Defining and redesigning the in-between spaces of the Harbour Police Station in Rotterdam.

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Abstract. Concerning the built environment, some spaces in and around buildings symbolise the edge and intercommunication between two opposites and are therefore difficult to define. These so-called in-between spaces represent a threshold between polarities, such as inside and outside or private and public. The Harbour Police Station in Rotterdam consists of three buildings and has multiple in-between spaces, which include several entrances, doorsteps, windows, dormers, balconies, and a fenced perimeter. Since the new program will be more publicly oriented, the in-between spaces of the redesign need to attract passers-by, rather than obstructing them. Based on literature, archival drawings, personal observations and questionnaires, the influence of the materiality on the perception of in-between spaces is analyzed. Accordingly, the human perception of a building façade, entrance or window that attract passers-by can be expressed through perceptive descriptive qualities such as friendly, inviting, and pleasant. The research shows that this is influenced by the warmth, openness, and lightness of the in-between spaces. A warm materiality is perceived as pleasant and comforting and it indirectly excites to go inside. Furthermore, either big or many openings will create a more transparent building, that matches with public functions. Namely, the function should be clear on the outside. In line with this, an open façade and enough lighting contribute to a better visibility and draw attention to the building and its interior. Accordingly, it is particularly important that one can easily understand where and how one can enter. In summary, the materiality of the in-between spaces contributes to the experience of the appearance and the perceived function of the building. In the case of attracting buildings, the in-between spaces should be represented by clear accessible entrances, multiple or large windows, and warm colours, materials, and lighting.

1. INTRODUCTION

Within the field of Architecture, heritage plays a meaningful role. Namely, the emerging trends of digitalization and flexible working lead to the fact that large offices are less needed. This results in multiple buildings becoming vacant. However, this does not mean that such buildings have lost their value or should be demolished. On the contrary, the preservation of vacant heritage has even become of political importance (Meurs, 2016, p.26). In line with this, the Graduation Studio of Heritage & Architecture at the University of Technology in Delft focusses on the adaptation of vacant police buildings. Accordingly, this research is done in relation to a redesign project for the Harbour Police Station at the Sint-Jobsweg in Rotterdam. The secluded and secured buildings no longer fit their current function and

they are thus in need of a transformation. In order to incorporate a public program, it will be important to consider the perception of users and passers-by, as they should be attracted to the building instead of obstructed.

According to Canepa et al. (2019) the human perception is based on the sum of sensorial, physical, and material properties. Among other things, the perception of materiality can be influenced by aspects such as colours, textures, and levels of transparency of a building. Subsequently, these aspects affect how people observe and interpret a building. Namely, people tend to have the same attitude towards several similar situations, because of previous experiences and habits (Kahneman & Tversky, 1974). Since the perception is linked to associations, it will influence the assumption of its function and consequent use. To fit the perceived image of a building to its functional character, the materiality is therefore an essential factor. Namely, researchers have shown that users and passers-by make inferences about a building and its usage from the physical appearances, and these assumptions are often accurate. As an example, the American architect Louis Sullivan proclaimed that “Form follows function” (Sullivan, 1918, p. 43–46). In line with this, Venturi (1977) refers to this common desire for continuity between exterior appearance and interior function by stating that “the inside should be expressed on the outside” (p. 70).

The Rotterdam Harbour Police Station consist of three buildings, dating from 1933, 1940 and 1994. The buildings have separate entrances as well as shared transitions zones. However, it has become common to define space by assigning it to the notions of public and private. The differentiation in such situations is defined by human perception (Shahlaei & Mohajeri, 2015). However, some areas in the built environment are hard to define since they form an edge and intercommunication between two opposites. These spaces are called *in-between spaces* and represent a continuous shift between access and disclosure, inside and outside, private, and public, or building and space (Can & Heath, 2016). Consequently, these spaces form an ambiguous zone between two contradictory domains. Concerning the conditions of these ambiguous zones, in the natural world, an ecological border is a zone where there is more intense activity between different groups, while at the ecological boundary there is less activity (Sennet, 2017). In the case of the Harbour Police Station, the redesign should accommodate a public function, thus an in-between space with more intense activity would be desired.

Even though there are multiple literature studies on the in-between space, there is lack of knowledge about the human perception and the reasons why the materiality suggests either a gradual transition or a hard boundary.

Therefore, the following questions is raised: **“What is the influence of the materiality on the perception of in-between spaces?”**

2. METHODOLOGY

2.1. Theoretical research

The research consisted of a combination of methods. First, literature research exemplified the notions of the public, private and in-between spaces. This is based on the theory of Van Eyck (1959), but also the more recent work of Blaisse (2009; 2016) and Jürgenhake (2016) was taken into account to describe the meaning of these notions. Thereafter, archival research provided insight in the original design - dating from 1933 - of the Rotterdam Harbour Police Station. In addition, drawings from the renovation and extension in 1994 were used to fill the gaps and find out what has changed over time. The specification drawings were reduced into more comprehensible illustrations in order to visualize the building volumes and the most prominent in-between spaces. Eventually, the combination of the floor plans and own observations were used to define the other in-between spaces of the Rotterdam Harbour Police Station. In addition, literature research was used to understand and describe the human perception of materials. Ways of expressing the appearance of an either attracting or obstructing building were considered by defining a set of descriptive perceptive qualities. Based on literature of Karana and Van Kesteren (2008), Fleming et al. (2013), Sadalla and Sheets (1993), and Picard et al. (2003) a set of 36 adjectives was drawn up.

