



MENTALLY CHALLENGED WAYFINDERS

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ABSTRACT

The ability to find one's way and the experience of the wayfinding process within the built environment is an essential spatial skill that relies on our perception and cognition abilities of the wayfinder. Yet that skill ranges among humans as their cognitive abilities range and it significantly decreases within the mentally challenged. Wayfinding is defined by Arthur and Passini in 1992 "the process of finding the way to a destination in a familiar or unfamiliar setting using any cues given by the environment". Wayfinding process is to perceive, explore and solve spatial problems within the built environment, it depends on two main elements obtaining appropriate incoming sensory information from the built environment and processing and interpreting that information into cognitive mapping which assist in the wayfinding process.

The mentally challenged wayfinder characterised with lack in the cognition abilities which signifies a great barriers facing them in perceiving and finding their way within the built environment and their choice of routes independently and without any help and more important with dignity to enhance and facilitate their lives while reaching their required destination within a limited time. The well-designed built environment is based on interaction between the mentally challenged wayfinders and the environmental information cues. The environmental information cues are crucial for improving the awareness and providing the mentally challenged wayfinders with information and visual cues to help them to perceive the built environment and find their ways and enhancing the cognitive map. The paper discuss and determine the types of the environmental information cues within the built environment as the main force behind the perceiving and enhancement of the wayfinding process for the mentally challenged wayfinders.

KEYWORDS: Wayfinding Process, Mentally Challenged, Perception, Cognition, And Environmental Information Cues, Built environment

إيجاد الطريق لمتحدي الإعاقة العقلية

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الملخص

إن عملية إيجاد الطريق من المهام اليومية التي يقوم بها الإنسان بهدف الوصول الي نقطه معينه، فهي سلوك يقوم به الإنسان من خلال تفاعله مع البيئه المحيطة به، عن طريق استخدام حواسه المختلفه و ادراكه. تعتبر عملية إيجاد الطريق من المهام الصعبه التي تتطلب مهارات مختلفه منها الادراك الفراغي للبيئه المحيطة، ويختلف الادراك الفراغي من شخص الي اخر، فنجد الأشخاص ذوي القدرات الخاصه لهم ادراك فراغي محدود للبيئه المحيطة بهم، مع تباين الاختلافات بينهم من خلال فقدان جزء او بعض من حواسهم.

ان عملية ايجاد الطريق تتطلب بعض المعايير والمُدعمات في البيئة المحيطة التي تعتمد علي حواس وادراك المستخدم للبيئة المحيطة، بالتالي يستقبل المعطيات و يقوم بتحليلها و توظيفها حتي يستطيع الوصول الي خريطة ذهنية تساعده للوصول للمنطقة المنشوده في البيئة المحيطة.

ان البيئة المحيطة تتطلب ان تتواجد بها بعض المُدعمات البيئية التي تسهل عملية ايجاد الطريق لذوي القدرات الخاصة، وتساعدهم للوصول لأهدافهم معتمدين علي انفسهم ومندمجين في المجتمع بدون اللجوء لمساعدته الاخرين. ان الورقة البحثية تناقش وتتناول العلاقة بين الاشخاص ذوي القدرات الخاصة والبيئة المحيطة وما تحتويها من مُدعمات بيئية تساعد الاشخاص ذوي القدرات الخاصة علي ادراك البيئة المحيطة بهم والحركة من خلالها بسهولة ويسر وامكانيه للوصول الي المنطقة المنشوده.

الكلمات المفتاحية : إيجاد الطريق، ذوي القدرات الخاصة، الادراك، المُدعمات البيئية، البيئة المحيطة

1. INTRODUCTION

The built environment is the human-made surrounding that provides the spaces for all abled and disabled users' activities, "*The human- made space in which people live, work, and recreate on a day –to –day basis*" [1]. The built environment refers to the physical environment that offers the setting where humans live their lives. It has a great impact on the human senses, behaviour, their participating in life, physical and social activities, and their wellbeing community life.

