

## ABSTRACT

Title of Thesis: MAKING SENSE: AN EXPLORATION IN  
MULTI-SENSORY DESIGN

Abigail Leigh Bullock. Master of Arts, 2024

Thesis Directed By: Professor of the Practice, Peter Noonan,  
Architecture Department, School of  
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People view Architecture through a lens of sight. Often we learn from architecture from print media, the internet and other visual sources. This thesis aims to explore how one experiences architecture, not views it. To experience architecture, one needs to explore a work through all five senses: sight, smell, touch, taste, and sound. To create architecture, one must sculpt these sensory inputs. This experiential quality is especially important when considering people with sensory loss. Through this thesis one aims to help create independence for users of a space with hearing and/or vision loss through the incorporation of other sensory aspects within design. People with sensory loss often report feeling less satisfied in life and less independent than their peers. They also report higher degrees of loneliness and isolation. Through this work, one aims to help create a sense of community and independence. This is important to improve overall reports of life satisfaction for individuals with various degrees and types of sensory loss.

MAKING SENSE: AN EXPLORATION IN MULTI-SENSORY DESIGN

by

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2024

## Dedication

I would like to dedicate this thesis to my amazing and supportive family. I could not have done this without your unwavering support and encouragement. It is your presence that has allowed me to pursue this passion and achieve this milestone.

Mom, I appreciate the unwavering support and love throughout this process. I appreciate you always being there for me and supporting my education. Whether its walking me across the street to Saint Johns Lane Elementary School or being someone to talk to at the end of a hard day.

Dad, Thank you for your unwavering support. It's from you that I get my curiosity of life and drive to continue to ask questions. I appreciate your support and understanding, especially over these last 6 years.

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## Introduction

Through this exploratory thesis one aims to serve three main questions: how can one create a space that evokes all five senses, how can one create a space that can be utilized without vision and hearing, and how can one improve mental health for people who have sensory loss.

Architecture is often visually seen through media like books, internet webpages, and social media. This consumption of it limits the experiential qualities of the space created and reduces it to its mere visual qualities. This limits the sensory experience of the space. Through this thesis, one explores places that can be “seen” through all five senses of sight, smell, touch, taste, and sound.

When utilizing all senses, sensory loss can be not only accommodated, but also embraced. By diverting the architectural sensory inputs from a couple senses to all senses, when one sense is removed or reduced the effect is less drastic on one is output on the space. This allows for more inclusion within architectural space, rather than an afterthought.

These efforts when applied to populations that have large amounts of sensory loss can be impactful in improving quality of life. People with sensory loss often report feeling less satisfied in life and less independent than their peers. They also report higher degrees of loneliness and isolation. Through this thesis, these feelings are aimed to be reduced through sensory inclusionary measures. Sensory inclusionary measures will create a sense of community and independence and improve life satisfaction. To affect the reported independence of people with sensory loss, measures to complete tasks by oneself will also be included to allow tasks to be completed alone.

Overall, the thesis explores aspects of sensory design to improve quality of life. This allows for more independence and a higher report of quality of life for people with sensory

loss. It also affects the general sensory experience throughout the work. Quality of life is improve through feelings of independence and community. Independence and community are created through inclusionary design that creates more interactive experiences.

## Chapter 1: Sensory Loss

Senses are the root of human experience. The way people experience the world is founded on how they perceive it. This perception is curated by the sensory experiences incurred by the individual that create a narrative of life. We experience the world through five senses: hearing, seeing, touching, tasting, and smelling. These senses shape our perspective and worldview.

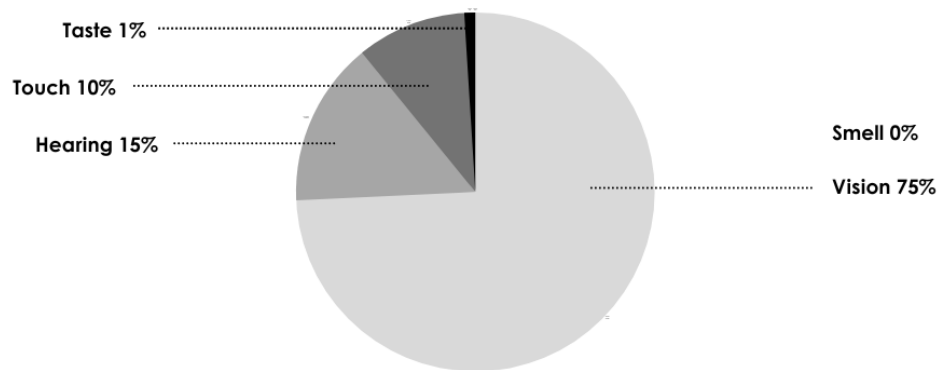
Because our perspective is shaped by our senses, many people who experience sensory loss, or the loss of a particular sense or multiple senses, have differing experiences from people without sensory loss. When people experience sensory loss, they often face social, navigational, health, and occupational difficulties that negatively impact their mental health. This chapter aims to explore the importance of each sensory loss through the two most impactful forms of sensory loss: hearing loss and vision loss.

### *Are all senses equally Important?*

Humans have five main senses, but each sense is not valued the same in American culture. Due to societal difference it can become more difficult for people with hearing or vision loss to interact with a hearing and vision oriented society. Hearing is used for primary communication. Most languages are rooted in auditory experiences. Hearing also helps people listen to movements, music, and potential dangers. Vision is used for seeing physical space. People use vision to navigate, to gauge social interactions, and to perceive depth. These two senses dictate much of culture, interactions and experiences. In addition to hearing and vision, other senses of touch, taste, and smell can and are utilized. Touch is used to interact with space and objects. People use touch to hold tactile things and feel them. Taste is used to experience food. Taste allows people to perceive good and bad food and detect if it is spoiled. Smelling is used to help perceive threats. People used odor to detect soured food and

potential danger (like fire and toxic chemicals). The five senses allow people to do different things and interact in different ways with society.

## WHICH SENSE WOULD BE HARDEST TO LOSE?



*(Figure 1) The breakdown of senses people would prefer to lose*

In an online survey, participants were asked which sense they would be most afraid to lose<sup>1</sup>. Three out of four participants said they would be most afraid to lose their sense of sight, making an overwhelming majority of the study. Fifteen percent of participants said that hearing was their most feared sense of losing. Ten percent of the population was most afraid of losing their sense of touch. A single participant said that they were afraid of losing their sense of taste, and no participants said they were most afraid to lose their sense of smell.

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<sup>1</sup> Hutmacher, Fabian. 2021. "What Is Our Most Important Sense?" *Frontiers for Young Minds* 9 (July). <https://doi.org/10.3389/frym.2021.548120>.

Why might people be more afraid to lose senses like vision and hearing over taste and smell? People may be more afraid to lose these two senses because they have the most perceived impact on how we engage in the world.



*(Figure 2) A man touching a Tactile artwork*

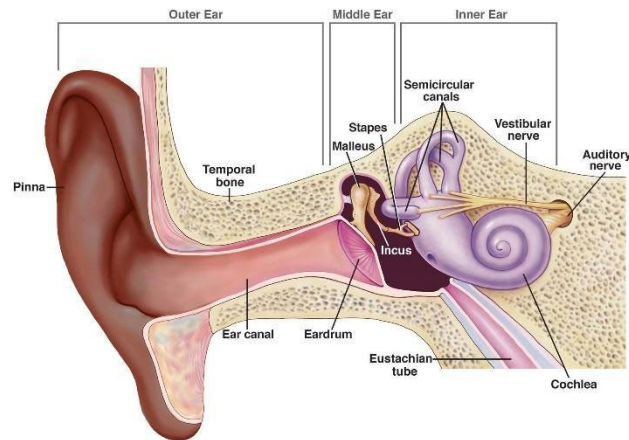
Humans have a visual culture. Many social norms are rooted in visual acts and behaviors. If one sees someone at a distance, one might wave. If one is at an art museum, they might look at art. If one is sitting on a beach, they may see the waves in the distance. These are culturally visual experiences that are impacted by losing the ability to see. Instead of waving to someone at a distance, one may verbally say their name. Instead of viewing an art museum, one may engage with emerging 3D-recreated touch-based artwork exhibits like *Dimension: An Exhibition of Sculpture for the Sighted and Blind*<sup>2</sup>. Instead of seeing the waves in the distance, one may smell and feel the sand between their toes.

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<sup>2</sup> California Arts Commission. *Dimension: An Exhibition of Sculpture for the Sighted and Blind*. Sacramento: Arts Commission. 1970.

In addition to being a sight-based society, humans primarily communicate using verbal communication. Although face-to-face conversation does utilize visual cues, primarily it is vocal communication used to convey ideas. This means that to many, the idea of losing hearing means losing the primary form of communication with others. This, however, has shifted and adapted due to an increased prevalence of internet-based communication, which often is more visual.

Because the general population sees the sense of sight and hearing loss as more severely detrimental to disrupting day-to-day life, this thesis will mostly focus on both hearing and vision loss as primary motivators for design utilizing all five senses. However, all five senses will continue to be used as methods of supplementing sensory loss, as they often can help to complement missing senses.



(Figure 3) The three parts of an ear

### Designing for Hearing Loss

Hearing is the ability to perceive sound vibrations through a change in pressure. In humans, this is sensed through the ears. The ears have a three-part system, consisting of an

outer, middle, and inner ear<sup>3</sup>. The outer ear is the visible exterior portion of the ear. This part of the ear collects sound and funnels it<sup>4</sup>. The middle ear helps to organize sound waves through amplification. This input is then sent to the inner ear which interprets the sound through the cochlea. This is then sent to the brain where one can react to the sound. Hearing loss occurs when an element or elements of this process is disrupted or damaged. This occurs due to genetic, physical damage, or age-related degeneration of hearing. There are four main types of hearing loss: Conductive, Sensorineural, Mixed and Central auditory dysfunction.

Conductive hearing loss is the loss of hearing from abnormalities in the outer or middle ear structure. This stops the ear from being able to collect sound<sup>5</sup>. Conductive hearing loss can often be fully corrected or reduced through surgery or by utilizing hearing aids<sup>6</sup>.

Sensorineural hearing loss is hearing loss due to abnormalities in the inner ear structure<sup>7</sup>. This also can be caused by a problem with the hearing nerve<sup>8</sup>. Sensorineural hearing loss disrupts the amplification of noise, which then stops the inner ear interpretation. A common cause of sensorineural hearing loss is Presbycusis. Presbycusis is the loss of

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<sup>3</sup> School, McGovern Medical. "Ear Anatomy Schematics." Otorhinolaryngology - Head & Neck Surgery, August 15, 2022. <https://med.uth.edu/orl/online-ear-disease-photo-book/chapter-3-ear-anatomy/ear-anatomy-schematics/>

<sup>4</sup> "How Do We Hear?" National Institute of Deafness and Other Communication Disorders. Accessed October 4, 2023. <https://www.nidcd.nih.gov/health/how-do-we-hear#:~:text=Sound%20waves%20enter%20the%20outer,malleus%2C%20incus%2C%20and%20stapes.>

<sup>5</sup> Shearer, A&nbsp;Eliot, Michael&nbsp;S Hildebrand, Amanda M Schaefer, and Richard JH Smith JH Smith. Genetic hearing loss overview - genereviews® - NCBI bookshelf, 1999. <https://www.ncbi.nlm.nih.gov/books/NBK1434/>.

<sup>6</sup> CDC. "Types of Hearing Loss | CDC." Centers for Disease Control and Prevention (2021) June 21, 2021. <https://www.cdc.gov/ncbddd/hearingloss/types.html#:~:text=Conductive%20Hearing%20Loss.>

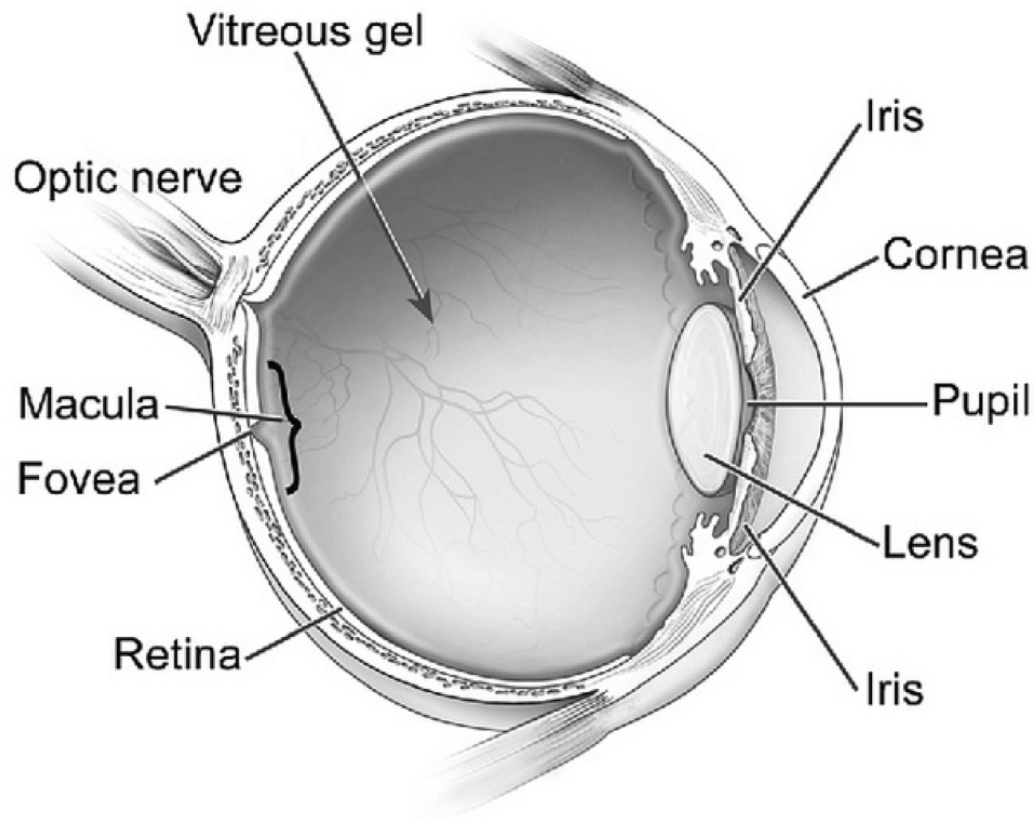
<sup>7</sup> Shearer, A&nbsp;Eliot, Michael&nbsp;S Hildebrand, Amanda M Schaefer, and Richard JH Smith JH Smith. Genetic hearing loss overview - genereviews® - NCBI bookshelf, 1999. <https://www.ncbi.nlm.nih.gov/books/NBK1434/>.

<sup>8</sup> CDC. "Types of Hearing Loss | CDC." Centers for Disease Control and Prevention (2021) June 21, 2021. <https://www.cdc.gov/ncbddd/hearingloss/types.html#:~:text=Conductive%20Hearing%20Loss.>









*(Figure 5) Parts of an eyeball*

### Designing for Vision Loss

Vision is the ability to perceive light through reflected objects. In humans, this is sensed through the eyes. Eyes work through a series of connected parts that communicate to create visual images to the brain<sup>18</sup>. The light first passes through the cornea which bends the light to help the eye focus. The light then goes through the pupil, which is an opening within the eye. The amount of light filtered is controlled by the iris. The light then passes through

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<sup>18</sup> National Eye Institute. 2019. "How the Eyes Work | National Eye Institute." [www.nei.nih.gov](http://www.nei.nih.gov). July 16, 2019. <https://www.nei.nih.gov/learn-about-eye-health/healthy-vision/how-eyes-work#:~:text=When%20light%20hits%20the%20retina>

the lens which further helps the eye focus on light. This light then hits the retina and reacts to the focused light. The optic nerve then takes these inputs to the brain where we can see the image equivalent to what our eyes are processing.

Vision loss is the disruption of the process the eye conducts to make sense of light. It may produce no vision, warped vision, or limited vision to those who experience it. People with vision loss are impacted physically, mentally, and emotionally. There are various types and degrees of vision loss that impact users. Total blindness is the complete lack of light perception<sup>19</sup>. This means that users have no vision capabilities. They experience only darkness. Only 15 percent of eye disorders result in total blindness, Making it rare in comparison to other types of Vision impairment.

Low vision is another type of visual impairment. Low Vision is a sense of sight that is not fully corrected by glasses, surgery, or other magnification aids or assistive technology<sup>20</sup>. This means that people who experience low vision experience some light but may not experience the correct arrangement or interpretation of that light. Visual impairment is a specific categorization that may apply to people with low vision or total blindness<sup>21</sup>. People with Visual impairment have decreased visual function that disrupts their daily living. Legal blindness is another categorization that may apply to anyone with visual impairment. Someone who is legally blind is determined to be eligible to receive government benefits and aid including tax exemption programs, disability, and reliability training<sup>22</sup>. This is determined through a score for visual acuity worse than 20/200 or a visual field restriction of 20 degrees.