2.2. Questionnaires

To be able to answer the main research question, the results of the literature research were brought together with the human perception. By means of a questionnaire, the perception of the local community had come into play. In addition to the three buildings of the Harbour Police Station in Rotterdam, three other case studies were selected. For each building a questionnaire was composed on the basis of three photos. The first photo showed the façade, the second showed the entrance and the last one showed the windows. All six questionnaires started by asking whether people know the particular building and how they experience it in terms of accessibility, attraction and perceived program. Thereafter, the pictures and the 36 descriptive perceptive qualities were used to question the human perception of the façade, entrance, and windows of the six buildings. These questions in relation to the human perception were followed by asking the participants why they experienced it this way. The research was conducted in the vicinity of the Harbour Police Station at the Sint-Jobsweg in Rotterdam. Since most people in this area speak Dutch, the questionnaire was translated into Dutch. The results of the research were visualized by

graphs, and the explanations were analyzed to find material attributes that lead to an inviting character.

3. RESULTS

3.1. Defining the in-between spaces

Regarding the in-between space, its meaning is open to multiple interpretations since it represents the intercommunication between two opposites (Can & Heath, 2016). The ethical framework for opposites can be exemplified by a classic conflict — in relation to people — between two theologians. Martin Buber (1878-1965) depicted the ethical relationship between people as an I-thou relationship, where one becomes more intimate and personal after an increased amount of interaction and knowledge (Teyssot, 2018). Emmanuel Levinas (1906-1995), on the contrary, mentioned that the dash that separates I and thou represent an unbridgeable difference between people (Sennet, 2017). One of the architects who often worked on reconciling opposites was Aldo van Eyck (Strauven, 2007). Throughout his career, he explored different relationships between polarities. He relied on the before mentioned philosophy of Buber, who called the space between I and Thou (or It) the *Zwischen* (Teyssot, 2018). Consecutively, Van Eyck conceived the in-between space as a place that enables different people and things to gather and unite (Strauven, 2007). In addition, the threshold allows the opposite polarities to become twin phenomena.

In addition to this theory of Aldo van Eyck, the more recent work of Petra Blaisse, founder of Studio Inside Outside, and Birgit Jürgenhake, architect and researcher, are taken into account to describe the meaning of the boundary between the public and the private. As an example, Jürgenhake (2016, p.27) describes the façade as the intermediate space. Accordingly, the façade forms the mediating surface between the public and private area, which separates the two conditions of inside and outside. Moreover, Blaisse (2009; 2016) also mentioned that the threshold is foremost represented by the façade. More specifically the combination of walls, windows and doors form the boundary of interior and exterior space in architecture. Lang (1985) emphasizes the different elements of the entrances, such as doors, doorsteps, and portals. On a larger scale, the perimeter of the site or area is said to represent this ambiguous zone as well. In line with these notions, Shahlaei and Mohajeri (2015) mention circulation zones, entrances, windows, balconies, and verandas as the main connection between inside and outside. Furthermore, roofs, fences, dormers, courtyards, and doorsteps can be added to this list of in-between spaces. When analyzing these different types of in-between spaces, two deviations can be made. First of all, the level of possible penetration differs

throughout the various kinds of spaces. For example, one can walk through the doors or entrances, while one cannot enter the roof, wall, or balcony. Nevertheless, they are all considered as in-betweens. Furthermore, there is a discrepancy between solids and voids. As an example, the doors and windows are specific objects, while the veranda or balcony covers a more abstract area. Namely, the solids itself form the in-between space and the in- and outside of this space can be appointed. However, in the case of the voids of the veranda or balcony it is hard to define the border of the space that is either public or private. The in-between spaces, including its similarities and differentiations, are summarized in figure 1.

