

**INFORMATION AND FUNCTIONS OF DIGITAL MAP FOR
ELDERLY'S GOING-OUT BEHAVIOR**

高齢者外出行為におけるデジタルマップ情報と機能

August 2021

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Department of Design

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CHIBA UNIVERSITY

(千葉大学審査学位論文)

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Abstract

This research aims to help the elderly to achieve active aging WHO provoked in 1948. After the idea was being purposed several countries and organizations follow its concept to a bureaucratic level. Taiwan and Japan, these two countries belong to Asia and have super-aging status, but the address systems are different. The wayfinding and information of the map show the districts can be known its factors for comparison. Also, the generation showed phone-holding ratio also affects the familiarity with a digital map. Therefore, the subjects chose the 20s and above 60 to test their differentiation. This research is following by the concept to provide a potential tool for the elderly to have the going-out willingness. There is 3 sections of this essay: (1) survey; (2) experiment; (3) in-depth interview. The survey is collected from the 20s and above 60 two age groups: Taiwan and Japan two groups to knowing usability problems and underlying meaning about functions of the digital map. It showed that people have a destination or do not have a different meaning when using these functions. The experiment is for testing the prototype and the changing of going-out willingness before and after using the map. The districts of age had some changed but not in the paired t-test. The third section is an in-depth interview, it is for knowing the reasons and daily life about low going-out behavior to comprehend why they had low going-out willingness. The conclusion contains 5 guidelines: (1) the color should be eased to distinguish the button or other operation tools from the reading materials. (2) the new/event information requires providing actively. (3) other surrounding potential destinations can provide the traveling itinerary by time. (4) knowing the demographic of users can give a more personal suggestion. (5) the integrated map system is not just for the elderly; it is a tool for communicating with family and friends. For future research, the companies and demographics can be done a more specific survey for knowing the different kind of background how people operate the digital map and help them get the information easier and fitting their potential needs they might even know.

Acknowledgments

This work would not be possible without the help and support of many people. The whole journey cannot tell in a few words that how I am appreciating all the advice, contributions, guidance, and support. Even though during the Covid-19, they still give me such courage to finish this paper.

First, I would like to thank my family being supported the decision to study for a doctorate at Chiba University. If not having their support and understanding, I will not have the faith to finish this essay.

To Professor Sato Kiminobu, my advisor and mentor, from exchange student until now for giving me much advice and not only in the research but also in my personal life. Even on the vacation, he was still willing to spend his time discussing with me.

To Professor Munakata, for giving me many thoughts during the research from other perspectives and answering the questions.

To Professor Terauchi, Mizokami, and Ono, for their advice, comments, and feedback during the final stage of this research.

To professor Chen and Lee, for guiding me to the way on the research and giving me so many opportunities to practicing the research process.

To all the Environmental Design lab members, we had much wonderful time. We worked so hard on the projects and had fun at the party or lab. It is an unforgettable life.

To Hiroshi, Xu Bin, Karen Chen, Wu Zhuya, Zhou Mengcai Yan Lu, Wang Jiayue, Lu Shuan, Fan Hsiwen, Chen Yin, Kao I Wei, for helping me to get through the life of all the struggling and listening to my complain.

Finally, to all the people, for helping with the survey, experiment, and interview.

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Chapter 1. Introduction

Research Background

Purpose and Hypothesis

Research Process and Limitation

1-1. Research Background

The definition of health is including three parts which are physiological, mental, and social well-being and not merely the absence of disease or infirmity (WHO, 1948). Also, this definition has not been changed since 1948. Therefore, it shows that still the same importance for people nowadays. In Taiwan, Japan, and lots of aging/aged/super-aged society almost all the countries will face this problem, the amount of elderly is rising promptly. Because their sense, mobility, and reaction are losing gradually, based that their willingness of going out also decreasing. (Edholm *et al.*, 2018) The connection with a neighbor is also losing.

The research about elderly's movement is from various perspectives, like about the restriction by their own body functions/health (Jun *et al.*, 2008; Kawauchi and Ishikawa, 2015), inconvenience public transportation (Watanabe and Kageyama *et al.*, 2015), and the area they are living in (Nitanai *et al.*, 2021). Besides the endogenous and exogenous limitations, some studies are trying to find out those activities or groups to appeal to them to go out. But there are not many studies through the media to provide information and trigger the elderly to go out. On the other perspective, the elderly leaving the house can maintain their physiological, psychological, and social health (Jacobs *et al.*, 2018; Takahashi *et al.*, 2020). Jacobs (2018) tracks peoples' age is 70-95 from 2010 to 2015, with their daily going out behavior being quite an essential part related to their health maintenance.

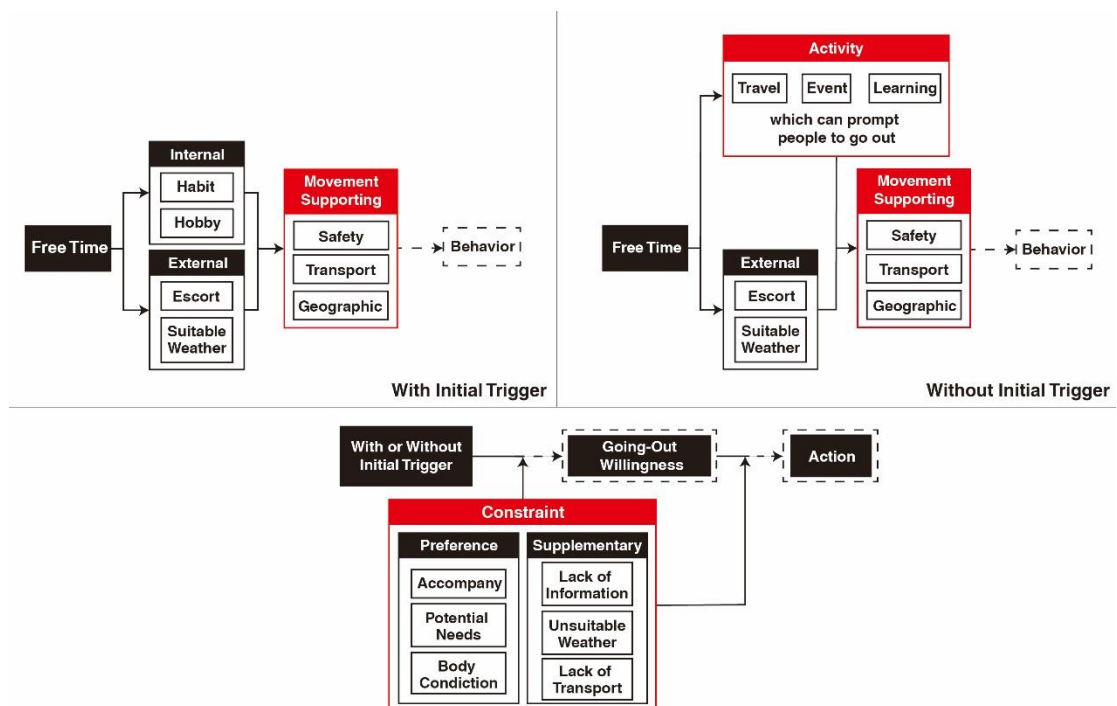
In the digital age, portable electric equipment (tablet, smartphone, and so on) almost becomes a piece of fundamental equipment in routine life and its usage ratio is growing rapidly. According to the Newzoo Global Mobile Marketing Report (2018.09) indicates that around 70 million people (55.3%) in Japan and 14.2 million people (60%) in Taiwan hold smartphones. It pointed out that people are no longer needed to stay in an anchored place to take information in.

The two core elements of this research are: (1) the information that can trigger the elderly's going-out willingness; (2) reducing the obstacles of going-out behavior via the integrated map system. The aims are to help the elderly have a going-out willingness and try to reduce the obstacle when they are willing but do not behave yet. Using a platform to provide the information may trigger them or make them feel easy to go out without worrying about being a burden while they go out independently. The first part focuses on the map information's potential meaning for a user and the culture does impact people when they are using a map; the second part tries to know the reason and the information does impact the user's willingness and the reasons for stopping them going out. About the integrated map system, Google Maps, Apple Maps, or other digital map apps can point to the large scale for daily life, but mostly the general information or real-time traffic situation. What if the real-time exploration of the information can raise the willingness or reduce the problem to users, it will be more and more people use it to extend their own life actively and healthier.

1-2. Purpose and Hypothesis

The purpose and hypothesis of this study are related to the elderly going out with a map and how the information impacts their behavior. Here are the purposes of this study:

1. Finding out the potential meanings in existing functions of paper and digital maps. (Chapter 3)
2. Prompting elderly to go out to have physiological activities and social connections with



others. (Chapter 4)

Figure 1. Elderly going-out behavior trigger model

Chapter 4 is based on this hypothesis including 2 types of people who are having an initial trigger and without an initial trigger; also, the constraint effects in 2 different positions, hence there are 4 possibilities.

This hypothesis, focusing on the elderly why elderly people do not have the going-out willingness besides necessarily going out (*i.e.*, grocery shopping, hospital *et al.*). Besides necessarily going out, when the elderly leave their home and have some connections with others more, they can have more opportunities to have a connection with others, exercise their

body, and other benefits. But we do not know the whole process of elderly going out, then we cannot provide the correct or precise resources for them. All the action has internal and external triggers. Therefore, internal, and external factors need to be divided into a part. This hypothesis is based on the elderly having extra time. The whole model contains 5 parts: (1) Information; (2) Personal Factor (internal and external); (3) Constraint; (4) Going-out Willing; (5) Action.

Information is containing two parts: Activity and Movement Supporting. In the Activity, the most important is as a prompt to make the elderly go out. Preliminary studies (Harada and Muramatsu, 2020) showed that the elderly have more than 60% going-out behavior based on necessary purposes. This research switches the focus to unnecessary going-out behaviors. In the Movement Supporting, there are 3 independent criteria: geography (*i.e.*, slope, stair *et al.*), safety (*i.e.*, a place to rest, toilet *et al.*), and transport (*i.e.*, walking, cycling, train *et al.*).

Personal Factor includes two parts: internal and external. Internal means their own hobby, habit, personality. External means accompanying, the suitable weather, and season, but in this part, weather and season are uncontrollable, therefore, only will be asking that these two criteria are influencing them or not only.

The constraint is also divided into 2 parts: preference and supplementary. In the preference, the potential requirement, and the activities are required people to accompany but there is not, or it is required concentration without interference, but they cannot avoid that. They prefer someone to accompany them then they are willing to go out, or they like to go out alone, but they need assistance. Supplementary means that they do not have enough information, such as lack of transport (*i.e.*, they give up driving license, few buses/trains or even far away from the bus stop or train station.) or they do not know where to go or the activity they are willing to join in.

Going-out Willingness means that the elderly's willingness to go out. Action means that they really go out. In the model, the constraint cannot be determined; it affects the process

before becoming a desire to go out, or they already have had the willingness, but it reduces the effect and cannot cross the threshold to take action to go out.

There are 4 patterns in this hypothesis, pattern 1: the elderly who have hobbies the constraint to affect them before inspiring them to go out; pattern 2: the elderly who do not have hobbies the constraint to affect them before inspiring them to go out; pattern 3: the elderly who have hobbies the constraint to affect them before going out; pattern 4: the elderly who do not have hobbies the constraint to affect them before going out.

For patterns 1 and 3, they both aim at those who have their own hobbies, and we just need to figure when constraint happens and how to remove or reduce the effect for crossing the threshold of not going out. Patterns 2 and 4 are more challenging which need to trigger people who do not have a purpose or are not a fan of going out. Even if they have free time, they probably choose to stay at home. Therefore, what can arise is their desire to go out and reduce the constraint effect are the main goal in the model and study. But there is one possibility that constraint will affect the willingness of going out and action simultaneously.

1-3. Research Process

Process

This study means to reveal the elderly's going-out behavior and the factors connected with it. There are 5 steps conduct in this research which contain:

1. Study scope definition

The aims of this research are: (1) the map elements potential meaning of people and revealing its features in different cultures, for constructing the integrated map system; (2) triggering elderly have going-out behavior, then having physiological activities and social connections, for maintaining or improving their physiological, psychological, and social health., and the background of the whole study is based on the WHO active ageing and the aging problem in Taiwan and Japan. (Chapter 1)

2. Preliminary research

There are 4 parts of preliminary research: (1) Consciousness with Space and Map, for understanding people's consciousness about using map and reaction after reading the information; (2) Digital Map Design and Elements, for the features of digital map and the basic design guidelines of map design; (3) Information Behavior and Oder Effects, for revealing the people after receiving information and how does the information affect people's going-out willing and behavior; (4) Elderly and Going-out Behavior, for collecting the elderly's going out purposes and the reasons may make them choose not to go out. (Chapter 2)

3. Survey

In the survey stage, there are 3 different ways to approach the aims of this research. (1) The questionnaire, the existing digital and paper maps' functions, and the meaning behind its which important in having decided and undecided destination situations. (2) Usability Test, to figure out that map design may affect the going-out willingness and the age difference

between people who are in the 20s and above 60. (3) In-depth Interview, for understanding those who do not have a physiological moving problem their reasons for not going out., and what is possible solutions can be provided in the integrated map system.

4. Analysis

By using quantitative and qualitative analysis to get the insights from these surveys. Such as the Chi-squared test, T-test, and other multivariate statistical analyses. The qualitative analysis is using protocol and behavior analysis to pick up the underneath data from usability tests and in-depth interviews.

5. Final Outcomes

For the outcomes, there are 2 parts. One is all surveys and its analysis conclusion and provides the design guidelines for people who integrated map system to trigger the elderly to go out more than usual to keep physiological, psychological, and social health. The other one is based on the conclusion to design a prototype.

Study Process

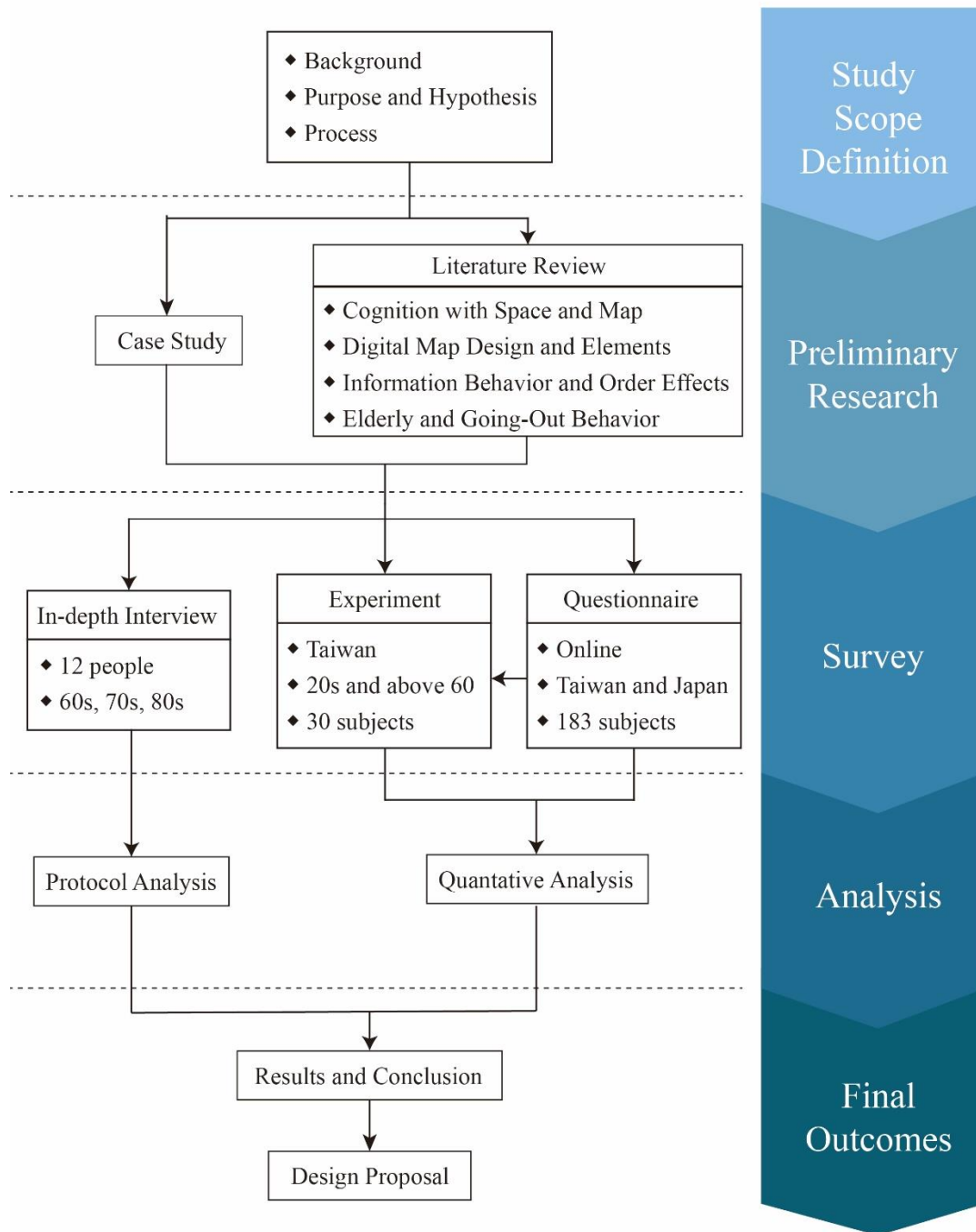


Figure 2. Research process

References

English

1. Edholm P, Nilsson A, Kadi F. 2019. Physical function in older adults: Impacts of past and present physical activity behaviors. *Scand J Med Sci Sports*, 29(3), 415-421.
2. WHO. Official records of the world health organization no. 2 summary report on proceedings minutes and final acts of the international health conference held in New York from 19 June to 22 July 1946.
3. Jacobs J. M., Hammerman-Rozenberg A., Stessman J. 2018. OBJECTIVES: Frequency of Leaving the House and Mortality from Age 70 to 95. *Journal of the American Geriatrics Society*, 66, 106-112.
4. Takahashi, T., Nonaka, K., Matsunaga, H., Hasebe, M., Murayama, H., Koike, T., Murayama, Y., Kobayashi, E., Fujiwara, Y. (2020). Factors relating to social isolation in urban Japanese older people: A 2-year prospective cohort study. *Archives of Gerontology and Geriatrics*, 86, 103936.
5. Newzoo's 2018 Global Mobile Market Report: <https://newzoo.com/insights/articles/newzoos-2018-global-mobile-market-report-insights-into-the-worlds-3-billion-smartphone-users/> (Accessed 07 January 2019)

