

How to make the campus life more comfortable for students on the spectrum?

Focussing on the KU Leuven built environment

Ruben Bamps

Thesis voorgedragen tot het
Behalen van de graad Master
In de ingenieurswetenschappen:
architectuur

Promotor:
Prof. dr. ir. arch. Ann Heylighen

Co-promotor:
Dr. arch. Phuong Lan Nguyen

Academiejaar 2022-2023

KU LEUVEN

 **FACULTEIT
INGENIEURSWETENSCHAPPEN**

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ABSTRACT

Going to college is a challenging and highly influential phase in people's lives. During these years, people discover and develop their qualities and interests but also face challenges, like living independently, distancing from their parents, and distancing from the environment they trust. On this path of going to college, becoming independent, and developing oneself, some students might need guidance to avoid these difficulties. Students on the (autism) spectrum have a higher chance to face these difficulties (compared to their fellow students) due to their specific way of thinking. Furthermore, students on the spectrum could experience the built environment as rather chaotic and overwhelming. Therefore, to improve the college life for students on the spectrum, this master's thesis focusses on their perspective and on how the built environment affects their college experience.

Through the built environment lens, this research aims to understand autistic students' daily struggles, and what influences their college experience. In general, it aims to understand how these struggles effect their lives and their opportunities. Once insight is gained into the challenges faced by autistic students, this research gives perspective on what they find essential in their college life. What is more, it explains their experiences during exams, lectures, and the breaks between two lectures. During this research, the role of the built environment is analysed, and suggestions are made to improve it. These suggestions seek to increase autistic students' chances to pass their exams and thus also their chances to graduate.

For this research, I interviewed five students on the spectrum who all study at KU Leuven (in Leuven). Based on these interviews, I identified in which space they feel the most and least comfortable and which objects, elements, or spatial qualities contributes to these experiences. By analysing these data, I found patterns, similarities, or differences between participants' experiences. These data indicate that their college life could be described, based on three themes, namely: study, sociality, and retreat. Furthermore, I described their perspective on the (university) built environment also into three themes, namely: clarity, distractions, and escapement. In addition, these descriptions lead to suggestions to improve the KU Leuven built environment, like spaces where students have exams or lectures. These suggestions are grouped around three themes, namely: spatial improvement (at different scales), organisational improvements, and sensitization. Furthermore, I used these suggestions to inform a student organisation that could implement them. This offers a way to make student organisations more aware of making their student events more accessible for students with autism.

The research results offer insight into some critical elements within the built environment. The suggestions to improve these spatial elements vary from changes that require considerable investments, like integrating enough sound-insulation or sound panels, to tips and tricks, like dimming the lights, eliminating buzzing sounds or integrating clear and functional signage. The thesis concludes that simple attention towards material use, signage, and clear planning, could make an important difference for autistic students. Furthermore, based on this research I am convinced that listening to and learning from people on the spectrum could be a key element in making better designs for everyone.

ABSTRACT

De studententijd is een uitdagende periode die een grote invloed heeft op iemands leven. In deze periode ontdekken en ontwikkelen mensen hun kwaliteiten en hun interesses. Jammer genoeg zijn hier ook uitdagingen aan verbonden, zoals zelfstandig leven en afstand nemen van ouders en/of een vertrouwde omgeving. De weg die universiteitsstudenten afleggen tijdens hun studie is dus niet zonder moeilijkheden en is voor iedereen anders. Zo hebben sommige studenten meer nood aan begeleiding doorheen hun studententijd dan anderen. Studenten met autisme hebben bijvoorbeeld meer kans op moeilijkheden doordat hun manier van denken verschilt met die van studenten zonder autisme. Om een inzicht te krijgen in de ervaringen van studenten met autisme, focust deze master thesis op hun perspectief en welke rol de gebouwde omgeving van de KU Leuven heeft tijdens hun studententijd.

Dit onderzoek geeft inzicht in de moeilijkheden waarmee studenten met autisme dagelijks mee geconfronteerd worden, hoe deze hun ervaringen en mogelijkheden beïnvloeden. Verder geeft dit onderzoek perspectief over de ervaringen van autistische studenten tijdens examens, tijdens lessen en de pauzes tussen de lessen. Hierbij worden de elementen, waar zij van vonden dat er onderzoek rond gedaan moest worden, uitgelegd. Tijdens dit onderzoek werd de rol van de gebouwde omgeving besproken en hoe ze te verbeteren op basis van ervaringen. Het in kaart brengen van deze rol haalt zowel de positieve als negatieve aspecten van de gebouwde omgeving naar boven. Zoals gezegd, zorgt dit voor verbeteringen in de gebouwde omgeving, maar draagt dit ook bij aan sensibilisering eens dit onderzoek verder verspreid zou worden. Verder zorgen deze aanpassingen in de gebouwde omgeving ervoor dat de slaagkansen van autistische studenten toenemen, waardoor ook de kans dat ze afstuderen stijgt.

Om data te verzamelen, heb ik vijf studenten met autisme van de KU Leuven geïnterviewd. Op basis van deze interviews zoek ik naar objecten, elementen of ruimtelijke principes in situaties waar studenten met autisme zich het meest comfortabel voelen of, net het tegenovergestelde, zich het minst comfortabel bij voelen. Hierbij wordt er een nadruk gelegd op de gebouwde omgeving en hoe die een invloed heeft op de ervaringen van studenten. Door deze data te analyseren, heb ik patronen, gelijkenissen of contradicties gevonden tussen de ervaringen van de verschillende deelnemers. Hieruit volgde dat het studentenleven van hen beschreven kan worden door drie thema's, namelijk: studie, sociaal leven en terugtrekking. Verder heb ik ook de rol van de gebouwde omgeving van de universiteit kunnen samenvatten in drie kernwoorden, namelijk: duidelijkheid, afleidingen en ontsnapping. Deze beschrijvingen gaven de mogelijkheid om de gebouwde omgeving van de KU Leuven, zoals ruimtes waarin studenten examens of lessen hebben, te verbeteren. Deze verbeteringen heb ik ook in drie thema's

opgedeeld, namelijk: ruimtelijke verbeteringen (op verschillende schaalniveaus), organisatorische verbeteringen en sensibilisering. Verder heb ik deze verbeteringen voorgesteld aan een studentenorganisatie en gevraagd deze dan ook te implementeren in één van hun evenementen. Verder hoop ik dat studentenorganisaties meer bewust worden over studenten met autisme en hoe hun evenementen inclusiever te maken voor hen.

Door mijn onderzoek heb ik informatie verkregen over de ruimtelijke elementen die een rol spelen in ervaringen van studenten op het spectrum. Deze elementen variëren van grotere interventies waaronder het integreren van voldoende geluidsisolatie of geluidpanelen, tot kleinere tips and tricks zoals duidelijke en functionele signalisatie. Door al deze informatie, besluit ik dat eerder eenvoudige aandachtspunten inzake materialiteit, signalisatie en duidelijke planning, de ervaring van autistische studenten beduidend positief kan veranderen. Verder ben ik ervan overtuigd dat luisteren en leren van mensen met autisme een sleutelement is om betere ontwerpen te maken voor iedereen, al dan niet met autisme.



CHAPTER 1. INTRODUCTION

This chapter introduces my master thesis' research. First, I sketch the problem and why it is important to do this research now. To ensure the reader understands what it means to have autism, this is explained in this chapter. In addition, this chapter clarifies the most appreciated way of talking to and about people on the autism spectrum. Further, the college life and its associated challenges, which students (on the autism spectrum) face, are noted. After this clarification, this chapter covers the objectives and research questions of this master thesis. This chapter ends mentioning the structure of this master thesis.

1.1 Problem statement

1.1.1 Sketch of the problem

How students experience their time as a student at a university depends on various factors. These factors could relate to the student's interests, their financial status, medical status and so on. During this time, people develop themselves and thus find their interests. On the other hand, students face different challenges, like stress, anxiety, fear of failing, or lack of motivation. Autistic students face these same challenges, but also have difficulties with living independently and social communication (Hendrickson et al., 2017; Tackx, 2020). These difficulties cause stress and discomfort. What is more, autistic students have more difficulties with concentration during lectures and exams compared to neurotypical¹ students, which worsen the comfort and enhance their stress level (Hendrickson et al., 2017). Noise is an example that causes lack of concentration due to problems with distinguishing foreground from background noise. What is more some autistic students can be attracted to certain sounds (Kinnaer et al., 2014).

Being concentrated during lectures and exams, is (according to me) essential to develop skills and gain information to pass exams and eventually graduate. Some students on the spectrum agreed that the way they experience sensory input, sometimes interfered with their ability to study (Anderson et al., 2018). What is more, certain factors in the environment cause problems to concentrate when needed. Unwanted distractions could have a negative impact on the ability to learn (McAllister & Maguire, 2012b). These factors **vary** for each autistic person, some will have troubles with noises, others with lights (Gaudion et al., 2015). What is more, the severity of these sensory factors can vary (McAllister & Maguire, 2012b). Autistic people are **hypersensitive** (over-stimulated) and/or **hyposensitive** (under-stimulated) to sensory input (Gaudion et al., 2015). They have a specific way of interpreting the world that can make them find it a disorientating and frightening (McAllister & Maguire, 2012b).

Additionally, autistic students struggle with everyday **routines and chaos** which interfere with their studies in higher education (Fleischer, 2012). To give them support, architects could provide predictability, consistency, and structure in time and space (Kinnaer et al., 2014). Considering these structures and predictability raises the question if the built environment of universities influences the routine and experience of autistic students. In addition, it is interesting to question how to improve the built environment. As a student engineering architecture of the KU Leuven, I chose to analyse the built environment of the KU Leuven which I consider as a familiar environment.

¹ Neurotypical people: people who have "a style of neurocognitive functioning that falls within the dominant societal standards of "normal." (Walker, 2023)

In general, this research focuses on the daily college experience of students with autism. More specifically, the challenges they are confronted with on a daily basis and which role the built environment of the KU Leuven plays in it. Therefore, concepts, spatial aspects, or items that contribute to make autistic students feel comfortable or uncomfortable, are specified and explained. All these concepts and aspects are situated within the KU Leuven built environment. In addition, this research focuses on understanding how students with autism experience the built environment of the KU Leuven. Once mentioned and understood their experiences, I searched for ways to improve the KU Leuven built environment.

1.1.2 What is autism?

Autistic students are neurodivergent, which means that these students have “a mind that functions in a way that diverges from the dominant societal standards of ‘normal’” (Walker, 2023). This way, neurodiversity or being neurodivergent introduces a concept to look at autism as part of a bigger picture within a variety of conditions. In general, the term neurodiversity covers **all the differences and variations in the human brain**, which take into account social skills, learning skills, and mood attention (Neurodiversity Working Group, 2022). By all these differences and variations, it becomes a broad term, and therefore three subdivisions could be made. The Neurodiversity Working Group (2022) divides neurodiversity into three groups: applied neurodiversity, clinical neurodiversity, and acquired neurodiversity. Applied neurodiversity (or neurodivergence) and clinical neurodiversity (or neurodivergence) include the conditions which people are born with, while acquired neurodiversity covers the conditions which have changed people’s cognition and behaviour through time, due to an injury or a developed health condition. Examples of acquired neurodiversity are PTSD², anxiety and depression.

Applied neurodiversity (or neurodivergence) includes the conditions which people are born with, but which are not considered to be health problems. The most common are dyslexia, dyscalculia, dysgraphia, and dyspraxia³. The third group, **clinical neurodiversity** (or neurodivergence) includes the conditions which people are born with and which relate to difficulties in communication, social skills, behaviour and impulse control (Neurodiversity Working Group, 2022). Examples of clinical neurodiversity are autism spectrum condition and Tourette syndrome⁴.

² PTSD or Post Traumatic Stress Disorder is a mental condition that is caused by experiencing or witnessing a traumatic event, which causes flashbacks, anxiety, and nightmares of that events (Mayo Clinic Staff, n.d.).

³ Dyslexia, dyscalculia, dysgraphia, and dyspraxia are learning conditions that relate to respectively reading and spelling, math, writing and, the organization of movement which could cause clumsiness (Brocks Academy, 2013).

⁴ Tourette syndrome is a chronic tic disorder characterized by chronic motor tics and vocal tics (Neurodiversity Working Group, 2022).

To narrow down the topic, I have chosen to focus on students on the autism spectrum.

However, this research focuses on autistic students, it does not mean the autistic students are only diagnosed with autism. In general, autism could be comorbid with other neurodivergent conditions, like ADHD⁵, anxiety, and depression (Anderson et al., 2018; Brown & Coomes, 2016; Hendrickson et al., 2017). This way, the analysis for this research takes possible **comorbid diagnosis** of students on the spectrum into account. In addition, autism spectrum condition is a spectrum of varieties. Therefore, all the diagnosed people have **different experiences, different preferences** (Brown & Coomes, 2016), **different weaknesses and different strengths** (Neurodiversity Working Group, 2022). Some are more triggered by their sight, others by their hearing, touch and/or, smell (McAllister & Maguire, 2012b). Due to these varieties and comorbid diagnosis, I will use the term **people on the spectrum** to make the people aware of these differences and possible comorbid diagnosis.

People on the autism⁶ spectrum have a condition that affects the way they interact with the world, and they experience the world around them (American Psychiatric Association, 2010). Because of this other way of thinking, people on the (autism) spectrum are neurodivergent compared to people who are not on the (autism) spectrum. Autism is an **umbrella term** for the different subgroups within the autism spectrum which indicates the differences in the way autistic people experience their diagnosis (McAllister & Maguire, 2012b). Further, autism spectrum condition (ASC) is a neurodevelopmental condition that is characterised by differences (compared to people without ASC) which relate to impulse control, sensory regulation, the ability to initiate and sustain reciprocal social interaction, and communication (Neurodiversity Working Group, 2022). However, there is a growing number of researchers who believe that the physical environment is an important point of departure to improve autistic people's quality of life (Gaudion et al., 2015; P. Nguyen et al., 2021). As a master student in engineering architecture, I have gained knowledge about designing and creating the built environment. By this knowledge, I can link people's opinions, experiences, and preferences to the built environment. Therefore, I could use this knowledge of the physical environment to improve autistic people's quality of life. Furthermore, gathering information about students on the autism spectrum did broaden my knowledge. Therefore, I became able to propose improvements to the built environment for students on the autism spectrum.

⁵ ADHD or attention deficit hyperactivity disorder is a condition whereby people with ADHD can have troubles with concentration, seem restless, or can act on impulse (NHS, 2021).

⁶ Autism comes from the Greek word autos which means self (APA, 2013 via Kinnaer et al., 2016).

1.1.3 Talking about autism

There are different ways to talk about people who are disabled in certain situations (e.g., people on the spectrum). When talking about a disability, the way of speaking is important, because it has an influence on people's life (Pellicano, 2015). Since the 1980s, people started to talk about **disabilities as a situation** that describes a series of factors a person experiences, instead of an impairment people have (Winance, 2007). Following this idea, we cannot say that people are disabled (or have a disability). Instead, we could say a person is disabled within a certain situation. Later on, government guidelines (of the United Kingdom) were made to encourage teachers and clinicals to use inclusive language when communicating about and with people who are disabled within certain situations (Pellicano, 2015). This inclusive language does not define people by their disability but uses so called **"person-first"** language. For example, you can refer to a "person with autism" instead of an "autist". Both could be interpreted in the same way, but the second semantic has a rather negative connotation. However, some disabled people have criticised the person-first language and preferred the **"identify-first"** language. In the case of autism, people who use identify-first language, would say the "autistic person". However, it is not clear between the person-first and identify-first language which people prefer to use (Kenny et al., 2016; Pellicano, 2015). Therefore, I will use both in this thesis. Furthermore, I did not talk about ASD (autism spectrum disorder), which is frequently used in papers⁷, but I did use ASC (autism spectrum condition). ASD lays the emphasis on a disorder, which has a rather negative connotation and have synonyms like diseases and illness⁸. By the use of ASC, we refer to autism as a neurological difference, instead of a neurological disorder (Tackx, 2020).

1.1.4 Importance of research about autism

Research on autism shows that autism is a spectrum. Therefore, everyone with autism has different preferences and has different needs. However, researchers and designers have a misconception of the preferences or essentials of autistic people when designing the built environment. According to the research of Pellicano, Dinsmore and Charman (2014), autistic adults prioritised research on how public services could meet the needs of autistic people, while the researchers prioritised research on the best ways to improve the life skills of autistic people. Other researchers like Milton (2014) argue that people with autism become distrustful of researchers and their aim. To gain back trust, autistic adults and their peers mention that they would like **more awareness** and **knowledge exchange** between researchers, professionals and the public to avoid misconceptions (Pellicano et al., 2014). Due to the lack of information and the lack of contact with the end users, researchers and designers could make wrong choices or have preconceptions

⁷ See (Hope, 2022a), (McAllister & Maguire, 2012b), and (Hendrickson et al., 2017) as an example.

⁸ Synonyms suggested by Google.

while designing for people on the spectrum (Nguyen et al., 2020 in Langdon et al., 2020). Research showed that teachers and faculty members are unfamiliar with teaching students on the spectrum (Vogel et al., 1999 via Brown & Coomes, 2016). Therefore, research is needed to know what people on the spectrum want to be investigated. Furthermore, it gives the opportunity to learn from their point of view on the built environment.

Since 1990, there has been a rise in the number of people diagnosed with autism in the United States of America. In the future, this trend will continue due to the rise in the number of children who are diagnosed. Based on data across different areas of the United States of America, the Centers for Disease Control and Prevention (2014) has concluded that the number has increased to 1 in 68 children (via Brown & Coomes, 2016; Sarrett, 2018). Furthermore, another study shows that the number of children with autism has increased from 1 in 150 (year 2000) to 1 in 88 (year 2015) in 15 years in the United States (Pinder-Amaker, 2014). In addition, most children on the spectrum are not intellectually disabled (Pinder-Amaker, 2014). Therefore, these numbers indicate that in almost every school at least one student has autism. However, although there is an increase of students on the autism spectrum, it does not clarify why we need to do this research (now). Therefore, I want to note this research is needed to make people aware of the challenges students on the spectrum face and why these challenges differ from students who are not on the spectrum. This way, I want to give the reader an insight into the challenges autistic students face and what is contributing to them.

1.1.5 Challenges of going to college

Going to college comes with major challenges for many students. During the college years, neurotypical individuals may have the highest chance to develop **major psychiatric illnesses** such as depressive disorder, bipolar disorder, and schizophrenia (Pinder-Amaker, 2014). Students on the spectrum have a higher risk to develop psychiatric issues when compared with their neurotypical peers (Pinder-Amaker, 2014). Furthermore, students on the spectrum (and without an intellectual impairment) also have the **lowest rates to register for post-secondary education**. In addition, national statistics in the United States indicate that just 38.8% of students with autism, who start a post-secondary education, will graduate (Newman et al., 2011 via Cox et al., 2017). However, the ones that have a post-secondary education, have **better life outcomes** (Hendrickson et al., 2013). To give students on the spectrum an equal chance to graduate, higher education institutions are **obliged to implement inclusive education** (Pesonen et al., 2021). Although people who go to college have better life outcomes and higher education institutions are obliged to have adjusted education for people with autism, there is still a lower rate of students who find a job, when compared with their peers (Pesonen et al., 2021; Van Hees et al., 2015). Further, in research of Lambe et al. (2019), the participants highlighted socialising was one of their biggest fears in

college. Due to bullying in the past, they looked to **socialising as dangerous** (Lambe et al., 2019). In addition, students on the spectrum appear to misinterpret nonverbal communication which makes socialising and working in group difficult (Gobbo & Shmulsky, 2014).

Students on the spectrum could face the same challenges as any other student, like stress and performing anxiety. Furthermore, students on the spectrum also have a higher chance to face challenges with social communication, have a higher need of support/coordination (Hendrickson et al., 2017), and struggle to manage their everyday routines which interfere in their higher education studies (Fleischer, 2012). These everyday routines are related to self-care, changes in domestic routines and in study routines (Lambe et al., 2019). According to Van Hees et al. (2015) the life of a student consist of three major domains: education (e.g. participating classes, study skills), student life (e.g. students unions, extracurricular activities) and living independently (e.g. shopping, cooking, living in a residence). All the challenges that are related to each domain and their combination cause difficulties within the college experience of students on the spectrum which are problematic (Van Hees et al., 2015).

1.2 The role of the built environment

1.2.1 *Influences of the built environment*

As mentioned in the introduction, some people on the spectrum have troubles to concentrate in daily situation, because of distraction by certain noises, lights, smells.... The way people on the spectrum interpret this sensory input gives them a unique perspective of the world which could make the world disorientating and frightening (McAllister & Maguire, 2012b). Furthermore, the way people on the autism spectrum experience the built environment could also be determined by the **implantation of a building**. For example, some people on the spectrum prefer open spaces to have an overview, while others find subdivided smaller spaces more pleasant, which offers more structure (Kinnaer et al., 2016). All these examples show that the built environment influences the autistic students' experiences. Mostafa (2015 via Hope, 2022b) proposed **the first set of evidence-based design guidelines** to design built environment for individuals with autism. These guidelines could be used to design interiors, buildings, and clusters of buildings (Mostafa, 2021). Her guidelines had seven main principles: acoustics, spatial sequencing, escape space, compartmentalization, transitions, sensory zoning, and safety (Mostafa, 2015). The first guideline, acoustics, notes to minimize the background noise, echo, and reverberation time (Mostafa, 2015). Second, spatial sequencing remarks the importance of a logic plan and spaces in a logical order, based on the use of the spaces. Third, escape spaces are spaces with a neutral sensory input which the user can change to their needs. The fourth principle, compartmentalization, notes to create a clear environment where every

space has a single and clear function. Fifth, transitions relate to spaces that provide the possibility to prepare for an overstimulating space (e.g., event hall). Sixth, the sensory zoning principle proposes to organise spaces according to their sensory quality. Lastly, safety is important for everyone, but for children with autism (who have another way of perceiving things), this could become more important (e.g., sharp edges) (Mostafa, 2015).

Other researchers, like Tackx (2020), show that **smaller adjustments**, could have a significant impact on people with autism. During her master's thesis research, she investigated which role the built space of students' accommodation has on students on the spectrum (Tackx, 2020). She discovered that a student valued a whiteboard within a shared kitchen of her student accommodation. This gave her the possibility to write anonymously her complaints, like uncleaned dishes or disturbing noises (Tackx, 2020). This example shows that little adjustments could have an impact on the college experience of students on the spectrum.

1.2.2 Escape spaces

When reading literature, which dated from the last ten years, I remarked other researchers mentioned escape spaces as a quality in the built environment for people on the spectrum. An escape space is **a space where one can retreat** when a situation becomes too overwhelming (Hope, 2022a). These spaces do not need to be an actual separated room, but it could be a corner of a room or a space underneath a stairs (Kinnaer et al., 2016). This way, **personal space** is created which is considered important to people on the spectrum to have a space to find comfort and de-stress when needed (McAllister & Maguire, 2012a). However, these escape spaces could be an actual separated space. For example, the DCU Sensory Pod, which is shown below (Figure 1, Figure 2). The DCU Sensory Pod is part of a project of the Dublin City University (DCU) to make an autism friendly campus. These so-called Sensory Pods are quiet zones/spaces placed in busy corridors, which are covered by sound proofing (Hope, 2022b). This space (or "sensory pod") provides tools, like calming imagery on a LED screen, for those who want to avoid sensory overload, but also for those who crave sensory input (Hope, 2022b).

When the idea was proposed, the executive board did not want to install these quiet spaces due to the stigma they would create. However, once implemented, they became rather popular (Hope, 2022b). As a master student within engineering architecture, I wonder if the stigma would not be an issue once implemented in other universities, like the KU Leuven. Furthermore, I questioned if these DCU Sensory Pods “include” students on the spectrum or rather separate them. Figure 3 shows the differences between exclusion, separation, integration, and inclusion. In my opinion, the DCU Sensory Pod has more to do with **separation or integration instead of inclusion**. Therefore, I wondered if separation or integration would be desired instead of inclusion in some cases for people on the spectrum.

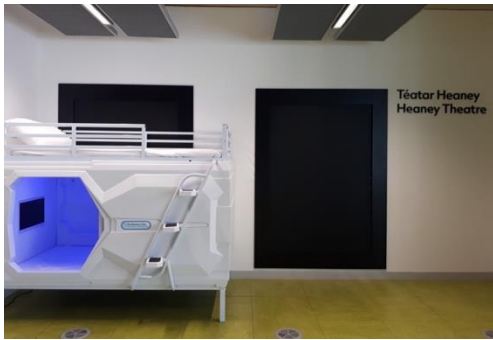


Figure 1: Outside DCU Sensory Pod ©DCU



Figure 2: Inside DCU Sensory Pod ©DCU

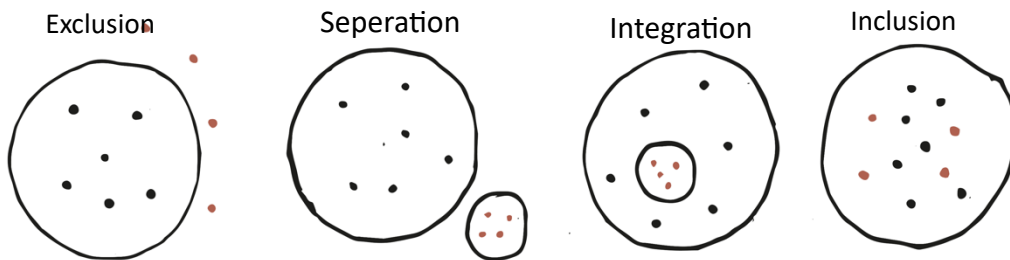


Figure 3: Exclusion, separation, integration, inclusion

1.2.3 Potential of previous research to build on

As mentioned before, researchers believe the built environment could improve autistic people's experiences, education, and quality of life (Hope, 2022b; McAllister & Maguire, 2012). The DCU Sensory Pods and the guidelines of Mostafa (2015 via Hope, 2022b) are interesting and may help to improve the autistic students' college experience. However, these examples include adjustments which have a rather high impact on the design of the building. Therefore, it could be more difficult to implement these suggestions, due to lack of space, funding the project, or the stigma (e.g., DCU Sensory Pod (Hope, 2022b)). Therefore, it is also **interesting to pay attention to smaller adjustments/elements**, (e.g., whiteboard (Tackx, 2020)) during the research of my own thesis. By these small adjustments funders, residence owners, organisations... will not need much (financial) effort to improve the built environment for people on the spectrum. Therefore, I am convinced that it also would be interesting for them.

1.2.4 Gaps in previous research

By using multiple references, Gaudion et al. (2015) quoted that the existing design research, which relates to autism and the built environment, mainly focuses on children with autism. Only **a few researchers focus on adults** (Gaudion et al., 2015) which caused a lack of research on autistic adults. However, the last years researchers started to investigate adults and students with autism (Lambe et al., 2019) (e.g. the master's thesis of Tackx from KU Leuven (Tackx, 2020) or DCU Sensory Pod (Hope, 2022b)). In my master's thesis the participants and I (the researcher) talked about comfortable and uncomfortable spaces in the KU Leuven built environment. This way, we **proposed spatial adjustments** to improve these uncomfortable spaces and proposing an alternative. Lastly, this research distinguishes itself from other investigations by its **focus on the campus life and the autistic students' experiences during exams and lectures**, which is a big part of the college experience to gain knowledge, to socialise, and learn soft skills⁹.

⁹ Soft skill is an umbrella term for skills which include critical thinking, problem solving, public speaking, professional writing, and teamwork (Wikipedia, 2023).

1.3 Goals and research questions

1.3.1 Objectives

With this research, I tried to understand autistic students' experience during their college years, and the challenges they face. I focussed on their daily challenges as **living independent**, their **experiences on the campus**, and the **influence of the built environment**. Within this focus, I tried to pay extra attention to the spaces in which students on the spectrum have exams and lectures because I believe these spaces influence students to pass exams and so finally graduate. Lastly, I want to note that this research **seeks to more public accurate awareness** of the challenges autistic students face. This awareness is considered important by autistic people and their parents (Pellicano et al., 2014).