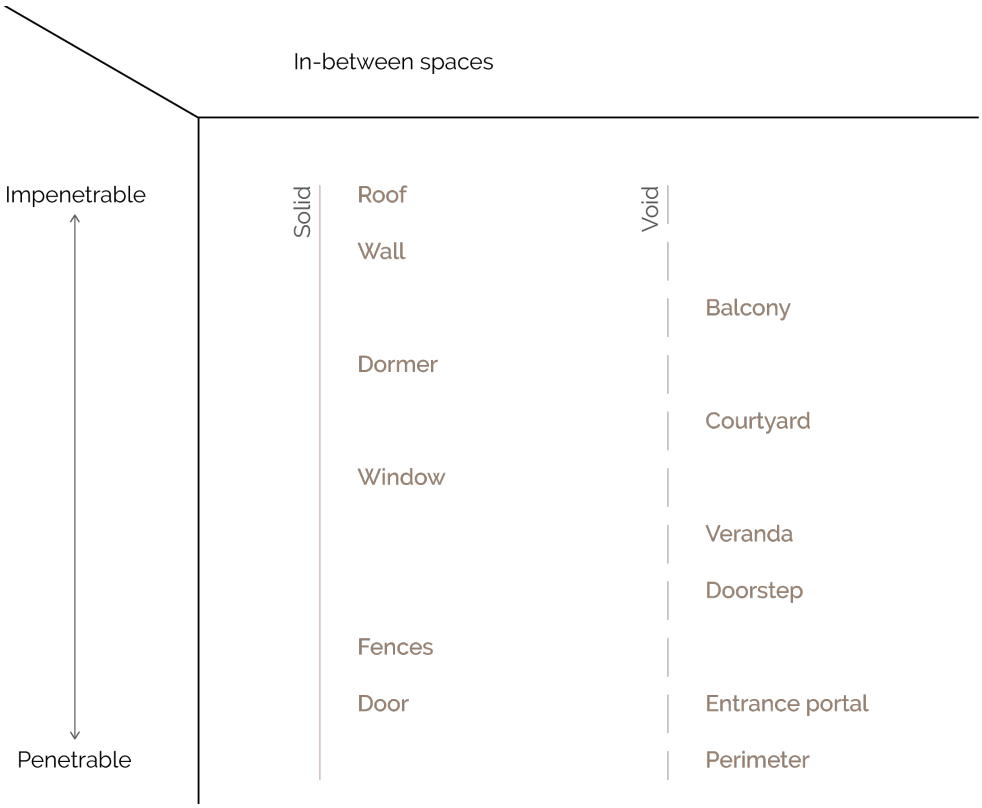

Figure 1. Overview of in-between spaces in the built environment based on Van Eyck (1959), Lang (1985), Blaisse (2009; 2016), Shahlaei and Mohajeri (2015) and Jürgenhake (2016).

Concerning the focal point of this study, the in-between spaces of the Rotterdam Harbour Police Station are analyzed. Figure 2 shows the buildings and the in-between spaces. In the original drawings and images, the buildings include the middle building, dating from 1933, and a former

workshop and section room on the south side. In these years, the in-between spaces of the Harbour Police Station are - as well on their floorplans as in the actual built design - to a large extend defined by the fenced perimeter, which surrounds the building block. Over time, the Harbour Police Station has expanded. Furthermore, pontoons were added and renovated. Also, the workshop and section room on the south side were demolished, and a new office was added on this location in 1994. Simultaneously, the residence and (work)shop building on the north side had become vacant and was added to the Harbour Police Station as well. Last but not least, the fences in front of the 1933 building were removed, but at the same time new fences were added on all other sides. As a result, the in-between spaces have remained dominated by the fenced perimeter.

Figure 2a, b. In-between spaces of the Harbour Police Station defined by the perimeter in 1933 and 2021, respectively. (Solid = building volumes, Hatch = in-between space)

Even though these fences fit the idea of a secured space in relation to the Police function, it also creates an obstructing feeling. In case of a new function, it would be likely that the fences would be removed. In that case the other in-between spaces will be perceived as well. Therefore, the façade, windows, and balconies, etc., must be considered additionally. Since the Police Station consists of three buildings, there are multiple in-between spaces. In figure 3 the different in-between spaces are

highlighted. It becomes clear that in every building at least one entrance and multiple windows are present. Dormers, small fences, balconies, and doorsteps tend to be more unique. These notions are valuable to compare the in-between spaces in the next phase.

Figure 3. In-between spaces of the Harbour Police Station.

3.2. Perception of the in-between spaces

In the field of Architecture, little research is done in relation to material experience. However, when one looks at the discipline of Industrial Design Engineering, it seeks to find a balance between business, people and technology. Furthermore, the relation between the form, the function, and the effect of materials on human perception has been studied more elaborately. As an example, in the book *Design and Emotion Moves* (2008) the experience of materials is divided into six descriptive categories, including emotional, associative, perceptive, sensorial, use and technical descriptions of materials. Furthermore, the book points out that sensorial characteristics are used the most to describe the experiences of materials. This is followed by the perceptive characteristics, with which they are interrelated. Namely, the sensorial characteristics define the interaction with the human sight, touch, smell, taste, and hearing. Concerning the perceptive characteristics, Karana and Van Kesteren (2008) state that they

“[…] elucidate what we think about materials, what kind of meanings we attribute after the initial sensorial input, and what qualities a specific material expresses (p.5)”. According to this study, examples of adjectives that can be used to describe the human perception include formal, tough, friendly, sexy, sober, masculine, warm and firm. The meaning that is attached to the materiality can thus be described in the form of material characteristics as well as human characteristics. In addition, it should be noted that these characteristics are not always similar to the technical and sensorial attributes. As an example, the materiality of a façade can be experienced as cold, while the senses do not have to feel a low temperature. This is because visual temperature relates to the perception of for example colour, while the tactile temperature is based on the thermal attributes. Similarly, Fleming et al. (2013) state that people make judgments about materials based on perceived qualities rather than based on the material classes. Therefore, the judgement is composed of a combination of objective material attributes and the subjective experience. Adjectives that are mentioned in their research *Perceptual qualities and material classes* (2013) include soft, smooth, and flexible, but also subjective adjectives like beautiful and comforting appear useful to describe the material perception judgement.

