DEAFSPACE AND DISABILITY

A research into DeafSpace design and its peculiarities in relation to other architectural adaptations for disabilities

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ABSTRACT

Throughout history the built environment has mostly been designed from an able-bodied perspective, which causes a set of challenges for people with disabilities. In the 20th century however, a growing attention for disability in architecture took place that resulted in a shift in architecture. This thesis focusses on DeafSpace design and how architecture has historically responded to the need to design for people with disabilities. This leads to the research question of this thesis: *What makes design for DeafSpace so special compared to other architectural adaptations for other disabilities?* By analysing three buildings that follow the DeafSpace design principles, this thesis shows what makes DeafSpace special compared to other architectural adaptations for other disabilities. DeafSpace concerns design principles that go beyond the mere application of a ramp for wheelchairs. DeafSpace creates spaces that benefit 'every-body', it refuses the 'normalisation' and 'standardisation' of the able-bodied perspective. It is about creating awareness and it seeks to design and improve spaces to be functional for the deaf and hard-of-hearing. In saying so, it is to be concluded that, in contrast with its name, DeafSpace and its five design principles—*Space and Proximity, Mobility and Proximity, Sensory Reach, Light and Colour,* and *Acoustics*—are beneficial to 'every-body'.

Keywords
DeafSpace, universal design, disabilities, deaf, 'every-body', able-bodied

NOTE

When talking about deafness, the terms deaf, Deaf and hard-of-hearing are being used. There is however, a difference between these terms. The term deaf is used to describe a person with a hearing problem and in some cases it is also used to refer to people who are hard-of-hearing. The term Deaf, with a capital D, describes people who have been deaf all their lives, meaning that they use sign language as their first language. The term hard-of-hearing is used to describe people with a partial hearing loss.

In order to keep this thesis clear, it was decided to use the terms deaf and hard-of-hearing. Only in quoted sentences the term Deaf occurs. This choice was made for the reason that deafness and hard-of-hearing are treated as part of architectural disabilities, while the term Deaf, with a capital D, describes a community.

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1 INTRODUCTION

Throughout history the built environment has mostly been designed from an able-bodied perspective, which causes a set of challenges for people with disabilities. In the 20th century however, a growing attention for disability in architecture took place that resulted in a shift in architecture.

In today's climate, also as a result of the BLM and Me Too movement, difference is being celebrated, as is inclusivity. In the past however, there was an emphasis on 'normalisation' and 'standardisation'. A great example for this is the Neufert (1936): standardized designs for able-bodied people who are all more or less similar in height and proportion. This, you could argue, also has an effect on how people with disabilities were being perceived. But nowadays there is a growing awareness that everybody is different and that diversity should be celebrated, rather than shunned. This means that rather than trying to 'normalise' people with disabilities and try to make them adapt to standardised designs, there is now growing awareness that design can and should adapt to everybody. In response, a contemporary emergence of new fields in architecture has taken place. One of these newest fields of architecture that is being tackled by designers is DeafSpace, an architectural approach to change the built environment for deaf people.

This thesis will focus on DeafSpace design and how architecture has historically responded to the need to design for people with disabilities. It will be examined where and how the design for 'every-body' has become increasingly important in architecture and how this has impacted the notion of DeafSpace. Previously done research on (designing for) disabilities suggests how thinking differently about disabilities has enabled innovative and new kinds of architecture. It however, fails to make a connection with DeafSpace. It is relevant for this thesis to position the emergence of DeafSpace within the broader history of designing for disabilities. On the other hand, in research specifically aimed at DeafSpace, the emphasis is mainly on the design principles for DeafSpace, it fails to mention the impact designing for 'every-body' had on it. For this thesis it is therefore important to link the contemporary emergence of DeafSpace to the notion of design for ‘every-body’. This leads to the research question of this thesis: *What makes design for DeafSpace so special compared to other architectural adaptations for other disabilities?*

In order to answer this research question, the historical lessons learned as throughout the 20th century will be studied through a literature survey in the second chapter. Literature research is necessary to gain insight into the shift in architecture to design for ‘every-body’ that has taken place during the 20th century. In the third chapter an analysis on DeafSpace design in relation to architectural design for ‘every-body’ will be done. To be more precise, different DeafSpace designs will be studied through examining their design adaptations in the built environment to create a space for deaf people, and will be positioned in the architectural/historical field of designing for disabilities.

2 ABLE-BODIED VS. 'EVERY-BODY'

Since the earliest of times the (male and able) human body has been used as a measuring system. Limbs were the basis of all the units of measurement. In ancient Egypt for example the measurements of the sloping walls of a pyramid were taken in palms, half-palms or quarter-palms (Robins & Shute, 1985, p. 107).

The proportional relationships of the human body has been extensively studied throughout history. The earliest canon about the human body and its proportional relationships, found in a burial chamber among the pyramids near Memphis, originates from about 3000 BC (Kamil, 1996, p. 63). Other known examples of the use of human proportional measurement systems are the time of the Egyptian pharaohs (Gillings, 1982, p. 224), the ancient Greek and Roman times, the canon of Polykleitos, which was long recognized as the standard (Tobin, 1975, p.307) and the Middle Ages. Another example is the Vitruvian Man made by Leonardo da Vinci around 1490 on the basis of the description of Vitruvius' ideal ratio of the human body, written between 30 and 15 BC. Vitruvius described the human body as being the basis of proportion among the Classical orders of architecture (Murtinho, 2015, p. 508). Or think of Ernst Neufert who in 1936 wrote the book Architects' Data, which founds a rationalization of the human body and the built environment so that the latter could perfectly adapt to the former (Neufert et al., 2012, pp. 26-27) Since then, his dimensional diagrams are considered as a source of fundamental information in architecture. And lastly Le Corbusier´s Modular Man (1948), designed according to the golden ratio, used to improve both the appearance and function of architecture (Ostwald, 2001, p. 147). Le Corbusier explains that his Modular Man illustrates *"range of harmonious measurements to suit the human scale, universally applicable to architecture and to mechanical things"* (Le Corbusier,1948, cited in Rasmussen, 1964, p. 118).

In all of these examples the able human body exists as the representation of a norm. This representation has resulted in a 'normalisation' and 'standardisation' of the able human body and has established standardized designs for able-bodied people who are all more or less similar in height and proportion, thus creating the able-bodied perspective. But designing from an able-bodied perspective means that there is little consideration for people with disabilities in the design process. This framework of normality attempts to push individuals who deviate from the norm into 'standard' (able) bodies (Bauman & Murray, 2014, p. xvi). By not acknowledging differences as 'being different', they are seen as something to be corrected (Solvang & Haualand, 2014, p. 2). And even if disability is taken into account in the built environment, disability is seen as a dis-ability and translated into accessibility standards and guidelines (Heylighen et al., 2013, pp. 7-8). Architectural disability, however, is a way of refusing the 'normalisation' of the able-bodied perspective. This in no way means that architecture should only be made for people with disabilities. Architecture should be inclusive to 'every-body'. Selwyn Goldsmith was one the first to write about this inclusive architecture. In his revolutionary book Designing for the Disabled (1963, p. VII), he wrote: *"I wish when I use buildings to do so in the same way as others, to be integrated rather than segregated, to be treated as normal and not just a peculiar person."* Goldsmith's way of thinking brought on a notion that architecture should indeed be for 'every-body'. One of the first examples of a more inclusive design, and away from the able-bodied perspective, is designed by Goldsmith himself. In 1967, based on his analysis of interviews with 284 local wheelchair users, he invented the dropped curb (as seen in figure 2.1). Fifteen of these were installed at intersections around the city of Norwich, England (Cave, 2011). The dropped curb has since then been an important element of the urban environment throughout the world. After his invention Goldsmith realised the impact the dropped curb had on all users, such as people using a cane, pushing a stroller, roller skates, or a skateboard.

