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Multi-Sensorial Architectural Design as a design element for the Visually Impaired (A potential equity and universal design for diffable)

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ABSTRACT

Visually impaired people have limitations and challenges in understanding the built environment. The current one focuses on exploring the built environment through the visual elements of architecture, whereas their condition is limited to visuals. The purpose of this study is to explore spatial quality to meet the needs of blind people. As well as demonstrating the importance of designs that explore multi-sensory architecture for them. The research methodology is qualitative with content analysis that explores the phenomenon of the experience of visually impaired people. In this research, we will explore the experiences form one of the member of the National Commission of Disabilities Indonesia in perceiving space and the surrounding environment. As well as their personal experience interpreting space through multi-sensory in the form of haptic perception (active-passive), auditory perception, and olfactory perception. They will extract from all multisensory architectures which implementation is most effective for their needs. The results show the importance of multisensory architectural design that supports equity and universal design for visually impaired people. It also empowers them to live independently, safely, and comfortably.

1. Introduction

Architectural Design to design the built environment has a huge influence on a better life for most of the world's population. In general, architectural designs are designed based on aesthetics and visual function and tend to ignore other non-visual senses, such as hearing, smell, touch, and the sense of taste. Human abilities can explore beyond visual focus. So architectural design should be able to overcome visual limitations and be able to stimulate other human senses to improve life. All the senses that exist in humans are the existence of tactile senses which are related to nerves, so they are directly

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related to tactility [1]. Especially for people with visual impairment, have always used and interacted with space using designs from visual perception. This condition forms a spatial gap between people with visual impairment and the built environment.

According to the World Health Organization, visually impaired people in the world: 285 million people, consisting of 39 million people who are blind, and 246 million people who have low vision [2]. Medically, visual impairment is a limitation of the actions and functions of the visual system that cannot be corrected using glasses [3]. This limitation is social, blindness means utilizing other senses, with alternative skills, methods, and tools to interact with the surrounding environment. WHO classifies visual acuity and impairment into: moderate visual impairment, low visual acuity, and blindness [4]. This paper aims to understand the needs of the visually impaired holistically, to minimize challenges and gaps in interaction with the built environment and outdoor spaces. The experience of holistic multi-sensory architecture for the visually impaired is the basis for the design of architectural elements and can be one of the bases for producing designs that can be used by all humans, whether they are disabled or normal (universal design).

1.1. Multi-sensorial Architecture for the visually impaired.

Architecture is traditionally dominated by visuals because humans are creatures who are dominant towards visuals [5, 6, 7]. This means that everyone tends to think, imagine, reason, and engage in interactions and activities. Pallasma explained that architecture is currently turning into retinal art. Architecture in general has become an art of printed images captured by a hasty camera. [8].

As it is more frequently explored, such visual dominance is plausible or, can be explained neuroscientifically [5, 9]. And our brains are used more to process what we see than to handle information from our other senses [10]. For example, according to Felleman and Van Essen (1991), more than half of the cortex is involved in processing visual information [11, 12, 13]. However, it is important to know that as other senses are used, they can sharpen other sense stimulants into the brain and nerves to interact with space. For its development, currently, more and more architects and designers are starting to consider multisensory architecture to broaden perspectives and to stimulate other senses: sound, touch (proprioception, kinesthesis, and vestibular sense), smell, and even taste. Canadian Bruce Mau designs through exploration with two main sensory functions: sight and sound to dominate the design imagination. [14, 15]. This was further supported by Palasma, an architect from Finland who stated: "Spaces, places, and buildings are undoubtedly encountered as multisensory life experiences. Not only is architecture just a visual image, but it is also the experience of setting the ear, skin, nose, and tongue. Architecture is the art of reconciliation between ourselves and the world, and this mediation occurs through the senses” [16, 17].

Visually impaired people who have visual limitations face challenges and gaps in interacting with the built environment and the outside world daily, especially when using public spaces [18]. Even though it is considered one of the most vulnerable communities in urban areas, it often lacks access to parks and other open public spaces [19]. So they build new understanding by combining different perspectives through other senses, and this mechanism is stronger with different cognition [20]. Visually impaired people optimize other senses: hearing, smell, touch, and the sense of taste. Oteifa explains that the visually impaired interact with the built environment through haptic (touch), auditory (sound), and olfactory (scent) perception [21]. Haptic perception consists of active touch (kinaesthetic & tactile) and passive touch, and auditory perception: natural conditions, activities, materials, surrounding environment, and distance and orientation. Meanwhile, olfactory perception: emotions, material, and memory [21]. Multisensory is a combination of at least two different sensory modalities in sequence. For example, touching an object involves both haptic and visual modalities. Multisensory processes can be multimodal if they involve active motor input, such as turning the head or moving the hands [22].