Japanese

1. 全相俊, 吉田樹, 竹内龍介, 秋山哲男: 都市地域における高齢者の外出実態とその影響要因としての個人属性に関する研究, *土木計画学研究・論文*, 25(3), 755-762, 2008
2. 渡邊奈緒, 陰山健司, 金子雄一郎: 公共交通シニアパスが高齢者の外出行動へ与える影響 – 社会実験による検証 –, *運輸政策研究*, 18(3), 4-9, 2015
3. 似内遼一, 荻野亮吾, 梅本大輔, 松村優, 櫻井理加, 細萱一立, 遠藤良顕: 郊外住宅地に住む高齢者の外出を維持する地域戦略のあり方に関する一考察, *福祉のまちづくり研究*, 20, 23-34, 202

Chapter 2. Literature Review

Consciousness with Space and Map

Digital Map Design and Elements

Information Behavior and Order Effects

Elderly and Going-out Behavior

Case Study

Summary

2-1. Space and Map Consciousness

People sense the environment around needing to process kinds of information, especially visuals. There are signs, billboards, and other types of aid that provide the information we need. Besides the fixed aids, there are also smartphone or car navigation systems. These portal devices provide information to help people receive the environment. When creating a cognitive map, people interact with their environment, using all five senses to absorb all kinds of information. They then combine their knowledge and memory to form a unique mind map (Lynch, 1960; Bell *et al.*, 1995). People receive information and process it as their system to realize the environment. A city is composed of five elements, which are also used in wayfinding and cognitive mapping (Lynch, 1960). The map is the most efficient tool for people to understand not grid city planning (Mooser, 1988).

Some studies believe that there are two kinds of wayfinding processes: (1) orientation/survey strategy and (2) route strategy. The orientation/survey strategy can obtain information from different resources (*i.e.*, integrating the information between different nodes) and create a more flexible cognitive map. Moreover, route strategy refers to a series of instructions, such as landmarks being the main reference in a wayfinding strategy when subjects move from one location to another (Lawton, 1994, 1996; Lawton and Kallai, 2002). These two strategies exhibit two kinds of map users: one needs some additional information between the nodes along the route, and the other needs a landmark to create a route plan. The first strategy is primarily used by men, and the second one is used primarily by women.

Nori and Giusberti (2006) indicate the wayfinding has three types of the group which are (1) landmark task, this type of people mainly rely on photo and figure; (2) route task, they more use sequence, map description, right-left discrimination, and 2D rotation to make sure the destination or orientation; and (3) survey task, in this group, they use path, 3D rotation, and sum and straighten which more likes bird's-eye viewpoint of an object-centered reference system., and these studies show that women may use route strategy/task more, but Nori and

Giusberti's study shows other two tasks still have around 20% of people in each. Therefore, it may relate to other socio-demographic not only just gender. However, no study shows whether culture or nationality has a significant effect on wayfinding strategies. This study specifically analyzes the difference in nationality.

Some theories explain how user experience is applied in the design and construction of spaces. These theories are related to people's behaviors and how they are guided by a building's features. Fogg's model believes that people are coercive, but this concept is only applicable in specific situations (Fogg, 2009). Moreover, Rahimi's model tends to believe that a user is influenced by his or her own sociocultural experience (Rahimi, 2014; Rahimi *et al.*, 2018). Lastly, Knutson *et al.*'s model includes the following seven factors: orderly, benefit, accessibility, convenience, utility, incentive, trust, and environment. This model also divides user experience into different levels to analyze how people participate in common activities (Kunston *et al.*, 2007). Based on these theories, this study tries to find the important elements of map usage that help users to have a pleasant wayfinding experience. Even though 3 models are approaching spatial experience, but still cannot explain the differences between people who have decided or undecided destinations. By the differences, even the same functions show different meanings for the user's operation. It may show when people use the same tools, but the meanings can be variable.

Moeser (1988) pointed that a simplified map is more important than people's familiarity with the environment. It means that people can get better information from the map than their memory. The information of map plays the role of navigation in the paper map in daily life for most of the people, but in this research tends to find an underlying role in the digital map for elderly.

2-2. Digital Map Design and Elements

The origin of maps can be traced back to around B.C. 500 when people used these maps to indicate to locate food or water. Thus, to read maps, people should understand space and semiotics. Humans have developed language and semiotics to help place information in maps and develop cartography to make users easy to understand the information in maps. The map revolution started with the 1950s quantitative revolution, followed by the 1960s' communication model, the 1970s cognition theory, and then the 1990s' geo-visualization, which improved map design and legibility.

According to Mentello *et al.* (1999), the performance of a map depends not only on its visual appeal but also on its words and graphics. Meanwhile, the digital map has changed the performance differs from each one and the way how the map interacts with a user. Users choose their accuracy to clarify the information and make a difference in their recognition for each user. The interface will influence usability and impact wayfinding. Digital maps, such as Google Maps and Apple Maps, have changed peoples' behaviors. These maps try to combine a user's previous information and the interactive functions to make it more real-time.

Digital maps can show and output any scale and range. They can also easily connect with satellite images, aerial photos, or other information from databases to enhance users' recognition of geographic information. Moreover, processes involved in map design should be integrated with GIS (Geographic Information System), RS (remote sensing), and GPS (Global Positioning System) as databases (Lin and Wang, 2010). The 3D outward appearance of the landmark shows easier to understand from 18.33% to 81.67% (Mulazimoglu and Basaraner, 2019) and the street name is also playing a critical role in the wayfinding of tourism maps in Macau (Yan and Lee, 2015). It shows that if those who have the same address system idea can be easier to understand the map information which may provide new thinking in map design to guide the user to adopt the different system of the map.

Wakabayashi Yoshiki (2008) has elaborated on the difference between paper and digital maps. In the comparison of the paper map and digital map, the digital map provided the adjustable scale and range., and the real-time renewal information is the most important for users that they can know the correct and latest information (Although the renew is not immediately but compare to paper map renewal or generating is quick). The other advantage part of digital maps is that users and map makers can interact with each other, it becomes a communication tool. More and more digital maps designed the comment section for users can upload their thought or give a rank on the map. The traditional paper map is the one way to send the information to users.

2-3. Information Behavior and Order Effects

There are some theories related to information behavior. According to Wilson (1991, 1999, 2000) “The totality of human behavior in relation to sources and channels of information, including both active and passive information seeking, and information use.” Information exists in our daily life, no matter we gain it and use it actively or passively. It will affect our decision and behavior. In 2000, Wilson focused on humans and their needs to modify the whole theory.

Based on Wilson’s model (1999), there are 3 behaviors included: information seeking behavior, information-searching behavior, and information use behavior. In this study, the main information will be environmental information for elderlies who want to go outside whether they have a destination or not and using the information to help them or encourage them to leave the house even have some activities. By the map system to provide the information they need.

Information behavior research is the separating of certain information. About people use the map to find their destination is put into wayfinding related research. People’s experiences and demographics are related to their next decisions or behaviors. The wayfinding also is a seeking process that is related to the 2-1 spatial cognition and the environment information (Rahimi, 2014; Rahimi *et al*, 2018).

And here are some other types of information seeking behavior research that showed that demographics are just influencing the wayfinding also in others information. The health-related information seeking behavior is associated with age and gender and other demographics (Rosis and Barsanti, 2016; Cotten and Gupta, 2004; Li and Theng *et al*, 2016; Siliquini and Ceruti *et al.*, 2011; Baumann and Czerwinski *et al.* 2017; Valero-Aguilera and Bermúdez-Tamayo *et al.*, 2012; Bundorf and Wagner *et al.*, 2006).

Not only the demographics, a relatively objective perspective, the identify (subjective perspective) is also the core concept in the information behavior. The five different ways of

identity showed that people's information behavior might change by identifying concepts (Hicks, 2020)

Hogarth and Einhorn's (1992) beliefs show that recency information influences more than primacy information. But in Arnaud Rey *et al.* (2020) the importance also influences the result if the most initial information shows in the first and positively, then people will decide by it instead of others. After absorbing the information, the order effect will help us to make a decision, such as the primacy effect if the most important information is put in the upper order, then it will influence people to behave.

2-4. Elderly and Going-Out Behavior

The definition of free time going out activity, the term "free time going out" is defined as going out activities that take place during the time of human life after subtracting physiological needs and working hours, and that is solely for the purpose of personal enjoyment. However, as an exception to this definition, going out during physiological and working hours that meet specific conditions shall be included in free time going out (Tanaka *et al.*, 1991; Sakurai and Ozaki, 1996).

Information is an essential variable of going out so it is a media that can receive information or contact others. In contrast, the emphasis on using SNS also seems like a possibility that may cause the elderly does not to want to go out or decrease their going-out willingness. Katsura and Hashimoto (2019) the elderly in the 60s who use social media a lot showing they have more offline activities, 70s and 80s who use mail, smartphone, or computer internet more, their psychological health is better. Several surveys are showing that even though in modern society, people can use the internet to communicate with others. Yet, the reality meeting still shows better effects than through the internet and mobile equipment in social health. Communication in offline activities can arise from the concern of others or local love. (Edo *et al.*, 2015). Other research regards that SNS (social networking service) is a method of increasing real communication which cannot be replaced (Onitsuka *et al.*, 2011; Nakatsuka, 2011). Based on the theories, the elderly receiving information has more possibility to explore the other activities they did not know or participate in before.

ENVIRONMENTAL FACTORS

The weather can change people's going-out behavior, temperature is one of the factors. Harada and Matsumura (2017; 2020) collected people when snowing season and non-snowing season going-out behavior in elderly. Those people have high self-efficiency when they are handling essential activities (*i.e.*, going to a hospital, bank, or city office and clearing snow). In contrast, people might worry about themselves having low self-efficiency and it could

reduce the possibility of going out. Also, the snowing season and non-snowing season affect older people's going-out behavior from their daily movement distance can tell the huge difference by the weather. Shintani *et al.* (2003) older people reduce 65.9% movement distance when snowing season.

The heatwaves also a problem for the elderly, especially in Europe Australia, and Korea, the morbidity and mortality in the elderly population becomes a public health problem (Larrieu *et al.*, 2008; Cheng *et al.*, 2018; Son *et al.*, 2012; Åström *et al.*, 2011). Staying in high heat for a long time can cause people to feel dizzy, faint, dehydrated even heat exhaustion. A team designs a robot by taking weather forecast data to provide some recommendations on the weather conditions to help the elderly to arrange their daily activities (Szeles *et al.*, 2017).

PHYSIOLOGICAL AND PSYCHOLOGICAL FACTORS

The elderly's body functions are the one factor that is relating to their going-out behavior. Not only themselves but their families also worry about it. In the scenario, they probably are asked not to go out, or other family members will offer to take them to go out. It becomes a mental pressure that they are embarrassed to ask others to take them to go out. Or they just ask the family to bring something they need, or they want (Murray and Musselwhite, 2019).

Another one is giving up their driving license, neither they give it up by themselves nor someone asks them to give it up. It takes a possibility to go out. For people in the city or a place with a well-designed public transportation system, it does not matter if they have a car or driving license. But people who live in the countryside or suburban lacking public transportation mean that they lose independence and must start relying on other people (Ryan and Wretstrand, 2019). No matter if other people are family, government staff, or some daily retailer truck. Moreover, even if they want to take public transportation, there might be another challenge for them. Habib *et al.* (2011) say that the use of the public transport system

often requires a certain familiarity, and a relatively high level of physiological and cognitive functioning, requirements that exclude some groups of older people.

2-5. Case Study

For this study, five digital maps were analyzed to identify their various functions and elements: Google Maps, Apple Maps, Taipei Historical Maps, what3words, and Toilet Map. The results of this case study were then used to design the questionnaire. The survey aimed to determine which of these functions' participants used or known before. Besides, the type also chooses them by the amount of downloading.

Google Maps and Apple Maps have created the most extensive digital maps, and the other three maps are based on these designs because they allow a user to pinpoint their position and access information. Google Maps, for example, uses instant GIS to update the traffic status (*e.g.*, show peak traffic sections or suggest an alternative route) based on a user's position. Apple Maps does not give instant updates. The case study shows that Google covers more functions than the other four maps, but many of these (such as Shop and Spot or Street View) need to be updated. Furthermore, Google Maps of smaller, tourist-oriented areas can update very slowly or not at all.

Taipei Historical Maps collects 10 maps from different eras and integrates them into present-day Taipei. Tourists can use these maps to find ancient monuments or use street view to experience what streets or places might have looked like in earlier times. Conversely, the what3words map does not rely on traditional coordinate reference systems; instead, the design team divides all areas into a grid of 3m² squares and assigns a unique three-word address to each, *e.g.*, "heave.skater.belonging". Also, it can be used as Google Maps, just put in the name of the destination. The final application is Toilet Map helping users in Japan to find their nearest toilet. The app also allows them to access the place and open time, type of toilet, and so on. Most importantly, this application can interact with a user by editing the information of the toilet.

The table gives an overview of the functions these five maps have to offer. The findings from the case study emphasize the preciseness and accuracy of digital maps such as Google

Maps and Apple Maps. Therefore, designers or engineers with a limited budget would profit from using these two maps as bases to create the other digital map, especially for the elderly. They need more time to learn and familiar with the new system or operation process than the youth. Also, the layout for the elderly would be considered in the research. The operation process can determine that they will be continuing to use the map next time or long time. In all the digital map was designed for everyone, but none of them was designed for the elderly. Hence the layout was not quite fit for the elderly users. The next chapter would survey to understand what the questions and pain points are for the users.

