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Master's Thesis
Academic Year 2019

MOOV:
Simplifying Tokyo's Train Station Navigation for Local and Foreign Tourists

Keio University
Graduate School of Media Design

Cendikia Luthfita

Abstract of Master's Thesis of Academic Year 2019

MOOV:
Simplifying Tokyo's Train Station Navigation for Local and Foreign Tourists

Category: Design

Summary

Train is the most reliable transportation in Japan. Not just the residents but also tourists are using train for commuting. However, some people who is visiting a station for the first time find it difficult to find their way just within the station. The design of Japanese train station and its wayfinding is not effective to help people to move quickly in a crowded place. This research is to find the solution for passengers to easily find the way to their specific destination by re-designing conventional wayfinding with visualize one based on universal language design.

Keywords:

Wayfinding, Universal Language Design, Signage, Pictograms, Train Station

Keio University Graduate School of Media Design

Cendikia Luthfita

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Acknowledgements

This research is dedicated to improve mobility and hospitality for people. Hopefully it adds more value to the society, particularly in the navigation section. Throughout the writing process of my thesis, I had receive amazing supports and assistance, which helped this thesis to be finished on time.

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Chapter 1
Introduction

1.1. Research Background

Getting around the station in Japan is relatively difficult, not only for foreign tourists but also for locals. In Japan, some of the stations are as complex as the maze. For example, Shinjuku station. Not only about its complexity, but also its inconsistency for the wayfinding system. This research aims to overcome the problem of complexity and inconsistency, through designing universal language-based wayfinding in which everyone from any language background can understand. The main point in this research is the design part, which is using the pictograms, however, in Chapter 4, it is also mentioned about the application of this idea by using AR technology. It is, purposely, to give an insight of how this idea can be implemented.

Train as The Main Transportation in Japan

The train is the most reliable transportation in Japan. Not only for the residents but also tourists who are using the train for commuting. About more than 18.5 million people are using the train every day with around 26,000 daily train services. Specifically in Tokyo, the capital of Japan, there are more than 30 railway operators running in the Tokyo Greater Area in 121 total lines. It is expected to grow since Japan has been preparing for the Tokyo Olympics 2020. Based on the research conducted in 2017, more than 12.5 million of foreign tourist came to Tokyo. Shinjuku station for example, is one of the busiest station in the world with around 760,043 passengers in daily basis (FY 2015).

In a complex station like Shinjuku, with many people walking around the station, it is difficult to see the wayfinding. It is hard to pause for awhile in the middle of pathway because people's walking speed is fast.

For the tourists who are visiting the station for the first time, they might find the station confusing, especially the complicated ones like Shinjuku and Shibuya. Some wayfinding are written in multiple languages, such as Japanese, English, and Chinese, but those languages may not cover the needs of people coming from different language countries with zero understanding of one language among those three. Language barrier is the main problem here. Although we have Google translate and Google Maps for now, but considering the fact that we need to have fast mobility to move around the station, I believe redesigning wayfinding is important.

1.1.1 Problems about Wayfinding in Japan's Train Station

However, some people who are visiting a station for the first time find it difficult to find their way just within the station, especially the complicated ones. The design of Japanese train station and its wayfinding is not effective to help people to move quickly in a crowded place. This research is to explore a new design of wayfinding, mainly in the train station, so that passengers can easily find their way. Especially for tourists, they are usually looking for restaurants, photo spot, or shopping center nearby the station. Although there is a technology like Google Maps, but still many problems occurred after getting off the train and to get to the destination. Based on the user study I conducted through survey and interviews, the problems are:

- At some stations, although the wayfinding is written in many languages such as Japanese, English, Chinese, and Korean, but visually it is too crowded and the font size is too small to read;
- Information board are only available in some spots within the station;
- The size of information board are quite small and hard to read, and only available in Japanese and English;
- Wayfinding in the stations usually are only giving the information of the exit codes (number and alphabets);
- The crowdedness of station might affect the vision towards wayfinding;

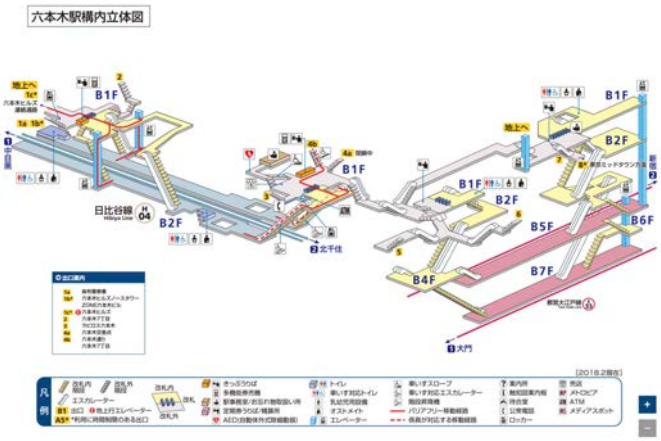

Figure 1.1 Roppongi Subway Station Map

- At some stations, the color of wayfinding are not built based on Color Universal Design (CUD), which some visually-impaired passengers find it difficult;
- From tourist perspective, what they want is to find the famous tourist objects, restaurant, or shopping center nearby, but there is no such wayfinding that specifically guiding to those places;
- Communicating verbally like asking around is quite difficult, especially if there is a language barrier.

Take a look at Tokyo Metro stations, the exit name is described in combination of alphabets and numbers. For example, exit 1C in Roppongi station is for those going to Roppongi Hills. The information given on the website and printed flyers at Roppongi station are written in Japanese only.Tokyo Metro, one of the subway operator in Tokyo, Japan has their own style for designing a wayfinding. Considering that some of the stations have many exits, they only put codes of the exit ' s name on the wayfinding.

Take a look at Figure 1.2, it says exit “ 3 ” only. Although it is written in Japanese (Kanji), English, and simplified Chinese, it does not indicating what is on the exit 3. If you have never seen the information board at the station nor gotten any clues about exit 3, you will never know what is on there. If you take a walk a little bit more, you will see different wayfinding that stated something

Figure 1.2 Exit at Roppongi Station

instead of just exit 3. It says, “for Roppongi Crossing”, written in Japanese (Kanji) and English. The question is, why the clue of the place is only written on the wayfinding located nearby the exit itself? Why it remains a mystery from where we get off of the train until we reach the exit? What if it is not the exit that it is supposed to be? Should we walk around first then go out of the station? or just simply out from whichever exit then consider later where to go? From the observation I did at Roppongi station, I figured out that the wayfinding there is not friendly for tourists. Before getting off of the train, I checked Google Maps, so I could know which exit should I go for. What if there is a certain condition where the tourist does not have any access to the internet? The wandering time will be longer than usual average time for non-first time visitors.

This is one example of the station in Tokyo, Japan, which is not equipped with tourist-friendly wayfinding system. In Japan, different railway operators, different stations, means different wayfinding style. There is no standardized style of wayfinding, hence the user needs to think, to look up, try to understand the meaning behind codes and colors in wayfinding especially about the exits. Which I believe is not efficient for the tourists. In the next chapter I will explain more details about the problems I found from the observation and interviews during the user study and come up with solutions. The reason behind the idea

of using visualized information instead of text is because visualized information sending the information in just one blink of an eye. It is also language-barrier free, meaning that everyone can understand the message easily.

Wayfinding, up until today, are built in two-dimensional platform like board or a digital signage. Some stations in Japan have multilingual information on their wayfinding as they are preparing for Tokyo Olympics 2020. However, some stations located in rural areas, are not even equipped with alphabetical guidance. They are all written in Japanese letters: Kanji or Kana.

Also, wayfinding in stations are only show limited information, since the space of wayfinding itself is limited. What first timer visitor or tourist want is the guidance to some popular spots, such as shopping area, restaurant, or local attraction/park.

Moreover, stations which are under constructed need to change their wayfinding in a quick time. Shibuya station for example. It is not possible to make the proper wayfinding in a very short time. Hence, the station staff usually created an emergency wayfinding by using the tape or paper and pasted it onto the wall. Some of this kind of wayfinding are written in both languages: Japanese and English, but mostly it is written in Japanese language only (see picture below).

1.2. Objectives

This research study is driven by these questions as follows:

1. How might we help tourists to get around the station effectively and efficiently?

2. How might we redesign the wayfinding that are understandable by anyone with different language background?

3. What are the factors that we can add to redesign the wayfinding and how can it be implemented?

4. Can the newly designed wayfinding be applied in other area/scope, not just in train station and/or not just in Japan?

Figure 1.3 The wayfinding only written in Japanese found at Hiyoshi station

Figure 1.4 The wayfinding written in Japanese and English found at Shibuya station

1.3. Research Proposal

In this research, I am exploring the solution for the first time-visitors, both local and foreign, to fix the problems in finding a way to go to specific destination by designing a new wayfinding that can be easily understood. Content-wise, this wayfinding is built based on popular needs of tourists, such as finding restaurants, famous tourist spots, shopping center, etc. As we know, Japan is one of the popular tourist destinations among Asian countries, especially welcoming the 2020 Tokyo Olympics, more tourists are expected to come to Japan. People from all over the world, with different languages, will use the train as a transportation. Design-wise, this wayfinding is designed to keep less verbal by using pictograms and the design of pictograms is being tested to see whether it is understandable or not. Also, considering some people who has a visual impairment such as partial color blind, the design of wayfinding will follow the Color Universal Design (CUD) rules. Without putting aside the aspect of aesthetics, this wayfinding is also designed for future use, such as using Augmented Reality (AR) technology to build immersive wayfinding.

The purpose of this research is to give the personalized visualized wayfinding information based on universal language design, through virtual wayfinding. Why virtual, speaking about infrastructure cost and efficiency, virtual is more efficient and cost less than building up the physical, conventional wayfinding. I am eager to explore other medium that can be used as a wayfinding, not just a two-dimensional platform or a neon box. Too many wayfinding in one space can be very confusing and not eye-friendly. It contradicts the purpose of wayfinding itself: to guide the way. If the wayfinding blends well with the environment around the space, it is easier for people to understand and find their way. Moreover, the technology that will be happening soon, which is AR glasses, make it more possible to increase one ' s mobility by looking through the AR wayfinding for navigation.

1.4. Research Goals

This research is aim to go deeper into the problem of wayfinding within the station through the lens of universal design, language-barrier free, and hoping to become

the reference for the government or other stakeholders to make a standardized wayfinding for a better transportation system.

1.5. Contributions

The contribution of this research are as follows:

1. The research about wayfinding in Japan's train station can be used for further study

In this research, I did field observations, surveys, and interviews to find the problem about wayfinding in Japan's train stations, especially in Tokyo. I made a comparison between wayfinding in different stations and different railway operators. This is to find the similarities and the differences, and what is in between. Also to find the real problems by doing an on-site test in major stations in Tokyo. The output of the research can be used for further study to improve the wayfinding design and other general research related about navigation and station.

2. The research output about color perception and pictograms can be used to develop a standardize wayfinding in public space

This research study is also examine the perception towards color and its association to given sample words such as building, park, and food. From the result we can see that for some words we have similarities, some words are not. This is can help us deciding which color should be used to design or develop a service based on universal design principle. I also developed some pictograms and let it tested to make sure that people from every cultural background can understand the meaning behind it. The pictograms I develop has been tested and can be used for further design development or to build a standardize pictograms for wayfinding in public space.

3. Giving the idea for app developers to create a tourist-related service

Since Japan is welcoming for more foreign tourists to come, this design research can be developed into the real app. The app will be very helpful and useful

for tourist to move around the station, including guiding them to famous tourist spots nearby the station. For future works, this service app can be expanded for business, such as to have a partnership with local businesses.