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<sup>19</sup> Yeon Lee, So, and Fassil&nbsp; B Mesfin. "Blindness." National Center for Biotechnology Information. Accessed September 6, 2023. <https://pubmed.ncbi.nlm.nih.gov/28846303/>.

<sup>20</sup> Yeon Lee, So, and Fassil&nbsp; B Mesfin. "Blindness." National Center for Biotechnology Information. Accessed September 6, 2023. <https://pubmed.ncbi.nlm.nih.gov/28846303/>.

<sup>21</sup> Yeon Lee, So, and Fassil&nbsp; B Mesfin. "Blindness." National Center for Biotechnology Information. Accessed September 6, 2023. <https://pubmed.ncbi.nlm.nih.gov/28846303/>.

<sup>22</sup> Yeon Lee, So, and Fassil&nbsp; B Mesfin. "Blindness." National Center for Biotechnology Information. Accessed September 6, 2023. <https://pubmed.ncbi.nlm.nih.gov/28846303/>.

Vision loss is a common experience. Often it is a symptom that Progressively gets worse with age<sup>23</sup>. Age-related macular degeneration is the leading cause of vision loss among white people (54.4 percent of cases). Glaucoma and Cataracts are the leading cause of vision loss in people who are black (above 60 percent of cases). The overall leading cause of low vision is Cataracts, which lead to 50% of bilateral vision loss.

Vision loss impacts an individual's ability to navigate and experience. Vision loss leads to more feelings of loneliness and isolation while also providing physical barriers to engaging in public space.

### *Designing for Deafblindness*

Deafblindness is when a person has highly reduced or no senses of vision and hearing loss. The two circumstances may be individual or related. This often leads to increased difficulty in navigating daily life as opposed to having just hearing or vision loss.

The most common form of deafblindness is Usher syndrome<sup>24</sup>. 1-4 people out of 25,000 people in the world have Usher Syndrome. Usher syndrome is an inherited autosomal recessive disorder. People who have Usher's syndrome have hearing loss present at birth and vision ability progressively weakening. Vision loss worsens over time due to progressive retinitis pigmentosa.

Although people who have deafblindness often face many of the same obstacles that people with only one sensory reduction have, they often have to result in different solutions.

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<sup>23</sup> PMC, Europe. "Causes and Prevalence of Visual Impairment among Adults in the United States." Europe PMC. Accessed October 4, 2023.  
<https://europepmc.org/article/med/15078664/reload=0#impact>.

<sup>24</sup> Akobirshoev, Ilhom. Vetter, Michael. Iezzoni, Lisa I. Rao, Sowmya R. Mitra, Monika "Delayed Medical Care and Unmet Care Needs due to the COVID-19 Pandemic among Adults with Disabilities in the US." Health Affairs 41, no. 10 (10, 2022): 12/18/ 2023  
<https://www.proquest.com/scholarly-journals/delayed-medical-care-unmet-needs-due-covid-19/docview/2720976144/se-2>.

This is because they do not have the other sense to rely on. The technology used includes pocket memories, daisy players, magnifying glasses, reading TVs, reading machines, Braille displays, visual interpretations, and tactile wristwatches<sup>25</sup>. This allows sensory input to be amplified so that the limited form existing forms of senses may be utilized. For people with no sensory input left from hearing or vision, more tactile, touch-based devices are often used to learn information.

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<sup>25</sup> Akobirshoev, Ilhom. Vetter, Michael. Iezzoni, Lisa I. Rao, Sowmya R. Mitra, Monika "Delayed Medical Care and Unmet Care Needs due to the COVID-19 Pandemic among Adults with Disabilities in the US." *Health Affairs* 41, no. 10 (10, 2022): 12/18/ 2023 <https://www.proquest.com/scholarly-journals/delayed-medical-care-unmet-needs-due-covid-19/docview/2720976144/se-2>.

## Chapter 2: The Effects of Sensory Loss on Mental Health

Having sensory loss can make a large impact on mental well-being. Often people who experience sensory loss have increased feelings of depression and negative mental health conditions. A common report from people with sensory loss is a lack of independence. Also people who have large amounts of hearing loss often experience ableism. Ableism is a system of exclusion and discrimination of people with disabilities, such as sensory loss<sup>26</sup>. This is due to beliefs about the value of human life, health, accomplishments, and beauty. This often leads people with sensory loss to experience feelings of exclusion. This and sensory barriers make it more difficult for people with high levels of sensory loss to be both independent and engage with the sensing society. This thesis aims to help understand the starting place of independence and improve user experience to foster independence. This is to increase the mental health of people with sensory loss.

### *The Effect of Sensory Loss on Depression*

Hearing and Vision Loss are prone to cause an increased likelihood of developing depression. Because of preconceived notions about people who have hearing and vision loss and a communication barrier between people with differing sensory abilities, people with sensory loss have a drastically higher likelihood of developing depression. Depression is a series of chronic conditions characterized by constant feelings of sadness, lifelessness, and emptiness. There are three types of depression: major depression, mild depression, and

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<sup>26</sup> Steffi, Joice Y., Gobinda Majhi, and Navaneetham Janardhana. "Ableism and Mental Health of Young Adults with Visual Impairment: An Overview." *Indian Journal of Health and Wellbeing* 13, no. 3 (09, 2022): 416-419. <https://www.proquest.com/scholarly-journals/ableism-mental-health-young-adults-with-visual/docview/2723853954/se-2>.

bipolar disorder<sup>27</sup>. Major depression is a recurring disorder where one feels a constant inability to be happy. Mild depression has those same feelings of unhappiness but is not as strong and may have brief periods of happiness. Bipolar disorder is a repetitive shift from depressed to manic and manic to depressed. Manic phases may consist of episodes of impulsive behavior, hyperactivity, and a lack of sleep. By having any of the three forms of depression one experiences more overall sadness and lack of content in their life.

Specifically with older adults, there is a strong correlation between people with hearing loss and those who have depression<sup>28</sup>. This is due to difficulty in interactions with others and engaging with peers. Adults with hearing loss often have reduced symptoms when seeking treatment for their sensory loss, like hearing aids. This is because they feel less separated from their peers.

People who have hearing loss often feel ostracized by others because of their sensory loss. Because of this separation, many people who have hearing loss try to limit the visual presence of their sensory loss. This is done through people with large amounts of hearing loss associating with the hearing community as opposed to the deaf community. People have a mindset that leads to them wanting to join a majority mindset. This means that, due to hearing loss being a minority group, they often are left aside from the hearing community. This minority experience can create negative feelings that lead to conditions like depression.

Because people with vision loss are another minority group, they often experience many of the same feelings of depression and anxiety. It is reported that one in four adults

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<sup>27</sup> “Signs and Symptoms of Depression - Project Helping.” 2020. Project Helping - Do Good. Feel Good. September 22, 2020. [https://projecthelping.org/signs-and-symptoms-of-depression/?gclid=Cj0KCQjwj5mpBhDJARIsAOVjBdrImwNDY6t6GlpBLQ0TCMPI3-z79nFDoSr88TBIC0IczNH2h5GeuaoaAjyEEALw\\_wcB](https://projecthelping.org/signs-and-symptoms-of-depression/?gclid=Cj0KCQjwj5mpBhDJARIsAOVjBdrImwNDY6t6GlpBLQ0TCMPI3-z79nFDoSr88TBIC0IczNH2h5GeuaoaAjyEEALw_wcB).

<sup>28</sup> “Depression and Hearing Loss.” n.d. American Academy of Audiology. Accessed October 11, 2023. <https://www.audiology.org/consumers-and-patients/hearing-and-balance/depression-and-hearing-loss/#4>.

with vision loss have anxiety or depression<sup>29</sup>. This statistic is five times as prevalent in younger adults as opposed to those 65 and over with vision loss. This is due to preconceived notions set upon people with vision loss. Another symptom of Vision loss is a perceived set of traits that people with vision loss have to the public. Through a series of interviews describing thoughts and opinions on people with vision impairment, they are often described as docile, dependent, melancholy, or helpless<sup>30</sup>. This is regardless of physical ability and rather a preconceived notion of people with vision loss.

When a person is deafblind they often face many of the negative societal and mental health symptoms that people that have exclusively vision or hearing loss have. These feelings and norms in many cases will be amplified.

People who have visual and hearing loss that significantly impact their daily lives are Deafblind. When students have Deaf Blindness They often are not suited for programs that support students who are solely deaf or blind. Through a study of children who are deafblind within an educational setting, these feelings of isolation were expressed. Often deafblind people feel excluded by peers and instructors because of missing visual or auditory social cues<sup>31</sup>.

Through this Thesis one aims to avoid exclusion and help connect people to reduce depression rates for people with sensory loss.

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<sup>29</sup> CDC. "Protect Your Vision." Centers for Disease Control and Prevention. (2021) September 27, 2021. <https://www.cdc.gov/visionhealth/resources/features/vision-loss-mental-health.html#:~:text=Vision%20loss%20can%20affect%20your%20physical%20health%20by%20increasing%20your>.

<sup>30</sup> Vaughan, C. Edwin, and Fredric K Schroeder. 2018. *Social and Cultural Perspectives on Blindness : Barriers to Community Integration* (version Second edition.) Second ed. Springfield, Illinois: Charles C Thomas, Publisher.

<sup>31</sup> Correa-Torres, Silvia Maria. "Communication Opportunities for Students With Deafblindness in Specialized and Inclusive Settings: A Pilot Study." *Re:View* 39, no. 4 (Winter 2008): 197–205.

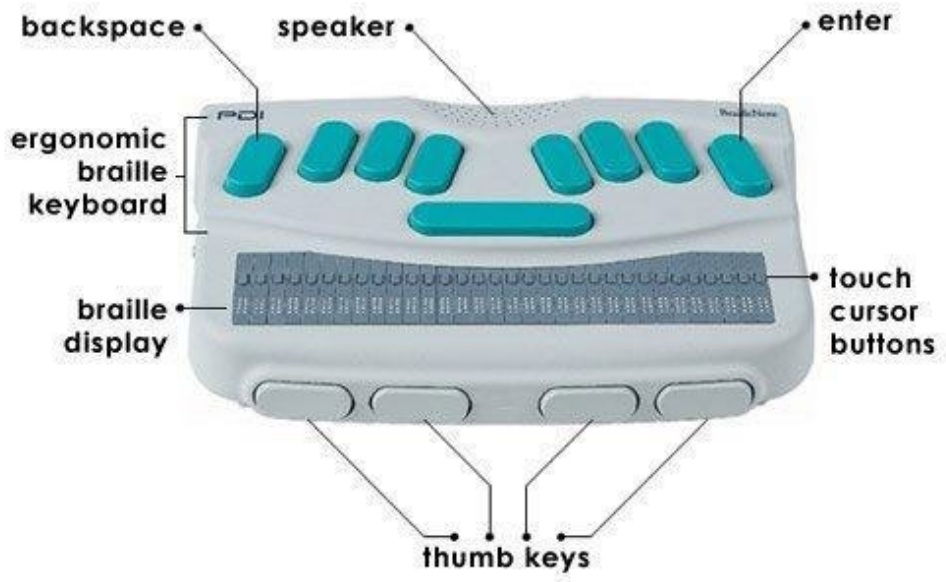
## *Effect of Sensory Loss on Independence*

When people experience large amounts of vision or hearing loss, they often feel less independent than their peers. This is because sensory loss can make navigating and communicating with the full-sensing world harder. This can cause the need for aid, either in the form of physical aid, or aid from people, to navigate daily life.

Many people with hearing or vision loss are helped by the usage of an interpreter. Interpreters translate language from either visual to verbal or verbal to visual. Interpreters also can take on other roles depending on the user's needs. For example, many people can assimilate into an environment without additional human aid. Some people also engage in environments that support their sensory loss, such as a person with hearing loss in a classroom environment where a teacher knows sign language<sup>32</sup>. These environmental factors determine how people with sensory loss can engage with or without the need for interpreters or other human-based assistance.

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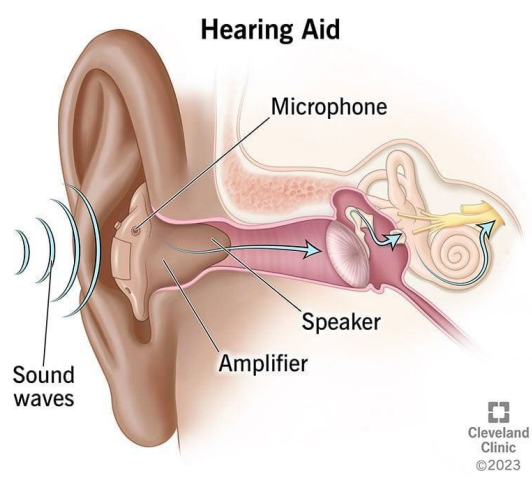
<sup>32</sup> Smith, Melissa B. *More Than Meets the Eye : Revealing the Complexities of an Interpreted Education*. Studies in Interpretation, V. 10. INSERT-MISSING-SERVICE-NAME. Washington, DC: Gallaudet University Press (Bibliovault), 2013.



## BrailleNote BT 32



(Figure 6) The BrailleNote BT 32



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Clinic  
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(Figure 7) How a hearing aid works

In addition to human-based aid, many people with sensory loss can adapt using physical aids. One example is the BrailleNote mPower BT-32 notetaker and Tiger Cub Jr. embosser. These instruments allow people who are blind to type in braille. Based on a study of interviews with deaf students in middle school and people supporting the student, they noted that technology improved the classroom experience<sup>33</sup>. People with limited experience working with blind students also benefited from a streamlined training process that allowed for the communication between Braille and English to be improved. This allows for more direct communication between the two mediums. Aids for hearing loss include cochlear implants, and other technical devices such as connection to smartphones, hearing loops with telecoil in hearing aids, and an FM-system<sup>34</sup>. These systems amplify sound and may help people who have some hearing. Many can also utilize hearing aids to get greatly improved senses of hearing<sup>35</sup>. These medical aids are typically prescribed by professionals, which can be increasingly difficult to access.

People with sensory loss also face difficulty in accomplishing daily tasks independently. Some tasks specifically reported by people with hearing and or vision loss include heavy chores, grocery shopping, and housework<sup>36</sup>. These are all daily tasks performed in private spaces, where people want independence. Within this same study, participants reported difficulty with tasks correlated to the severity of their sensory loss. This

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<sup>33</sup>Farnsworth Jr, Charles R. and Luckner, John L. "The Impact of Assistive Technology on Curriculum Accommodation for a Braille-Reading Student." *Re:View* 39, no. 4 (Winter 2008): 171–87. doi:10.3200/REVV.39.4.171-187.

<sup>34</sup> Akobirshoev, Ilhom. Vetter, Michael. Iezzoni, Lisa I. Rao, Sowmya R. Mitra, Monika "Delayed Medical Care and Unmet Care Needs due to the COVID-19 Pandemic among Adults with Disabilities in the US." *Health Affairs* 41, no. 10 (10, 2022): 12/18/ 2023 <https://www.proquest.com/scholarly-journals/delayed-medical-care-unmet-needs-due-covid-19/docview/2720976144/se-2>.

<sup>35</sup> CDC. "Types of Hearing Loss | CDC." Centers for Disease Control and Prevention (2021) June 21, 2021. <https://www.cdc.gov/ncbddd/hearingloss/types.html#:~:text=Conductive%20Hearing%20Loss>.

<sup>36</sup> Raina, Parminder, Micheline Wong, and Helen Massfeller. "The Relationship between Sensory Impairment and Functional Independence among Elderly." *BMC Geriatrics* 4, (2004): 3. Accessed October 11, 2023. <https://doi.org/10.1186/1471-2318-4-3>.

included people who are deafblind reporting the highest amount of difficulty accomplishing daily tasks. They also reported feeling as though they have less decision-making control over their lives. This can be especially concerning without proper access to healthcare.

People who have sensory loss often face difficulty getting access to medical care. Because of the disruptions to communication, it is often difficult to navigate medical care and communicate symptoms and feelings. This sentiment was compounded during the Covid-19 pandemic. People with disabilities overall have had a difficult time gaining access to care during the pandemic due to insurance coverage, cost, and disability bias. Participants who had more than one disability also reported access in higher numbers than those with one disability<sup>37</sup>. An increased accessibility to medical care negatively impacts the sensory loss community. This is of increased importance due to a need for an interconnected web of care for sensory loss. For example, for full support, someone with hearing loss needs a team of otolaryngologists, speech and language therapists, audiologists, and specialty-trained nurses. Children with hearing loss will additionally need pediatricians, early hearing intervention, and family support specialists<sup>38</sup>. With a large network needed to gain significant care for people with sensory loss, the lack of access to medical care can be extremely detrimental to those with sensory loss.

Overall, the negative preconceived notions about people with sensory loss and how that impacts the way they engage in the world and receive support causes people with sensory loss to feel less independent than their sensing peers. This leads to overall unhappiness, depression, and a trend of unfulfillment for people with sensory loss.

