

SEMINAL BREAKTHROUGH IN TACTILE PICTOGRAM DESIGN FOR VISUALLY IMPAIRED IN TRAIN STATION

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Abstract: One of the ideal public transportation facilities for the visually impaired in daily activities is trains. To be used at maximum, there is a need for communicative media to support the independence of orientation and mobility for the visually impaired in the train station. The media plays a role in supporting visually impaired individuals to know where they are, where to go, and how to reach the destination. The previous result regarding visually impaired ability to identify pictorial form which is designed with Primadi Tabrani's ancient visual language semiotic approach shows a great opportunity for a pictogram to be the solution. However, the challenge is how to make the visually impaired person understand the meaning description that has been designed into tactile pictogram by touch. Basic consideration in designing process is the clarity of visual form when being touched, which is influenced by the way the shape is drawn and the tactile height.

Keywords: seminal breakthrough, tactile pictogram, visually impaired, train station

Introduction

One media that can be upgraded to support orientation and mobility system for the visually impaired in train station is pictogram. Pictogram is a visual communication that has a function as a destination and contextual motion navigator quickly without emphasizing on the same understanding verbal vocabulary context by its users. Based on visually impaired habits and ability in reading by touch, in order for the pictogram to be used properly by them, it needs to be designed as a tactile media.

The main aspect that should be considered in designing tactile pictogram is to have high clarity when the visually impaired interacts with its media by touch. The easier the form of the pictogram is felt encourages the visually impaired ability can interpret the message properly. Ideally tactile pictogram design can improve the visually impaired reading ability starts from identifying forms, motion descriptions, and understanding contextual instructions. This is important because every visually impaired person has obstacles in building perceptions when reading tactile images without verbal

context guide. In addition, until now there has been no international convention on tactile graphic symbols specifically in supporting daily visually impaired activities in public space.

As shown by the previous studies that has been written in paper titled Building General Perception for Blind People as Orientation System in The Bandung City Train Station through The Pictogram Design (Fariz, 2018), the design of a pictogram that adopts the concept of Primadi Tabrani's ancient visual language only made the visually impaired able to identify the forms, while motion descriptions and contextual instructions of the message could not be read. In an effort to solve this problem, it is necessary to develop a conceptual design of tactile pictogram by adapting the visual language approach whose imitation process is assigned by vision for sighted, now presented by touch.

The output produced is a system and communication design standard for the visually impaired using nonverbal communication on tactile media. In general, it is expected that this research will become an input for train station managers in supporting the independence of orientation and mobility of visually impaired so that they can be more empowered as productive subjects in industrial era 4.0.

Methodology

The design approach uses semi-otics. The beginning of the studies is done by understanding the superior of Primadi Tabrani's ancient language theory which lies in how to read plural images are translated as motion description. The final analysis come up with the idea of applying the motion description as the pictorial language concept of the tactile pictogram. Along with the findings in the paper Building General Perception for Blind People as Orientation System in The

Bandung City Train Station through The Pictogram Design (Fariz, 2018) which shows the need for design improvement, the deepening of analysis is carried out again on the theory of ancient languages to adapt the concept of motion description into sequential principles. Then, the design method uses desk research method. The design with this method includes the stages of literacy study, observation, and trials. The literacy study aims to build a comprehensive understanding of the cognitive science concepts of the senses of touch when accessing tactile-based visual information. Observation aims to gain experience with the visually impaired directly so as to be able to understand pragmatically problems about their daily orientation and mobility. The trial aims to evaluate the final results of the design directly on visually impaired respondents using prototypes. The findings obtained are then analyzed quantitatively and qualitatively. Quantitative analysis aims to uncover the effectiveness of the design and qualitative analysis aims to uncover the causative factors.