Designers should create spaces that engage and stimulate many senses simultaneously, aiming to enhance the overall experience and create a more memorable and immersive environment. This approach recognizes that humans understand their environments through a combination of sensory input, and by designing with this in mind, architects can create spaces that evoke specific emotions, enhance well-being, and enhance users' quality of life.

1.2. Equity & Universal Design

Designing the built environment for visually impaired people does not necessarily focus on objects, but design can also be used for everyone. In the perspective of justice and the Universal design framework, in the learning process, Rose and Meyer, 2002 explain that design that can be used for all and is fair is without the need for regulation and represents multisensory. Design that can be used effectively and productively as a common basis for inclusion among people with diverse abilities and learning styles [23]. Everyone has different learning styles, different life experiences, skills, interests, and abilities. Universal Learning Design Guidelines [24], define requirements by offering various ways of engagement, representation, and action/expression to interact in the learning process.

Universal design is a design that can be used by everyone together without the need for adaptation or special treatment [25]. The universal design approach has several universal design principles. The main principle is fairness in use (equitable use), by providing facilities that can be used by all users from various groups [23, 26]. Another principle is Safety and security for all users. Design must be able to minimize the dangers and adverse effects for everyone, as well as tolerance for errors and comfort [25, 26]. Design must also be able to ensure easy access to, and from inside and outside the building and environment that is free from physical and non-physical barriers and easy to understand regardless of the level of knowledge, experience, language skills, and concentration of the user. Simple and intuitive use [25, 26]. The design also provides easy access to information (perceptible information) for everyone. Design must ensure easy access to information for all users ranging from the user's sensory abilities to physical conditions [24, 26]. In addition, independence in the use of space is needed. the design considers the various abilities of different users so that it can be used independently without the help of others. [23, 26]. The next principle is energy efficiency for all users. Design can be used efficiently and comfortably by users without experiencing difficulties. [24, 26]. The last is the appropriate size and space for all users. Size and space can be used by all users regardless of body position, posture, size, and mobility of the user. [25, 26].

The implementation of universal & equity design has holistic thinking. The design can accommodate all needs. However, it is impossible to design environments, experiences, and activities that can be used in a meaningful way for everyone [27]. So, the ideal design should have tolerances to minimize challenges and gaps in space interaction for all.

2. Methodology

To holistically understand the needs of visually impaired people, the initial approach is to understand multisensory architecture for the visually impaired. This aims to find multi-sensory objects for the visually impaired which will be explored by expert sources. General framework with deductive content analysis, to build a semi-constructive framework for exploring and confirming multisensory architecture for the visually impaired regarding detailed architectural elements. This is to build new understanding with in-depth perspectives from expert sources who are also visually impaired people and provide new insights [20].

The expert resource persons are not only visually impaired people, but also have positions as commissioners of the National Commission for the Blind, which has the task of monitoring, evaluating, and advocating for the respect and protection of education for people with visual impairments throughout Indonesia. Information obtained from expert sources representing blind people with disabilities and experiencing the needs of blind people with disabilities.

In detail the research stages (figure 1):

1. Explore the theory of multisensory architecture for the visually impaired, then detail it in the question.
2. Written questions based on previous theory [21].
3. Semi-structured in-depth interviews with expert sources, the National Commission for the Blind. He is a visually impaired person who is 54 years old. His position as a national commission for the Blind is to provide outreach and knowledge to design-built environments that can minimize the challenges and gaps in interaction between visually impaired people and the built environment.
4. Translation of the interview results: (a) Global transcription, (b) detailed transcription, (c) meaning segment, & (d) coding.
5. Content analysis of the deductive method from the results of deep interviews.
6. Recommendations for multisensory architecture design elements for the visually impaired that minimize challenges and gaps with frame equity and universal design.