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<sup>37</sup> Akobirshoev, Ilhom. Vetter, Michael. Iezzoni, Lisa I. Rao, Sowmya R. Mitra, Monika "Delayed Medical Care and Unmet Care Needs due to the COVID-19 Pandemic among Adults with Disabilities in the US." *Health Affairs* 41, no. 10 (10, 2022): 12/18/ 2023 <https://www.proquest.com/scholarly-journals/delayed-medical-care-unmet-needs-due-covid-19/docview/2720976144/se-2>.

<sup>38</sup> Khalili, Yasir AL, and Sofia Anastasiadou. "Hearing Loss." National Center for Biotechnology Information. Accessed September 6, 2023. <https://pubmed.ncbi.nlm.nih.gov/31194463/>.



## Chapter 3: Deaf and Blind Culture

Having hearing and vision loss has cultural associations that contribute to the ways that individuals who have hearing and vision loss experience the world. Hearing loss, vision loss, and dual hearing and vision loss have shared counter-cultural norms, values, art, and opinions within their respective groups. Hearing and vision loss have separate cultural norms from one another that are based on unique sensory experiences. This leads to differing opinions on what constitutes a culture. Blind-deaf culture is also reliant on a separate subset of cultural influences that creates a unique perspective alternative to groups with singular sensory loss. Through this chapter, one aims to establish the intricacies of each cultural group and how that impacts the worldview of people who experience that sensory loss. One also aims to better establish the differences between the cultural norms of each.

### Deaf Culture

Deaf Culture is a well-established set of cultural norms that are heavily agreed upon among deaf people. In deaf culture, there is a profound difference between the word “deaf” and “Deaf”. When deaf is not a proper noun and therefore not capitalized it is a condition of severe or profound hearing loss<sup>39</sup>. When lower case it refers to the act of not having or having limited forms of hearing. Deaf with an uppercase “D” refers to people who identify as belonging to the Deaf community. Not all people who are deaf associate or feel as though they belong to the Deaf community. The Deaf community is a cultural minority that often

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<sup>39</sup> Malebranche, Mary, Kevin Morisod, and Patrick Bodenmann. "Deaf Culture and Health Care." CMAJ : Canadian Medical Association Journal 192, no. 50 (2020): E1809. Accessed October 18, 2023. <https://doi.org/10.1503/cmaj.200772>.

faces discrimination due to its status as a minority cultural group that encapsulates a very small population. People who are culturally Deaf can be visibly identified by the hearing community due to the primary indicator of Deaf culture, the utilization of sign language as a main form of communication<sup>40</sup>.

People who are Deaf tend to be resistant to alternative forms of speaking such as lip-reading. There also is growing resistance from many deaf people who feel that technology like cochlear implants improves a person's hearing and is negative for the Deaf community. This is because it puts focus on deaf people accommodating to hearing people as opposed to hearing people focusing on learning to sign<sup>41</sup>. Many people who are deaf are also against assistive technology like cochlear implants because it creates less of a focus on deaf-dedicated education and separate teaching resources<sup>42</sup>. Overall, many find the reliance on hearing-correcting technology to be distracting and drawing away from resources that should be promoting deaf-inclusive forms of communication like signing. Another common opinion in the Deaf community is the dislike of the term "hearing impaired". This is because it implies that there is a deficit that needs to be overcome rather than a trait<sup>43</sup>. That phrasing can influence a negative notion about people with hearing loss and should be avoided.

People with hearing loss are not impaired in communication, they have a culture based on non-hearing-based forms of communication. People who have hearing loss are dependent on the usage of a different language that is a visual signifier rather than a verbal

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<sup>40</sup> Malebranche, Mary, Kevin Morisod, and Patrick Bodenmann. "Deaf Culture and Health Care." *CMAJ : Canadian Medical Association Journal* 192, no. 50 (2020): E1809. Accessed October 18, 2023. <https://doi.org/10.1503/cmaj.200772>.

<sup>41</sup> Leigh, Irene W, Jean F Andrews, and Raychelle L Harris. 2020. *Deaf Culture: Exploring Deaf Communities in the United States (version 2nd ed.)*. 2nd ed. San Diego: Plural Publishing, Incorporated. <http://public.ebib.com/choice/PublicFullRecord.aspx?p=6376729>.

<sup>42</sup> Malebranche, Mary, Kevin Morisod, and Patrick Bodenmann. "Deaf Culture and Health Care." *CMAJ : Canadian Medical Association Journal* 192, no. 50 (2020): E1809. Accessed October 18, 2023. <https://doi.org/10.1503/cmaj.200772>.

<sup>43</sup> Leigh, Irene W, Jean F Andrews, and Raychelle L Harris. 2020. *Deaf Culture: Exploring Deaf Communities in the United States (version 2nd ed.)*. 2nd ed. San Diego: Plural Publishing, Incorporated. <http://public.ebib.com/choice/PublicFullRecord.aspx?p=6376729>.

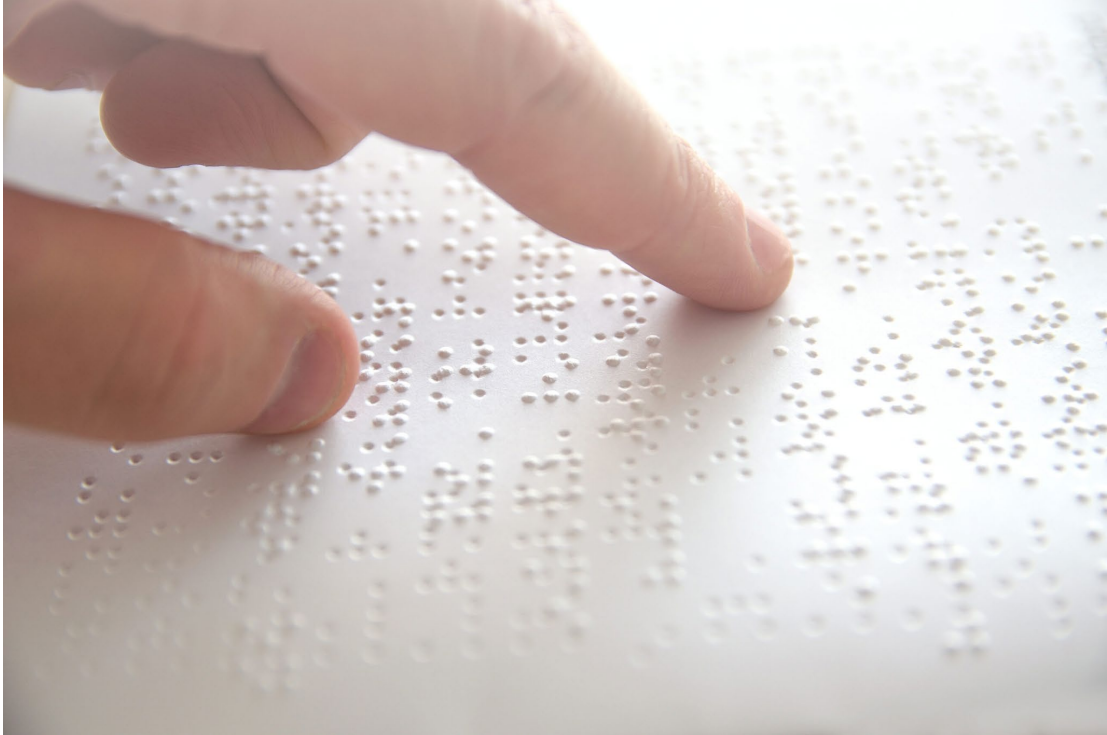
one<sup>44</sup>. Mostly this would constitute sign language: a visual language conducted through viewing visual hand-based words and phrases. Like the visible nature of language, people who are Deaf often relate to the world more visually and tactically rather than based on hearing. This has led to a sense of identity coming from seeing the world a different way<sup>45</sup>. It is a common misconception that deaf people are limited in their ability to experience, however, this opinion is not shared by the deaf community. Deaf people experience the world differently, not less than hearing people. This is seen in advancements in hearing-based artwork in visual form. These works are created by people who are deaf and include alternative forms of hearing-based art like sign poetry, sign song, and deaf theater<sup>46</sup>. This is because, deaf people have created a way to engage with most things that are typically provided in a verbal template, in a visual or tactile form.

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<sup>44</sup> International Conference on Deaf Culture (1989 : Washington, D.C.). 1994. *The Deaf Way : Perspectives from the International Conference on Deaf Culture*. Washington, D.C.: Gallaudet University Press.

<sup>45</sup> International Conference on Deaf Culture (1989 : Washington, D.C.). 1994. *The Deaf Way : Perspectives from the International Conference on Deaf Culture*. Washington, D.C.: Gallaudet University Press.

<sup>46</sup> International Conference on Deaf Culture (1989 : Washington, D.C.). 1994. *The Deaf Way : Perspectives from the International Conference on Deaf Culture*. Washington, D.C.: Gallaudet University Press.



(Figure 8) A person reading braille

The translation from verbal to visual or tactile is seen as valuable and important to people who are deaf. Many people who have hearing loss feel so strongly rooted in their Deaf culture that they would not want to be hearing if they could choose to be so. This is because they understand the world without hearing it, and are deeply rooted in a non-hearing culture.

Overall Deaf culture is an important part of how people with hearing loss engage with the world and with each other. Deaf culture has a profound impact on the daily lives, interactions, and feelings of acceptance of people with sensory loss. Deaf culture is vision and touch-based and often leads to the distinct understanding of a non-hearing-based society. Deaf culture also shows the interconnected support and connectedness of people in the Deaf community.

## Blind Community

Independent of deaf culture created around the loss of sound is the blind community a community based around the loss of sight. However blind culture is less organized and established formally to the daily life of people with vision loss compared to people with hearing loss<sup>47</sup>. Many people who are blind share resources and are interconnected through a sense of connection from their shared experience but are less unified in a cultural norm and set of expectations. People who experience total blindness often find it limiting to be described as part of a shared experience and collective whole instead of an individual experience. This allows resources to be catered to an individual's specific needs and lifestyle. People who have vision loss still have common experiences that unite them into a community but are less unified in a formed culture.

One of these is discrimination based on vision loss<sup>48</sup>. Like with hearing loss, people with vision loss are often seen as “less than” by their sighted peers. People with vision loss are often expected to be less capable of tasks and comprehension, which limits their ability to engage in a predominantly sighted world. One of these unifying discriminatory measures is education catered specifically to people who cannot see. Only 10 percent of students who are blind are taught braille because there is a lack of access to appropriate resources to do so<sup>49</sup>. This contributes to difficulty in gaining employment, with 85 percent of people with total blindness who are employed being fluent braille readers<sup>50</sup>. This means that the majority of

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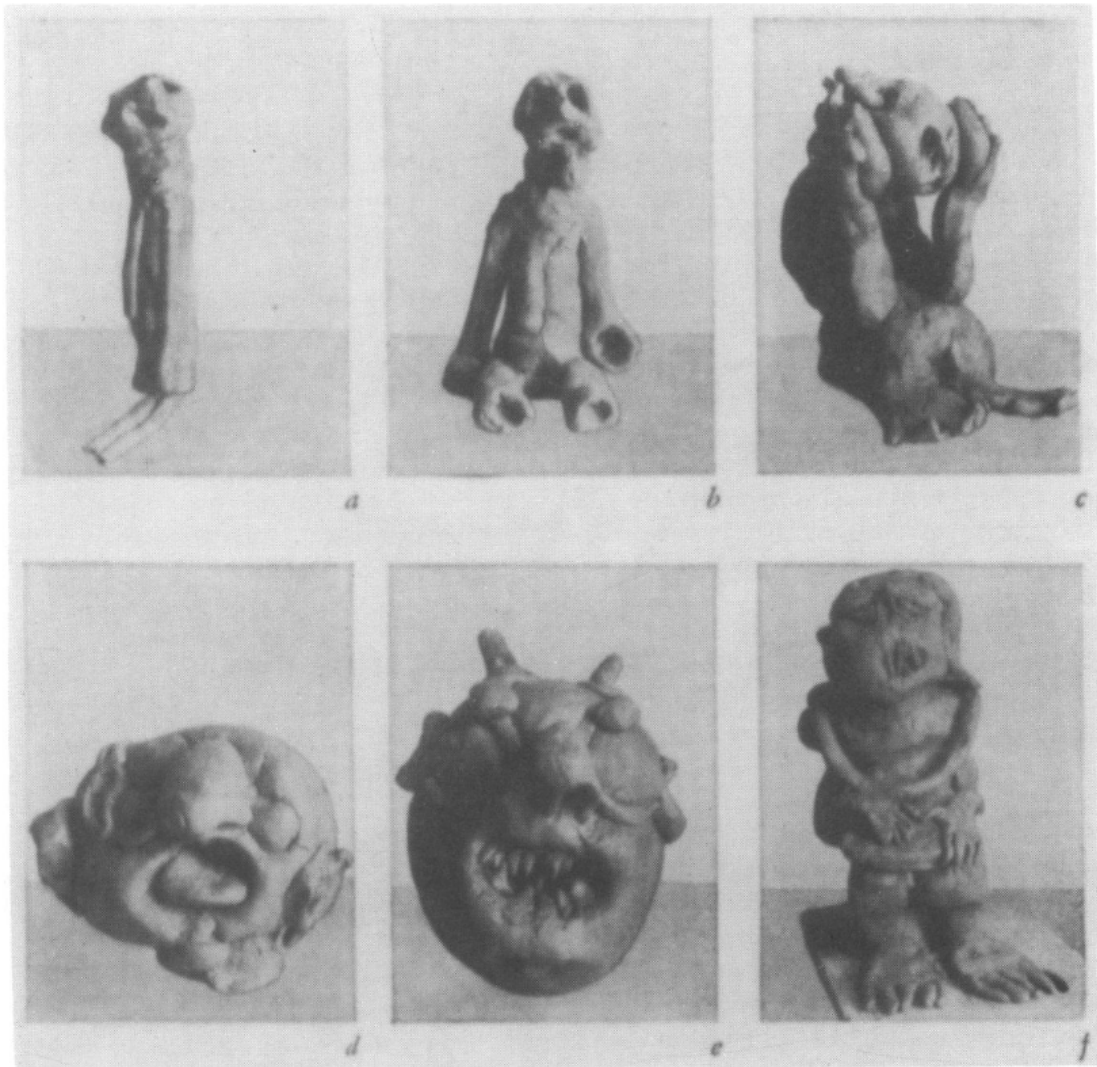
<sup>47</sup> Weisleder, Pedro. "No Such Thing as a “Blind Culture”." *Journal of Child Neurology*, (2012). Accessed October 18, 2023. <https://doi.org/10.1177/0883073812441249>.

<sup>48</sup> Weisleder, Pedro. "No Such Thing as a “Blind Culture”." *Journal of Child Neurology*, (2012). Accessed October 18, 2023. <https://doi.org/10.1177/0883073812441249>.

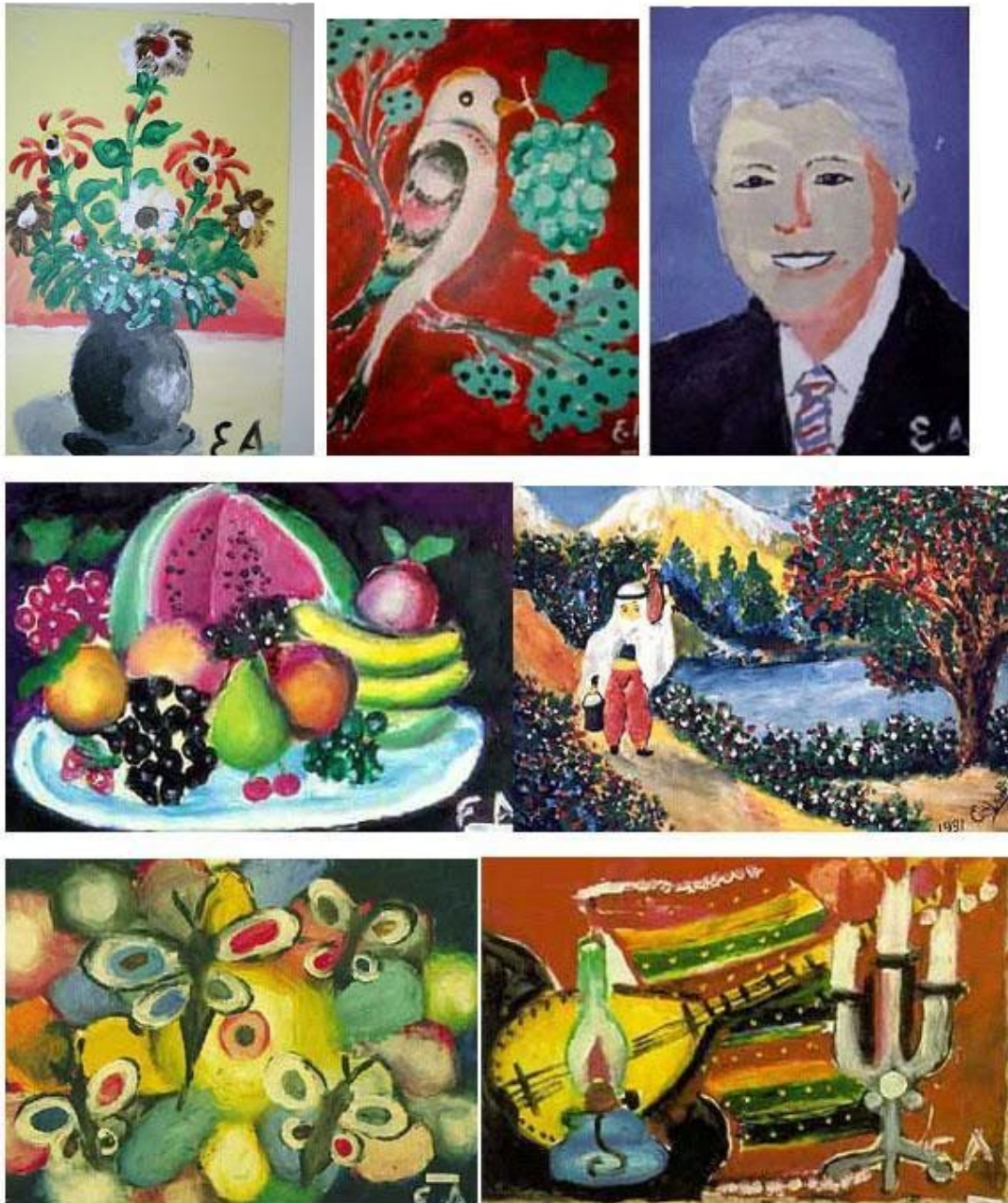
<sup>49</sup> Weisleder, Pedro. "No Such Thing as a “Blind Culture”." *Journal of Child Neurology*, (2012). Accessed October 18, 2023. <https://doi.org/10.1177/0883073812441249>.