Literature Review

The theory used as the basic concept of tactile pictogram design is still using ancient visual language theory from Bahasa Rupa (Primadi Tabrani, 2012) as in the paper titled Building General Perception for Blind People as Orientation System in The Bandung City Train Station through The Pictogram Design (Fariz, 2018). Ancient visual language is a drawing system that has proximity to Albert Einstein's relativity theory which reveals that space cannot be separated from time. This image system is called Space-Time-Plane (STP) whose characteristics are described in various directions, various distances, and various times. There are three components in learning how to draw with an STP system. These components are im-

age way, inner grammar, and outer grammar. Image way is the way in which objects are drawn. How to arrange various image way in a scene so that you can tell a story is called the in-ner grammar. Whereas the method of distinguishing image way and the ar-rangement of expressions between pan-el and one another until the sequence of the panel are able to tell a story is called outer grammar.

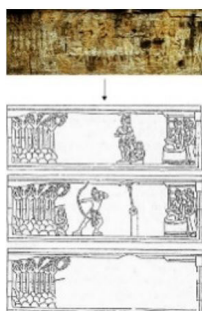


Figure 1. Lalitavistara relief: story of archery contest
Source: Self Courtesy

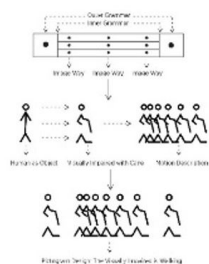


Figure 2. Previous Design
Source: Self Courtesy

The pictures above are an example of a reading scheme and the application of three components to draw on STP system and last research tactile pictogram design. Those pictures are taken from one of the reliefs from the Borobudur temple which tells the story of an archery contest. Then, tactile pictogram design from last study signifies the visually impaired person is walking.

Result and Discussion

The Way the Shape is Drawn



Figure 3. Drawing Technologies
Source: Self Courtesy

Visually impaired meets general difficulty when tactile pictogram is designed with simultaneously concept. The difficulty is the visually impaired limitation to be able understand the relation of structural shapes as a whole object containing message. Therefore, identification graphic tools are needed for this. The idea selection is based on graphic symbols that are most familiar related to daily reading activities of visual impaired.

Based on analysis braille letters are chosen as the basic idea for tactile pictogram identifying process tools. This selection refers to braille is the most familiar symbol tactile that visual-ly impaired always interacted with in daily life. By using this the braille dots are developed to draw a pictogram form that consists dots to make a straight line, curved line, and angular line where all of them are connected to each other. The dots perform the function to im-prove the readability aspect of tactile pictograms by the sense of touch re-gardless experience variation and the level of sensitivity of the visually im-paired towards tactile media. The dots become the standard of reading and the concept of memory. These dots are not only designed to make the visually im-paired able to read pictograms but also as a way to be described again by them.

Types of Tactile Pictogram

1. Contextual Pictogram

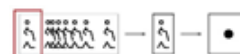


Figure 4. Contextual Pictogram Drawing System
Source: Self Courtesy

Contextual tactile pictograms serve as symbols sign to identify activities when using train station facilities. Designed by placing a form of pictogram on a media and by reading it thoroughly by the palms of the hand. The idea of the pictogram is symbolized from general perception of the visually impaired who are interconnected with the character of an object outside the equation of the concrete image context.

2. Directional Pictogram



Figure 5. Directional Pictogram Drawing System
Source: Self Courtesy

Directional tactile pictograms serve as a symbols sign used to determine and direct the visually impaired towards the destination. Pictograms are depicted with two main symbols, namely: humans and interconnected lines. Human symbols show visually impaired while line symbols are used as indicators of destinations read by tracing the palms of the hands and feet. The line symbol connects human symbols in one area to another as a sign that it involves moving activities. How to differentiate areas from one another is by adding contextual pictograms drawn as one unit. For example, a human symbol stands inside a door connects with a human symbol that stands next to the train, indicating the displacement of the place from the entrance to the platform. This pictogram can be used as a room concept map both applied concretely and imaginatively.

3. Instructional Pictogram



Figure 6. Instructional Pictogram Drawing System
Source: Self Courtesy

Instructional tactile pictograms serve as symbols sign that play roles in describing the environment conditions and instructions for their gestures so that visual impaired can survive safely to reach the destination. Instructional pictograms are read by using the palms of the hand and drawn into two applicative symbols smaller than the contextual pictograms and directional pictograms. Vertically composed, the upper symbol shows the condition while the lower symbol shows the instructions for gestures that are safe to be done. The use of instructional tactile pictograms has to be adjusted to the conditions of the area in the field. While showing the condition of environment, if it coincides with directional pictograms, therefore the line symbols on the directional pictograms will be adjusted to the instructional ones indicating the condition of the space.