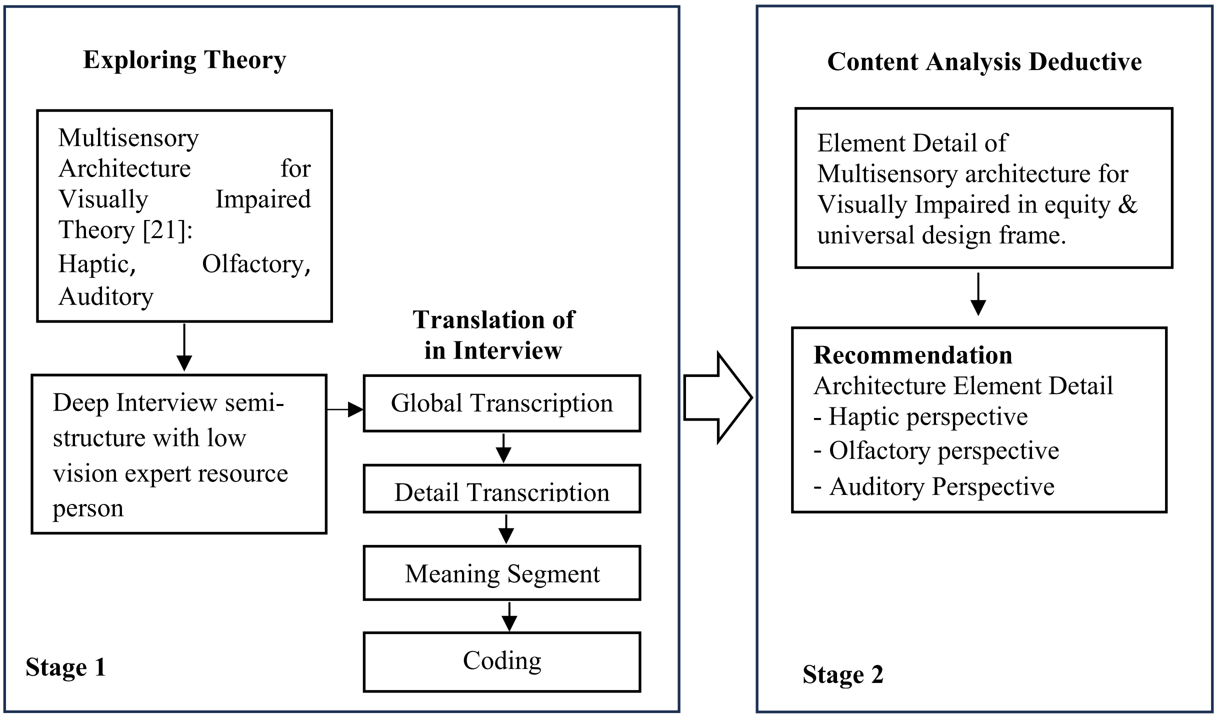


Fig 1: Research Methodology Stages

3. Result and Discussion

Previous research groups multisensory architectures for the visually impaired into:

- Haptic Perception feedback: active touch consists of kinesthetic & tactile, and passive touch consists of heat sensation and airflow.
- Auditory Perception themes: nature, activities, material recognition, recognition of familiar surroundings, and judging distance and orientation.
- Olfactory Perception themes: memory, material recognition, and emotions. [21].

From this theory, questions were prepared for in-depth interviews with the sources. Expert resource person, Jonna Aman Damanik, 54 years old. He experienced vision problems (glaucoma) starting in 2007. So his left eye functioned 30% and his right eye was completely blind. The left eye can identify light and silhouette shapes. Semi-constructive questions to confirm existing theories and develop design recommendations.

In the deep interview process. Jonna explained that the responses and interactions of the visually impaired do not stand alone in the senses of touch, auditory and olfactory (smell). All senses support each other for interaction and understanding outdoor and indoor built spaces. However, from the interview results we identified the perceptual coding results as in figure 2.

HAPTIC						AUDITORY	OLFACTORY	
Independent (Assistive)	Tactile	Contras Colour	Contras Form	Thermal	Lighting	Identify Mobility through reflected sound	Place Scent	Memory smell
7	9	8	5	3	2	2	3	1
21%	26%	24%	15%	9%	6%	100%	75%	25%
34						**2**	**4**	

Fig 2: Perceptual coding results

3.1. Haptic Perspective

In haptic perception, the details that are usually used and felt by people to identify a room with body movements produce six categories that appear with the greatest tactile frequency: 27%, color difference: 24%, independent (assistive equipment): 21 %, difference in shape: 15%, thermal: 9%, and lighting: 6%.

In the results of research on haptic perception (touch), it was found that active and passive haptic perception will be continuous and complement each other. The graph shows that tactile is the perception category most often used by people with disabilities to feel direction and environmental conditions. Juhani Pallasmaa, explains that touch, or haptic in architecture, relates to materials; natural materials - stone, brick and wood. Also transparent materials in the form of glass, as well as other metal materials, and other synthetic materials [28]. Haptic dominance is found in tactile elements, then contrasting colors, contrasting shapes, thermal, lighting and self-response (assertive). Jonna explained that tactile does not stand alone, it is supported by color, shape and other elements from other senses. Touch (haptic) is a mobility response with body movements to interact with space and form. This tactile perception is also supported by contrasting colors and contrasting shapes. Tactile implementation is the initial response of visually impaired people by touch [28]. Architectural experience through touch with materials in the form of material, texture and color of materials supports each other's touch. The texture of wood grain, the surface grain of marble, the cold precision of steel, the textured pattern of brick [29]. Rybczynski also mentioned texture and temperature, two main attributes of tactile sensation [29, 30]. In the design of a Tom museum for the visually impaired in Tokyo, changes in temperature, and changes in floor material (woven tatami or cedar wood), were also something that Henderson also deliberately designed [31, 32]. There are also braille letters on the door handles, tactile exploration of textures and materials is designed on the walls, floors and railings [33].