The first objective of this research was to **identify spaces in which some students on the spectrum experience comfort and discomfort** and why these students experience these spaces in this way. Therefore, I looked for relations between their experiences and the possible role of the built environment. Once these spaces have been identified and analysed, the second objective is to identify **ways to improve the spatial elements/spaces which causes this discomfort**. In my opinion, identifying and improving the situation is equally valuable and so both have been extensively described. Further, both are based on experiences of autistic students. Therefore, both adopt a qualitative research approach. In addition, the differences between the participants are noted to clarify the specificities of some participants. Within my own research, similarities and differences will be identified between experiences of some or all participants. This way an overall idea of their experience will be created and explained.

1.3.2 Research questions

To understand the college experience of autistic students and what their (daily) challenges are as a student, I try to find answers on the following two research questions and their related subquestions:

1. Which spatial elements make students on the spectrum feel (dis)comfortable within the KU Leuven built environment?
 - What is the role of the KU Leuven environment in autistic students' college experience?
 - Which role could escape spaces play in the KU Leuven built environment?

2. How to improve the KU Leuven built environment for students on the spectrum?
 - How to improve their campus experience by adjusting the KU Leuven built environment?

- How do they look at inclusive design? And what do they think of design that integrates or separates them?

The answers to these research questions could point to larger adjustments, like providing escape spaces or adjusting the wall finishes, but also smaller adjustments like changing the form furniture or providing the possibility to dim the light.

1.3.3 Used methods

To give the participants the opportunity to explain their experiences, I adopted a **qualitative research approach**. This way, I interviewed and observed the participants. The interviews were **semi-structured interviews** and so my role, as an interviewer, was to guide the interview. This way, I motivated the interviewees to talk about the topics they consider as important, instead of letting them only answer the questions which I prepared beforehand. In general, qualitative research is an umbrella term for research that focuses on behaviours and interactions of people in a social context (Fossey et al., 2002). Therefore, people do not use statistical data or quantifications (Fossey et al., 2002). This approach made it possible to focus on the specific experiences of the participants and what they consider as important. What is more, qualitative approaches can take **emotional characteristics, personal characteristics, and lived experiences** into account (Francis et al., 2009; Gaudion et al., 2015). This allows me to gain a better understanding of their point of view. In addition, most of the existing research focuses on the general classification of autism and **forgets to focus on the variety on the autism spectrum** and the individual preferences of autistic people (Francis et al., 2009; Gaudion et al., 2015).

1.4 Master's thesis structure

This first chapter gave a brief **introduction** this master's thesis research. First the problem statement is clarified. Second, the role of the built environment is explained and third, the goals and the research questions of this research are explained. Further in chapter 2, the **research set-up** is explained. Within this chapter, I discuss my own background as a researcher, the general idea of this research, and how I started to gather participants for this research. To end this chapter, I give a quick sketch of the participants.

In chapter 3, the **first field study** that has been done, is explained. Therefore, I explain the related methods and the different stages. In addition, I explain the findings of this first field study. To structure these findings, I divided these into two parts. First, a **description of the student's environment**. Second, I describe some **suggestions to improve** to the built environment, based on the data gathered out of the field study. In addition, I added an **intermezzo**. This part explains the

different opinions of the discussed topics during the meetings extensively. Even though this part could be interesting to read, it is not necessary to read it to understand the research and its findings.

Further, chapter 4 describes the **second field study** which has been done for this research. In this chapter, first the methodology is explained. Second its findings are explained and third, the discussion of this field study is described. In this discussion, I look back at the findings of the first field study and implement its findings.

Further, chapter 5 is a **discussion and conclusion** of this research. In this chapter, I briefly describe the research and discuss the different topics related to other investigations. This part is followed by a reflection on the research. Therefore, I look back at the methodology and me as a researcher. Lastly, I mention some proposals for future research.



CHAPTER 2. THE RESEARCH SET-UP

This chapter covers the set-up of the field study. First, I explain my own background. I talk about myself as a researcher and what I already knew before the start of this research. After this background, I explain the general idea of my field study: what is my methodological approach, start-up of the research, and who are the participants of my research.

2.1 Background

2.1.1 *About the researcher*

I'm a fifth (and last) year architectural engineering student of the KU Leuven. Before I started this research, I had **no foreknowledge** about people on the autism spectrum and no one ever told to me, they have autism. However, I had some preconceptions. First, I **expected** people on the spectrum would be introvert and have difficulties to communicate. Second, I thought they are very structured people who want to estimate situations beforehand. And third, I thought they could be easily overwhelmed. By these preconceptions, I could have been influenced in the analysis and my methodology. For example, I was rather careful when I approached them. This way, I tried to give a formal impression in the beginning. However, because I did not have any foreknowledge, most of the information is gathered via a literature study and the field study that is done for this research.

As a start of this research, I wanted to gain knowledge about the concept of inclusive design. This way, I should become familiar with this concept and the relation between this concept and my own research. Therefore, I followed an **elective course**, called Inclusive Design, simultaneously with my literature study. During this course, (former) researchers and a user/expert¹⁰ presented their experiences related to inclusive design to give us insight into their point of view. In addition, for an assignment of this course I needed to interview a user/expert twice. In my assignment, I had the opportunity to interview a student on the spectrum who has colour-blindness. First, this **user/expert and I visited a building** of KU Leuven. During this visit, the user-expert talked about his experience of this building. In this way, he gave me insight of his perspective and view to this building. Second, we **discussed a design** that a colleague and I made in our fourth year studying architectural engineering. Based on his experiences of the real built environment, he gave feedback about the discussed design to improve it. Later, this user/expert also became a participant of my thesis.

2.1.2 *Friend in student accommodation*

Since my first year at college, I am living together with 23 other students in a student accommodation. In this student accommodation we all share a collective dining room/kitchen which we see as a social space where we come together. Due to interests of some of my fellow students at my student accommodation, I talked about my master thesis' research. After a while, a **fellow student from my accommodation** approached me and told me he has

¹⁰ User-experts are people with one or more disabilities who gained expertise by their experience as a disabled person in dealing with the challenges of the environment. (Ostroff, 1997)

autism. In addition, he asked if I wanted to have a talk with him about his condition. Of course, it seemed (and was) very interesting and so we had a rather informal chat. He gave new insights about autism and his experiences on campus. It is noteworthy to mention that he studied two years of engineering architecture. Therefore, he knows the same campus as I. This way, it became easier to communicate via examples on this campus. Before we had this talk, I knew him for two years and a few months. When I first met him, he was a rather quiet person who secluded himself in his own room. Therefore, I thought he (like some others) did not want or need any social contact from the people of our student accommodation. After a few months, he started to become more present in the dining room and he started to talk with the fellow students of my accommodation and me. Therefore, my preconceptions about him started to change. After a while I started to know him, and I started to consider him as a friend.

2.2 General idea

2.2.1 Methodological approach

Due to the assignment of the elective course and the talk with my friend of my student accommodation, I started **to value qualitative research**. The experiences that were shared during these chats, gave a view on their experiences which (I think) I could not find via quantitative research. In addition, the participants told their experiences from their perspective. I felt that their experiences were different from each other and what is more, from the knowledge I found in the literature study. Furthermore, the research of Pellicano, Dinsmore and Charman (2014) concludes that autistic adults prioritise research on services, interventions, and support, which was in **contradiction with the researchers' thoughts**. Autistic adults opted for **more awareness and knowledge exchange** between researchers, professionals and the public (Pellicano et al., 2014). The researchers prioritised improving the life skills of people on the spectrum. This way, the research of Pellicano, Dinsmore and Charman (2014) shows a misconception between the research that researchers prioritise and the research autistic people prioritise.

To avoid these misconceptions between the users/experts of my research and myself, I chose to use a **qualitative approach and to give the participants the possibility to guide the research**. Using a qualitative approach gives the possibility to focus on the preferences and experiences of the users/experts which they want to share. As Van Schalkwyk and Dewinter (2020 via Crane et al., 2021) mention: *"Qualitative methods are relevant when researchers want to explore how people experience situations and problems, giving voice to the lived experience of autistic individuals and stakeholders."* Further, according to

Fossey et al. (2002) it is important to highlight the research participants' opinions and social contexts and how they understand these social contexts.

2.2.2 *Start of the research*

To start my field study, I searched participants who wanted to be interviewed for my thesis and share their experiences. Via the Inclusive Design course, I gathered **five participants**, who are students and have autism and some of them have an additional diagnose. The five participants did not know each other, but all had signed up as a user/expert with autism for the Inclusive Design course. Twelve students on the spectrum were contacted via email which was sent by postdoctoral researcher Natalia Pérez Liebergesell who has access to a list of KU Leuven students with a condition who have the possibility to access support, such as extra time during exams. In the email, all the participants were informed about the research set-up and their role in it. In addition, it was mentioned how the data would be recorded, processed, and stored if that was the case. If they wanted to participate in the research, they had to email me. This way, they gave consent to inform me about their diagnosis. By following this method, the fieldwork fits within the research project 'enable² - enabling the building sector to create enabling spaces', for which ethics approval was obtained from the Social and Societal Ethics Committee of KU Leuven. Afterwards, seven students emailed me for additionally information. Later, five students stayed in contact who all became participants. The other two students stopped replying from which one said he had troubles with his computer and so it became difficult to communicate. However, the five participants have **a different profile in terms of gender, age, study, comorbid diagnose, and religion**. This variety of profiles gave insights from different perspectives which led to interesting discussions. In section 2.2.3 a short description of the participants is given.

Further, every participant knew which photographs were used and knew that their name would be changed in a pseudonym. The research set-up contained four different meetings. During these meetings, the participants had the choice to bring a peer (family-member, close friend etc.) to the meeting. However, the perceptions of peers do not always align with those of the autistic students (Hendrickson et al., 2017). Therefore, this peer could influence the participants' perspective. Furthermore, it is easier to schedule a meeting with one person than with two persons. To clarify, in the master thesis of Elise Tackx (2020), which also focusses on autistic students of KU Leuven, Tackx experienced difficulties with scheduling meetings with the participants and their peers. For example, some peers were the participants' parents, who were not often in Leuven and had to come from afar which made it difficult to meet. However, in this research all the participants chose to meet alone, so without a peer.

2.2.3 Participants

Pseudo-name: Adrian

Age: 19y

Study: Second year of civil engineering

Diagnosis: Autism + ADHD + dysgraphia

Diagnosis autism: Second year of primary school (9y)

Other:



Pseudo-name: Aisha

Age: 19y

Study: first year commercial science

Diagnosis: Autism + ADHD

Diagnosed: End of first year of university (19y)

Other: Muslima

Second year of college



Pseudo-name: Celine

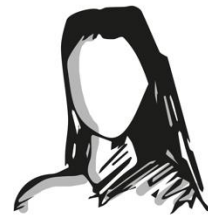
Age: 24y

Study: Second year of Japanology

Diagnosis: Autism

Diagnosis autism: During fourth year of high school (16y)

Other: Was depressed



Pseudo-name: Mark

Age: 24y

Study: first year PhD-student civil engineer

Diagnosis: Autism + ADHD + colourblind

Diagnosed: After first year of university (19y)

Other: User/expert from Inclusive Design course



Pseudo-name: Warre

Age: 26y

Study: Last year of Informatica

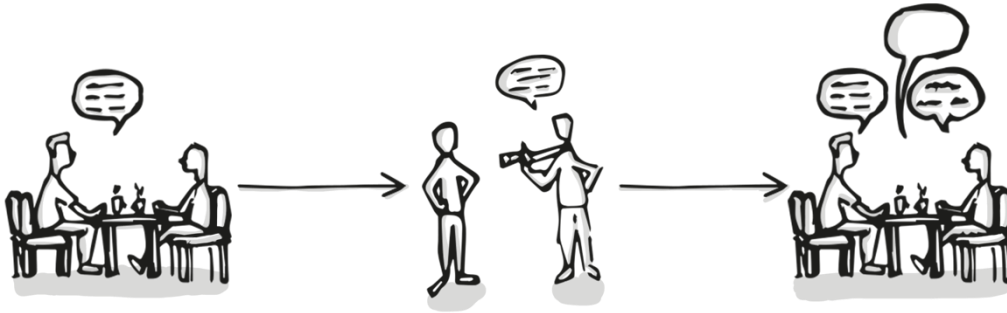
Diagnosis: Autism

Diagnosed: End of fourth year of university (21y)

Other: Convinced he has ADHD (not diagnosed)

Participated four years in the Inclusive Design course





CHAPTER 3. FIELD STUDY I: INTERVIEWS WITH THE PARTICIPANTS

This chapter covers the first field study that was conducted during the research. First, a short description and the purpose of the field study is given. Further, the original methodology is explained and how I eventually executed it. At the end of this chapter, I share my findings and a discussion of this field study. The discussion consists of a descriptive part and a part in which I suggest elements to improve the built environment.

3.1 Introduction of the field study

The first field study was conducted to understand the college experience of the autistic students who participated in my research and to get to know them. During this research, the participants and I had **three meetings** in which we had semi-structured interviews. The first meeting was a rather informal meeting in which the research set-up and the coming meetings were clarified. This meeting lasted around one hour for each participant. In the second meeting, I tried to understand the participants' college experience and how their college experience could be improved. This meeting lasted with Adrian, Mark, and Warre around two hours and with Aisha and Celine around one hour. After this meeting, I analysed the data which I collected during the meeting, by listening back to the different meetings and make a list of all the different topics (and additional discussion) that were mentioned. The third meeting served as a clarification of the statements that were made during the second meeting if needed. Further, I asked their opinion on the topics that the other participants mentioned. In this way, I could compare the participants' opinions. This meeting lasted almost two hours with Adrian and Mark, one hour with Warre, and half an hour with Aisha and Celine. It is noteworthy that the meeting with Aisha, Celine, and Warre was online. Furthermore, during the discussions with Adrian and Mark, we often talked about irrelevant topics (e.g., video games or sports) to have a pleasant conversation. After this interview, I combined all the data and adjusted the findings of the second meeting. Further, I made schemes that gave an overview of the findings (Figure 8).

3.2 Methodology

3.2.1 *First stage: Get to know the participants.*



The first stage of the field study was meant to get to know the participants. In addition, I made sure they understood the research and its intentions. The first appointment was a rather casual, semi-structured interview which served to make the participants feel comfortable with me and the process of the research. During this meeting, we talked about the **content**, the **schedule** and their **first thoughts of the research**. Once, the research was clear to them, we had a chat about each other's college experience and daily life to get to know each other. It is noteworthy, they were not obliged to answer questions if they did not want to. In addition, I notified that the other meetings would be audio recorded via my phone and that I would use the audio record to analyse the meeting afterwards. This way, they knew that the recording could be stopped if they wanted. After this chat, I got a first impression about the participants' common experiences and their interests.

For this meeting, we met at a **location chosen by the participant**. This way, they could determine the environment of the meeting where I expected them to feel more comfortable during the first interview even though I was a stranger to them. What is more, people on the spectrum vary from each other and have different preferences (McAllister & Maguire, 2012b). Therefore, it was difficult to determine a good environment for them. For example, some prefer open spaces, others prefer more separate rooms (Kinnaer et al., 2014). By letting them choose an environment, we could have the meeting in an environment according to their preferences. Furthermore, it gave me an opportunity to discuss the environment and why they chose that specific space. Even though I expected these meetings to go in enclosed spaces on campus (e.g., an empty auditoria or seminar room), four out of five participants asked to go to a **cafe** in the afternoon and drink a hot drink. Mark and Adrian chose a bar that they did not know but were curious about. They considered this meeting as an occasion to go to this bar. Aisha and Celine wanted to meet at a bar that they already knew. This way, all four wanted an informal comfortable conversation with a drink. The fifth participant (Warre) did ask to meet in a **seminar room** so he would not be distracted by other people during the meeting.

At the end of this first meeting, I had the impression the participants felt comfortable, and I did not experience troubles related to disclosing towards me. What is more, they all wanted to participate in the whole research and signed an informed consent form in which they gave permission to use the gathered data of the research. To finish this meeting, I asked if they would prepare a **take-home task** before the second meeting. This task is a start of the photovoice interview which was conducted in the second meeting. The **photovoice interview** is an interview in which the interviewer guides the interview based on photographs the interviewee made. Photovoice is a method which enables researchers to gain information from someone else's point of view by using photographs. The images produced and discussed by the participants stimulate social interaction (Wang & Burris, 2016). The use of taking photographs and talking about them in an interview, gives the participant the possibility to reflect on what they prioritise in this research (King et al., 2019). I expected **three to five photographs in which they feel comfortable and three to five photographs of spaces in which they feel uncomfortable**. To get the participants started, I proposed a template they could use. However, if they wanted, they could make their own template. Next to the photos, they had the possibility to write comments about spaces. These comments could help them during the interview because some autistic people find it difficult to pour out their thoughts by talking and prefer writing them down (Baumers & Heylighen, 2010; Kinnaer et al., 2016).

3.2.2 Second stage: Experiences of the participants



In the second meeting the participants showed the prepared photographs they took from the take-home task, that was asked after the first meeting. Even though I had the feeling the task was clear after the first meeting, it was remarkable that some students experienced troubles gathering photographs of “comfortable spaces” and “discomfortable spaces”. Celine could not think of any photograph and Aisha took in total four photographs. Celine told me she had troubles to find these (dis)comfortable spaces because she did not link (dis)comfortable situations to the built environment. Therefore, she did not bring any photograph. Hereby, Celine and I started to analyse the interior of the cafe (in which we met for the second meeting) as an alternative which started the conversation. Aisha said she had the same problem but found three examples of comfortable spaces and one discomfortable space (instead of at least three discomfortable spaces) from which the conversation started. Lastly, it was remarkable Adrian did not write any comment next to his photographs. He preferred to show the photographs and just talk about them, instead of preparing some text, what could be related to his dysgraphia.

I conducted a **semi-structured interview** in which I tried to let the participant talk as much as possible. The photographs and the written texts served as an anchor to share their experiences in the chosen spaces and to explain what makes these spaces (dis)comfortable. The three to five photographs of discomfortable spaces were improved via a **co-design** method. The photographs of comfortable spaces were discussed and used as a reference to gain ideas to improve the discomfortable spaces. Once we had discussed all the spaces, we started a co-design session to improve the spaces in which they feel discomfortable. The co-design was a discussion with visualisation of some propositions. For this visualisation, I wanted to use tracing paper to place over the photographs. This way, the participants could suggest spatial adjustments to create a fictive, maybe utopian, space that represented their adjustments. If they did not feel comfortable to draw or had difficulties to visualise something, I drew their ideas. In addition, if these drawings were not clear, I could use Photoshop as an alternative. Overall, the co-design process was led by the participants to explore their experiences (Gaudion et al., 2015). This way, I hoped to motivate them to be creative and feel comfortable to talk about their suggestions with me.

However, during the interviews I had the impression it was hard to motivate the participants to propose suggestions. Only Mark wanted to draw, and he proposed some suggestions. Adrian, Aisha and Warre talked about their negative experiences within the discomfortable spaces but had difficulties to improve these spaces. Therefore, the conversation focused on a description of the discomfortable

spaces, what made these spaces uncomfortable and what should be avoided to improve their experience. As mentioned, Celine did not find spaces in which she felt (dis)comfortable. As showed in Figure 4, the second meeting with Celine was after the others' second meeting. What is more, the second meeting with Celine was after the third meeting with Warre and the one with Mark, due to difficulties with the take-home task and time-management issues. Therefore, the meeting with her went differently. We mainly talked about the interior in which we were during the meeting. Further, we talked about the examples the others gave and she gave her opinion about these examples.

During all these meetings, I recorded the session, and we made notes and sketches to clarify if it was necessary. After each meeting with a participant, I made a transcription of each interview which give me a closer look to the discussed spaces and topics. Once I analysed the interviews, I started to compare all the data with each other and listed all the different spaces, spatial elements, and spatial principles. Once, everything was listed, I searched for similarities between the participants and noted if there was one. Afterwards, I added all the topics in a presentation with related images, which gave an overview. After this meeting, I gained knowledge about the participants' college experience and how to improve their experience from their point of view. In addition, the meeting gave perspective on the challenges the autistic students (who were interviewed) face daily.

3.2.3 *Third stage: Verification process*



As mentioned in the previous stage, I analysed the data that I gained from the previous meetings. In the third stage/meeting, the student on the spectrum and I talked about the analysis, and we **discussed my preliminary findings**. If necessary, I asked questions to clarify some unclear elements of the previous stage. This way, the session was intended to be a **verification** process to clarify the previous meeting. If the participants did not have time for this meeting or felt the sessions became too overwhelming, they did not need to participate this session. As an alternative, I proposed to send an email in which I explained my findings as well as possible on which they could mail me back.

However, all the participants wanted to and did this session. Eventually, the session mainly existed out of comparing the participants' experiences. What is more, due to some difficulties, three out of five participants asked to meet online which we did. To guide the meeting, I used the presentation with the different topics. This way, all the topics were discussed and compared. These meetings were recorded and afterwards I made a transcript of each meeting which I used to analyse and create an overview of the data. In the analysis, I divided the different

spaces based on their function, to create an overview of the different discussed spaces. After this meeting and analysis, I gained a lot of new information which relates to the participants' variation of preferences and similarities. Due to all the new information, I want to note that this verification process was far more interesting than I had expected. Afterwards, I analysed the different perspectives and complement and added the list of different topics (which I made after the previous stage). This way, I got an overview of all the different topics and I could find differences and similarities between the participants.

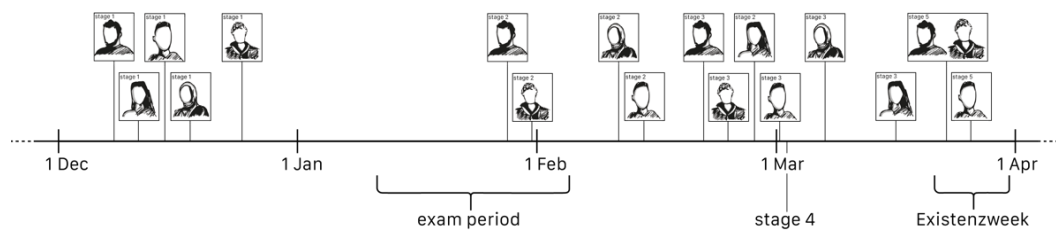


Figure 4: Timeline meetings

3.3 Findings

3.3.1 Describing the student's environment

The title of this master's thesis research is "How to make the campus life more comfortable for students on the spectrum? Focussing on the KU Leuven built environment." There are three themes/words in this title that define this research, namely the **KU Leuven built environment**, (**college life** of) students on the spectrum, and make more comfortable (or **improvement**). The next subchapters (3.3.1.1 and 0) cover the two first themes which are seen as the topics to describe the student environment of the participants. The first subchapter describes the college life of students on the spectrum, while the second describes the built environment for students on the spectrum. After these descriptions, I proposed suggestions to improve the student environment which are explained in subchapter 3.3.2. In addition, it is noteworthy that the descriptions of all these themes are based on the data received during the qualitative research. Therefore, it is possible the descriptions are in contradiction to the existing research.

3.3.1.1 College life of students on the spectrum

The college life of students on the autism spectrum is the first theme that is explained. This theme clarifies what it means to be a student on the spectrum and what difficulties they face. I divided the college life into three themes: study, sociality, and retreat. All these themes are explained in the following sections and are based on the data received from the research. Therefore, some students on the spectrum could have another experience during their college compared to the description of this research.

3.3.1.1.1 Study

The first category "study" covers everything that relates to following the lectures, studying the curriculum, and finally passing exams. In the figure right (Figure 5), all the elements that relate to study and that were mentioned by the participants, are listed in the circle. As part of study, I placed "**interpreting exams**" as a first element to discuss. While interviewing the participants, three out of five participants mentioned they had troubles to correctly interpret the questions of exams. For example, Adrian said he often interpret exam questions as a yes-or-no-question and so he answers these questions briefly but correctly. However, the professor expects an extensive answer instead of his brief one and so his grades are lower. Therefore, he faces difficulties to pass some exams, even though he knows and understands the whole curriculum. In addition, he told me that he

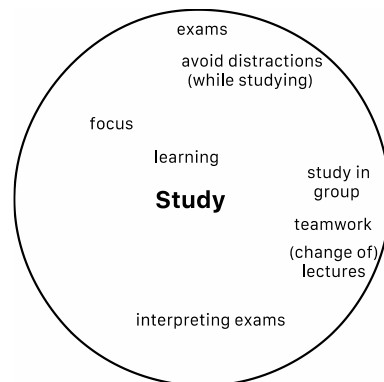


Figure 5: Study

preferred oral- or multiple-choice exams. During oral exams, the professor could help him when he misinterprets the question and explain the question in more detail. Multiple-choice exams are easier because the answer is on the paper and **dubiousness** is avoided. While making exams, all the participants get distracted which causes mistakes and therefore lower grades. For example, Mark told me he is distracted by people who drop their pencil which cause small mistakes, like a plus turns into a minus without knowing. During oral and multiple-choice exams, the participants could be made aware of this mistake and correct it.

Another element of study is **working in a group**. As part of the curriculum, students need to work in a team for some assignments. During this research, Adrian mentioned he found it difficult to work with other students because some of them do not meet the deadline for their part of the assignment. Celine and Mark also faced struggles with teamwork due to the social interaction which exhausted them.

3.3.1.1.2 Sociality

The second category “sociality” covers all the social activities that students do during their college years. All the elements that were mentioned by the participants, and that are related to sociality, are listed in the figure (Figure 6). In this figure, the elements: “study in group, teamwork and, (change of) lectures” are also related to the category “study” and therefore there is some overlap. This way, the first category study/education of students cannot be seen without some social aspects/situations. This overlap/relation between sociality and study gives an opportunity to make friends via activities which are related to courses or the moments before, during or after the lectures.

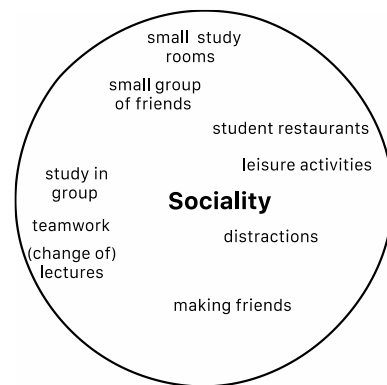


Figure 6: Sociality

As part of the college experience, students have time and the possibility to do some leisure activities. All the participants take time for some leisure activities, like biking, swimming, walking with friends, or going to a student restaurant. However, they could be **socially exhausting** which could make them tired and make them feel uncomfortable. When the participants had a socially exhausting day, they enjoy calming down at their home or student residence. For example, Adrian plays videogames in the evening after a day with multiple lectures to relax and to calm down, the other participants read a book or watch TV series. In addition, I asked how they experience the small **breaks between lectures** and if they recover during these breaks. Aisha told she has difficulties to focus after the

break and get back in the “lecture-mode”. The others experience these breaks as exhausting due to the social interactions with all the other students who take the same lectures.

Lastly, Adrian, Aisha, and Celine like more **one-on-one encounters**. Even though they have multiple friends, they like to meet them separately. Mark and Warre also like to have one-on-one encounters with their friends but also like to be part of a larger group. For example, both were members and animators of a youth association. In addition, Warre mentioned he really liked his youth association, but he noticed that he was really exhausted afterwards. Furthermore, he noticed his peers were not (equally) exhausted as him. He mentioned: “The people who are fanatic of Kazou [youth association that organises vacations], do five vacations in a summer holiday, they have thus less than a week time to recover. I need at least 10 days of recovery just to recharge my social battery. I get a lot of satisfaction out of these vacations, but I am really exhausted afterwards.”¹¹

3.3.1.1.3 Retreat

The third category “retreat” relates to the **need to retreat/escape** from some situations. All the elements that were mentioned and are also related to retreat during college life, are listed in the figure in the right (Figure 7). When situations become too overwhelming, students on the spectrum want to retreat to an escape space. The participants need these escape spaces and in general they use their **student accommodation** or their parental home as a safe escape space. In these spaces the participants find rest and **recharge their “social battery”**. If they want to stay on campus and retreat, they look for spaces that are less stimulating than others, like the spaces under a stair or an empty seminar room. Even though these spaces eliminate a lot of sensory input, they still give too much sensory input when a situation becomes too overwhelming. What is more, retreat could also relate to leisure activities. For example, Adrian plays each day a videogame, Mark sports two times in a week, and Warre often reads a book or plays videogames. This way they all find a way to recover and find rest at the evening.

