTRAND (BEACH)

A.178

The Noorderstrand is a part of the beach near Scheveningen, The Hague. The part that was observed was next to the harbour entrance, which is marked by large, concrete blocks.

The observation was conducted on a Saturday afternoon between 15:35 and 16:35, the sun was shining.

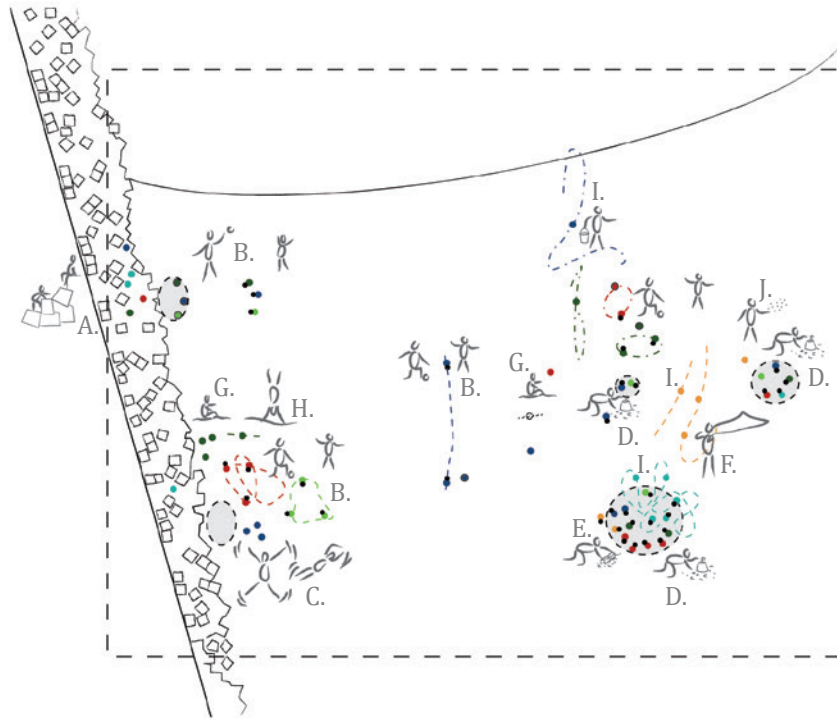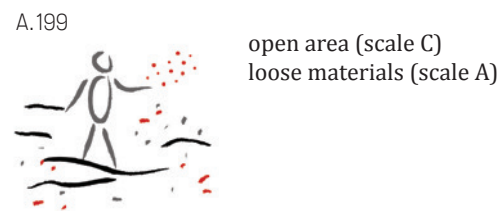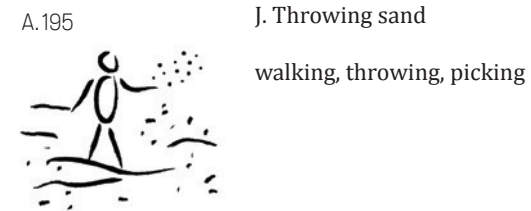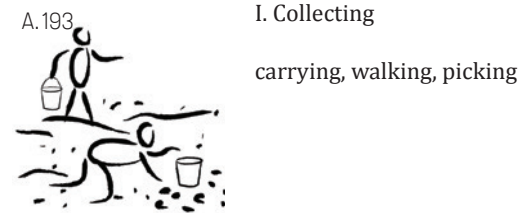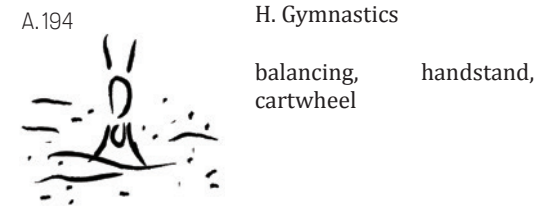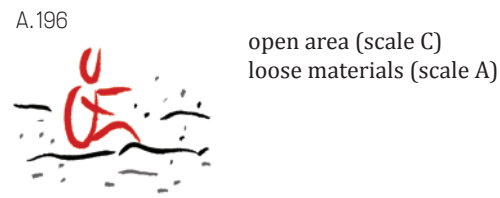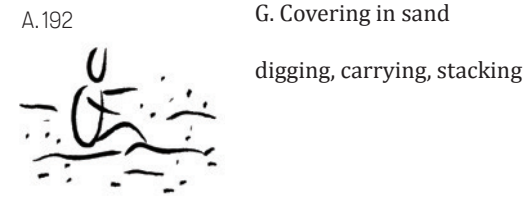*The dotted grey areas represent places where people sat in the sand.*

Fig. A.179   Floor plan

measuring moments
- 1
- 2
- 3
- 4
- 5
- 6
- parent
- collecting materials
- playing with objects
- moving around during play

A.180   **A. Concrete blocks**

climbing, balancing, sitting, jumping

A.181   height differences (scale B to overcome C)
platforms (scale B)