It was quickly recognized that the invention of the dropped curb makes life better for all. However not every design led to this kind of insight. Around the same time (1968), the United States implemented the Architectural Barriers Act: it became a requirement to make architecture accessible to all (Preiser & Smith, 2010, p. 35). As a result architects began adding ramps,

Figure 2.1 National Groundworks Ltd. (n.d.). Dropped curb. [Photograph]. Retrieved from https://nationalgroundworksltd.co.uk/dropped-kerbs/

Figure 2.2 Nels Akerlund. (2017). Exterior view the Laurent House. [Photograph]. Retrieved from https://www.laurenthouse.com/gallery

Figure 2.3 Nels Akerlund. (2017). Fireplace mantel [Photograph]. Retrieved from https://www.laurenthouse.com/gallery

wider doors, and other accessible elements to their designs. Despite the fact that these elements did ensure equal access, they often did not fit in with the aesthetic of the building. It often meant separate entrances to buildings for wheelchair users, which helped uphold the negative stigma against people with disabilities (Preiser & Smith, 2010, p. 35).

When people with disabilities were kept being excluded in the built environment, they started to adapt their own homes (Imrie, 2004, pp. 756-758). People with disabilities made sure that in the comfort of their own homes they would be included. A great example for this is the Kenneth and Phyllis Laurent House in Rockford, Illinois by Frank Lloyd Wright from 1946 (figure 2.2). This house was specially designed for Kenneth and Phyllis Laurent to make Kenneth's life in a wheelchair easier (Billock, 2020). The Laurents struggled to adapt their own home to make it wheelchair-friendly. They needed a new home that would make their life easier. Frank Lloyd Wright based the entire design of their new home around Kenneth's eye level and made sure that with every design decision he kept accessibility in mind (Billock, 2020). For example, when standing in the house, everything seems to be too low—the fireplace mantel (figure 2.3), light switches, doorknobs, the furniture and even the ceiling—but once you sit, all feels right.

However, due to the lower placed elements of the Kenneth and Phyllis Laurent House it can be argued that this design is not entirely inclusive to all. Whereas the disabled body was excluded in the public built environment, the able body was being excluded in the self-adapted houses for people with disabilities. Adapting your own home however, does not solve the problem of being excluded. People with disabilities should not have to adapt their own homes to fit their needs, houses like that should already be available. As a result, in 1997, a shift in architecture took place. Instead of self-adapting houses and adding special facilities to a 'normal' building, the concept of Universal Design was established. The term is defined as follows by its creator and architect Ron Mace (1985, cited in Preiser & Smith, 2010, p. 33): *"Universal Design is the design of products and environments to be usable by all people, to the greatest extent possible, without the need* *of adaptation or specialized design."* Meaning that Universal Design is the design of buildings, products or environments to make them accessible to all people, regardless of their age, size, ability or disability. It thus transcends categorical attention to specific target groups, such as exclusive facilities for wheelchair users. The built environment should be designed to meet the needs of all people who wish to use it. If the built environment is accessible, usable and convenient, it is beneficial to 'every-body'.

Only in the last two decades the notion of designing for 'every-body' has shifted from a great emphasis on mobility, for instance thinking mostly of people who are unable to walk, to also include people who are blind or people who are deaf or hard-of-hearing (Solvang & Haualand, 2013, p. 5). This is due to the fact that deaf people do not see themselves as having a disability, they see themselves as 'Deaf' (Solvang & Haualand, 2013, pp. 1-2). According to Padden and Humphries, *"deaf people dislike being viewed only as medical objects in need of treatment"* (2005, p. 9). Nevertheless, according to Solvang and Haualand *"deaf people are without doubt perceived as such by most hearing people, both disabled and non-disabled"* (2013, pp. 1-2). Regardless of how they are being perceived, deaf people have always tended to group together in meeting places, like a deaf school. Having their own language is a great reason for that. Sharing a language encourages deaf people more than other people with disabilities to create these meeting places (Solvang & Haualand, 2013, p. 2). Deaf people have learned to adapt and create their own meeting places, because the built environment was not accessible to them. If we now look back at Universal Design, we can see why deaf people have not been included from the beginning. In Universal Design, accessibility is achieved with technological change as the solution. This, however, has created limitations: Universal Design sees accessibility as a being related to mobility. However, accessibility also relates to gaining access to and being included in the social environment. It was in 2001 that Imrie and Hall (pp.16-19) therefore came up with an addition for Universal Design: in addition to technological change, an inclusive social environment is needed. Both of these come into play when deaf people come together in meeting places (Solvang & Haualand, 2013, p. 5).

Figure 2.4 Carol M. Highsmith. (n.d.). Chapel Hall, Gallaudet Universit [Photograph]. Retrieved from https://www.britannica.com/topic/Gallaudet-University

Figure 2.5 Dangermond Keane Architecture. (2012). Gallaudet University Campus Plan [Illustration]. Retrieved from http://dangermondkeane.com/projects/gallaudet-university-campus-plan

A result of this addition to Universal Design is the notion of DeafSpace, an architectural approach to adapt the built environment and improve how spaces are designed for deaf and hard-of-hearing people. As discussed, the built environment has mostly been designed from an able-bodied perspective, which causes a set of challenges for deaf and hard-of-hearing people: uneven pavements, narrow hallways, unexpected steps, poor lighting, backlight, glares and wall colours that blend with skin tones, to name only a few of these challenges (Hales, 2017). DeafSpace is about creating awareness and it seeks to design and improve spaces to be functional for the deaf and hard-of-hearing. However, DeafSpace was never formally studied or written down until 2005. According to Padden *"there are very few places Deaf people can call their own"* (2005, p. 375). A great example for this are deaf schools. Although the name sounds as if deaf schools are a place owned by deaf people, the opposite is true. Deaf schools did not take into account the needs of deaf people. The aim was to maximise control over the deaf in the hope of 'curing' them (Padden & Humphries, 2005, p. 12). As a result, deaf people seeked a place where they felt included. Deaf people therefore started to adapt and (re)construct their own homes so that the spaces fit their needs: knocking down walls to create sight lines to enable communication through sign language and placing mirrors and lights in strategic locations to improve sensory awareness (Edwards & Harold, 2014, p.1356; Bauman & Murray, 2014, p. 378).

One place where the challenges from the built environment were particularly prevalent was *Gallaudet University* in Washington, a university for the deaf and hard-of-hearing (figure 2.4). In 2005 the university assigned architect Hansel Bauman to make a design for their new and improved campus (figure 2.5). To make this design Bauman, who is not deaf, collaborated with the ASL (American Sign Language) Deaf Studies Department for over three years to create the architectural approach known as DeafSpace (*Gallaudet University*, n.d.). As a result *Gallaudet University* became the first full-fledged project based on DeafSpace design. In chapter 3 this design will be discussed in more detail.

In keeping with designing for ‘every-body’ it is important to emphasise that, in contrast with its name, DeafSpace is beneficial to ‘every-body’. It is simply a synonym for good design principles. Take a restaurant or an open-plan office with loud chatter for example, these are difficult to navigate for the deaf and hard-of-hearing. By adapting such spaces to have better acoustics with less reverberation and lighting that is better for the eyes, it allows not only deaf and hard-of-hearing people, but ‘every-body’ to be included in a conversation.