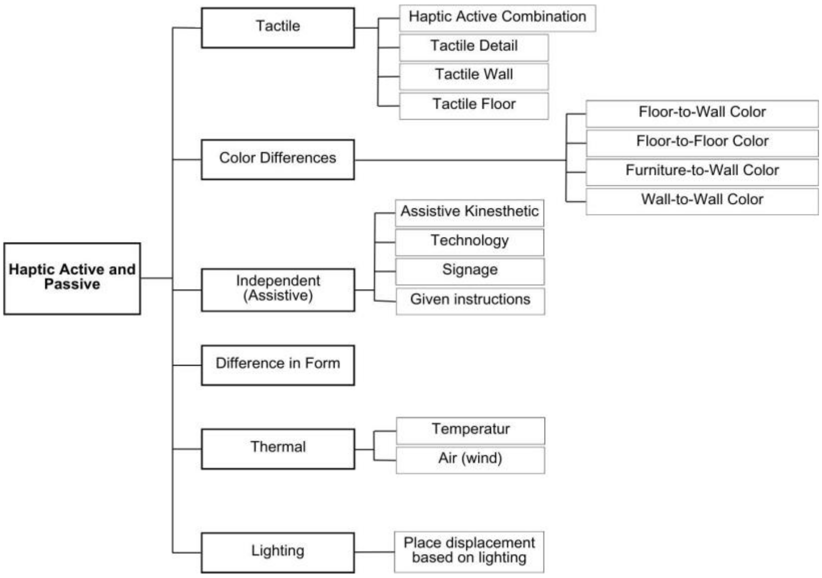


Fig 3: Diagram of haptic perception research results

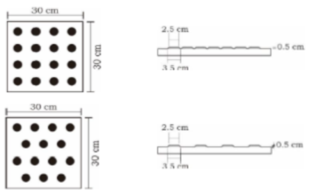
Jonna also explained that public buildings in Jakarta that have minimized the challenges of visually impaired people are hotels. The design is in the form of tactile, different colors and materials that form a design composition and stimulate multi-sensory haptics. When moving between rooms, visually impaired people can feel small details such as the texture on the walls. Apart from that, if you are moving between rooms or between floor levels, there are railings that can be used to guide the way. These two things are referred to as tactile walls. This texture can be a sign for visually impaired people when they pass through a room. At the same time, tactile details can also be felt through the soles of the feet if there is a slight difference in level on the floor. Another example, the use of ramps is preferable to stairs. Tactile floors with different materials, as well as detailed railings and wall details are markers of differences in architectural elements.

Color differences can help them to distinguish spaces. Color differences between floor and wall, floor and floor, furniture and walls, and walls and walls using contrasting colors. Color differences help recognize space and spatial movement. Color differences that are too blended together can be dangerous for people because they cannot see differences or changes in space. Monochrome colors are not recommended because the colors tend to be the same and are quite difficult to differentiate.

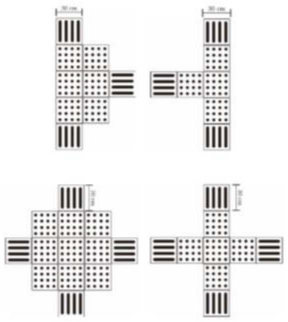
For the art gallery, the background wall color of the painting uses a contrasting color to the painting, so that the visually impaired can enjoy the artwork globally and in silhouette. Contrasting shapes can also give the different character of an area. Apart from that, design elements can be combined with movement from the interior to the outdoor, apart from material elements, also lighting and temperature to support the gap for visually impaired people.

Passive haptics is related to differences in color and light, where moving places with lighting is carried out with the perception of light received by visually impaired people. This action is carried out by people with mobility. The reason why we use light perception is because visually impaired people can still perceive light entering their eyes, even if only a few percent. In this case, their visuals are used to the extent of knowing that visually impaired people have changed rooms or places, both inside the building and outside the building. The light used cannot be too warm or cool because it can make visually impaired people dizzy and make their eyes tired more quickly. Apart from that, the movement of space through light will be related to 'Thermal'. Lighting will be assisted by passive haptics in the thermal category because indirectly, the skin will feel the movement of the room from the existing temperature. Then when you move, there will be a flow of air that passes through your body. Changing air flow from low to high or hot to cold can be a sign for visually impaired people that the room they are entering is different.