Table 1. Figures of map

Application Function	Google Maps	Apple Maps	Taipei Historical Maps	What3words	Toilet Map
Main target	Wayfinding	Wayfinding	Education & Tourism	Wayfinding	Toilet indicated
Base map	-	-	Google Maps	Google Maps	Google Maps
GPS	○	○	○	○	○
Navigation System	○	○	×	○	×
Number of Layers	3	1	10	2	1
Layer Switch	○	×	Changeable	○	×
Direction Indicator	○	○	×	○	×
Street View	○	×	×	×	×
Provided Information	Shop and Spot	Shop Spot and	×	×	Toilet
External Linkage	User's website or Google	Uber or taxi apps	×	Uber, and others map-related APP	×

2-6. Summary

This section is organized the 4 parts of the literature reviews and the case study to set up the process of the whole hypothesis and the following up survey, experiment, and in-depth interview. The 4 sections of literature reviews are talking about the “consciousness with space and map”, “digital map design and elements”, “information behavior and order effects”, and “elderly and going-out behavior”. These sections supported the model of this research. The first 2 sections are space consciousness and components of the map which are the base of the integrated map system for understanding the functions of the map. The information behavior and elderly going-out behavior is for knowing the operation and the essential factors about the triggers how the research can affect them to have the going-out willingness or have actual behavior of going-out.

People have their internal (lifestyle, age, gender, household, and so on) and external (weather, living area, transportation, information, and so on) factors that affect their going-out behaviors. Based on the smartphone holding ratio, the 20s group is almost 100% both in Taiwan and Japan, the above 60 groups are 60% in Taiwan and 55% in Japan. It is might be a chance that a digital map can be a potential media that could be used as an external factor to trigger people to go out.

The most essential factors in this research are the information of the map, and how to arrange it into the map, and easy to understand and operate for the elderly. According to the literature review, there are 2 conclusions. The first, for triggering the elderly to go out more, the operation of map or making the information easy to understand must need to be focused on. The other part is the information fitting the elderly need or the most critical for them needs to be discovered in this research.

For reducing the gap of the operating map, the case study was to be also concerned. Also, the case study was analyzed the 5 maps which are contained the 2 major maps of the world and the 3 maps showed the different position systems, targets, or purposes in the digital map.

The based map of other digital maps usually chooses Google Maps as the foundation. Therefore, the survey and experiment in chapter 3 and 4 also use Google Maps as a question and design as a base map in the prototype of the integrated map system.

Reference

English

1. Baumann E., and Czerwinski F. *et al.* 2017. Gender-specific determinants and patterns of online health information seeking: results from a representative german health survey. *Journal of Medical Internet Research*, 19(4), e92.
2. Bell, P. A., and Greene, C. T. *et al.* 1995. *Environment Psychology* (5th edition), Psychology Press.
3. Bundorf M. K., and Wagner T. H. *et al.* 2006. Who searches the internet for health information? *Health Services Research*, 41(3p1), 819-836.
4. Cheng, J., and Xu, Z. *et al.* 2018. Heatwave and elderly mortality: An evaluation of death burden and health costs considering short-term mortality displacement. *Environment International*, 115(April), 334-342.
5. Cotten S. R., and Gupta S. S. 2004. Characteristics of online and offline health information seekers and factors that discriminate between them. *Social Science and Medicine*, 59(9), 1795-1806.
6. De Rosis S, and Barsanti S. 2016. Patient satisfaction, e-health and the evolution of the patient-general practitioner relationship: evidence from an Italian survey. *Health Policy*, 120(11), 1279-1292.
7. Deborah Hicks. 2020. Clarifying identity in information behavior research: A conceptual analysis. *Library and Information Science Research*, 42, 101035.
8. Doherty, R. A., and Sorenson, P. 2015. Keeping Users in the Flow: Mapping System Responsiveness with User Experience, *Procedia Manufacturing*, 3, 4384-4391.
9. Fogg, B. J. 2009. A behavior model for persuasive design. *PERSUASIVE 2009: The Fourth International Conference on Persuasive Technology (2009)*, 1-7.
10. Guccione, A. A. 2000. *Geriatric physical therapy*, Second edition. K. White, ed., St. Louis: Elsevier Mosby, 134- 147.
11. Habib, K.M.N., and Kattan, L. *et al.* 2011. Model of personal attitudes towards transit service quality. *Journal of Advanced Transportation*. 45(4), 271–285.
12. Herssens, J., and Heylighen, A. 2008. Haptics and vision in architecture - Designing for more senses. *Proceeding of Conference Sensory Urbanism(2008)*, 102–112.
13. Hogarth, R. M., and Einhorn, H. J. 1992. Order effects in belief updating: The belief-adjustment model. *Cognitive Psychology*, 24(1), 1-55.
14. Kelvin Lynch. 1960. *The Image of City*. MIT press. Massachusetts.
15. Kirasic, K.C. 2000. Age differences in adults' spatial abilities, learning environmental layout, and wayfinding behavior. *Spatial Cognition and Computation*, 2, 117-134.
16. Larrieu, S., and Carcaillon, L. *et al.* 2008. Factors associated with morbidity during the 2003 heat wave in two population-based cohorts of elderly subjects: PAQUID and Three City. *European Journal of Epidemiology*, 23(4), 295-302.

17. Lawton, C. A. 1994. Gender differences in wayfinding strategies: Relationship to spatial ability and spatial anxiety, *Sex Roles*, 30, 765-779.
18. Lawton, C. A. 1996. Strategies for indoor wayfinding: The role of orientation, *Journal of Environmental Psychology*, 16(2), 137-145.
19. Lawton, C. A., and Kallai, J. 2002. Gender differences in wayfinding strategies and anxiety about wayfinding: A cross-cultural comparison, *Sex Roles*, 47, 389-401.
20. Li, J., and Theng, Y.-L. *et al.* 2016. Predictors of online health information seeking behavior: changes between 2002 and 2012. *Health Informatics Journal*, 22(4), 804-814.
21. Lin, Y. L., and Wang, C. H. 2010. Evaluation of Electronic Map Interface on Web Pages for Naive Users, *Journal of Ergonomic Study*, 12(1), 43-55.
22. Millar, S. 1997. *Reading by touch*. London: Routledge Press. 14-27.
23. Montello, D. R., and Lovelace, K. L. *et al.* 1999. Sex-related differences and similarities in geographic and environmental spatial abilities, *Annals of the Association of American Geographers*, 89(3), 515-534.
24. Mulazimoglu, E., and Basaraner, M. 2019. User-Centred Design and Evaluation of Multimodal Tourist Maps, *International Journal of Engineering and Geosciences*, 4(3), 115-128.
25. Murray, A., and Musselwhite, C. 2019. Research in Transportation Business & Management Older peoples' experiences of informal support after giving up driving. *Research in Transportation Business & Management*, 30, 100367.
26. Nakevska, M., and Anika, v. d. S. *et al.*, 2017. Interactive storytelling in a mixed reality environment: The effects of interactivity on user experiences, *Entertainment Computing*, 21, 97-104.
27. Nori, R., and Giusberti, F. 2006. Predicting Cognitive Styles from Spatial Abilities, *The American Journal of Psychology*, 119(1), 67-86.
28. Oudin Åström, D., and Bertil, F. *et al.* 2011. Heat wave impact on morbidity and mortality in the elderly population: A review of recent studies. *Maturitas*, 69(2), 99-105.
29. Rahimi, F. B. 2014. A model for sociocultural interactions in museums. *Museum Management and Curatorship*, 29 (2), 174-187.
30. Rahimi, F. B., and Levy, R. M. *et al.* 2018. Human behaviour and cognition of spatial experience; a model for enhancing the quality of spatial experiences in the built environment. *International Journal of Industrial Ergonomics*, 68, 245-255.
31. Rey, A., and Le Goff, K. *et al.* 2020. The primacy order effect in complex decision making. *Psychological Research*, 84, 1739-1748.
32. Ryan, J., and Wretstrand, A. 2019. What's mode got to do with it ? Exploring the links between public transport and car access and opportunities for everyday activities among older people. *Travel Behaviour and Society*, 14, 107-118.
33. Siliquini R., and Ceruti M. *et al.* 2011. Surfing the internet for health information: an Italian survey on use and population choices. *BMC Medical Informatics and Decision Making*, 11(1), 21.

34. Son, J.-Y., and Lee, J.-T. *et al.* 2012. The Impact of Heat Waves on Mortality in Seven Major Cities in Korea. *Environmental Health Perspectives*, 120(4), 566-571.
35. Steinfeld, E., and Maisel, J. 2012. *Universal design: Creating inclusive environments*, New Jersey: John Wiley & Sons, 3, 276.
36. Szeles, J., and Kubota, N. *et al.* 2017. Weather forecast support system implemented into robot partner for supporting elderly people using fuzzy logic. *IFSA-SCIS 2017 - Joint 17th World Congress of International Fuzzy Systems Association and 9th International Conference on Soft Computing and Intelligent Systems*. 1-5.
37. Taillade, M., and N'Kaoua, B. *et al.* 2016. Age-Related Differences and Cognitive Correlates of Self-Reported and Direct Navigation Performance: The Effect of Real and Virtual Test Conditions Manipulation. *Frontiers in Psychology*, 6, 2034.
38. Taillade, M., and Sauzéon, H. *et al.* 2013. Age-related wayfinding differences in real large-scale environments: detrimental motor control effects during spatial learning are mediated by executive decline?, *PloS one*, 8(7), e67193.
39. Valero-Aguilera B., and Bermúdez-Tamayo C. *et al.* 2012. Factors related to use of the internet as a source of health information by urological cancer patients. *Support Care Cancer*, 20(12), 3087-3094,
40. Yan, L., and Lee, M. Y. 2015. Are tourists satisfied with the map at hand?, *Current Issues in Tourism*, 18(11), 1048-1058.
41. Zomer, L.-B., and Schneider F. *et al.* 2019. Determinants of urban wayfinding styles, *Travel Behaviour and Society*, 17, 72-85.

Japanese

1. 若林芳樹: 地理空間の認知における地図の役割, 認知科学, 15, 38-50, 2008
2. 河内萌未, 石川徹: 健常高齢者の外出意欲と外出活動の関係に関する研究, 計画行政, 38(3), 49-53, 2015
3. 原田圭子, 村松真澄: 積雪寒冷地在住高齢者の外出頻度と外出に対する自己効力感との関係—非積雪期における調査から, 日本老年看護学会誌 (老年看護学), 22(1), 107-114, 2017
4. 原田圭子, 村松真澄: 積雪寒冷地に住む高齢者の外出目的別楽しみの程度と外出に対する自己効力感との関係, 25(1), 123-131, 2020
5. 田中直人, 荒木兵一郎, 足立啓, 川西俊久: 「神戸市における公営プール施設の利用動向」, 日本都市計画学会学術研究論文集, No.26, 39 工-396, 1992
6. 桜井康宏, 尾崎正治: 「余暇生活グループ化の展開過程からみた大都市コミュニティセンターの意義」, 日本建築学会計画系論文集, No. 479, 97-106, 1996

7. 桂 瑠以, 橋本 和幸: 高齢者のインターネットの使用が社会的活動及び精神的健康に及ぼす影響の検討, 情報メディア研究, 18 (1), 1-12, 2019
8. 衛藤彬史, 鬼塚健一郎, 星野敏, 橋本禪: 「連携域」におけるオンラインコミュニティの活用が集落間の交流や共同での村づくりを促す可能性, 農村計画学会誌, 34, 189-194, 2015.
9. 鬼塚健一郎, 星野敏, 中塚雅也: 過疎地域における知識共有 Web サイトの利用実態—兵庫県篠山市「さとねっと」を事例として—, 農村計画学会誌(論文特集号), 30, 321-326, 2011.
10. 中塚雅也: 地域づくり活動に対応した集落 SNS の開発と効果, 農林業問題研究, 47(2), 220-226, 2011.
11. 新谷陽子, 原文宏, 中島燈, 秋山哲男: 積雪寒冷地における高齢者の冬の外出及び交通行動に関する研究, 第 27 回土木計画学研究発表会講演集, CD-ROM, 83, 2003.

Chapter 3. Generation's Map Operation Consciousness of Survey

Subjects and Methods of Survey

Results of Survey

Conclusion of Survey

3-1. Subjects and Methods of Survey

Chapter 3 has 2 purposes: (1) finding out the culture or experience will affect people's use of digital maps; (2) testing users in the decided and undecided destination situation, the map functions can be defined into different potential meanings, and the reason for choosing Taiwanese and Japanese is that Taiwan and Japan are the same as belonging to East Asia countries. At the same time, there were some connections between these two countries, not only the goods but also the people.

In the travel business, more and more Japanese and Taiwanese visiting each other's countries. The data showed that twice Japanese people came to Taiwan, and 4.5 times Taiwanese people went to Japan in a decade. It might show the digital map in tourism becoming more important than before. Even though we had a smartphone and digital map, somehow these tools only can provide a large scale.

Google Maps, Apple Maps, or other digital map apps can point to the large scale for daily life or do some rough research for traveling, for not a famous tourism spot or small town is not enough or even no data. Therefore, this research is focusing on designing the local tourism area to develop or design a digital map and have some distinctions with these existing map apps to provide a better tourism and map using experience. For local tours, there are some functions still deficient. The research aimed to supply local tourists with a more fluently and deeper experience of the place they visit. In chapter 3, meant to connect how users make a decision and the order in which they are operating digital maps whether they have decided on a destination or not.

In Taiwan, the "Road Number System" uses street names to help people identify their locations. In contrast, the "Block Number System" in Japan divides the district and codes of every building in the block. It is a huge difference for people to try to find the destination they want to be. For Taiwan, people need to find the road first and following by the number with

adding or reducing direction, then they can arrive at the place. In the contrast, in Japan, people need to find the block first, then go through around the block to find the place they want to go.

Technology shortens the physical distance, but the mental and social distance has been

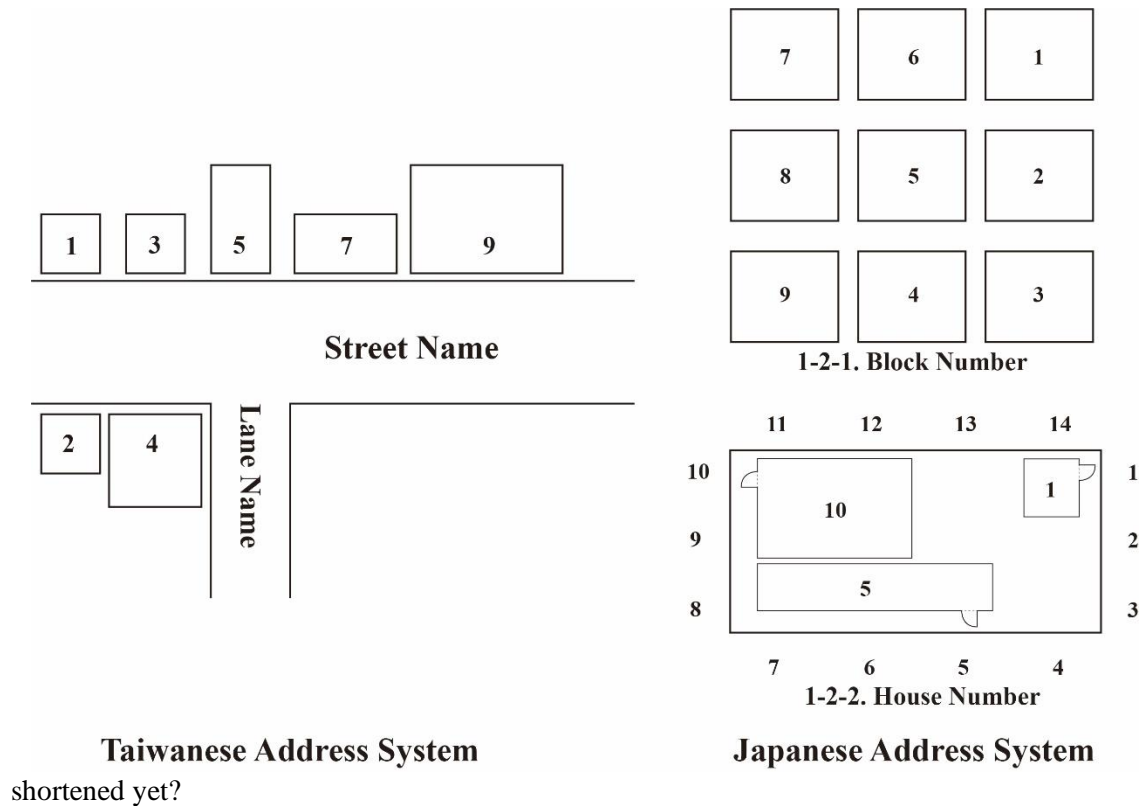


Figure 3. The address system in Taiwan and Japan

A tourism map is just an example for pointing out the map's potential meaning, the potential meaning could be a possibility for the map. Map could be a more daily life level for people to receive information and affect people's lifestyle. Therefore, the chapter used the digital map in tourism and two nationalities as an example for the first stage test to build up the integrated map system. About the former research, lots of wayfinding abilities and strategies with demographics such as gender, culture, age, and so on (Rahimi, 2014, Rahimi *et al.*, 2018; Lawton, 1994, 1996; Lawton and Kallai, 2002; Nori and Giusberti, 2006; Zomer *et al.*, 2019), and some research of age-related are more focus on learning environmental layout,

real vs. virtual test, and big scale map using. (Kirasic, 2000; Taillade *et al.*, 2013; Taillade *et al.*, 2016). Hence, this part focused on the age distinction with map information.