3 DESIGNING DEAFSPACE

In this third chapter of the thesis, we will examine DeafSpace and its principles in greater detail. With this knowledge analyses of three DeafSpace designs can take place. These designs will then be positioned in the architectural field of designing for disabilities.

3.1 The principles of DeafSpace

From an architectural standpoint, the world is designed for hearing people. Spaces designed for the hearing, can give the deaf anxiety – when you cannot hear footsteps from around the corner or behind you, you cannot prepare for who or what is around you (99% Invisible, 2020). When walking together in conversation deaf people tend to keep a wide distance from another for clear visual communication using sign language. During a conversation signers will also shift their gaze between the conversation and their surroundings keeping a close eye for hazards and maintaining proper direction (Bauman, 2005). A corner wall, as seen on figure 3.1, will keep a person approaching out of view, meaning that the signers will have to stop their conversation once they reach the corner to avoid bumping into each other. Where hearing people can adjust their walking route by being alerted by the sound of footsteps, deaf people are not able to. Signers will benefit from a curved wall to enable them to move through a space uninterrupted.

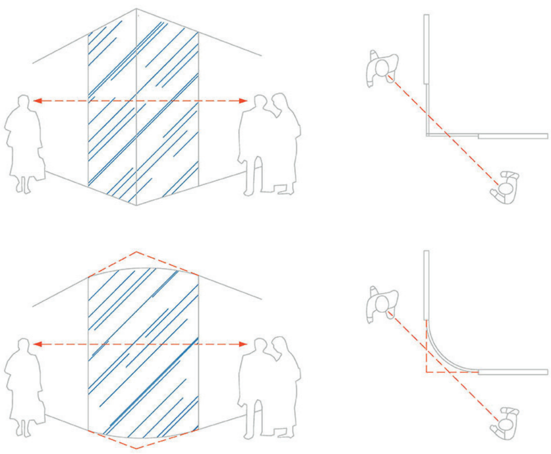

Figure 3.1 Dangermond Keane Architecture. (n.d.-c). Mobility and Proximity. [Illustration]. Retrieved from http://inclusion.vn/deaf/deaf-space/

Figure 3.2 SmithGroup Architects. (2012, March 23). The SLCC or Sorenson Language and Communication Center. [Photograph]. Retrieved from https://99percentinvisible.org/episode/episode-50-deafspace/

The previous section described one of the five design principles of DeafSpace (*Mobility and Proximity*), developed by architect Hansel Bauman himself in collaboration with the ASL (American Sign Language) Deaf Studies Department, as a result of his design for the new and improved campus for *Gallaudet University* (*Gallaudet University*, n.d.). Together they developed a framework of more than 150 design elements that impacts how the deaf and hard-of-hearing experience a space. These elements aim to address not only the practical needs of communication, but also the need we all have to feel safe and secure in our surroundings. The 150 elements can be placed in what has become the five principles of DeafSpace (*Gallaudet University*, n.d.): *Mobility* *and Proximity, Space and Proximity, Sensory Reach, Light and Colour,* and *Acoustics.* In the next paragraphs each DeafSpace principle will be explained by referring to three case-studies.

The first case study is *Gallaudet University* in Washington D.C., United States. In the previous chapter *Gallaudet University* was already briefly mentioned. The campus, designed by Bauman, consist of multiple buildings. Some of these are designed by different architects, but they are all based around the concept of DeafSpace. In this study, the focus will mainly be on two buildings of this campus. One of these buildings is the main building to the campus: the Sorenson Language and Communication Center, or SLCC, by SmithGroup, with deaf architect George Balsley serving as a consultant (figure 3.2). The other is the Living and Learning Residence Hall 6 of *Gallaudet University*, or LLRH 6, by LTL Architects in collaboration with Quinn Evans Architects (figure 3.3).

Next is *The Helsinki Central Library Oodi* in Helsinki, Finland by ALA Architects (figure 3.4). This building was designed around the concept of accessibility. This accessibility is also inclusive to deaf people: the building has emergency information for the deaf. In case of emergency the alarms, announcements and emergency exits are communicated in both sign language and in texts on screens (Kukkapuro, 2020). Although the term DeafSpace is not specifically used by the architects, its principles are clearly visible in the design.

Lastly the third case study *Hazelwood School*, seen on figure 3.5, in Glasgow, Scotland. *Hazelwood School* is a school for minors, aged 2 to 18, who are blind and deaf, also known as 'dual sensory impaired' (Alan Dunlop Architect, 2013). With their design Gordon Murray & Alan Dunlop Architects did not specifically apply the DeafSpace design principles. Architecturally, this is a new type of design, it is all about the sense of touch and sound. This means an even closer step towards inclusive design. However, some of the DeafSpace design principles are visible.

Figure 3.3 Prakash Patel. (2013). The Living and Learning Residence Hall 6 or LLRH 6 [Photograph]. Retrieved from http://ltlarchitects.com/gallaudet-university-residence-hall

Figure 3.4 Tuomas Uusheimo. (2018a). Oodi Helsinki Central Library [Photograph]. https://www.archdaily.com/907675/oodi-helsinki-central-library-ala-architects

Figure 3.5 Alan Dunlop Architect. (n.d.-b). Hazelwood School [Photograph]. Retrieved from https://aasarchitecture.com/2016/09/hazelwood-school-glasgow-alan-dunlop-architect.html/hazelwood-school-glasgow-by-alan-dunlop-architect-01/

3.2 *Principle 1: Mobility and Proximity*

Figure 3.6 Andrew Propp. (2016). Entrance SLCC [Photograph]. Retrieved from https://www.washingtonian.com/2016/01/13/gallaudet-universitys-brilliant-surprising-architecture-for-the-deaf/

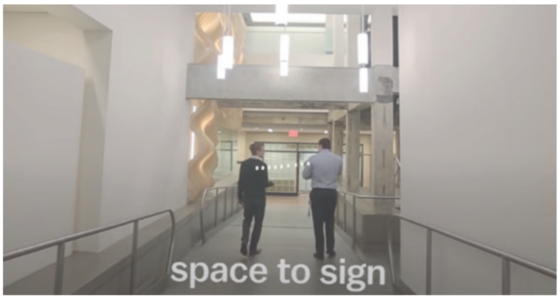

Figure 3.7 Estelle Caswell. (2016g, March 2). Wide Hallways Gallaudet University [Photograph]. Retrieved from https://www.youtube.com/watch?v= FNGp1aviGvE&t=2s

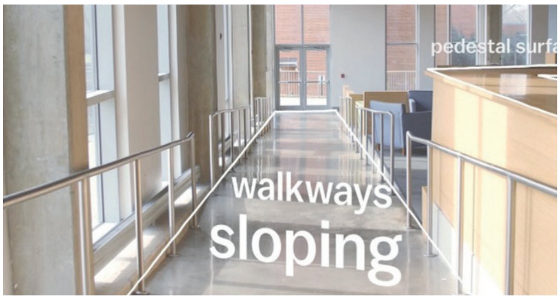

Figure 3.8 Estelle Caswell. (2016d, March 2). Sloping hallways Gallaudet University [Photograph]. Retrieved from https://www.youtube.com/watch?v=FNGp1aviGvE&t=2s

In the previous paragraph, an example of the first design principle was briefly mentioned. *Mobility and Proximity* is about creating clear walking routes, allowing signers to easily converse. An example for this is seen at the entrance of the Sorenson Language and Communication Center, or SLCC, at *Gallaudet University*, right on figure 3.6. The entrance doors are automatic sliding doors, allowing signers to enter the building without having their conversation being interrupted. In the hallways, stairs and ramps *Mobility and Proximity* is also implemented (figures 3.7 and 3.8). They are all wider than normal so two people can walk next to each other and sign: to allow for 'signing space'. This term will be discussed further in the following paragraph. However, the building uses stairs as little as possible since stairs require visual attention: when walking up the stairs, you have to pay close attention to each step to see where you put your foot. For signers, this means that they have to deviate their line of sight from a conversation. Ramps reduce this. People can communicate more easily when walking up a ramp, they do not have to pay attention on where they need to walk. This use of ramps can be related to the architectural adaptations for mobility disabilities. For wheelchair users, a ramp is a way of moving through a building, but for signers a ramp also has another function. The use of the ramp therefore differs. Whereas the ramp serves as a means of movement for both parties, the ramp is especially pleasant for signers to be able to continue the conversation. Wheelchair users, however, have only one use for it.