Nevertheless, the interrelation between the senses and the perception is highlighted again by Sadalla and Sheets (1993), who found out that the sensory qualities of a product or building can be associated with certain components of a material’s personality. Their research indicates that humans make inferences about buildings and its owners because of cues that are present in the façade. As an example, wooden shingles can be regarded as artistic, flagstones tend to reflect a high social status, and red bricks can be associated with warmth (Sadalla & Sheets, 1993). In line with this, the study of Picard et al. (2003) characterized the perceptual dimensions of textures by asking participants to produce tactile descriptive adjectives that came to mind when experiencing certain fabrics. This resulted in additional tactile qualities and properties on which any material can be rated. Those verbal labels include qualities in relation to the hardness, thickness, smoothness, and elasticity. Furthermore, the temperature, weight and (un)pleasant experience are considered. Based on these studies, a list of descriptive perceptive qualities is set up (table 1). Within this list, every two adjectives represented opposites of each other.

Soft	Hard	Fragile	Resistant	Informal	Formal
Smooth	Rough	Open	Closed	Feminine	Masculine
Thin	Thick	Colorful	Monochrome	Friendly	Unfriendly
Flexible	Firm	Shiny	Matt	Pleasant	Unpleasant
Warm	Cold	Frivolous	Sober	Pretty	Ugly
Light	Heavy	Elegant	Dull	Inviting	Obstructing

Table 1. List of 36 descriptive perceptive qualities based on Karana and Van Kesteren (2008), Fleming et al. (2013), and Picard et al. (2003).

Concerning the perception of the materiality of in-between spaces, a case study analysis was set up. In this study six different buildings, including the buildings of the Harbour Police, were analyzed. This means that three similar case studies were selected, including the residential complex Tuin van Noord in Rotterdam, restaurant Houtloods in Tilburg and hotel Villa Augustus in Dordrecht. Similar to the Harbour Police Station, those buildings are made out of brick, located in the Netherlands, secluded from other buildings, and recently renovated and transformed. Therefore, they might be an inspiration for the transformation of the Harbour Police Station. The six buildings were visited and an overview of the buildings, the entrances and the windows were photographed and digitally retouched to remove signs and titles.

Figure 4. The three entrances of the Harbour Police Station, dating from 1933, 1940 and 1994 respectively, as shown in the case study.

Thereafter, a list of questions was set up. Passersby from the Sint-Jobsweg and Müllerpier were interviewed based on pictures of the façade, entrances, and doors. Respondents were asked to tell whether they recognized the building, what they thought the function of the specific building was, and why they thought that. Furthermore, they were asked to

define their first impression of the façade on the basis of the descriptive perceptive qualities. In addition, they are asked the same regarding the photos of the entrance and the windows specifically. The results are visualized in graphs, such as the one in figure 5. The other graphs are added to the appendix.

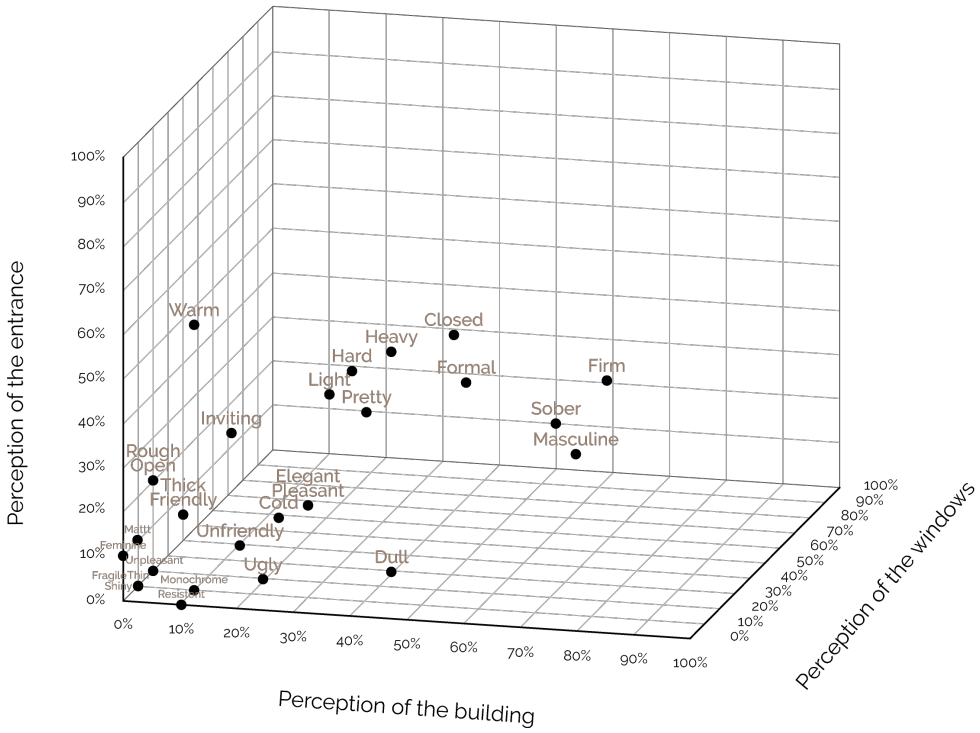

Figure 5. Results of the descriptive perceptive qualities of the 1933 building of the Harbour Police Station.