Subjects

The subjects focused on the 2 groups who were in their 20s and above 60. These 2 groups of people presented the age of almost 100% having using digital map experience and who almost relied on paper map generation. Therefore, this survey only collected these 2 groups of people as a database.

Methods

To determine the usability and user experience of paper and digital maps, the questionnaire was divided into 3 sections: demographic, the experience of using a map, and the importance of map functions (in 2 situations: decided and undecided destination).

Firstly, the demographic included questions on nationality, age, gender, career, and education. The demographic included some significant disparities that can be used in setting up a map using principle. The second part of the questionnaire focused on user experience: how frequently they used their maps, how they evaluated their experience, and what wayfinding aids they used. The third part was asking people whenever they have decided where they would like to go or not, then the importance of 6 functions to them. The 6 functions were: Direction, Navigation Multilayers, Information of shop or spot (in the below use Information), Outward Appearance, and Street View.

3-2. Results of Survey

CHI-SQUARED TEST

A total of 183 people (93 Taiwanese and 90 Japanese) participated in this research project. Of these, 113 people were in their 20s, and 70 people were above the age of 60. A chi-squared test revealed significant dissimilarities in how participants who are from different nationalities, ages, and gender groups use and experience digital maps when their traveling.

DIFFERENCES IN NATIONALITY

The data indicate that Japanese participants ($F(1,4) = 30.562$; $p < .001$) use paper maps more often than Taiwanese participants. In contrast, Taiwanese ($F(1,4) = 29.8793$; $p < .001$) prefers digital maps over Japanese. The reason should be more studies to confirm the reason relating to socio-demographic, policy, or other reasons. Regarding nationality, about the main usability difficulties, the results indicated that Taiwanese participants have: First, Unclear user's direction ($F(1,1) = 6.673$; $p < .01$). About this problem, Google Maps and Apple Maps both suggest users return wi-fi, recalibrate phone or check the setting of an app. There is still no proof that can explain why Taiwanese will have this difficulty more. The second one, incomprehensible or illegible ($F(1,1) = 11.998$, $p < .001$), which is may the digital map use words to replace the illegible (more research needs to be done on this).

Outdated Information ($F(1,1) = 13.268$; $p < .001$), this distinction might be because Taiwanese participants think it is unlikely that a digital map will give outdated information. Japanese user has a problem with font size too small ($F(1,1) = 4.562$, $p < .05$), it could be the illegibility between traditional Chinese and Japanese which required minimum size are 8 pt and 10.5 pt. Therefore, Japanese users may need a bigger font size than Taiwanese (Shimomura *et al.*, 2012; Zheng and Li, 2004).

As Table 2 shows, participants from both nationalities use Other Shops, Signage, Asking people, and Instinct as wayfinding aids. However, Taiwanese subjects make significantly

more use of Street names ($F(1,1) = 7.722$; $p < .01$) which indicates that the address system does support people identify spatial information (like orientation, the use of egocentric coordinates, and so on). Landmarks ($F(1,1) = 41.741$; $p < .001$) and there are some studies show that demographic (such as gender or age) has a significant difference in wayfinding task or strategy (Lawton, 1994; Lawton, 1996; Lawton and Kallai, 2002; Nori and Giuberti, 2006) and the outward appearance of their destination ($F(1,1) = 7.323$; $p < .001$). In Taiwan, the street name can easily be obtained from the country's address system; in Japan, however, streets (especially those in residential areas) are not named.

Table 2. The Chi-Squared Test results of nation

Preferred Media	
Usage frequency of paper map	30.562*** (Japan)
Usage frequency of digital map	29.873*** (Taiwan)
Usability Problems	
Incomprehensible of illegible	11.998*** (Taiwan)
Font size too small	4.562* (Japan)
Unclear user's directions	6.673** (Taiwan)
Information overload	2.278
Outdated information	13.268*** (Taiwan)
Wayfinding Aid	
Street name	7.722** (Taiwan)
Other shops (not the destination shops or spots)	2.440
Landmark	41.741*** (Taiwan)
Outward appearance of destination	7.323** (Taiwan)
Signage	0.979
Asking other people	1.926
Instinct	0.292

* <0.05 , ** <0.01 , *** <0.005

DIFFERENCE IN AGE

Table 3 shows that the participants above the age of 60 ($F(1,4) = 34.65$; $p < .001$) are more likely than those in their 20s to use paper maps, and the younger group prefers digital maps ($F(1,4) = 79.443$; $p < .001$). It may be affected by the smartphone holding ratio, in Japan, the age between 60-69 is 46.4%, 70-79 is 19.7%, and over 80 is only 46%. But in 20-29, the holding ratio is 88.7% (Statistics Bureau Ministry of Internal Affairs and Communications Japan, 2019). Also, in Taiwan, in 20-29 is 100% and above 65 is 64.4% (Chan, 2018). Further research may confirm the smartphone's operation ability will have an influence on or not.

The results further indicate that participants from all age groups experience issues with two parts, first one is usability problems with Font Size too small ($F(1,1) = 29.225$; $p < .001$). It should be noted that the preferred size of traditional Chinese text for optimal reading speed and comfort is 16 pt > 12 pt > 8 pt and 16 pt > 12 pt > 8 pt, respectively. The error ratio is 8 pt > 12 pt \approx 16 pt (Zheng and Li, 2004). But the research is for the paper reading, the font size on the smartphone needs more research it.

Research also shows that the elderly can decipher a minimum font size of 8pt, but, especially in Japanese, their performance declines when they read anything smaller than 10.5 pt (Shimomura *et al.*, 2012). Unclear user's direction ($F(1,1) = 7.994$; $p < .01$), the 20s have this difficulty than those above 60, the reason still is unclear now which should need more evidence to prove., and the third one is outdated information ($F(1,1) = 11.027$; $p < .001$), also 20s feel this problem than above 60, it may relate with the usage frequency. The 20s rely on a digital map than above 60 which is when the data is outdated or has not been updated frequently. And the second part is wayfinding aids with Landmark ($F(1,1) = 20.59$; $p < .001$), Outward Appearance of their destination ($F(1,1) = 6.485$; $p < .05$), Signage ($F(1,1) = 8.207$; $p < .01$), , and Instinct ($F(1,1) = 8.358$; $p < .005$). Furthermore, those in their 20s use landmarks and their instinct more often than the older group of participants, who rely on the outward appearance of their destination, signage, and asking people for directions.

Asking other people for directions ($F(1,1) = 18.013$; $p < .001$) which is the only one those above the age of 60 higher than the 20s, and according to some of the participants, those in their 20s are not as comfortable talking to strangers as those above the age of 60. Because they prefer relying on asking people, it may reduce them to use other aids to distinguish the direction or orientation. After all, asking local people can get the information instead of thinking through the whole process of wayfinding easier. Although the aim is different the result still shows some differences in the age which means age is one of the critical demographics which will influence how people recognize, process, and integrate the information between map and environment (Kirasic, 2000; Taillade *et al.*, 2016; Taillade *et al.*, 2013).

Table 3. The Chi-Squared Test results of age

Preferred Media	
Usage frequency of paper map	34.650*** (60+)
Usage frequency of digital map	79.443*** (20s)
Usability Problems	
Incomprehensible of illegible	2.880
Font size too small	29.225*** (60+)
Unclear user's directions	7.944** (20s)
Information overload	0.116
Outdated information	11.027** (20s)
Wayfinding Aid	
Street name	0.958
Other shops (not the destination shops or spots)	1.745
Landmark	20.590*** (20s)
Outward appearance of destination	6.485* (20s)
Signage	8.207** (20s)
Asking other people	18.013*** (60+)
Instinct	8.358** (20s)

* <0.05 , ** <0.01 , *** <0.005

DIFFERENCE IN GENDER

In terms of gender, the data suggest two areas in which men and women's user experiences and wayfinding strategies differ: Women have difficulty with unclear user's direction ($F(1,1) = 7.116$; $p < .01$) and use signage ($F(1,1) = 8.327$; $p < .001$) as an aid. According to Nori and Giusberti (2006) indicates the women use they imply a linear spatial organization and right-left discrimination ability, which are good predictors of the use of egocentric coordinates to help them find the route and call this type of people a route task (Nori and Giubetti, 2006). Other research supports the finding that women find it more challenging to figure out directions (Colucciaa *et al.*, 2007; Prestopnik, 2000; Schmitz, 1997; Kato and Takeuchi, 2003; Hund and Minarik, 2006).

Table 4. The Chi-Squared Test of gender

Preferred Media	
Usage frequency of paper map	7.207
Usage frequency of digital map	5.765
Usability Problems	
Incomprehensible of illegible	0.247
Font size too small	0.624
Unclear user's directions	7.116** (F)
Information overload	0.513
Outdated information	0.235
Wayfinding Aid	
Street name	0.482
Other shops (not the destination shops or spots)	2.012
Landmark	3.770
Outward appearance of destination	1.886
Signage	8.327*** (F)
Asking other people	0.854
Instinct	1.069

* <0.05 , ** <0.01 , *** <0.005

Multi-Way Analysis of Variance (ANOVA)

In the multi-way ANOVA, it shows then users have undecided their destination, “Information” is the only significantly higher than the decided destination. “Information” contains spots or shops related details. The other significant functions are “Navigation” and “Direction”, these two functions show the opposite results, when users are decided their destination, the importance of these two is higher than undecided. It shows that people with destinations need transportation-related resources. The “Information” shows that people without a destination need more references to decide where to go.

The other three functions are significant between decided and undecided destination situations. These three functions might not have seemed that important whenever two kinds of situations. “Street View” and “Outward Appearance” might be that they just play a character that supports people to know the whole environment around the destination or where they are. “Multilayer” plays a filter to help users to find the type of place they want to go or easier to find out their destination.

Table 5 Estimates of six functions

Dependent Variable	Situation	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
Street View	Decided	3.366	.085	3.198	3.534
	Undecided	3.410	.085	3.242	3.578
Outward Appearance	Decided	3.672	.075	3.525	3.819
	Undecided	3.749	.075	3.602	3.896
Direction	Decided	4.333	.077	4.182	4.484
	Undecided	4.077	.077	3.925	4.228
Navigation	Decided	4.055	.081	3.896	4.213
	Undecided	3.770	.081	3.612	3.929
Information	Decided	3.514	.074	3.368	3.660
	Undecided	3.984	.074	3.838	4.130
Multilayer	Decided	3.787	.078	3.634	3.940
	Undecided	3.918	.078	3.765	4.071

Table 6 Pairwise Comparisons of six functions

Dependent Variable			Mean Difference	Std. Error	Sig. ^b	95% Confidence Interval for Difference ^b	
	D	U				Lower Bound	Upper Bound
Street View	D	U	-0.044	0.121	0.717	-0.281	0.194
	U	D	0.044	0.121	0.717	-0.194	0.281
Outward Appearance	D	U	-0.077	0.106	0.470	-0.285	0.132
	U	D	0.077	0.106	0.470	-0.132	0.285
Direction	D	U	.257*	0.109	0.019	0.043	0.471
	U	D	-.257*	0.109	0.019	-0.471	-0.043
Navigation	D	U	.284*	0.114	0.013	0.060	0.508
	U	D	-.284*	0.114	0.013	-0.508	-0.060
Information	D	U	-.470*	0.105	0.000	-0.676	-0.264
	U	D	.470*	0.105	0.000	0.264	0.676
Multilayer	D	U	-0.131	0.110	0.235	-0.348	0.086
	U	D	0.131	0.110	0.235	-0.086	0.348

Based on estimated marginal means

*. The mean difference is significant at the .05 level.

b. Adjustment for multiple comparisons: Least Significant Difference (equivalent to no adjustments).

D: Decided; U: Undecided

PRINCIPAL COMPONENT ANALYSIS (PCA)

In total, 12 map functions—of which six were decided (D) and six were undecided (U)—were analyzed in this part of the study. The principal component analysis is for checking the map functions in different groups of people what is the meaning behind functions. It also provides new perspectives for the elderly or other types of groups' targets when they want to go out. To indicate the most important things to them and pick up the elements for an integrated map system.

PCA IN NATIONALITY

The KMO of Taiwanese is 0.727, Bartlett's Test of Sphericity is 472.443 ($p < 0.000$), and cumulative 71.95% of the variance. There are 4 components in Taiwanese, which are (1) Orientation, containing navigation and direction no matter decided or undecided the destination to show people where it is; (2) Seeking Possibility, containing information and Multilayers when a user does not have a destination for them to choose place; (3) Detail Content, the things have related the destination; (4) Atmosphere, providing user to know the regional feeling.

Table 7. Taiwanese user's components of map functions

	Orientation	Seeking Possibility	Detail Content	Atmosphere
Navigation (D)	0.800	0.078	0.216	-0.032
Direction (U)	0.799	0.193	0.013	0.225
Navigation (U)	0.780	-0.087	0.067	0.356
Direction (D)	0.769	0.319	0.073	-0.142
Information (U)	0.142	0.861	0.140	0.138
Multilayers (U)	0.194	0.815	0.166	0.215
Street View (D)	-0.060	-0.048	0.808	0.378
Outward appearance (D)	0.231	0.135	0.777	-0.017
Information (D)	0.201	0.366	0.615	-0.085
Multilayers (D)	-0.010	0.546	0.559	0.038
Street View (U)	0.127	0.200	0.099	0.867
Outward appearance (U)	0.154	0.560	0.068	0.603

*D = decided, U = undecided

The KMO of Japanese is 0.606 Bartlett's Test of Sphericity is 371.837 ($p < 0.000$) and cumulative 66.60% of the variance. Also, there are 4 components in Japanese for map functions: (1) Orientation, same as above; (2) Goal Information, is only providing specific place content to users; (3) Street View and (4) Layer, these two are just as showing as like literature meaning as the function itself.

Table 8. Japanese user's components of map functions

	Orientation	Place Content	Street View	Layer
Direction (U)	0.833	0.043	0.126	0.008
Direction (D)	0.795	0.355	-0.129	-0.101
Navigation (D)	0.681	-0.084	0.388	0.154
Navigation (U)	0.669	-0.036	0.440	0.077
Outward appearance (D)	0.264	0.736	0.130	0.036
Information (U)	-0.114	0.718	0.013	0.355
Outward appearance (U)	-0.092	0.677	0.407	0.102
Information (D)	0.181	0.508	0.004	0.377
Street View (U)	0.218	0.083	0.820	0.162
Street View (D)	0.163	0.279	0.688	-0.158
Multilayers (D)	0.034	0.138	-0.094	0.851
Multilayers (U)	0.007	0.240	0.177	0.802

*D = decided, U = undecided

PCA IN AGE

The KMO of 20s is 0.651, Bartlett's Test of Sphericity is 441.068 ($p < 0.000$), and cumulative 66.38% of the variance. The analysis points to four components that influence map function: for the age of 20s user have four components influence digital map functions: (1) Orientation, giving direction where a user wants to go; (2) Advice Tip, the users have decided destination, these functions only providing some detail to them; (3) Decision Making, and (4) Atmosphere, attracting a user who does not have a destination in mind, but in 20s they may see Outward appearance (U) as "Decision Making" to help them decide to go where.

Orientation guides the user and is the most important component for the 20s because all users (whether they have a place in mind or not) need to confirm their destination. Tourism information, they think about Multilayers, outward appearance, street view, and information when they decide the destination, as confirming or getting the information before they arrive. “Decision Making”, they have not decided the destination yet, therefore they use these functions to help them to decide the next spot they are going to. The final component only contains street views no matter if users decided the destination yet, there to go which is named “Atmosphere”.