Chapter 2
Literature Review

2.1. Introduction to Wayfinding

The word wayfinding is usually used to describe the directional guide and the whole concept of systematic design for navigation in a particular space. Wayfinding is the process of finding your way to a destination in a familiar or unfamiliar setting using any cues given by the environment.(Farr et al. 2012)

In 1960, an urban planner Kevin Lynch from his book, The Image of The City, explains that "way-finding" relates to the process of forming a mental picture of one's surroundings based on sensation and memory. (Gibson 2019) For instance, wayfinding is a tool that helps you to navigate from location A to location B. Although they share similar concept, wayfinding and navigation has a different meaning. Wayfinding, the broader term, refers to how people find their way around environments. Navigation refers to the specific means by which people find their way, including route navigation, landmark navigation, and map navigation.(Kelly 2011)

Wayfinding is an umbrella term which includes the various means by which people not only navigate but also orient themselves in their environments. The terms wayfinding and navigation differ in their scope: wayfinding is the overall concept, and navigation is one of the means by which people can find their way. Good wayfinding systems contain diverse elements that aid each type of navigator, whether landmark, route, or map.(Kelly 2011)

The conventional wayfinding can be found in a printed format, such as posters and signages. Some of them are pasted onto the wall, some of them are hung on the ceiling, on a standing banner, or even stuck on the floor. In this case, at Japan's train station, most of the wayfinding are printed, especially for the temporary wayfinding. The station operators are aware of the number of tourists

Figure 2.1 Variations of Wayfinding in Japan's Train Stations

using the train as transportation, hence they try to include English guidance as a part of wayfinding. Not all of the stations are completed with multi-language wayfinding and yet English is not the common language for some people.

Although the technology of navigation is getting better, like Google Maps, but still problems for navigation within the station occurred. The guidance that Google Maps suggest to the user are not specific, and for some conditions, it does not help. It helps for outdoor navigation, but not indoor ones.

On the left figure shows that wayfinding is stuck on the floor at Oimachi station. Not only directing people to go to the track, but also toilet and stairs. On the right figure, the wayfinding at Iwamoto station is hung on the ceiling. Some temporary wayfinding also being pasted onto the wayfinding showing the direction to neighboring station.

2.2. Principles of Wayfinding

Designing a good wayfinding might be more complex than it seems. At least, there are four points that designers need to know from the user's perspective: (Slater 2019)

1. Knowing the current location to answer the question of "Where am I?"
2. Knowing the destination to answer the question of "Where to go?" or "What do I want to see after this?"
3. Knowing the best possible route to answer the question of "Which way to go?"
4. Built-in Route Maintenance, in case the route changed because of construction or renovation

Besides knowing how the wayfinding works, in order to design a visual cues for wayfinding, we need to know the principles for effective wayfinding. Principles for effective wayfinding include:(Foltz 1998)

- Create an identity at each location, different from all others
- Use landmarks to provide orientation cues and memorable locations
- Create well-structured paths
- Create regions of differing visual character
- Don't give the user too many choices in navigation
- Use survey views (give navigators a vista or map)
- Provide signs at decision points to help wayfinding decisions
- Use sight lines to show what's ahead

At least there are four main considerations in order to build a successful wayfinding system for general users: Eye level, Light, Fonts, and Color Language.

2.2.1 Eye Level

The height at which information is presented, depends on the environment also the target audience itself. There is a rule called "Golden Rule" states that an eye level of 163cm is the ideal height to put a wayfinding.(Uebele 2007) This rule is not relevant for some areas with the average height is below European standard, like in Asia. I believe this golden rule is not the best solution or general applicable

for any conditions. What about short people, kids, or what about tall ones whose height is more than 180cm? This problem of eye level can be answered by making a wayfinding that is personalized to each user. Details will be explained in Chapter 3.

2.2.2 Light

Light is also an element that needs to be considered when making a wayfinding. We need to know exactly the environment's conditions: Is it located underground? Is there enough light during daytime? Will it be visible during raining time? etc. In this research, I did a test which several conditions applied and to measure its visibility to the users. There are three conditions: daylight, night, raining. The design elements of wayfinding like colors, shapes, or text are also affected by light conditions. Details will be explained in Chapter 3.

2.2.3 Fonts

Fonts are essential aspects to create a good wayfinding. Bad fonts might be unreadable or lead to a confusion. Fonts used between roman and other non-roman languages are also different. In a major station in Tokyo, like Shinjuku or Shibuya station, the wayfinding information consists of multi languages: English, Japanese, Chinese, Korean, or even Thai. Because of the coming of Tokyo Olympics 2020, the Japanese government and other stakeholders started to consider other languages as many tourists from all over the world will come. This is actually a good initiatives to facilitate people from different language backgrounds, but design-wise, does it eye-friendly to put many texts in one signage?

2.2.4 Color Language

Colors have certain cultural and historical connection, that makes some people has different interpretation towards color. In a complex wayfinding system, color can help people to understand the codes hidden behind. As our eyes can capture color and connects to the brain in milliseconds, adding color is effective to tell words in a nonverbal manner. Until today, there is no color standardization.

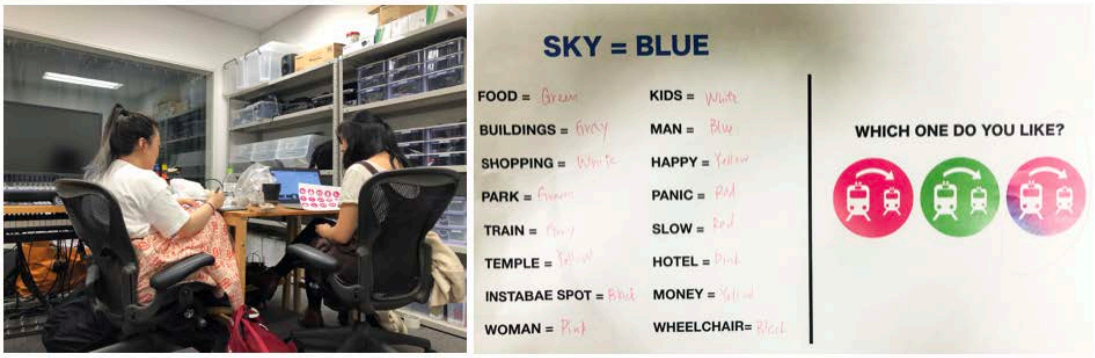

Figure 2.2 Color and Word Association Survey I did to 50 correspondents

Based on the online survey I did with more than 130 correspondents, more than 50 percent responded that the wayfinding in train stations in Japan, especially in Tokyo, are visually too crowded. According to the study, the human brain processes images faster than text. Text are best use to clarify the meaning of image that is too general, but keep it short and simple. In this research, I would like to visualize the information, instead of using text to make people understand easily and visually-friendly.

On the Figure 2.2, I did a test about word and color association, how people perceive the word and transform it into the color. I asked about food, buildings, shopping, park, train, temple, photo spot, woman, man, kids, happy, and money. For example, when I asked about "money", people who are originally coming from United States, they think green is for money, because dollar is printed in green. Some people from China think that money color is gold or red because Chinese Yuan is printed in red ink. At the same time, there are some similarities found in "buildings" represented in grey color, or park in green color, man in dark color and woman in bright color.

2.3. Universal Language Design

Herbert E. Vogt, 1986 said "If a picture can save you a thousand words, then that same picture can save you another ten thousand words if it is in a document that will be translated into ten other languages". (Horton 1993) Yes, graphics can not replace words totally, but at least it can overcome the problem of language barriers. Especially for public place use, using graphics helps people to understand quickly.

Color Universal Design

Not all people can see the colors as it is. Some people have visual impairment that disable them to see the true color. Generally, there are three major types of color vision: P type (protanope), D type (deuternope), and C type (common-type). (Ichihara et al. 2008)

Protanope and Deuternope people often considered as color-blinded people. By carefully choosing the colors for public signage, we can also accommodate people with different seeing capabilities. This is also included to the principles of universal design, where it is a market-driven process intended to create environments that are usable by all people. Based on Norwegian State Council on Disability in 1997 accommodating the needs and wishes of everyone is also necessary for universal design.

For instance, the rules of CUD are as follows:

- If the color used as a code, we have to choose the color that is super easy to distinguish from other colors. The chosen color must accommodate people with or without visual impairments.
- If the color does not used for coding, better to pick the colors that are contrast to the background color and change the saturation. It is not recommended to choose the color that is too contrast such as red over blue.
- Also, the color must not be too soft or white-ish since it is hard to see for some people with visual impairment.

Principles of Universal Design

At least there are two principles of universal design based on Universal Design New York that are related to designing a wayfinding: [1]

- Perceptible Information
  (In terms of building) should provide all essential information in a variety of modes (e.g., written, symbolic, tactile, verbal) to ensure effective communication with all users regardless of their sensory abilities.

- Simple and Intuitive
  Means of use should be intuitively obvious so that it operates as anticipated and, therefore, can be used spontaneously.

2.3.1 Progressive Disclosure

Based on the study, the human brain can only process small information at one time. When designers design the wayfinding or information board, sometimes they make a common mistake: giving too much information all at once. In order to make a good design and delivering information right away, designers should apply the concept of progressive disclosure. Progressive disclosure means providing only the information people need at the moment. (Weinschenk 2011) In the train station, people ' s needs are different. Some people want the information that direct them to a shopping area or a toilet. It is important to make a wayfinding that can be personalized based on the user's needs at the moment. So that the progressive disclosure can be applied.

How can such information of a busy station can be delivered effectively? In this AR era, wayfinding can be build for more personal use using AR technology. Google, Microsoft, or Apple are trying to make AR glasses become commercial. Later, this kind of glasses will be used just like a smartphone.

2.3.2 Pictograms as a Medium

According to Cambridge Dictionary, pictograms is a picture or a symbol that represents a word or phrase. The first pictorial signs appeared in 30,000 BC, in the form of cave paintings. It began to develop and were used all over the world

Figure 2.3 Pictograms Used for Tokyo Olympics 1964
[2]

since 9,000 BC. Now pictograms have developed in an incredibly efficient and simple way to represent and communicate ideas because they offer a clear and concrete explanation pointing to a simple fact.(unknown unknown)

Pictograms have been used many times for public event such as Tokyo Olympics 1964 and Munich Olympic Games 1972. Otl Aicher and Gerhard Joksch designed a system of pictograms that is still used until today. However, many pictograms been produced and used to adapt the local culture.

There is a standardization for pictograms used in public place such as ISO graphical symbols or AIGA (American Institute of Graphic Arts). Although there is a standardization for such symbols, in fact, based on the survey I did shows that some people recognize the different symbols than the usual ones.