All the users of a building are considered disabled by the absence of the information within the built environment in the wayfinding process. The needs of the abled and disabled users in the wayfinding process are different from one to another according to their abilities, therefore, it is significant to study the requirements and the relationship between the users according to their needs, abilities with their physical built environment, while designing the features of the built environment that can satisfy and afford all their needs [2], to create enabling and accessible environments for the diverse and different needs of the abled and disabled users within the built environment.

2. WAYFINDING PROCESS

The process of accessing a building and navigating through it to a required destination is called wayfinding. As Kevin Lynch in 1960 was the first one to introduce the term wayfinding in his book "*the image of the city*" and defined it "*as the consistent use and organization of sensory cues from external environment*. [3], he interprets the importance of the wayfinders senses in the wayfinding process which depends mainly on the environmental perception and cognition of the wayfinders, and guided the idea of wayfinding process of being the concept of spatial orientation. Firstly the term wayfinding was used in the context of the environmental psychology and Geography, but has subsequently been used in relation to design of built environments, and has been used in the context of architecture to refer to the wayfinders' experience of orientation and choosing a path within the built environment.

The Wayfinding process depends on two main elements obtaining appropriate incoming sensory information from the built environment and processing and interpreting that information into cognitive mapping, "*spatial characteristics in either an on- route or distant environment using only information perceived and memorized while traveling*" [4]. Wayfinding process depends on the ability of the wayfinder whether it is physical or mental abilities and the wayfinder perception and cognition abilities within the built environment and the interaction between them and the effect of the behaviour on the wayfinding process and the aspects of the built environment which can facilitate the process, "*the process of finding the way to a destination in a familiar or unfamiliar setting using any cues given by the environment*" [5]. It is a process to perceive, explore and solve spatial problems within the built environment as shown in figure 1.

2.1 PERCEPTION

Perception is the process of interpreting information received from the senses [6], it is an information processing activity. It is mental process and sensory process, which is the interpretation of incoming sensory information and is influenced by a variety of factors as the users past experience, the effect of stimulation, level of attention to the details, the ability to respond, motivation’s level and social and emotional perform.

Perception deals with two ways of processing: processing the sensory input, which changes low level information to high level information, and processing that is related to the user’s experience, knowledge, and attentions that had great effect on the perception [7]. The environmental perception is related to the reinterpretation of the gathered data by users in the way that stores, transforms, organizes, forgets and recalls knowledge [8], it is affected by personal and cultural differences, as all the users interpret the same scene differentially.

2.2 COGNITION

Cognition is mentally processing information obtained through perception; it is the process of knowing, gaining, organizing the information received from the built environment. It focuses on some aspects as thinking, remembering and mental development, and it involves the understanding of values and effect on behaviour and attitude formation [9].

Spatial cognition starts from the setting itself; it is the process that helps the user to navigate within the built environment forming the cognitive map leading to cognitive mapping. A cognitive map is a mental map about the arrangement of the things and spaces within the built environment.

In 1988, Norman has introduced in his book “The Design of everyday things [10] the terms “Knowledge in the world” and “Knowledge in the head”, he explained the external and internal information for wayfinding process within the built environment, as the wayfinder needs to operate certain tasks that lies in the world, therefore they are not required to know everything and store it as knowledge in the head. But by providing the required knowledge in the world, it had a great effect on reducing the wayfinder’s mental load and easier usability of everything and reducing the time to understand and improve accuracy.