Shape Symbolized

Based on the type of activities that are often carried out generally by facility users in various train station areas, the tactile pictograms design for the visually impaired is divided into four contextual: regulations, public service, processing activities and concessions. Regulations symbols are related to things that are instructive such as permissions, prohibitions, cautions, and warnings. Public service symbols are related to infrastructure facilities and services that support various needs at the station. Processing activities symbols are related to station facilities access that involves active objects. Concessions symbols are related to the use of station facilities that require a process of approval, agreement, or permission.

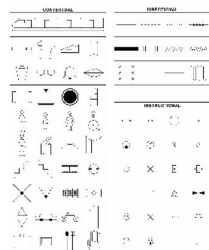


Figure 7. Shape Symbolized
Source: Self Courtesy

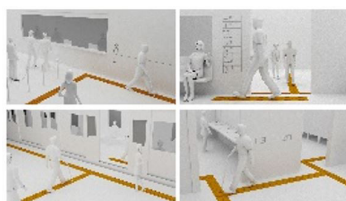


Figure 8. Digital Simulation
Source: Self Courtesy

Trials

The case chosen for the design study is symbolizing an accessible form for toilet sign. The toilet symbol specifies for men and women. The main reason for this case is that toilet is one of the most important facilities in train stations and gender concept is a most basic learning for the development of visually impaired people knowledge so it is hoped that the data collection process can be more efficient. The conceptual form chosen as the idea for the toilet tactile pictogram is hair length differentiation, specifically short hair signifies men and long hair signifies women.

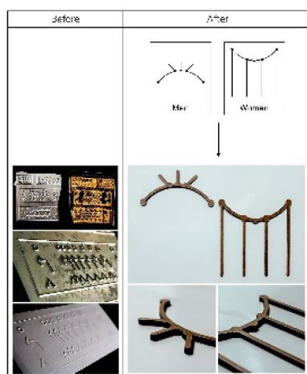


Figure 9. Prototypes
Source: Self Courtesy

The material used to produce the pictograms is acrylic with a thickness of 3mm coated with coarse textured paper. The symbol for the men toilet is 9cm x 4.4cm while women one is 9cm x 9.4cm. Acrylic material is chosen because its production is easier to form a shape and is relatively cheaper compared to other hard materials.



Figure 10. Trials Process
Source: Self Courtesy

The trials method conducted to measure the effectiveness of communicating through pictograms that have been designed by vote system. Technically, everyone is instructed to read the two symbols in their respective ways and then they must determine which one represents the symbols for men and women without being given any description in any form. Trials process involves 20 visually impaired with 50:50 ratio gender classification and range aged 20-55 years in Bandung, Indonesia.

The results of trials show that 12 out of 20 visually impaired choose symbol that are in line with the communication message of tactile pictogram design. The average respondents need a ranged time 40 to 90 seconds to decide. In detail, 8 of 12 perceive symbol with hair differentiation accordingly to the message of the design, 2 of 12 decide based on their perception of smaller form identical to men and vice versa, then for last 2 their decisions are influenced by the speed of reading pictograms which stimulates to match the perception that men can move faster than women generally. For those who don't give the same answer, 6 out of 8 still de-

cide based on their perception of sex anatomy that the form that is read longer is identical to male sex and vice versa, while 2 out of 8 didn't give the answer because of the forms make confuse hardly.

Conclusion

The results revealed that the de-signed tactile pictogram in this study is still not optimal. The respondents gave inputs that the concept for design is still complicated to be used as orientation and mobility system for the visually impaired at train stations. Although the selection idea of visual symbol can be said effective in symbolizing the meaning, the form is not simple and inefficient to translate because it takes a long time or need verbal assistance. Thus, a visual system improvement is still need-ed for tactile pictogram designs to be more accessible, simplifying semantic process, high readability and can also be used for all.

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