Figure 2.4 Pictograms are used for wayfinding in Kaihim Makuhari station

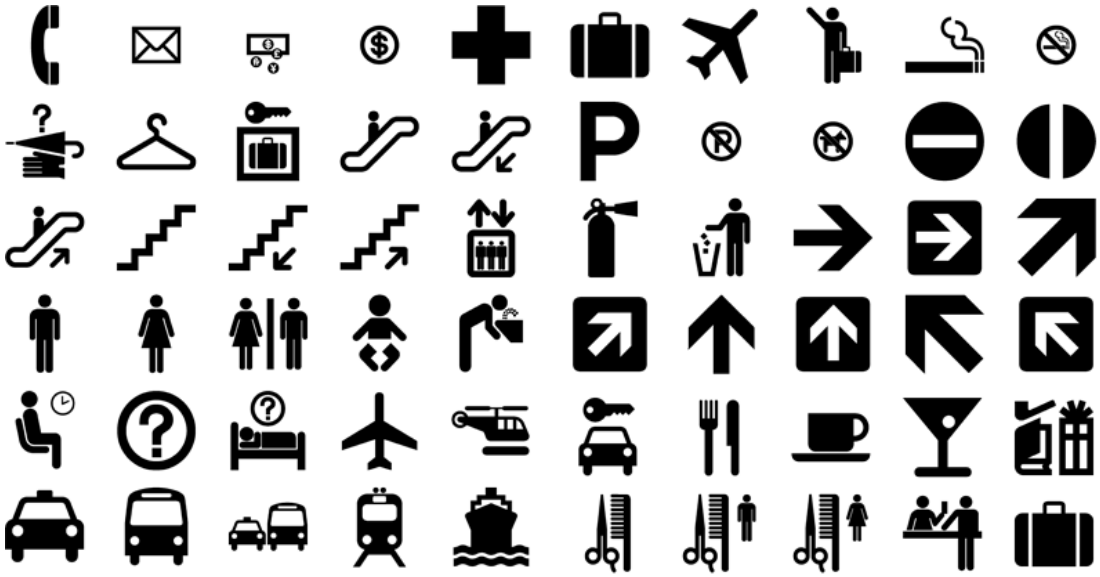

Figure 2.5 AIGA Symbols

2.3.3 Using Pictograms for Wayfinding

At some places, pictograms have been used for wayfinding. The famous wayfinding designer Lance Wyman created a wayfinding as a visual language for navigation. Since 1960s, designer Lance Wyman masterminded wayfinding systems around the world and defined the field of environmental graphics. (Budds 2015)

Lance Wyman's first creation about wayfinding was for Mexico, where he created the modern wayfinding for the country. To welcome the guests from all over the world because of Mexico Olympics in 1968, he created a pictorial system of signage, icons, logos, etc. His design was so powerful and strong as a visual identity.

His work inspires me to create a wayfinding that based on the pictograms. I believe visual communication communicates better than words. As Tokyo will be host for Olympics in 2020, I think it is a good time to redesign the wayfinding and to create a strong identity all around the city starts from the train station.

Figure 2.6 Lance Wyman and his design of wayfinding
[3]

Figure 2.7 Lance Wyman's design in National Mall, Washington DC 1976
[4]

2.4. Related Works

Google Maps

Google Maps is a revolutionary wayfinding tools in this digital era. This shifted our perception in exploring new place. Before Google Maps came out, we tend to look for the nearest information board or map, or ask people around. We tend to look around and more aware about the surroundings. We remember the cues more, like unique buildings or statue. After Google Maps out and become our basic needs, we rely much on it. Yes, Google Maps helps a lot. Although it keeps developing, in fact, Google Maps has still minor problem about indoor wayfinding. Also, it does not give us specific information as it is only well-developed for some area. Plus, before we start using Google Maps, we need to know exactly where we want to go. Even though this is useful, but this is decreasing the will and chance to explore new place, especially for the first time visitor might find it difficult.

The user interface of Google Maps makes us to keep looking on the phone, which might be dangerous if we use inside a train station. Google Maps is currently available in two dimensional interface, although Google developers said they are building an AR wayfinding embedded onto Google Maps. Google's AR-enabled Maps app was first introduced at I/O 2018, showing a fox that helped you find your way. Google made a lot of design prototypes for how Maps AR would work, and many failed. (Stein 2019)

Google thinks that AR-enabled maps makes people keep looking on the phone and thus endanger people. Users who have tested this Google AR maps also saying that the fox is distracting. From those feedbacks, Google wants to keep the design as simple as possible. By now, the developer still figuring how to not distract people when they use AR map and they do not mean to design the AR to blend with the real world.

Tokyosubway (App)

Tokyo Subway operator has a mobile application called "tokyosubway" that enables people to search which station is the closest to the destination. You can type the location or search by landmark, such as museum, shopping, and parks. This app is useful for those who may confused when deciding to take a subway

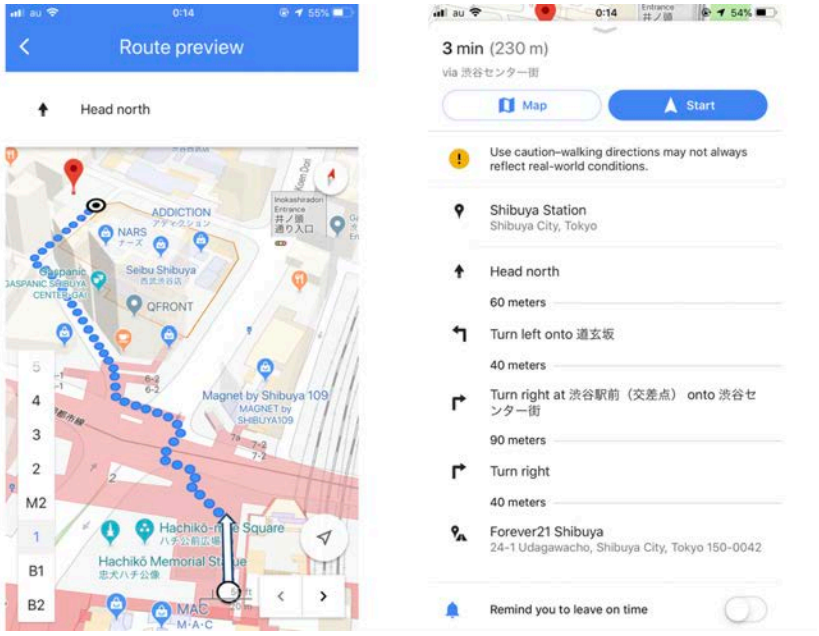

Figure 2.8 The interface of Google Maps

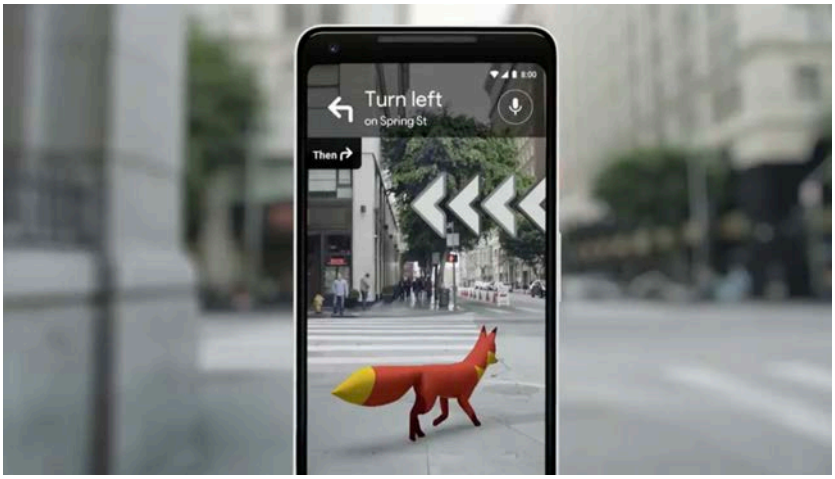

Figure 2.9 Google AR-enabled Maps
5

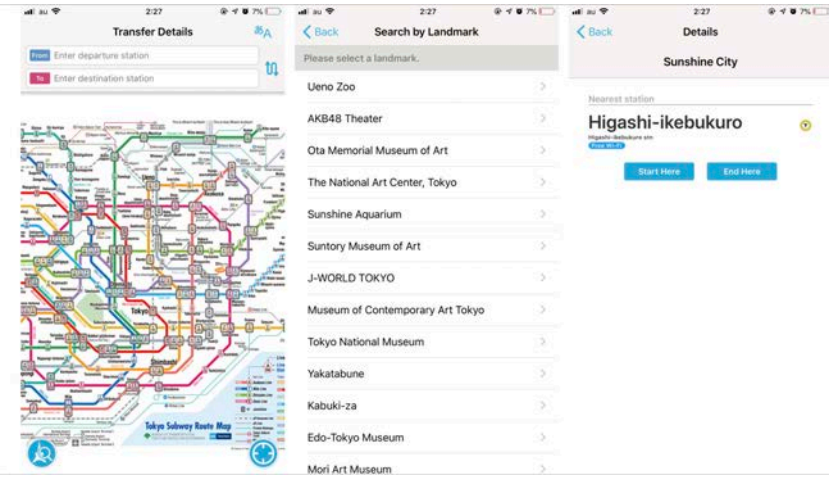

Figure 2.10 The interface of Tokyo Subway App

and which lines should they take to go to their destination. The limit is, this does not enable people to explore popular spots around the station that they are currently at. This will just show you which subway train should you take to reach your destination. You need to know where you want to go before you start.

Based on the survey I did, some people find it difficult to explore nearby spots when they are at subway station. That is because the underground station's architecturally more complex than the above ground station. We can not see what is above us or what is around.

Notes

1 http://idea.ap.buffalo.edu/udny/Section3.htm

2 https://mediamadegreat.com/olympic-pictograms/

3 http://designlectur.es/events/lance-wyman/

4 http://www.lancewyman.com/projects?id=146

5 https://www.cnet.com/news/google-maps-doesnt-want-you-walking-around-in-ar-fox-gone-io

Chapter 3
Research Method and Needfinding Process

This research is focusing on qualitative methodology. However, quantitative data is also needed as a complementary.

These are the steps I have done for this research (in a chronological order):

1. Observing The Train Stations Across Tokyo
2. Conducting an Online Survey about Wayfinding in Tokyo's Train Stations
3. Pre-User Test 1: Finding Destination (In-The-Station Simulation using Pictures)
4. Conducting a Survey about Color and Word Association
5. Designing Pictograms and Get It Tested
6. On-Site Observation and Pre-User Test 2: Ebisu st. and Jiyuugaoka st.
7. Ideation and Concept Design
8. Creating and Designing a Prototype for User Test
9. Concept Proving (User Test 1)
10. Evaluation: Adding New Element to The Prototype
11. Concept Proving (User Test 2)

12. Analyzing User Test Result and Conclusion

Between each steps, the literature review and interviews process were also being conducted to enrich the data for this research. From "Ideating Process and Concept Design" to "Analyzing User Test Result and Conclusion" will be explained in Chapter 4 and Chapter 5.

3.1. Observing The Train Stations Across Tokyo

Observe and compare train stations across Tokyo area (including Yokohama, Saitama, and Chiba) from different major railway companies to find and analyze the wayfinding design and nomenclature. Also to find the similarities and differences. The findings are developed to find the solution in order to redesigning wayfinding.

From the observation, I found similarities and differences of wayfinding at some sample stations across Tokyo greater area.

3.1.1 Comparing The Wayfinding: Similarities

The similarities are as follows:

1. The basic wayfinding icons are basically the same, such as toilet, toilet for people with disability, nursing room, and a no-smoking area sign. Red for female toilet and blue for male toilet. For those signs, they do not put the text next to the icon;

2. Arrows are used to indicate direction (left, right, up, down, turn over). Usually found on the signage also nearby the stairs;

3. For the text, Japanese Kanji written in bigger size than other language such as Latin (English), Japanese Hiragana, Korean (Hangul) and Chinese.

4. Exit guidance is colored in yellow. In every station I visited, the yellow color always used to indicate the exits. However, it is not always means exit. At JR station, yellow is used for JR Sobu Line, so the pathway that goes to the JR Sobu Line, always in a yellow-themed.

Figure 3.1 Exit is always colored in yellow

Figure 3.2 Using basic pictograms for toilet is one of the similarities

3.1.2 Comparing The Wayfinding: Differences

On the other side, I also found the differences, such as:

1. The design of wayfinding itself is different between railway companies. For JR East, the wayfinding contains text written in Japanese Kanji (big size) with Latin (English), Hiragana, Korean language as complementary, also the sign/pictograms and arrows, covered up in a color which indicates the train lines color. In a contrast with JR East wayfinding, for Keikyu corporation on Keikyu line, the wayfinding only consist of text, without color indication and pictograms.