Based on this, the perception of the three buildings of the Harbour Police Station appears to be quite different. The 1933 building is perceived as masculine and firm considering its façade, but warm, pretty, and inviting in relation to its entrance, while the windows are experienced as sober, formal, and light. On the contrary, the façade of the 1940 building is perceived as cold, firm and closed, while pleasant, inviting, and dull tend to be the main descriptive perceptive qualities of the entrance, and the windows are described as rough, closed, and sober. Furthermore, the 1994 building is perceived as formal, firm, and sober regarding its façade, but ugly, unfriendly, and dull considering the entrance, and dull, formal, and cold with respect to the windows.

3.3. Inviting materiality aspects

Now that the overall perception of the six buildings is known, the question arises as to which material attributes led to the particular experiences of the building façades, entrances and windows. In relation to the adaptive reuse project of the Rotterdam Harbour Police Station, an inviting, pleasant and friendly character is desired. Therefore, it is meaningful to understand why certain in-between spaces are perceived like that.

Accordingly, within the case study the question was raised whether the participants could describe what elements they believed led to their perception. This was an open question, so several different answers were given. The focus of the analysis of these answers lied in the first place on the words inviting, pleasant and friendly. It turned out that it should be evident to the passer-by that the building is publicly accessible. This could for example be envisioned by signs, use cues or other ways of transparency of the interior program. Furthermore, the entrance should be clearly visible. This means that it would be desirable to have the entrance at the front side of a building or it should somehow pop out in respect to the rest of the façade. This can be interpretated as a preference for differences in depth, detailing or materialization. In addition, entering should be easy. This means that the passer-by should not have to pay a lot of effort in opening the door. It is therefore more tempting when a door is open or when it opens automatically. With this in mind, inclusivity would probably be desired as well, which means that the entrance should be wheelchair friendly for example. Furthermore, the most mentioned possibility to attract people is to make the inside visible from the outside and vice versa. By means of transparency and good lighting, the function and the atmosphere can become clear, and this turns out to be attracting.

Within the questionnaires, it had become clear that warmth, openness, and lightness go often hand in hand with the desired attracting characteristics. For instance, in the cases of Villa Augustus and the 1933 building of the Harbour Police Station, especially inviting and warm were repeatedly assigned simultaneously. Moreover, in the example of the Houtloods, pleasant, light and open were continuously selected together. Therefore, the words warm, open, and light were considered additionally. Warm materials and colours, such as the brown bricks of the 1933 building, were perceived as comforting and pleasant. Thereby, it tempted the passers-by to take a closer look at the building and its function, which can lead to entering the building. Apart from warm materials, warm lighting has an attracting effect as well. However, this is not only the result of the warmth that it provides. Namely, multiple participants emphasized the availability of transparency in order to peek inside. People want to see the interior of the

building to feel more invited. This can be enhanced by the lighting because this contributes to the visibility. In line with this, openness turned out to be desired because an open façade contributes to a better relation between inside and outside and it draws attention to the interior. Therefore, it can be interpretated that either big windows or many openings will create a more transparent building, that matches with public functions.

4. DISCUSSION AND CONCLUSIONS

Within this research, different questions have been addressed. As a conclusion, the main question “What is the influence of the materiality on the perception of the in-between spaces?” can be answered. The outcomes of the research and case study show that the perception of the in-between spaces is indeed influenced by material aspects. Especially openness, lightness, and warmth result in an attracting building. However, it does not only influence the appearance, but it also tells something about the function and the use of the building.

The presence of changes in materiality between the façade and the entrance can contribute to a pleasant appearance, since it highlights where one could enter. In line with this, the in-between spaces represent a continuous shift between inside and outside. Overall, a subtle change in materiality contributes to a clear and ease way of accessibility. Namely, it is then perceived as directive rather than obstructive and it indicates two contradictory domains can really become twin phenomena. Additionally, windows or other glass zones guide the passer-by in its perception of the functions, as it makes the interior visible. Again, the transition between inside and outside becomes more subtle and this is often perceived as more desirable in terms of creating a welcoming character. This is further emphasized by the materiality of the in-between spaces. Warm colours, materials, and lighting are experienced as comforting and pleasant and are therefore preferred in order to lead the passers-by to the inside.

All in all, a combination of material attributes within the in-between spaces can contribute to an inviting, pleasant and friendly experience. Attracting in-between spaces can be created by accessibility in terms of clarity and ease, transparency by means of lighting and windows and the friendly warmth of colours and materials. Even though this research is done in relation to a design project for the Harbour Police Station in Rotterdam, this research can be suitable for multiple projects. Namely, many buildings no longer fit its current function, so it is valuable to take into account the perception of the materiality of the in-between spaces in order to accommodate future usage of vacant heritage in general.

5. BIBLIOGRAPHY

Blaisse, P. (2009). The Instinctive Sense of Space and Boundary. *Inside Outside*, 84–87.

Blaisse, P. (2016). Avoiding Architecture, a Manifesto. *Materia Arquitectura.* 14, 116–120.