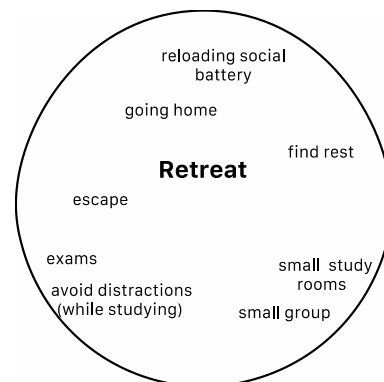


Figure 7: Retreat

Retreat also has overlap with the two other categories. The overlap between sociality and retreat is already explained in the previous subchapter. The small group of friends or the one-on-one encounters is also a form of retreating from

¹¹ Original: “De mensen die fanatiek zijn van kazou doen vijf vakanties op een zomervakantie, die hebben dus minder dan één week tijd aan recovery. Ik heb minstens 1,5 week nodig aan recovery om gewoon de batterij weer op te laden. Ik haal er heel veel uit maar ik ben ook dood achteraf.”

crowds or a large group of friends, and therefore these overlap between sociality and retreat. The overlap between retreat and study relates to the possibility to have a **separated room to study or take an exam**. All the participants could make their exams in a less crowded room. This way, they have a lower chance to get distracted during exams. What is more, Mark gets distracted during exams by noises and moving shades from the space next to his room. To avoid these distractions, he could sit away from the doors which may distract him. Another example, Warre could use his own noise-cancelling headset during exams to filter background noises. Because he can use his own headset, he does not get distracted by the feeling of wearing this headset. He knows the feeling of wearing this headset and is familiar with this feeling and so it does not distract him.

While studying, three out of five students (Adrian, Celine, and Mark) retreat to their student accommodation to avoid getting distracted by other students. Aisha mainly studies in a campus library because she has two brothers who distract her at home, and she does not have a student accommodation. Therefore, the library becomes the best alternative available to her. Warre, on the other hand, goes to the campus library because he has troubles to pay attention in his student accommodation and needs some social pressure while studying. When the library becomes too busy, for example during the exams, he does study at his student accommodation or in separated rooms on campus.

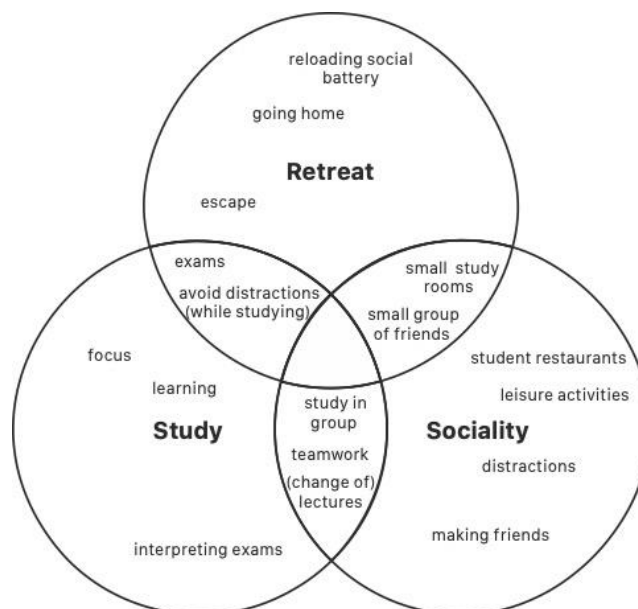


Figure 8: Overall scheme college life

3.3.1.2 The built environment of students

The KU Leuven built environment of students on the spectrum is the second theme which shapes their environment during their university years. This theme could also be described into three categories: clarity, distractions, and escapement. According to my analysis of the received data, these themes describe the built environment. The first theme “clarity” has to do with the need of clarity in the built environment. **Clarity gives certainty** which is important for the participants. The second theme “distractions” is already mentioned in the previous (sub)chapters. The number of distractions in the built environment is a factor which has a big influence on the participants’ building experience. When talking about (dis)comfortable spaces, distractions were mentioned the most. The last theme “escapement” has to do with spaces in which students can retreat to avoid these distractions (see 3.3.1.1.3) when needed.

3.3.1.2.1 Clarity

The first theme is clarity (Figure 9). **Clear circulation and clear signage** are essential to improve the built environment. The participants mentioned that there are different spaces in which they had **troubles with understanding** the signage. For example, Adrian told me he has difficulties to understand the signage of fire doors in the KU Leuven built environment (Image 1). This sign has a **dubious caption** according to Adrian. In a lot of cases students must go through doors with these signs on, but the door has the caption “Fireproof door keep it closed please!” on it. Adrian interprets this caption that he must keep the door closed and so he cannot go through this door. This dubious meaning causes Adrian frustrations and doubts about what he must do in this situation. Adrian and I proposed to change the caption into “Please, close the door when passed”¹². This way, it becomes clear if students can pass or not.

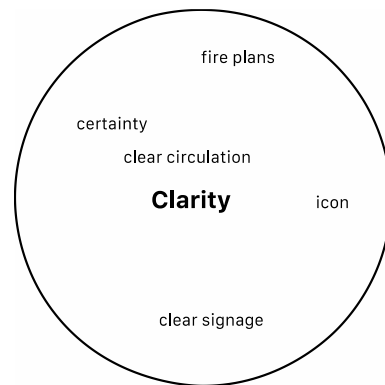


Figure 9: Clarity



Image 1: Example unclear signage
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Mark mentioned to find it difficult to know in which spaces he has permission to go and which not. As a PhD-student, he has permission to go in some spaces that normal students are not. Hereby, some doors have signs with writings on it that students cannot pass these doors. It is very confusing for him to know when he has permission and when he does not. In addition, Adrian, Aisha, and

¹² Original: “Doe ze terug dicht wanneer je er door bent gegaan.”

Mark mentioned to have problems to find the rooms in which they must be for some classes due to lack of signage. Mark proposed to use fire-escape plans which are positioned near every staircase. He finds these plans very clear and simple. This way, if he has troubles to find something, he could go to the nearest staircase and look at the plan. In the examples above it becomes clear that signage is important.

Even though clear signage could solve much, **clear circulation** is equally important. All the participants want to know where to walk in a building and which path to follow. For example, Mark and Adrian mentioned to have difficulties to **know where to walk** in a wide hallway. If the hallway is too wide, they start to wonder if they need to walk at the edges or in the middle of the hallway. Furthermore, Adrian likes when a hallway is just wide enough for two persons to pass next to each other. By this width, people do not rush next to him and do not push him. However, Celine also wants a clear path to walk, but prefers wider paths so **nobody could push** her. As part of this clear path, Mark likes spaces in which he knows what will **happen in the next space**. Due to opaque doors as a connection between different hallways, he does not know if the next room will be a hallway, or it would be a seminar room or an auditorium. He suggested that doors between hallways could be provided with a small window so people can see what is behind them. Doors to seminar rooms or auditoria could be fully opaque. This way, he does not get distracted in a seminar room or auditoria when people are passing by in the hallway. What is more, to make a clear distinction between doors that lead to other hallways and those that lead to classrooms, people can easily see which doors lead to hallways and which do not. However, Mark proposed this idea, but it is in contradiction with the preference of Aisha (see Aisha).

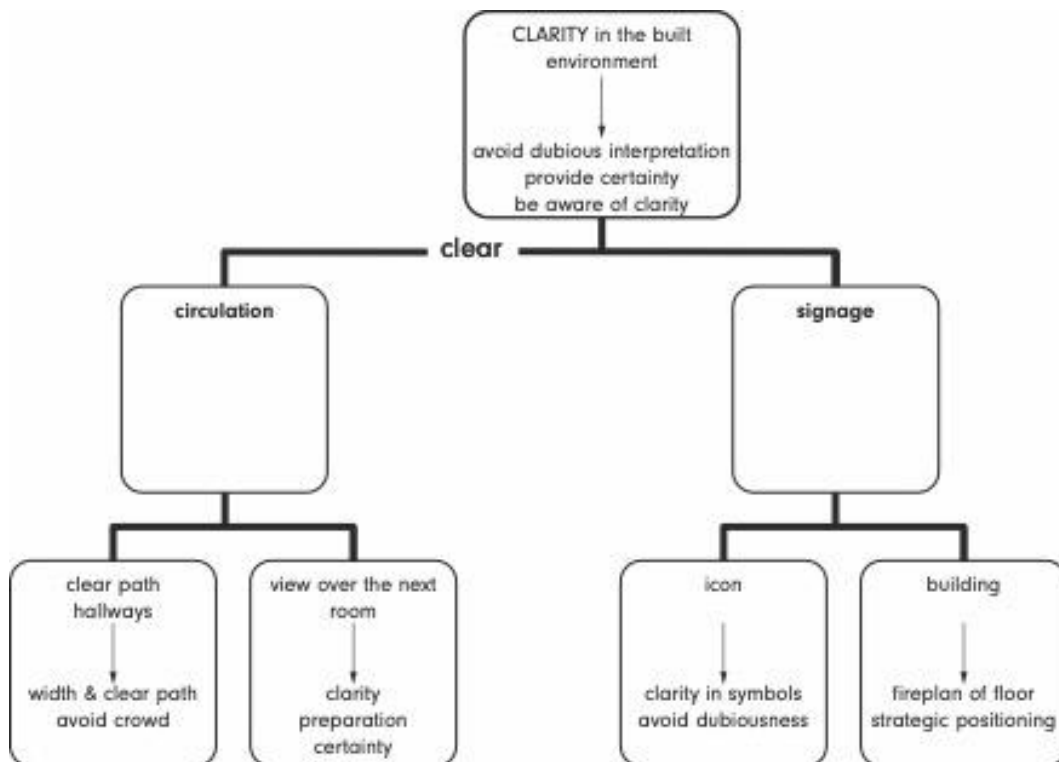


Figure 10: Scheme clarity

3.3.1.2.2 Distractions

The second theme that shapes the built environment is “distraction(s)”. During the research, the participants mentioned several distractions related to the built environment. In the scheme (Figure 11) I added all the elements that relate to the distractions that were mentioned by the participants. As the figure shows, the theme “icon” has an overlap with clarity. Even though icons serve to create clarity in the built environment as mentioned above (3.3.1.2.1), it could also distract people (on the spectrum). For example, Adrian and Mark told me they like the **guiding system of hospitals** where coloured lines on the floor would guide you to the place you need to be. However, if these lines would be on a wall, they would confuse and distract, because these lines would disturb the simplicity of the wall. On a floor, it does not distract them, and it seems logic because you walk on a floor and so you can walk on that line as an anchor. Adrian added he is sometimes distracted by information boards due to all the information the board gives. Often, he stops and read the whole board and forgets the conversation he has with other people.

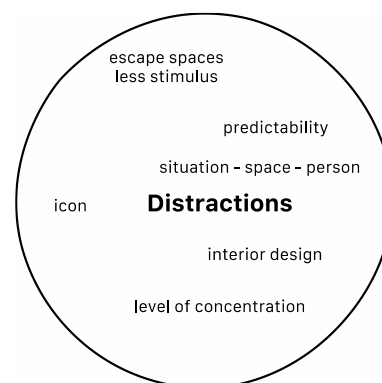


Figure 11: Scheme distractions

During my research, I also found differences and similarities between the participants and therefore, I conclude that the **distractions depend on the person**. For example, Adrian often wears sunglasses inside a building to filter bright lights, while the other participants do not need this. Even though the others also like indirect light or light that is not too bright, they are not triggered by light the same way as Adrian is. Aisha, Mark, and Warre are more stimulated by touch, compared to Adrian. They do not wear certain sweaters (e.g., wool) and **cut off the etiquettes** of their sweaters and t-shirts. Warre added he cannot focus with a mouth mask because he is constantly aware and triggered of his own breath against his skin. Therefore, he needed to **adapt** during the corona pandemic because the masks were obliged in certain spaces at certain periods of time.

Further, all the participants are distracted by certain noises and have **difficulties to filter background noises** during lectures and exams. Noises that constantly change are more difficult to filter than noises that stay constant. To filter the background noises at lectures, I had the idea to provide the possibility to plug in your own headset at your table. This way, students hear the professor when they want to pay attention but are distracted by background noise. Mark and Warre liked the idea very much and it would improve the way they experience college. The others had the feeling they did not need it and had difficulties with the **stigma** of using a headset during lectures. Mark and Warre also had this feeling and so, they would only use their headset in the situations when they want to pay attention but are distracted by environment.

Lastly, some participants prefer to study in public libraries. Celine, Mark, and Adrian choose to study alone at their student accommodation due to distractions by other people. Warre and Aisha, on the other hand, study with their friends in KU Leuven libraries to respectively feel social pressure and avoid distractions caused by her family at home. Warre needs this social pressure and wants to have a distinction between his study- and sleep space. However, he also mentioned he could only focus for four hours in the library due to constantly trying to ignore the distractions in the library. Aisha, on the other hand, does not live in a student accommodation and can only study at her home or in a library. Because she has brothers who are loud and distracting, she prefers the library.

Next to the person, the participants also experience distractions in different ways **depending on the situation and the space**. For example, a hallway is a space where people sit or pass by. Hereby, they do not have to pay attention to certain things or people. This way, the participants do not have a problem with being distracted. What is more, some distracting static objects (e.g., plants) could help to eliminate other stimulus so the participant feel more at ease in a hallway. If this same object would be placed within a classroom, it would distract the participants to this object and so, they cannot pay attention to the lecture. This becomes a

problem and cause frustrations because students are recommended to pay attention to the lecture. Therefore, distractions become a problem. In addition, the participants really like when they could control the space and the distractions within a space. For example, this **controllability** could be the possibility to dim the lights, to close the curtains, or to arrange the temperature. Related to the controllability within a space, **the interior design determines the number of distractions** and chaos students on the spectrum experience. For example, Mark experiences more chaos when an interior wall is finished with bricks instead of plaster or when different material finishes are used. Therefore, he prefers a white plaster wall in front of the auditorium. Even though the other participants also experienced more chaos with some texture, the preference of **the interior design depends** on the person because they are also different. For example, Aisha is really distracted by the periodic system when it is placed in an auditorium, while Adrian, Celine, and Mark do not pay attention to it. Warre is also distracted by the periodic system but can use it as a tool to concentrate during lectures. When he finishes a line of chemical elements, he obliges himself to pay attention. However, during exams he considers the periodic system as a rather distracting element.

As mentioned, next to the person and the space, **distractions and chaos are depending on the situation**. A first distinction that needs to be made, is if the situation is **predictable** or not. When the participants could not predict the situation, they experience (more) chaos, and they feel more overwhelmed. For example, Adrian told me that if something is planned, he does it and if something is not planned, he does not do it. This way, if people ask him to do something spontaneously, like going for a walk, he does not do this. Warre also really likes **structure**, before starting the meetings, he wanted to know how much time each meeting would take, so he could plan all the meetings in his schedule. Mark said that there is a difference between buildings that he already knows and buildings which he does not know. He mentioned that **a building that he already knows and can predict, gives less chaos**. Adrian, Celine, Mark, and Warre gave the example they do not like too crowded spaces but during a drink after a school related event, they would go to these drinks because they are prepared for the crowd, and they are expecting this crowd. Hereby, the chaos is acceptable, and they face this chaos.

It is noteworthy that severity of distractions are also **depends on the level of concentration** which is needed. They make a clear distinction between leisure activities (e.g., students association events, sports), lectures, and exams. During exams and lectures the distractions are less, but each distraction is more distracting. However, in some cases (e.g., a party), they (often) do not go. This way, they **avoid the predictable chaos** and crowd and stay in a relaxed safe space. In addition, Mark mentioned he did not mind the mess and chaos at his parents' house because he is getting used to that mess. Therefore, this mess is predictable and acceptable. However, he gets distracted by the mess at his office at the KU Leuven. If someone leaves writings on a whiteboard, he wants to understand this board and so, he is distracted, even if these writings are his own. He wants to understand these writings or wants to think about the topic of these writings. This way, he clarified the difference between unrelated mess and work-relevant mess. He explained the difference between **the level of concentration** which is needed depending on the situation. These do not mind him if he has time to look at them, but when he is in a meeting and he sees these writings, they become distracting. As he mentioned, he follows two conversations in his head, the one in which he follows the meeting and the other in which he tries to understand the writings.

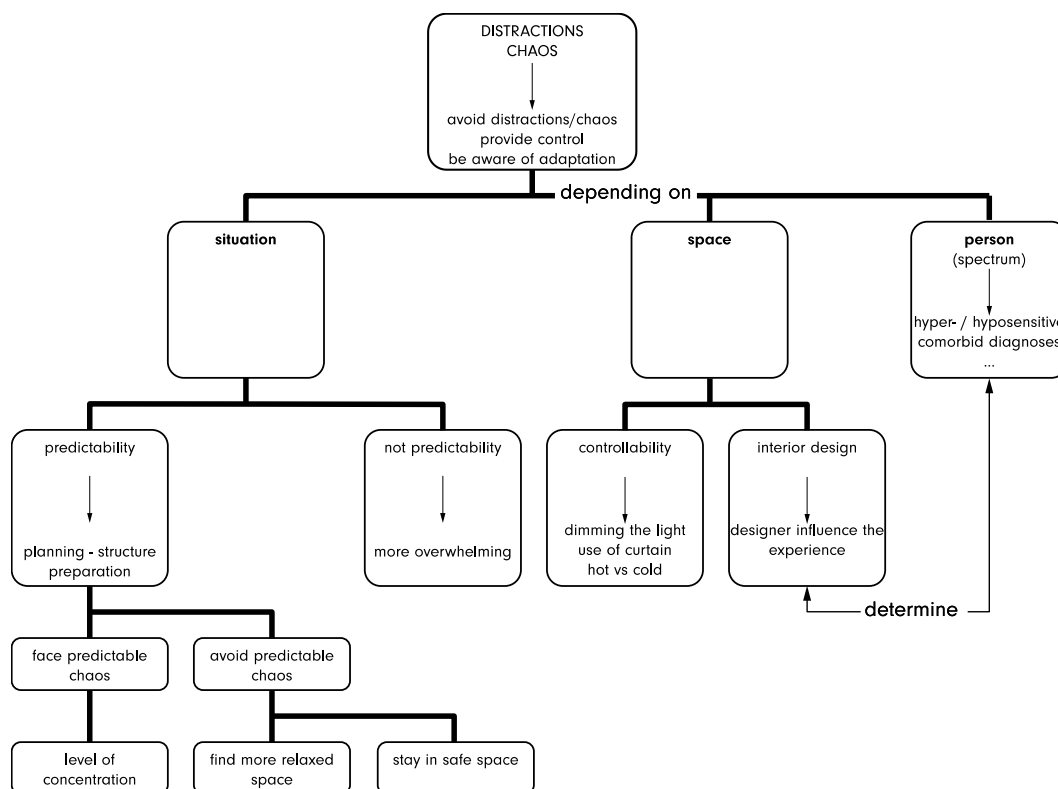


Figure 12: Scheme distractions

3.3.1.2.3 Escapement

The third theme that relates to the built environment is “escapement”. As mentioned, “**escape- or safe spaces**” are important spaces for people on the spectrum. During the meetings, all the participants mentioned to use their student residence or their parental home as the space to retreat. If situations become too overwhelming, they go to their student residence to fully retreat. They do not stay on campus because it is difficult to escape from all the distractions, except for the lavatories, which only Warre uses to escape when needed. Due to this lack of escape spaces on campus, the participants did not talk about real escape spaces on campus. If they start to feel overwhelmed, they will go to their student residence as a preventive measure. However, once I showed the example of the **DCU Sensory pod** (see 1.2.2), they thought it could be useful when implemented in the KU Leuven built environment. Aisha and Mark did not like the design and had difficulties with the **stigma** and would not use it. Adrian, Celine, and Warre liked the idea and would use it, but had also doubts about the stigma. As Warre said “it is better than nothing”¹³. After this statement, he clarified that it is a first step to have an escape space where students could go if situations become too overwhelming. Celine added she would only use it in emergencies, but would go to her student residence if possible.

Even though the participants do not use or find “**no-stimulus spaces**”, (as I call them in figure below (Figure 14)) on the campus of KU Leuven (except for the lavatories), the participants use more subtle spaces to retreat. The image on the right (Image 2) shows the student restaurant Quadrivium at a calm moment. During lunch, this

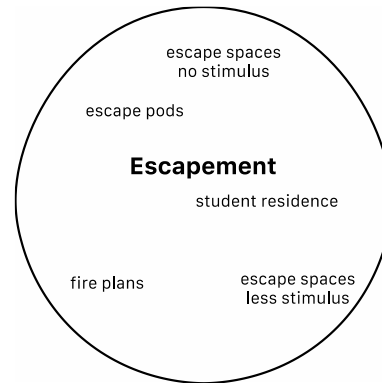


Figure 13: Escapement



Image 2: Student restaurant
©Ruben Bamps

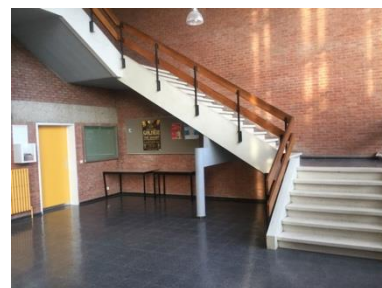


Image 3: Space under staircase
©KU Leuven

¹³ Original: “Het is beter dan niks”

restaurant is overcrowded by people which could lead to distractions and chaos causing people on the spectrum want to escape. However, Mark gave this example to explain that he likes this space. When he wants to eat, he sits at the high tables which aim to the windows. This way, he does **not look at the crowd** enabling him to not get too overwhelmed by the crowd. Furthermore, he puts on his headset and so he does not hear all the noise that is coming from behind him. A similar example are the **spaces under a staircase** (Image 3; Image 4). Because of the lower height, they experience a safer closed feeling. In these spaces participants feel safe and so, they like these spaces. In the first image (Image 3), students could read the poster on the board and could focus on this poster. In this way they could calm down and ignore the crowd behind them. The second staircase (Image 4) gives students the possibility to sit and relax.

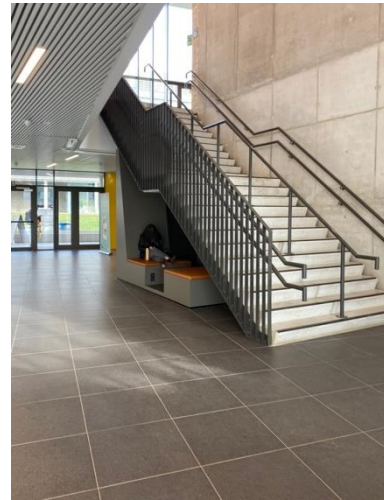


Image 4: Space under staircase
©Ruben Bamps

In the last situation (Image 5), an extra space next to a hallway is provided. This hallway is not crowded and gives the possibility to escape from other larger spaces such as the student restaurant nearby. This way, the **escape space becomes integrated within a larger space** where students can escape. Even though all these spaces are helpful to avoid crowds and reduce sensory input, when the participants feel overwhelmed these spaces **fail to calm down**, due to people who pass by and could stimulate different senses. These spaces could prevent to become in a too overwhelming situation but does not calm down when you are already overstimulated. As Adrian said: “You need to have a lot of **self-knowledge** before you can prevent these situations”.¹⁴



Image 5: Hallway ©Ruben Bamps

Therefore, the participants would like an escape space in which they can retreat if needed, but it must be **integrated in the design** of the building. During the interviews, some participants mentioned **social acceptance** to be important. For example, Mark told me he does not like something that is exclusive for people on the spectrum. Therefore, he proposed an escape space that is integrated in the interior design, and that provides the possibility to sit with a friend or alone.

¹⁴ Original: Je hebt al veel zelfkennis nodig om preventief te zijn in zo'n situatie. Meestal besef je het te laat dat je een mentaal breakdown gaat hebben.

Afterwards, I had the idea to propose meeting rooms for videocalls which could also serve as an escape space. Warre added a point of attention to these escape spaces on campus. He needs a real escape space outside of the campus. He needs time alone, away of the campus he knows without people he knows. In addition, Mark and Adrian mentioned they like a **clear cut between school and leisure**. Adrian mentioned he faced mental problems because he did not take enough breaks of his schoolwork by which he would not relax. Therefore, he started to make a clear cut between school and leisure.

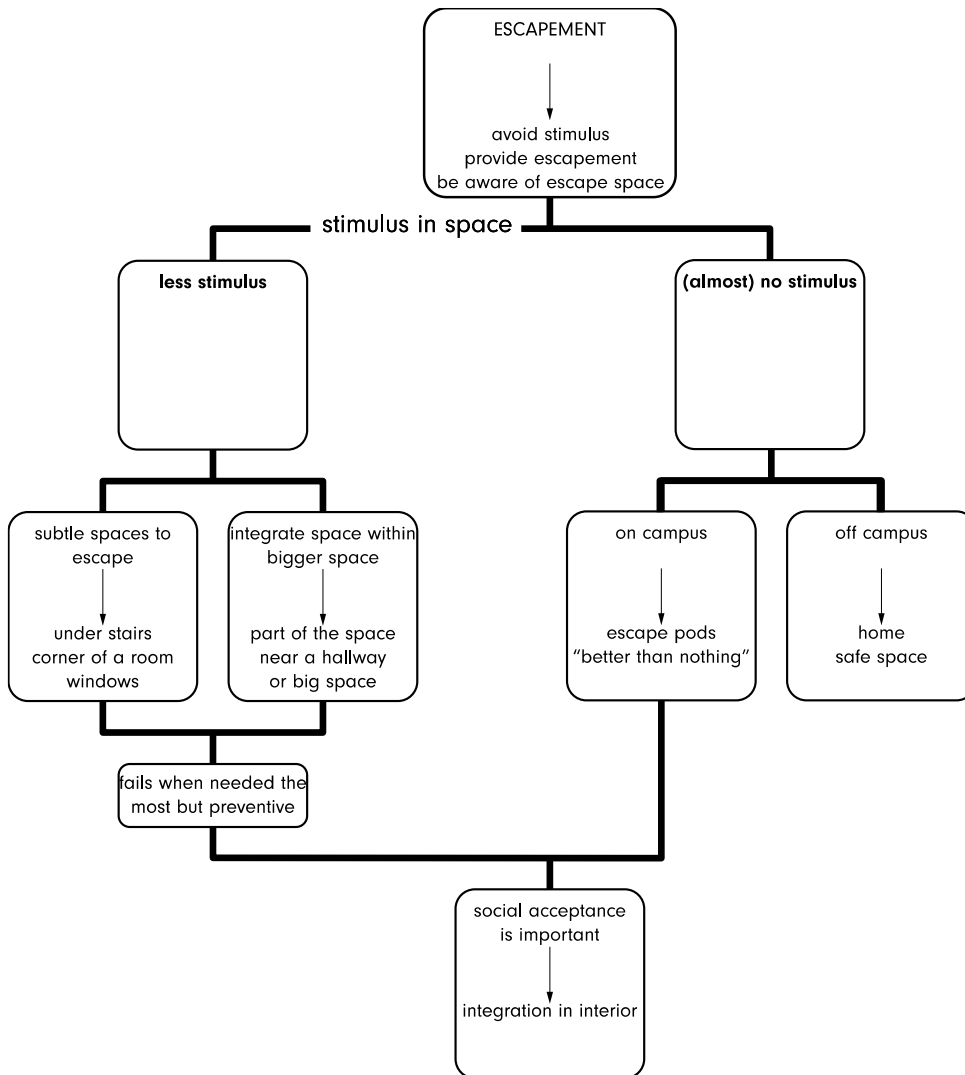


Figure 14: Scheme escapement

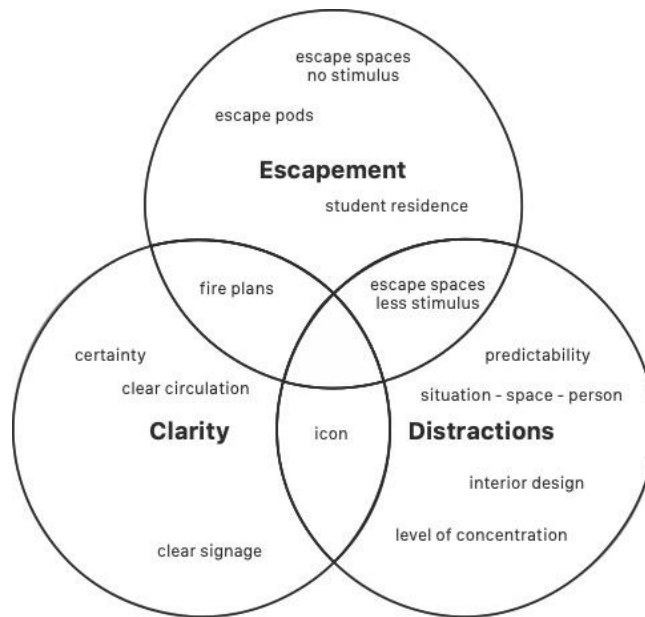


Figure 15: Scheme built environment

3.3.2 Improvements

The previous subchapters describe the college life of the participants and the role of the KU Leuven built environment in their experiences. In this subchapter, the **improvements** based in the autistic students' experiences are discussed. During the interviews, the participants presented examples of uncomfortable spaces from the KU Leuven built environment. To improve these uncomfortable spaces, the participants and I made and discussed suggestions for these spaces. Some of these improvements were mentioned in the previous subchapter as a clarification of some uncomfortable spaces. In the following parts, I made an overview how people could improve the college experience of students on the spectrum. This could serve as a guideline to improve both the built environment and their college experience. This subchapter is also divided into three parts: spatial improvements, organisational improvements, and sensitization.