2. The queuing line design, which is also considered as part of wayfinding, is also different if we compare among the train stations. Some stations has only line with different colors, some others has colored line with arrows, and the rest only with symbols and strips. For example, in Rinkai Line, the indication for queuing line is only by symbol of triangles. Some people might not understand the meaning of it, but that is Rinkai Line style. On the other hands, Tokyu Corporation on Toyoko Line has colored line with arrows and some text to indicate which train, which car, and which position for specialized seat/area in the car.

3. Some stations which are located nearby tourist spot indicate the exit with a proper wayfinding. For example, Shibuya station has a sign which based on Hachiko statue to indicate the Hachiko statue exit, that is usually become the appointment place. Other stations only just put the text of the location name, and the rest have not realized yet to apply the wayfinding for popular spots.

4. The U-turn. I found at some stations, the U-turn indicates that the passenger need to make a U-turn right after they see the sign. At other stations, it might have different meanings. We usually feel confused about the U-turn used in the train station and until now there is no such solution to really describing when to take the U-turn and where is the exact place.

5. Color coding is also different. For JR stations, the platform color indicates the line name. For example, orange color for JR Chuo Line and green color

for JR Yamanote Line. In different station such as Tokyu Railway station, the red indicates the Toyoko Line. All stations that located between the line has some red-ish color station. At Yokohama station, Keikyu railway has navy color for their wayfindings, meanwhile Tobu railway operator at Ikebukuro station also has navy-ish color for the wayfinding inside the station. The color codes are important to consider because it affects to the people who has problem about visual ability. Different perception about color means different information received. If the colors are slightly different, it is hard to distinguish and may lead to miscommunication.

6. The way they put wayfinding. This is interesting for me because even the same railway operator but different station, the way they create and put the wayfinding is somehow varies. At Shibuya station, we can find the wayfinding on the wall, hang on the ceiling, or even on the ground. The shape and color is also different. Some has cute paws-themed wayfinding some only use simple posters.

Based on the observation, I can also conclude that there are no wayfinding that is specifically designed for the tourists, which guiding them to the famous tourist spot nearby the station or the place where they usually want to go such as restaurant, shopping area, or landmarks. We need to exactly know where do we want to go or at least looking at the information board first before we decide to choose which exit. Even sometimes the information board does not give the information that we want. Also, the use of too many words in wayfinding makes confusion, especially for those who has a language barrier problem.

3.2. Survey about Wayfinding

Before I start designing the solution for wayfinding problem, I would like to confirm my hypothesis about the wayfinding problems in Japan's train station. It is important to understand the user's perspective and what they need, hence the solution will be effective.

This online survey was responded by 132 participants across the globe. It is participated by 48.5 percent male and 51.5 percent female, which is balance. The

Figure 3.3 The variation of wayfinding in Japan's train station

purpose of this survey is to know whether people who already visited Japan or those who lived in Japan as a temporary resident feel confused about the station's wayfinding. Also, to find the real problem exist about the wayfinding in Japan's train station. Their opinions and feedbacks from the survey will be considered as a base problem to develop a solution.

The questions on the survey are developed and formulated from the hypothesis as mentioned in the Chapter 1, such as:

- Information board are only available in some spots within the station;
- The size of information board are quite small and hard to read, and only available in Japanese and English;
- Wayfinding in the stations usually are only giving the information of the exit codes (number and alphabets);
- At some stations, although the wayfinding is written in many languages such as Japanese, English, Chinese, and Korean, but visually it is too crowded and the font size is too small to read;

So I started by giving a question: *"Please tell me why you think it is difficult to find your way inside a train station?"*

Some of the answers are:

- "Misleading signs and arrows";
- "Scale of station, number of exits, number of lines";
- "There are so many informational so It takes time to find the information that I need";
- "There are plenty of signs and most are written in English";
- "Depends on the size of the station but normally the sign boards are helpful;"
- "Depends on the station. Small stations outside Tokyo are easy to navigate while big ones within Tokyo like Shinjuku Station or Tokyo station are very confusing";

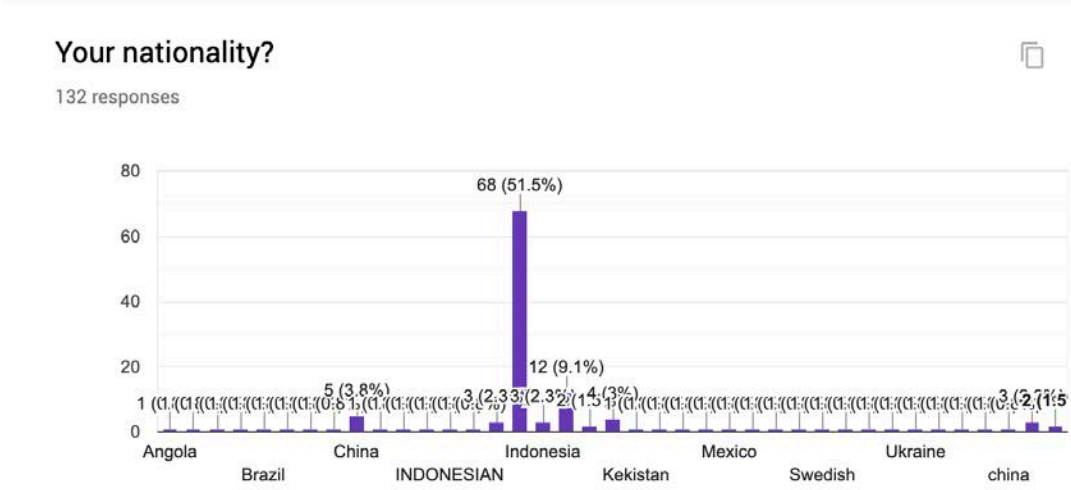

Figure 3.4 Participant's Nationality

- "Depends on how the station maintained. some very local one does not really show the exit, or where the bus station for certain route exist";
- "Too many distractions and the signs are not clear. It take times to get used to with those signs";
- "In massive station, number of people and limited number of officers are making difficult to find a map or information about the station";
- "Big station with multiple exit (Tokyo, Shibuya), many direction + number of people makes it hard to find where I suppose to go";

Also I gave the question of one wayfinding picture I found at subway station and ask their opinion about this, more than 50 percent agreed that the design of this wayfinding is visually too crowded.

Some respondents, which are Japanese people, they can understand the wayfinding because it is written in Japanese and they think the wayfinding is really helpful because it is explained in detail. The other respondents said it is too crowded because giving too much information in one place.

Last but not least, to know what kind of wayfinding style that people prefer, I gave some sample pictures on the survey and let them choose.