A.182   **B. Ball sports**

throwing, kicking, running

A.183   open area (scale C)
play equipment (scale A)

A.184   **C. Sand angels**

rolling, waving

A.185   open area (scale C)
loose materials (scale A)

A.186   **D. Sand castles**

stacking, digging, building, carrying

A.187   open area (scale C)
loose materials (scale A)
play equipment (scale A)

A.188   **E. Toys**

playing with toys

A.190   open area (scale C)
play equipment (scale A)

A.189   **F. Super hero**

running around

A.191   open area (scale C)
play equipment (scale A)

A.192

G. Covering in sand

digging, carrying, stacking

A.196

open area (scale C)
loose materials (scale A)

A.194

H. Gymnastics

balancing,   handstand,
cartwheel

A.198

open area (scale C)

A.193

I. Collecting

carrying, walking, picking

A.197

open area (scale C)
loose materials (scale A)

A.195

J. Throwing sand

walking, throwing, picking

A.199

open area (scale C)
loose materials (scale A)
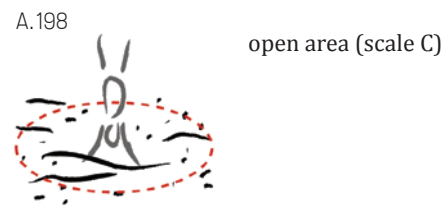
During the observation, most of the children were playing in the sand. All activities, mostly appeared on or around a seating place, usually marked by towels or other personal stuff. The seating area is the lower, right corner hosted most of the activities.

Activities that were most popular are building sandcastles (D) and playing ball games (B). Second best was either playing with toys (E) in the sand (C), climbing on concrete blocks (A) or collecting sand, rocks or shells (I). Children engaged the least in gymnastic activities (H) or playing super hero (F).
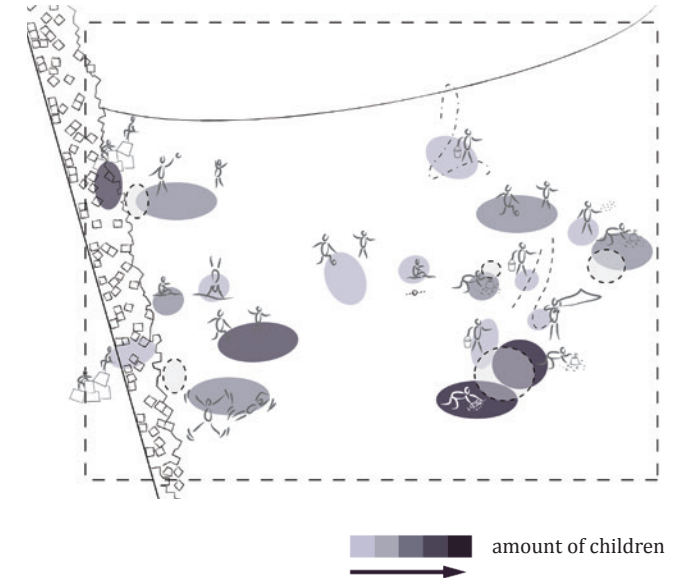
amount of children

Fig. A.200 Number of children playing at different play areas

Fig. A.201 Number of children playing at different play objects during the observation. Ranging from most to least played at.

B. QUESTIONS INTERVIEW FANTASY WORLDS

The questions listed below were used during the interview to gain the right information. The **bold questions** were leading and the others were used to explore the topic more or to explain what was meant with the question.

Can you describe how the fantasy world looked like?

How did the world look like? What kind of landscape was it? What was the scale of this world? *For example, was it a forest, dessert, city, an entire country, world or even a solar system with multiple planets?*

How detailed was the world? Did you think of road systems, languages, history, politics, or anything else?

What kind of inhabitants lived in this world?

Try to describe how they looked, what kind of names they had?

Was there a main character in this world?

If there were other inhabitants, where did they live?

Can you describe how you 'used' this world?

Was the world some kind of décor to the stories or plays you engaged in or was the creation of the world central to the play?

Whenever you created a story or play, did you involve toys, or other objects in your play?

What was your role in this world? Were you the creator of all the stories and/or the world or did you play a role in the stories as well? Whenever you also played a part in the stories, what was your role? Was it always the same or did you play different parts?

Was there a specific place or location in your surroundings, where you needed to be, before 'playing with' your world?

If you created stories in your world, what was the subject to these stories?

Was there a theme that reappeared?

Was it a continues story or could these different stories be seen loose from one another?

Was this world secret to others?

Did your parent know about the world?

Did you tell friends, siblings or others about the world or did your invite them to play within your world?

Have you ever recreated this world outside of your mind?

Did your built structures that were part of the world?

Did you make drawings, wrote stories, or anything else?

Around what age did this world evolve and when did you lose interest?

Did you notice any changes in the development of your world over time?

Did it increase in complexity?

Did the world become bigger or smaller? Have you created more places, landscapes, countries, people, or other things?