Unlike *Gallaudet University*, the stairs of *The Helsinki Central Library Oodi*, figure 3.9, do not at all following the design principle of *Mobility and Proximity.* The width of these stairs is minimal. It only allows two people from opposite direction to pass each other. If two signers were to walk up the stairs they will not be able to continue their conversation. Besides stairs, *The Helsinki Central Library Oodi* also has a ramp, as seen on figure 3.10. This ramp does have the right width to give enough room for signing and for passing oncoming people. The ramp however, is too steep to be of use to wheelchair users. So this ramps may be inclusive to deaf people, it is not inclusive to 'every-body'.

In the *Hazelwood School*, the design principle *Mobility and Proximity* is used differently than at *Gallaudet University*. Here, it is not about the concept of allowing a conversation to continue, but about the way children can move through the building. Through its architecture, the *Hazelwood School* allows children to be independent. This is achieved by a 'backbone wall' that functions as the spine of the building (figure 3.11). The wall leads visually impaired children from their classrooms throughout the building. By using cork as the material for this wall, clear auditory differences are created between the hallways and the classrooms (Herssens & Heylighen, 2012, p. 382). As a result, the circulation ensures independence.

In the case studies two aspects of design solutions for *Mobility and Proximity* are being used. At *Gallaudet University* the solutions are based around the concept of allowing conversation to continue and to allow for 'signing space'. In the *Hazelwood School*, however, it is not about the continuation of a conversation, but about the movement through a building. This way of making it easier to move through a building could also have been used at *The Helsinki Central Library Oodi*. The library, like the *Hazelwood School* and *Gallaudet University*, could have had wider hallways and stairs to make the building more inclusive. With wider hallways and stairs, deaf people will be able to continue signing while walking. This minimal intervention, has great consequences: the building becomes inclusive for 'every-body'. By simply having wider hallways or stairs a space can be comfortably used by 'every-body'. If hallways are wider, it means that 'every-body' has to manoeuvre less. No one needs to deviate from their walking direction. This is where the design principle of *Mobility and Proximity* relates to Universal Design because 'every-body' will benefit from its design solutions. It transcends categorical attention to specific target groups. Ramps for example allow not only deaf people but also people with and without (mobility) disabilities to move through a building. They, too, then have to pay less attention to where to place their feet on stairs during a conversation. Wide hallways, stairs and the use of ramps make for a safer and better built environment for 'every-body'. The design solutions of the principle of *Mobility and Proximity* are therefore beneficial and inclusive to 'every-body'.

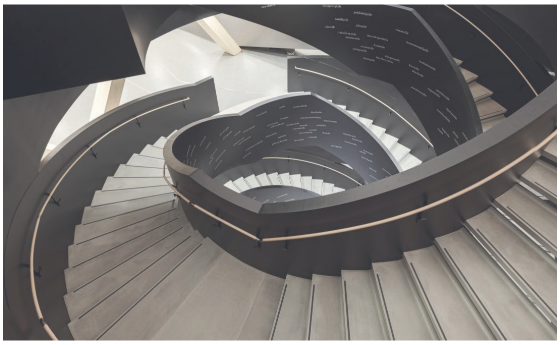

Figure 3.9 Tuomas Uusheimo. (2018f). Spiral Staircase Oodi Library [Photograph]. https://www.archdaily.com/907675/oodi-helsinki-central-library-ala-architects

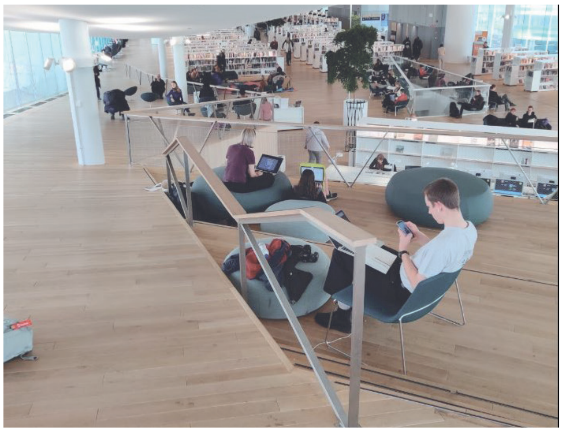

Figure 3.10 Andrey Baranovskiy. (2019, October). Ramp (left) Helsinki Central Library Oodi [Photograph]. https://www.google.nl/maps/place/Central+library+Oodi

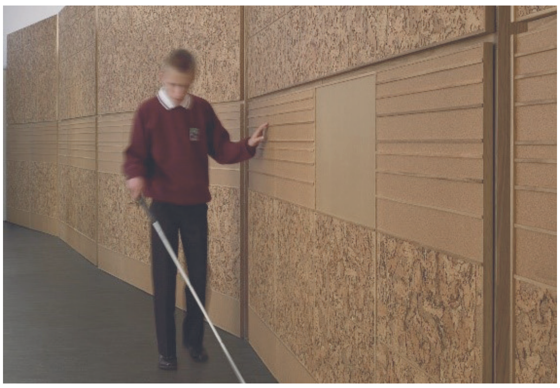

Figure 3.11 Alan Dunlop Architect. (n.d.-a). Backbone wall Hazelwood School [Photograph]. Retrieved from https://architizer.com/projects/hazelwood-school/

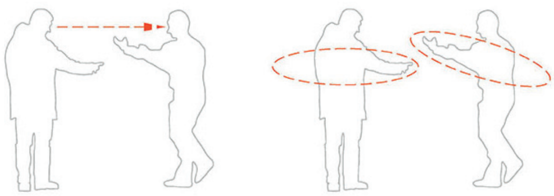

Figure 3.12 Dangermond Keane Architecture. (n.d.-e). Space and Proximity. [Illustration]. Retrieved from http://inclusion.vn/deaf/deaf-space/

Figure 3.13 Estelle Caswell. (2016f, March 2). U-shaped lecture rooms Gallaudet University [Photograph]. Retrieved from https://www.youtube.com/watch?v=FNGp1aviGvE&t=2s

Figure 3.14 Gallaudet University. (n.d.-b). Lobby SLCC left view [Photograph]. Retrieved from https://www.usgbc.org/articles/leed-and-deafspace-designing-community-architecture

3.3 Principle 2: Space and Proximity

The second design principle *Space and Proximity* can be described as follows: when deaf people sign they tend to keep a distance from another to better see each other's facial expression and to give space for signing (figure 3.12). This distance between signers in conversation, known as 'signing space', is greater than that of a spoken conversation. For example, if we look back at the explanation of the first design principle we were talking about two signers walking together in conversation through a hallway. Now imagine this same situation, but now instead of moving through a hallway, the signers are standing in it. When this hallway is too narrow to stand in, hearing people will simply stand closer together and are still able to continue their conversation. For signers this narrow hallway offers a problem. If they stand closer together their signing space will overlap, meaning that they cannot continue their conversation. Their signing space will be interrupted. In fact, the more people there are in a conversation, the more signing space is needed. It is therefore no surprise that this signing space greatly impacts the layout and furnishing of a building.