Figure 3.5 Sample picture of wayfinding found at subway station in Tokyo

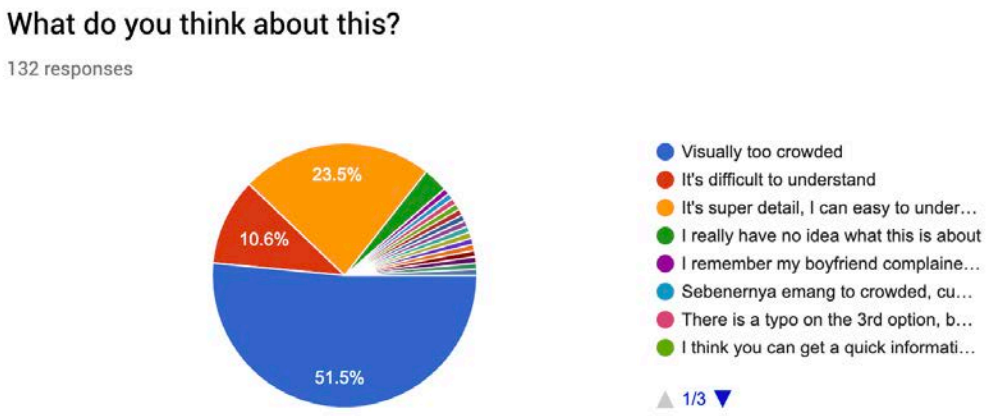

Figure 3.6 Online survey result

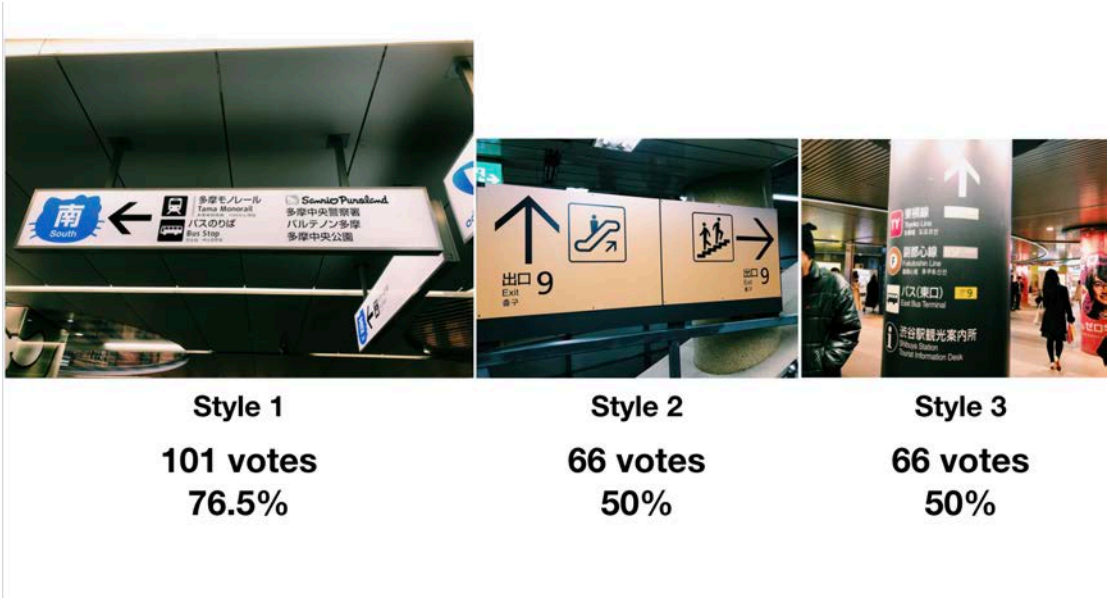

Figure 3.7 "Which style do you prefer?" result

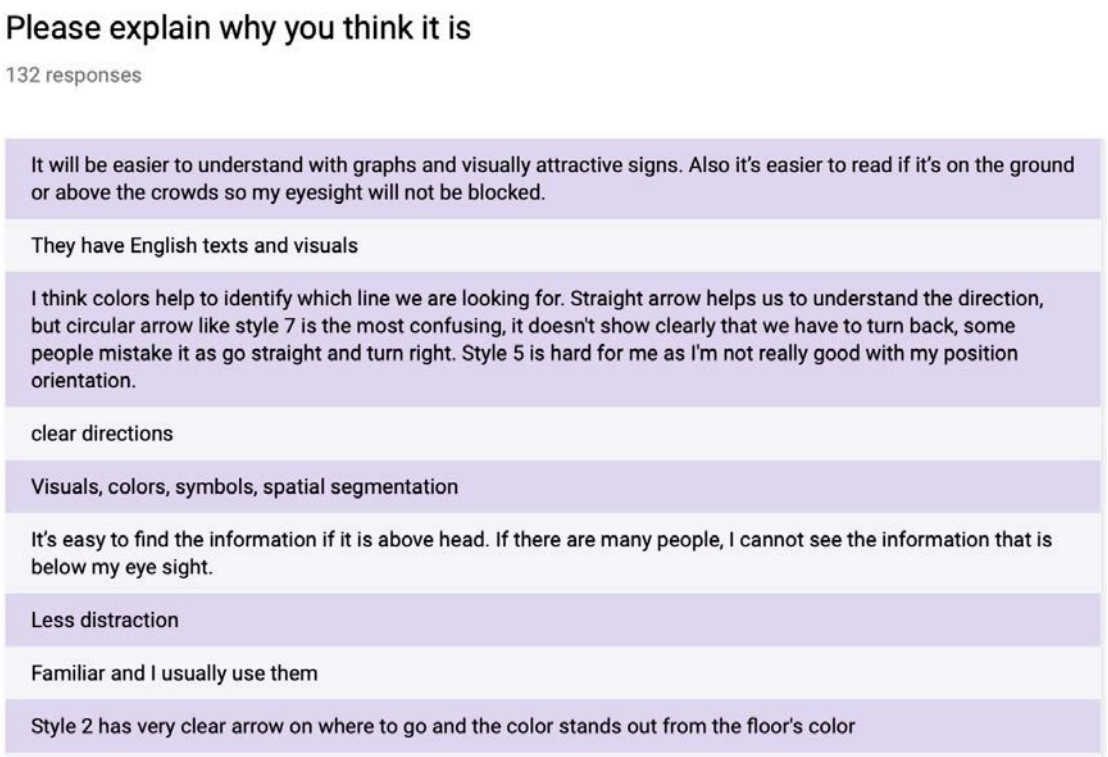

Figure 3.8 "Visually attractive but less distracting" style of wayfinding

From this result, more than 70 percent people prefer the wayfinding that is unique and visually attractive, it has Hello Kitty characters on it. It is not just about the aspect of "kawaii" but also the wayfinding itself is located at Tama station, which is nearby Sanrio Puroland Theme Park, the origin of Hello Kitty.

In average, 50 percent people also prefer the wayfinding that only shows the pictograms and minimum text. It looks visually clean but attractive, yet less distracting.

There are two points that can be examined here:

1. As Japan is welcoming for foreign tourists, the government needs to facilitate the public space with more convenient facility, including adding some languages that can be understandable by people from different countries. Mostly the foreign tourist coming from China, Korea, Southeast Asia, and European countries. Which means, at least three languages should be added

onto the wayfinding. However, considering that there are no more space to write those down, using pictograms might be best to be used for this case. Using visualization that can be understandable by everyone.

2. Wayfinding, ideally should accommodate everyone's need of information. As mentioned in the principle of universal design: keep it simple and intuitive. Too much information might blurring the essential information that the user might need at the moment. It has to be clear and understandable since the first blinks of an eye. Hence, the movement and flow of the user will be faster.

3. People prefer the wayfinding that is visually attractive but clean, with minimal use of words, because it is less distracting. The location of putting the wayfinding is also important point need to be considered in making a good wayfinding.

We Agree That The Wayfinding Design Should be Improved

On the other question, I also asked about the improvement of wayfinding. Does it necessary to be improved and what should be improved. From 132 respondents, 73.5 percent answered that it has to be improved.

Sample opinions from the respondents:

"For a country that has a lot of lines, Japan has done pretty good job in organising the wayfinding. However this system is not used for the entire Japan. If I go to rural area, the signs are lesser and they are all in Japanese. But the most annoying one is when I took the wrong platform and there's no easy way to find how to go to the opposite platform (this happen to me at Musashi Kosugi JR station). Keikyu line at Yokohama is also confusing. I happened to transfer from Yokohama station (Keikyu) to Tokyu line, but when I exited from Keikyu line I ended up inside JR and couldn't exit because of multiple card tapping."

"In Japan wayfinding are very informative compare to other country, but most of the time it' s very confusing. Sometime the signs were suddenly disappear and I got lost inside the station especially inside a big station such as Tokyo and Shinjuku."

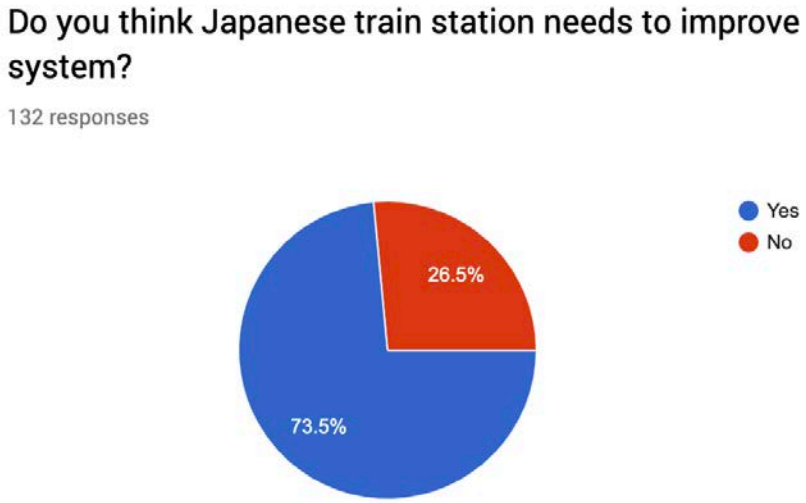

Figure 3.9 We agree that wayfinding needs to be improved

From those two sample opinions, we can conclude that Japan's train station wayfinding at some stations although are well designed, but still confusing for tourists. More reports of the online survey will be shown at the appendixes section.

3.3. Pre-User Test 1

In this test, I made a simple quest given to the participant about finding the way to one particular place. The test was held inside a room. About 5-6 people doing the test at the same time. This test is purposed for better understanding about wayfinding in Japan's train station and to know the problem from participant's feedback.

The test was held in 10-15 minutes per session. Participants were asked to go to "remm Roppongi" as their destination. They were given 1 minute to check the information board before they start. Some pictures were shown from the moment they get off the train and in every intersection. They need to answer the questions

Figure 3.10 Pre-User Test 1

(like going left or right) based on the picture.

By using the online survey-style, I can collect the data about how many times they made mistakes. Around 70 percent participant still made a small mistake such as when they saw the U-turn sign.

Although the pictures shown were not clear enough, but they enjoyed the test experience. One of the participant said that we rely too much on Google Maps and less aware of the information board and surrounding environment. Especially at the subway station where it has many exits.

"If we can see what is nearby the exit without having to look at the information board, that will be great".

3.4. Survey about Color and Word Association

Next is to know what people think about a thing and what color that describe it the most. This is essential to design pictograms which can be understandable for everyone and to eliminate error in translation.

To design a good wayfinding, we also need to consider about the background

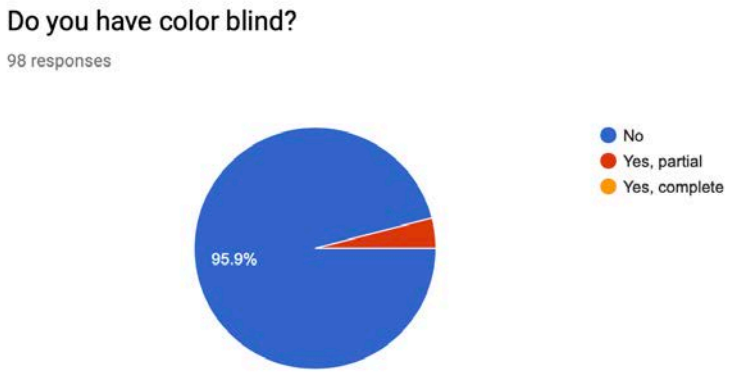

Figure 3.11 95.9 percent participant has no visual impairment

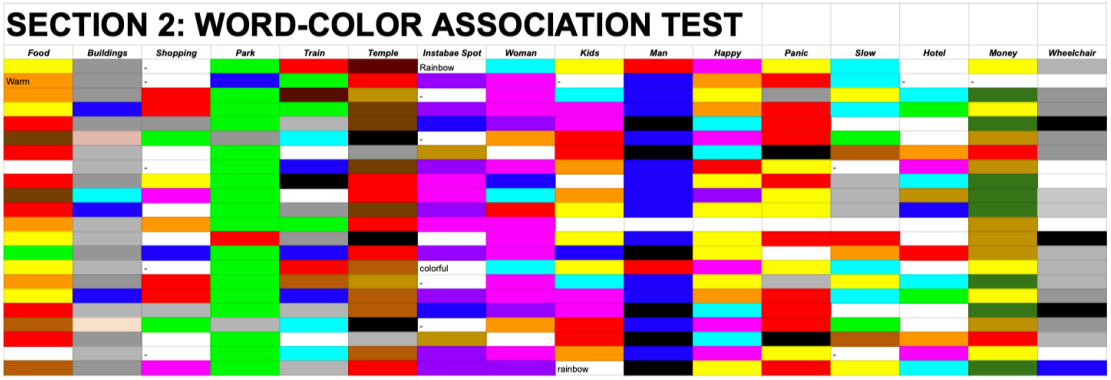

Figure 3.12 Survey about color-word association

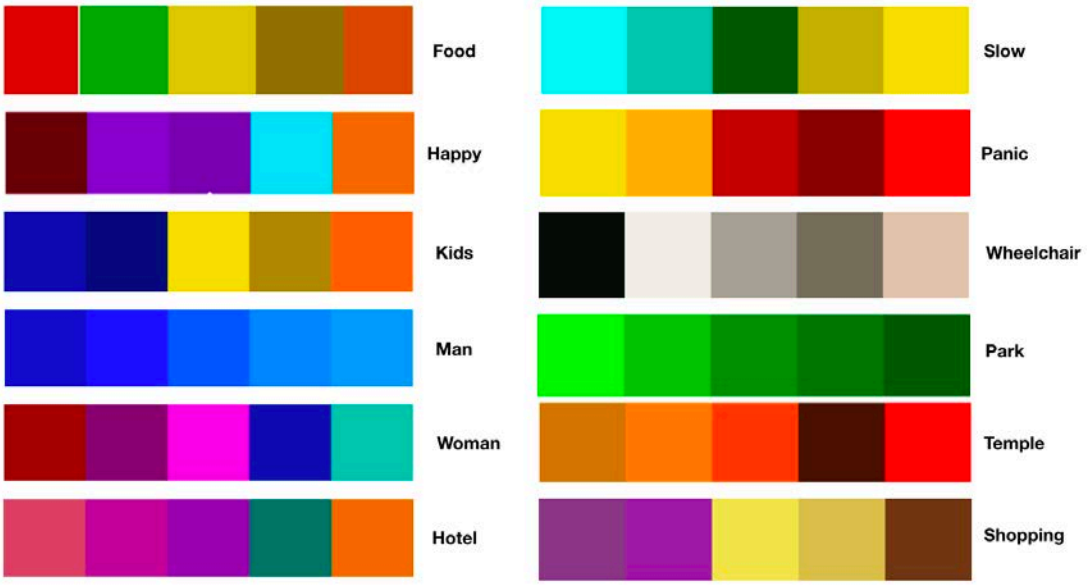

Figure 3.13 The result from color-word association test generated

color style. Whether it is a gradient or solid color. Given the choices of background styles:

1. Style 1: Gradient of the same color
2. Style 2: Solid color
3. Style 3: Gradient of contrast color

The result shows that 62 percent of the participants prefer the background color to be gradient of the contrast color (style 3). It is also trending now among young generations about gradation, which has been part of Apple's designs of their app. So, I decided to take the design with gradient background for the whole design.