<sup>50</sup> Weisleder, Pedro. "No Such Thing as a “Blind Culture”." *Journal of Child Neurology*, (2012). Accessed October 18, 2023. <https://doi.org/10.1177/0883073812441249>.

children who are blind are not being taught braille, but a majority of those who can have employment are, leading to fewer opportunities overall for people who are blind.



*(Figure 9) Sculptures made by an 11 year old girl responding to the following prompts: A. "Sitting", B. "I put an apple in your hands", C. "I am very tired, sleepy", D. "I am yawning", E. "I am eating candy", F "I am reading".*



(Figure 10) Paintings made by the blind artist Esref Armagan

Some shared experiences from people who experience blindness are its influence on communication and spatial experience. Viktor Lowenfeld is a professor of art education at Hampton Institute and Pennsylvania State University who focuses on the spatial experience of blind people. He conducted a study through a comparative analysis of drawings between

low-vision and full-vision children and what these comparisons could reveal. He points to the .revelations made about the spatial evolution of drawing in people with low vision and how this shows how blind people view space overall<sup>51</sup>. Viktor Lowenfeld compares these representational styles from subjects with various degrees of vision. Often people who have had total blindness since birth will reflect their inability to see in the way they draw things spatially within their drawings. People without vision tend to draw two-dimensional and object-based. Often artistic works are based around a reference point like a ground line rather than visual observation. This points towards a potential diversion from the progression of children's spatial depiction from drawing representative objects that stand in for an object to the objective drawing of an object. In low-vision subjects, this depiction changes less drastically and often continues to present images representationally as opposed to objectively.

An example of an artist who showcases the blind experience translated into art is Eşref Armağan. Eşref Armağan is an artist who was born without properly formed eyes. Because of this, he has learned how to represent things visually in two-dimensional oil paintings using touch-based application and observation<sup>52</sup>. He notes a difficulty in interpreting perspective space and the sizing of objects into one another. This experience of Eşref Armağan points towards some of these shared visual observations from people with total vision loss, that impact the way they interact with space.

Overall Blind Community is an important part of how people with hearing loss engage with the world and with each other<sup>53</sup>. Vision loss has a profound impact on the daily

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<sup>51</sup> Lowenfeld, Viktor. 1965. *The Nature of Creative Activity: Experimental and Comparative Studies of Visual and Non-Visual Sources of Drawing, Painting, and Sculpture by Means of Artistic Products of Weak Sighted and Blind Subjects and of the Art of Different Epochs and Cultures*. 2d ed. London: Routledge & Paul.

<sup>52</sup> Hayhoe, Simon. 2017. *Blind Visitor Experiences at Art Museums*. Lanham, Maryland: Rowman & Littlefield. INSERT-MISSING-URL.

<sup>53</sup> Hayhoe, Simon. 2017. *Blind Visitor Experiences at Art Museums*. Lanham, Maryland: Rowman & Littlefield. INSERT-MISSING-URL.

lives, interactions, and feelings of acceptance for people with sensory loss. By having a network of people with shared sensory experiences people can better engage and interact with the space around them. Vision loss is often complimented through the utilization of tactile observations and hearing, which leads to a profound understanding of the world dependent largely on these two senses

### Deafblind Culture

Deafblind culture is a unique cultural identity different than groups that are singularly blind or singularly deaf<sup>54</sup>. The experiences of people who are Deafblind differ from people who are singularly deaf or singularly blind because they have an additional reduced sense that impacts their world interaction. Often with people with dual sensory loss, senses are not both reduced at birth and have been lost at different times. This has a profound impact on how people interact and what senses they rely on<sup>55</sup>. A person who is blind since birth, but has recently lost their sense of hearing is going to have a more difficult time engaging with the loss of their hearing than their sight. The same is true for the reverse in order of sensory loss. Because of the dual loss of senses, it can become difficult to navigate between both identities and often leaves people with dual sensory loss separated from both identities.

## Chapter 4: Independent vs Dependent Spaces

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<sup>54</sup> Jaiswal, Atul, Heather Aldersey, Walter Wittich, Mansha Mirza, and Marcia Finlayson. "Participation Experiences of People with Deafblindness or Dual Sensory Loss: A Scoping Review of Global Deafblind Literature." PLoS ONE 13, no. 9 (2018). Accessed October 18, 2023. <https://doi.org/10.1371/journal.pone.0203772>.

<sup>55</sup> Jaiswal, Atul, Heather Aldersey, Walter Wittich, Mansha Mirza, and Marcia Finlayson. "Participation Experiences of People with Deafblindness or Dual Sensory Loss: A Scoping Review of Global Deafblind Literature." PLoS ONE 13, no. 9 (2018). Accessed October 18, 2023. <https://doi.org/10.1371/journal.pone.0203772>.

When Pondering How sensory loss impacts mental health and culture, one must also think about the impact that independent and dependent spaces have on these results. Independent and dependent spaces define the public and private spheres of human life and our interactions with others. This notion is increasingly important when looking at reported thoughts and feelings by people with sensory loss. There are both reported feelings of a lack of independence and feelings of isolation from people who experience deafblindness<sup>56</sup>. One can conclude that this is due to an imbalance in the public and private realms of individuals with sensory loss. This is the result of the balance or imbalance between living and working spaces utilized in the public and private spheres<sup>57</sup>.



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<sup>56</sup> Turunen-Taheri, Satu, Hagerman Sirelius Annica, Sten Hellström, Åsa Skjönsberg, and Gunnel Backenroth. "Combined Severe-to-Profound Hearing and Vision impairment—Experiences of Daily Life and Need of Support, an Interview Study." *PLoS One* 18, no. 6 (06, 2023). doi:<https://doi.org/10.1371/journal.pone.0280709>. <https://www.proquest.com/scholarly-journals/combined-severe-profound-hearing-vision/docview/2826187335/se-2>.

<sup>57</sup> Sarnitz, August, and Inge Scholz-Strasser. 2015. *Private Utopia : Cultural Setting of the Interior in the 19th and 20th Century*. Berlin: De Gruyter. INSERT-MISSING-URL.

*(Figure 11) a Private Home office*

### *Independent Spaces*

Independent spaces are places where people engage with architecture on an individual basis. This provides a one-on-one interaction between people and the place they are in. The most common example of private space is the home. The Home is the symbol of the private realm<sup>58</sup>. It is a space of separation and protection. A controversial inclusion in independent spaces is private workspaces. Often private spheres are experienced as the division of work and home<sup>59</sup>. The two have differing experiences, consciousness, and identity. When workspaces are placed within the private realm, for example, a home office, it can cross the boundary from independent to dependent space. The adaption of workspaces, especially due to the worldwide response to Covid-19, makes the workspace an increasingly private pursuit. In addition, private exterior space is seen as an intimate independent space that allows people to both have a connection to nature and feel separated and protected as in other private spaces. This allows for an overall more direct individual-to-space connection.

When exploring independent spaces like homes, private offices, and private exterior spaces, one can gain a personalized connection between the work of architecture and oneself. Expression of this personal style by using the senses can impact the user's response to personal space. Decoration, style, and light and visual-based stimuli that influence the tone

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<sup>58</sup> Madanipour, Ali. 2003. *Public and Private Spaces of the City*. London: Routledge. doi:10.4324/9780203402856.

<sup>59</sup> Chambers, Erve. Low. Setha M, Rapopor, Amos. *Housing, Culture, and Design : A Comparative Perspective* Philadelphia, Pa.: University of Pennsylvania Press. 2016.

and feel of space<sup>60</sup>. Sound also is a large determinant of space with a general preference for music that corresponded to the intensity of the space<sup>61</sup>.

Independent spaces are personalized to the specific user's experience. The private sphere is where individualism is expressed. This allows for independent spaces to not just be Utilitarian but be the expression of the individual<sup>62</sup>. This allows for the form to express the personalized opinions and attitudes of the user within. Independent spaces serve as an indicator of self, similar to clothing or other expressions of style and taste.

Independant Spaces	Dependant Spaces
Independent spaces are places where people engage with architecture on an <b>individual</b> basis.	Dependent spaces are places where people engage with architecture through <b>community</b> .
Examples include the <b>home, private workspaces, and personal exterior spaces</b>	Examples include <b>commercial spaces, public workspaces, and public parks</b>
Independent spaces are personalized to the <b>specific</b> user's experience.	Dependent spaces are personalized to the <b>general</b> user's experience.
The utilitarian purpose and <b>reflection of self</b> are balanced.	The utilitarian purpose and ability to make <b>public statements</b> are balanced
sense of <b>protection</b>	Sense of <b>belonging</b>

(Figure 12) a comparison of independent and dependant spaces

<sup>60</sup> Geng, Ziwen, Wei Le, Benhai Guo, and Hongjuan Yin. "Analysis of Factors Affecting Visual Comfort in Hotel Lobby." PLoS One 18, no. 1 (01, 2023). doi:<https://doi.org/10.1371/journal.pone.0280398>. <https://www.proquest.com/scholarly-journals/analysis-factors-affecting-visual-comfort-hotel/docview/2767164717/se-2>.

<sup>61</sup> Geng, Ziwen, Wei Le, Benhai Guo, and Hongjuan Yin. "Analysis of Factors Affecting Visual Comfort in Hotel Lobby." PLoS One 18, no. 1 (01, 2023). doi:<https://doi.org/10.1371/journal.pone.0280398>. <https://www.proquest.com/scholarly-journals/analysis-factors-affecting-visual-comfort-hotel/docview/2767164717/se-2>.

<sup>62</sup> Sarnitz, August, and Inge Scholz-Strasser. 2015. Private Utopia : Cultural Setting of the Interior in the 19th and 20th Century. Berlin: De Gruyter. INSERT-MISSING-URL.

This is then seen in the difference between spatial and beautiful architecture and buildings that can be used and lived in. Overall Buildings serve purposes. Architecture is created to serve the purpose. In some cases that purpose may be The expression of an individual, but in many independent spaces, that want must be balanced with a utilitarian purpose. An example of this would be in housing. The house is an expression of the individual who lives inside of it, but must also act as a place that can be lived in<sup>63</sup>.

Independent space promotes user independence. Because architecture addresses thin individuals on a personal level, it allows intimacy to be created<sup>64</sup>. Private space becomes where people go to have one-on-one connections with the architectural form and grow closer connections to others sharing such an intimate space. Private space can create a place for the immediate social unit, Those one lives with<sup>65</sup>. Private space can also provide a personal territory of protection<sup>66</sup>. Private space is a space separated from people. Individuals no longer wear a mask within their private sphere. Independence is created through the ability to create space where one identifies there is an interdisciplinary work of placemaking specifically in the comparison between those who design and those who occupy housing and independent spaces allows for a connection between those who design private spaces and those who inhabit them. This is strengthened when there is an interception of those who work in an area and those who live in an area from a culturally informed perspective<sup>67</sup>. This is then amplified when considering the additional consideration of who designs independent spaces.

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<sup>63</sup> Sarnitz, August, and Inge Scholz-Strasser. 2015. *Private Utopia : Cultural Setting of the Interior in the 19th and 20th Century*. Berlin: De Gruyter. INSERT-MISSING-URL.

<sup>64</sup> Madanipour, Ali. 2003. *Public and Private Spaces of the City*. London: Routledge. doi:10.4324/9780203402856.

<sup>65</sup> Madanipour, Ali. 2003. *Public and Private Spaces of the City*. London: Routledge. doi:10.4324/9780203402856.

<sup>66</sup> Madanipour, Ali. 2003. *Public and Private Spaces of the City*. London: Routledge. doi:10.4324/9780203402856.

<sup>67</sup> Chambers, Erve. Low. Setha M, Rapopor, Amos. *Housing, Culture, and Design : A Comparative Perspective* Philadelphia, Pa.: University of Pennsylvania Press. 2016.

Independent spaces, however, do tend to separate the individual from the collective whole. This means that because the space is so protective and isolated it may harm the individual's ability to utilize it to connect to others. This downfall can be seen in housing not properly planned or lacking ways to connect. In successful independent spaces, one must harness the feelings of individuality, self-expression, and protection while not disrupting the user's right to social engagement, community, and the public sphere.

Independent spaces are spaces designed to fit personal needs and grow the bond between individuals and space. The importance of this is amplified by the need of people who have sensory loss to feel independence. People want control over their own lives, and private space allows people to express and engage authority over their environment.



*(Figure 13) A public plaza with people dancing*

## Dependent Spaces

Dependent spaces are spaces in which users rely on public interaction to engage with a space. This means that the public engagement of the space defines the space itself. A dependent space is a space where people have and rely on social interaction and public engagement. They shape socialization, interaction, and public connection<sup>68</sup>. A common dependent space is public parks and outdoor gathering spaces. Green spaces contribute to mental physical and social well-being<sup>69</sup>. This allows for users to be more happy overall. Community is created through the creation of quality public space<sup>70</sup>. This allows the community to have a central place to gather. a survey was conducted of residents that measured their response to the 12-item Sense of Community Index, a survey that reports overall happiness within a defined residential area. The results show the biggest physical factor in promoting community is the participants' distance from their homes to public spaces. Public spaces can also be commercial spaces. Commercial spaces like coffee shops, bars, malls, and other commercial ventures can become instances of third space. Third spaces are places that serve as the in-between, being neither work nor home. They can also be non-commercial places like public parks, churches, and typically dependent spaces. These third spaces allow people to feel as though they are part of the community<sup>71</sup>. Offices also take up this role of dependent space. Traditional office buildings are designed to be a place of interaction for a common goal. Often the separation between home and work parallels this separation between independent and dependent spaces. Dependent spaces promote interaction

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<sup>68</sup> Low, Setha M. 2023. *Why Public Space Matters*. New York, NY: Oxford University Press.

<sup>69</sup> Hurst, Helen. "Sensory Garden Project Supports Wellbeing." *Journal of Community Nursing* 36, no. 6 (Dec, 2023): 14. <https://www.proquest.com/trade-journals/sensory-garden-project-supports-wellbeing/docview/2755621869/se-2>

<sup>70</sup> Francis, Jacinta, et al. "Creating Sense of Community: The Role of Public Space." *Journal of Environmental Psychology*, vol. 32, no. 4, Dec. 2012, pp. 401–409, <https://doi.org/10.1016/j.jenvp.2012.07.002>. Accessed 9 Apr. 2019.

<sup>71</sup> Low, Setha M. 2023. *Why Public Space Matters*. New York, NY: Oxford University Press.

and community in the public sphere. This allows users to grow beyond their immediate housing unit. It also creates community and a sense of belonging.

A Sense of belonging is increasingly important when considering the increased feelings of separation from people with sensory loss. Often deafblind students feel excluded by peers and instructors because of missing visual or auditory social cues<sup>72</sup>. With the inclusion of sensory-based public space, the ability to engage beyond the private sphere into the public sphere is increased and reinforced. Public spaces and Third places become hubs where communities gather together<sup>73</sup>. This allows for people, regardless of sensory ability to interact and connect.