Table 9. 20s user’s components of the map function

	Orientation	Advice Tip	Decision-Making	Atmosphere
Navigation (D)	-0.78315	-0.12851	-0.0326	0.09714
Navigation (U)	-0.78241	-0.05099	-0.03315	0.31249
Direction (U)	-0.77399	-0.0145	-0.08316	0.16726
Direction (D)	-0.70629	-0.12099	-0.26523	-0.24211
Multilayers (D)	0.01373	-0.73056	-0.21572	-0.06465
Outward appearance (D)	-0.15155	-0.72697	-0.1347	0.21342
Information (D)	-0.09866	-0.66873	-0.13995	-0.04983
Street View (D)	-0.07131	-0.54726	0.10688	0.62578
Information (U)	-0.08321	-0.19855	-0.86808	-0.04075
Multilayers (U)	-0.03538	-0.08638	0.90298	0.10501
Outward appearance (U)	-0.2543	-0.34371	0.62522	0.53797
Street View (U)	-0.37957	-0.33725	0.59769	0.84985

***D** = **decided**, U = undecided

The KMO of above 60 is 0.708, Bartlett's Test of Sphericity is 445.867 ($p < 0.000$), and cumulative 68.02% of the variance. For the user who is above the 60s, there are only three components: (1) Tourism Tip (No matter they have decided the destination or not, these functions play the same meaning is giving them tips; the Outward Appearance is only in undecided situation, they may use is to get some more detail for decision); (2) Orientation (same as 20s); and (3) Surrounding Situation (feeling through the information from the environment they can understand where they are). For people above 60, they regard

Information (U&D) and Multilayers (U&D) as the function providing them with local tourism information. Information can provide detail about the store (*e.g.*, open time, phone number, address, recommendation rank *et al.*). Multilayers can filter types of a spot. Outward Appearance (U) can show how the spot looks.

For the user who is above the 60s, there are only three components: (1) Advice Tip (giving some advice to the user); (2) Orientation (giving direction where a user wants to go); and (3) Surrounding Situation (feeling through the information from the environment they can understand where they are).

Table 10. above 60 user's components of the map function

	Tourism tip	Orientation	Surrounding Situation
Multilayers (U)	-0.8843	-0.08722	-0.02369
Multilayers (D)	-0.83008	0.01025	0.04506
Information (U)	-0.79735	0.0494	0.24222
Information (D)	-0.66418	-0.27392	0.15365
Outward appearance (U)	-0.61945	-0.11883	0.37461
Direction (U)	-0.14267	-0.89882	0.03707
Direction (D)	-0.05141	-0.83395	0.21249
Navigation (U)	-0.05	-0.83265	0.11042
Navigation (D)	-0.04415	-0.73063	0.27762
Street View (D)	-0.03538	-0.08638	0.90298
Outward appearance (D)	-0.2543	-0.34371	0.62522
Street View (U)	-0.37957	-0.33725	0.59769

***D** = **decided**, U = undecided

For the age of above 60, the first component is advising information which provides the data to help them go there or decide to go there. Orientation is also the second component above 60. We can view the street view to receive some of the feelings when they visit there.

PCA IN GENDER

The PCA of genders are not passing the KMO test all of them are under 0.6, hence it cannot be discussed in this research.

PCA IN ALL SUBJECTS

In the result of all participants, KMO is 0.685, Bartlett's Test of Sphericity is 815.946, and cumulative 68.02% of the variance. The analysis points to four components that influence map function: (1) Orientation (giving direction where a user wants to go); (2) Tourist Information (switching layers about the type of place and searching for information to shop or spot); (3) Atmosphere (attracting a user who does not have a destination in mind); and (4) Checking Information (helping a user to confirm a destination). "Orientation" guides the user and is the most important component because all users (whether they have a place in mind or not) need to confirm their destination.

Table 11. Four components of the map function

	Orientation	Tourism Information	Atmosphere	Checking Information
Direction (U)	0.83229	0.06188	-0.1776	0.00137
Direction (D)	0.76949	-0.05771	-0.23523	0.0779
Navigation (D)	0.76895	0.0681	-0.05988	0.17601
Navigation (U)	0.75842	0.21872	0.04277	0.10144
Multilayers (D)	-0.01212	0.7687	-0.02213	0.1739
Information (D)	0.03954	0.69532	-0.46008	-0.05891
Multilayers (U)	0.12953	0.69435	-0.47055	-0.11316
Information (U)	0.16745	0.64124	0.07543	0.28692
Outward appearance (U)	0.11959	0.30191	-0.75948	0.11526
Street View (U)	0.25684	-0.06272	-0.73971	0.36887
Street View (D)	0.0798	0.03398	-0.27009	0.84782
Outward appearance (D)	0.23145	0.41674	-0.03416	0.67328

*D = decided, U = undecided



Figure 4. The components of each demographic

Tourist information is unique to digital maps. This kind of information is also provided regardless of whether a tourist has decided on a destination or not. Regarding the third and fourth components, the results show that the outward appearance and street view of a building or place are used as wayfinding aids if the user has decided on a destination; when the destination is unclear, these two components can attract tourists to a particular place. This section can base on demographics (such as age, gender nationality, and so on) to confirm it will be affected or not.

The analysis points to four components that influence map function: for the age of 20s user have four components influence digital map functions: (1) Orientation (same as above 60); (2) Tourism Tip, (3) Decision Making, and (4) Atmosphere (attracting a user who does not have a destination in mind, but in 20s they see “Outward Appearance” (U) as “Decision Making” to help them decide to go where). “Orientation” guides the user and is the most important component for the 20s because all users (whether they have a place in mind or not) need to confirm their destination.

For the 20s, the second component is tourism information, they think of Multilayers, outward appearance, street view, and information when they decide the destination, as

confirming or getting the information before they arrive. The third component in the 20s is decision-making. In this component, they have not decided the destination yet, therefore they use these functions to help them to decide the next spot they are going to. The final component only contains one function when a user has not decided where to go which is named atmosphere. Are these functions can convey distinct meaning to the different types of wayfinding strategies or task users? The order of functions can be customized to fit the user's wayfinding process or the preference for giving them much more degree of freedom.

3-3. Conclusion of Survey

This study aims to identify the types of maps. Specifically, the functions and information of local tourist areas are acceptable for most users. Instead of updating every 2–3 years like world maps, the tourism maps are designed with specific areas and people in mind. Therefore, they have unique features. The address systems can be considered as one of the components influencing how users process map information and wayfinding. However, more research should be done to confirm if there are any significant differences between individuals using different wayfinding strategies or tasks.

The results show significant differences in how people from different nationalities, age groups, use and experience maps. Chapter 3 shows that map design should focus more on how to use a map and interact with the environment. For this reason, these features need to be considered when designers create maps. For example, a digital map would be more functional and appealing if it allows a user of a specific age and nationality to choose the functions and aid(s) with which makes them feel most ease of use.

NATIONALITY

The results show that the purpose of a function determines how much importance a user attaches to it. For example, participants in this survey valued a map's orientation function (whether they had decided on their destination or not). However, the data also shows that the "Street View" function and the "Outward Appearance" of a destination impact different components in Japanese. Or in a different situation, it shows the same component, such as Taiwanese. These two functions show that when users have decided on their destination, they use these two functions to check the spatial information for all the subjects, *i.e.*, confirming their position or how the surrounding looks like. However, when the destination is undecided, the atmosphere component comes into play to attract tourists to a spot.

Orientation shows containing the same functions and as the first component in both Taiwanese and Japanese. People use it as wayfinding as the first image in both countries. But the next three components show some diversities. The second component of Taiwanese is “Seeking Possibility”, by looking for information to understand the spot and using Multilayers to narrow down the specific type of place to visit while they have not decided to go anywhere. The second of Japanese is “Goal Information”, the outward appearance, and information to know a piece of place information no matter whether they decided to visit or not. The third one of Taiwanese is “Detail Content” when a user has chosen a place to go, they see all the content of that place to make sure where it is and the environment around it or may use the layer function to confirm the same type of shop. The third one of Japanese is the “Street View”, which is not much important for Japanese people, and the final one is “Layer”. These two functions are not often to be used by Japanese users. It can be done with some more future research to find the reason why they do not use it. The final component of Taiwanese is “Atmosphere” as the third component in all subjects, the component provides the atmosphere around where they are, or they are looking. It plays a character to let users know the history/architecture and so on in the area.

AGE

Orientation for the 20s is the first and second for above 60. This result shows the 20s using a digital map, they want to know where they are? Which direction they are facing? Also, how long do they need to move? It shows that not only gender can influence the wayfinding strategy/task, and age also influences how people have the wayfinding process (Zomer *et al.*, 2019). Orientation is the only component that has the same function in all the results which means no matter all kinds of demographics have the same opinion for digital map orientation-related function is important. If we make users answer personal profiles (nationality, age, and wayfinding task preferences) before using digital maps. The designer can make variable interfaces that may alter the user’s basic consciousness about wayfinding. For people above 60, they see information and Multilayers whether they are decided or undecided and outward

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appearance when they are undecided as kind of functions can provide them the get local tourism information to know the information of store (*e.g.*, open time, phone number, address, recommendation rank, comment and so on), types of spots, and how the spot looks.

ALL SUBJECTS

Orientation is the only component that exists in all results. It means that the map's most important functions for different nationalities or ages as an essential category., and it is also telling that the map using in wayfinding as the people most used role in daily life.

Furthermore, the results show that the purpose of a function determines how much importance a user attaches to it. For example, participants in this study valued a map's orientation function (whether they had decided on their destination or not). However, the data also shows that "Street View" and the outward appearance of a destination impact different components. When users have decided on their destination, they use these two functions as the check information, *i.e.*, to confirm their position. Nonetheless, when the destination is undecided, the atmosphere component comes into play to attract tourists to a spot.

Combining with the results in wayfinding strategies/tasks, demographic, and decided/undecided destination, which can design a better map using process and fitting variable groups. The map can be designed for different types of users, through a preceding test and following by the demographic to setting three types mainly wayfinding aids to make sure they can have an easier and comfortable local tourism map operating experience (Prestopnik and Roskos-Ewoldsen, 2000; Nori and Giusberti, 2006; Rahimi, 2014; Rahimi *et al.*, 2018; Zomer *et al.*, 2019). Although this research only asked nationality, it contains the culture and habits behind them. The demographics of users affect their map operation and experience.

In this chapter, the results show that people in different generations have their own preferences while they are using a map in traveling. It figures out that when they have a

destination or not the map functions present different meanings. What if in daily life, the functions or information could also have the possibility to affect people in various generations and be a trigger or reduce obstacles for elderly's going-out willingness.

Therefore, the next chapter focuses on the characteristics of map information and discusses how people behave and respond when they receive information., and by experimenting with the 20s and those who are above 60 to find out the attitudes of going out, before using the map and after using. The second part is an in-depth interview, by interviewing those who do not like to go out or have a strong willingness to go out (but the body function does not limit them to go out).

Reference

English

1. Bell, P. A., and Greene, C. T. *et al.* 1995. *Environment Psychology (5th edition)*, Psychology Press. London.
2. Chan, T.-I. 2018. *2018 Communications Market Report*. National Communications Commission press. Taipei
3. Colucciaa, E., and Iosueb, G. *et al.* 2007. The relationship between map drawing and spatial orientation abilities: A study of gender differences. *Journal of Environmental Psychology*, 27, 135-144.
4. Doherty, R. A., and Sorenson, P. 2015. Keeping Users in the Flow: Mapping System Responsiveness with User Experience, *Procedia Manufacturing*, 3, 4384-4391.
5. Fogg, B. J. 2009. A behavior model for persuasive design. *PERSUASIVE 2009: The Fourth International Conference on Persuasive Technology (2009)*, 1-7.
6. Guccione, A. A. 2000. *Geriatric physical therapy (Second edition)*. K. White, ed., St. Louis: Elsevier Mosby, 134- 147.
7. Herssens, J., and Heylighen, A. 2008. Haptics and vision in architecture - Designing for more senses. *Proceeding of Conference Sensory Urbanism(2008)*, 102–112
8. Hund, A. M., and Minarik, J. L. 2006. Getting from here to there: Spatial anxiety, wayfinding strategies, direction type, and wayfinding efficiency. *Spatial Cognition and Computation*, 6(3), 179-201.
9. Kato, Y., and Takeuchi, Y. 2003. Individual differences in wayfinding strategies. *Journal of Environmental Psychology*, 23(2), 171-188.
10. Kirasic, K.C. 2000. Age differences in adults' spatial abilities, learning environmental layout, and wayfinding behavior. *Spatial Cognition and Computation*, 2, 117–134.
11. Knutson, B. J., and Beck, J. A., *et al.* 2007. Identifying the dimensions of the experience construct. *Journal of Hospital Leisure Market*. 15 (3), 31–47.
12. Lawton, C. A. 1994. Gender differences in wayfinding strategies: Relationship to spatial ability and spatial anxiety, *Sex Roles*, 30(11/12), 765-779.
13. Lawton, C. A. 1996. Strategies for indoor wayfinding: The role of orientation, *Journal of Environmental Psychology*, 16(2), 137-145.
14. Lawton, C. A., and Kallai, J. 2002. Gender differences in wayfinding strategies and anxiety about wayfinding: A cross-cultural comparison, *Sex Roles*, 47(9/10), 389-401.
15. Lin, Y. L., and Wang, C. H. 2010. Evaluation of Electronic Map Interface on Web Pages for Naïve Users, *Journal of Ergonomic Study*, 12(1), 43-55.
16. Lynch K. 1960. *The Image of City*. MIT press. Massachusetts.
17. Millar, S. 1997. *Reading by touch*. London, Routledge Press. 14-27.
18. Montello, D. R., and Lovelace, K. L. *et al.* 1999. Sex-related differences and similarities in geographic and environmental spatial abilities, *Annals of the Association of American Geographers*, 89(3), 515-534.

19. Mulazimoglu, E., and Basaraner, M. 2019. User-Centred Design and Evaluation of Multimodal Tourist Maps, *International Journal of Engineering and Geosciences*, 4(3), 115-128.
20. Nakevska, M., and Anika, v. d. S. *et al.* 2017 Interactive storytelling in a mixed reality environment: The effects of interactivity on user experiences, *Entertainment Computing*, 21, 97–104.
21. Newzoo’s 2018 Global Mobile Market Report: <https://newzoo.com/insights/articles/newzoos-2018-global-mobile-market-report-insights-into-the-worlds-3-billion-smartphone-users/> (Accessed 07 January 2019)
22. Nori, R., and Giusberti, F. 2006. Predicting Cognitive Styles from Spatial Abilities, *The American Journal of Psychology*, 119(1), 67-86.
23. Prestopnik, J. L., and Roskos-Ewoldsen, B. 2000. The relations among wayfinding strategy use, sense of direction, sex, familiarity and wayfinding ability, *Journal of Environmental Psychology*, 20(2), 177-191.
24. Rahimi, F. B. 2014. A model for sociocultural interactions in museums. *Museum Management and Curatorship*, 29 (2), 174–187.
25. Rahimi, F. B., and Levy, R. M. *et al.* 2018. Human behaviour and cognition of spatial experience; a model for enhancing the quality of spatial experiences in the built environment. *International Journal of Industrial Ergonomics*, 68, 245–255.
26. Schmitz, S. 1997. Gender-related strategies in environmental development: Effects of anxiety on wayfinding in and representation of a three-dimensional maze. *Journal of Environmental Psychology*, 17(3), 215-228.
27. Shimomura, K., and Ashizawa, S. *et al.* 2015. Effects of color and illuminance level on the legibility of colored letters for older people. *Color Science Association of Japan*, 36(1), 15-26.
28. Statistics Bureau Ministry of Internal Affairs and Communications Japan. 2019. *STATISTICAL HANDBOOK OF JAPAN*. Statistics Bureau Ministry of Internal Affairs and Communications Japan press. Tokyo.
29. Steinfeld, E., and Maisel, J. 2012. *Universal design: Creating inclusive environments*. New Jersey: John Wiley & Sons, 276.
30. Taillade, M., and N’Kaoua, B. *et al.* 2016. Age-Related Differences and Cognitive Correlates of Self-Reported and Direct Navigation Performance: The Effect of Real and Virtual Test Conditions Manipulation. *Frontiers in Psychology*, 6, 2034.
31. Taillade, M., and Sauzéon, H. *et al.* 2013. Age-related wayfinding differences in real large-scale environments: detrimental motor control effects during spatial learning are mediated by executive decline?. *PloS one*, 8(7), e67193.
32. Tsao, S. H., and Chang, C. L. 2010. The Development of Academic Cartography in Taiwan. *Environment and Worlds*, (21), 99–111 (in Chinese).
33. Yan, L., and Lee, M. Y. 2015. Are tourists satisfied with the map at hand?, *Current Issues in Tourism*, 18(11), 1048-1058.
34. Zheng, D. X., and Li, C. X. *et al.* 2004. Effects of Chinese Characteristics on Reading Performance, *Journal of Far East University*, 21(1), 37-46 (in Chinese).