Figure 1 Wayfinding as a spatial problem

Source: <http://www.rez.com.au/notes/from-wayfinding-to-thingfinding>

3. MENTALLY CHALLENGED

The American Association on intellectual and Developmental Disabilities AAIDD, described the mentally challenged as: “A disability characterized by significant limitations both in intellectual functioning and in adaptive behaviour as expressed in conceptual, social, and practical adaptive skills, this disability originates before age 18. [11]

Mentally challenged have difficulties in both intellectual functioning, and adaptive behaviour, slowness in some abilities, they experience difficulties with processing information, learning, communicating, using information and they have impaired cognitive processing ability resulting in deficits in adaptive functioning. The IQ of the mentally challenged is below 70, they are

categorized into four levels: the mild mentally challenged, the moderate mentally challenged, the severe mentally challenged and the profound mentally challenged [12]. The paper focuses on the first two categories as they can interact and integrate independently within the society.

Perception in mentally challenged is related to impairment in the sensation accompanied with limitation in the mental abilities as visual, hearing and touch, the environmental information must support good performance, safety and awareness within the built environment. Mentally challenged have cognitive impairments which affect the ability of learning and memorization. This leads to the difficulty in understanding the built environment.

There are four challenges facing the mentally challenged in their participating and accessibility within built environment [13]: The pace with the information needed to be processed while the society interacts at a high level, the complexity level in instructions: instead of simplifying the information for them, the services providers tend to speak loudly or in childish ways, the literacy level, which is a great obstacle for the mentally challenged and Stigma, still the mentally challenged treated as patients or people in need of protection and to be supervised.

Barriers facing mentally challenged in wayfinding process

Everyone faces barriers and difficulties every day, but for mentally challenged barriers and obstacles can be more frequent and have a great impact on them and their acceptance and adaption in life. The World Health Organization describes barriers as being more than physical barriers: “*Factors in a person’s environment that, through their absence or presence. Limit functioning and create disability.*” [14]. There are some barriers that face the mentally challenged in the wayfinding process:

- Lack of attention of the mentally challenged to the required information and orienting to a source of information within the built environment and the difficulty in remembering large amounts of the written information in the wayfinding process [15].
- Non-reader mentally challenged or reads in different language than that used in the environmental information [15]
- The indication of signs such as a sign that intends to direct to a specific forward space, the arrow points upwards, which means it is overhead, this leads to a confusion to the mentally challenged due to the unacceptable message and the amount of information given in the built environment [17].
- The maps are provided in the built environment are two-dimensional maps, they are graphic and abstract interpretations of three- dimensional spaces, so the information needs to be translated to the actual space and the directories that provide text only are no source of help for the mentally challenged[18].

4. ENVIRONMENTAL INFORMATION CUES

There are fundamental factors in wayfinding design in the built environment which articulates and facilitates the wayfinding in the built environments for all the users including the mentally challenged, and they are distributed into seven environmental information cues.

4.1 LANDMARKS

Landmarks are reference points in the wayfinding process, they are important wayfinding aids and cues for the mentally challenged, as well as those who cannot understand or read the native language, they help them to recognize the route, and they provide accessible information to find their required destination as shown in figure 2.

In designing a landmark, some points should be considered as to be well-defined, unique and marked in shape, colourful, and appropriately located at intersections and significant points to help in a successful wayfinding process.

Landmarks could be sculptures, architectural features as decorative columns, or artwork, they should be provided with appropriate signage to help the mentally challenged wayfinders in receiving the required environmental information [17]. Landmarks could be remarkable and interactive by adding an additional sensory input as sound or smell which enhance the wayfinding process and be more effective as an example popcorn kiosk that ensures the smell of it in the built environment or sound of a water fountain within the built environments [18].

4.2 DIRECTORIES

Directories provide the mentally challenged wayfinders with a lot of detailed information which present a problem for mentally challenged to understand all the complex and mixed information and it needs skills of decoding and reading which might be a problem facing them [18].

Directories should be cluster the information in small grouping and to be simple not crowded with many information, uncomplicated, and to be readable text, well-lit, using code colouring, without any glare and avoid any reflections and preferred to use text with graphic information to facilitate for the mentally challenged wayfinders to understand the given information and where is the required destination [22].