3.3.2.1 Spatial improvements

Spatial improvements relate to all the elements that could be improved by architects or designers when designing the built environment. All the elements related to this part are divided over three levels of scale. In the next paragraphs, the improvements at each scale are described. To give a logic order, I start with the smallest scale, scale of detailing, next the scale of the finishings, and at last the biggest scale, the scale of the building.

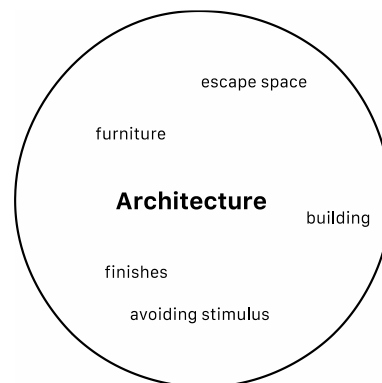


Figure 16: Architectural improvements

3.3.2.1.1 Detailing

The first scale is **the scale of detailing**. This scale is mainly about the finishing of the walls and the floors. However, on this level of scale **acoustics** also becomes important. By choosing good acoustic finish materials and acoustically separate rooms and floors from each other, students on the spectrum are less distracted by noises inside a room or noises outside a room. **Texture and colours** of finishes are important. Overall, the participants told me they prefer **pastel** colours instead of bright colours. During the third meeting (see Third stage: verification process), I showed the participants photos of three rooms (Image 6, Image 7, and Image 8). Overall, they all disliked the same room for the same reason. The saturation of the yellow room (Image 6) was too bright. The other two rooms were seen as equally good by everyone, except for Mark and Warre. In general, they all preferred the blue room (Image 7) due the soft combination of the pastel-blue with white. In the green room (Image 8), Mark experienced a more intense room compared to the other two due to this extra material.



Image 6: Yellow room @KU Leuven



Image 7: Blue room @KU Leuven

Next to this example, he gave other examples of auditoria in which he experienced more chaos, because of the use of the multiple textures. As Mark said, do not use too many textures, **paint is a good alternative** for the colours. It is noteworthy to remark that Mark has colour-blindness by which he filters some colours and experiences them less intense. Adrian and



Image 8: Green room @KU Leuven

Warre mentioned they could also be distracted by too many textures and if these textures were in a **pattern** (e.g., tiles), they keep staring at these patterns. Lastly, Mark and Warre like the smooth table finishes in the green room compared to the finishes of the tables in the blue room. The **smooth surface** is more comfortable, compared to the rough wooden texture of the blue room. Because they touch the rough texture with their hands, they are distracted by it. Therefore, it is recommended to be selective with the materials that you are going to use. Furthermore, it is recommended to use pastels (less saturated colours) in the interior. In addition, all the participants liked **natural light** which make windows interesting to use. They mentioned that the natural light should not be direct in their face. An improvement would be the use of translucent curtains. Furthermore, it could help to **point the windows to the north** or use the nearby buildings as a

cover. What is more, these windows should be placed at a higher level than the street level to avoid distractions by the people who are passing by. In addition, all the participants mentioned they get really distracted by moving things or flickering lights.

3.3.2.1.2 Furniture

The second scale is **the scale of furniture**. As mentioned, the finishes of the tables play a role. In addition, the measurement of the furniture also plays a role in a room. For example, Aisha mentioned to prefer the tables that stand in the green- and yellow room. These are wider causing the students' sight being blocked by the table. When taking an exam, students most of the time look at their exam and their tables. By the width of these tables, the neighbours are not in their direct- or peripheral vision allowing them to not be (or be less) distracted by their neighbours. For example, Mark likes **wider tables during exams**, but notified these are not necessary during lectures. During lectures students mainly look at the professor instead of their desk making the wider desks not necessary. While discussing these tables, they all mentioned that the tables of a standard auditoria of the KU Leuven were too small. On these tables, just a vertical paper fits what makes it difficult to place pencils, markers, et cetera on these tables. Further, they mentioned that some chairs were old which make became too steep and uncomfortable. In addition, they all would like chairs that are soft, but it was not necessary.

Further, loose furniture could have a positive influence in the built environment. Adrian, Aisha, and Celine told me they like **plants**, due to its calming effect on them. Mark and Warre agreed with the others' opinion about plants, but respectively liked more to watch a campfire and flowing water. Also, the **brightness and positioning of lamps** are important for students on the spectrum. They should not be point directly to a person. To prevent this, the source of direct light could be **covered by a translucent element**. In addition, Adrian and Warre aim their desk lamp at the wall or ceiling instead of their desk or paper which makes the light indirect. Aisha and Celine aim their lamp at their paper to have a clear view of their paper. Mark switches between the wall and his paper.

3.3.2.1.3 Building

The third scale, the **scale of the building**, it is important to have a **clear plan**. In a building, it is needed to have logic and clarity. Adrian mentioned: “I want to understand a building”¹⁵ while Mark and Warre want to understand and have control over the room in which they are. For example, Mark mentioned to pay attention to the fire extinguishers in a room. This gives him control over the space in which he is. Aisha and Celine did not mention to need logic but did want **clarity**. In addition, escape spaces are important for students on the spectrum. Whether these are subtle or not, they should be **placed on logic spots** in a building. For example, an escape space should not be placed in the middle of a large open space but more subtle to the side of a space. Aisha, Mark and Warre mentioned they see an opportunity in the entrances of an auditorium. These spaces could be provided with seats and tables to study or to escape. Even though there are some auditoria in the KU Leuven built environment that provide these spaces, Mark added he did not have the feeling students have the permission to sit over there during the exam period. Another element of furniture are doors. Doors could also cause distractions during lectures or exams when people enter after the start of an exam or a lecture. For example, Aisha showed a photograph of a door which she likes because it reduces sounds. This door has a system that reduces noises of this door when people enter or leave via this door. This way, she does not get distracted by the door when people enter during lectures when they are late.

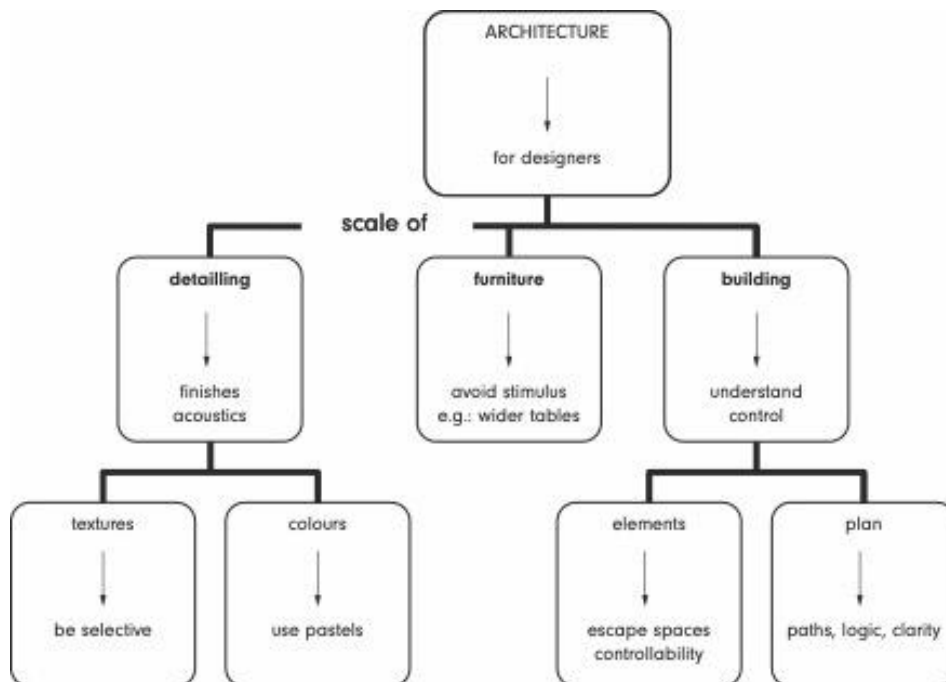


Figure 17: Scheme architectural improvements

¹⁵ Original: “Ik wil een gebouw kunnen begrijpen.”

3.3.2.2 Organisational improvements

The second aspect for which I propose improvements are **organisational improvements**. All these propositions relate to what organisations (as the KU Leuven) could do to improve the college life of students on the spectrum. For this part, I make a distinction between **clear communication** and **clear organisation**. Related to study, clear communication has to do with a clear formulation of questions on exams. This way, yes-or-no questions should be avoided unless the answer is expected to only yes or no. Communication related to buildings has to do with clear signage which is already explained (see 3.3.1.2.1).



Figure 18: Organisational improvements

Clear organisation, on the other hand, has to do with organising student-related activities. As a first step, it is important to **inform people about students on the spectrum** and what they might do to avoid distractions. For example, Adrian often puts on his sunglasses during exams and lectures, so he does not get distracted by bright lights. Even though he has the permission to wear them during exams, a supervisor did not understand why he wore sunglasses inside a building and had to take them off. Because he had to take his sunglasses off, he had troubles to focus during the exam. After 15 minutes the professor arrived, and he told the assistant, Adrian was allowed to wear the sunglasses, making it possible for him to wear them again. This is an example in which the professor did not inform the assistant about his privilege to wear sunglasses during exams, which caused a misunderstanding. Furthermore, Mark told me that an assistant projected an analogue clock during the exam to tell the time. Even though the time was clear, the clock was constantly moving which caused troubles to focus during the exam. He (and the other participants) get(s) really distracted by moving things such as this clock. Therefore, it is important to **inform** the assistants about the struggles some students have to focus. Additionally, clear organisation has also to do with **organising lectures, events, and exams in structured way** which may avoid crowds. What is more, it could be useful to allocate less distracting exam rooms to people on the spectrum.

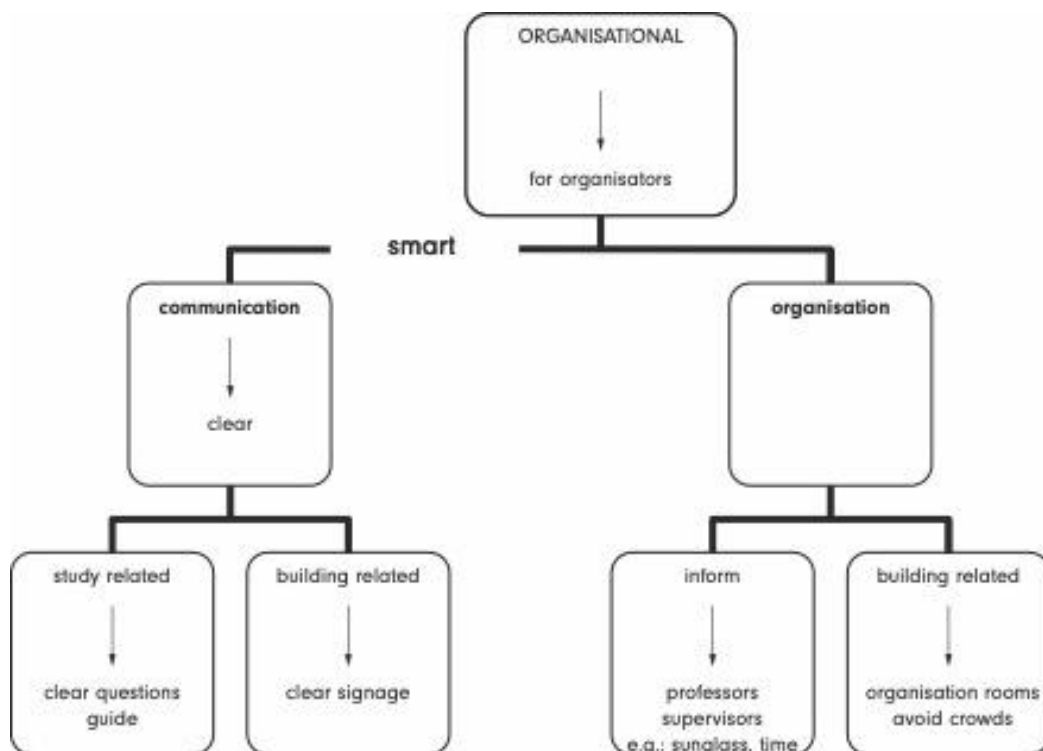


Figure 19: Scheme organisational improvements

3.3.2.3 Sensitization

3.3.2.3.1 Architectural impact

The third aspect of improving is sensitization. First or all, people need to be **aware of the impact the built environment** has on people on the spectrum. During the meetings, I recognised the participants had troubles with the **stigma** of their autism. For example, Aisha, Celine, and Mark would not use the DCU sensory pod due to lack of integration in the interior (which creates a stigma). Therefore, I believe this stigma would be less (or gone) when people are aware of autistic students' need to escape on campus. Further, people could become **aware of the distractions** and chaos students on the spectrum experience. This way, event-organisers and designers could keep this in mind while organising or designing an event. This would make the events more enjoyable for students on the spectrum. In addition, it is important to create awareness about the **controllability** (by e.g., light dimmers or curtains) in architecture.

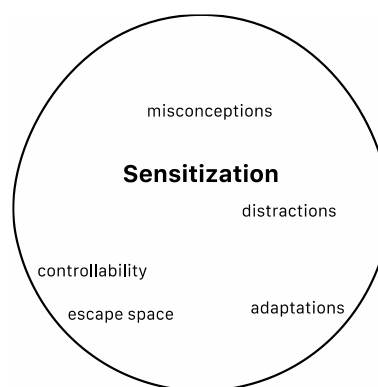


Figure 20: Sensitization

3.3.2.3.2 Adaptations

Further, I believe that people need to be **aware of the adaptations** some students do (to fit in the built environment). As mentioned, Adrian often uses sunglasses inside a building to filter bright lights. Not everyone understands why he wears them inside which could lead to a difficult situation (e.g., during exams). Another example of an adaptation is the use of a noise cancelling headphone. This is a very useful tool and, for example, Warre uses his own headphone during exams to eliminate noises that distracts him. He is used to the feeling of these headphones, and so he is not distracted by the strange feeling of another headset. In this case, the students on the spectrum adapted to filter some elements. A last example, Mark and Warre mentioned to eat at less busy hours at their student residence to avoid a too loud and crowded kitchen. It is noteworthy that the others do not have a shared kitchen (Adrian and Celine have their own kitchen in their studio, Aisha lives at her parental home).

3.3.2.3.3 Misconceptions

Lastly, I think people need to be better informed about people on the spectrum which **avoid wrong preconceptions**. During my research, I questioned family members and friends on their thoughts about people on the spectrum. It was remarkable, many of them had another idea of people on the spectrum than my findings show. Some have the impression that people on the spectrum are asocial. However, during my research I had the feeling they were all **social and have multiple friends**. Some just had **difficulties with communication** and could get sometimes distracted during the meetings with me. Mainly due to people who passed by or because of the interior design. Another misconception is that people on the spectrum are super smart. During the research, I recognised all the participants were equally smart as everyone else. However, some of them were **passionate** by their study and they know a lot about that topic. This way, they seemed smarter than other people who are not equally passionate about their study. As Warre mentioned, we are not like 'Rain man'. Another misconception has to do with the difference between autism and OCD. For example, Mark did not have problems with unrelated mess, and he makes a clear distinction between autism and OCD¹⁶. As he said: "Indeed, in my room there is unrelated mess. For example, the tissue box that is not placed straight does not bother me. I think that this is a big difference with OCD."¹⁷

¹⁶ OCD = obsessive-compulsive disorder

¹⁷ Original: "Inderdaad bij mijn kamer is het eerder ongerelateerde rommel. Zoals bijvoorbeeld die tissuebox dat niet recht staat, maakt mij niet uit. Ik denk dat dat een groot verschil is met OCD dan als voorbeeld.

Another misconception is that people on the spectrum would definitely not go to parties. As mentioned, people on the spectrum do not like crowded, loud parties. However, Adrian and Warre mentioned that they already went to different parties or a drink before the party because their friends asked them. For example, at the student residence of Adrian, the students sometimes drink together and go to a party afterwards. Adrian joins them before they leave to a party and has a drink with his fellow students in his residence. He said he liked these drinks and is happy to hang out with these students. In addition, I know the autistic student at my own residence joins the drinks at our student residence, but he does not join the party afterwards. However, he rarely joins us at a party. He said to me he liked the invitation, but it would be too much sensory input at once to go always to the party. People must be aware of this misconception because some people assume that people on the spectrum do not want to talk or do not want to go to parties. Therefore, people do not talk to them or do not invite them, even though the autistic student wants to. The student of my residence told me he had a friend who stopped inviting him, once the friend knew had autism, because his friend expected that he would not go. This is unfortunate and could be avoided if people would know more about people on the spectrum.

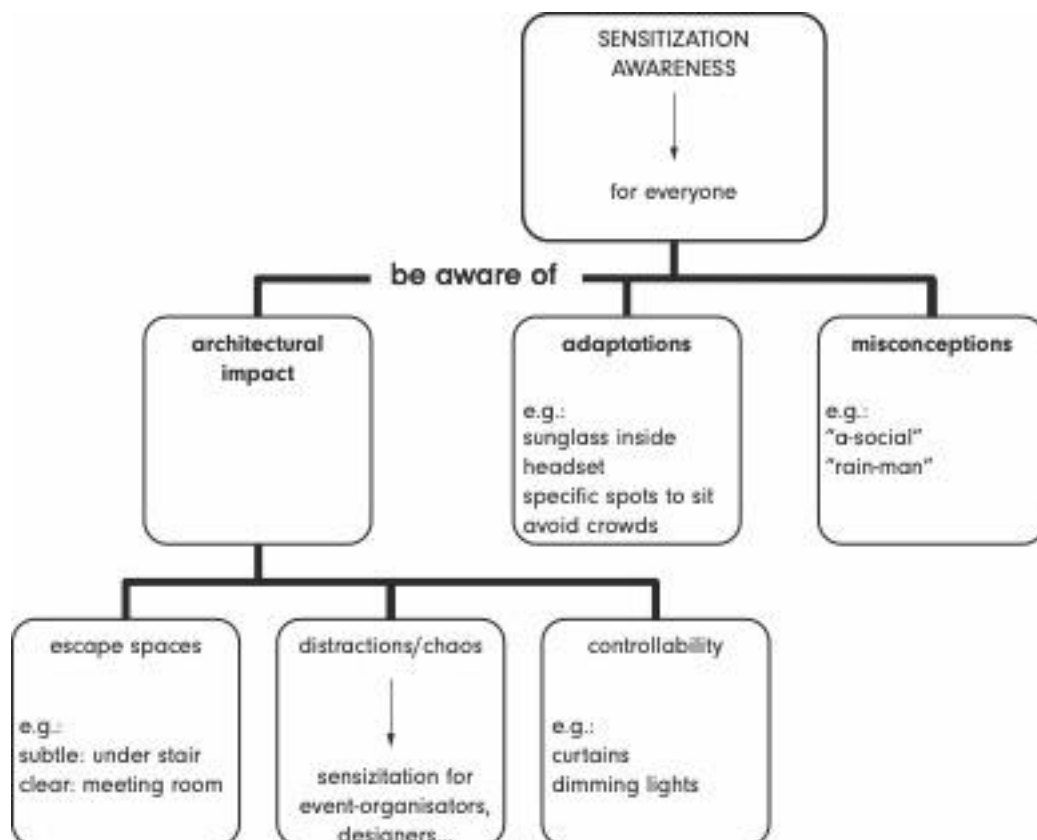


Figure 21: Scheme sensitization

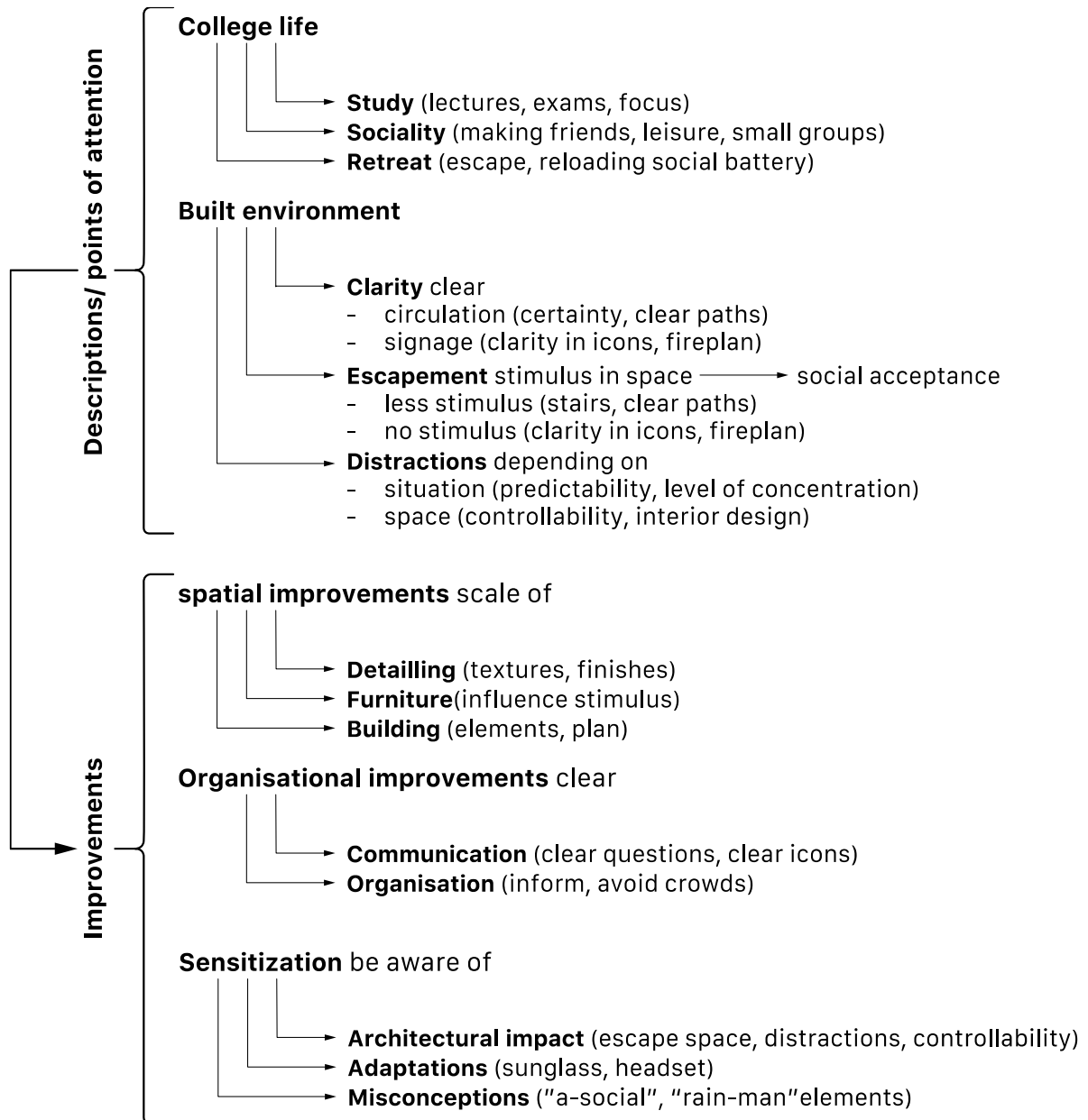
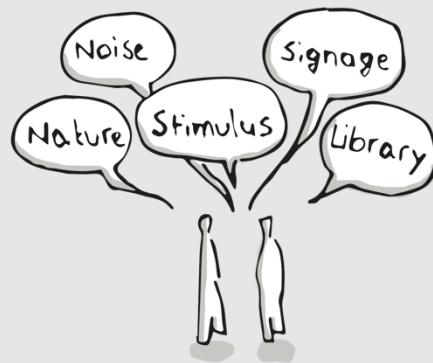


Figure 22: Overall scheme discussion



INTERMEZZO

This chapter explains the different meetings with the participants for the first field study. Even though this chapter could be interesting to read, it is not necessary to read it to understand the findings. All the different opinions are discussed and compared. All the images which are shown during the second and third meeting are added. This way, the reader has an idea how the meetings went, and which topics were mentioned.

Description of the field study

In this chapter, the findings of the second and third stage are described in detail. The first stage, on the other hand, is not. As mentioned, this stage served to obtain consent, to inform participants about the research, and to get to know each other. Therefore, the conversation was a rather informal one. Afterwards, I got the first idea of their college experience and their first thoughts/opinion about the research. In this subchapter, the interviews with each participant are separately discussed. In the first part of this subchapter (Second stage: photovoice and co-design), I explain the photographs they took for the take-home task (see 3.2.2) and their comments. In the second part of this subchapter (Third stage: verification process), I described the third (and last) stage of this field study (see 3.2.3). Because Celine did not take any photographs, we could not do stage 2. Therefore, we already discussed some topics which the other participants mentioned during the second stage. During the third meeting, I asked some additional questions and asked her opinion on some topics the other participants mentioned during the third stage. Because we did not do stage 2, I mentioned all the findings of the two meetings with her under the verification process (Celine).

Second stage: photovoice and co-design

Adrian

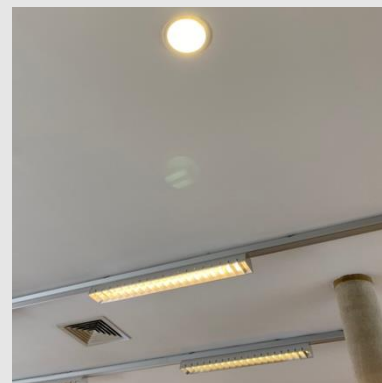


The second meeting with Adrian took place in his student accommodation. After the first meeting, we knew our student residences were close to each other because we biked in the same direction to our student residence. Hereby, Adrian invited me for the second meeting at his student residence. For the take-home task, Adrian took in total eight photographs from which he considered five as comfortable spaces, and three as uncomfortable spaces. As mentioned in the methodology (see 3.2.2), he did not write any comments next to the photographs and he rather told me all his comments. In addition, I want to note that Adrian did not have any problems to communicate by talking. However, he mentioned to have difficulties to write (fast). During primary school, he went to a physical therapist to figure out what his writing hand is. He mentioned he wrote bad with both his hands, which started to become a problem at school. After these sessions, the therapist concluded his writing are equally bad with his left as his right hand. Therefore, he was told to write with his right hand. This way, they wanted to make sure he trained just one of them. Even though he listened to this advice, he (unfortunately) still has problems to write (fast). Therefore, he liked to talk to me instead of writing or typing a text.