Two other categories of haptic perception are possible are said to be related, namely 'Independent (Tools)' and 'Differences in Form'. What is meant by independence is how visually impaired people can carry out activities and move around on their own with assistive devices. The tools used can be in the form of blind canes, applications, or technology that has been integrated into the construction of a space. Technology can also be a personal electronic device, namely a smartphone. Because of these things, 'differences in form' are quite important to pay attention to. Differences in shape can help visually impaired people to differentiate between items or spaces because they can still recognize basic shapes.

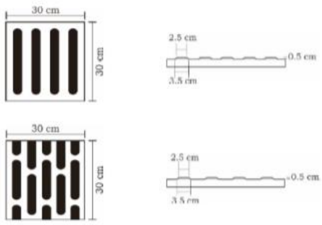


Tactile dot pattern

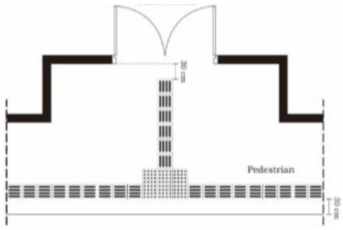


Intersection floor tactile pattern

Tactile floor dots (junctions), identified with stick aids to help respond to spatial interactions.



Striped tactile pattern (corduroy)



Tactile pattern of lines and dots (stops on doors)

Indicates that there is a train platform ahead. If he wasn't careful, he might fall into the ditch. Such tiles can be used to show sudden changes in level

The placement of these tiles indicates that there are stairs or other obstacles ahead. Be careful. These tiles are also called corduroy hazard warning tiles.

often used when there are two types of paths combined. One of these paths is intended for pedestrians while the other path, for example, is for bicycles. In such cases, tiles are installed

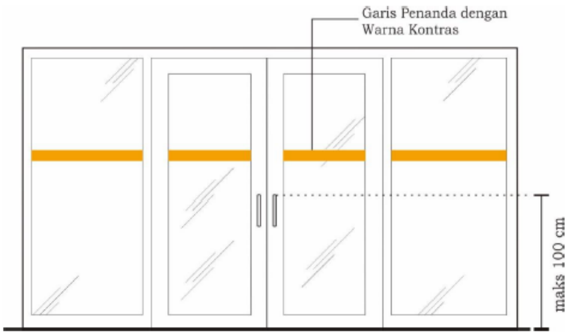
Stairs equipped with braille letters on the top of the handrail at certain intervals indicating the position of the steps (Tactile detail) along bicycle paths and across pedestrian paths

This tile indicates that it is safe to move forward. The path is free of obstacles and safe.

These tiles warn the visually impaired that they are approaching the edge of the transit lane on the road

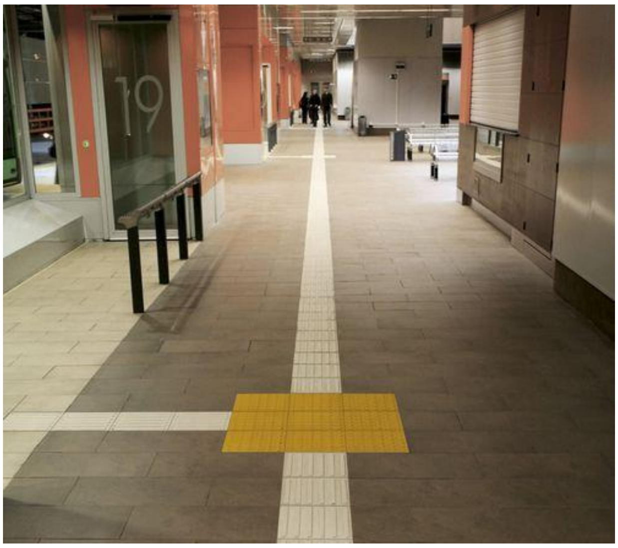
Stairs with tactile floors, different materials and colors, as well as different materials on the walls and railings. Shows the limits of spatial differences. (https://businessnorway.com/solutions/taktila-durable-tactile-indicators-made-from-recycled-plastic)

Fig 4 : Tactile in public facilities [25]

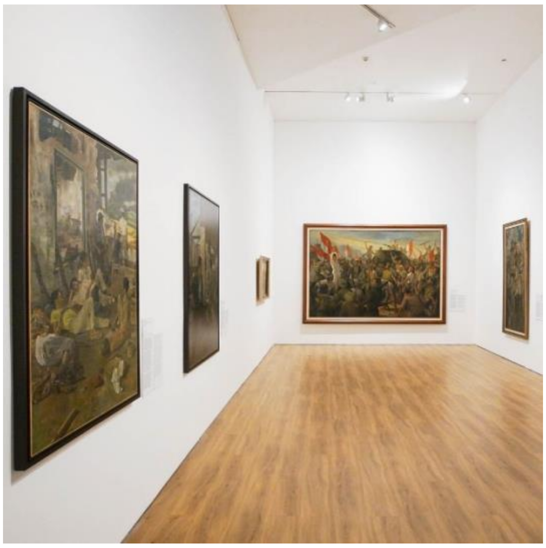


The yellow color and contrast with the material on the door shows

Lighting to provide space boundaries and still provide room aesthetics.