4.3 SIGNS

Signs are a major component in the built environment for mentally challenged in the wayfinding process, their clarity, continuity, and consistency are fundamental to assist finding the required route and destination. The American with disabilities [23] put guidelines for the signs to achieve equal access to all in public spaces, example of that signs have braille and tactile identification information in order to provide orientation to blind and visually impaired. The signs should have some aspects to facilitate the process for the mentally challenged wayfinder.

- Clear and simple with readable information, easy to understand and read with appropriate and large text and colour contrast with the background, graphic image to help mentally challenged who non -reader, and braille for the vision impairment and avoid any reflection or glaring of the signs which can cause confusion for the mentally challenged in the way [17].
- Placement of the sign within an appropriate height and a clear visibility and consistent at the decision point, different levels, services as restroom, restaurants, information desk mainly in large public buildings, at eye level in a well-lit location
- Exiting information should be placed perpendicular to the route and above eye level and for emergency exiting, signs should be placed on the wall low enough so that the wheelchair disabled can reach it within the built environment [18].

4.4 MAPS

Maps should be provided with some aspects to make it easier to read and to be helpful for mentally challenged wayfinders as placing the maps at the entry and the decisions points, it should be less cluttered and highlight the anchor point. Linking the map information to directories for different facilities of the building and using graphics with suitable size with the written information, suitable size for the map to be easy readable, using of colour to reinforce the information, Light up the map, so the information is readable especially for low vision mentally challenged wayfinder and the lighting does not produce glare on the map surface. Showing the floor on the map that the user is on, mainly in the large public building. And using the sentence “*You are here*” marking are helpful in the wayfinding process [18].



Figure 2 landmarks are reference point in the wayfinding process. Source: Hospital Sant Joan

4.5 COLOURS

Colours are important in the perception process of the space and the built environment and wayfinding process, it is a significant support and reinforcement for mentally challenged in the wayfinding process, and spatial perception of the built environment but never be used as the primary aspect of wayfinding process because there are some wayfinder with colour vision deficiency so need to be supported with another form of given information to serve all the wayfinders.

Using too many colours can affect the wayfinding process and be a problem for the mentally challenged as it is difficult in remembering and differentiating between more than five and causes overloaded on them [5], also when using poor contrast in colour between any object and the surrounding it affects the ability of the wayfinder to find their destination independently.



Figure 3 colour to show changes in use in different parts of the building. Source: MVRDV house new offices in Rotterdam



Figure 4 colours as an environmental information cue Source:www.pinterest.com/0kxv1vl6vry1hiu/wayfinding/

In selecting colours, one should consider the psychology effect of the colour, Consider the user having colour impairment as the blind wayfinder are able to sense the energy of the colour by using colour to show changes in use or functions in different parts of the building as shown in figure 3, avoid too much colour which cause confusion and too much contrast (see figure 4) and using different coloured trails to identify the routes as shown in figure 6 and avoid using soothing and calming colour[28].

4.6 Light

Light is useful in wayfinding process for mentally challenged either natural or artificial light, it provides a greater visibility through the building to find the required destination using lighted landmarks and paths, and helping in reading the signs and maps.

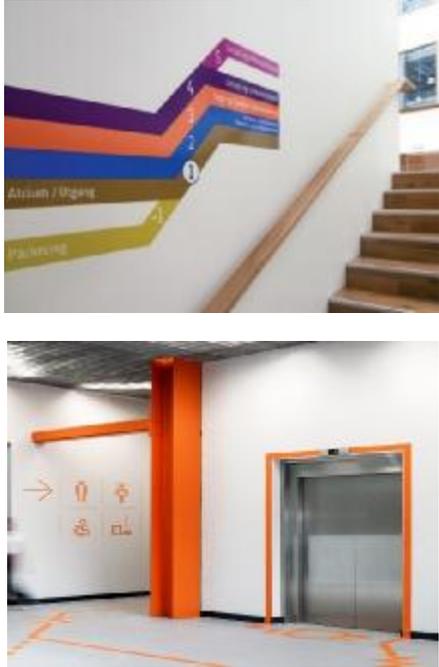
The placement of the light play a great role in reinforcing the wayfinding process especially during emergency exiting, it can be placed to highlight the ways and path to conform or warn the mentally challenged wayfinders through the route. Lighting design should ensure that there are no reflections and glare on the signs or maps to be easily readable and helpful and avoid any sudden change in the level of lighting when moving through the building to prevent any confusion or frustration that could happened for the mentally challenged wayfinder[18]