The first photograph Adrian showed, explained directly what he likes in a space, namely dimmed light. He showed a photograph of a coffee bar (Photograph 1) in which he sat the day before the second meeting. As the photograph shows, the lightings in this space are dimmed which Adrian likes. He mentioned his experience of a room is determined by this lower intensity of the lightings and if lightings are dimmed, he could really enjoy a space. Part of his unique perspective, he is more sensitive to lights compared to other people. This way, he gets overstimulated by bright or direct lights. This overstimulation has only to do with the intensity, the colour does not really matter. In this coffee bar, the lightings were dimmed which made it possible to take a clear photograph. Clear photographs of bright lights are difficult to make which indicates this light source is properly dimmed. For example, I took a photograph of the lightings in the library in which I studied. In this photograph, it is clear the lights are brighter, and the source of light is less clear (Photograph 2).



Photograph 1: Coffee bar ©Adrian



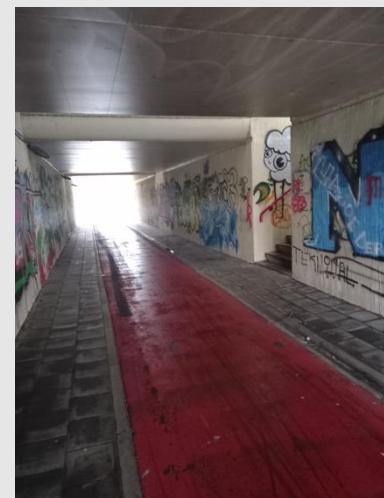
Photograph 2: Light library ©Ruben Bamps

Further, Adrian told me the lightings in the KU Leuven built environment often could be dimmed by a system. However, he often experiences difficulties with the intensity of lights inside some auditoria or seminar rooms. This way, he often needs to wear sunglasses inside a building. The problem is two sided. First, not every space in the KU Leuven built environment has a system to dim the lightings. Second, some professors or supervisors have difficulties to know when the lightings are too bright and even if they know, some do not know how to dim the lights. Even though the system could help Adrian, there is no certainty it will help him. Next to this system, some lightings are dimmed by its cover, like the light in Photograph 1. Further, he mentioned to point the spot of his desk lamp to the ceiling when it is too dark at night, instead of pointing it to his paper. This way, the light of his desk lamp is indirect and less bright which is less stimulating. During the conversation of these lightings, I remarked his room does not have a lot of direct lights due to the position of the windows to the East. In addition, he mentioned the building across the street blocks the most direct sunlight. Further he has also the possibility to arrange the entering sunlight by using curtains.

The second photograph shows a skylight in a hallway (Photograph 3). Adrian likes this room because of this skylight. In general, he experiences skylights as indirect that lights up a room in a pleasant way. However, he added the combination of skylight with artificial lights, could make a space too bright. This way, the skylight is useful, but in combination with artificial lights it could cause an overwhelming space. He preferred that lights should be turned off during the day when a skylight is provided. However, he does not prefer natural- or artificial lights, but he believes artificial light is often direct and natural light is not because buildings (or other spatial elements) divide the light before pointing at a person. The next example he gave (Photograph 4: bicycle tunnel), makes the idea of lights clearer. In this bicycle tunnel, the sunlight is divided over the whole tunnel. Hereby, the intensity of the light is rather low which Adrian enjoys this space. Due to the space for pedestrians and these enjoyable lights, Adrian likes to walk or sit in this tunnel. Further, there is little passage which makes this space peacefully and a space without distractions. In this space, I want to note he did not experience the graffiti on the wall as disturbing or chaotic.



Photograph 3: Skylight hallway ©Adrian



Photograph 4: bicycle tunnel ©Adrian

The fourth photograph of a good space is the entrance of an auditorium (Photograph 5). Before lectures and exams start, a crowd often waits in this space before entering the auditorium. Adrian is comfortable in this space due to the extra space to wait. This way, he could wait near the radiator and avoid the crowd at the door of the auditorium. Even though Adrian appreciates the extra space, he thinks the hallway is too wide. Hereby, people could walk next to each other which creates a crowded hallway according to Adrian. He prefers a hallway in which only two people could walk next to each other. The hallway should guide people and should make clear where everyone should walk. Hereby, I tried to find a combination of a small hallway and this waiting space. I asked if he



Photograph 5: Entrance auditorium ©Adrian

would like to have a small hallway in which at every entrance of an auditorium a waiting space is provided. He told me he would really like this idea and he even would add a window and some chairs in this waiting area. By providing this waiting space, he believes crowds will be avoided in hallways which would cause less sensory input and more space to be escape of crowds. This way, each space has a clear function and people know where to walk and where they could wait. Adrian likes clarity and overview. In his last photograph of comfortable spaces, Adrian showed me the room of a friend's student accommodation (Photograph 6). He wanted to note the closet in the middle of this room; Hereby, the room is divided into two spaces with a clear function. On the one side a space to sleep and to study and the other side to relax and to eat. This way the room has a clear organisation. In addition, Adrian mentioned he likes to have control over a space and by having this division, he understands and has control over the room.



Photograph 6: friend's room ©Adrian

The first photograph of an uncomfortable space is a photograph of the coffee machine at Adrian's house (Photograph 7). This machine makes a lot of noise when it gets cleaned. Hereby, Adrian needs to close his ears, or he would be overstimulated by the loud zooming noise. As an improvement, he said it would help if it would not be loud. He told me he would place the machine in a cupboard which should absorb the loud sound. He understands that a coffee machine is hard to avoid because many people use it, but it should be possible to decrease the (loud) sound.



Photograph 7: Coffee machine ©Adrian

Further, he showed the second example which is a photograph of his chess club (Photograph 8). This chess club is every Saturday in a primary school. This building is organised in a way that people need to go through a room (in which they play chess) if they want to go from the cafeteria to outside. Then, this space could



Photograph 8: Chess club ©Adrian

become crowded which bothers Adrian. He told me it could be easily solved by adding another door to outside from the cafeteria. This way, Adrian thinks the current floor is not logic. Further, the last example Adrian gave, is a crossroad which he needs to pass by when going from his student residence to the centre of Leuven (Photograph 9). By this image, he wanted to make clear that clarity and clear signage is important to him. Adrian mentioned he wants to understand a building, have insight into this building, and finds his way in a building. The crossroad gives him doubts and stress because it is unclear where he needs to bike. Inside a building, he likes when fire plans or clear signage is placed. At last, he mentioned to like the system hospitals use in which coloured lines on the floor guide people through the whole building.



Photograph 9: Crossroad ©Adrian

Aisha



The second stage with Aisha took place in a seminar room on a KU Leuven campus. For the take-home task, she took in total four photographs from which she considered three as comfortable spaces and one as an uncomfortable space. Even though I asked three to five photographs of comfortable spaces and three to five photographs of uncomfortable spaces, she took four photographs in total. She did not mention why she took just four but did say she had difficulties to find some spaces. Even though I had the impression she understood the take-home task, it is possible she did not, or she misunderstood what I meant. Further, it is possible she did not know more spaces in her environment. During the meetings, she mentioned to be diagnosed with autism for six months (previous summer). Therefore, she sometimes had problems to link her diagnosis with the (built) environment.

The first photograph Aisha showed, presents a door element which she considers as part of a comfortable space (Photograph 10). She likes the door element because it slows down the door when it opens or closes. Furthermore, it stops the door from slamming to the wall. This way, this mechanism reduces a lot of noise which Aisha appreciates in seminar rooms or auditoria. She clarified that during lectures some students are



Photograph 10: System door ©Aisha

late for classes, so they enter when the lecture has started. Therefore, the door opens and closes during the lectures. When people enter and doors without this system open and close, she gets distracted by the sound these doors make. Thanks to this system, these sounds are eliminated, and she does not get distracted. In addition to the first photograph, she showed the second photograph (Photograph 11). This is the same door, but she wanted to focus on the door itself. The door is opaque by which the elements behind the door does not visually distract her. When the door would be see-through or have a window in it, she would be distracted. Further, the combination of the green door with the white floor, has a rather peaceful effect on her.



Photograph 11: Door hallway @Aisha

The last space she considers as comfortable, is a hallway near the entrance of an auditorium that provides space to sit or to study (Photograph 12). The natural light which enters illuminates the space which causes a pleasant place to study, according to Aisha. In addition, she mentioned that natural light has a rather calming effect on her. What is more, the sunlight which enters is indirect because the building across the street blocks the direct sunlight. In this way, she experiences the space as more comfortable. Furthermore, this hallway is also located on the second floor which causes fewer visual distractions by people who are passing by when she is studying. She mentioned if this space would be on the first floor, she would be distracted by the people who pass by. At last, she



Photograph 12: Hallway @Aisha

also mentioned plants have a calming effect on her. However, the plant on the tables does not. She explained the plant was integrated in the table which causes the dirt of the plant is at the same height as the table. Hereby, Aisha gets distracted by this dirt which gives a rather chaotic sight. Furthermore, the dirt gets on the table or on her paper which is frustrating. This way, the plants have a calming effect on her, but the dirt not. In addition, she mentioned the flowerpot could also have a calming effect. She makes a clear distinction between a light coloured or white flowerpot and the darker, dark green, or brown flowerpots. The lighter ones give peace while the dark ones are more distracting and are experienced intensively.

The photograph of the uncomfortable space is a one of a dining area for students (Photograph 13). Even though this space has big windows, there is not much of natural light which enters the space. Furthermore, Aisha mentioned there is not a door or wall which divides the space. This way, people who sit in this space, can see people from all the hallways which are near this space. When Aisha sits with her friends in this space, she gets distracted by all the people who pass by in these hallways and in the dining area. Further, she gets many visual stimuli by these people. A clear visual division between the dining area and the other rooms would improve this space (according to Aisha). In addition, when I was looking at this photograph beforehand, I remarked many elements in this room. This way, I had the feeling the space could be visually overwhelming. Aisha confirmed this presumption. Further, she told me the green chairs, the vending machines, the tiles, and the positioning of all these elements are really disturbing. She does not find logic in the interior design which makes it chaotic. Further, she mentioned the lightings are too bright. In the photograph the lightings are turned off and there is no one in the space which could give a wrong picture of the description of Aisha. However, we concluded Aisha experiences this room as an intense and overwhelming one.



Photograph 13: Dining area @Aisha

Mark



For this meeting, Mark and I met in a separated room in the KU Leuven Arenberg campus, where I was certain we would not get disturbed by people. Mark prepared seven photographs for the take-home task. He did not want to call the spaces comfortable or uncomfortable. He just wanted to highlight different elements in these spaces which he thinks are important to understand his perspective. All the spaces have some positive- and some negative aspects that did not make them comfortable or uncomfortable. For the take-home task, he did not seem to have any problems to find the spaces or to write comments about these spaces. It is noteworthy, he mentioned that not every example is something which he sees or experiences daily in the KU Leuven built environment. For example, he took photographs of spaces of his parental home which have nothing to do with KU Leuven. However, all the spaces relate to his college experience.

The first photograph Mark showed was a photograph of his desk in his bedroom in Leuven (Photograph 14). In general, this is a space in which he feels comfortable. By this photograph, he wanted to clarify he is a bit messy, which is not a problem for him. This way, he clarified the difference between the mess in his room and the mess in the meeting room (Photograph 15). In both situations it's his own mess but he experiences them differently. Hereby, the mess in his bedroom are objects which are placed randomly, and the mess in the meeting room are his own writings. Even though these writings are his own and he knows what they mean, he gets distracted by them during meetings. He wants to get back in the thinking process of these writings which cause a distraction. This way, he pays less attention to the meeting or as he described: "I often have a dialogue with myself when I am thinking about the board and the meeting. I have become good in focussing on two conversations and gather the most important out of it."¹⁸ In his bedroom on the other hand, he considers the mess as unrelated because the mess does not have any meaning. For example, it does not bother him that the tissue box is not placed straight. He thinks this is a difference between a person on the spectrum and people who have OCD¹⁹. The writings on the whiteboard have meaning for him and he said: "If I do not need the information, I am happy to know nothing of some projects, but when I want to know something, I really want to know everything."²⁰



Photograph 14: Room Leuven ©Mark



Photograph 15: Meeting board ©Mark

In addition, Mark mentioned to get distracted by a board which is not clean. He mentioned a whiteboard keeps having some traces even when people try to clean it properly. A blackboard does not have this problem by which Mark prefers this instead of a whiteboard. However, a blackboard makes noises and creates dust by which it is not a solid solution, but still better than a whiteboard, according to Mark. To improve this whiteboard, I proposed to place a screen or curtain before the whiteboard. This way, he will not be distracted by the blackboard during a meeting. Mark thought the idea was rather strange and would feel uncomfortable

¹⁸ Original: "Heel vaak heb ik een dialoog met mezelf alsof ik bezig ben met dat bord als met de vergadering. Ik ben goed genoeg geworden in het focussen op 2 gesprekken en het belangrijkste eruit opnemen."

¹⁹ OCD: obsessive-compulsive disorder

²⁰ Zolang ik die informatie niet nodig heb, ben ik perfect gelukkig om echt niks te weten van bepaalde projecten, maar vanaf het moment dat ik iets wil weten, wil ik ook echt alles begrijpen.

to place the screen before or during a meeting. Hereby, he would rather take time to clean it properly and come early or stay late to clean it.

Further, Mark mentioned to like the natural lights which enter through the window in his room. Furthermore, his bedroom is on the first floor by which he does not see people passing by on the street. Hereby, he only gets distracted by the sound of the traffic. By the position of the building, the natural light is indirect which is important. Further, by his curtains from which one that let no sunlight pass and one which is translucent, Mark can arrange the amount of sunlight which enters his bedroom. Compared to the KU Leuven built environment, he told me light is also a determining factor of his experience of a building. However, as long as the (sun)light does not point directly at his face, he does not really mind. In his bedroom he also avoids direct lights. The visual stimulus is important to Mark. Even though Mark has colour-blindness which causes less intense colours, he gets visually stimulated by lights, textures, and some colours. This way, he likes the wall in front of his desk which is a white plaster. The simple texture and colour cause a peaceful view which is perfect to work. In general, he prefers a rather sober décor in a learning environment.

Further, we talked about some KU Leuven auditoria we both know. In general, the interior design of an auditorium does not mind him, except for the front wall and windows. When discussing, he compared two examples of auditoria (Photograph 16 and Photograph 17). The first auditorium has a front wall which is made out of brick. He experiences this as more chaotic due the extra texture and depth in the finishing. The other one has a white plaster wall to look at. Even though the other walls have a wooden texture (which he experiences more chaotic compared to a plastered wall), he finds this more pleasant. He clarified that he does not have to look at the wooden walls by which he does not mind these walls. However, he added the window distracts him due to all the people who pass by. Further, I wondered what his opinion is about the periodic system which is placed on the wall (Photograph 16). During lectures and exams, he can ignore it. It is something that is integrated in the interior design, is static and it does not make any sound. If it would be something dynamic, like people passing by or flashing lights, he would be distracted. In addition, he gave an example of when he was distracted by something dynamic. During an exam, he had once a problem with a clock which was projected to tell



*Photograph 16: KUL auditorium
©KU Leuven*



*Photograph 17: KUL auditorium 2
©KU Leuven*

the time. This was constantly moving by which he was distracted by the clock and had troubles to focus on his exam. However, he mentioned to be lucky because he did not wear his glasses so that he did not see the clock and was less distracted. In addition to exams, he mentioned to have troubles to correctly understand the questions on an exam. By his unique perspective, he could misinterpret some questions which causes lower grades.

As mentioned before, Mark likes the natural light which enters through the window of his bedroom. However, it is located on the side of the street. By this orientation, the noise of traffic disturbs him therefore he often wears a headset when he works in his bedroom. When he still was a student, he lived in a large student accommodation (around 200 students) in which the other students often made noise at night. Hereby, he used his headset to filter all these noises which was a rather good tool. However, when he wanted to study some difficult theory, he preferred an absolute silent space. Further, he added his collective kitchen could be crowded. If the kitchen was too crowded, he avoided this crowd and ate at another moment. This way, he adjusted a little bit to eat at a more pleasant time, which was not a problem for Mark. Mark said: He is a rather evasive person with “the philosophy that there is no problem if he is not making a problem out of it, or it does not bother him too much”²¹. In addition, he mentioned to get used to some noises or he would have difficulties to function in the society. By wearing earplugs or a noise cancelling headset, the problem is partially solved. However, during lectures he could not wear his headset. Hereby, he could hear some distracting noises during the lectures which should be avoided. For the noises, he makes a difference between distracting background noises (e.g., a dropping pencil or whispering people behind him...) and constant background noises (e.g., ventilation). Due to these noises which distract him, I had an idea to create a system which eliminates the background noises. This system provides an AUX-plugin at every (or some) seats in which students could plugin their headset. This way, students could hear the professor via their headset. Then, background noises would be filtered. Mark liked this concept to filter the background noise. However, he would only use it when he wants to pay attention during the lecture, but he gets distracted by background noises.

To finish the discussion about his desk, he started to talk about his office chair. In general, he needs a comfortable office chair which has a soft material. In addition, I wondered if he would like to have cushions that are worked in his seat in the auditoria. Mark liked the idea and would appreciate it, but it is not a must. He considered it as an extra luxe. He prefers a soft material, but the angle of inclination of the chair is more important. He mentioned (in the KU Leuven built environment) some chairs in auditoria are sagging, which is not comfortable and

²¹Original: “Ik heb ook ergens de filosofie dat het geen probleem is tot ik er zelf een probleem van maak. Alle zolang ik het zelf niet te erg vind of te hard uit mijn weg moet gaan, is het ook ok.”

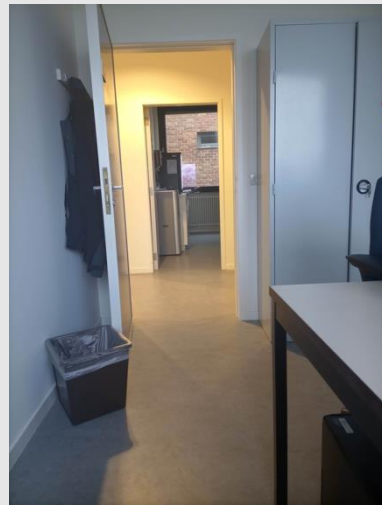
distracts him. In addition, he explained the difference between a rough and a smooth material of the desk. When it is a rough material, he experiences the desk as a more chaotic. He explained it is similar to walls which are made of a rough material (e.g., wood or brick).

The second and third photographs Mark showed, presented his office at the KU Leuven (Mark is a PhD-student, see 2.2.3). The first image shows his view when he is working at his desk (Photograph 18). He thinks it is a rather calming view, due to the sky and the moving trees. Furthermore, it is located at the fourth floor which avoids the sight of people passing by. Only some birds are distracting him due to speed they fly by. Hereby, it is noteworthy to add that this window is located at the North side of the building, which avoids direct light to enter via this window. This all gives his office a nice and calming view. In addition, he mentioned to also like calming element like fire and water. However, he said water could also be disturbing by its sound, but still, it also calms him down.



Photograph 18: View from office ©Mark

Even though the positioning of his office gives a pleasant view, it also has a downside. First, he gets distracted by the person who sits in front of him. While working, the other person needs to type on her keyboard which distracts Mark. He added, he eliminates this distraction by wearing his headset (to eliminate the typing noise) and by placing something between their desks (to eliminate the visual stimulus). Hereby, he filters these distractions in a relatively easy way. Another distraction which he cannot filter, is a group of people in the hallway (Photograph 19). Across his office, the coffee machine with a small kitchenette is placed. Hereby, groups often gather around to take a break and drink a cup of coffee together. When Mark is working and a group is taking a break, he gets distracted by them. Hereby, he also needs to take a break, even though he wants to concentrate. To filter this noise, he puts on his headphones, and he closes the door of his office, but not every sound of these groups is filtered. This makes it sometimes difficult to focus on work. At last, he added it disturbs him, but he is used to this. Because he starts to know his office and he knows which challenges or difficulties he will face when he is in his office, he is used to it. Hereby, it is predictable, and he is fine with it.

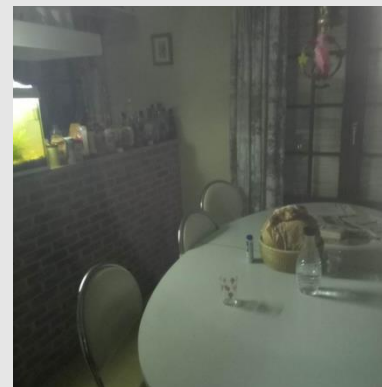


Photograph 19: View to hallway ©Mark

The fourth photograph Mark took, is one of the kitchen and dining area of his apartment in Leuven (Photograph 20). Mark mentioned he often sits at the table in the dining area to work with his roommate, to read papers while eating, and sometimes without a clear reason. He thinks it is an open quiet space which is located at the side of his small garden (and so not the side of the street). He said this dining area is quieter compared to his own room (due to the traffic). Everything in this space has its function, otherwise it wouldn't be there. In addition, he wanted to compare the kitchen in Leuven with the one in his parental house (Photograph 21). He describes the kitchen in his parental house as a rather chaotic one. Even though there are a lot of elements and textures in this space, Mark likes to sit in this space. He knows everything within this space where he predicts what will happen and he is used to this space.



Photograph 20: Kitchen Leuven ©Mark



Photograph 21: Kitchen Ekeren ©Mark

In addition to this space, I wondered if he prefers small or big spaces. He told me it is situation dependent. He clarified big spaces sometimes can be overwhelming due to its largeness and all the elements in this space. Small spaces, on the other hand, can be overwhelming due to the lack of personal space. In addition, we talked about his bedroom in his parental home (Photograph 22). He started to tell me the lightings in this room are not good. First, the room is at the shadow side of the house which causes a lack of natural light. Second, he never had the feeling the artificial lights in his bedroom made him work productively. Furthermore, the colours of the walls create a rather cosy room. This makes the room pleasant to relax but he did not have the feeling he could work efficiently in this space.



Photograph 22: Bedroom Ekeren ©Mark

Warre



The second meeting with Warre took place in the same room as the second meeting with Mark. Warre prepared nine photographs of spaces he considered as comfortable spaces and four of spaces he considered uncomfortable spaces. He did not seem to have any troubles to find the spaces for the take-home task. First, we talked about his interest in this research and in general participating in research related to inclusive design. He mentioned it was his fourth year that he participated as a user/expert for courses and research related to inclusive design. Hereby, I had the feeling he knew already what he wanted to highlight from his perspective. Further, he is 26 years old by which I believe he has some life experience, and he knows which spaces he likes and which he avoids.

Before discussing his photographs, I showed Warre the presentation that I made for the interim presentation in January because he was interested in this presentation and the feedback. During the meetings, he mentioned multiple times to value research related to inclusive design and likes helping this research. As a part of the presentation, we briefly discussed the DCU Sensory pod (see 1.2.2). Warre seemed to like the idea and said, “it was better than nothing”. He added separation could also be nice and sometimes even better than integration. For example, he prefers to take an exam in a room in which he can put on his headset with four other students, compared to a space in which 100 students sit. According to him, exclusion is not good, but separation is. According to Warre, the KU Leuven organisation is doing its best to help students on the spectrum. When he compared to some of his friends on the spectrum who study at other universities in Belgium, they concluded he has more possibilities to ask for help. He is grateful for this support, and he even believes he would not obtain a bachelor’s degree without this help of the KU Leuven organisation.

In addition, I wondered how he experienced high school. In general, he did not like it and he did not get enough support when he needed. Hereby, it is noteworthy he got his diagnosis after his third year as a KU Leuven (university) student. Hereby, his teachers at his high school (and he) did not know he has autism. At last, he mentioned that fellow students have the same interests. This makes a big difference with high school in which a lot of people does not understand some of his interests.

After this introduction, he showed the first photograph which he took in the Kruidtuin (Leuven) (Photograph 23). The Kruidtuin is a public botanic garden in which Warre spent a lot of time during his college years at Leuven²². He went to find peace and to escape of the busy city life of Leuven, the campus environment, and his social life. The spot he showed, is not his favourite spot in the garden, but it represents the most what he is looking for. His favourite spot strangely is at a fountain in the garden which gives an overview over the park and the people in it. As a response to his explanation, I wanted to know if he would like to have a similar space on campus. He told me he wants something which is off campus without people he knows. Even though there would be a similar space on campus, he still has doubts. He wonders if these spots would attract too many students. If this happens, he told me it would not help the students on the spectrum and it is not a space to retreat.



Photograph 23: Kruidtuin ©Warre

Within the KU Leuven built environment, some spaces are designed to retreat, like spaces under staircases. These spaces could help to retreat in certain situations. As Warre mentioned: “When you sit under the staircase you see more people passing by, when there are not many people passing by, it is a peaceful space. When you needed to retreat, these spaces help the least.”²³ He added to this statement, he is happy that these spaces exist on campus even if he does not use them. He prefers to sit in an empty auditorium to retreat as an alternative. However, he also mentioned to see quality in these retreat spaces (e.g., under staircase) because he likes to have an overview of the people near him while he is not part of the crowd. Hereby, he relates to the Kruidtuin in which he also prefers to sit near the fountain to have an overview. Furthermore, he mentioned to like seeing flowing water. He even finds peace in the sound of falling water.

In addition, he clarified the second photograph of the KU Leuven swimming pool (Photograph 24). He mentioned this space a terrible one based on his sensory input. It is often crowded, music is playing loud, and the finishings of the floor are tiles which gives a visual and a tactile stimulus. This all does not matter to him because he likes swimming and being in the water. Swimming gives him peace, no matter how intense the environment is. During his college years, it boosted his mental, physical health, and his social life. Two years ago, he had a contract as an

²² Warre graduates this year and does not have a lot of student credits by which he does not live in Leuven anymore.

²³ Original: “Onder de trap heb je dan wel meer passage maar op de momenten wanneer er minder volk voorbij komt, is dat ook wel rustig. Maar op de momenten wanneer je het net het meest nodig hebt, dan gaat het het minste helpen.”

employee of the KU Leuven via the inclusion course. Hereby, he could go to the swimming pool at timeslots only employees of the KU Leuven are allowed. These slots were less busy, making it more pleasant to swim. Hereby, I wondered if he would like a timeslot for people on the spectrum to swim. This would be an hour that the music is turned off (e.g., Carrefour)²⁴ and only people on the spectrum could go. He liked the idea and would make time for have such a moment, but he did not believe it could be organised. The swimming pool is always in use by people. In addition, I want to notify Warre appreciated the idea to turn off the music, but he already uses earplugs or waterproof earphones. This way, he did not think it would improve his experience.



Photograph 24: Swimming pool
©KU Leuven

The third photograph Warre showed, represents the study space in the attic of the Campus Library Arenberg (Photograph 25). Even though this space could become crowded, this was his favourite space to study with friends in a KU Leuven library. The floor is finished with carpet which creates a soft space which absorbs partially the sound. When someone is sensitive to touch (like Warre is), a soft floor and chairs provide a pleasant space. Because I know the space, I asked if he did not mind the vibrations that the floor passes along when people pass by. He did (get distracted by the vibrations), but it did not matter to him. Because he also gets distracted by seeing people who pass by, these vibrations did not distract him more. When he went to study in this space, he tried to go at less busy times. This way, he tried to be less distracted. What is more, the artificial lightings in this attic are not too bright and the natural light cannot shine directly on your face. By all these factors related to light and material, the space is a rather pleasant space to study for Warre. Further, he also mentioned to sit in a separated room (in the Agora library). During an exam period in which students were obliged to wear a mouth mask (due to the corona pandemic),



Photograph 25: Library attic ©Warre



Photograph 26: Agora library ©Warre

²⁴ For example, the Carrefour of Leuven provide some hours in which the lights are dimmed and the music in the shop is turned off.

Warre could sit in this separated room (Photograph 26). He could sit alone in this separated room which made him realise how much other people distract him, when he is studying. What is more, inside this room he did not need to wear his mouth mask which was also something good. He told me he is constantly distracted by his mouth mask when he wears due to his own breath against his face. Easy tasks, like remembering what he need to buy in a shop, became difficult. Therefore, he really liked to be alone, especially during the covid pandemic. He added, even though the room was not good based on the tactility, he really liked to study alone. Further, he could control the light inside the room which is important for him. He clarified: "Nobody likes the sun shining in his/her face, but if you cannot ignore the sun for hours, then that is bad. For the most people on the spectrum this control is useful."²⁵

This controllability is also important at the student residence of Warre, which he showed as the fifth photograph (Photograph 27 and Photograph 28). His bedroom was not perfect (e.g., street side of the building), but it was his space which he could control. For example, he had curtains by which he could control the light and he added posters to the wall. Further, he could choose the positioning of his furniture which gave him the possibility to organise everything. Even though he did not change a thing when he moved in, everything has its function which gives him control. For example, his desk stands against a white plastered wall which does not distract him by light or other elements. He has chosen this residence because it is located near the Kruidtuin of Leuven, and it is rather large (around 20m²) for a student residence room. Further, he did not want a window that aims to the South. Before living in this student residence, he lived in another student residence. This one has a window which aims to the South. Therefore, it could become 31 degrees or more in his bedroom by which he became sick.