*Figure 14: “Deaf President Now” protest at Gallaudet University*

Dependent space also provides a means for people to voice opinions. Specifically, a prominent example of this within the Deaf Community is Gallaudet's “Deaf President Now”

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<sup>72</sup> Correa-Torres, Silvia Maria. “Communication Opportunities for Students With Deafblindness in Specialized and Inclusive Settings: A Pilot Study.” *Re:View* 39, no. 4 (Winter 2008): 197–205.

<sup>73</sup> Orvell, Miles, and Jeffrey L Meikle. 2009. *Public Space and the Ideology of Place in American Culture*. Architecture, Technology, Culture, 3. Amsterdam: Rodopi. INSERT-MISSING-URL.

Movement. Gallaudet is a notable deaf university that did not have a deaf president at the time of the protest, leading to public action. This movement utilized the dependent areas of prominent deaf space to voice an opinion on deaf culture. The protest itself was a weeklong protest on Gallaudet's grounds that ended in the appointment of a Deaf university president.

Dependent spaces allow for places to interact but also provide a space for overconsumption of social engagement. This means that due to the overly public qualities of a space the space can be too open and non-limiting in social interaction. This can contradict the feelings of protection harnessed in private space, and leave individuals feeling overexposed. Good Public space creates pockets of retreat for people to better have control over their socialization and public exposure.

Dependent spaces allow people to engage within their community, form bonds with others, and have a third space. This allows for good public space to do public good beyond the immediate architectural value of the work. Dependent spaces also define communities and landmark spaces that determine what one thinks of when one goes to a space.

## Chapter 5: Designing to See and Hear

When thinking of architecture most people will imagine visual characteristics. One might think of the massing or the way that things look. Architecture, However is not solely about visual qualities, but rather about the experiences they help to curate. Vision, Along with hearing, touching, tasting and smelling, help to curate one's sense of space and place.

Sound is a sense know for it's ability to communicate. Most people communicate in person by using verbal language. When thinking about architecture, this curation of sound a noise becomes what defines the sensory experience of sound.

In this chapter, the senses of vision and sound will be explored in their role in creating space. These senses were separated due to their increased presence in architectural discourse and the amount of emphasis placed on them when discussing architecture. Vision and hearing also have the most emphasis placed on them in terms of senses overall and are seen as the most difficult to live without. This exploration is both to evaluate how seeing and hearing spaces contribute to sensory experience and determine their relationships to other senses.

### Seeing

A common proverb is "Seeing is believing". There is an idea that to know something one must see it. However, does one really know if they only see? Can one always trust their vision?

Vision is the act of seeing. To see one perceives light through reflected objects interpreted by visual images in the brain<sup>74</sup>. This allows people to have visual stimuli that help shape the way one views space. This visual culture has been highly explored through architecture. When speaking about vision Le Corbusier states:

“I exist in life, only if I can see”

Through this quote, he conveys that one’s ability to see defines the act of existing. This quote does not encompass the impact of other sensory measures on the user’s existence, but rather defines existence as the ability to see. This allows architecture to view seeing as a higher importance than other senses. Overall Architecture has a tendency to be Occularcentric<sup>75</sup>, meaning much of the creation is focused on its visual appeal as opposed to its Sound based, touch based, taste based and smell based qualities. The potential downfalls of this is the lack of immersive experience gained by focusing full efforts on one sense and ignoring the others. Occularcentric architecture views lead to limitations in the users experience and, over time, their existence.

The seeing of architecture has continually gained more importance as the images of architecture are more readily distributed<sup>76</sup>. This is through means such as print media, and the internet. This method of distributing architectural images impacts the exposure people have to architecture. It is no longer a full sensory experience, but rather a visual limited set of curated views. Why visit a building when you can look at photos of it online? Because you lose the senses of hearing, touching, tasting and smelling.

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<sup>74</sup> National Eye Institute. 2019. “How the Eyes Work | National Eye Institute.” Wwww.nei.nih.gov. July 16, 2019. <https://www.nei.nih.gov/learn-about-eye-health/healthy-vision/how-eyes-work#:~:text=When%20light%20hits%20the%20retina>

<sup>75</sup> Pallasmaa, Juhani. 2012. *The Eyes of the Skin : Architecture and the Senses* Third ed. Chichester, Est Sussex, United Kingdom: Wiley, A John Wiley and Sons, Ltd, Publication.

<sup>76</sup> Pallasmaa, Juhani. 2012. *The Eyes of the Skin : Architecture and the Senses* Third ed. Chichester, Est Sussex, United Kingdom: Wiley, A John Wiley and Sons, Ltd, Publication.

Vision and the usage of it in architecture, however, can be a great tool in helping to improve the sensory experience of people who have lost ability in hearing, touching, tasting and / or smelling. By creating alternative visual measures, one can increase the experiential value when a different sense is missing. One example is at Gallaudet's Campus. Gallaudet is a Deaf university, focusing of deaf education. Because of this focus on the Deaf population, Gallaudet has created many buildings and spaces that capitalize on visual measures. An example of this is their



*(Figure 15) Galludet Universities Living and Learning Residence Hall 6 in Washington, D.C. by Quinn Evans Architects. The image shows the large education lecture hall in the first floor*

Living and Learning Residence Hall 6 by LTC Architects. The University building helps promote deaf space through the usage of sliding doors, wide hallways, and public open space to allow for better visual-based communication and acoustical considerations for people with some hearing abilities. Specifically it uses multi story viewpoints that allow users to inhabit an interior balcony space and view the main hall below. This viewpoint allows people who have hearing loss to speak visually to people on the lower levels through sign

language and other forms of visual communication that allows for the utilization of visual space to help adapt for the loss of auditory space.

Overall seeing architecture can be an expansion of sensory abilities and the limitation of them. Often people view seeing as the only concern, rather than equally spreading responsibility to all five senses. Vision can, however be used as a tool to expand on other senses or lack of senses.

### Hearing

“Sight is the sense of the solitary observer, whereas hearing creates a sense of connection and solidarity”

was stated by Juhani Pallasmaa in his book *The Eyes of the Skin*<sup>77</sup>

This quote explores the usage of sound as a tool of connection. Sight is something experienced one an individual level. It is often a personal connection between person and the architectural form. Hearing tends to relate more to the interconnectedness of a multiple of people and space.

People view Hearing as the sense of connection. Communication between people often occurs on a person-to-person basis through verbal interaction. This is through languages and instinctive noise based reactions. This allows conveying ideas from one to another.

The sound of architecture is created through the way that architecture conveys our sense of hearing<sup>78</sup>. The sensory aspects we feel when inside those spaces determine our

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<sup>77</sup> Pallasmaa, Juhani. 2012. *The Eyes of the Skin : Architecture and the Senses* Third ed. Chichester, Est Sussex, United Kingdom: Wiley, A John Wiley and Sons, Ltd, Publication.

<sup>78</sup> Rasmussen, Steen Eiler. 1962. *Experiencing Architecture*. Translated by Eve M Wendt Second United States ed. M.i.t. Press Paperback, 2. Cambridge: M.I.T. Press, Massachusetts Institute of Technology.

impressions of space. For example, if a room is “cold” it might not be physically cold but have qualities that make it be perceived as cold. For example, the room might use cool toned colors and have a high reverberation rate in sound that makes it feel empty. Sound has sensory qualities other than communication that impact of one experiences a space.



(Figure 16) Leon Battista Alberti’s Santa Maria Novella in Florence, Italy

The idea of sound as a tactile element of a work is often explored through repetition. In Leon Battista Alberti’s work, he often interprets hearing as a form of geometric rhythm

and pattern<sup>79</sup>. In his work, Santa Maria Novella, where Alberti designed the façade, one can see this act of rhythm. Through this facade, he uses repetitive geometric designs and patterns. The repetitive action start to convey the repetitive tune of song, music and sound, allowing for physical artifacts of architecture to convey sensory experiences of sound. The facade also responds to the role of the church through its ability to control the reverberation patterns of Latin hymns<sup>80</sup>. Leon Battista Alberti uses the facade to convey the interior hearing-based sensory inputs.

Hearing has many usages beyond being a communication tool. Hearing contributes to an overall experience that affects how one views a space. Maurice Merleau-Ponty states

“My perception is therefore not a sum of visual tactile and audible givens: I perceive in a total way with my whole being. I grasp a unique structure of the thing, a unique way of being, which speaks to all my senses at once”<sup>81</sup>

Through this quote, he conveys the importance of not just vision or hearing but how the whole body curates user experience and responses.

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<sup>79</sup> SHERIDAN, TED & Van Lengen, Karen. (2003). Hearing Architecture. Journal of Architectural Education. 57. 10.1162/104648803770558978.

<sup>80</sup> Rasmussen, Steen Eiler. 1962. Experiencing Architecture. Translated by Eve M Wendt Second United States ed. M.i.t. Press Paperback, 2. Cambridge: M.I.T. Press, Massachusetts Institute of Technology.

<sup>81</sup> Maurice Merleau-Ponty, ‘the Film and the new psychology’, *in ibid*, p 48.

## Chapter 6: Designing with Alternative Senses

When a layperson thinks about architecture, they primarily view it as a visual object, as opposed to a multisensory experience. Communication is seen in a similar vein. Often when one thinks of communication, they think of auditory communication instead of a multisensory effort. Both space and communication can, however, be explored fully by the remaining three senses to create a more immersive experience.

When viewing architecture, it is often seen as a two dimensional front<sup>82</sup>. When looking in an architecture book one sees countless images and two-dimensional visualizations of architecture. This does not capture the entire experience of engaging with architecture, rather only its object form at curated viewpoints. The change in touch, taste, and smell, affects how we enter spaces<sup>83</sup>. This means that the impact and experience truly formed with architecture is experienced with all senses.

When discussing this importance of the sensory experience Le Corbusier states, “Architecture must be walked through and traversed. Organized around some abstract point that pretends to be a man, a chimerical man with the eye of a fly and vision simultaneously circular. Such a man simply does not exist, in consequence of this misconception, our own man has two eyes set in front of his head, and he stands six feet above the ground and looks ahead. These biological facts are enough to damn the whole batch of plans that have the wheel revolving around a fictitious pivot.”<sup>84</sup>

Le Corbusier is saying that the experience of walking through a work to understand it. Architecture goes beyond the typical vision-first way of viewing. Architectural forms do

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<sup>82</sup> Zeniti, Djamel. *Ptah: Architecture Design Art*. The Alvar Aalto Academy, 2003.

<sup>83</sup> Zeniti, Djamel. *Ptah: Architecture Design Art*. The Alvar Aalto Academy, 2003.

<sup>84</sup> Le Corbusier, *Talks with Students from the Schools of Architecture*, translated by Pierre Chase. Orion Press, New York, 1961, pp.44-45. Quoted in Ricardo L. Castro, Rogelio Salmons, Villegas Ed., Bogotá, 1998, pp.28-29.

not just exist as a picture moment in time but rather a series of experiences<sup>85</sup>. These experiences are rooted on the base senses and improved with an increased look towards sensory curation.

Within this chapter, we will be discussing three underutilized forms of senses in architectures: touch, taste, and smell. Within these sections, we will explore what the sense means in architecture and examples of how it has been utilized.

### Touch

Touch is seen as the sense that regulates our habitual interactions between architecture and man. Touch is coming to contact with an object by directly pressing one's skin against it. This contact is established through a physical touching

In Juhani Pallasmaa's, *The Eyes of the Skin*, he states

“All the senses, including vision, can be regarded as extensions of the sense of touch - as specializations of the skin”<sup>86</sup>.

By saying this, Pallasmaa is conveying the importance of touch to the sensory experience. He also conveys the physical touch based connection to all the senses. For example when seeing a textured wall one can imagine how it feels, without physically touching it. The act of designing is also a tactile based experience. This is due to the physical act of drawing and the physical impact of holding pen to paper<sup>87</sup>. The remnants of touch are seen on the paper through the strokes of each individual line. The weight and pressure convey a physical condition.

When discussing tactile forms in architecture Walter Benjamin states

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<sup>85</sup> Zeniti, Djamel. *Ptah: Architecture Design Art*. The Alvar Aalto Academy, 2003.

<sup>86</sup> Pallasmaa, Juhani. 2012. *The Eyes of the Skin : Architecture and the Senses* Third ed. Chichester, Est Sussex, United Kingdom: Wiley, A John Wiley and Sons, Ltd, Publication.

<sup>87</sup> Zeniti, Djamel. *Ptah: Architecture Design Art*. The Alvar Aalto Academy, 2003.

“By use and by perception - or rather, by touch and sight. ... Tactile appropriation is accomplished not so much by attention as by habit.”<sup>88</sup>

By saying this Benjamin means that, touch is experienced through habitual experiences. For example, one may know how to traverse a habitually experienced room in the dark, by relying on their touch and conditioned usage of it to navigate the space.



*(Figure 17) Chris Downey walking the stairs in his “Lighthouse” project*

Touch as a form of navigation is a commonly used occurrence of touch. One example of a touch-based architect is Chris Downey. Downey is an architect that experiences total blindness. Due to his Blindness, Downey focuses the architectural experience on the other four senses, like touch. Within the project “Lighthouse” Where he collaborated with Mark Cavagnero Associates, Touch is explored as a primary navigational tool. This work was

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<sup>88</sup> Quoted in Ricardo L. Castro, Rogelio Salmons, Villegas Ed., Bogotá, 1998, p.28.

constructed to provide office space and social services for the Lighthouse for the blind and visually impaired organization. Through this design, tactile functions like wall guiding systems and changes in floor type help guide users. Well-lit areas also help some with limited senses of sight to add to the tactile experience. The tactile experience creates habitual paths that help to aid the navigation of those without sight.



*(Figure 18) A boy interacting with a Touch wall*



*(Figure 19) Friendship park overview*

Another work of tactile importance is Friendship Park by Gaston Cuna and Marcelo Roux. This park focuses on a user's tactile, audible and aromatic experiences to create an immersive park experience for all users. This is done through the usage of tactile walls, loud waterfalls, musical game experiences, and a large quantity of flowers. The Tactile walls serve as a guiding principle throughout the work that help to navigate users into a series of multisensory spaces.

Touch is a sense that can help guide through architecture by continuous tactile interactions between the user and space through the act of physically touching. Within architecture, Touch is used as a navigational tool and as a sense to complete daily tasks.

## Taste

Taste is the sense that initiates Intimacy between form and body. To taste one must have contact beyond tactile, by physically entering the body. This creates an intimate connection between taste and the individual.

When discussing the intimate nature of taste Adrian Stokes states

“In employing smooth and rough as generic terms of architectural dichotomy, [is] better able to preserve both the oral and tactile notions that underlie the visual. There is a hunger of the eyes, and doubtless there has been some permeation of the visual sense, as of touch, by the all-embracing oral impulse”<sup>89</sup>

Stokes is conveying the relationship between taste and other senses. He describes the visual connections that can lead to oral sensations. An example of this would be looking at food. Without actually tasting it, one can imagine how it would taste and can experience a taste-based experience. The same is true for touch. When one tastes they experience a touch-based texture of food. This taste-based sense can then be explored through an oral impulse. This allows the invoking of oral sensations from visual and tactile senses in the architectural space<sup>90</sup>.

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<sup>89</sup> Stokes, Adrian. 1951. *Smooth and Rough*. London: Faber and Faber.

<sup>90</sup> Pallasmaa, Juhani. 2012. *The Eyes of the Skin : Architecture and the Senses* Third ed. Chichester, Est Sussex, United Kingdom: Wiley, A John Wiley and Sons, Ltd, Publication



*(Figure 20) Two Employees at Mozzarella communicating in sign language*

The intimacy of taste can also be explored through food. Food often carries cultural values or norms that reflect the architectural space. An example of this is Mozzarella, a Deaf owned and operated pizzeria focused on providing service to the deaf community through food. By having food that is created and consumed in a deaf environment, one is immersed in deaf culture. The intimate act of consuming food heightens this experience.

Taste is the sense that initiates Intimacy by physically entering the body. This creates an intimate connection between taste and the individual through culture and physical immersion between sense and body.

## Smell

Smell is the sense that affects one's sense of memory. Odors of the day-to-day smells have lasting impacts of how to view spaces and recall memories<sup>91</sup>. For example, the smell of a childhood home may recall emotions of safety, security, happiness, due to an association of a distinct smell and a lived experience. Through smell, we can direct over 10,000 distinct odors allowing for highly customized experiences that are incredibly specific<sup>92</sup>. One can relate distinct smells with experiences<sup>93</sup>. For example, food smells pleasant to encourage the body to eat. When eating one experiences pleasure, which allows for the smell connected with that activity to encourage memories of other times when it was consumed.

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<sup>91</sup> Barbara, Anna. Anthony, Perliss. *Invisible Architecture : Experiencing Places through the Sense of Smell*. Milano: Skira. 2006.

<sup>92</sup> Pallasmaa, Juhani. 2012. *The Eyes of the Skin : Architecture and the Senses* Third ed. Chichester, Est Sussex, United Kingdom: Wiley, A John Wiley and Sons, Ltd, Publication.