4.7. Texture

Royal National Institute of blind people [30] suggested some design criteria for considering the choosing of different textures to differentiate between spaces and giving them different identities, while using a material that does not produce reflections or glaring, due to the confusion it causes during the wayfinding process and using materials with high absorbing noise

properties in high noise areas and space, so the noise does not cause distraction for the mentally challenged wayfinders

5. CASE STUDY

Environmental information cues	Project
<p>LANDMARKS Google new Tech Corners campus in California, designed to create a work and social spaces that support the employee health by a playful working space and enhance the employee and the visitors experience within the built environment. The theme of wayfinding by colours as a varied colour palette assists in the spatial experience of the user within the building. On each floor that morph into distinctive colours and patterns, which lead the building to be a landmark due to its coloured façade.</p> <p>DIRECTORIES Google new Tech Corners campus in California, there are 200 individual directories guide the visitors through each floor by reinforcing the key rooms and facilities within the campus, and 86 directories inside the building in each floor</p>	
<p>SIGNS In the Storehagen Atrium in Forde, Norway, is selected as “Human Environment Design”, it is governmental office building. The signs had significant role in helping the user to find the required destination, On the staircase, text for offices below the floor in the sign appears on the down- life side of the diagram, while text associated with higher floors appears on the top- right side.</p> <p>In Here East is a tech and creative campus on the Queen Elizabeth Olympic Past in East London. There are huge orange graphic signs on the wall and the floor which is guide for all the types of the users to assist them in the wayfinding process</p> <p>MAPS In Here East is a tech and creative campus on the Queen Elizabeth Olympic Past in East London. There are a series of bold large scale forms, bent monoliths</p>	

with digital screens that show a sequence of digital maps, signposting and community messages

COLOURS

In Google new Tech Corners campus in Sunnyvale, the colour had a great role in the building, as each floor had its identified colour and can be seen from outside the building, each floor had its different colour to assist in wayfinding within the building, including the furniture and all the aspects of the floor

In the C. Mark Openshaw education center is a new campus for the Utah schools for Deaf and the Blind. The colours used is light with high contrast accents of bright red illuminated features that considered as landmark for the building, had a visual effect on the users due to its bright and glowing red colours.

LIGHT

In the storehagen Atrium in Forde, Norway, is selected as “Human Environment Design , it is governmental office building ,light is based on natural and artificial light, there is a huge glass façade that inters the natural light to the sitting spaces

TEXTURE

In the C. Mark Openshaw education center is a new campus for the Utah schools for Deaf and the Blind. There are different texture in the walls and the floor of the paths indoor and outdoor to help the blind user to navigate through the building



CONCLUSION

As shown in the paper, the built environment has a strong impact on the behaviour and the attitude of the wayfinders, therefore, there are many aspects and recommendations that need to be considered while designing the built environment. Accordingly, all the users including the mentally challenged wayfinders can interact and integrate within the built environment, achieving the accessibility and legibility that are required to enhance the built environment and facilitate the wayfinders' experience.