Photograph 27: Student residence
©Warre



Photograph 28: Student residence 2
©Warre

²⁵ Original: "Niemand heeft graag zon in zijn/haar ogen maar als je het echt niet kan negeren voor uren, dan is dat wel echt erg. Voor de meeste mensen op het spectrum is die controle wel handig."

When talking about his student residence, we also discussed the kitchen in this student residence. He considered this as the first uncomfortable space (Photograph 29). He needed to share this space with five other students, and he often tried to avoid the other students in the kitchen. Some students did not do their dishes or did not clean which caused a mess in the kitchen that Warre did not like. To improve this situation, I proposed to use a whiteboard to communicate. In the research of Tackx (2020), a participant liked a whiteboard in her kitchen by which she could anonymously tell her complaints. However, Warre did not believe this idea would work in his student residence. He believes people will know that he wrote something on the whiteboard, which he did not like. He told me people talk to each other and could recognise a handwriting, definitely in a student residence with five other students. Hereby, he believes it would lead to exclusion.



*Photograph 29: Kitchen residence
©Warre*

The second photograph of an uncomfortable space is a photograph of an auditorium in the KU Leuven Campus Arenberg (Photograph 30). Warre does not like this kind of auditoria. The large number of people who sit in the auditoria and the hard rough seats, make it difficult to pay attention. The seats keep him constantly aware of the uncomfortable position in which he sits. Therefore, I wondered what his opinion is of seats which have cushions worked in. He likes the auditoria with these seats, but he also realises it is not manageable to provide these in every auditorium. Furthermore, he added soft materials are good for the tactility and the absorption of sound (e.g., carpet Photograph 25) which is also an important aspect. Instead of using materials which absorb sound, I suggested the same system which I proposed to Mark (see 0) to filter the disturbing background noises. He was very enthusiastic about this idea and mentioned: "That would be fantastic. I walk everywhere with earplugs and if I that would help to not hear background noises. [...] In general, this would be a gamechanger for my studies."²⁶ However, he also added it would not be good for his social life by which he would only use it when he wants to pay attention to the lecture but is struggling to concentrate due to distraction by noise.



Photograph 30: Auditorium ©Warre

²⁶ Original: "Oh dat zou ik fantastisch vinden. Ik loop overal rond met geluidsfilterende oortjes en als dat ik niet meer het geluid zou moeten horen van het geluid achter mij of voor mij. [...] Al bij al ,zou dat wel een gamechanger zijn voor mijn studies."

Further, we discussed the silent area of the KU Leuven Campus Library Arenberg (Photograph 31). In this room, the background noise is not a problem because people must be quiet. The main problem in this space is the visual input. First, he has the feeling people are staring at him in this space which make him feel uncomfortable. Second, the lights are too bright in this space. The lights shine bright at the desk and his paper or his laptop, which causes difficulties to see what is on his laptop. To improve this space, I proposed some interventions like lowering the floor, adding sound absorbing panels, and changing the lights. However, he had the feeling this space was just not for him, which he considers to be fine. In this library, he has an alternative (the attic Photograph 25) and that is fine.



*Photograph 31: Silent area library
©Warre*

He experiences the same feeling about the last space we discussed (Photograph 32). This is ALMA 3, which is a student restaurant. He does not like the restaurant at all, but that is fine. He told me the space is way too crowded, there is not a single spot in which he can sit quietly and, when you go at the “wrong” time, the sun shines constantly in your face. All these elements cause frustrations, distractions, and overstimulation, which gives Warre reasons to consider this space as uncomfortable.



Photograph 32: ALMA 3 ©Warre

To improve this space, I proposed to add some interior walls that divide the space, absorb sound, and filter the sunlight. He did not believe this would improve the space and he started to feel uncomfortable. Therefore, we stopped talking about this space. He just wanted to add during his first year, he went weekly to the student restaurant to socialise, but after a while he stopped going there because he did not like the space. Further, he once analysed the space for the elective course Inclusive Design and from that moment he realised, he thinks it is a terrible space. This was also the last photograph he wanted to show by which we also stopped the meeting. Afterwards we had an informal conversation about his interest next to school (e.g., pc-games, communicating via Discord). Hereby, we did not end the meeting in an uncomfortable situation.

Third stage: verification process

Adrian



The third meeting with Adrian took place in his student residence. To start the meeting, we talked a bit about his daily life and activities he does next to school. He explained he plays a game by which he controls the division between work and leisure. Previous year, he did not play this game, which caused stress and anxiety. After this explanation, I started to ask some questions about the previous meeting. First, I showed my own desk lamp (Photograph 33) because I believed this could clarify and represent his idea of a comfortable lamp. As the photograph shows, the source of light is covered by a plastic filter which avoids direct light. Furthermore, people can arrange the colour of the light (white, light-yellow, or yellow) and the brightness of the light. When I showed Adrian the desk lamp, he confirmed it is indeed a lamp which he likes. In addition, I wondered how to improve direct lights, like spots. Hereby, I proposed to place paper or tracing paper over the spot which changes the direct light, indirect. Adrian liked the idea, and he thinks it is rather simple, cheap but still effective.



*Photograph 33: Desk lamp
©Ruben Bamps*

During the previous meeting, Adrian mentioned to get distracted by the dynamic objects. Mark has the same difficulty, but also, he gets distracted by flashing lights and he experiences some texture more intense. Therefore, I wondered if Adrian had something familiar to Mark. He told me textures do not bother him because it is a static element without a clear pattern. This also applies to periodic system in auditoria. It does not distract him because it is a static element in the environment. If it would be a moving element, this would be really disturbing. In addition, he compared the sound of a car with the sound of music (played by someone else). He considers a car as rather spontaneous which is ignorable. The sound of a car is something that he is used to, and that is very brief. On the other hand, he thinks the sound of music has too much rhythm which is distracting. Furthermore, he thinks music often has a pattern. However, some constant noises, like a constant zoom (e.g., dark noise), he thinks is nice. He often uses these sounds to study. He experiences something familiar with people. When another student drops their pencil during an exam or lecture, he is briefly distracted but relatively can filter it. When someone starts to tap their foot, he has troubles to focus. He even believed another student distracted him during an exam

which caused a lower grade. In addition, I wondered why he did not say something about the tapping foot of his colleague. He explained he believes he must focus on his own paper, and he should not pay attention to the other students. Hereby, he did not want to distract other students by telling them to stop tapping.

Further, we started to talk about his social life. He told me he likes one-on-one encounters instead of a large group of friends. Large groups are difficult and not pleasant to be part of. Further, I wondered if he gets distracted by a mouth mask when he needed to wear it in a social activity, as a one-on-one encounter. He did not mind the mouth mask. His sensory input mainly comes from his sight and hearing. His touch and taste are average. His smell is under stimulated, according to Adrian. Further, I wondered what his opinion is about the ALMA 3 (which Warre does not like, see 0). He said he could ignore the background noise because it is a constant one to him. Unlike Warre, he did not have any problems with the sunlight in the ALMA 3. He found some places which are not too bright. What is more, these darker places are not crowded which makes the space rather pleasant according to Adrian. Further, we also talked about the DCU Sensory pod (see 1.2.2) and the possibility to retreat in the KU Leuven built environment. He liked the idea to have these pods. He even thought of some similar spaces in the Quadrivium on the Campus of Arenberg in which he could escape. These spaces are located under stairs, near a hallway or in the dining area. However, he thinks people need to have some self-knowledge and courage to run away when you need to escape from an overwhelming situation. Therefore, he also had some doubts, especially because the DCU Sensory pod is not integrated in the interior design.



Photograph 34: Yellow room
©KU Leuven

Further, I showed Adrian a presentation in which all the topics of all the participants are placed. Hereby, we discussed the topics and compared all the opinions. First, I wondered how he experiences recovery after and between lectures. He makes sure he takes enough breaks. Previous year, he faced stress and anxiety because he did not take breaks. Hereby, he obliges himself to play daily a game. Once he finished the game, he starts to study (if he has time left). Since he is playing this game, he is happier and found a way in which he obliges himself to take a break from school. In addition, he told me he did not consider the breaks between two lectures as a time to



Photograph 35: Blue room
©KU Leuven



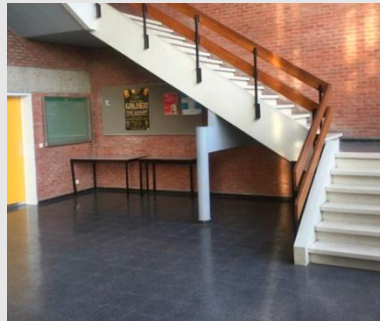
Photograph 36: Green room
©KU Leuven

recover. It is an intense time, but he does not mind being social. Hereby, he could not say if it was a rather good or bad time on campus. He added he did not experience a difference between the duration of the breaks. He told me if a lecture is planned, he does not mind when this lecture will be. This planning is important at every aspect of his daily life. For example, if his dad asks to go spontaneous for a walk in a forest, he says no. He needs some time to mentally prepare.



Photograph 37: Entrance auditoria 1
©Adrian

Further, Warre mentioned to not like tiles (see 0). I wanted to compare his opinion with the one of Adrian. Therefore, I showed the dining area Aisha showed (Photograph 13: Dining area @Aisha), the swimming pool (Photograph 24: Swimming pool ©KU Leuven), and the separated room in the Agora library (Photograph 26: Agora library ©Warre). He would experience mainly visually differences between the space due to the tiles. In general, Adrian is not stimulated by touch but by sight. Therefore, he preferred the tiles of the swimming pool. These do not have a pattern of colours by which he considers the floor as a constant one without texture (like Photograph 37:



Photograph 38: Entrance auditoria 2
©KU Leuven

Entrance auditoria 1 ©Adrian and Photograph 38: Entrance auditoria 2 ©KU Leuven). The other two have a pattern which distracts him. Further, I showed three seminar rooms in the KU Leuven built environment (Photograph 34, Photograph 35, and Photograph 36). The yellow one (Photograph 34) is his least favourite because the colour is bright. The other two, are equally good. However, he would not mind sitting in the yellow one and added the lightings are more important.

In addition, I wondered if he preferred a white- or blackboard. As Mark, he mentioned to prefer the blackboard due to the traces the whiteboard has after people used it. Adrian followed this opinion and preferred a blackboard because it is clean and clear. To end the focus on the auditoria, I showed two photographs of entrances of auditoria (Photograph 37 and Photograph 38). The first one is a photograph Adrian took for the take-home task, the second is an example which I know. I wanted to know which one of these two, he prefers. He explained he still preferred the one he showed. The staircase is a good wait/escape space, but he cannot see the doors of the auditorium. Hereby, he does not know if they are open or not. To know if he may enter the auditorium, he needs to look at other people which he does not like.

To end the meeting, I wondered what his opinion is on separation versus inclusion for people on the spectrum. He told me separation is something that works well for people on the spectrum. He gave the example of his chess club which provides a separated space for people on the spectrum. He likes this space, but he realises this is not possible in every situation. What is more, he thinks it is difficult to design a space which is made for people on the spectrum. He added people make a clear difference between people with a physical and mental condition. If a person has a mental condition, people often say to “just try harder” while it is not that simple. People will not say to a person who needs a wheelchair (in certain situations) to try harder and try to walk.

Aisha



The third meeting with Aisha was online. In the previous meeting, Aisha mentioned to like an opaque door (see Photograph 11). Due to the proposal of Mark to implement a small window in doors between hallways (see 0), I asked Aisha her opinion. She understood the idea of Mark, but added it is still depending on the situation. If she wants to pay attention to her friends, such a window still can distract her. If she does not have to pay attention, it does not matter for her.

Further, I asked what her thoughts were about the three seminar rooms, I also showed to Adrian (Photograph 34, Photograph 35, and Photograph 36). Aisha preferred the blue room due to the peaceful symbiotic between the blue- and the white colours in this room. What is more, the curtains are integrated well in the interior design. This way, she is not distracted by them during lectures. In addition, she said this integration is important to her to pay attention. However, in hallways the interior design does not mind. She added the light inside a seminar room should not shine too bright or aim at her face. Further, we discussed the breaks between different lectures. In general, these breaks distract her by which she loses her focus. After a small break, she has difficulties to pay attention to the lectures. In addition, she has difficulties to pay attention to lecture after a walk outside the campus. For example, she had to cross a large public square to go from lecture A to lecture B. Once she arrived and the lecture started, she could not focus on the lecture.

Further, because Aisha is a Muslima, I wondered if there is a relation between her religion and her autism. First, she said autism does not have a lot to do with her religion. From her perspective, it has to do with her culture. She believes the Moroccan culture considers mental health as a taboo. What is more, going to a psychologist is something that does not fit within this culture. Therefore, she is lucky to have parents who follow this religion but do not strictly follow the culture. This way, the parents of Aisha have a broader view on the things related

to mental health. Hereby, she could get testing which resulted in her diagnosis. However, she believes some of her Moroccan friends have autism, but they cannot ask their parents because these friends know their opinion about mental health issues. Aisha thinks this is a pity but is happy to have received her own diagnosis. When she is at home, she often feels very tired of an overstimulating day. Her parents often do not understand why she is tired or why she reacts differently to some situations. Since she got her diagnosis (previous summer), her parents have started to understand her.

Celine



Because Celine had troubles to find an example of a comfortable- and an uncomfortable space, we started to discuss the topics the other participants mentioned during the interviews. First, I showed Celine the three seminar rooms (Photograph 34, Photograph 35, and Photograph 36) which I also showed to the other participants. She knew these seminar rooms (due to some lectures of her) and thinks the lights are too bright in these rooms. In general, she preferred the blue room because of all the colours inside this room match. Therefore, there are not elements that point. This way, she gets less distracted by the interior. The yellow room (Photograph 34) has a floor which is too bright according to Celine. Further, she did not like the combination of the green and the wood in the green room (Photograph 36), which is a rather personal preference. Therefore, she mentioned her experiences are similar in the blue and the green room. However, in all the seminar rooms she gets distracted by the sound of the bells of the church nearby. This is a rather minor comment she added. Because the seminar rooms are small compared to an auditorium, she does not mind the bells. In general, the crowd in an auditorium is more disturbing than the sound of the bells.

Further, I wondered what her opinion is on the breaks between two different lectures. She explained these short moments are rather exhausting, but in a different way compared to paying attention during lectures. For example, she had to guide some Japanese people in Leuven for four hours and afterwards she needed three days to recover of this social activity. If she follows four hours of lecture, she does (almost) not need to recover. During the breaks between lectures, she needs some recover to reload her social battery. In addition, she mentioned longer breaks could help her to escape. When she has a moment to take a walk between lectures, she could escape from her environment by walking, listening to music, and looking at the pavement. This way, she avoids a lot of stimuli, and she has time to calm down. Even though this helps her to escape, she needs to go to her student residence when she really wants to retreat. Walking helps her partially, but when situation becomes too overwhelming, she needs to go to her student residence. In this space, there are not elements that could

stimulate or surprise her which gives a peaceful and calming environment. In addition, I asked how she organised her student residence (e.g., randomly placed, spartan division). She divides her student residence into clear rooms with a clear function. In addition, we talked about a similar structure in the KU Leuven built environment. She prefers this clear structure but when we were talking about the hallways, she prioritised space instead of a clear hallway, like Adrian wants (see 0). She likes when a hallway guides her through a building but also wants space. She absolutely does not like when people touch her. This way, she prioritises sufficient space over clarity. Further, I showed her the different photographs of the spaces which have a tiled floor (Photograph 13, Photograph 24, and Photograph 26). In general, she experiences tiles as cold and chaotic, mainly by the visual aspect of tiles.

Further, I wondered if she likes to have windows. In general, Celine does. Windows give her peace and calm her down by which she can look at it without starting to overthink things which gives peace. However, similar to the other participants, people who pass by do not bring peace. About interior design, she mentioned to like white- and pastel coloured finishings. These finishings also have a peaceful character. Hereby, the material does not bother Celine. Furthermore, I wondered what her opinion is on the periodic system and if she preferred a blackboard instead of a whiteboard. First, she mentioned to get used to it and could ignore it during lectures. Second, she preferred the blackboard due to its dark background on which people write with a light colour. She thinks this is more pleasant to look at. This she compared to the dark mode on her mobile phone. At last, I showed her the DCU Sensory pod (see 1.2.2) and asked her opinion. She appreciated the idea but (as mentioned) she would go to her student residence. However, if she would be too overwhelmed on campus and does not have sufficient time to go to her student residence, she would use it. She has some problems with the stigma around the DCU Sensory pod and it would be better if the DCU Sensory pod was integrated in the interior design.

Mark



The third meeting with Mark was in the same room as the second meeting. I started the conversation to ask how he aims his light when he is studying/working. He mentioned it depends on the situation and the moment of the day. He often aims his desk lamp at his paper to clearly see his paper. However, sometimes he aims his desk lamp at the wall in front of him. Then, the light is dimmed and becomes indirect to his face. As mentioned before (see 0), Marks does not want direct light shining in his face. However, he still wants a clear view of his paper. In addition, in auditoria this is similar. He does not want (sun)light directly on his face, but he wants a clear illuminated blackboard. Hereby, he likes when spots are aimed

at the blackboard in auditoria. During the discussion about lights, he added that direct lights, like spots, easily could be covered by a simple element (e.g., paper see suggestion of Adrian Adrian). When we talked during the previous meeting about auditoria, he made a difference between the background noises in auditoria (see Mark, e.g., whispering people behind him versus ventilation). I wondered how he experienced rain. In general, rain became a habit, except for thunder clouds. Mark reflected on his experience via an example. When he sat in the kitchen of his student residence. This kitchen is located between two bedrooms of two fellow students. While he was talking to these students, it started to rain. While he was having a conversation, he recognised a difference between the two sounds of the rain falling on the windows in these rooms. Hereby, he knew in which room the window was opened and in which room it was not. The other students did not recognise any difference, but he did. This clarified his unique perspective, and he indeed gets distracted by the rain but is capable to ignore it.

Further, I wondered if he studies in a KU Leuven library but, he did not. In general, he studied at his student residence because he experienced the least distractions in this space. He liked this space but, during the exam period he would sit always in this student residence. Therefore, he got bored of seeing the same walls every moment for a whole month. Hereby, I proposed he could sit in smaller, less crowded spaces in the KU Leuven built environment which provide space to study (e.g., entrance auditorium or empty seminar rooms). Mark did not find these spaces to be welcoming during the exam period. Therefore, he did not go to these spaces and stayed at his student residence. When we discussed these spaces, I showed an example (which we both know, and) that provides space



*Photograph 39: Study place auditoria
©Ruben Bamps*

for student to sit or study (Photograph 39). He told me he studied once in this space when he had some time between two lectures, and he liked it. The clarity/separation of space to study and hallway, is calming to Mark. Due to the separation between the hallway and the desks, people know where to walk which Mark likes. A similar entrance is at the other side of the building. However, there is no separation like this. Therefore, Mark does not like the hallway to study and misses this clarity. In addition, he told me he likes an overview of a space, and he wants to know where elements are in a space. For example, he looks out for fire extinguishers inside a room. Hereby, he creates a map inside of his head which creates control over a room. He added he also wants to know how he gets out of a building. Hereby, fire plans and clear signage could help. What is more, he thinks

the system used in hospitals, by which coloured lines on the floor clear the path, is a good alternative of the plans. In addition, we talked about the implementation of these lines. He preferred these lines on the floor. If they would be on the walls or ceiling, it would distract him.

Further, I showed the three different seminar rooms (Photograph 34, Photograph 35, and Photograph 36) and wanted to know his preference. He said the yellow one has a bright coloured floor by which he did not prefer this one. However, he added he has colour-blindness, he experiences these colours less intense. Further, the green room had an extra texture which he did not like because he experiences this as more chaotic (see Mark). Hereby, he preferred the blue one, but he added he would not mind sitting in the other two. In addition, I wondered if he has other points of attention in an auditorium when he has an exam or a lecture. To Mark, this made a clear difference. During exams, his focus is on the exam. Therefore, he does not mind the interior design. Furthermore, the width of the tables could block his view to the floor which eliminates visual distractions. For example, if his table is wide enough, he cannot see the people in front of him. When a table is rather small (e.g., the width of an A4-paper), his vision is not blocked. Therefore, he could be visually distracted by the environment. By these distractions (e.g., visual distractions, distractions by sound) he gets lower grades because he makes small mistakes (e.g., a plus becomes a minus). Further, I wanted to know his opinion about the breaks between two lectures. He told me it is a socially exhausting moment. He mentioned: “The breaks between two lectures ask a lot of energy. Another kind of energy if compared to focus energy. I think a social battery or something like that.”²⁷

At last, I was curious about his opinion of the DCU Sensory pod (see 1.2.2). In general, the social aspect holds him back. If these pods are used by everyone and it is socially accepted to use it, he would use it. He does not want to explain to people why he wants to use it. I showed another example (Photograph 40) of the Dublin City University. He told me he liked this one more because it is better integrated in the interior design. In addition, he thinks separation is good, but exclusion is not. He gave some examples within the KU Leuven built environment in which people can escape when needed. These spaces are more subtle (e.g., spaces near a hallway, under a staircase) by which everyone uses them, and he feels comfortable using them. To finalise, he mentioned the need to escape depends on the situation in which he is.



Photograph 40: Escape hatches @DCU

²⁷ Original: “Leswisselingen vragen wat dat betreft net heel veel energie. Een andere soort energie dan ik moet mij concentreren soort energie. Precies een sociale batterij ofso.”

Lectures are less intense, compared to parties but you must pay more attention during lectures which makes it often more difficult.

Warre



The last meeting with Warre was online. First, I wanted to bring up the inclusion-separation debate to clarify some statements of the previous meeting. He does not think architecture could help to integrate or include people on the spectrum when they need it the most. He believes, separation sometimes is the best way and if these separated spaces are provided, it is fine. However, separation is not the perfect answer. He mentioned: “Would I be pay more attention in a lecture with five to six other students? Absolutely. Would it improve my college experience? Absolutely not, because you just stimulate social anxiety. I know someone who after a few months did not dare to go to class and so after his first year did not leave his student residence anymore.”²⁸ He added that offering the possibility to separate is important. In addition, I wondered how he experiences the breaks between the lectures and the need to recover at the evening. His answered clearly: “It was not a recovery of the lectures, but recovery in general because the most exhausting is not sitting in the lecture but being social for a whole day. I was not studying in the evening, but I made sure I was doing something else, which is not something social.”²⁹

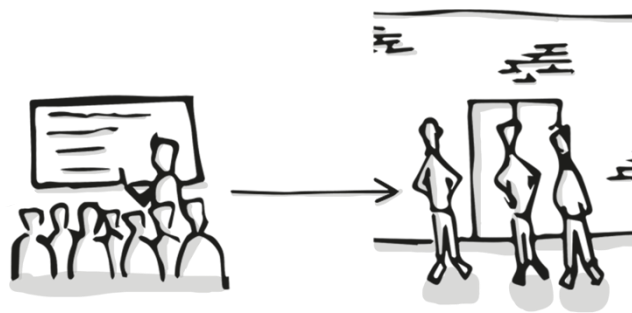
Further in the interview we discussed the lightings inside a room. He mentioned to like a room/window that aims to the North and that is not at the ground floor. If he can control the light by for example curtains, it is fine. He also said, his desk lamp aims at the ceiling instead of his desk by the same reason as Adrian (see Adrian). Hereby, he has an indirect light, and he does not experience the light as too intense. As a follow-up, I showed Warre the three seminar rooms (Photograph 34, Photograph 35, and Photograph 36) and I asked his opinion. He told me he would be most distracted by the wood in the green room. However, he also preferred the floor of the green room. This one does not attract his attention when compared to the floor in the yellow and blue room. However, he also mentioned it does not really matter to him which materiality or colour is used, based on his visual preference. He thinks his mind is constantly searching for distractions in the environment. Therefore, he also could be distracted by a white

²⁸ Original: “Zou ik beter kunnen opletten in een hoorcollege waar ik met 5 of 6 mensen zit? Absoluut. Zou dat beter zijn geweest voor mij als student? Zeker weten niet want dan speel je gewoon social anxiety in de hand. Ik ken iemand die zo na een paar maanden niet meer naar de les durfde gaan en zo na zijn eerste jaar zijn kot niet meer uit kwam.”

²⁹ Original: “Het was zelfs niet gewoon lesrecovery maar recovery in het algemeen want het vermoeienste is niet perse in de les zitten maar omgaan met iedereen voor een ganse dag. Ik was savonds niet bezig met het verwerken van mijn les maar ik zorgde ervoor dat ik bezig was met iets anders, dat ik bezig was met iets en liefst iets niet te sociaal.”

plastered wall. Hereby, the visually aspect does not matter. Furthermore, he still would be more distracted by the people around him instead of the built environment. It is noteworthy, Warre did not like tiles (see 0) which has to do with the poor sound absorption and hardness of tiles.

In addition to interior design, I asked his opinion about the periodic system which sometimes is used as decoration in some auditoria. He gets distracted by it, but he also uses it as a tool to concentrate. By obliging himself to focus after reading just one line, he can pay attention. Warre did not know if it eventually helped him during his studies, but he suspects it helped during lectures. During exams, on the other hand, he relatively was too long distracted by it. Further, I also asked his opinion on the discussion between black- and whiteboard. He did not have a preference. He just wanted that it would not make noises. Hereby, this is depending on the person who uses it instead of the material. At last, I asked his opinion about the entrance of an auditorium versus the staircase (Photograph 37 versus Photograph 38). He told me, he preferred the staircase because he has the possibility to wait above while everyone else is waiting at the beginning of the staircase. Hereby, he could avoid the crowd and chooses a space in the auditoria before anyone else.



CHAPTER 4. FIELD STUDY II: EXISTENZ

This chapter covers the second field study that has been done during the master's thesis research. First it gives a short description and the purpose of the field study. Further the originally planned methodology is explained and how I eventually executed the methodology. At the end of this chapter, I shared my conclusion out of this field study and what people could do to improve the built environment for people on the spectrum.

4.1 Introduction of the field study

During the second field study, I tried to make a **student organisation** implement my findings into one of their student-related events. In addition, I wanted to visit this event with the participants (of the first field study, see 2.2.3). This way, we could discuss this event and the implementation of the findings. During this discussion, I could verify my (processed) findings when integrated in an event. Therefore, this event became a **try-out of my findings**.

To start this try-out, I approached the student association called Existenz. This is a student association of first year master students engineering architecture that organises events related to architecture and architectural interventions. Last year, I was part of this organisation and since I have a good relationship with the new members of the organisation, I approached them. What is more, the members of Existenz are **future engineering architects**. Therefore, this research and its implementation could interest them (according to me) because it relates to the curriculum of engineering architecture.

To communicate my findings, I prepared and gave a presentation. Once all my findings were explained, I suggested some interventions which they could implement in their event. During their event, the participants and I went to the “improved event”. We gave our opinion on the event and discussed the participants’ experience. In addition, we evaluated the event and discussed if the interventions indeed improved their experience.

4.2 Methodology

4.2.1 Fourth stage: Informing Existenz.



The first meeting of this field study (fourth stage of the whole thesis) meant to **inform the members of Existenz** about my findings of this thesis. In addition, I asked if they would implement these findings in their (biggest) event, called “**Existenzweek**”. Once a year, Existenz transforms an abandoned building in (or nearby) Leuven into a place where students meet to enjoy art, music, and architecture for a week, which is called the Existenzweek. During this week, Existenz organises different activities and presents interventions related to relevant actual topics (e.g., sustainability, renovation, or inclusive design). The overall goal of this event is temporarily to revalue this abandoned building and give it an upgrade by these interventions. In addition to these interventions, I wanted to implement my findings in this event. By using my findings as part of this upgrade, it could improve the event and it could be a source of inspiration.