3.5. Designing Pictograms and Get It Tested

I created 15 sample pictograms for wayfinding and get it tested. The test was conducted through online survey and offline. The purpose of this test is to know if

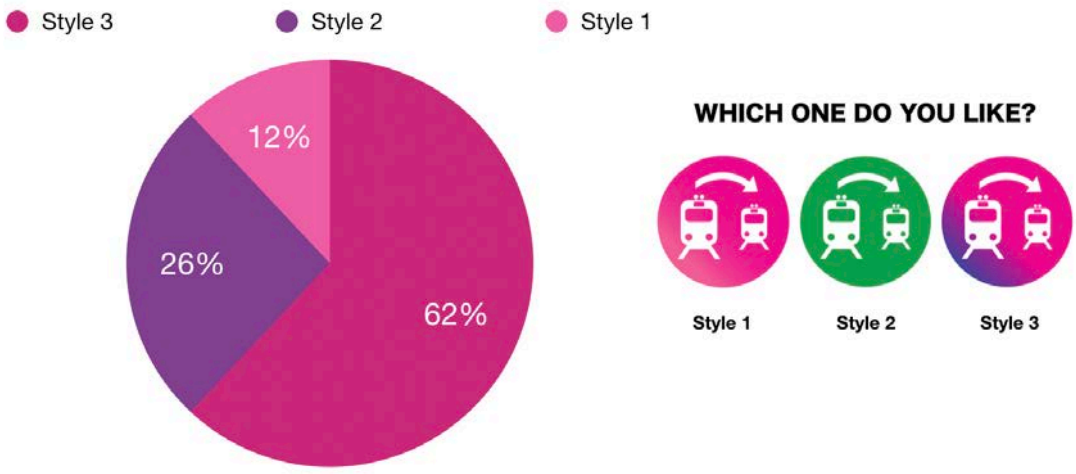

Figure 3.14 Preference of Background Color Style

Figure 3.15 People prefer the gradient color background(left)

Figure 3.16 Apple New iOS 13 Color Trend
[1]

the pictograms work for everyone or not. If yes, then it can be used for wayfinding and in the future can be implemented for broader purposes.

124 people were participating in this survey. The result are as follows:

1. Elevator, Escalator Up, Escalator Down, Toilet, Restaurant, Hotel, Temple, Train, Wheelchair, and Park/Playground are mostly correct.

2. IC Card Machine, Shopping Bag, Prayer Room, and Buildings are mostly answered wrong.

After hearing the feedback and analyzing the result, it can be concluded that 10 out of 15 pictograms are ready to use and the rest should be redesigned.

3.6. On-Site Observation and Pre-User Test 2

This test was held two times. The first group did the test at Ebisu station and the second one at Jiyugaoka station. I gave the user a quest where they need to go to the specific place with limitation in using Google Maps. They have to do

Figure 3.17 Pictograms Used for This Test

navigation manually, either by looking at the information board, maps, or asking people around. After the test, I did some interviews to know how they feel and to get their feedback. The feedback is useful to confirm the hypothesis and to develop the effective solution.

The first session was held at Ebisu station. Ebisu station is chosen because it has multiple railway operators: JR and Tokyo Metro. It has underground station and also located nearby Shibuya, which is famous tourist place. Three of the participants were never been there before, D from Japan had been there before five years ago and he is not familiar anymore.

The participants were four people from different countries and different level of Japanese language ability. All of them is non-native English speaker either. They are devided into two groups. The time consumed during the test will be examined to check how long it will take to navigate around the station without the help from Google Maps. The first group is B from India and A from Philippines, the second group is C from Hong Kong and D from Japan. The test rules are:

- The participants were requested to go to "Ebisu Beer Museum"
- They are not allowed to check on Google Maps

Figure 3.18 On-Site User Test

- They are allowed to check the information board or guide map, or asking people around

I ensure that they did not look for the Google Maps during the test because I followed them throughout the test.

The first group took 22 minutes to get to the place. The second group took 43 minutes. Here are some feedbacks I got after the test:

- A: "It was tiring. I got used to Google Maps instead of wandering around or ask someone. So it was a bit difficult, because the wayfinding is complicated. The good thing is that if you focus to see the wayfinding, you will realize the beauty of the surroundings. Opposite to that, if you look on Google Maps and it tells you where to go, you will probably not care about the surrounding area."

- B: "I think it's exciting and fun. It was a little bit hard in the starting since we don't know where the Beer Garden is, we tried to look at the maps in the station and it was nothing mentioned about that on the maps but Ebisu Garden Palace (not the "Ebisu Beer Museum"). It was confusing about the name. Later on, when we just got out from the exit, we saw the map and it was mentioning the beer museum. In India people rely so much on

Google Maps, it is very hard if you do not have internet. Also, it is difficult to find Wi-Fi here in Japan."

- C: "The reason why it took so much time is first, because we rely too much on map and compass, especially for direction, second is that I am not familiar with the style of map in Japan. Directional-wise is confusing because it just the map that facing to the north, not as in the way you look at the map so we initially took the wrong direction. There is no indication that we are on the right street until we look into another map confirming where we are located at the moment. In my place, if it is a tourist spot, they usually have a big sign indicating about that place, it could be name or shape. For example, like a beer museum, they will have a giant beer sign where people can just see it from far away."

- D: "The last time I came here was five years ago and I took a different way today. This experience makes me realize how much we rely on the Google Maps in daily basis. It is kind of refreshing experience to read the road signs again and walk based on what we see there."

The second session was held at Jiyugaoka station. The participants are E and F, both are married couple with one baby from Indonesia. They have been living in Japan for less than a year. Their Japanese language ability and English are also limited. They usually use Google Maps to get around or ask somebody around.

The rules here is also same: no Google Maps or internet use. They requested to go to a place called "Little Venice" in Jiyugaoka area. This place is also trending now among tourists.

Right after they get off from the train, they went to the nearest exit. After they out from the station, they tried to look to the guide map. On the map, it does not show "Little Venice" since it is a new place. Then, they went to Koban (Police Office) located next to Jiyugaoka station, and tried to ask in English.

However, the police officer did not understand and stopped helping them. Then suddenly another police officer coming and luckily he could speak little English. He explained about how many intersections and at which intersection should they make a turn. After walking based on the guidelines, they passed the actual place. The test took around 22 minutes to finish the quest.

I asked them some questions and the feedbacks from them are:

- "We usually ask the station crew. Some of the stations we have visited have "Pocket Talk", the device that could translate the voice directly. We prefer to ask someone rather than looking to the map because we don't understand the map. In the big station, the wayfinding usually has English guidance, but for station like Harajuku does not have."
- "When we asked, the station crew usually explained in detail, even they would draw it for us. Then, they will give the paper to us."
- "For the station that has multiple exits, such as Yokohama station, we usually get out from the station first. From whichever exit is fine. Then, we start to look for the map or ask people around. The problem is if we stay still inside the station, it is super confusing. We can not stop in the middle since there are many people walking. It is also difficult to look at the wayfinding because it is too crowded. We prefer to get outside first because we have more space to think. Especially for those with baby or group trip, it is more convenient to just get outside and find some space rather than staying inside the station. We can be more focus there."
- "If we stop or make a pause inside a station, usually a small accident will happen. For example, people bump to us. We feel unsafe and inconvenient."
- "Before we decided where to go, we usually look for the recommendation on the internet. Restaurant for example. If the location, in fact, is far from the station and since we are carrying the baby, we prefer to go to the nearest restaurant."
- "The station that is located underground such as Tokyo Metro is more difficult than the usual station. Not just because the wall is higher and we feel besieged."
- "There are no such standardization about wayfinding that mostly make us confused, especially about the coding of color and exit."

- "I think the important thing that needs to be improved is to make sure that people notice that it is a wayfinding. I realize the design here in Japan is hard to be defined, for example, poster about serious announcement and poster for kids day are looked similar. Plus, too many texts written and no visual graphic that attracts us."

After collecting data and feedback in the needfinding process, next process is to ideate the solution and concept proving. Details will be explained in Chapter 4.

Notes

1 https://thenewspocket.com/2019/05/14/apple-ios-13-update/

Chapter 4
Ideation and Proof of Concept

4.1. Ideation

Based on the outputs obtained from the needfinding process, we can list top three biggest problems that users/tourists encounter when navigate in and around the station:

1. There is no standardized wayfinding for all the station in Japan.It is also need to get redesigned in a simple yet attractive manners
2. Because of the lack of information shown on the wayfinding, it can not accommodate the needs of tourists in general
3. The station's condition and crowdedness affect the way we see the wayfinding and navigate in and around the station

The question here is: *"How might we create a personal assistance that helps us navigate effectively in and around the station for the first time?"*

4.1.1 Base Idea

From the needfinding result, it is mentioned that big station, which has multiple lines is the most difficult to navigate. Let's take an example of Shibuya station.

I created a storyboard to make the idea easier to understand. It is based on the needfinding result.

In general, the tourists will feel confused once they get off from the train. They have to make decision since the beginning when the train arrives, to turn left or turn right. Usually some people will follow where the crowd goes. Once they

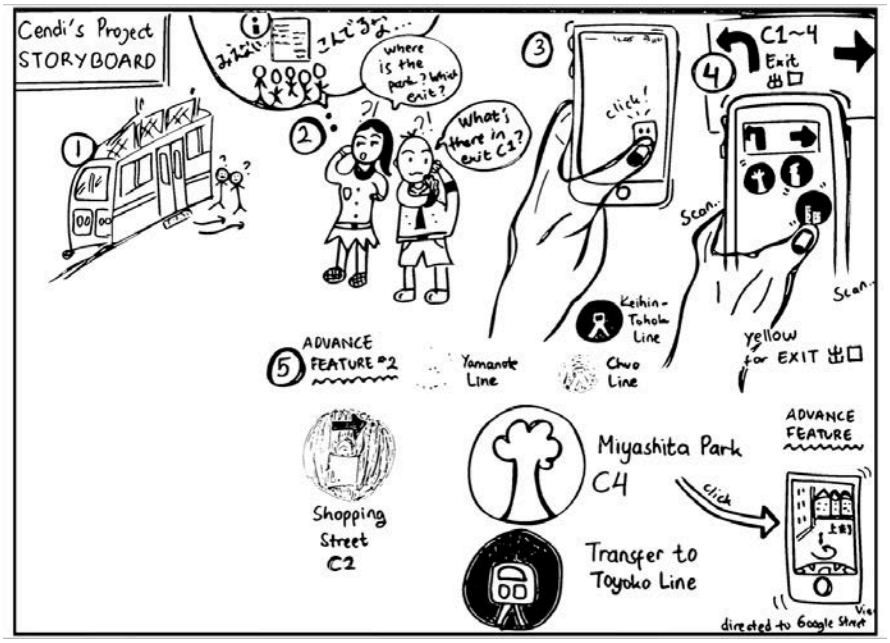

Figure 4.1 Original Sketch 1

find the space to pause, they will look for the information board, guide map, or internet (e.g: Google Maps).

Since some big stations in Tokyo are using code to name the exit (look at Figure 4.2) and the way they coding it is not uniform in every station, people who are not familiar with it will be confused.

In order to decide which exit should we choose, we need to know the destination that we want to go. Although there is an information board, in fact, it does not cover any single information that the tourists need. The trend of tourism is kept updating and it is hard to accommodate if we still depend on the information board or guide map. From the railway operator or government perspective, it will take so much effort and cost to maintain the information.

The output of this idea will be a mobile application (hereinafter:"app"). Not just functioned as a navigation tool, this app can also inspire the users to go exploring the place that they never been to.