The mentally challenged are a part of the society that need to interact and be accepted by the community within the built environment, they need to navigate and wayfind their required destination in a limited time, independently and without any help and more importantly with dignity. Eventually, this results in facilitating their lives and having them accepted in the society. The well-designed built environment is based on interaction between the mentally challenged wayfinders and the environmental information cues. The environmental information cues are crucial for improving the awareness and providing the mentally challenged wayfinder with information and visual cues and images to help them perceive the built environment and find their way and enhance the cognitive map leading to concrete cognitive mapping. The environmental information cues are essential features within the built environment; they are the main force behind the perceiving and enhancement of the mentally challenged wayfinder in the wayfinding process. This paper highlights some considerations to be taken into account in future research:

- Consider the mentally challenged part of the community needed to be intergraded with all the activity in the society and have the accessibility and legibility to any public building independently.
- Lack of the information concerning the environmental information cues within the built environment that can provide the mentally challenged wayfinder his required destination in the wayfinding process.
- Address the barriers and obstacles that face the mentally challenged especially the social and physical barriers that force them not to interact within the built environment, and try to overcome these barriers.

REFERENCES

- 1- Roof, K.; Oleru, N., (2008). *Public Health: Seattle and king county's push for the built environment*, J Environ Health.
- 2- Lang, J., (1987), *Creating architectural theory: The role of the behavioural sciences in environmental design*, Van Nostrand Reinhold, New York
- 3- Lynch, K. (1960), *The image of the city*, Cambridge, MIT-Press.
- 4- Golledge, R., (2003) *Human wayfinding and cognitive Maps*, in M Rockman & J steele (Eds), *Colonization of Unfamiliar Landscapes: The Archaeology of Adaptation*, Routledge, UK.
- 5- Arthur, Paul; Passini, Romedi, (1992), *Wayfinding: people, signs, and architecture*, New York, McGraw.
- 6- Goldstein, E.B., (2010), *Sensation and perception*, Belmont, CA: Wadsworth, Cengage learning.
- 7- Bernstein, Douglas A., (2010). *Essentials of psychology*, Cengage learning.
- 8- Gifford, Robert, (2002) *Environmental psychology: principles and practice*, optimal books publishers.
- 9- Downs, R. & Stea, D., (2005), *Image and Environment: Cognitive Mapping and Spatial Behaviour*, Chicago, U.S.A
- 10- Norman, D. (1988) *The Design of everyday things*, Doubleday, New York.
- 11- The American Association on intellectual and Developmental Disabilities AAIDD, *intellectual disability (2010): Definition, classification, and systems of support*, 11th.ed.
- 12- WHO, (1996), *Division of mental health and prevention of substance abuse, ICD-10 Guide for mental Retardation*. World Health organization.

MENTALLY CHALLENGED WAYFINDERS

- 13- Yalon - Chamovitz, shira, (2009) *Invisible access needs of people with intellectual Disabilities: A conceptual model of practice*, Intellectual and Developmental Disabilities.
- 14- WHO, (2011), *World Report on disability*, World Health organization.
- 15- Salmi, P., Ginther, D & Guerin, D., (2004), *Wayfinding for adults with intellectual disabilities, designing for the 21 St Century III: An international conference on universal Design*, Rio de Janeiro, Brazil.
- 16- Castell, Lindsay, (2008) *Building access for the intellectually disabled*, university of technology, Australia.
- 17- Salmi, Patricia, (2017) *wayfinding Design: Hidden barriers to universal access*, university of Minnesota Twin cities.
- 18- Castell, Lindsay, (2006). *Adapting building design to access by individuals with intellectual disability*, Curtin University of Technology, Western Australia.
- 19- ADA, (2010) *A Guide to ADA signage & wayfinding Basics*, Inpro corporation, Interior and exterior architectural products, American with disabilities Act.
- 20- UK Department for children schools and families, (2008) *Building Bulletin102: Designing for Disabled children and children with special education needs*, the stationery office, UK.
- 21- Royal National Institute of Blind people, Homes for people with learning disabilities and sight loss (2016): *A guide to providing safe and accessible environments*.