The contrasting colors of the floor and walls make it easy to identify the space.



The contrasting color of the back ground wall and painting provides a painting accent. So that visually impaired people can enjoy the painting silhouettes.

Fig 5 : Contrasting colors in design elements and lighting to provide space boundaries (pinterest, 2020)

3.2. *Auditory Perspective*

The interview results show that auditory perception produces one category, namely identification of mobility with reflected sound. Visually impaired people identify mobility through the reflection of sound in space, to receive information on the dimensions of a space (height, area) and atmosphere. When in a room, the sound reflection received by visually impaired people varies according to the size of the room where they are. There are several ways to produce reflections in space, for example clapping, snapping your fingers, humming, and tapping the floor with your feet. By doing this, visually impaired people can find out the dimensions of a room from the reflection of the floor, walls, and ceiling.

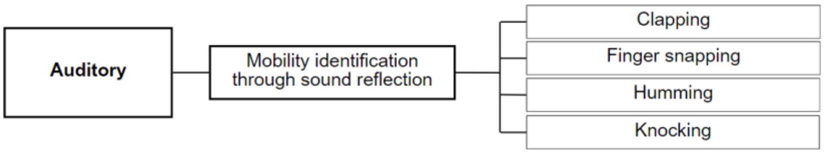
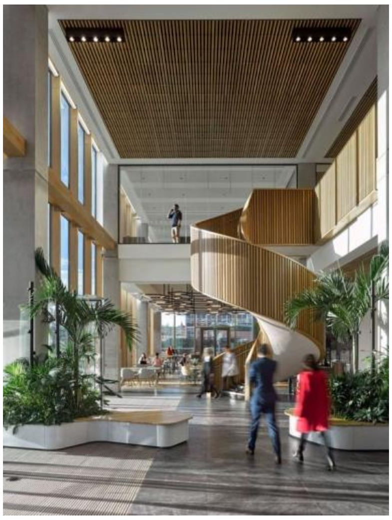


Fig 6: Diagram of the results of auditory perception research

Architectural design can be strengthened by sensory auditory, relying on hearing to provide explanations of spatial conditions, psychological effects of comfort and well-being [33]. The design is not only passive from material reflections but can also be combined with multimedia audio. Like the work of Le Corbusier projected back by Lannis Xenakis.

Material has an important role in identifying space, understanding the character of the material that will be applied in space is very important. The character of the material has Sound Properties in Interior Acoustics. Three substances can be a medium for sound waves from the sound source to the receiver, namely solid, liquid and gas. Of the three substances, gas is the substance that most often acts as a medium for sound waves. This propagation of sound waves through the air is called airborne propagation, namely when the vibrations experienced by the sound source touch the air molecules around it. If the vibration continues until it touches the boundary area, it will be possible for sound to propagate through solid objects or what is called structure borne. This depends on the characteristics of the boundary field itself. The reactions of various types of characteristics of this boundary area are reflection, diffuse reflection (diffusion), absorption, deflection (diffraction), and refraction (refraction). [33]

For floors that function as sound insulation, noise can be handled by using soft materials or by applying a floor that is made to float (raised floor) and filled with materials that are able to absorb sounds. Carpets can function as acoustic elements (sound insulators/noise) and weaken the propagation of sound. Meanwhile, ceramics reflect sound. So that ceramics effectively provide reflections in the space, can help identify the space. Wall and ceiling materials also provide a reflective effect to identify the space.



Atrium space with ceramic material, higher reflection provides identification of large spaces.