This impact can be noticed in the layout of the classrooms at *Gallaudet University*. Unlike most classrooms, the rooms at *Gallaudet University* have a different set up: the tables in the classrooms are formed in either a semi-circle or U-shape, allowing teachers and students to be constantly visually connected (figure 3.13). All students can be involved in a discussion/conversation. There are no front row seats. This placement of tables however, is not only beneficial for deaf people, hearing people too will be more involved during class.

Another place where the impact can be observed is in the furnishing of the lobby of the SLCC at *Gallaudet University*. At the heart of this lobby is a custom-made, horseshoe-shaped seating (figure 3.14). This seating allows even a large group of people to sit and sign with each other. It allows for clear signing space. However, the size of this horseshoe-shaped seating is inconvenient for hearing people, who may not be able to hear people on the other side. It can therefore be argued that this design solution is not inclusive to all. Bauman himself, the architect of *Gallaudet University* and co-creator of DeafSpace design, considers this horseshoe-shaped seating only partially successful: the curvature and rigidity of the backrest do not make the seat very flexible. It is better for signers to be able to move their seats around in order to make the right arrangement for a conversation.

Where this is done better is in the LLRH 6 at *Gallaudet University*. The common room of the LLRH 6, as shown in figure 3.10, can accommodate a large number of students with free-standing seats and an amphitheatre-like area for lectures and other social events (figures 3.15 and 3.16). In this common area, in contrast with the SLCC, students can easily grab a chair to join a conversation. Another problem the architects have addressed is the lack of storage space for bags. If signers want to have a conversation, they need to have their hands free. Most spaces, however lack any kind of storage. In the common room therefore, a three-quarter high cupboard has been placed for storage (figure 3.17, behind the chairs).

When it comes to seating places *The Helsinki Central Library Oodi* has a similar design solution as *Gallaudet University*. In the reading room, also referred to as the 'book heaven', a kind of tribune has been created, as shown in figure 3.18, where people can sit and talk. Unlike the SLCC, this room does have moveable chairs (figure 3.19). Deaf people can move these chairs and place them near the tribune to form a circle with enough signing space, allowing signers to easily have a conversation. However, this 'book heaven' has been created for hearing people. It is therefore logical to note that this room is better used by hearing people than the horseshoe-shaped seating in *Gallaudet University*. With the tribune of the library, it is easier to sit side by side and have a conversation with just the person next to you. At *Gallaudet University*, the entire tribune was a semi-circle, which forced people to have a conversation with all the people on the tribune. But at *The Helsinki Central Library Oodi*, not the tribune, but the reading room has a (semi-) circular shape. The tribune seating in themselves are not facing each other. Only by moving the chairs can a (semi-) circle be created, allowing signers to easily have a conversation. By doing so, the architects have, consciously or unconsciously, created an inclusive space for the deaf.

Figure 3.15 Prakash Patel. (2012a). Common room LLRH 6 [Photograph]. Retrieved from http://ltlarchitects.com/gallaudet-university-residence-hall

Figure 3.16 Prakash Patel. (2012c). Common room LLRH 6 during event [Photograph]. Retrieved from http://ltlarchitects.com/gallaudet-university-residence-hall

Figure 3.17 Prakash Patel. (2012b). Common room LLRH 6 cupboard [Photograph]. Retrieved from http://ltlarchitects.com/gallaudet-university-residence-hall

Figure 3.18 Tuomas Uusheimo. (2018g). Tribune ´book heaven` Oodi Library [Photograph]. https://www.archdaily.com/907675/oodi-helsinki-central-library-ala-architects

Figure 3.19 Tuomas Uusheimo. (2018c). Moveable chairs ´book heaven` Oodi Library [Photograph]. https://www.archdaily.com/907675/oodi-helsinki-central-library-ala-architects

To conclude, for *Space and Proximity* design solutions impact the layout and furnishing of a building. For both *Gallaudet University* and *The Helsinki Central Library Oodi* their layout and furnishing is impacted. At *Gallaudet University* (semi-)circular seating demonstrates how 'every-body' can be better involved in conversation. *The Helsinki Central Library Oodi* showed, though not intended, how moveable chairs benefit deaf people in conversation. Even though *Space and Proximity* is at present focussed on deaf people, with the exception that its design solutions are beneficial for hearing people too, design solution for people with mobility disabilities can be part of this too. If (semi-) circular seating can be created, a place for wheelchairs can also be a part of this design. In that way *Space and Proximity* will be inclusive to all, thus rendering it part of Universal Design.

3.4 Principle 3: Sensory Reach

Sensory Reach, principle three, is when a deaf person walks into space and they immediately 'read' the entire room to maintain control (figure 3.20). Think of the movement of shadows or subtle changes in facial expressions and the positions of other people. To better understand this, think of a theatre. It does not matter what seat you have, you will always be able to see the stage. This is how deaf people experience every room. They scan the environment and activities around them and see things that hearing people tend to overlook. This is has been taken into account in the lobby of the SLCC at *Gallaudet University*. Here a sense of openness is clearly visible (figure 3.21). The design of the lobby is based around visual range: it has transparent lifts, balconies allowing for shared *Sensory Reach* and big open hallways. All these elements enable the lobby to have clear view lines everywhere. Deaf people can walk into this space and immediately 'read' the entire room to maintain control. They can easily scan the environment and activities around them. Furthermore, the entire lobby allows conversation to be constant by enabling people to sign between levels: because you can clearly see people on all floors, you can not only sign to people beside you, but also with people a floor higher (figure 3.22).

Similar to the lobby of SLCC at *Gallaudet University*, *Sensory Reach* is prominent on the third floor of *The Helsinki Central Library Oodi*. The 'book heaven' and study spaces are open and spacious, allowing deaf people to easily 'read' the entire room to maintain control (figures 3.23). To elaborate further, the 'book heaven' has a large visual range. Similar to the lobby of the SLCC, there are clear lines of sight in the space. The openness of the space allows you to see people on the higher levels easily, giving signers at different height levels a shared *Sensory Reach* of communication.