<sup>93</sup> Barbara, Anna. Anthony, Perliss. *Invisible Architecture : Experiencing Places through the Sense of Smell*. Milano: Skira. 2006.



(Figure 21) Silicon House



(Figure 22) Deck of Silicon Hoise

Another distinct smell is nature, which connects to positive associations between one and the natural world. Specific environments may trigger distinct nature smell based memories. Within SelgasCano's Silicon House, there is an emphasis on the curation of nature-based odor. The project is built on the outskirts of a forest that the architect intended to carry through into the interior of the work. There are trees and native vegetation planted throughout and inside the building, mostly residing under the raised platform foundation. This allows for the positive reinforcement of the natural setting to be read within the work.

On a less positive note, smell can also invoke negative memories. One distinct smell is the smell of death. Death is a natural part of the human experience, but generally seen as a negative one. The smell of death is a foul odor that is not well liked. This connects the two negative experiences together. Particularly with negative odors, there is more emphasis on the removal of odors rather than the curation of odors<sup>94</sup>. This means that the focus tends to be on masking odors rather than producing a true sensory experience.

Sensory experiences establish truth. Senses establish viewpoints. This is especially true for smell because it is the most lasting of all the senses. This is because it is the sense best connected to memories, particularly with familiar settings like home and other repeat experiences<sup>95</sup>. Smell establishes a place and a moment in time. This is important because it relates spaces to aspects of specific moments.

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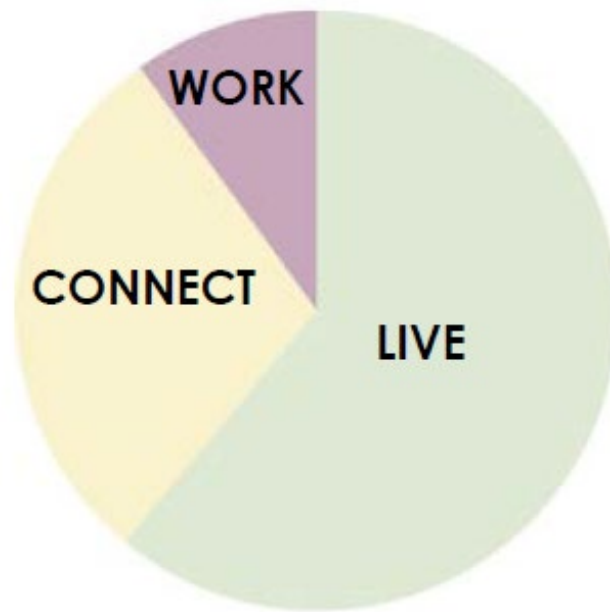
<sup>94</sup> Spence, Charles. 2020. "Senses of Place: Architectural Design for the Multisensory Mind." *Cognitive Research: Principles and Implications* 5 (1). <https://doi.org/10.1186/s41235-020-00243-4>.

<sup>95</sup> Pallasmaa, Juhani. 2012. *The Eyes of the Skin : Architecture and the Senses* Third ed. Chichester, Est Sussex, United Kingdom: Wiley, A John Wiley and Sons, Ltd, Publication.

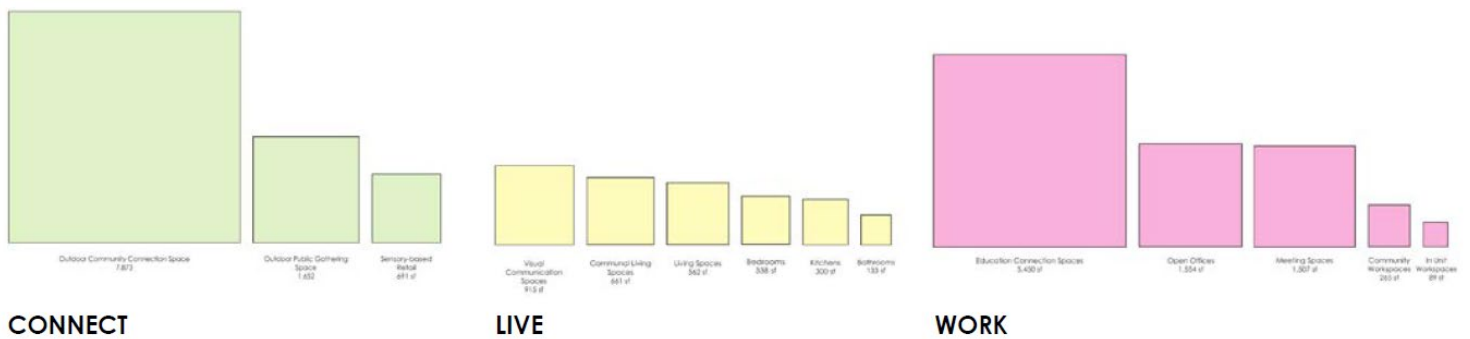


## Chapter 7: Program

Sensory design should be universally explored and utilized throughout all architectural forms. For the scope of this thesis, an ideal project will be explored where these ideals can be best utilized. Within this program, there is a separation of three distinct zones: Connect, Work, and Live.



(Figure 23) a distribution of program types



(Figure 24) The program broken down into zones

Within the connect zone, efforts are made to allow people with sensory loss to both connect with one another and the greater community context. This is done through establishing a series of community spaces design with sensory measures. The outdoor community connection area is one of these spaces. It aims to provide places of meetings by happenstance that allow for “running into” others. This could include trails and paths along the site. The second space would be a sensory-based retail location similar to the precedent, *Mozzeria*. This space allows for employment for people with sensory loss and a way to connect this community to the public. The third space within this zone is outdoor public gathering spaces. These are specially designed spaces where people can sit and congregate.

Within the work zone, a focus is placed on providing places where people with sensory loss can work. This is to help people provide for themselves. The first space provided is an in-unit workspace. The placement of a workspace within housing units allows people to work from home, especially in a post pandemic world. It also allows people to have a “home-base” for education and work within their independent space. In addition to independent workspace, the thesis proposes a series of community workspaces. This allows people to work communally and form connections with others who are working. It also allows for team meetings and group work. There would also be dedicated meeting rooms and open offices connected to this space. There is also an effort for specific education-based spaces that would allow for communal efforts more focused in an educational rather than a work setting.

The third and largest zone is the live zone. This area allows for independent living for people with and without sensory loss. Within each unit would be bedrooms,

bathrooms, kitchens, and living spaces that are specifically adapted to utilize more senses than sight to navigate. They also utilize wayfinding techniques and adaptations for people with sensory loss. For example, controlled lighting systems for people who have limited vision but the ability to see light. In addition to expected unit spaces, these units would feature additional visual communication spaces that allow people who are deaf to communicate verbally. These spaces promote ideals on independent living, a large concern for people with sensory loss.

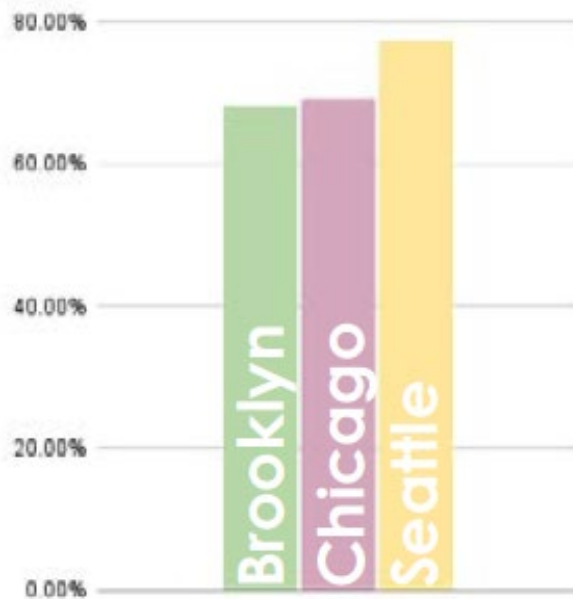
Unit Sizes	Studio	1 bed	2 bed	3 bed				
	<b>995 SF</b>	1332 SF	1670 SF	2008 SF				
	<b>Average</b>	LightHouse	Casa Mac House	Friendship Park	Sorenson Center	Living and Learning Residence Hall 6	Sixth Street NE	Foglia Residences
Total SF		37800 SF	2497 SF		87000 SF	60000 SF	1500000 SF	73500 SF
<b>Connect - Public Community</b>								
Outdoor Community connection area	6782 SF			7295 SF			6270 SF	
Sensory-based retail	691 SF						691 SF	
Outdoor Public gathering space	717 SF			717 SF				
<b>Live - Private retreat</b>								
Bedrooms	338 SF		362 SF			253 SF	447 SF	290 SF
Bathrooms	133 SF		163 SF			106 SF		130 SF
Living spaces	562 SF		738 SF					386 SF
Kitchens	300 SF		475 SF					124 SF
Communal living spaces	661 SF					654 SF	667 SF	
Visual communication spaces	915 SF		313 SF		1327 SF	1106 SF		
<b>Work - productive space</b>								
In unit workspaces	89 SF		89 SF					
Community workspaces	255 SF	200 SF			203 SF	361 SF		
Education connection spaces	5450 SF				10500 SF	4333 SF		1516 SF
Meeting spaces	1507 SF	1000 SF			1826 SF	593 SF	3600 SF	516 SF
Open Offices	1554 SF	500 SF				2608 SF		
<b>TOTAL without units</b>	<b>18532 SF</b>							
With 50 units	86840 SF							
With 100 units	155148 SF							
With 150 units	223457 SF							

(Figure 25) Program determined by Precident examples

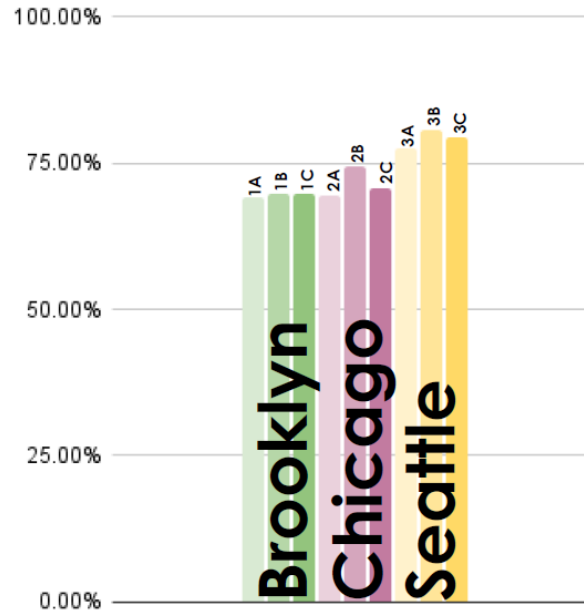
Throughout these three zones, the work aims to allow for both independent living and community building for people with sensory loss. This is in an effort to improve a reported quality of life for people with sensory loss. Throughout these spaces, one aims to set an example for how architecture can and should interact with all senses.

## Chapter 8: Selecting Seattle

When selecting a site for a project, it is vital to consider the context in which it is placed. Through this thesis is an exploration into uses of senses, which can and should be applied universally. For this thesis, one must determine where is the prime location to exhibit sensory design for sensory loss, in which the work will be best utilized. Through this exercise, the location of Seattle, Washington was chosen due to its proximity to services, green space and transit. Other sites considered were Chicago, Illinois and Brooklyn, New York



(Figure 26) A graph showing the comparison of sites between cities



(Figure 27) A graph showing the comparison of sites between Sites

When selecting what site to pursue ten main factors were considered in the selection process: transit, existing infrastructure, population, access to community, existing housing, historic context, land quality visibility, diversity and green space. Through these site characteristics, one is able to better determine where services are best utilized.

The connection to public transport is important because it allows for people to easily access the site. Easy access is vital to allowing the services provided to be readily available and accessible to many. Transportation includes access to metro and bus services, bike lanes and bikability, and walkability. These forms of access allow more people to directly engage within the space. In Seattle, transportation is better than much of the surrounding city, but less than on some of the other sites. The access

to the metro is 15 minutes and .7 miles away<sup>96</sup>, which is walkable but not ideal for a project where many of the inhabitants may have difficulty walking. However, there is a bus station potentially on site or by site. The area is semi walkable but has no bike lanes. Overall, it is semi accessible for public transportation.

In addition to accessibility to the site, the existing services should be considered within the work. The site should have some existing services, but not abundances of services where the intervention is not needed. Within the site there is the “Lighthouse for the Blind”, a service that helps prepare people who are blind and deafblind get access to services. These services include job training and braille embossing, lessons which allow people who have vision loss to be more successful in finding a job.

Due to the service offered within the scope of work, provide many general community benefits, having a large population on or by the site can help to facilitate more usage of the work. Because of this, the work is better suited in an urban environment. Seattle acts as this urban environment with over 737,015 people<sup>97</sup>.

The actual makeup of a large percent of people that have vision and hearing loss within the population also serves as a point to build off. Although Washington as a state is below average in the total population with hearing and or vision loss, Seattle is a hub for people who have vision and/or hearing loss. This allows the site to be more accessible for those who best benefit from it.

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<sup>96</sup> “Seattle.” n.d. Seattle. <https://www.google.com/maps/place/Seattle>.

<sup>97</sup> “U.S. Census Bureau QuickFacts: Seattle City, Washington.” n.d. [www.census.gov](http://www.census.gov). <https://www.census.gov/quickfacts/seattlecitywashington>.