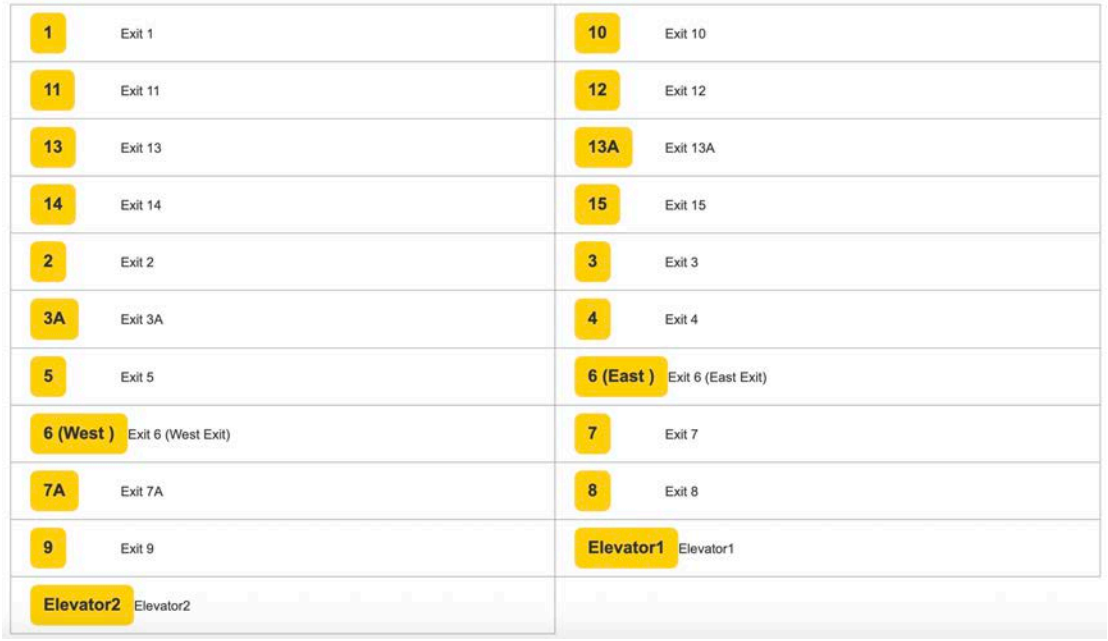

Figure 4.2 Exits at Shibuya station

Features

To provide convenience for tourists in exploring new place around the station, here are the features of this idea:

- It translates the exit name into the only information that we need;
- The information will be shown in pictograms so everyone can understand;
- The pictograms will be delivered in an interactive way, it responds to our (eyes/camera) movement, hereinafter called "icon";

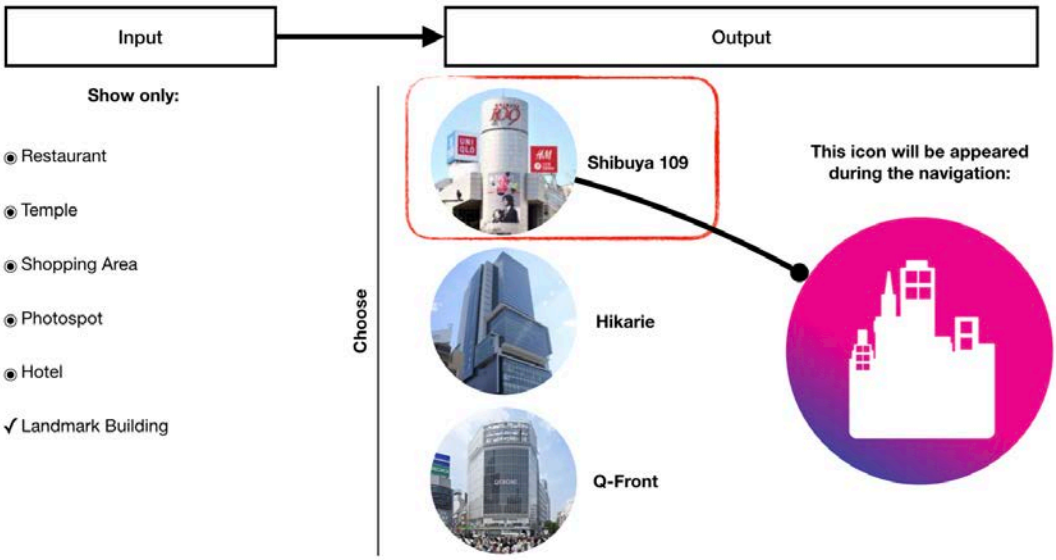

Figure 4.3 The Flow

4.2. Concept Design

The design of this idea belongs to category of speculative design. From the book "Speculative Everything: Design, Fiction, and Social Dreaming" by Anthony Dunne and Fiona Raby, speculative design is not in trying to predict the future but in using design to open up all sorts of possibilities that can be discussed, debated, and used to collectively define a preferable future. (Dunne and Raby 2013)

The idea can be executed in many ways. For example, the Augmented Reality (AR) technology can be one of the way. If in the future, AR glasses will be like a smartphone now, which everyone owns, this idea can be very useful. Although it can be possible in near future, now there are still some limitations, such as the GPS technology which only can detect longitude and altitude. GPS can not detect depth, yet. AR Cloud is trending now and might be a good tool to use to build an everywhere AR system, but this may raise the privacy issues. [1]

To make sure that the app is convenient to use, I keep the user experience (UX) flow as minimum as possible.

Figure 4.4 Concept Visualization

Look at Figure 4.3. From the front-end perspective, once the user open the app, there are only two steps:

1. Step One (Mandatory): "What are you looking for?" "Where do you wanna go?" The user has to choose what to be shown. This process is eliminating the wayfinding which unnecessary to see. This helps user to get more focus because it is not distracting.

2. Step Two (Complementary): "Choose where to go!" This step is only appear if there are many options around the stations.

After that, the display will show only one icon as the wayfinding or guidance. In the settings, the user can set the icon to be: "Always show" or "Show sometimes". "Always show", means during the starting point until the ending point, the icon will always appear. "Show sometimes", means the icon will only appear if the user looking at the signage or when the user position is at the intersection.

4.2.1 MOOV: Effective Navigation Assistant for Tourists

As mentioned before, the output of this idea will be a mobile application (app). This app is called "MOOV". MOOV aims to help tourists move effectively in and around the station. This app is very useful if the tourists go to the busy

Figure 4.5 MOOV Branding

station such as Shinjuku or Shibuya station or the station that does not have multi-language guidance.

Based on the survey explained in Chapter 3 about color-word association, the color of purple and magenta are mostly described as happy. This color combination is also considered gender less. It is also represent the spirit of young generation, as the main target user. "It ' s been reported that at least 50 percent of young generation believe that gender runs on a spectrum — this pink is their gender less mascot. " [2]

Figure 4.6 MOOV Concept Design

4.2.2 Target User

The target of this service in general is anyone (except those with total blind disability). The person who is not familiar about the station environment. Specifically, this app is targeting the millennial tourists, around 17-35 years old who are coming to Tokyo, Japan and using train as a main transportation.

4.2.3 Limitations

- As for now, building the app with GPS based AR is the most efficient way to achieve. However, if the AR is build with GPS-based, GPS still cannot detect the depth yet. For using in subway station, the GPS only detects X,Y. If the location is above or down below us, it might not work well.
- If the AR is build based on location point, it might take more time and costs to build the infrastructure.
- If the user keep looking at the icon, the user may lose focus to surrounding situation.

4.3. Prototyping and User Test

The first prototyping is using the video with icon guidance along the way in Shibuya station. The participant asked to move their head, body, or legs whenever they think they need to move. In the beginning I did not give the instruction for them to follow the icon. It is to see whether they get the idea of the moving icon and will they move their body automatically or not.

In 2 minutes duration of the video, the participant is taken to the trip in Shibuya station in the video. They are asked to go to the building nearby the station, which is Shibuya 109. The icon is moving based on the direction to the destination. This is to give the idea of what the wayfinding will look like.

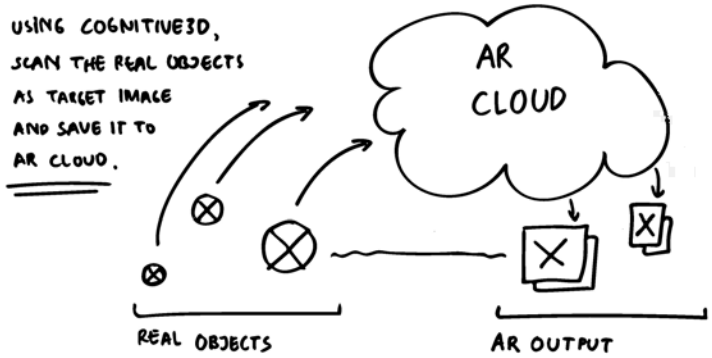

Figure 4.7 Back-end Flow of AR Cloud

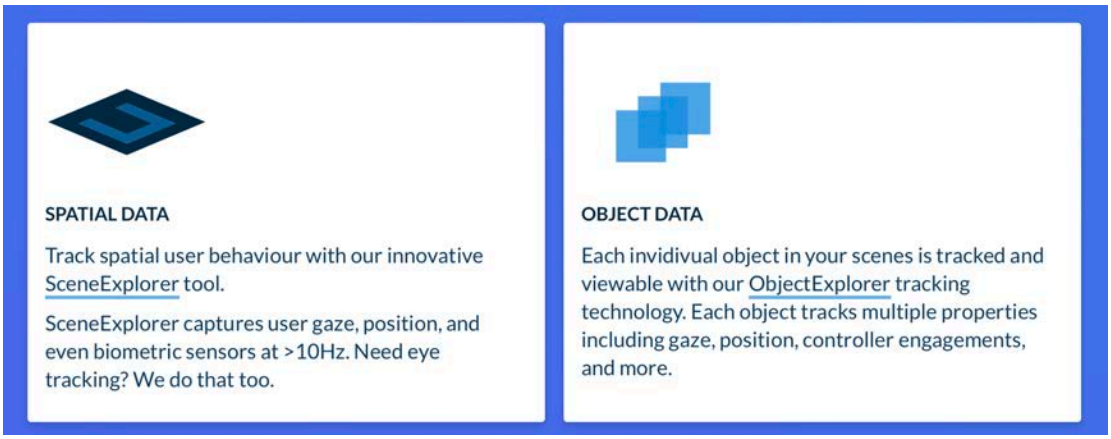

Figure 4.8 Cognitive3D Features
[3]