There are, furthermore two other places in *The Helsinki Central Library Oodi* that provide a sense of overview for deaf people. In the study rooms on the second floor the chairs are adjustable (figure 3.24). For deaf people, this gives the possibility of adjusting the height of their seat so that they have a better overview of a room. When a chair is higher, a deaf person can

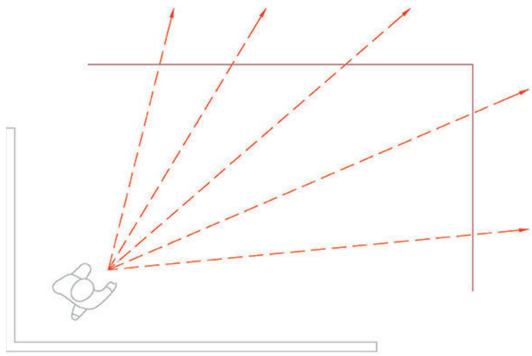

Figure 3.20 Dangermond Keane Architecture. (n.d.-d). Sensory Reach. [Illustration]. Retrieved from http://inclusion.vn/deaf/deaf-space/

Figure 3.21 McMullan & Associates. (n.d.). Lobby SLCC right view [Photograph]. Retrieved from https://www.mcmse.com/gallaudet-sorenson

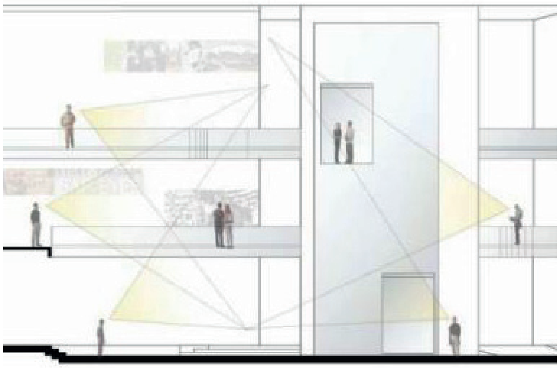

Figure 3.22 Gallaudet University. (2006, May 1). Section lobby SLCC [Illustration]. Retrieved from https://slideplayer.com/slide/4151991/

Figure 3.23 Tuomas Uusheimo. (2018e). Open-plan reading room 'book heaven' [Photograph]. Retrieved from https://www.archdaily.com/907675/oodi-helsinki-central-library-ala-architects

Figure 3.24 Tuomas Uusheimo. (2018h). Workplaces second floor Oodi Library [Photograph]. Retrieved from https://www.archdaily.com/907675/oodi-helsinki-central-library-ala-architects

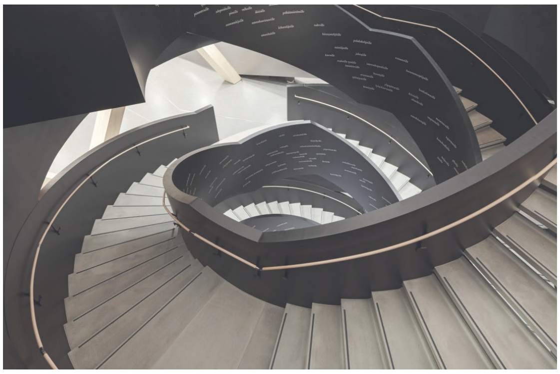

Figure 3.25 Tuomas Uusheimo. (2018f). Spiral Staircase Oodi Library [Photograph]. https://www.archdaily.com/907675/oodi-helsinki-central-library-ala-architects

more easily keep an eye on fellow visitors and their surroundings. The second place that provides a sense of overview for deaf people is the spiral staircase. Due to its openness and form, the staircase allows deaf people to see what is happening both underneath and above (figure 3.25).

Another example of *Sensory Reach* is when you are looking for a free classroom to use. Where hearing people can hear people talking behind a closed door, deaf people are not able to. Deaf people benefit from a glass door so that they can see what is happening behind it. Or in other words: transparency is important. *Gallaudet University* used this as a design solution for its doors. All the doors of the SLCC building have glass panels to make visible what is going on behind it, to see if a room is being used or to see if someone is at the door. Having said that, in classrooms or offices opaque glass panels, as seen on figure 3.26, are used to give a sense of privacy: through opaque glass, only the silhouette of people can be seen. This maintains privacy in a room, while still allowing the right information to be visible (whether a room is used or not). In addition to this another design solution for *Sensory Reach* is used at *Gallaudet University*: the building uses mirrors or reflective materials to help people see what is happening behind them (figure 3.27). With the help of reflection deaf people can be alerted when someone approaches from behind, as they cannot hear people walking towards them.

Both the SLCC at *Gallaudet University* and *The Helsinki Central Library Oodi* offer good design solutions for the design principle of *Sensory Reach*. These case studies show that is necessary for the built environment to be designed with a spatial awareness in 360 degrees, like designing viewlines through and between buildings, glass doors and big open spaces. It can be concluded that all the mentioned design solutions are relevant for 'every-body'. Even though the design principle was originally intended to provide control for deaf people, hearing people will also benefit from a big open space that offers an overview. A clear overview of a space makes 'every-body' have equal (social) control. *Sensory Reach* broadens the concept of Universal Design and expands on the notion to design for 'every-body'. Universal Design is in fact based around the concept of making design usable by all people *“without the need of adaptation or specialized design”* (Ron Mace, 1985, cited in Preiser & Smith, 2010, p. 33). *Sensory Reach* however, is not an explicit necessity, but it would certainly make a space better for ‘every-body’. *Sensory Reach* brings design solutions that go beyond the principles of Universal Design. It transcends categorical designs that are only implement to make a space inclusive.

Figure 3.26 Estelle Caswell. (2016e, March 2). Transparent doors Gallaudet University [Photograph]. Retrieved from https://www.youtube.com/watch?v=FNGp1aviGvE&t=2s

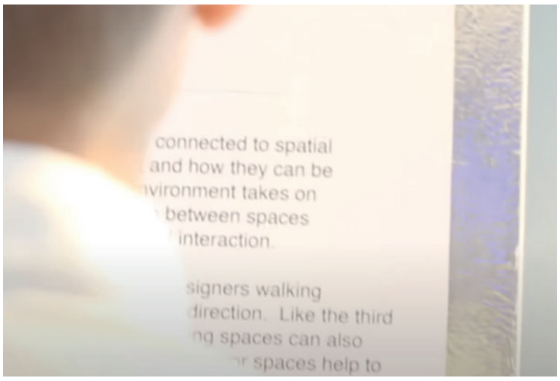

Figure 3.27 Estelle Caswell. (2016c, March 2). Reflective signs Gallaudet University [Photograph]. Retrieved from https://www.youtube.com/watch?v=FNGp1aviGvE&t=2s

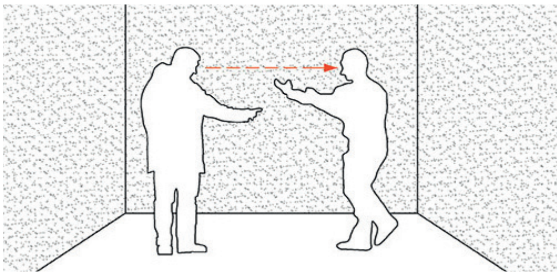

Figure 3.28 Dangermond Keane Architecture. (n.d.-b). Light and Colour. [Illustration]. Retrieved from http://inclusion.vn/deaf/deaf-space/

Figure 3.29 SmithGroup Architects. (2012, March 23). The SLCC or Sorenson Language and Communication Center. [Photograph]. Retrieved from https://99percentinvisible.org/episode/episode-50-deafspace/

Figure 3.30 Andrew Propp. (2016, January 13). SLCC curtain walls [Photograph]. Retrieved from https://www.washingtonian.com/2016/01/13/gallaudet-universitys-brilliant-surprising-architecture-for-the-deaf/

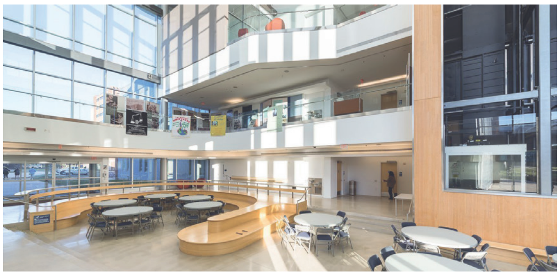

Figure 3.31 Gallaudet University. (n.d.-b). Lobby SLCC left view [Photograph]. Retrieved from https://www.usgbc.org/articles/leed-and-deafspace-designing-community-architecture

3.5 Principle 4: Light and Colour

For deaf people good use of *Light and Colour*, the fourth principle, is a key factor in conversations. A lack of proper lighting and colour can lead to loss of concentration and even physical exhaustion. We have all experienced the situation where you cannot see your computer screen, positioned in front of the window, because of the sun and its glare. If we apply this to someone's face, the glare will make it impossible to read that person's face. Reading someone's facial expression and lips, however, is crucial while signing. A facial expression for example, can completely change a sentence or the meaning of a word. Lip-reading is even more important, without it a signer cannot know which sign is being used. Glare, shadows or backlighting, but also wall colour that is similar to a person's skin tone, can interrupt and distract from conversations and can make reading peoples facial expressions and lips difficult. The solution to these problems is controlled (day)light to create a soft diffused light and wall colours like muted greens or blues to contrast a range of skin tones to attune to 'deaf eyes' (figure 3.28).