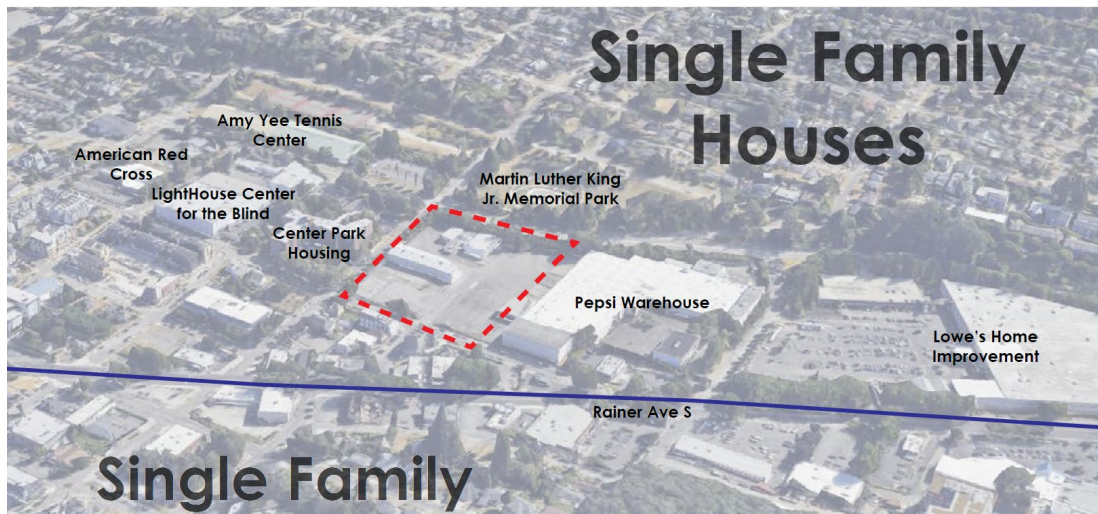
		Helen Keller Services, 180 Livingston St, Brooklyn, NY 11201		NIXTER CENTER, 6610 N. Clark S Chicago, IL 60626		2501 S Plum St, Seattle, WA 98144	
	Subtopic	Score	Notes	Score	Notes	Score	Notes
Transit	Transit	100.00%		65.00%		60.00%	
		20/20		13/20		12/20	
	Distance to metro	5	2 min walk .1 mile	3	13 min walk .6 mile	3	15 min walk .7 Miles
	Distance to Bus Station	5	On Property with a bus lane	4	On Property	4	On Property
	Walkability	5	Walkable with existing infrastructure	5	Walkable with existing infrastructure	4	Semi Walkable with existing infrastructure
	Bike Access / Lanes	5	There are bike lanes	1	No bike lanes	1	No bike lanes
Existing Infrastructure	Existing Infrastructure	86.67%		86.67%		93.33%	
		13/15		13/15		14/15	
	Is a resource similar to proposal already existing	3	There is a children's facility existing, but it does not primarily support adults or offer connected housing. It could be expanded on.	3	There is a community center existing, but it does not integrate with the community or offer connected housing. It could be expanded on.	4	There is a community center existing, but it does not integrate with the community or offer connected housing. It could be expanded on. Resorces are split up throughout the city
	Is there already existing resources that solve the problem?	5	Problem is not solved yet, could Intervene to solve	5	Problem is not solved yet, could Intervene to solve	5	Problem is not solved yet, could Intervene to solve
	Is there an existing center that one can branch off from?	5	Helen Keller Services - education building	5	ANIXTER CENTER	5	Lighthouse For the Blind
Population	Population	100.00%		90.00%		80.00%	
		10/10		9/10		8/10	
	Is there a large population	5	2,736,074 People In Brooklyn	5	2,696,555 People In Chicago	4	737,015 people In Seattle
	Is it an urban environment	5	Yes	4	Yes	4	Yes
Access to Community	Access to Community	26.67%		20.00%		80.00%	
		4/15		3/15		16/15	
	Is there an above average population with Vision loss	2	1.97% have vision loss. below the national average	1	1.9% have vision loss. below the national average	4	Seattle is a Hub for vision loss, Washington has average reportings
	Is there an above average population with Hearing loss	1	less than 15% have Hearing loss	1	15-6-16.9% Have Hearing loss	4	Seattle is a Hub for hearing loss, Washington has average reportings
	Is it an area with an above average population of both hearing and vision loss	1	It is below national average	1	It is below national average	4	It is above national average
Existing housing	Existing Housing	65.00%		85.00%		80.00%	
		13/20		17/20		16/20	
	Is there existing housing nearby	3	Yes, but there is a need for more	4	Yes, but limited	3	Yes, but there is a need for more
	Is there low income housing nearby?	3	Yes, but there is a need for more	4	Yes, but there is a need for more	4	Yes, but there is a need for more
	Is there a need for more housing?	5	Population continues to increase in area but housing has not matched this increase	5	Population continues to increase in area but housing has not matched this increase	5	Population continues to increase in area but housing has not matched this increase
	How good is the housing?	2	A neighborhood maintained housing, no major improvements needed	4	Housing Quality could improve, but poses no immediate threats	4	Housing Quality could improve, but poses no immediate threats
Historic Context	Historic Context	33.33%		46.67%		73.33%	
		5/15		7/15		11/15	
	Is a history of Hearing loss connected to the site?	1	No direct legacy	1	No direct legacy	3	Many health related buildings are in the area, including the Red cross
	Is a history of Vision loss connected to the site?	1	No direct legacy	1	No direct legacy	3	Many health related buildings are in the area, including the Red cross
	Does the site have existing negative history that would have to be addressed?	3	Community has an extensive history, particularly with gentertification	5	No directly negative history in relation to the site	5	No directly negative history in relation to the site
Land Quality	Land Quality	60.00%		60.00%		65.00%	
		12/20		12/20		13/20	
	Light and air	2	High buildings block direct access	2	High buildings block direct access	5	Direct access to light and air
	Terrain	5	Flat relatively	5	Flat relatively	2	Hilly
	Amount of frontage	4	Four- sided frontage	3	2- sided frontage	4	Four- sided frontage
	Is there an existing building?	1	Yes, there are not developable spaces without removing an existing building	2	Yes, But there is an underutilized parking lot	2	Yes, But there is an underutilized spaces
Visibility	Visibility	50.00%		80.00%		50.00%	
		5/10		8/10		5/10	
	Is this an area where there is already a city center?	1	Many green spaces and gathering areas	4	No, there is not a large "Hub"	1	Many green spaces and gathering areas
	Is this an area where that could potentially use a local "Icon" or draw?	4	Yes, although there is some, there is a large population that could benefit from another	4	Yes	4	Yes, although there is some, relatively nearby
Diversity	Diversity	100.00%		100.00%		93.33%	
		15/15		15/15		14/15	
	Is it ethnically diverse?	5	Yes, Mixed Ethnic population	5	Yes, Mixed Ethnic population	5	No, It is 69.5% White
	Is there a Income diversity?	5	Yes, The median Household Income is \$32,135	5	Yes, The median Household Income is \$38,625	4	The Median loome is \$45,736,
	Is there a clearly defined age group of the area?	5	No, Mixed Household types and Income	5	No, Mixed Household types and Income	5	No, Mixed Household types and Income
Green Space	Green Space	60.00%		60.00%		100.00%	
		6/10		6/10		10/10	
	Is there direct access to green space?	1	No, not directly attached	1	No, not directly attached	5	Yes! a large park adjacent to the property
	Is there green space accessible within walking distance to the site	5	Yes! a large park 7 min to the property	5	Yes! a large park 4 min to the property	5	Yes! a large park adjacent to the property
		68.17%		69.33%		77.50%	

		Brooklyn			Chicago			Seattle		
	Subtopic	1A	1B	1C	2A	2B	2C	3A	3B	3C
Transit	Transit	100.00%	95.00%	95.00%	65.00%	60.00%	60.00%	60.00%	60.00%	65.00%
		20/20	19/20	19/20	13/20	12/20	12/20	12/20	12/20	13/20
	Distance to metro	5	5	5	3	2	3	3	3	3
	Distance to Bus Station	5	4	4	4	5	5	4	4	5
	Walkability	5	5	5	5	4	3	4	4	4
	Bike Access / Lanes	5	5	5	1	1	1	1	1	1
Existing infrastructure	Existing Infrastructure	86.67%	86.67%	86.67%	86.67%	86.67%	86.67%	93.33%	93.33%	93.33%
		13/15	13/15	13/15	13/15	13/15	13/15	14/15	14/15	14/15
	Is a resource similar to proposal already existing	3	3	3	3	3	3	4	4	4
	Is there already existing resources that solve the problem?	5	5	5	5	5	5	5	5	5
	Is there an existing center that one can branch off from?	5	5	5	5	5	5	5	5	5
Population	Population	100.00%	100.00%	100.00%	90.00%	90.00%	90.00%	80.00%	80.00%	80.00%
		10/10	10/10	10/10	9/10	9/10	9/10	8/10	8/10	8/10
	Is there a large population	5	5	5	5	5	5	4	4	4
	Is it an urban environment	5	5	5	4	4	4	4	4	4
Access to Community	Access to Community	26.67%	26.67%	26.67%	20.00%	20.00%	20.00%	80.00%	80.00%	80.00%
		4/15	4/15	4/15	3/15	3/15	3/15	16/15	16/15	16/15
	Is there an above average population with Vision loss	2	2	2	1	1	1	4	4	4
	Is there an above average population with Hearing loss	1	1	1	1	1	1	4	4	4
	Is it an area with an above average population of both hearing and vision loss	1	1	1	1	1	1	4	4	4
Existing housing	Existing Housing	60.00%	65.00%	65.00%	85.00%	90.00%	95.00%	80.00%	80.00%	80.00%
		12/20	13/20	13/20	17/20	18/20	19/20	16/20	16/20	16/20
	Is there existing housing nearby	4	3	3	4	4	5	3	3	3
	Is there low income housing nearby?	3	3	3	4	4	5	4	4	4
	Is there a need for more housing?	4	5	5	5	5	5	5	5	5
	How good is the housing?	1	2	2	4	5	4	4	4	4
Historic Context	Historic Context	33.33%	20.00%	33.33%	46.67%	46.67%	46.67%	73.33%	73.33%	73.33%
		5/15	3/15	5/15	7/15	7/15	7/15	11/15	11/15	11/15
	Is a history of Hearing loss connected to the site?	1	1	1	1	1	1	3	3	3
	Is a history of Vision loss connected to the site?	1	1	1	1	1	1	3	3	3
	Does the site have existing negative history that would have to be addressed?	3	1	3	5	5	5	5	5	5
Land Quality	Land Quality	75.00%	75.00%	80.00%	60.00%	70.00%	70.00%	65.00%	95.00%	80.00%
		15/20	15/20	16/20	12/20	14/20	14/20	13/20	19/20	16/20
	Light and air	4	4	5	2	4	4	5	5	5
	Terrain	5	5	5	5	5	5	2	4	4
	Amount of frontage	4	4	4	3	4	4	4	5	5
	Is there an existing building?	2	2	2	2	1	1	2	5	2
Visibility	Visibility	50.00%	50.00%	50.00%	80.00%	80.00%	80.00%	50.00%	50.00%	50.00%
		5/10	5/10	5/10	8/10	8/10	8/10	5/10	5/10	5/10
	Is this an area where there is already a city center?	1	1	1	4	4	4	1	1	1
	Is this an area where that could potentially use a local "icon" or draw?	4	4	4	4	4	4	4	4	4
Diversity	Diversity	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	93.33%	93.33%	93.33%
		15/15	15/15	15/15	15/15	15/15	15/15	14/15	14/15	14/15
	Is it ethnically diverse?	5	5	5	5	5	5	5	5	5
	Is there a income diversity?	5	5	5	5	5	5	4	4	4
	Is there a clearly defined age group of the area?	5	5	5	5	5	5	5	5	5
Green Space	Green Space	60.00%	80.00%	60.00%	60.00%	100.00%	60.00%	100.00%	100.00%	100.00%
		6/10	8/10	6/10	6/10	10/10	6/10	10/10	10/10	10/10
	Is there direct access to green space?	1	3	1	1	5	1	5	5	5
	Is there green space accessible within walking distance to the site	5	5	5	5	5	5	5	5	5
		<b>69.17%</b>	<b>69.83%</b>	<b>69.67%</b>	<b>69.33%</b>	<b>74.33%</b>	<b>70.83%</b>	<b>77.50%</b>	<b>80.50%</b>	<b>79.50%</b>

(Figure 28) Site Matrix based on specific sites

Due to the housing nature of the project, the most benefit would be in the selection of a site that has limited housing options, bad housing options, or unaffordable housing options. Currently in the area, there is housing but there is a need for more housing and better quality housing. Seattle also has a rising population that will continue to need more housing<sup>98</sup>.

The existing infrastructure is also important in understanding the historic context of the site. Near the site is the Red Cross building, which is a medical care facility. There is also a nearby park called the Jimi Hendrix's Park, dedicated to the late musician. This connects to the purpose of the work and those whom it aims to serve.



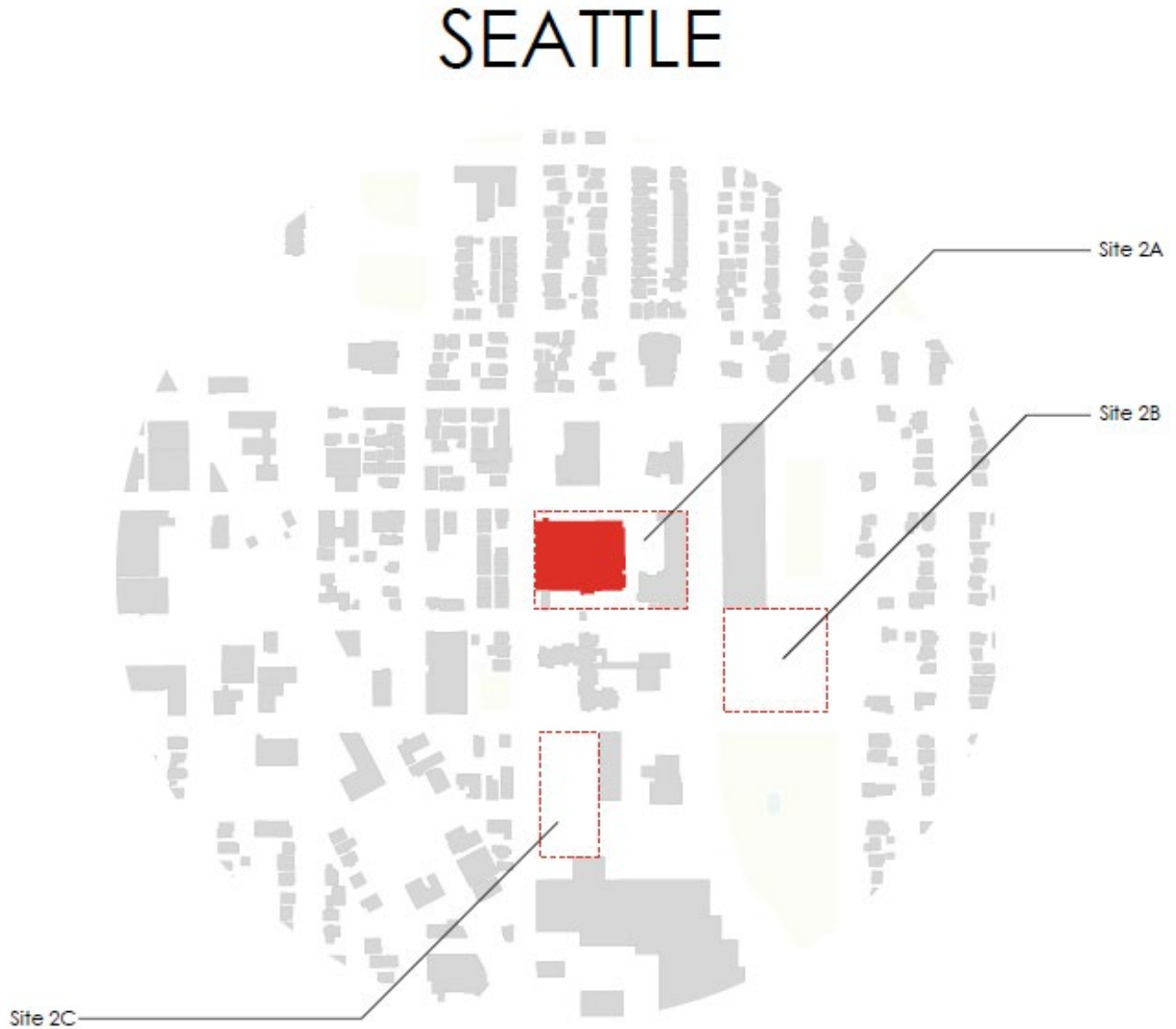
*(Figure 29) Nearby elements*

To best serve the public, high quality space is needed to be made. To not distract from the mission, having existing space with usable terrain, light and air and

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<sup>98</sup> “Nickels Backs 60% Increase in City’s Population by 2040 | the Seattle Times.” n.d. Archive.seattletimes.com. Accessed December 19, 2023. <https://archive.seattletimes.com/archive/?date=20060815&slug=population15m>.

frontage is needed. This allows the work to focus on the senses themselves. This area of Seattle is hilly due does have opportunities for four sided frontage and direct



access for light and air. This allows the work better conditions to develop off.

(Figure 30) Diagram of possible sites in Seattle

The work should also be naturally visible to the community due to its placement and the nonexistence of a current center. This site does have existing Icons, but are mostly oriented to exterior spaces. This allows a more interior based space to shine.

The access of the facility to a diverse population is important to broaden access and accessibility of the work to people from all lifestyles. This would lean itself to a site that is diverse in ethnicities, income, and age. Seattle is below average on ethnic diversity compared to the other considered sites. This means that in this consideration it is not a prime site. However, due to its higher ratings in other categories, Seattle is the most well rounded work.

One of the highest value points of Seattle is its abundance of green space. As mentioned, the site has access to Jimi Hendrix's Park, a staple green space of the city. It also has direct access to the Amy Lee tennis center and park. This allows the work to have direct access to green space. The access to greenspace is important to allow a connection to an existing green system and space.

Overall, the selection of Seattle as a site is an important grounding as the ideal site to put a sensory-based building. This is due to the ideal conditions of the site, its ability to be accessed by many and its history and established networks for connecting to people with vision and hearing loss.



**The Lighthouse for the Blind**  
2501 S Plum St, Seattle, WA 98144

The Lighthouse for the Blind is an organization that provides support spaces for Blind people. There are additionally other Blind, deaf, and blind-deaf, services in the area that could be incorporated into the work.

(Figure 31) Seattle Site Summary

## Chapter 9: Convergence

When first considering blocking and stacking three main objectives have to occur: providing a difference between the housing and commercial opportunities, creating public and private interior and exterior space, and providing enough space to provide adequate program.

Within the massing options all methods have some form of division between living spaces and working spaces. Some methods divide this space by floor by having the working and gathering spaces on the bottom floor and the living spaces on the top floor. others divide it further by separating the buildings that these programic programs live in.

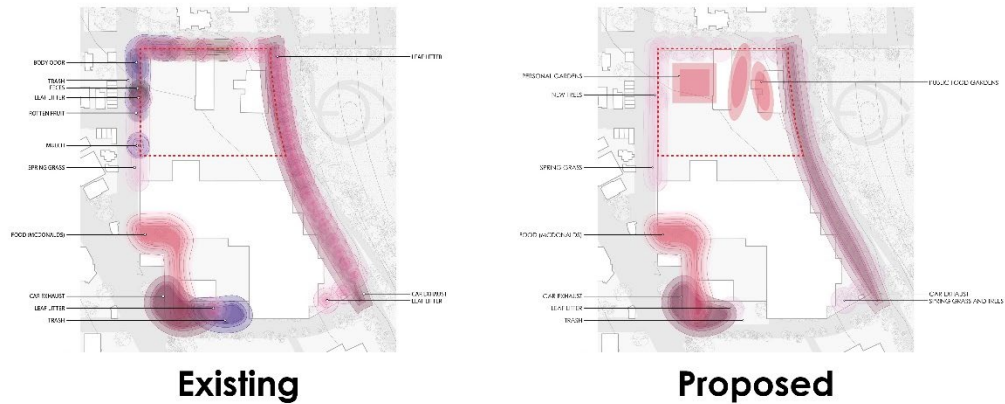
With the division two distinct areas are to be created divulging in public and private exterior spaces. A public space serves as a front to the community this will serve as a way to engage and interact. The private exterior space will be for residents to engage with nature independently.

the third objective is providing enough space for program. currently the site is larger than the programmatic requirements need it to be. this means, one can either have a more “open” approach about spaces and there interaction to the exterior or it could have an increased amount of “live”, “work” or “gather” spaces.