Can, I., & Heath, T. (2015). In-between spaces and social interaction: a morphological analysis of Izmir using space syntax. *Journal of Housing and the Built Environment, 31*(1), 31–49. https://doi.org/10.1007/s10901-015-9442-9

Canepa, E., Scelsi, V., Fassio, A., Avanzino, L., Lagravinese, G., & Chiorri, C. (2019). Atmospheres: Feeling Architecture by Emotions. *Ambiances, 5*. https://doi.org/10.4000/ambiances.2907

Fleming, R. W., Wiebel, C., & Gegenfurtner, K. (2013). Perceptual qualities and material classes. *Journal of Vision*, 13(8):9, 1–20. https://doi.org/10.1167/13.8.9

Karana, E. & Van Kesteren, I. (2008). Materials affect: The role of materials in product experience. In Desmet, P., van Erp, J., & Karlsson, M. (2008). *Design and Emotion Moves* (1st ed.). Cambridge Scholars Publishing.

Lang, R. (1985). The Dwelling Door: Towards a Phenomenology of Transition. In D. Seamon & R. Mugerauer (Eds.), *Dwelling, Place and Environment: towards a phenomenology of person and world* (1st ed., pp. 201–213). Martinus Nijhoff Publishers. https://doi.org/10.1007/978-94-010-9251-7

Meurs, P. (2016). *Heritage-based design*. TU Delft. https://books.bk.tudelft.nl/press/catalog/view/484/493/107-1

Picard, D., Dacremont, C., Valentin, D., & Giboreau, A. (2003). Perceptual dimensions of tactile textures. *Acta Psychologica*, 114(2), 165–184.

Sadalla, E. K., & Sheets, V. L. (1993). Symbolism in building materials: Self-presentational and cognitive components. *Environment and Behavior, 25*(2), 155–180. https://doi.org/10.1177/0013916593252001.

Shahlaei, A., & Mohajeri, M. (2015). In-Between Space, Dialectic of Inside and Outside in Architecture. *International Journal of Architecture and Urban Development*, *5*(3), 73–80.

https://ijaud.srbiau.ac.ir/article_8548_bfe8d7153580b1856ba3de915801e831.pdf

Sennet, R. [Harvard GSD Talks]. (2017, October 23). *The Open City* [Video]. YouTube. https://www.youtube.com/watch?v=7PoRrVqJ-FQ

Strauven, F. (2007). Aldo van Eyck – Shaping the New Reality From the In-between to the Aesthetics of Number. S*tudy Centre Mellon Lectures, 12*.

Teyssot, G. (2008). Aldo van Eyck's Threshold: The Story of an Idea. *Anyone Corporation*, 11, 33–48. http://www.jstor.org/stable/41765182

Tversky, A., & Kahneman, D. (1974). Judgment under Uncertainty: Heuristics and Biases*. Science, 185*(4157), 1124–1131. https://doi.org/10.1126/science.185.4157.1124

Venturi, R. (1977). *Complexity & Contradiction in Architecture* (2nd ed.). Museum of Modern Art.

6. BIOGRAPHY

Daphne Fahrner is a graduation student at the University of Technology in Delft, the Netherlands. In 2019 she obtained her bachelor's degree at the Faculty of Industrial Design Engineering. Subsequently, she started a Premaster at the Faculty of Architecture and the Built Environment. After completing this, Daphne started the Architecture Track of the Master Architecture, Urbanism and Building Sciences. Her interest lies especially in old and detailed brick buildings, and this resulted in becoming a graduation student in the Vacant Heritage Studio. Besides her fascination for materiality and heritage, she is keen to learn about psychological aspects as well. Therefore, the relationship between buildings and the human perception is taken as the focal point of this paper.