Following this principle is the SLCC at *Gallaudet University*. Here, in front of the façade, filled with full-height windows, a row of columns is placed to create a covered exterior walkway (figure 3.29). The columns shield both this walkway and the windows behind it from bright sunlight. In this way, (day)light is controlled to create soft diffuse light to allow for better circumstances for signers. Eye strain, or 'deaf eyes', for signers is thus drastically reduced.

The aforementioned lobby of the SLCC also follows the principle of *Light and Colour*s. As seen on figures 3.30, two walls of the lobby are curtain walls, which fill the space with natural light. These curtain walls face the north and west, meaning that little to no sunlight fills the lobby. Therefore sparing the eyes of signers as much as possible. However, the west-facing curtain wall does bring in direct sunlight at later times of the day, as seen in figure 3.31. This causes a problem for signers, when facing this curtain wall.

More generally, both SLCC and LLRH 6 use muted blues and greens to contrast a range of skin tones to reduce eye strain and use diffused light to make reading people's facial expressions and lips easier, as both can be seen in figures 3.32 and 3.33.

The design of *The Helsinki Central Library Oodi* is along the same lines: the entire third floor follows the design principle of *Light and Colour*. All walls on the third floor are curtain walls (figure 3.34), but due to the size of the space, sunlight does not reach the centre of the room. This means that all the workplaces on this floor, which are in the centre of the room, have controlled light. Only when the signers are near the curtain walls is there a possibility that they will have problems reading lips and facial expressions. In addition to controlled natural lighting, the third floor of the library has diffused light from above (figure 3.34), allowing signers to have a better concentration while working. Although *The Helsinki Central Library Oodi* was not specifically designed with signers in mind, the controlled light on the third floor does make reading peoples facial expressions and lips easier for them and allows for better concentration. The third floor thus, is inclusive to deaf people.

Lastly, *Hazelwood School*, where the windows of the classrooms are positioned at the top of the wall, as seen on figure 3.35, to reduce external visual distractions to maintain the children's concentration in classrooms. In *Hazelwood School* the design solutions related to *Light and Colour* are mostly focused on keeping this concentration and not so much on reducing eye strain from direct sunlight. This is clearly noticeable in the hallway where the 'backbone wall' is located. Figure 3.36 shows the enormous amount of sunlight that enters this hallway through the south-facing windows. Although there is some sun shading, as clearly visible on figure 3.x, it does not entirely block out the sun. This makes it difficult for signers to read each other's lips, facial expressions and signs.

It can be concluded that all case studies follow the design solutions of the principle of *Light and Colour* in one way or another. Whereas at *Gallaudet University* the emphasis is mainly on making it easier to read lips, facial expressions and reducing eye strain, at *Hazelwood School* the emphasis is mainly on

Figure 3.32 Estelle Caswell. (2016b, March 2). Muted colours Gallaudet University [Photograph]. Retrieved from https://www.youtube.com/watch?v=FNGp1aviGvE&t=2s

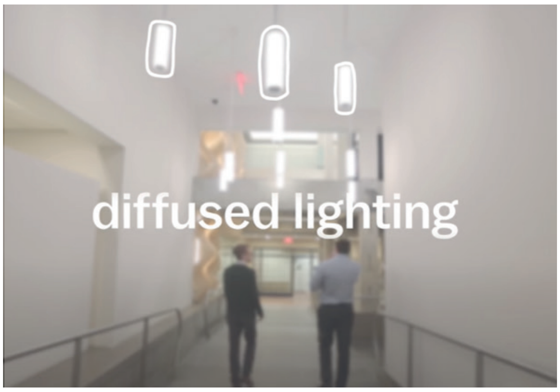

Figure 3.33 Estelle Caswell. (2016a, March 2). Diffused lighting Gallaudet University [Photograph]. Retrieved from https://www.youtube.com/watch?v=FNGp1aviGvE&

Figure 3.34 Tuomas Uusheimo. (2018b). Curtain walls and ceiling Oodi Library [Photograph]. Retrieved from https://www.archdaily.com/907675/oodi-helsinki-central-library-ala-architects

Figure 3.35 Alan Dunlop Architect. (2016a, September 30). Classroom Hazelwood School [Photograph]. Retrieved from https://aasarchitecture.com/2016/09/hazelwood-school-glasgow-alan-dunlop-architect.html/

Figure 3.36 Alan Dunlop Architect. (2016b, September 30). Hallway with sunlight Hazelwood School [Photograph]. Retrieved from https://aasarchitecture.com/2016/09/hazelwood-school-glasgow-alan-dunlop-architect.html/

stimulating concentration. At *The Helsinki Central Library Oodi*, on the other hand, no conscious attention has been paid to the effect of curtain walls and diffused light on the deaf. However, the effect is the same as at *Gallaudet University*: here too, reading lips and facial expressions are made easier and eye strain is reduced. *The Helsinki Central Library Oodi*'s design in particular becomes inclusive. This use of controlled light makes the design inclusive for deaf people, thus taking a step towards Universal Design. It should be stated, however, that good lighting and the use of wall colours that contrast a range of skin tones are not only beneficial to deaf people. 'Every-body' can concentrate better with controlled light, 'every-body' can see facial expressions better with the right wall colours and reducing eye strain is good for 'every-body'. 'Every-body' benefits from the design solutions of *Light and Colour*. The fourth design principle therefore is a part of Universal Design.

3.6 *Principle 5: Acoustics*

Lastly, the principle of *Acoustics*: deaf people have different degrees of hearing levels and they use hearing aids to enhance sounds. No matter what level of hearing, sounds still can be extremely distracting, with or without hearing aids. Look at the top half of figure 3.37, where we see a classroom located between a road and a hallway. We are all familiar with this situation: sitting in a classroom and constantly hearing background noises of cars driving past, people talking in the hallway or the constant humming of the air conditioning. For hearing people this is already a great distraction, but now imagine this situation for a person that uses hearing aids. If these constant noises are they only things you can hear, you cannot help but be distracted. Paying attention to your signing teacher will be very difficult. Spaces should be designed acoustically quiet, meaning that the hum of air conditionings, loud echoes, reverberation or other background noises should be eliminated or at least be reduced (figure 3.37).

It is remarkable that the *Acoustics* in the lobby of the SLCC at *Gallaudet University* are not optimal. The floor of the lobby creates reverberation and excess sounds can be heard through the lobby (Dobson, 2011). A different kind of material on the floor and absorptive panels on the upper parts of the walls to absorb excess sound could be a solution to these problems.