Overall the initial blockings provide initial attempts at mitigating these factors and will be built upon to solve them more eloquently within the development of this project.



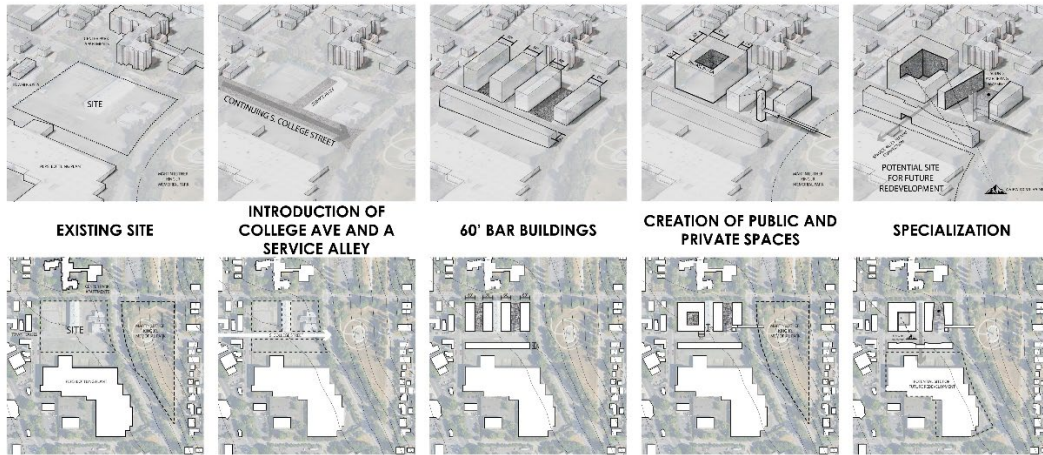
## SMELL



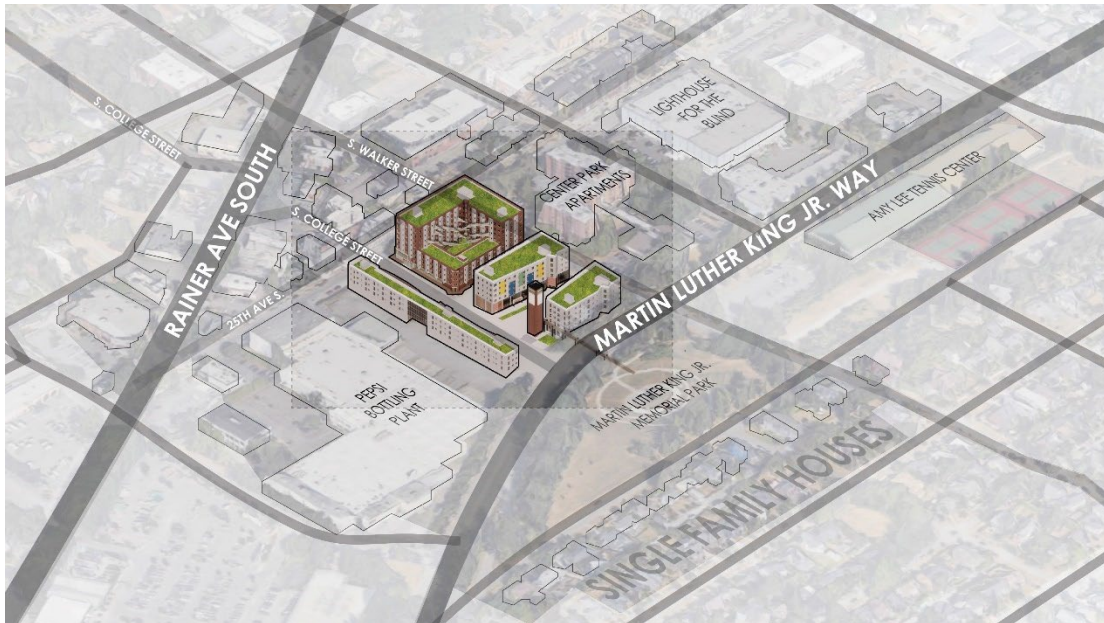
(Figure 33) Smell Proposal

The work builds off traditional 60' bar buildings to create livable housing while also providing specialized massings to direct sound and views. This creates a series of conditions and therefore a series of different sensory experiences one may choose to explore.

This is also explored through the connection to S. College Street. Currently the street is left with a dead-end at the site. Through this proposal one would call for the project to continue this street through the site and towards the existing Martin Luther King Jr. Memorial Park. This would allow for further traffic to be connected to the site and for further connectivity for pedestrians.



(Figure 33) Massing Evolution

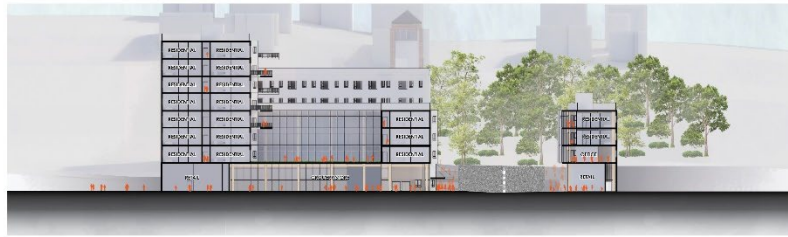


(Figure 34) Final Massing



(Figure 35) S. College Street

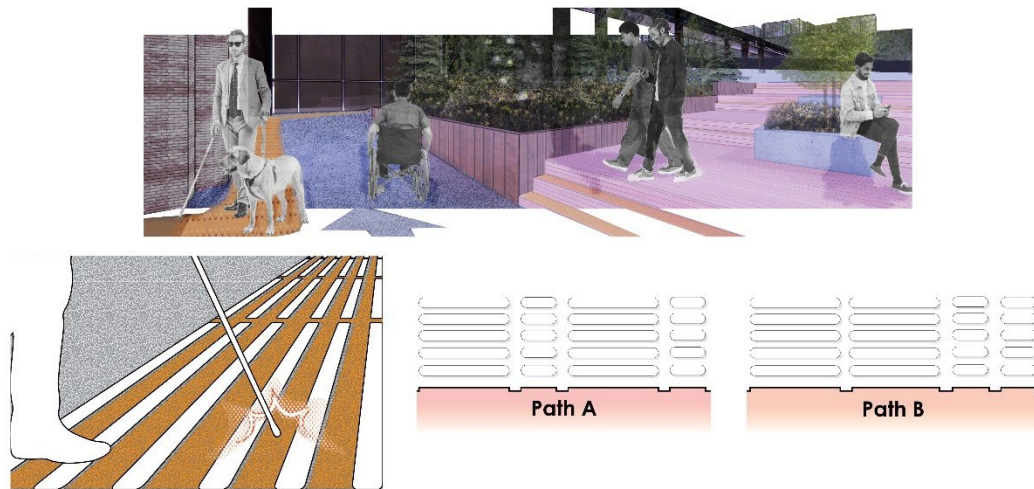
The work is also defined by its usage of a mixture of building a design types to create a mixed use community. This serves to activate the area for 24 hours as opposed to many of the nearby industries which only allow the area to be used in working hours. It also serves to create a mixture of uses which are less dependent on the market on one specific subsect or industry.



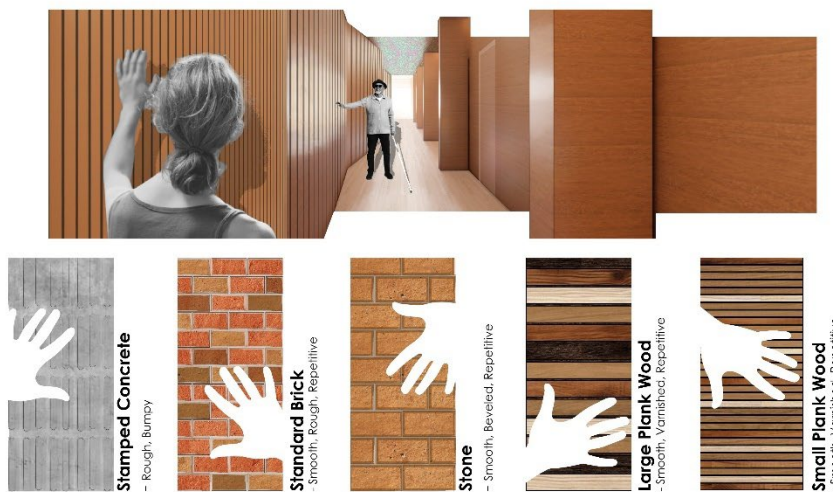
(Figure 35) S. College Street

When traversing this mixed-use community, special importance is given to creating a walkable neighborhood for all. To make a neighborhood truly usable for all, touch based navigation systems are employed to add an additional factor of navigation ability. This is done through the usage of raised touch paths that serve as a connection between various points of importance throughout the project. There is also bright colors used to denote the ending of stairs to make them more visible. Moreover many of the stairs are supplemented through the usage of an elevator observation tower which allows for both visibility and further connection onto the site.

Touch Based paths are also used in the hallways to allow a touch experience upon entry. This allows for easier navigation and a more experiential approach to units than in a typical building. This is done through the usage of touch walls and through the usage of nonlinear hallways.



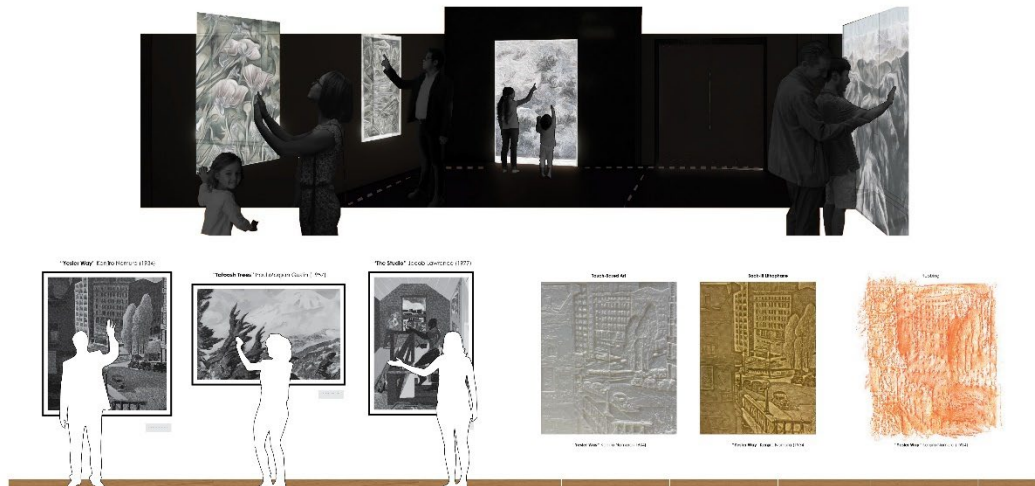
(Figure 36) Touch-Based Paths



(Figure 37) Touch-Based Surfaces

Touch is also used within the work in ways besides navigation. This includes a touch gallery. The touch gallery utilizes 2-D work from Seattle born artists or works depicting Seattle. This is then converted to a lithophane in which one can “Touch art”

that they otherwise would not be able to experience. This allows for people who are blind to experience art they would otherwise not have the chance to. The work is also backlit to allow other users who are not blind or have limited vision to see visually see the work.

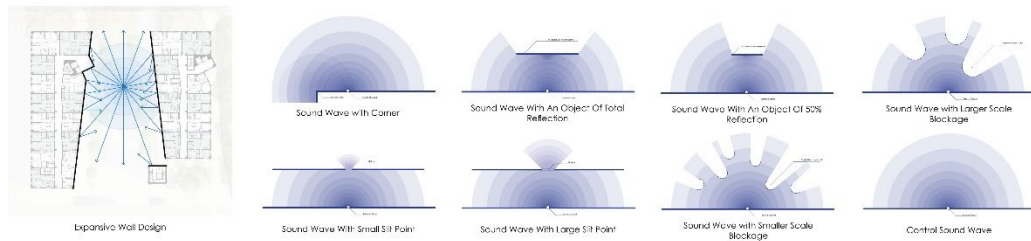


(Figure 38) Touch Gallery

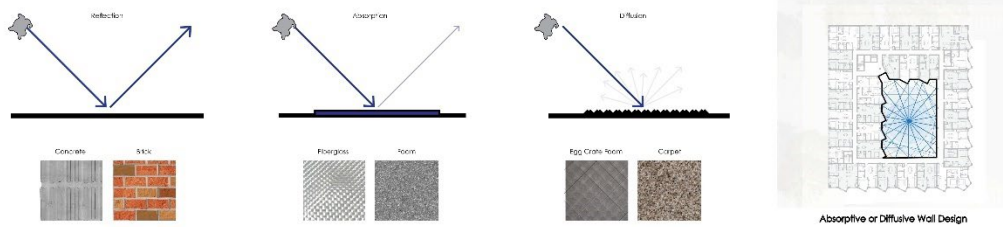
Sound is also a consideration within the space. Within the public performance area sound is amplified by using wedge shaped buildings to allow for sound to be further curated to the public plaza. The sound in the inner courtyard is reduced by it being contained in the courtyard and the increase in Noches that diffuse sound. This allows more quiet in this area of the project.

The inner courtyard also provides space for Visual communication through the usage of visualization courtyards that allow for residents to see one another and communicate visually (either by looking at one another and communicating through

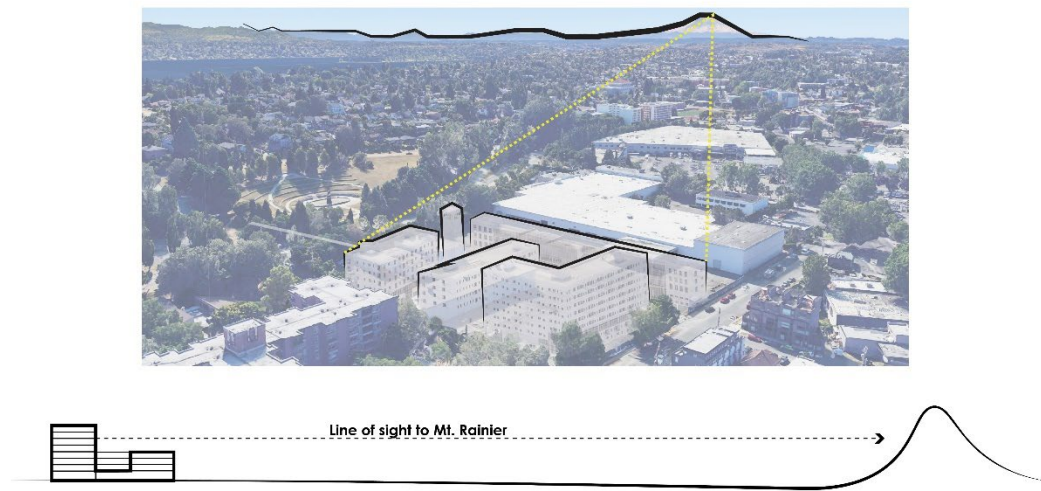
body language or through sign language. The courtyard also provides a space to visually see Mt. Rainier, a prominent attraction in Seattle.



(Figure 39) Public Performance Space



(Figure 40) Inner Courtyard



(Figure 41) Line of Sight to Mt. Rainier

Taste and smell are also explored thoroughly through this project. This was started through the idea of exploring the visual reactions to taste experiences. This experiment was done in two parts. Part one was the study of the visual representations garnered by foods and tastes as drawn by fellow colleagues. This is then explored by adding prompts into AI to explore generated depictions of tastes. This is then taken into account the exploration and arrangement of restaurant spaces aligning with the tastes they are designed for. These restaurants are then further explored through the usage of complementary plants and foliage in the smell gardens outside of each restaurant. Each area of the smell garden would correspond to the taste profile of the restaurant by providing plants that smell or taste like that assigned taste preference. This creates one unified experience.



Including Drawings From Adrian Mora, Zeynep Demircan, Joe Tannir

(Figure 42) An Experiment in the Visualization of Taste



(Figure 43) The Smell garden

Overall, the project takes into account various sensory measures to ensure a complete sensory experience for the user regardless of sensory abilities.

## Conclusion

This thesis aims to explore the relationship between architectural space and the senses to create a less sight-based experience. This thesis specifically points out experiential features for people with sensory loss to rely on less on spaces that predominantly use vision and hearing. By doing this the thesis aims to improve mental health and quality of life for its users.

It achieves these missions through it is three distinct zones Connect, Work, and Live. These zones aim to create environments that are tailored to the everyday need of it's occupants to provide opportunities for independent living while also reducing feelings of isolation and dependency.

This converges on a series of spaces in a mixed-use community that prioritizes sensory experiences to enrich the senses. This creates societal inclusion and overall, a more inclusionary space.

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