Small room with wooden floor and carpet, sound reflection with echo

Fig 7 : Material as a design element for sound reflection
(pinterest, 2020)

3.3. *Olfactory Perspective*

The interview results show that olfactory produces two categories. The category is Place displacement through scents & call back scent memory. "In general, aroma is classified as odor and fragrance has an effect on the body. "This will affect emotions and feelings," according to psychologist Katarina Ira Puspita. What humans inhale will enter the nerves and be sent to the brain. It is the brain that will regulate emotions and feelings according to the smell or fragrance received. However, the effects will vary. The situation also plays a role in conveying effects to the brain. A calm and quiet atmosphere makes the effect of aromatherapy candles more optimal compared to a busy and noisy atmosphere. However, if you inhale the same aroma or fragrance continuously, the effect will not be the same as the first time you inhaled the aromatherapy. This is the impact of decreasing response, because the nerves are starting to get used to inhaling the smell. Aromas or fragrances can be deposited in human memory. A number of experts have revealed that the human brain can store impressions of aromas related to their life experiences. Don't be surprised if an aroma that accidentally hits your nose can evoke a number of memories from the past, whether you want to remember them or not. Jordan Gaines Lewis, Ph.D. (2015), a psychologist who wrote that aromas and fragrances can indeed be attached to parts of the human brain. The first time you smell an aroma, the process reaches the olfactory bulb, which is a structure found on the lower side of the cerebral hemisphere, precisely located near the front of the human brain. Simply put, the aromas we smell travel past the nose and flow along the lower part of the brain. The olfactory bulb has a direct connection to two areas of the brain that stimulate feelings and store memories, namely the amygdala and hippocampus. Interestingly, information regarding images, hearing, and touch does not pass through this area of the brain. That is the reason why aromas and fragrances can trigger the brain to activate memories in the form of emotions and memories.

Dr Rachel Herz (2004) from Brown University is a researcher who coined the theory of the relationship between scent and memory. Herz conducted a study of five female candidates. All of the participants' brains showed active and rapid movements when they smelled a scent they were familiar with, rather than a foreign scent they didn't recognize. The research results revealed that these brain movements evoke memories of good and positive memories.

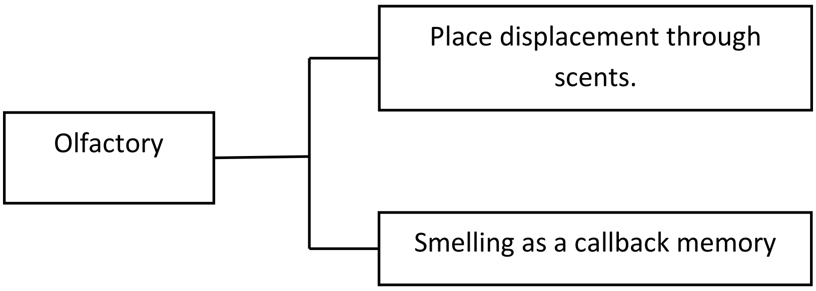


Fig 8 Diagram of olfactory perception research results

Olfactory perception (smell) is the second perception after auditory which provides support for visually impaired people in knowing the differences between places. Olfactory itself plays a role in identifying spatial movements through scent. According to sources, a room or place has a different aroma. From aromas and smells, people can know where they are by relying on the smells they remember, which is called callback memory. Apart from memory, it could be said that olfactory perception is also closely related to passive touch. The air that passes through visually impaired people often carries a distinctive smell, so they know they are indoors or outdoors. Usually this will happen when they are close to the natural environment [34].

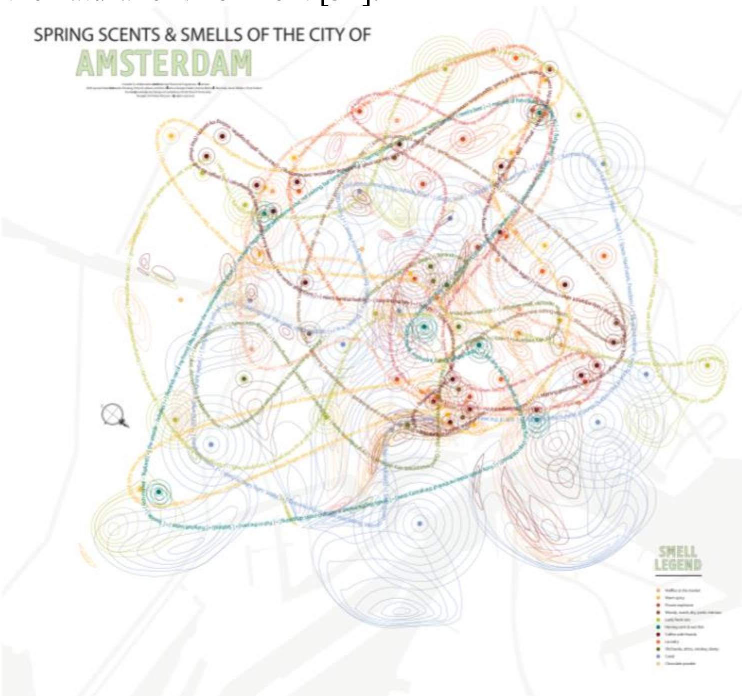


Fig 9: Scenscape of the city. Spring scents and smells of the city of Amsterdam by Kate McLean. [Credit "Spring Scents & Smells of the City of Amsterdam" https://sensorymaps.com/ [37]