35. Zomer, L.-B., and Schneider, F. *et al.* 2019. Determinants of urban wayfinding styles. *Travel Behaviour and Society*, 17, 72-85.

Chapter 4. Map Information for Elderly's Going-Out Behavior

Map Information for Elderly's Going-Out Behavior Experiment

Results of Usability Test

In-Depth Interview of People with Few Going-Out Behavior

Results of In-Depth Interview

Conclusion of Experiment, and In-Depth Interview

4-1. Map Information for Elderly's Going-out Behavior Experiment

This chapter engaged in the information of integrated map system for elderly's going-out behavior, it was divided into two parts: (1) map information for elderly's going-out behavior usability test; (2) in-depth interview of people with low going-out willingness. This section contained the subjects and procedure of the usability test. The usability test was focusing on the information on elderly going-out behavior. Studies showed visual function decline by aging (Haigh, 1993; Pak and McLaughlin, 2010; Andersen, 2012). Because this integrated map system uses visual instead of aural or other functions to receive information. For removing the reducing other possible factors the interface was designed by the protocol beneath.

The smartphone can change the screen display size (*e.g.*, display zoom: standard and zoomed, 2 types of size in the iOS system), it is a friendly design for the elderly. In this research, the main target is the elderly. Therefore, the integrated map system designed for the prototype is a more suitable interface for the elderly. Hence, the interface for the test was followed by the application design guidelines from Apple and other related research, especially, in color, button size, and font size. Following the human interface guidelines of Apple, the minimum height for the button is 30 pt. and the font size is 16 pt. performs better than 8 or 12 pt. in Traditional Chinese (Zheng and Li, 2004), and in screen, the red, orange, and yellow are easier for the elderly to distinguish (Schneck *et al.*, 2014).

SUBJECTS

The first part includes the people who are in the 20s and above 60, each group has 15 people. In Taiwan, the ratio of people using smartphones in the 20s is 100%, the lowest is in the 80s. But considering people using smartphones decreasing from the 60s is a milestone. Therefore, in the test, above 60 has been chosen as the other group as the subject. These people have used smartphones for at least 5 years and Taiwanese. Even though they both have the experience of using a smartphone, there are still some distinct things between these 2

groups. For expelling those not familiar with smartphone operation. The elderly groups still invited the people having smartphones using experience.

In the 20s are from 22-30 and above 60 are from 61-78. Only two people are not used to using digital map applications, but they have the experience of operating the car navigation system.

PROCEDURE

The usability test includes 3 steps: (1) pre-test questionnaire; (2) map operating; (3) post-test questionnaire. The whole procedure is around 20 minutes.

The first steps questionnaire contains 10 questions about the attitudes about going out (negative phase are 7 and positive phase are 3) in 5 points Likert scale from very agree to very disagree in Mandarin. The 10 questions were named A1-A10 in the pre-questionnaire and the named B1-B10 in the post-questionnaire.

Table 12. The attitudes about the going-out questionnaire

Pre	Post	Question
A1	B1	Although I do not have a specific purpose, I still like to go out.
A2	B2	I think it is miserable to go out and walk around.
A3	B3	I will not bring up wanting to go out by myself.
A4	B4	If I do not have a destination, I will feel bored while I go out.
A5	B5	Even if I just walk around my home, I still do not want to go out.
A6	B6	I think it is fun to go out and walk around.
A7	B7	I am willing to go out more in the future.
A8	B8	I wish I never had to go out.
A9	B9	Going out does not appeal to me at all.
A10	B10	I do not want to go out at all.

The second step is asking the participants to operate the map. There are two setup tasks for them. The first one is when they have a specific destination (only one option) and the second one is that they do not have a specific destination (three options), but they want to find a place

to have a rest. All these two tasks are set as coffee shops around them. To maintain the correction of the results, during the operation they cannot ask other people for help. The device is iPhone XS, and the screen has been keeping recording by iPhone screen recording without during operation.

The third step contains the same attitudes about going-out behavior as the first step. It is for knowing the difference going-out willingness between the information and operation of the map. Also, the post-test questionnaire asking about the habits of digital map operation and the efforts of functions and operation about going-out willingness.

Table 13. The attitudes about the prototype operating questionnaire

Habits of the digital map operation	
C1-1	When using digital maps, I have my own reading order.
C1-2	Following the previous question, what do you see first?
C1-3	What maps do you usually use?
The efforts of functions and operations about the going-out willingness	
C2	If the information is provided actively, it will make me want to go out.
C3	If the information is provided passively. It will make me want to go out.
C4	The amount of information on this map is just satisfying.
C5	If the amount of information on the digital map is just satisfying, it will make me want to go out.
C6	If the default reading order of the digital map fits my habit, it will make me want to go out.
C7	The arrangement layout of information on this map is easy to see.
C8	If the arrangement layout on the digital map is easy to see, it will make me want to go out.
Demographic	
Age	

Material

The Prototype is made by Adobe XD, screen size is 1125 x 2436 px. Base on Schneck *et al.* (2014) the elderly can distinguish red, orange, and yellow better than other colors, but red usually represents a dangerous or emergency, yellow is hard to distinguish apart from white; hence, the icon is used color #76614 (orange).

The font used DFHeiBold-B5 in icon and DFLiSongMedium-B5 in content; the font size is 25 pt. in the icon, 30 pt. in content. The height of icon design by this research is 30 px, width is adjusted by the length of words. The figures are downloaded from the google icon. To set up the most likely used digital map by them is reducing the other operation problem from not being familiar with this application.



Figure 5. Prototype

In chapter 4 is only focusing on age as a factor in the information that affects the going-out behavior. The reason is that following the research background mentioned that the aging/aged/super-aging society problem is the primary goal. Also, the results in chapter 3 showed that users in different age sections of the importance of information have huge distinctions in it. Therefore, the type of information which can trigger the elderly who do have some interest to go out is the target in this part., and the elderly who do not go out often is in the next part of chapter 4.

4-2. Results of Experiment

The usability test was taken by 30 people in two groups: the 20s and above 60, 15 in each group. By comparing the attitudes about going out in the questionnaire before and after the test. The cross table showed these 2 groups had some significant outcomes. Because the Chi-Square Test is for the variances both are nominal, the study chose Kendall's tau-b in symmetric measures as the index for checking the variances are nominal and ordinal.

PRE-QUESTIONNAIRE

Table 14. The average score of pre-questionnaire attitude

No.	Question	Average Score of above 60	Average Score of the 20s
A1	Although I do not have a specific purpose, I still like to go out.	3.67	3.33
A2	I think it is miserable to go out and walk around.	2.00	2.47
A3	I will not bring up wanting to go out by myself.	1.93	2.13
A4	If I do not have a destination, I will feel bored while I go out.	2.53	3.07
A5	Even if I just walk around my home, I still do not want to go out.	1.53	2.33
A6	I think it is fun to go out and walk around.	4.60	3.87
A7	I am willing to go out more in the future.	4.40	3.53
A8	I wish I never had to go out.	1.33	2.00
A9	Going out does not appeal to me at all.	1.40	2.00
A10	I do not want to go out at all.	1.13	1.87

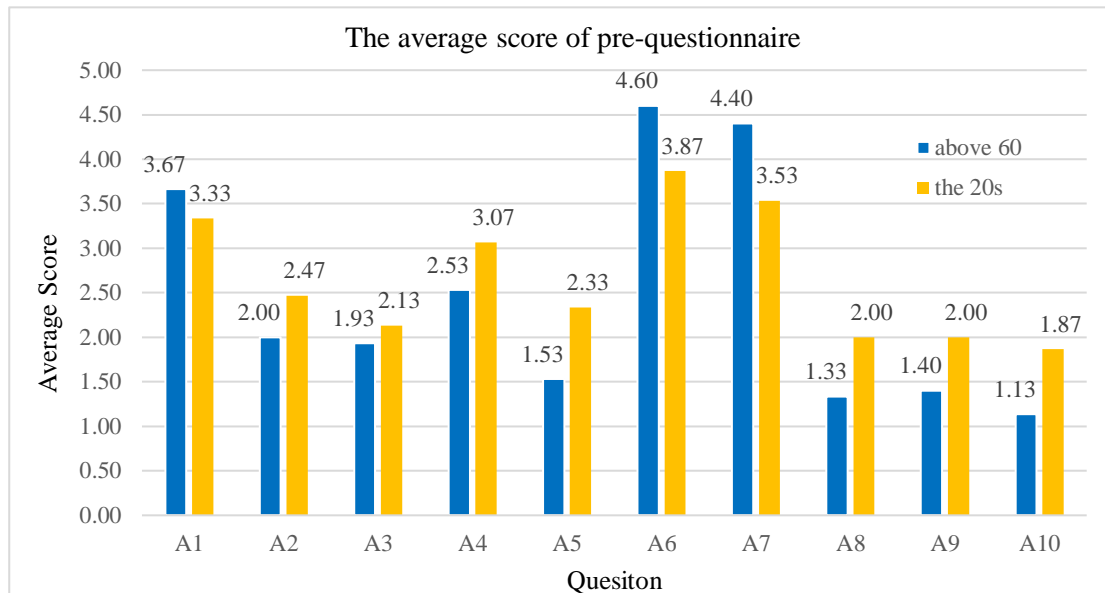


Figure 6. The average score of pre-questionnaire

The pre-questionnaire had 4 significant results that show the 20s have a higher score facing going-out behavior in negative phase attitude, and above 60 they have a higher score in positive attitude about going out. “Even if I just walk around my home, I still do not want to go out.” (A5) and “I do not want to go out at all.”(A10) are in the negative phase. “I think it is fun to go out and walk around.” (A6) and “I am willing to go out more in the future.” (A7) are in a positive phase.

Table 15. Symmetric Measures of Even if I just walk around my home, I still do not want to go out (A5)

		Value	Asymptotic Standard Error ^a	Approximate T ^b	Approximate Significance
Nominal by Nominal	Phi	.522			.085
	Cramer's V	.522			.085
	Contingency Coefficient	.463			.085
Ordinal by Ordinal	Kendall's tau-b	.373	.156	2.422	.015
	Kendall's tau-c	.431	.178	2.422	.015
N of Valid Cases		30			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

In the “Even if I just walk around my home, I still do not want to go out” (A5), the average score in the 20s was 1.53, in the above 60 group was 2.33 ($p < 0.05$). The elderly had more willingness about walling around their houses than the 20s. It presented that the elderly had more motivation about walking around houses than the 20s.

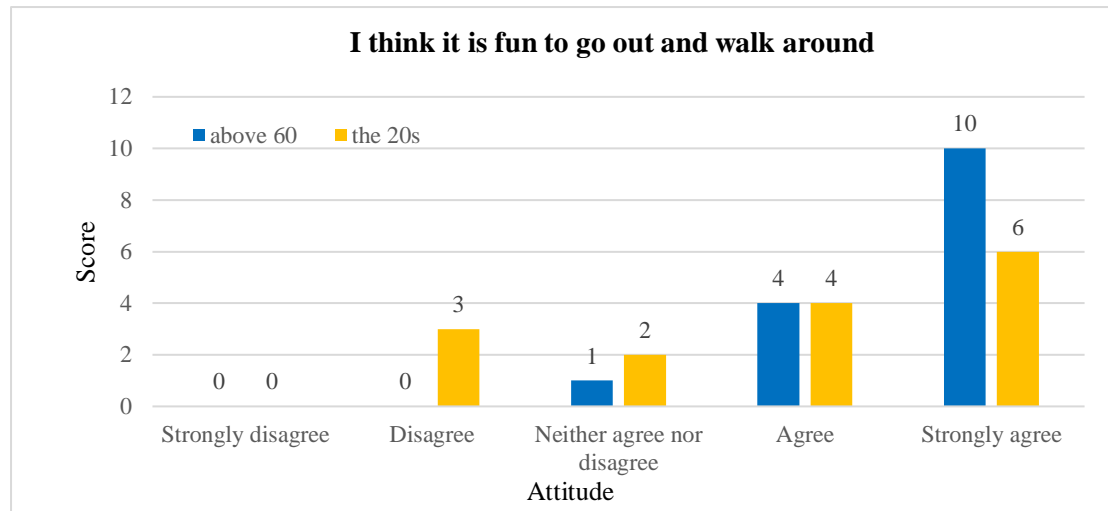


Figure 7. Even if I just walk around my home, I still do not want to go out (A5)

In the “I think it is fun to go out and walk around” (A6), the average score in the 20s was 3.87 and above 60 was 4.60. The elderly was showing their willingness of going-out higher than the 20s. 3 people in the 20s group thought they disagree with this idea. In contrast, above 60 group only one person showed a neutral attitude to this question and not one thought it was negative attitude about it.

Table 16. Symmetric Measures of I think it is fun to go out and walk around (A6)

		Value	Asymptotic Standard Error ^a	Approximate T ^b	Approximate Significance
Nominal by	Phi	.380			.228
Nominal	Cramer's V	.380			.228
	Contingency Coefficient	.355			.228
Ordinal by Ordinal	Kendall's tau-b	-.314	.153	-1.993	.046
	Kendall's tau-c	-.351	.176	-1.993	.046
N of Valid Cases		30			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

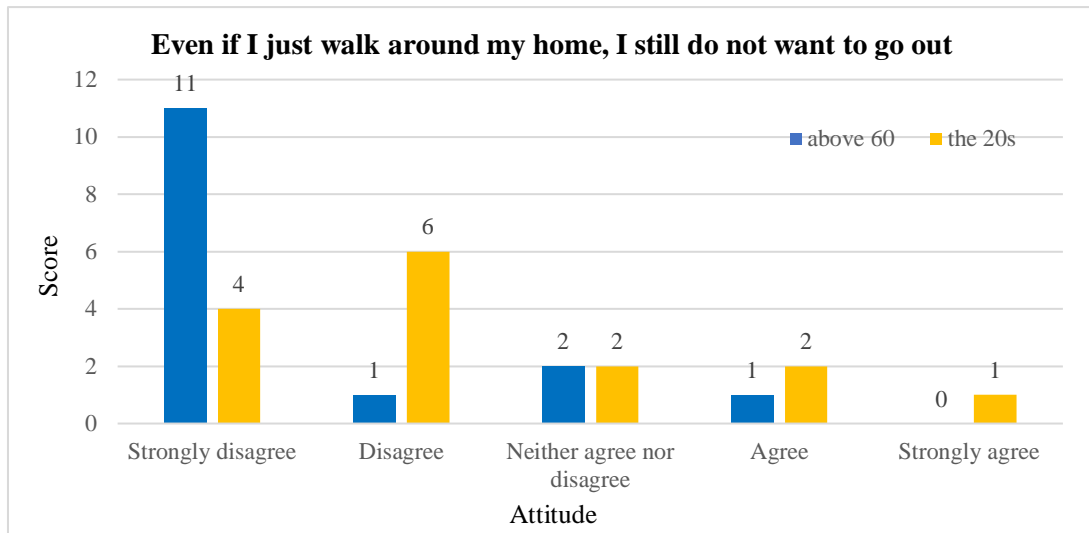


Figure 8. I think it is fun to go out and walk around (A6)

In the “I am willing to go out more in the future” (A7), the average score of the above 60 group was 4.40 and the 20s group was 3.53. The Kendall's tau-b showed the p-value was below 0.05, which is significant. 4 people in the 20s group showed the negative thought on this idea, they would not go out more in the future. It might have some other potential factors that affect them to go out.