Once I proposed this idea to the Existenz team, they were interested and listened to my suggestions. To communicate my findings and suggestions, I gave a **presentation**, which I added in the Appendix. Afterwards, they could ask me any questions or verify if their ideas would be indeed an improvement for the experience of students on the spectrum. After my presentation, they mentioned to keep the suggestions in mind when organising the Existenzweek. What is more by telling my findings to this organisation of students engineering architects, they started to understand the unique perspective of people on the spectrum and their additional preferences. In addition, it creates public awareness of people (or students) with autism. Furthermore, Warre and Adrian appreciate this broadcasting of people on the spectrum (see 3.3.2.3, example silent hour shop e.g., Carrefour). Lastly, it is noteworthy that this session with Existenz is done before the third meeting with Celine and Britt due to schedule of Existenz.

I started this presentation by explaining my research and what I already had done and what I was planning to do. Next, I started to tell my findings by enumerate different points.

First, I mentioned people on the spectrum experience everything in a **unique/other way**, but not a wrong way. Therefore, I gave the example of the dubiousness of the signage of fire doors (see 3.3.1.2.1) and the misinterpretation of exams. Further, I clarified to avoid dubiousness and to **provide logic signage**. In addition, I explained autism is a **spectrum** and so, everyone on the spectrum varies from each other. For example, some of the participants were more stimulated/distracted by noise, others by touch, and others by sight.

Second, I clarified that people on the spectrum are **not asocial**. However, they want to avoid distractions and chaos which are partially caused by crowds. Smaller groups give less sensory input and gives more controllability.

Third, I told people on the spectrum **adapt and accept** a lot in their life. I gave the example of Mark who told me that he experiences brick walls as overwhelming/chaotic (see 0), but he accepted it. Further, I gave the example of Adrian who often uses his sunglasses inside a building to filter bright lights. In addition, I mentioned that even though they have these adaptations, they still could be distracted by elements (e.g., flickering lights or people).

To finalise the description of autistic peoples' perspective, I mentioned **separation** could be better than inclusion. To clarify, I gave the example of the separated room during exams.

After this description, I suggested different interventions to improve their event, based on the findings of field study one (3.3.2).

First, I suggested to **dim lights, avoid direct lights, and avoid lights which could point to people**. Some simple adjustments, like covering spots or point spots to walls or ceilings, creates a more pleasant space (see Adrian). In addition, if spots need to point to people, I proposed to cover the source of light. As a cover, they could use a paper which changes the direct light into indirect light.

Second, I asked if they could **provide an escape space**. In addition, I added this space does not need to be a space that is soundproof or that does not have any visual stimulus. However, it should be a space which provides rest. Therefore, I had in mind to introduce some quiet exposition rooms. These spaces should provide retreatment when a situation becomes too overwhelming.

In addition, I mentioned that everything is **depending on the situation**. For example, a large, crowded room is different to a small exposition room, but both are good and have their own function. It is not necessary to make every room less stimulating because this is not manageable/realistic. The participants know that some spaces could become crowded and that these could lead to an overstimulated situation. As Warre mentioned he prefers quiet spaces, but social contact at social events is important (see Warre). Therefore, it is important to have the possibility to escape.

Lastly, I asked if they want to **provide clear signage and clear floor plans**. This way people could easily understand the building.

4.2.1 Fifth stage: Meeting at the Existenzweek



The last meeting (stage five) of this research, was the visit to the Existenzweek. Inviting the participants to the Existenzweek engages them to be part of a student related activity. These student related activities have a positive influence on the autistic students during their college life (Hope, 2022b). What is more, this event could be interesting for the participants and could be a rather pleasant experience. Afterwards, it could motivate them to go more to related events, which may **provide some structure** to help them with social interactions (Lambe et al., 2019). As mentioned in the previous sections, the Existenzweek is an event in which the Existenz team organises music events, relaxing lectures, workshops, and provide a space to design or to study. Due to this variety of activities during this week, it could become crowded at some times. Therefore, I proposed to **go in the afternoon**, which the participants thought was a good idea.

Originally, I planned to go with all the participants at the same time. This way, they could share their experiences of the Existenzweek with each other and could learn of each other's college experiences. For example, the (almost) graduated students (Mark and Warre) could give tips and tricks to the first- or second-year students (Adrian, Aisha, and Celine). Unfortunately, Celine and Aisha could not visit the Existenzweek due to, respectively, health problems and schoolwork. Adrian, Mark, and Warre could (and did) visit the Existenzweek, but Adrian not at same time as Mark and Warre, due to unmatching schedules. Therefore, I went separately with Adrian at another time and so, the idea of sharing experiences, did not go as planned.

While we were visiting the Existenzweek, I planned to have a sort of **walk-along interview** with the participants. This is an interview in which the participants guide the researcher in an environment they know (Carpiano, 2009). However, none of the participants did know this location/environment beforehand and so, I needed to guide them through the building. By listening to the participants, I could examine their perspective of the event. During the visit, the participants **shared their experience** and commented on the spaces. Ideally, a discussion would have started, and everybody could give their opinion. Unfortunately, as mentioned, only Mark and Warre could meet at the same time. This way, there was only a discussion between them, and they mainly agreed with each other. After the visit, I gained knowledge about the implementations of my findings in this event. At the end of the visit, I hope the participants liked the visit and appreciated the implementations of the suggestions, based on their perspective.

4.3 Findings

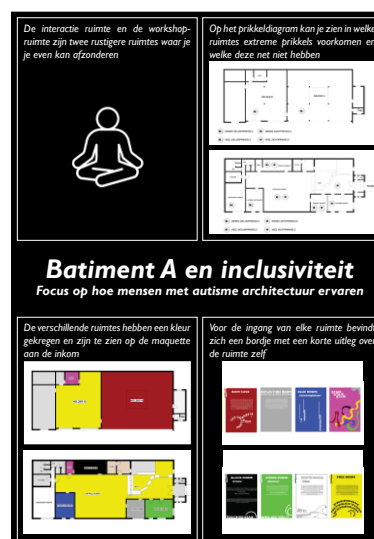
4.3.1 Comments during the visit

In this section, I describe all the different interventions (and spaces) which Existenz designed. In addition, I mention the opinions of the different participants. I will describe the intervention in the chronological order we visited the building. Therefore, I start with the entrance of the Existenzweek. We had to go via another building (coloured building in Figure 24) before we could see the building. In general, it was hard to find and so, I sent a photograph to the participants before we met. In addition, Mark and Warre mentioned it would be hard to find the entrance if I did not send the photograph beforehand. Adrian and I biked together to the event and I guided him to the event.



Figure 23: Location Existenzweek
©Ruben Bamps

Once we entered the building (at the upper floor), the first intervention was presented. At the entrance (of the building), Existenz positioned a scale model of the building that gave an overview of it. Furthermore, they placed a poster (Intervention 1) which gave a first impression of the different rooms. This poster included a clear floorplan of the building which indicated the location of the different spaces and if these spaces could have a high level of auditory and/or visual stimuli. When I visited the building with Adrian, he saw the poster and liked it. Mark and Warre, on the other hand, did not see the poster. Therefore, they did not give their opinion on it.



Intervention 1: Poster ©Existenz

Further, a blackboard is placed on the wall behind and in front of the bar, which is near the entrance (Intervention 2). The blackboard behind the bar gives an overview of the activities of the Existenzweek. The one in front of the bar, gave an overview of the (daily) menu. Adrian thought it gave a good **overview** of the whole week, which he appreciated. He only had difficulties to understand some names on the blackboard. Existenz gave all



Intervention 2: Bar and entrance
©Ruben Bamps

their activities a unique name (e.g., Batiment Breakthrough was a free podium and Batiment Breinsport was a chess competition). In addition, I told Adrian the Facebook event clarified all these names and the related activity. Mark and Warre, on the other hand, did not mention the boards. They just read it and thought it was clear. What is more, Mark and Warre did not need to know the meaning of these names. Therefore, they were not interested in the board (similar to the example of the whiteboard versus Mark 's own mess, see Mark). Overall, these two interventions had mainly to do with an organisational improvement (see 3.3.2.2). The coming examples, on the other hand are all spatial interventions to create different rooms (see 3.3.2.1).

The first spatial intervention is the central space (Intervention 3). This is a space to sit, study, relax, or have a drink. The walls are painted yellow, plants and carpets are placed as decoration, and tables and seats (which are made from pallets) were used to provide space to sit. All the participants mentioned to like this space. Even though it was rather crowded, they all found the space cosy. The carpets did absorb some sound and there was a clear overview over the room and everyone around. What is more, after we saw the whole building, I asked in which space they wanted to sit, and all the participants chose this space. They seemed to like this one and only Warre commented he got triggered by the smell, which he described as the combination of glue with plants. As mentioned, people studied and designed in this space. Therefore, some students made their scale models in this space, which clarified the smell. Lastly, it is noteworthy, we went in the afternoon to the event. Therefore, the space was not overcrowded compared to the evening. The two photographs in the right (Intervention 3 and Intervention 4) illustrate the difference between two moments.

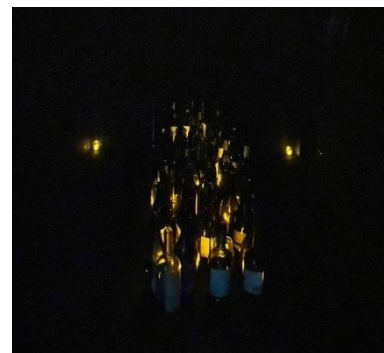
The second architectural intervention was the “Black room” (Intervention 5). This space was designed to stimulate everyone’s senses. This way, people could experience the consequences of disturbing lights and sounds. Within this space, a rather chaotic music was played, and small



*Intervention 3: Central space
©Ruben Bamps*



*Intervention 4: Central space (evening)
©Ruben Bamps*



*Intervention 5: Black room
©Ruben Bamps*

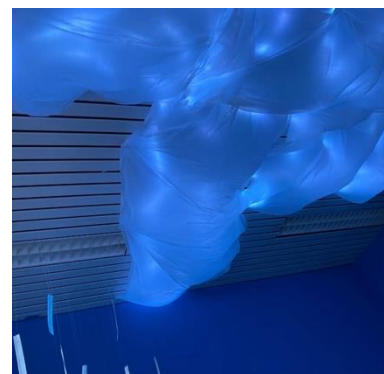
flickering lights with empty bottles of wine were placed on a table. Warre did not like this space at all, because he was overwhelmed by the flickering lights. Therefore, he wanted to leave this room after just a minute. Adrian, on the other hand, liked this room because of the darkness in the room. He did not mind the flickering lights and even did not notice these were flickering. However, when I went with Adrian, the music was not playing which may have influenced his experience. In addition, Mark did not have a clear opinion on the room. He was triggered by the objects, but because he read the explanation of the space before entering, he did not mind. Lastly, I also was triggered by this space. Due to the darkness and the glass on the table, I had difficult to see where I could walk. Furthermore, I did not want to break any glass which made me nervous.

The next room was called the mirror room (Intervention 6). It was a rather small room in which only a broken mirror was placed against the wall and on floor. In general, all the participants liked this room. It was a rather quiet room with a nice view to outside. The mirror made the space rather special, artistic and took the attention away of the participants (esp. Adrian). Because it was quiet and took the attention, the room was good to escape. Furthermore, this space was next to the centre space but did not have seats like the centre space. Therefore, it often was an empty room which made it a good space to escape to, when the centre space would become too overwhelming.



*Intervention 6: Mirror room
©Ruben Bamps*

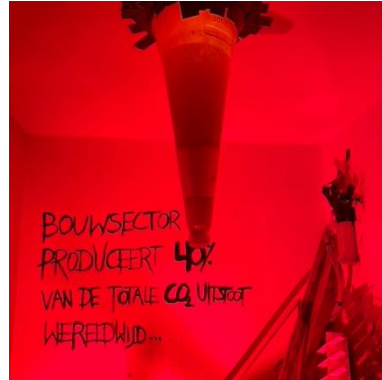
Further, we went into the blue room (Intervention 7). In this room, all the walls were painted blue, and on the ceiling, Existenz installed blue christmas lights covered with a blanket. This way, the blanket filters the direct light which made the room pleasant and peaceful. When I visited the building with Mark and Warre, this room was used by students and their design teachers. Because we did not want to disturb them, we did not get the chance to go inside this room. When Adrian and I visited, we could go inside. Adrian was enthusiastic about this room. He found the blanket a smart and original way to filter the direct light. Furthermore, some papers, with on each paper text, were hanging from the ceiling. These texts were dilemmas or expressions with a deeper meaning. Adrian did not understand the



*Intervention 7: Blue room
©Ruben Bamps*

meaning of these texts and its purpose. This made the intervention a little bit strange, but Adrian still liked the room.

Further, the red room was a space inside an old safe-deposit (Intervention 8) and so, it was small. Inside this space, Existenz wanted to note the amount of waste produced by the building sector. Therefore, they placed trash inside this room and used a red light to give a feeling of danger. In this space it was remarkable they used a cone to filter a lamp. Furthermore, they used a spot, covered by red paper, to give more light in this space. This way, all the light became indirect which the participants liked. However, none of the participants really understood the space. It did not have a clear function because people could not sit, and it was not big enough to have a comfortable conversation.



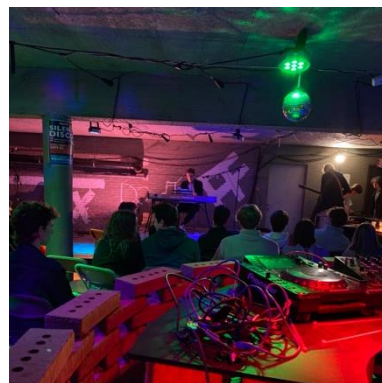
Intervention 8: Red room
©Ruben Bamps

Further, we went downstairs via the staircase (Intervention 9). On this staircase, Existenz used glow in the dark paint to create a pleasant space to pass by. Mark and Warre just went through the space without giving comments. Adrian, on the other hand, did like the space. He did not say a thing about the staircase itself but, focussed on the space underneath. He told me he could use this as a space to retreat. It is an accessible space which provides a visual cover. Furthermore, he believes no one will disturb him in this space.



Intervention 9: Staircase
©Ruben Bamps

The last space we needed to visit, was the basement (Intervention 10). This is an open space in which the most crowded events took place (e.g., Batiment Breakthrough and the silent disco called Boitiment). When we visited the space, it was empty without other people (during both the visits). All the participants did like the space but had not much to say about it, because they knew the space was not in use. However, the space was used for a silent disco. Therefore, I wanted to know their opinion on the concept of a silent



Intervention 10: Basement
©Ruben Bamps

disco. They responded it is a good alternative to a party because you can turn off the music, but the lights and the crowd still give many stimuli.

4.3.2 *Opinion on research*

At the end of the discussion of the event, we sat and drank something, which led to a pleasant informal conversation. During this conversation, I had two questions left. First, I wanted to know their opinion on the whole research: if I was a good researcher and if they expected something else of the research. Second, I wondered if they had any suggestions for further research. All participants answered similar to the first question. They **all liked the research** and the meetings. Adrian mentioned he did not experience the research as an obligation but rather as a conversation with a friend who wanted to talk about his autism, which is a topic that Adrian finds interesting. As he said: "I like to talk about people on the spectrum and if I speak with someone who gives me a **familial feeling** and wanted to talk about something which interests me, that is just nice to do."³⁰ Mark and Warre also liked the meetings. They liked I was someone who seemed interested in the topic and did not just want to finish a master's thesis. Further, they appreciated I added some personal anecdotes and asked questions which followed to their answers. Mark mentioned: "This way, you get more of us. I think we are more open, and we cooperate more which is probably better for yourself because you get better answers."³¹

For the second question, Adrian, told me future research should focus on clear signage (for people on the spectrum). Even though he seemed to like the signage of the Existenzweek, it should be improved and investigated in the built environment. He experiences difficulties with dubious/unclear signage (e.g., fire door, see 3.3.1.2.1). Furthermore, he mentioned buildings could guide people. This way, clear signage is not necessary because the building provides it. Lastly, Adrian mentioned that people need to be informed on the use of the lightings in auditoria. He once had an exam in an auditorium in which the intensity of the light was good (to him). A few moments later, a supervisor wanted to adjust the lights which made the light three times brighter (according to Adrian). Hereby, he needed to wear his sunglasses during this exam. To avoid similar situations, he proposed to make a clearer system which provides clear instructions how to use the system and which intensity is good for students (on the spectrum). Mark and Warre, on the other hand did not have an idea what needs to be investigated. However, Warre added that knowledge is one thing. The other important element is **spreading this knowledge**. According to Mark and Warre, this second element is the next step.

³⁰ Ik spreek vrijwillig graag over mensen met autisme en als ik dan afsprek met iemand die mij een heel familiaal gevoel geeft en dan ook nog eens vragen te stellen over iets wat mij interesseert, dat is gewoon tof om te doen."

³¹ Dan krijg je ook meer van ons gedaan denk ik. Dan zijn we opener, werken we beter mee en wat waarschijnlijk ook beter is voor u zelf ook want dan krijg je betere antwoorden.

Next to these two questions, Mark and Warre shared and compared some college experiences. First, they mentioned they did not experience problems in high school to pass exams, even though they did study after the school hours. What is more, they had grades which were above average. At college, on the other hand, they tried to study but did not pass exams. Therefore, they consulted the **student consult service** and got recommended to test if they have autism. This way, they got extra time during exams which helped. However, Warre still faced difficulties to study the theoretical parts of a course and he still had difficulties to pass exams. When he tries to study these parts, he starts to look at the walls around him instead of studying (without knowing). Warre gave an example in his first year when he counted all the bricks at the front wall of an auditorium during an exam, because he could not focus. Further in the conversation, they mentioned to struggle to get high scores. During exams, Mark and Warre **created a puzzle of their knowledge** to solve the questions. Before Mark even starts to write, he made this puzzle in his head. If he could not solve the puzzle, the answer is wrong, and he does not know what he must write. Warre, on the other hand, puzzles while writing. If he has a piece of the puzzle wrong, he needs to start over. Unfortunately, he wrote this wrong piece also on his official exam instead of a scrap paper which caused a chaotic and partially wrong answer on his exam.

4.4 Implemented improvements

In this part, I discuss the interventions done by Existenz. Therefore, I use the schemes which I proposed in the subchapter 3.3.2. For each theme of improvement, I discuss the different elements related to the interventions of Existenz. In addition, I want to notify, I asked a member of Existenz if I influenced some spatial interventions. Apparently, they only paid attention to correctly place the spots in the centre space. Therefore, the lights in the blue room and the red room (resp. Intervention 7 and Intervention 8) were not covered due to my suggestion to filter light. It was rather a happy coincidence that the design of these rooms required filtered light. Therefore, the discussion is based on the perspectives of the participants without knowing (and being influenced by) the real intentions of Existenz.

4.4.1 *Spatial improvements*

As shown in the previous section (4.3), almost all the interventions had to do with spatial aspects. Some of the interventions in spaces were not an improvement for the participants (e.g., Black room and Red room). However, all gave new insights on the experience of students on the spectrum. On the scale of detailing, Existenz did a great deal to make every light indirect in a rather original way. Furthermore, they painted the walls inside a room with some colour. This way, each room had a specific identity, without using multiple textures. What is more, the colours which have been used were **pastels**, except for the Red room and the

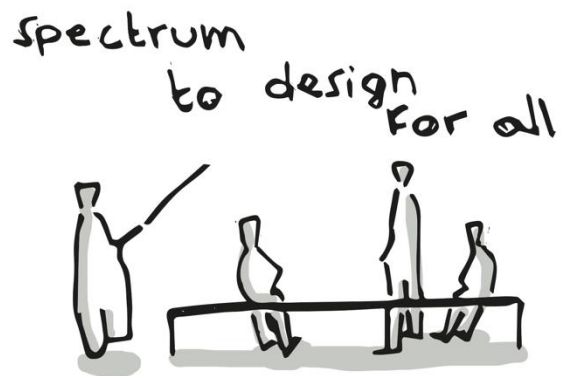
Black room. These two rooms were not meant to be used as spaces to sit and so it did not matter to the participants. On the scale of the furniture, the participants did not have much to say. In general, they liked to sit in the centre space, and the **carpets** absorbed sound which made it comfortable. Further, the less stimulating spaces (Intervention 6 and Intervention 7) did not have too much furniture. Therefore, these spaces did not stimulate the **visual senses** (of the participants). On the scale of the building, I want to note the Existenz team could not change much to the building (e.g., placing new walls or breaking walls). Therefore, they only had the possibility to logically organise the functions of the rooms. At the upper floor, the peaceful spaces around the centre space (Intervention 6 and Intervention 7) gave enough possibility to escape from the crowd (see floorplan Intervention 1). At the lower floor, the space was just an open space which made it more difficult to retreat. Only the space under the staircase (Intervention 9) could serve as an escape space, according to Adrian.

4.4.2 Organisational improvements

The organisational improvements are related to the clear signage of the event. Adrian mentioned Existenz provided **clear signage**, and he thinks everything was easy to find. Further, I had the feeling the **scale model** of the building was a nice extra touch, but it was unnecessary because none of the participants saw it. The plans, however, were very useful and gave a **clear overview**. Furthermore, all the activities (with the associated time) were clearly presented behind the bar. This way, the participants (and the other visitors) had a clear overview of all the activities.

4.4.3 Sensitization

By giving the presentation to Existenz, the members became aware of the difficulties students on the spectrum face, which is related to **sensitization**. This way, they learned about people on the spectrum and, hopefully, will keep these suggestions in mind for their own designs. In addition, I went multiple times without the participants to the Existenzweek. At these moments, some members of Existenz asked me what the participants thought of their event. This way, I had the feeling they were interested in the topic and indeed wanted to make the Existenzweek also accessible for them.



CHAPTER 5. DISCUSSION & CONCLUSION

This chapter is a discussion of the whole research. I briefly explain the different elements of the first and second field study. In addition, I reflect on the used methods and what could have influenced the results. Lastly, I add some propositions for future research based on the feedback the participants gave.

5.1 Discussion

During this master's thesis research, I analysed and discussed the experiences of five KU Leuven students on the spectrum and their college life in relation to the built environment. Each participant had a unique profile based on gender, religion, and age. This way, I gathered different perspectives on the discussed spaces or spatial elements. During these discussions, I asked the participants to determine the topics which they wanted to be discussed. Once, I gathered all these topics of each participant, I started to compare the different topics and **looked out for similarities or differences** between the participants. To guide the participants to determine these topics, I asked them to give examples of situations in which they feel comfortable or uncomfortable. These examples could help to describe their experiences and spatial principles. Based on these examples, I described their college life and the elements which are critical (to them) in the built environment. Afterwards, these descriptions led to some suggestions which should improve their college and **campus life**. Lastly, I wanted to test these suggestions in a **student related event**. Therefore, I informed a student association about these suggestions and asked if they would implement these in their event and so, this became a first **try-out**.

5.1.1 *Describing the student's environment*

5.1.1.1 College life of students on the spectrum

After the different meetings, I conclude their college life (of the five participants) can be characterised by three themes, namely: **study, sociality, and retreat**. The themes study and sociality appear in multiple other research as themes that characterise the college life (Hendrickson et al., 2017; Lambe et al., 2019; Pinder-Amaker, 2014; Saggars, 2015; Van Hees et al., 2015). On the other hand, the third theme, **retreat, is (often) not mentioned** as a theme that characterises students on the spectrum their college life. Even though other research highlights the importance of spaces in which students can retreat (Baumers & Heylighen, 2010; Hope, 2022b; Kinnaer et al., 2016; Mostafa, 2021), it is not considered as a characteristic of their college life. What is more, these retreat/escape spaces are considered as spatial elements in the built environment. However, in this research I also consider "retreat" as a theme that characterises their college life. As mentioned in 3.3.1.1.3, people could retreat via various things, like a home, a student residence, or leisure activities (e.g., sports and videogames), which is similar to statements that Van Hees et al. (2015) made. Furthermore, research highlights the importance of finding sufficient rest (Tackx, 2020; Van Hees et al., 2015). **Taking time to retreat and find this rest is important** (according to the participants and other research). Therefore, this became the third theme that characterises their college life.

Further, when I described the theme “**sociality**”, I mainly focussed on the aspects as working in group, one-on-one encounters, and their experience of social situations (e.g., socially exhaustion). However, McAllister & Maguire (2012) mention that **avoiding social situations/communication will not necessary improve autistic students’ college life**. During this research Warre (see Intermezzo Warre) agreed with this statement and gave an example of an autistic friend who stopped going to lectures and other social activities. This way, he stopped being confronted by other people and was less often overwhelmed. However, after a few months this friend did not dare to come outside of his house and so, he did not go outside to get the groceries. With this example and referring to McAllister & Maguire (2012), I want to note that sociality/social interaction is not something that needs to be avoided. It is just a **part of their (college) life**. Further, in the research of Van Hees et al.(2015), the participants valued their social life and needed friends. By observing and analysing other people, they created a “*script*” which helps them to know what to react in certain social situations. To relate to my own research, Warre mentioned something similar. He explained he created a **social system** during his time at high school which he uses now to socialise with people. However, Adrian, on the other hand, does not like to observe people. Therefore, he did not develop a similar system. Furthermore, he considers himself as a person who is rather social and so, believes he does not need this system.

Further, in other research the theme “**disclosure**” is also considered as a theme which characterises their college life (Cox et al., 2017; Pinder-Amaker, 2014; Saggars, 2015; Tackx, 2020; Van Hees et al., 2015). Some students on the spectrum appear to have problems with disclosing to other people, especially to disclose about their diagnosis. However, during the different meetings **none of the participants mentioned to have troubles with disclosing to other people**. Furthermore, Adrian and Warre liked talking about their condition.

Lastly, research related to the college life adds another theme, namely: **daily (independent) living**. This theme relates, first of all, to the difficulties of cooking, shopping, and **living in a student accommodation**. Furthermore, the participants of the research of Lambe et al. (2019) spoke also about these difficulties with living independently and the responsibilities that comes within it. Second, independent living relates to **leaving the parental house** which could cause difficulties with daily routines (e.g., hygiene or eating). The support of parents stays important for college students (Lambe et al., 2019; Tackx, 2020). However, none of the participants (of this master’s thesis research) mentioned troubles with independent living. Furthermore, Nguyen (2022) mentioned that independent living could have various meanings and each individual experiences it different. Because the participants had problems related to living independent, it did not become a theme which characterises their college life.

5.1.1.2 The built environment of students

The built environment of the participants' perspective could be characterised by three themes, namely: **clarity, distractions, and escapement**. According to the participants, many spaces (in- and outdoor) have dubious signage which stimulates stress. To clarify this statement, I introduced the theme "**clarity**". With this theme, I want to remark that a **logic floorplan and clear signage** are fundamental to improve the built environment. Brand (2010) motivates to add clarity so that people understand **how their interactions lead to certain outcomes**. Mostafa (2010) proposes to **provide clear and a single function** to each room which gives clarity and simplicity in the built environment.

Further, people on the spectrum are easily distracted by elements in the built environment. Furthermore, students on the spectrum **interpret sensory input in another way** and so, they could be easier distracted by certain smells, bright lights, and noises (Gaudion et al., 2015; Kinnaer et al., 2014), which causes discomfort and stress (Hendrickson et al., 2017). **Depending on the situation, the person, or the space**, this discomfort, stress, and distractions could vary from each other. For example, these distractions could cause a **lack of attention** during lectures and exams or cause **overwhelming situations**. This way, the participants respectively have lower grades, and want to escape out of the situation. However, students on the spectrum could also retreat by these distractions (Van Hees et al., 2015). By focussing on one specific distracting element, other sensory input could fade away. Adrian, Celine, and Warre mentioned something similar in hallways (e.g., plants or posters) which calms them down. Even though this could help them, it depends on the situation. When these elements are in an auditorium or a seminar room, they are distracted.