7. APPENDIX

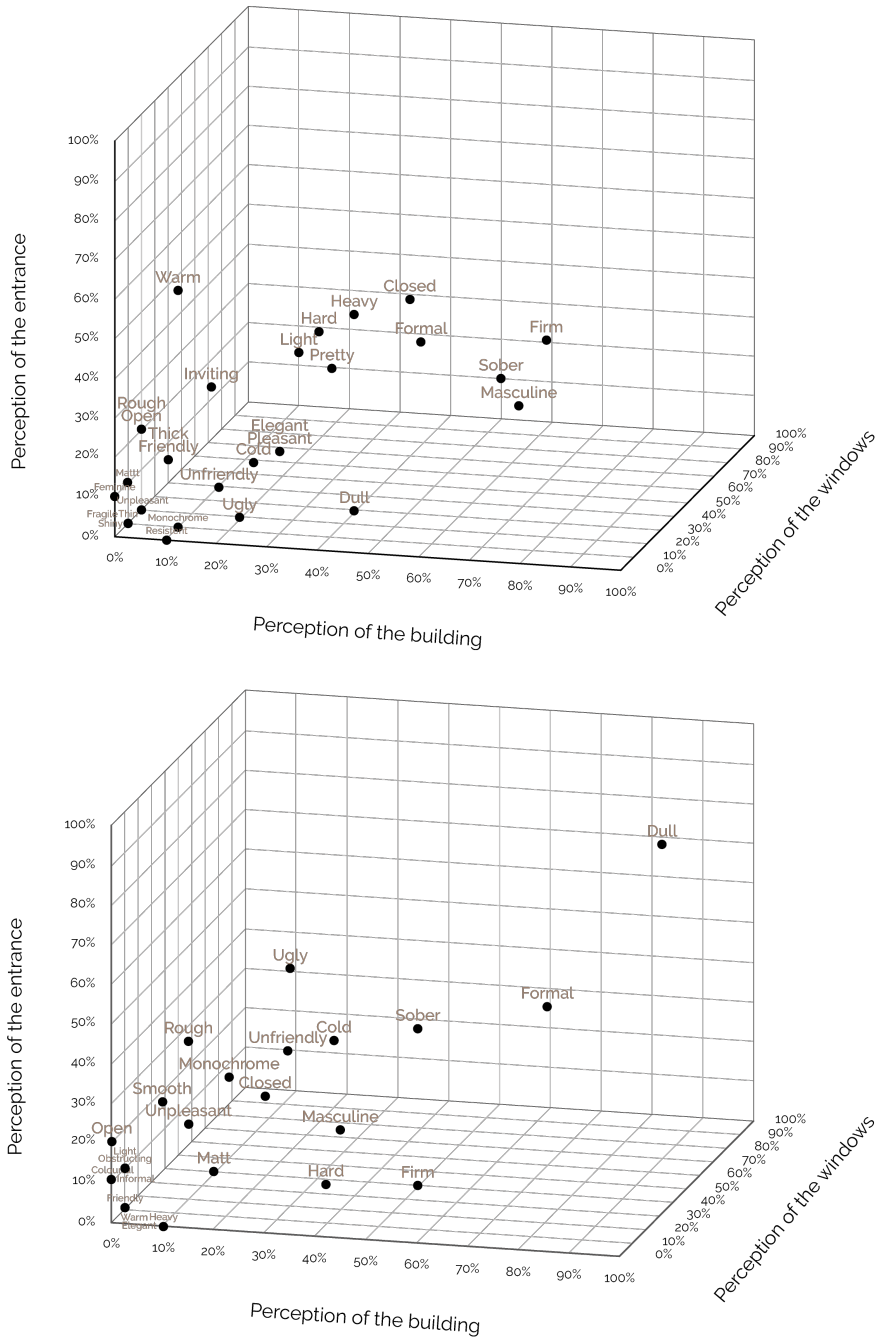

Figure 6 a + b. Results of the buildings from 1933 and 1940 of the Harbour Police Station, respectively.