One place where *Acoustics* have been worked out correctly is *The Helsinki Central Library Oodi*. Its design stands out when it comes to sound and acoustics. During the entire design process good acoustics were an important point. Each of the three floors of *The Helsinki Central Library Oodi* has a distinct function and each has its own soundscape. The third floor, that houses the 'book heaven', is the classic library: a place where peace and quiet is a requirement. The third floor is an open landscape that was designed acoustically quiet: the ventilation is noiseless and the cloud-like ceiling, as seen on figure 3.38, functions as a sound damper. In addition, noise and vibration insulation is implemented on every floor. For deaf people this means that throughout the entire building there are little to no sounds to be heard: no hum of air conditionings, loud echoes, reverberation or

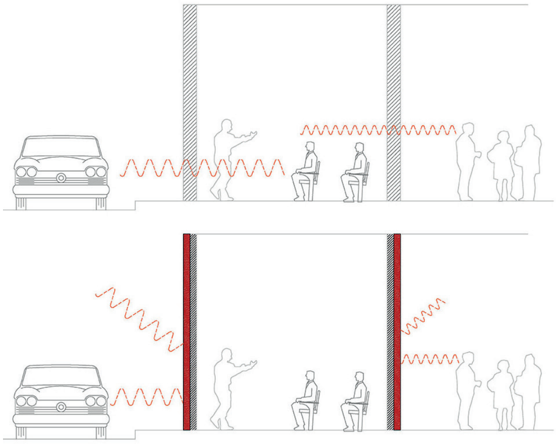

Figure 3.37 Dangermond Keane Architecture. (n.d.-a). Acoustics [Illustration]. Retrieved from http://inclusion.vn/deaf/deaf-space/

Figure 3.38 Tuomas Uusheimo. (2018a). Ceiling third floor Oodi Library [Photograph]. Retrieved from https://www.archdaily.com/907675/oodi-helsinki-central-library-ala-architects

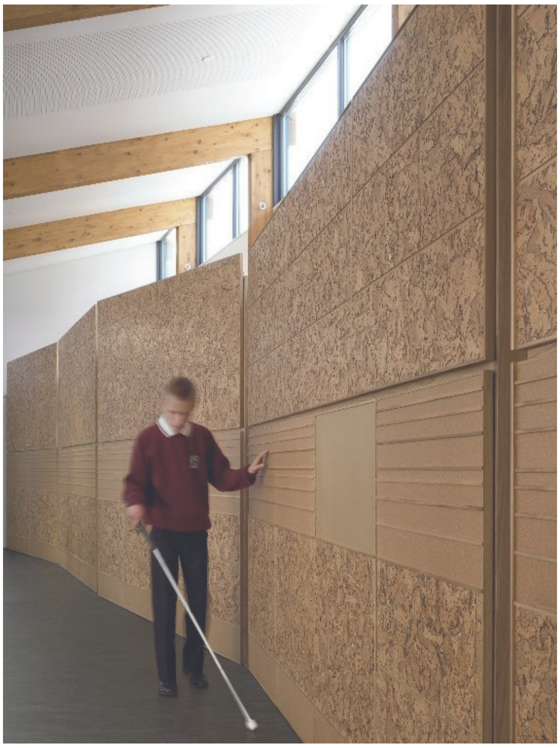

Figure 3.39 Alan Dunlop Architect. (n.d.-a). Backbone wall Hazelwood School [Photograph]. Retrieved from https://architizer.com/projects/hazelwood-school/

other background noises.

At the *Hazelwood School*, *Acoustics* are also important. Because of the traffic noise around the building, the school was designed with a high degree of acoustic insulation. This is partly done by means of ‘air plenums’, allowing for natural ventilation. At the same time, these ‘air plenums’ make sure that penetration of external sounds is limited to an acceptable level (A & DS, n.d.). Furthermore, the ‘backbone wall’ on figure 3.39 that leads visually impaired children from their classrooms throughout the building is made of cork. By using cork as the material for this wall, clear auditory differences are created between the hallways and the classrooms (Herssens & Heylighen, 2012, p. 382). At the same time the use of cork also helps to control sounds and reduce reverberation. As a result, *Acoustics* ensure independence.

The fact that the place where DeafSpace design was created, *Gallaudet University*, is lacking in one of its own design principles is rather astounding. Following the principle of *Acoustics*, *Gallaudet University* can learn a lot from the other case studies. Throughout *The Helsinki Central Library Oodi* little to no sounds can be heard: no hum of air conditionings, loud echoes, reverberation or other background noises. At *Hazelwood School*, even though not entirely quiet, the noise is reduced to an acceptable level. Good *Acoustics* are also beneficial and thus inclusive to visually impaired people. Sounds help people with a vision disability navigate themselves through their surroundings, allowing them to move independently through a building. Sounds give direction. *Acoustics* play an important part in this. The hum of air conditionings, loud echoes or other background noises, can be distracting for people with a vision disability. But not only people with vision and hearing disabilities benefit from good *Acoustics*. ‘Every-body’ will be less distracted if background noises are reduced. Therefore, the fifth design principle *Acoustics* is inclusive for ‘every-body’, and thus part of Universal Design.

4 CONCLUSION

By analysing three buildings that follow the DeafSpace design principles, this thesis has shown what makes DeafSpace special compared to other architectural adaptations for other disabilities.

Unlike other architectural adaptations for other disabilities, DeafSpace creates design solutions that go beyond just designing for disabilities. DeafSpace concerns design principles that go beyond the mere application of a ramp for wheelchairs. DeafSpace creates spaces that benefit 'every-body', it refuses the 'normalisation' and 'standardisation' of the able-bodied perspective. It is about creating awareness and it seeks to design and improve spaces to be functional for the deaf and hard-of-hearing. In saying so, it is to be concluded that, in contrast with its name, DeafSpace and its five design principles—*Space and Proximity, Mobility and Proximity, Sensory Reach*, *Light and Colour*, and *Acoustics*—are beneficial to 'every-body': wide hallways and stairs to provide space for conversations, means that 'every-body' has to manoeuvre less. No one needs to deviate from their walking direction (*Mobility and Proximity*). Changing the layout and furnishing of a building to have (semi-)circular seating, allows people to be constantly visually connected. Like this, 'every-body' can be involved in a discussion/conversation (*Space and Proximity*). Furthermore, a clear overview of a space makes 'every-body' have equal (social) control (*Sensory Reach*). This third design principle of DeafSpace *Sensory Reach* even broadens the concept of Universal Design and expands on the notion to design for 'every-body'. Universal Design is in fact based around the concept of making design usable by all people *"without the need of adaptation or specialized design"* (Ron Mace, 1985, cited in Preiser & Smith, 2010, p. 33). *Sensory Reach* however, is not an explicit necessity, but it would certainly make a space better for 'every-body'. It transcends categorical designs that are only implement to make a space inclusive. *Sensory Reach* broadens the concept of Universal Design and expands on the notion to design for 'every-body'. Moreover, good lighting and the use of wall colours that contrast a range of skin tones are also beneficial to 'every-body'. 'Every-body' can concentrate better with controlled light, ‘every-body’ can see facial expressions better with the right wall colours and reducing eye strain is good for ‘every-body’ (*Light and Colour*). Lastly, the hum of air conditionings, loud echoes or other background noises, can be distracting. If these background noises are reduces, ‘every-body’ will be able to concentrate better (*Acoustics*). DeafSpace is simply a synonym for good design principles.

DeafSpace and its design principles are a fairly new movement within Universal Design. At present, DeafSpace is mainly used in buildings with an educational function. Hopefully, in the future, the built environment can become even more inclusive by applying DeafSpace designs in other forms of architecture as well. Because the built environment should be designed to meet the needs of all people who wish to use it. If the built environment is accessible, usable and convenient, it is beneficial to ‘every-body’.

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