Table 17. Symmetric Measures of I am willing to go out more in the future (A7)

		Value	Asymptotic Standard Error ^a	Approximate T ^b	Approximate Significance
Nominal by	Phi	.481			.139
Nominal	Cramer's V	.481			.139
	Contingency Coefficient	.433			.139
Ordinal by Ordinal	Kendall's tau-b	-.357	.147	-2.400	.016
	Kendall's tau-c	-.418	.174	-2.400	.016
N of Valid Cases		30			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

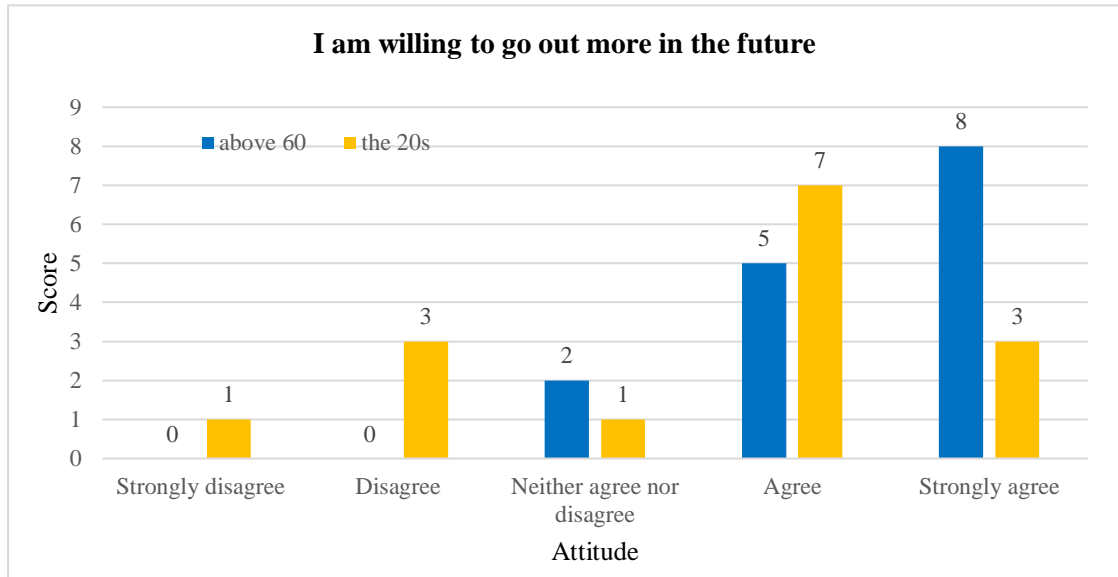


Figure 9. I am willing to go out more in the future (A7)

In the “I do not want to go out at all” (A10), the 20s group got the average score was 1.13, and the above 60 group was 1.87. The Kendall's tau-b's p-value was below 0.05 meant that is a significant result. 2 people answered that they agreed they do not want to go to at all. The above 60 showed that strongly disagree with this idea. They do have the thought that they would like to go out.

Table 18. Symmetric Measures of I do not want to go out at all (A10)

		Value	Asymptotic Standard Error ^a	Approximate T ^b	Approximate Significance
Nominal by	Phi	.365			.261
Nominal	Cramer's V	.365			.261
	Contingency Coefficient	.343			.261
Ordinal by Ordinal	Kendall's tau-b	.327	.143	1.973	.048
	Kendall's tau-c	.271	.137	1.973	.048
N of Valid Cases		30			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

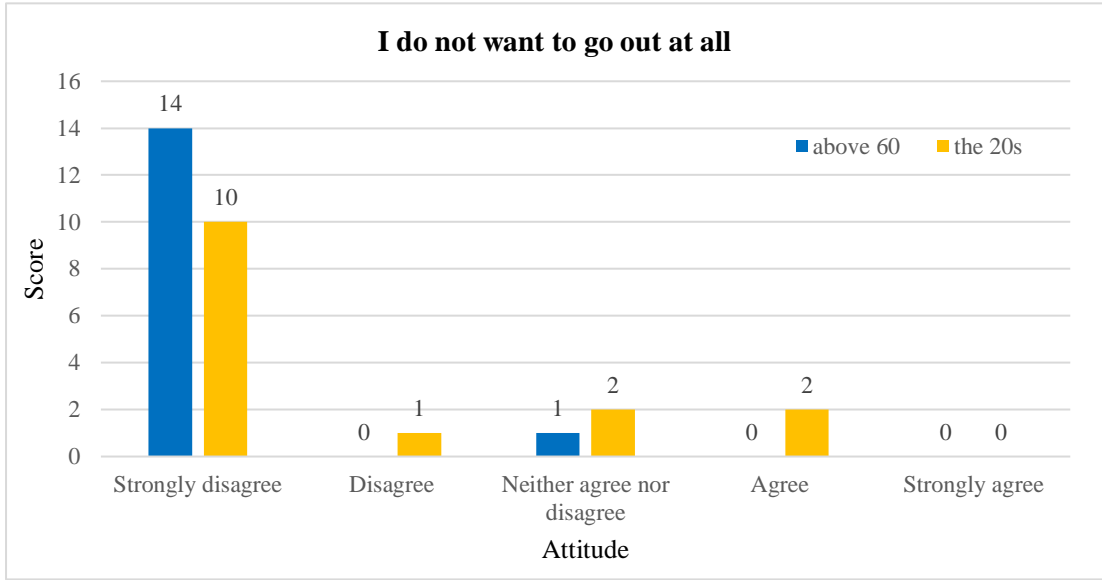


Figure 10. I do not want to go out at all (A10)

POST-QUESTIONNAIRE

The post-questionnaire had 3 significant results that show the 20s have a higher score facing going-out behavior in negative phase attitude, and above 60 they have a higher score in positive attitude about going out. A8 is in the negative phase; A7 is in the positive phase. The other one is the C7 which is “If the amount of information on the digital map is just satisfying, it will make me want to go out”, the elderly have a higher score than the 20s.

Table 19. The average score of post-questionnaire attitude

Question No.	Question	Average Score of above 60	Average Score of the 20s
B1	Although I do not have a specific purpose, I still like to go out.	3.67	3.47
B2	I think it is miserable to go out and walk around.	2.00	2.67
B3	I will not bring up wanting to go out by myself.	1.20	2.13
B4	If I do not have a destination, I will feel bored while I go out.	2.20	2.73
B5	Even if I just walk around my home, I still do not want to go out.	1.60	2.27
B6	I think it is fun to go out and walk around.	4.53	3.80
B7	I am willing to go out more in the future.	4.60	3.67
B8	I wish I never had to go out.	1.07	2.00
B9	Going out does not appeal to me at all.	1.67	1.87
B10	I do not want to go out at all.	1.33	1.80

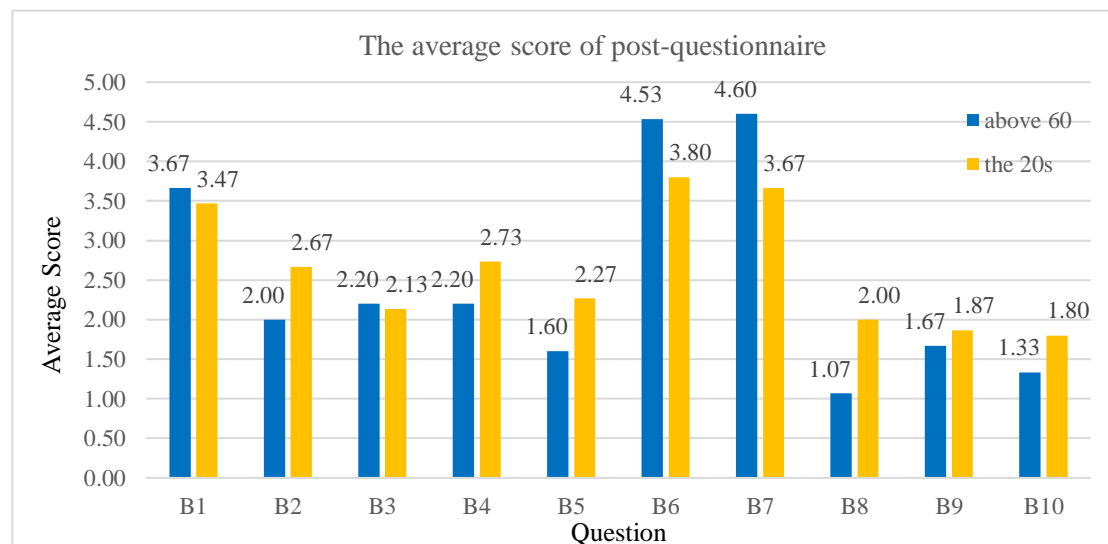


Figure 11. The average score of post-questionnaire

In the “I am willing to go out more in the future” (B7) the average score in the above 60 group was 4.60 and the 20s group was also 3.53. There are 4 people of the 20s group who showed a negative attitude in this idea also (as same as A7). The Kendall's tau-b’s p-value was below 0.05. All the above 60 showed that positive attitude in B7.

Table 20. Symmetric Measures of I am willing to go out more in the future (B7)

		Value	Asymptotic Standard Error ^a	Approximate T ^b	Approximate Significance
Nominal by Nominal	Phi	.456			.182
	Cramer's V	.456			.182
	Contingency Coefficient	.415			.182
Ordinal by Ordinal	Kendall's tau-b	-.355	.147	-2.301	.021
	Kendall's tau-c	-.400	.174	-2.301	.021
N of Valid Cases		30			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

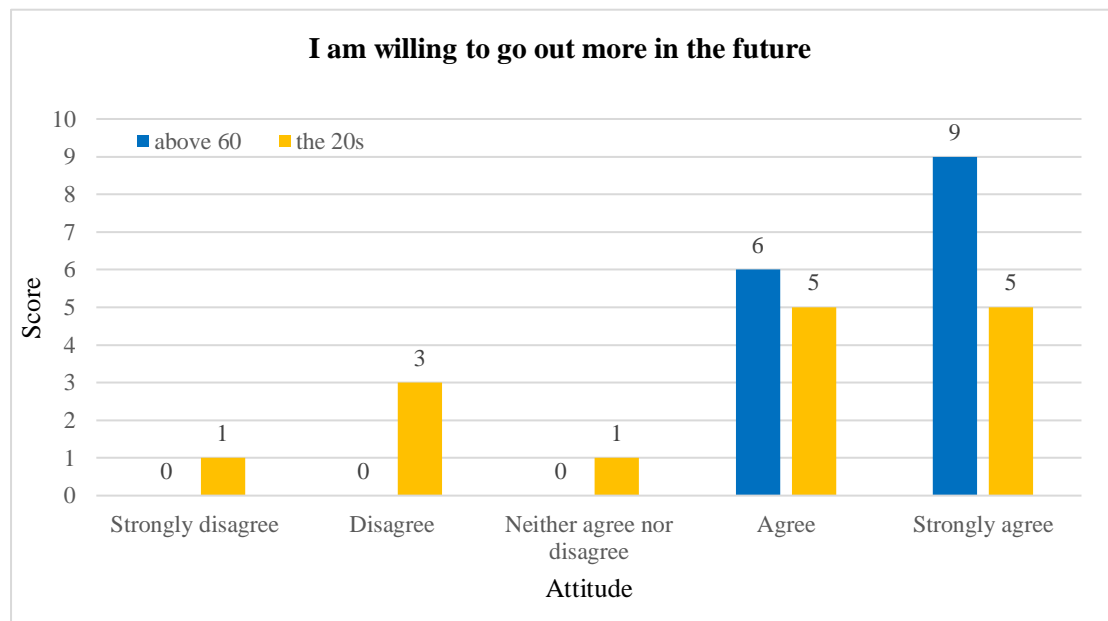


Figure 12. I am willing to go out more in the future (B7)

In the “I wish I never had to go out” (B8), in the 20s’ the average score was 1.33 and the group of above 60 was 2.00. The Kendall's tau-b’s p-value was 0.012 ($p < 0.05$) meant that was a significant result. 14 people in the above 60 group thought strongly disagree and 1 person has disagreed. In contrast, 3 people represented they wish they never had to go out in the 20s group.

Table 21. Symmetric Measures of I wish I never had to go out (B8)

		Value	Asymptotic Standard Error ^a	Approximate T ^b	Approximate Significance
Nominal by Nominal	Phi	.425			.247
	Cramer's V	.425			.247
	Contingency Coefficient	.391			.247
Ordinal by Ordinal	Kendall's tau-b	.395	.130	2.501	.012
	Kendall's tau-c	.351	.140	2.501	.012
N of Valid Cases		30			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

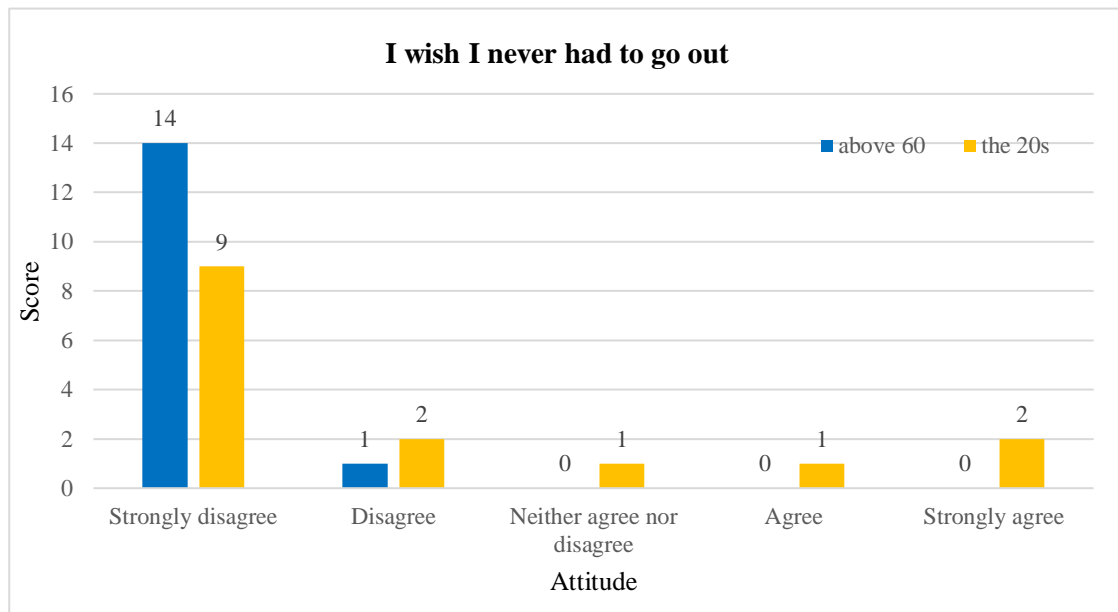


Figure 13. I wish I never had to go out. (B8)

HABITS OF THE DIGITAL MAP OPERATION

C1-1, C1-2, and C1-3 are the serial questions about their habit that about their map reading. C1-1 is about these 2 groups of people that do have a preference of map reading order. In the result, it showed that in both the 20s and above 60 most of them have preference. It does not have any significant difference.

Table 22. Chi-Square Tests of C1-1

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	2.040 ^a	2	.361
Likelihood Ratio	2.473	2	.290
Linear-by-Linear Association	.608	1	.435
N of Valid Cases	30		

a. 4 cells (66.7%) have expected count less than 5. The minimum expected count is .50.

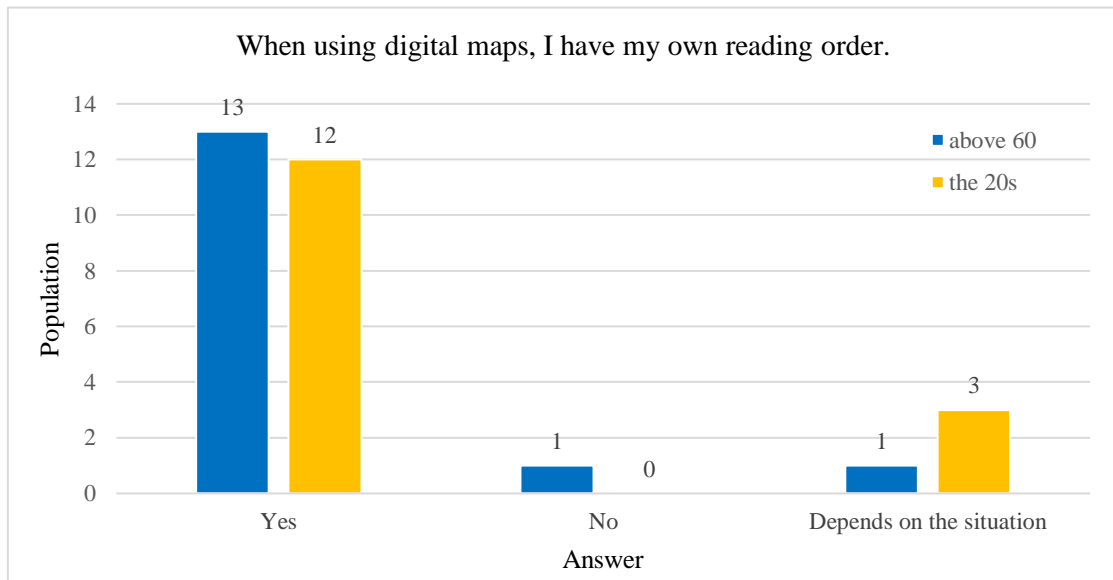


Figure 14. The preference of C1-1 for the 20s and above 60 group

The C1-2 is what they read the map first. 12 people would read transportation first, 6 people would read the menu, and 5 people would want to know the distance. Then 3 people chose to review and the other 3 were only one person., and one person does not have any preference. Combing the answers about the how to arrive the place were transportation, route, and distance, which are 17 people., and the information about specific places included menu, destination shop information, and review of a total of 11 people.