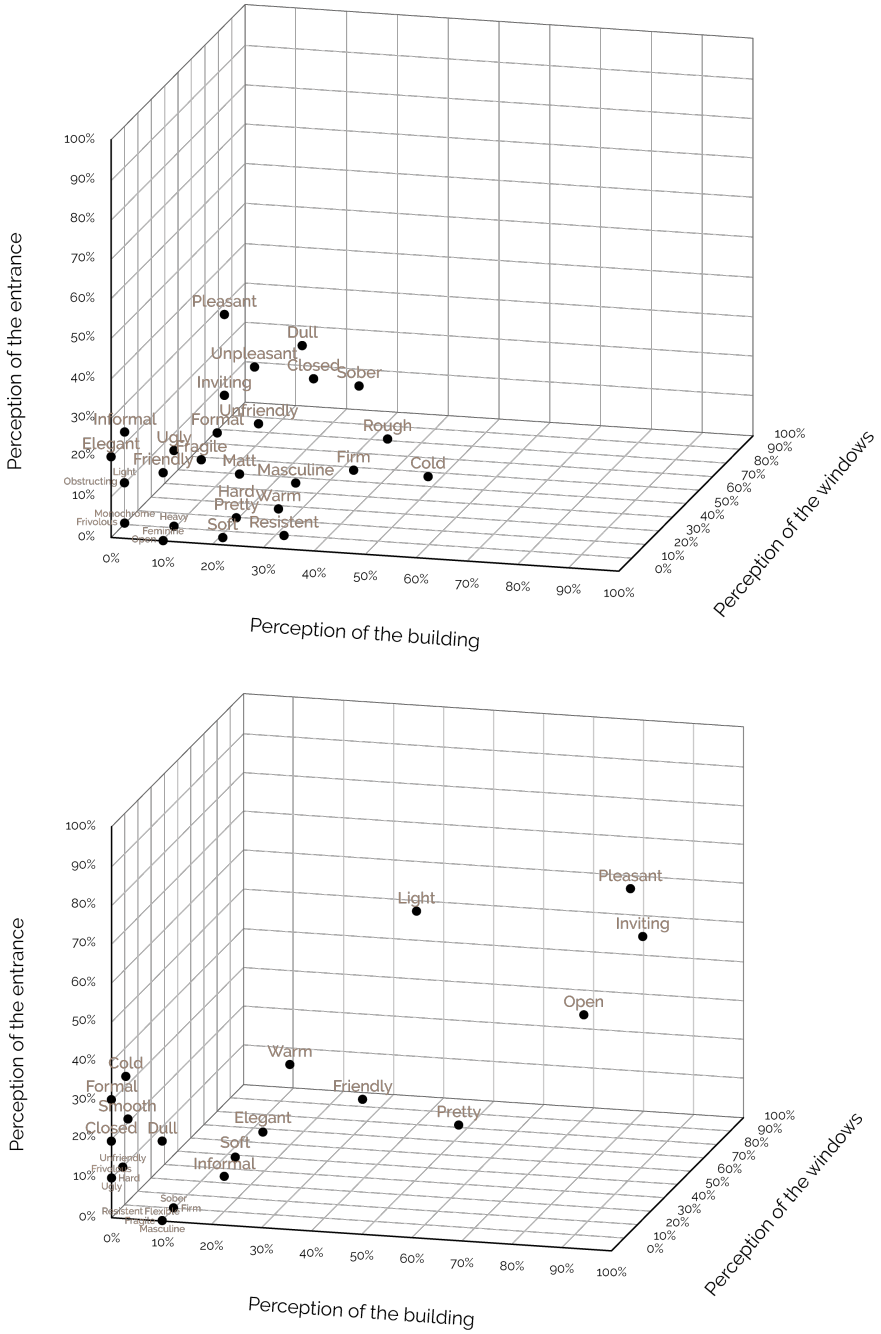

Figure 6 c + d. Results of the building from 1994 of the Harbour Police Station and the Houtloods, respectively.

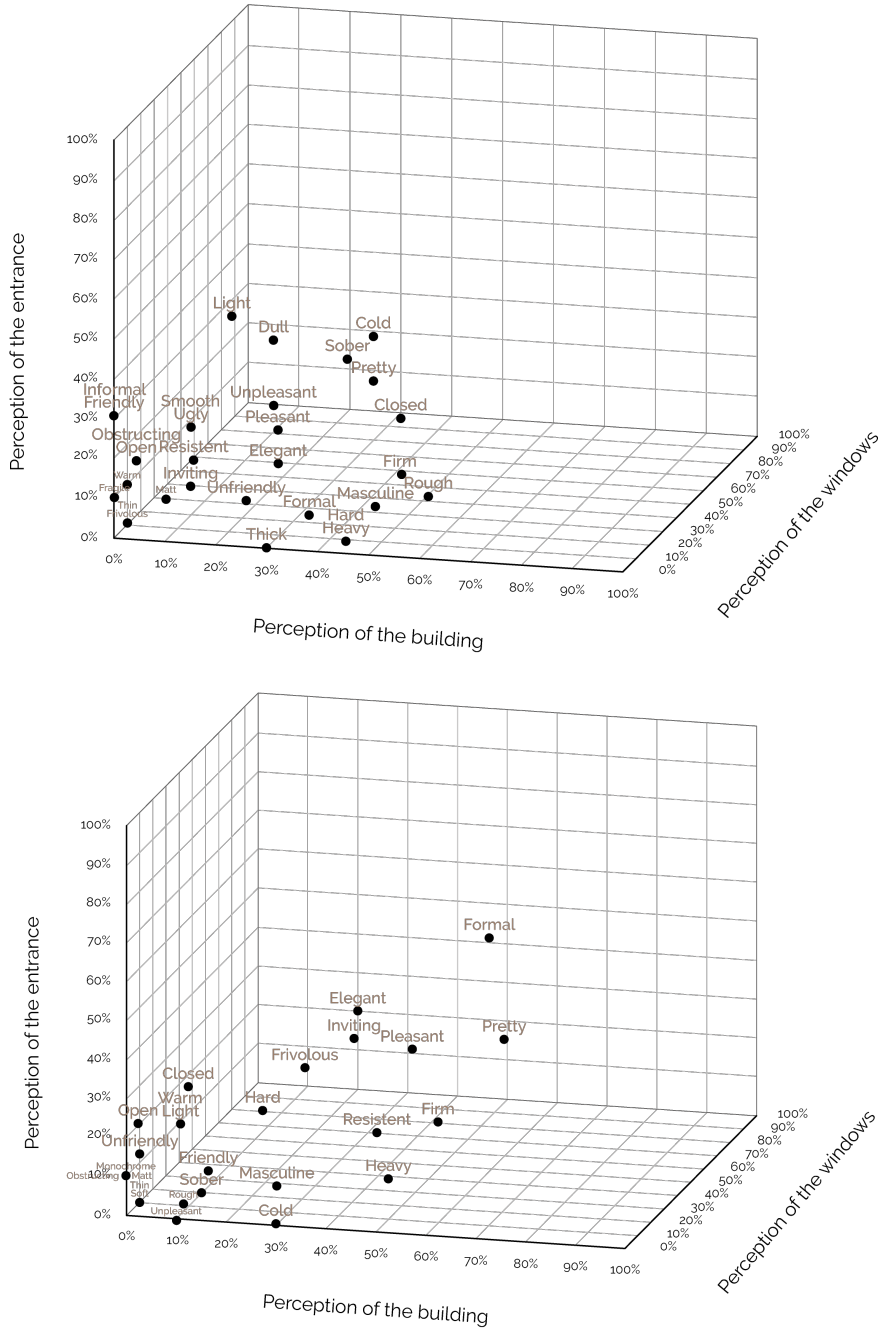

Figure 6 e + f. Results of the Tuin van Noord and Villa Augustus, respectively.