In addition, when analysing the data, I found that situations are also depending on **predictability** of the situation. In line with the findings of Baumers and Heylighen (2010), the participants are less overwhelmed in situations which they know and can predict. Because they know these situations, they can fall back on their experiences and **use these experiences as an anchor**. Furthermore, some struggle to face new situations, unexpected changes and have troubles to have an overview of large amounts of new information (Van Hees et al., 2015). In addition, it is noted that change is particularly difficult for people on the spectrum (Gobbo & Shmulsky, 2014). Similar to predictability, Lambe et al. (2019) make a distinction between **structured and unstructured social situations**. Structured social situations are situation which they can **predict and structure**, like lectures and group work. Therefore, these situations are more comforting. The unstructured social situations, on the other hand, are unpredictable and unstructured, like a spontaneous walk or flickering lights. These situations cause stress and high levels of anxiety, according to Lambe et al. (2019). This division of Lambe et al. (2019) is similar to the division that I make of predictable and unpredictable situations.

However, Lambe et al. (2019) mentioned that group work is considered to be structured. It is noteworthy that the participants of my research did not consider group work as structured or predictable. Because peers could be tardy, the participants consider group work as unpredictable or unstructured. Furthermore, some experience group work as socially exhausting. In addition to statements of the participants, research of Gobbo & Shmulsky (2014) concludes that some students on the spectrum face difficulties when working in group due to discussions.

Furthermore, depending on the person relates to the **variety of people on the spectrum**, which is in line with the Diagnostic and statistical manual of mental disorders: DSM-5™ (APA DSM-5, 2013 via Baumers & Heylighen, 2010). For example, while Adrian does not mind having an extra texture or decorations in an auditorium, but Mark does. This experiences of Mark is in line with the research of Landschip and Modderman (2004 via Baumers & Heylighen, 2010) who mentioned that **multiple decorations might cause stimuli**. Furthermore, some people on the spectrum find specific sounds or lights disturbing, while others want these stimuli and like to be stimulated. Therefore, each person is (or is not) stimulated by various things (Gaudion et al., 2015; Kinnaer et al., 2014; McAllister & Maguire, 2012b).

Lastly, the theme which characterises the built environment is **“escapement”**. Providing spaces in which students can escape could help avoid overwhelming situations or could help to calm down (Kinnaer et al., 2014, 2016; Mostafa, 2010). Furthermore, these spaces could help to recharge the **“social battery”**. However, some studies recommend to provide spaces which could stimulate sensory input, called **Sensory rooms** (Baumers & Heylighen, 2010; Brown & Coomes, 2016; Hope, 2022b). These rooms provide sensory input for people who are hyposensitive and need/prefer this stimuli (Baumers & Heylighen, 2010; Gaudion et al., 2015). However, none of the participants were hyposensitive and were often triggered by an overload of sensory input (and so hypersensitive). Therefore, the participants did not mention these sensory rooms, and these would not improve the building environment from their point of view.

5.1.2 Improvements

Based on the data gained via the interviews, I did some suggestions to improve the built environment for student on the spectrum. To give structure, I divided these improvements into three themes, namely: **spatial improvements, organisational improvements, and sensitization.**

5.1.2.1 Spatial improvements

This theme is explained at three scales of a building, namely: the scale of detailing, the scale of the furniture, and the scale of the building itself. Overall, each scale is related to **avoiding distractions, providing clarity/controllability, and providing escape spaces** in the built environment. These elements are the basis to improve the built environment from an architectural point of view. Further, at every scale it was important to **feel safe and have control**. Mostafa (2021) mentioned that **safety** is important, especially for children who are hyposensitive. For example, she proposed to avoid sharp things in the built environment. Even though none of the participants was a child or hyposensitive, they needed control to feel safe. Some wanted to have control and understanding of the building, others wanted control over the room. This way, safety relates more to controllability for the participants (of this research). Therefore, safety did not become a suggestion to improve their experience, but **controllability** did become (see 3.3.2.3).

5.1.2.1.1 Detailing

Out of the data, I recognised that all the participants liked **pastel colours**. Similar to this statements, Brand (2010) recommends to use only pastel colours in communal spaces. For private spaces (e.g., house or appartement), the designer should ask the users' preferences. Furthermore, Brand (2010) recommends to provide indirect lights by using **filtering elements** in front of a light source which is in line with the participants' opinion (see 3.3.2.1.1). In addition, the participants of this master's thesis research (and Brand (2010)) recommend to **provide indirect lightings via skylights**. Further, research also highlights the importance of **acoustics** (Brand, 2010; Mostafa, 2010; Tackx, 2020) and the **details of the interior** to improve acoustics (P. Nguyen et al., 2020). By paying small attention to sound, sight, smell, and touch the built environment could become less stimulating and autistic students' experiences could significantly improve.

5.1.2.1.2 Furniture

Brand (2010) recommends to provide furniture with **smooth, continue materials** with a minimum of details to minimise distractions which relates to the suggestion of Mark to have smooth tables. What is more, Brand (2010) proposes to add pin boards or magnetic boards to communicate, Tackx (2020) proposes whiteboards. Tackx (2020) found that a participant liked a whiteboard in a shared kitchen to anonymously communicate (about complaints) with other students at

her student residence. However, I proposed this idea to Warre when we tried to improve the shared kitchen at his student residence (see Warre). He thought this would not work in his student residence. He said that he is not with many people at his residence which makes it is easy to know who wrote something on the whiteboard. Therefore, he would not be anonymous, and believes the other students would not appreciate or understand his comments. This way, he believes the other students would be frustrated towards him, which does not solve the problem.

5.1.2.1.3 Building

First of all, a **clear plan** is important for people on the spectrum (Brand, 2010; Kinnaer et al., 2016; Mostafa, 2021). This relates to the clarity and the controllability inside a building. Furthermore, **escape spaces** are recommended by different research (Baumers & Heylighen, 2010; Hope, 2022b; Mostafa, 2021). However, when I explained the **DCU Sensory pod** (see 1.2.2) to the participants, three out of five did not seem to like the project and would not use it (when implement in the KU Leuven built environment). The other two liked the effort and mentioned that it was better than nothing. However, they all wanted to have these escape spaces to be more **integrated** into the interior design of the building. In addition, the participants mentioned to like **subtle spaces** which give the possibility to escape (e.g., under stairs) (Kinnaer et al., 2016).

5.1.2.2 Organisational improvements

The second theme, organisational improvements, is divided into two subcategories, namely: **clear communication and clear organisation**. Both relates to provide clarity in the built environment which is mentioned multiple times by the participants.

5.1.2.2.1 Clear communication

Out of this research (and other research (Brand, 2010)), it is turned out that clear communication is recommended. This means that people need to be clear in their communication and **avoid dubiousness**. Brown and Coomes (2016) amplify this statement by mentioning that using **“concrete language” and “clear or specific directions” are effective methods to communicate**. Furthermore, by using **visual clues and warnings**, people on the spectrum will understand what people expect from them. For example, Adrian and Mark mentioned to like the guiding-system which is used in hospitals. They think it is a clear and effective way to guide people. In addition, Lynch (1960 via Kinnaer et al., 2016) suggests to use this system and suggest to implement memorable edges (e.g., curved or half-walls). Further, clear communication is also important related to their college/daily life. People on the spectrum **need assignments and expectations to be clear and predictive** (Gobbo & Shmulsky, 2014). Therefore, these clear communication and guidance is essential. For example, some participants mentioned to have difficulties to interpreted exam questions correct, which causes lower grades.

5.1.2.2.2 Clear organisation

Furthermore, organisations could clearly **inform people about their (school-related) activities** (e.g., event of a student association or the university institution). This way, people can predict the event or activity, which is important to people on the spectrum. Furthermore, Fleischer (2012) notes the importance of **collaboration** and clear communication between an educational institution and the students on the spectrum (and their peers). Therefore, **planning tools, clear communication, and concrete information** give students on the spectrum clear instructions to know what is expected of them (Van Hees et al., 2015). Furthermore, Brown and Coomes (2016) recommend to make a policy that allows student to take a **“reduced course”** during the transition period from high school to college. To make this policy, clear and inform organisation is recommended.

5.1.2.3 Sensitization

5.1.2.3.1 Architectural impact

Lastly, sensitization also plays an important role to improve the college life of students on the spectrum. This way, architects could **become aware** of the impact the built environment has on people on the spectrum. This relates to their **choice of material**, the **controllability** of the environment, and the **possibility to escape**. Brand (2010) recommends using plasterboard which is painted for the finishing of a wall, recommends providing controllability, and recommends providing multiple exits to escape. By implementing these guidelines, he made a reference that other architects could use in future designs. Furthermore, Mostafa (2015) presented seven evidence-based guidelines (see 1.2.1) which architects could implement to design for individuals on the spectrum. By these recommendations and principles, architects may implement them and become aware of the impact of the built environment on autistic people.

5.1.2.3.2 Adaptations

Further, out of this research I believe it is important to make people aware of the **adaptations** which some people on the spectrum (need to) do. However, I did not find any similar statements in other research. Other studies mention different problems to acoustics or sight (Brand, 2010; Mostafa, 2021; Tackx, 2020) and wanted to solve them by adapting the environment. However, the participants mentioned they also adapt (e.g., headphones or sunglasses), which improved their college life and experience of the built environment. However, some participants struggle with the **stigma** around some adaptations (e.g., wearing headphones during lectures). Therefore, people could be informed which minimises the stigma.

5.1.2.3.3 Misconceptions

Further, by informing people about autism may help to avoid **misconceptions**. What is more, it could help for postsecondary employees to know how to recognise and react to students on the spectrum (Cox et al., 2017). In addition, some people on the spectrum would like to have other people **informed about the diversity and complexity of autism** spectrum condition (Van Hees et al., 2015). Further, Pellicano et al. (2014) mentioned some autistic people (and their peers) wanted more public awareness of the **aspects of autistic people which people do not often see** (on TV). They had the feeling there is only public awareness about people on the spectrum who are great at a specific topic (e.g., math or art), but people often do **not mention the daily challenges** of people on the spectrum. In addition, I mentioned that people think people on the spectrum are very smart (e.g., Rain man). However, all the participants were equally smart as their peers. All though, as (Gobbo & Shmulsky, 2014) remarked, people on the spectrum could seem smarter because they know a lot about a specific topic and are passionate by that topic.

5.1.3 Field study II

In the **second field study**, I wanted to implement these findings into a student related event. Therefore, I informed the student organisations Existenz about my research and its findings. Out of this, I did suggestions which were meant to improve the experience of students on the spectrum during their event.

The first suggestions I made, was to dim or avoid direct lights. Out of the research, I concluded direct lights are disturbing and could be overwhelming. In the recommendation of the organisation Reframing Autism (2019) the first point which is highlighted is to **turn off bright, direct, and/or flashing lights**. Further, this organisation recommends providing a *“fragrance-free environment”* (Reframing Autism, 2019) by informing the visitors to not wear strong perfumes or deodorants. However, I want to add to this statement that the event-makers should try to avoid all kind of strong smells. Warre mentioned to be triggered by the smell of plants and glue in the centre space of the Existenzweek which was overwhelming.

Second, I suggested to provide an **escape space**. This is in line with the third point of attention of the Reframing Autism (2019) which recommends providing an *“Autistic quiet space”*. However, this organisation did not mention that everything is depending on the situation. In their recommendations they considered the escape space as a space in which beanbags are placed to sit/lay and calm down. However, I mentioned to provide rather **small exposition rooms** which are part of the event but could also serve as an escape space. During this research, the participants mentioned they wanted these escape spaces to be **integrated** without feeling socially uncomfortable. Therefore, I did not expect the Existenz team to provide a separated space which is not only for people who want to escape, but also for other visitors.

Lastly, I asked to implement **clear signage and clear floors** which are helpful to people on the spectrum (Reframing Autism, 2019; The National Autistic Society, 2023). Furthermore, organisations recommend **informing the visitors clearly beforehand**. Even though I did not explicitly mention this, the Existenz team prepared a clear overview of the activities online and at the event.

Further, I asked their opinion about the research and what they want to have further investigated. Overall, they wanted to have **the knowledge implemented and the information passed to people**. Similar to the research of Pellicano et al. (2014), autistic adults preferred more knowledge exchange and public awareness about autism. In addition, they highlight the importance of explaining their daily challenges, so **common misconceptions are avoided**. Further, Adrian also wanted to have research about **clear signage**. In research, clarity and clear communication often appears (see 5.1.2.2). However, it was not always clear how they would implement this clarity and clear signage, or what made this signage “clear” compared to the existing signage (Brand, 2010; Kinnaer et al., 2016; Langdon et al., 2020; Mostafa, 2010). The signage on the fire doors at KU Leuven (see 3.3.1.2.1) is an example of unclear signage. However, I did not notice this unclarity before Adrian mentioned this example. Therefore, research about clarity for people on the spectrum and **how to provide clarity**, could be interesting.

5.2 Reflection

In this section, I reflect on myself (the researcher), the research approach, and the methodology which is used. First of all, this was my first qualitative research at college. This way, the questions (or the way I asked them) could be imperfect or could have influenced the participants' perspective. What is more, I had troubles estimating the number of people that I needed to interview. Afterwards, I think five was a good number of participants. They all gave new information, but many opinions were the same which made it interesting to compare. Furthermore, if there would be more participants, I would hear more repetition and it would take more time (but with less extra information) to compare and analyse the data. However, from the participants' view the meetings went well and they gave positive feedback. They felt comfortable with me which led to more information and more shared personal experiences (according to them). This feedback convinced me the research approach was a best choice (for me). In addition, by this research approach, they had to choose the topics which I attached importance to.

Thanks to using the **photovoice** method, it became a pleasant conversation in which they could show the spaces (or spatial elements/principles) they wanted. This way, three out of five participants gave a lot of examples and did not have difficulties to share the experiences. The other two (Aisha and Celine) did have some problems to find spaces or spatial principles. I do not have a clear explanation why they experienced problems to find spaces. However, I want to add some points of attention in which they differ from the other three participants.

First, they did not study engineering-related studies like the other participants and me. This way, I had fewer common interests with Aisha and Celine, which made it sometimes more difficult to talk each other.

Second, they both do not know the campus which I go. During the first meeting, I gave some examples which I know from my own campus. Because they do not go to this campus, they had difficulties to imagine these examples and share experiences.

Third, these two participants are females while the others are male. Girls on the spectrum react in a more passive, less confrontable way compared to boys (Rudy, 2022). This way, it is possible they did not want (or dare) to ask more explanation about the take-home task.

Fourth, Aisha had her diagnosis since previous summer. Therefore, she mentioned to not relate her autism to the built environment. This way, she also may have some difficulties to think of some spaces.

For the **co-design** part of the second meeting, I had the feeling, it was hard to improve the spaces experienced as uncomfortable. In general, the participants had troubles to design the spaces or identified disturbing elements which just needed to be removed. Further, they accepted they needed to avoid some spaces which is fine. This way, they did not want to improve these spaces. Further, the third meeting, the verification process, gave more information than I expected. By comparing the different perspectives and topics, the discussion became interesting. In this stage, I learned a lot about them, and I am glad they all participated this session. Afterwards, the analysis of the stage gave an overview of the different and similar perspectives. Lastly, I want to add that I only interviewed five students. Therefore, this research is not representative for every student on the spectrum.

As mentioned, the **second field study** was meant to be an implementation of the findings. In general, I had the feeling the participants liked the idea and the event. Even though it gave more insight into their experiences, the execution of the field study did not go as planned. First of all, the last meeting with Aisha and Celine was after the meeting with Existenz. This way, I did not have time to analyse all the data and I did not implement all the discussed topics. For example, I did not mention the importance of sensitization. Second, the presentation needed to be sooner to fit in the schedule of Existenz. Because it was three weeks before the event, Existenz already had ideas which they wanted to implement in the event. This way, it became difficult to implement all my suggestions.

The visit to the event did also not go as planned. I wanted to gather with all the participants at the same time. Unfortunately, this was not possible due to unmatching schedules. Furthermore, two out of five did not go to the Existenzweek. Therefore, I had less perspectives to evaluate the event and we did not have the group session which I hoped for. Even though the second field study did not go as planned, the information I gained from the three participants who went, was rich. What is more, by the conversation of Mark and Warre, I believe group sessions or duo sessions could have improved the research. When Mark and Warre shared their experiences, I had the feeling they gave me new insights in their point of view. During the interviews, Aisha, Celine, and Mark mentioned to not link their autism to the built environment. By organising these group sessions, they could help each other out to relate to the built environment. For example, when Mark and Warre shared their experiences, I had the feeling they helped each other to clarify different elements (e.g., experience during exams). This way, I believe group- and/or duo sessions are interesting for future research.

Further, I want to add two recommendations for future research to minimise similar problems as mentioned above. For future research (related to students on the spectrum), I recommend preparing a **planning** of different meetings and related deadlines. This seems logic but even though I tried, I faced problems related to time management. For example, the meeting with Existenz needed to be sooner to have a larger impact.

Second, I recommend using a method which makes the **participants speak freely** (like the photovoice method). It is important to be **open-minded**, ask about their experiences, and share some experiences of your own. This way, the participants are more at ease and want to share more information (according to the participants). In addition, Gobbo and Shmulsky (2014) recommend to use a non-judgmental approach which is especially helpful for students on the spectrum.

Lastly, all the highlighted elements (during this research) are elements that I can relate to. Even though I ignore these elements, I feel more exhausted after a day of confronting and ignoring these discussed elements. For example, a ventilation system could make noises in a room while I want to pay attention. This is more exhausting to keep my attention and I feel more exhausted afterwards. Therefore, I want to add that I believe that **listening to and learning from people on the spectrum could make better architecture for everyone**.

5.3 Future research

As mentioned, Adrian wanted future research on the clarity of a building and its signage. Mark and Warre wanted the research to become integrated into practice. This is related to the **sensitization** improvement part. As a proposal, the VVS (Vlaamse Vereniging Studenten) may help. In a recent article, they brought students on the spectrum (and briefly their challenges) into the spotlight (VRTNWS, 2023). What is more, they proposed 31 viewpoints to create a more inclusive college life (VVS, 2023). This way they wanted to create events available for everyone. As in a relation with the comment of Mark and Warre, this could be a step forward to put knowledge into the practical side. Furthermore, I believe, this is a step forward to improve the events, student residences, and the college life of students on the spectrum.

Thank you for your interest and reading this master's thesis research.



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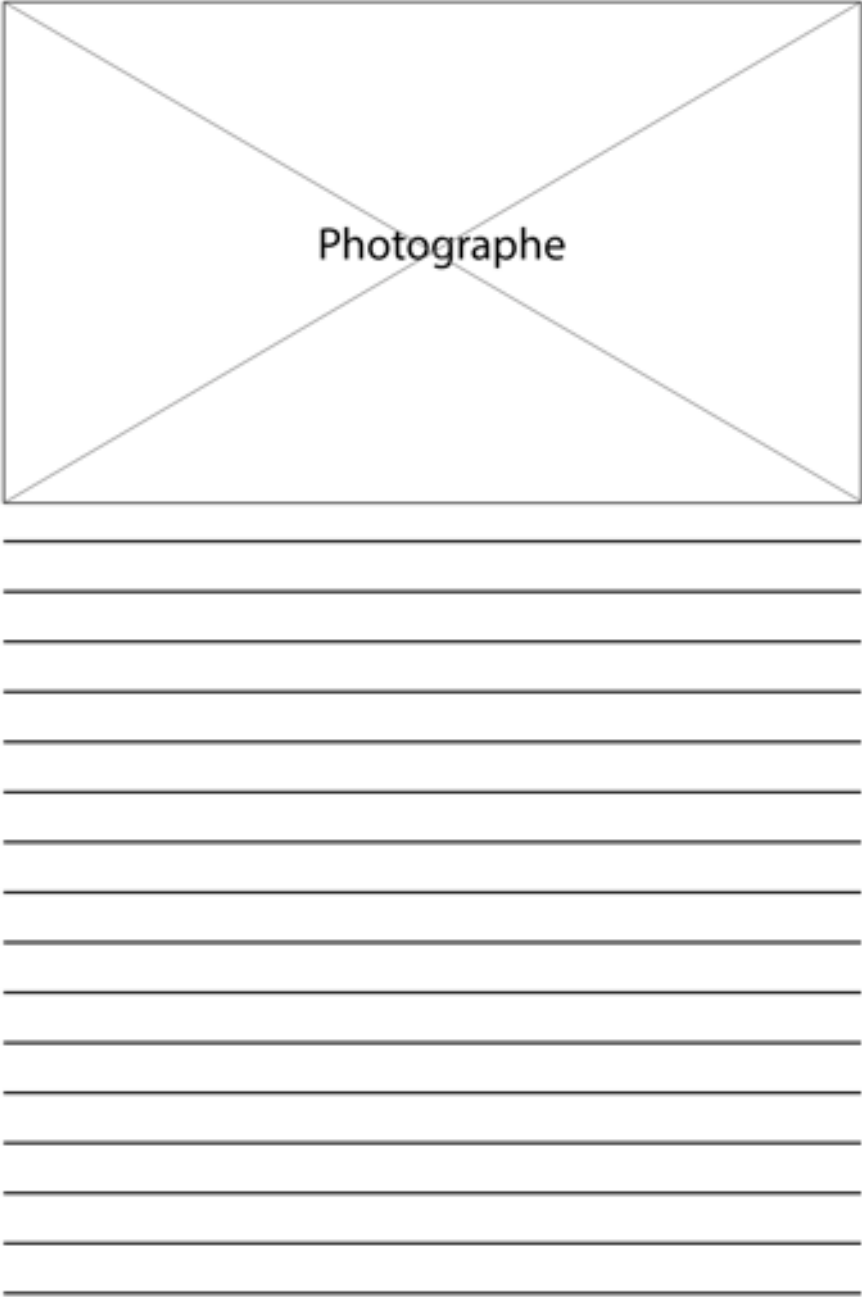
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APPENDIX

Proposed template take-home task



Photographe

PowerPoint used for stage 3:

INTERVIEW VERIFICATIE

Foto's om het gesprek wat te leiden

Ruben Bamps
Proctors: Ann Heylighen, Phucng Nguyen Lan, Sara Wilens



SEPERATION VS INTEGRATION

- . seperation beter tijdens examens
- . seperation minder goed voor rolstoelgebruikers bij een trap => museum M vs mijn eigen ontwerp
=> wanneer doet zich een situatie voor dat integration verkozen wordt?



RECOVERY

- . schetsing van recovery time
=> ook na een lesweek dat je weekend echt nodig hebt?
- . zie je de leswisseling ook als recovery?
- . haalt leswisseling je uit de lesfeer?



OVERZICHT CFR. KRUIDENTUIN

- . liever grotere ruimtes of net kleinere ruimtes voor het overzicht?
- . bewust van omgeving kan bij beide denk ik
- . groot is ook niet perse een hoge ruimte?



BETEGELDE RUIMTE

- . cfr zwembad => niet aangenaam?
- . door koudheid of echt visueel van textuur?



WIJSBEGEERTE BIB

- . verschrikkelijk doordat iedereen daar op elkaar zit
- . iedereen kijkt op u of je zit tussen de boekenkasten?



TEMPERATUUR

- . **Ver kies je een radiator of vloerverwarming?**
 - => regelbaar vs constant
 - => lokaal verwarmd vs geheel verwarmd?
- . **is dat afhankelijk van plaats?**
 - => gang vs seminarielokaal vs aula vs woning

7/14

RAAM

- . **Uitzicht maakt je niks uit maar eventueel wel grootte raam?**
 - => aangenaam uitzicht dat rust geeft
 - vb tijdens studeren?
 - => enkel indirect licht dat binnenvalt.



8/14

AULAS

- . **Zitvlak moet geen kussentjes zijn**
- . **Merk je een verschil tussen de verschillende aulas?**
- . **Minder storend als het een andere houdsoort is of eerder een plastic? Zachtheid ervan?**

9/14

LESLOKALEN

- . **kleurrijke lokalen**
- . **witte lokalen**



10/14

AULA

- . **periodiek systeem**
- . **krijtbord vs whitebord**



11/14

INKOM AULA



12/14

LAMPEN

. indirect licht

. naar boven schijnende lampen, ingewerkt licht



MERCITJES

Overview differences

Space	Function	Discussed item	P	S	A	
Auditoria + seminar room	lecture + exam	Different textures of finishes as disturbing		X		2/5
		Bright colors of finishes as disturbing			X	
		Periodic table as distractful		X		2/5
		Periodic table as ignorable		X		3/5
		Windows are distractful			X	
		Moving things as distractful			X	
		Unexpected sound is most distractful			X	
		No direct light on student			X	
		Prefer chalkboard			X	
	Texture of table is important		X		2/5	
	lecture	People sitting is constant noise			X	
		Wall in front is most important wall			X	
Periodic table as tool to concentrate		X				
exam	Width of table is important		X		3/5	
	Misinterpretation of exam questions		X		3/5	
Entrance hall	waiting	Escape space needed			X	
		Extention of hall, corner, or stairs			X	
Hallway	passing by	Clear circulation and signalisation			X	
		Need of enough space		X		2/5
		Changes of lectures is exhausting			X	
Library	studying	Use the library		X		2/5
Student residence	home space	Have a shared student residence		X		2/5
		Have a studio		X		2/5
		Live at their parental home	X			
		Retreat space			X	
Escape spaces on campus	finding rest	Would use DCU Sensory pod		X		2/5
		Use subtle retreat spaces			X	
		Have troubles with social aspect			X	

PowerPoint Existenz:

EXISTENZ PRESENTATIE

**Topic: Hoe ervaren studenten de gebouwde omgeving van de KU Leuven?
Leren van neurodiversiteit.**

Ruben Bamps
Promotors: Ann Heylighen, Phuong Nyugen Lan, Sara Willems

1/12

OVERZICHT

- . methode onderzoek
- . algemeen studenten met autisme
- . bevindingen voor Existenzweek

2/12

METHODE

- . literatuurstudie
- . effectieve onderzoek
- . schrijven...



methode algemeen bevindingen 3/12

ALGEMEEN

- . **uniek/anders perspectief hoe alles te ervaren**
MAAR ervaren het niet fout
 - => vage signalisatie
 - => klassieke KU Leuven branddeur waar je door moet: "hou ze dicht"
 - => logica



methode algemeen bevindingen 4/12

ALGEMEEN

- . spectrum; niet iedereen is hetzelfde (groot vs klein)
- . zeker geen asociale mensen
verkiezen vaak kleinere groepen
=> minder overweldigend



methode algemeen bevindingen 5/12

ALGEMEEN

- . **acceptatie doorheen leven**
 - => achtergrondgeluiden negeren (niet wegfilteren)
 - => baksteen veel textuur, maar overal (cfr)
- . **vooral last van dynamische dingen**
 - => schakeringen wolken, mensen die passeren (cfr)

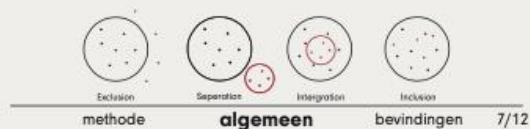


methode algemeen bevindingen 6/12

ALGEMEEN

. **separation / integration > inclusion**
(voor mensen met autisme)

. **vb examens**



KORT

alles wordt intenser ervaren
licht, geluid, textuur, tast...
+
logica

methode algemeen bevindingen 8/12

EXISTENZ

. **lichten dimmen/ vermijdt direct licht**
=> voornamelijk dan naar publiek of bezoekers
=> spots naar plafond/vloer/muur richten afh situatie
=> papier/kalkpapier voor spots

. **voorzie een "ontsnappingsruimte"**
=> vorig jaar boxen, kledingbox voornamelijk
=> "expositieruimte", ruimte zonder muziek/lichtshow
=> moet geen geluids- en visueel dichte kamer zijn
=> zijruimtes voorzien (cfr proclamatiezaal)

methode algemeen **bevindingen** 9/12

EXISTENZ

. **grondplannetjes voorzien**
=> liefst eerder brandplannenachtig
=> duidelijkheid & leesbaarheid is belangrijk

. **duidelijke signalisatie**
=> vermijd onduidelijkheden
=> wees logisch

methode algemeen **bevindingen** 10/12

EXISTENZ

. **situatie afhankelijk ontwerp**
=> examenlokaal is anders dan polyvalente zaal
=> vb tochtbond

. **vermijd dynamische dingen**
=> flikkerende lichtjes die onnodig zijn
=> zichten naar andere ruimtes beperken
=> aula's met ramen

methode algemeen **bevindingen** 11/12

SUCCES ERMEE

vragen?

12/12