Design with aroma or scent architecture is like a different effort. Experience with smell through culinary architecture, which provides a spatial experience of food smells [38, 39, 40]. When you pass the movie studio, there is the smell of popcorn. Or when passing through the peak tourist area there will be the aroma of roasted corn. However, unfortunately, odours are often synonymous with negative things, the smell of dust, mold, floor cleaners, the smell of cigarettes, and so on [41, 42]. Even though smells can be explored to strengthen architecture. Research that has been carried out by smell [37], the design of the urban area Scenescape of the city. Spring scents and smells of the city of Amsterdam by Kate McLean. Design regional zones with scents that identify the space and area. The character of the area with smell : waffles in the market, warm spicy, flower explosion, woody sweet, dry, paint resinous, leafy fresh rain, herring carts & wet fish, coffee with friends, laundry, old books, attics, smokey, damp, canal, and chocolate powder. (Kate McLean. 2017 (e.g., https://sensorymaps.com/;). Design idea based on scent with landscape design, namely a healing garden with a restorative effect from the scent of flowers and plants [41, 42].

Zoning based on smell architecture
Smell walking: 'getting to know' a place in a different way.

Fig 10: Regional design elements based on olfactory

Space design based on aroma architecture can be designed within the aroma contour. With a combination of outdoor and indoor interaction. The pattern and arrangement of activities can be grid, linear, and other patterns. Where the movement of space with aroma. Each zoning provides room information based on aroma. The scent experience of space users strengthens the impression of space. So, it becomes a challenge for architects to present smell as a design element. Namely the design element of the smell that represents the beauty and function of the space. The space simulation can be seen in figure 10.

From the description above, it needs to be underlined again that the design concept of multisensory architecture for visually impaired people is that the use of one sense is mutually supportive. Cognitive Mapping of Multisensory Architecture goes through a process like the following. Visually impaired people interact with the built environment through harmony between touch (haptic), hearing, and smell, and this is their way of recognizing the built environment. They synchronize the spatial mapping process following four basic stages [43]:

1. Obtain information through the senses (touch, hearing, and smell).
2. Thoughtfully selecting and processing consciously,
3. Storage of selection results in the form of spatial representation.
4. Decision-making, movement, and orientation based on stored representations to perform.

This cognitive mapping process helps visually impaired people minimize challenges and gaps in interacting with the built environment in the area.

The dominance of architectural design is still largely visual and eye-centred vision. When design focuses on other senses, it becomes anti-mainstream or hegemonic [44]. It is a motivation for architects or designers designing the built environment to design with the concept of multisensory architecture. Especially for visually impaired people in minimizing challenges and interaction gaps in the built environment. The results of this research provide design recommendations with haptic, auditory and olfactory exploration, which are not only used comfortably by visually impaired people but can also be enjoyed by all. Ramps with tactile signage and contrasting color materials not only make it easier for visually impaired people but can also be used comfortably by physically disabled wheelchairs, elderly people with canes, toddlers, pregnant women, and women with high-heels. Design provides a spatial experience that holistically engages more senses that we can better engage. As well as increasing comfort and quality of life while creating more benefits of immersive, interesting, and memorable multisensory experiences [10, 45, 46, 47, 48]. As well as architectural design for visually impaired people with a multi-sensory architectural concept, not only to fulfil Building Regulations and city regulations for the visually impaired, but also to support equity and universal design.

4. Conclusion

The dominance of architectural design is still mostly visual and eye-centered. When design focuses on other senses, it becomes anti-mainstream or hegemonic [44]. This is a motivation for architects or designers who design the built environment to design with a multisensory architectural concept. Especially for blind people in minimizing challenges and interaction gaps in the built environment. A design perspective that explores the concept of multisensory architecture requires better sensitivity to how the senses interact in daily activities. Designing with experiences that involve more senses. This will be able to improve the quality of life while creating a more in-depth, interesting, and memorable multisensory experience.

The exploration of multisensory architecture in this study from one nationally recognized expert resource (the national commission for the blind), Jona Damanik. Where the data obtained is based on his experience, knowledge, and expertise. The research will be richer if it involves more low vision people, with different ages, genders, and professions. And how the diversity of low vision people minimizes the challenges of responding to space and form. Future recommendations for public building design consider more multisensory architectural design. This needs to be supported by more detailed policies, as well as more detailed and varied architectural elements. Further research that needs to be explored is the field of architectural design practice that more deeply incorporates multisensory architectural perspectives into public buildings and city-scale public facilities. So that the development of buildings and urban spaces becomes better, more equitable, universally designed, and improves the quality of city residents in terms of social, cognitive, and emotional well-being.

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