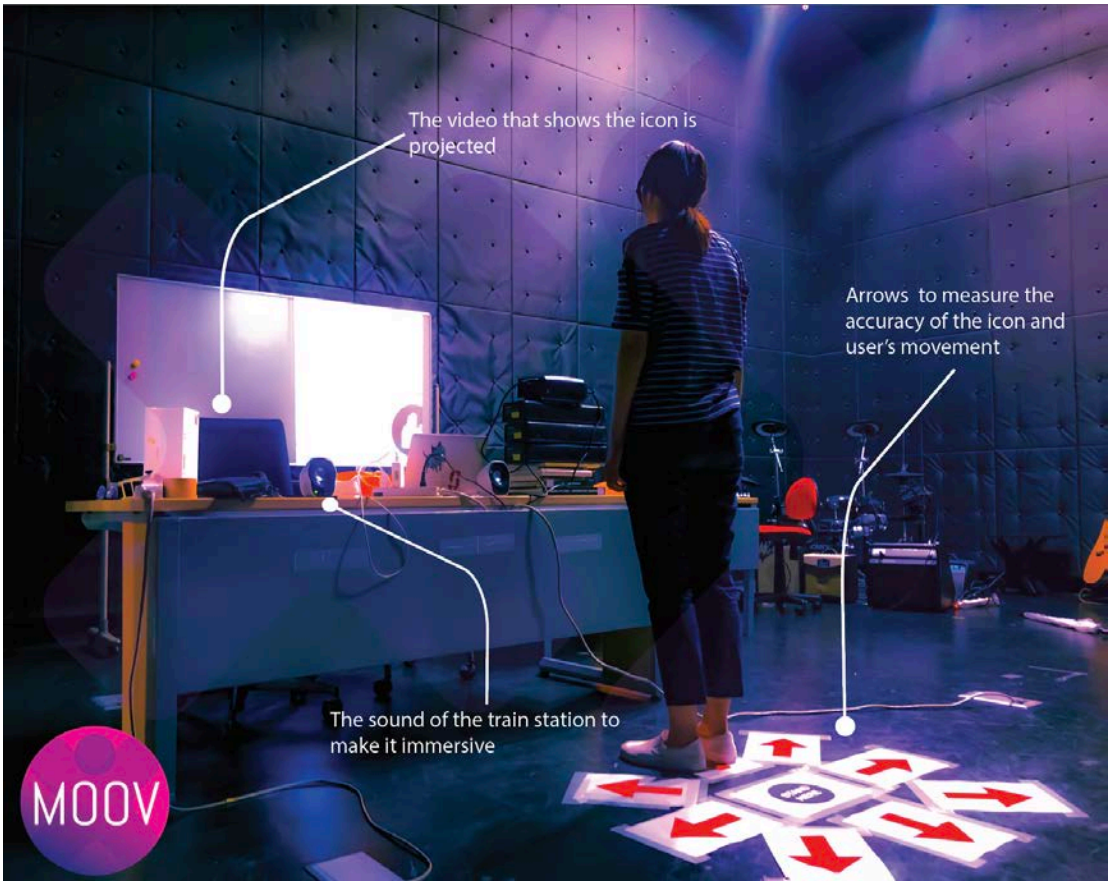

Figure 4.9 Prototyping

4.4. Evaluation and Re-Prototyping

The first user test was joined by eleven people. One person per session. It takes about 5-7 minutes to do the test. After the participant do the user test, they need to answer some questionnaires.

Some of the feedbacks are:

- If the icon goes out of sight, it is better to give some cues like sound or blink to grab our attention back;
- It is better to put some text as an additional information;
- It is better to put distance information, whether explained in number (for example, 300m) or making a different saturation to indicate how close or how far it is.

Some feedbacks will be used for the next prototyping, some are not. The feedback about adding additional information about the location's name for example, I will not take it because it contradicts the base idea itself. For more detail about the user test result, see Appendix.

Re-Prototyping

Based on the feedback from User Test 1, I added some elements to enhance the experience. The elements added are: Sound cues: If it is sounded on left ear means we have to look to the left side. If it is sounded on right ear means look to the right side. This is to grab the user attention when they lose sight. Distance information: I also add distance information at some moments when the user reach the intersection. Since it is shown in numbers, I think it can be understandable by everyone.

4.5. User Test 2 and Evaluation

The user test was joined by 10 participants. The participants are the same person that has done the User Test 1. Still the same concept and rules, only added new

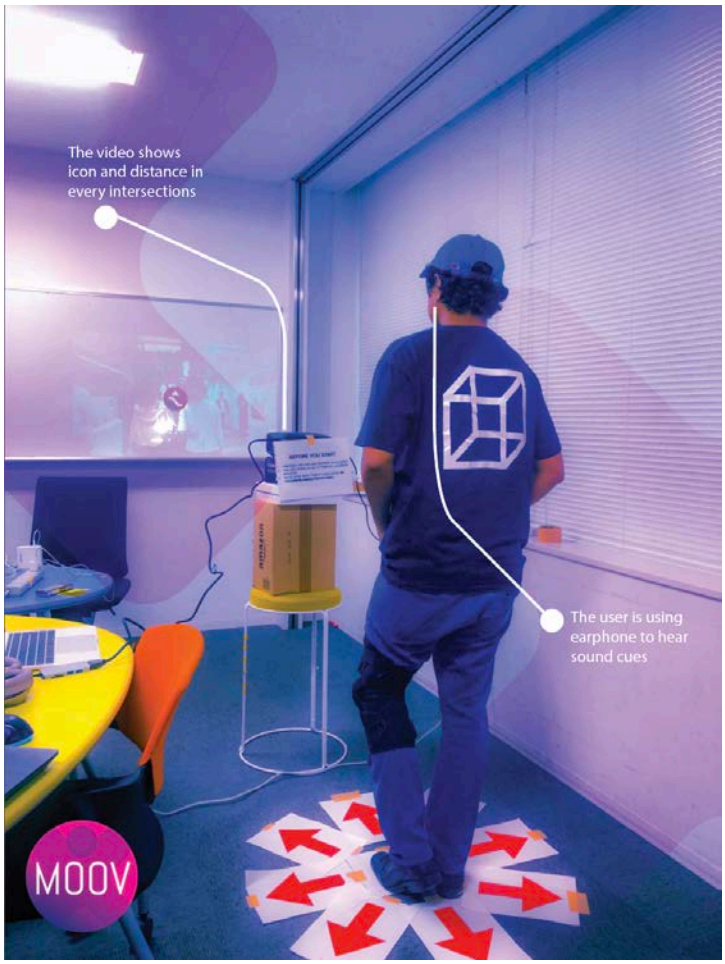

Figure 4.10 User Test 2

elements as mentioned above. The participant was given the earphone to hear the sound cues.

After the test the participant were also asked to fill the questionnaire and asked some questions. The questions are:

- "What do you think about the second experiment?"
- "Visual cues or sound cues that works better?"
- "If MOOV app has released, would you like to try?"
- "Do you think MOOV can replace the use of Google Maps?"
- etc. (more details please check Appendix)

81.8 percent of the participants say they would like to try MOOV app if it is released and 90.9 percent think that MOOV can replace the needs of Google Maps.

The participants think that the sound cues did not help much. Visual cues work better than a sound cues because they did not even aware of the sound cues and when they hear that they do not know what is that about. More visual cues such as blinking for the icon that out of sight is needed to put back their focus.

From the observation during the test, 90 percent of the participants move their body parts (foot, head, hands). They said, they moved the body parts automatically after seeing the icon moving.

They also think that MOOV can take over the place of Google Maps. It is because MOOV is easy to use and easy to understand.

It can be confirmed that this idea works, although all of the user participants have normal vision, but they are coming from different language background.

Notes

1 https://blog.rackspace.com/the-augmented-reality-cloud-and-the-future-of-information

2 https://www.thecut.com/2017/03/why-millennial-pink-refuses-to-go-away.html

3 https://cognitive3d.com

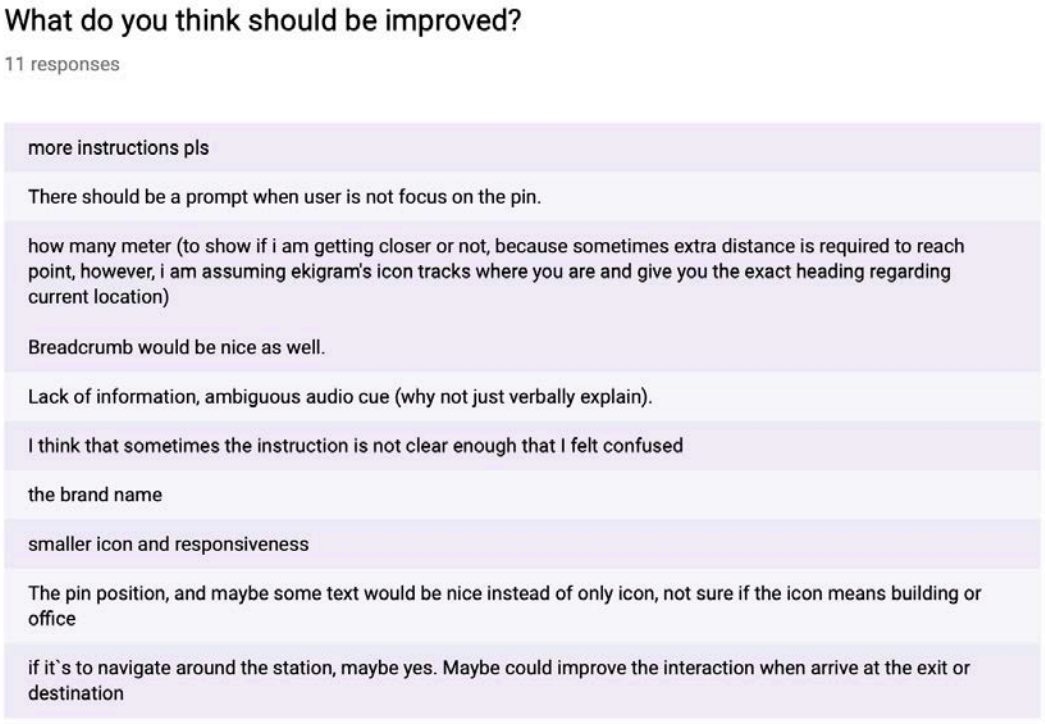

Figure 4.11 User's Feedback on User Test 2

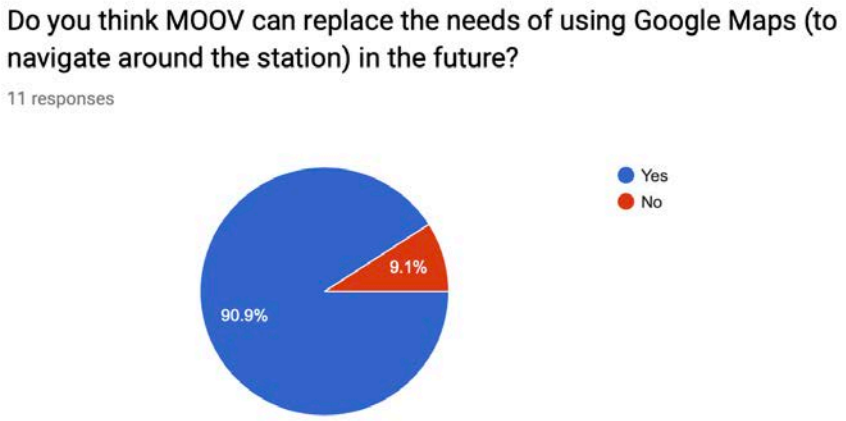

Figure 4.12 The Result of User Test 2

Figure 4.13 MOOV App Prototype

Chapter 5
Conclusion and Future Works

5.1. Conclusion

In conclusion, using pictograms is the easiest way to deliver the message without any language hassle. Our brain can perceive image faster than text. For wayfinding, it is suggested to use pictograms and keep the text to be minimal. This research proves that even with without any text, people can still receive the message. This is recommended for the stakeholders such as railway operator and government in general to consider replacing the conventional wayfinding system that has been used in the train station to more visualized ones. The visualized one can be implemented more efficiently by using AR technology. Creating the AR app for the wayfinding has more beneficial than renovating the whole infrastructure. This app called MOOV can accommodate people from any language background. This app will guide the tourists to get in and around the station in Tokyo area. It directs the tourists to the familiar spot nearby the station. As the era of AR glasses will come soon, this app can be very useful and hassle-free. In general, it can be used by anyone (except for people with total blind disability), but specifically, this app is designed for young tourists who travel Tokyo for the first time and are not familiar with the station environment. I hope in the future this app can be fully executed and implemented. I believe the more convenient the navigation, the more people will travel. This is a good tool to promote tourism and to welcome foreign tourists in one area, especially in Japan.

5.2. Future Works

In the future, this research can be taken further for these following:

- Study about the association between color and word, and its connection to

people's cultural background;

- The design of pictograms might be used for any kind of design, for example, to design a street sign with hologram;
- Hopefully this app can be implemented not just in Tokyo, Japan but all over the world;
- This app can also expanded into business model, create a partnership with local restaurant, attractions, and to help promoting tourism for a city.

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Appendices

A. User Test Picture


MOOV