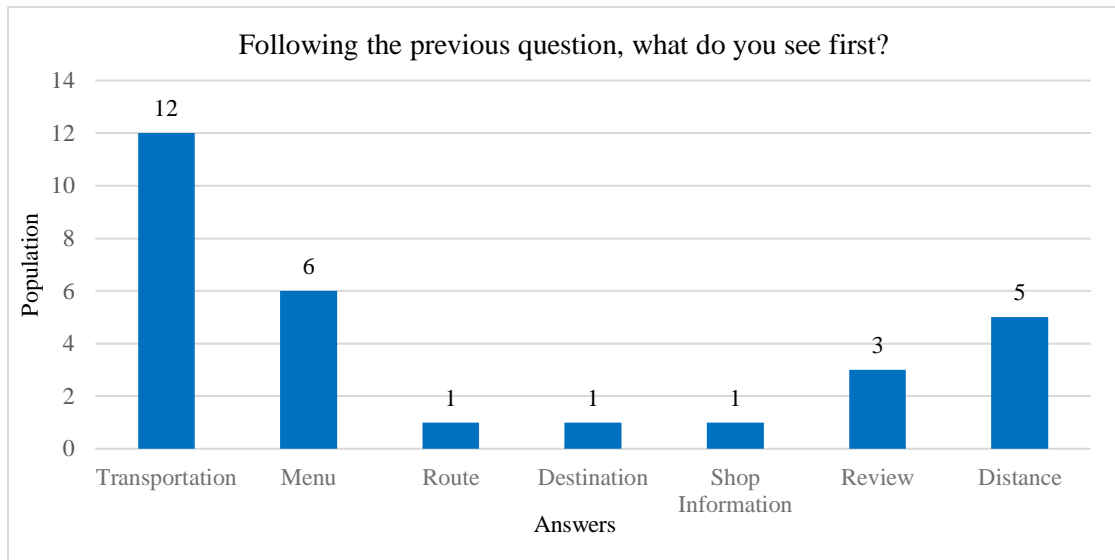


Figure 15. The preference of C1-2 for the 20s and above 60 group

The C1-3 was asking them which map they usually use. Most people used Google Maps which is 28 people and 3 people also used Apple Maps as well, then 2 people do not usually use digital maps. Therefore, Google Maps can be used for adjustment for the elderly because they also use it mostly. Apple Maps still a few people used it and these 3 people are the 20s.

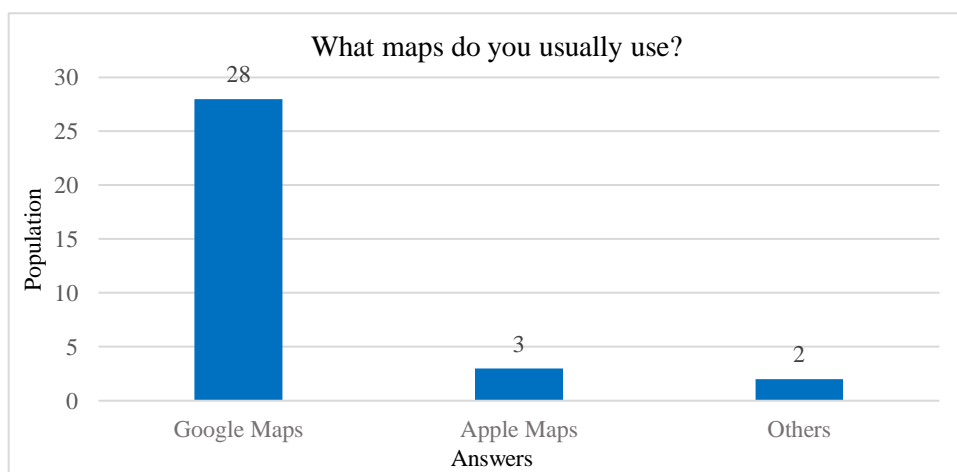


Figure 16. The preference of C1-3 for the 20s and above 60 group

THE EFFORTS OF FUNCTIONS AND OPERATIONS ABOUT THE OUTGOING WILLINGNESS

From C2 to C8 are asking subjects after using the prototype testing, asking the functions of information provided in the map. It aimed that figure out the difference in information display for the user in different generations. The C7 is only showed a significant difference.

About the other question. The information provided in the active way (C2) is higher than the passive way (C3), both in 2 groups. About the amount of information in prototype (C4). This prototype is based on Google Maps, which also meant that Google Maps provided the exact amount of information in the layout. Also, they thought the amount of information will make them have the going-out willingness (C5) are the same score, 3.93 points, in 2 groups. The default reading order (C6) did not show a significant difference in. But it presented that the default reading order of the digital map does affect them. The arrangement of the layout of the digital map would affect their going-out willingness, and both average scores are over 4 points.

Table 23. The average score of C2-C8

Question No.	Question	Average Score of above 60	Average Score of the 20s
C2	If the information is provided actively, it will make me want to go out.	3.67	3.60
C3	If the information is provided passively. It will make me want to go out.	2.80	2.93
C4	The amount of information on this map is just satisfying.	4.07	3.60
C5	If the amount of information on the digital map is just satisfying, it will make me want to go out.	3.93	3.93
C6	If the default reading order of the digital map fits my habit, it will make me want to go out.	3.93	3.60
C7	The arrangement layout of information on this map is easy to see.	4.40	3.67
C8	If the arrangement layout on the digital map is easy to see, it will make me want to go out.	4.13	4.00

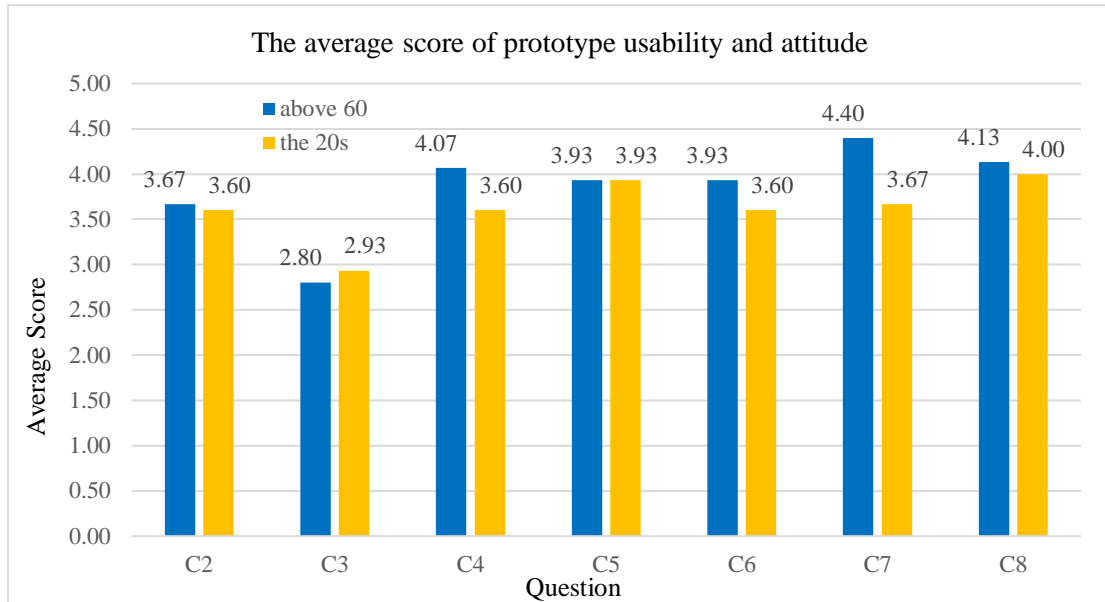


Figure 17. The average score of prototype usability and attitude

The arrangement layout of information on this map is easy to see (C7) is the only showed with a significant difference in the “the efforts of functions and operation about going-out willingness” phase. The 20s’ average score is 3.67, and the average of above 60 is 4.20 ($p < 0.005$). Based on the prototype is for the elderly, and it was trying to maintain the information it had been on the map. The revision of color and font size is for the elderly, easy to distinguish apart from other information. The elderly do need to have an arrangement layout with easier to reading and especially the font size and color to help them.

Table 24. Symmetric Measures of the arrangement layout of information on this map is easy to see (C7)

		Value	Asymptotic Standard Error ^a	Approximate T ^b	Approximate Significance
Nominal by Nominal	Phi	.427			.140
	Cramer's V	.427			.140
	Contingency Coefficient	.393			.140
Ordinal by Ordinal	Kendall's tau-b	-.377	.143	-2.546	.011
	Kendall's tau-c	-.436	.171	-2.546	.011
N of Valid Cases		30			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

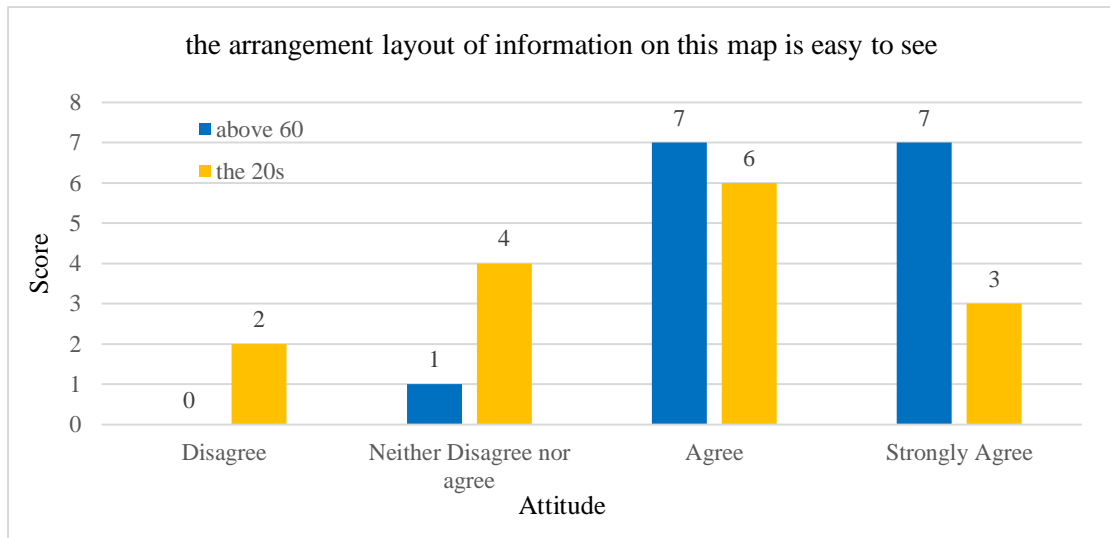


Figure 18. The attitude layout of the arrangement of information on this map is easy to see (C7)

PRE-QUESTIONNAIRE AND POST-QUESTIONNAIRE COMPARISON

The paired T-test did not show significant results in both groups. It all showed that after operating the prototype did not change their attitude about going out and the behavior could not be confirmed immediately. Both tables could tell the people's willingness and attitude is not easy to be changed in one-time experience. Also, all the subjects in the paired T-test did not show a significant distinction. These three tables show that people's attitude about going out is not that easy by one-time map operation.

Table 25. Paired Samples Test of above 60s

		Paired Differences							
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference		t	df	Sig. (2-tailed)
					Lower	Upper			
Pair 1	A1 - B1	.000	1.069	.276	-.592	.592	.000	14	1.000
Pair 2	A2 - B2	.000	1.512	.390	-.837	.837	.000	14	1.000
Pair 3	A3 - B3	-.267	1.710	.441	-1.214	.680	-.604	14	.556
Pair 4	A4 - B4	.333	1.113	.287	-.283	.950	1.160	14	.265
Pair 5	A5 - B5	-.067	.961	.248	-.599	.466	-.269	14	.792
Pair 6	A6 - B6	.067	.258	.067	-.076	.210	1.000	14	.334
Pair 7	A7 - B7	-.200	.676	.175	-.574	.174	-1.146	14	.271
Pair 8	A8 - B8	.267	1.033	.267	-.305	.839	1.000	14	.334
Pair 9	A9 - B9	-.267	1.033	.267	-.839	.305	-1.000	14	.334
Pair 10	A10 - B10	-.200	.775	.200	-.629	.229	-1.000	14	.334

Table 26. Paired Samples Test of the 20s

		Paired Differences							
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference		t	df	Sig. (2-tailed)
					Lower	Upper			
Pair 1	A1 - B1	-.133	.516	.133	-.419	.153	-1.000	14	.334
Pair 2	A2 - B2	-.200	.941	.243	-.721	.321	-.823	14	.424
Pair 3	A3 - B3	.000	.655	.169	-.363	.363	.000	14	1.000
Pair 4	A4 - B4	.333	.724	.187	-.067	.734	1.784	14	.096
Pair 5	A5 - B5	.067	.594	.153	-.262	.395	.435	14	.670
Pair 6	A6 - B6	.067	.594	.153	-.262	.395	.435	14	.670
Pair 7	A7 - B7	-.133	.352	.091	-.328	.062	-1.468	14	.164
Pair 8	A8 - B8	.000	.535	.138	-.296	.296	.000	14	1.000
Pair 9	A9 - B9	.133	.516	.133	-.153	.419	1.000	14	.334
Pair 10	A10 - B10	.067	.458	.118	-.187	.320	.564	14	.582

Table 27. Paired Samples Test of above 60s

		Paired Differences							
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference		t	df	Sig. (2-tailed)
					Lower	Upper			
Pair 1	A1 - B1	-.067	.828	.151	-.376	.242	-.441	29	.662
Pair 2	A2 - B2	-.100	1.242	.227	-.564	.364	-.441	29	.662
Pair 3	A3 - B3	-.133	1.279	.234	-.611	.344	-.571	29	.573
Pair 4	A4 - B4	.333	.922	.168	-.011	.678	1.980	29	.057
Pair 5	A5 - B5	0.000	.788	.144	-.294	.294	0.000	29	1.000
Pair 6	A6 - B6	.067	.450	.082	-.101	.235	.812	29	.423
Pair 7	A7 - B7	-.167	.531	.097	-.365	.031	-1.720	29	.096
Pair 8	A8 - B8	.133	.819	.150	-.173	.439	.891	29	.380
Pair 9	A9 - B9	-.067	.828	.151	-.376	.242	-.441	29	.662
Pair 10	A10 - B10	-.067	.640	.117	-.306	.172	-.571	29	.573

4-3. In-Depth Interview of People with Less Going-Out Behavior

The reason for choosing the elderly who have less going-out behavior is that going out is a chance for the elderly after retirement, they might face disconnection with people than before. Going-out behavior can maintain their body function and reduce the possibility of chronic diseases and Amnesia (Furuta *et al.*, 2004). For achieving WHO active ageing provoke, this is an approach to help them succeed at the idea of active ageing. Triggering their going-out willingness to enhance the going-out behavior and have a social connection with others to complete the goal of active ageing.

In the in-depth interview, this research collected 12 people from 61-84 years old elderly; gender contained 6 males and 6 females and nationality was Taiwanese. For selecting people fitting the target, before them taking the interview, 5 conditions had been taken. (1) left the house less than twice a week; (2) left the house for life necessary (*e.g.*, hospital, grocery shopping or paying a bill and so on.) did not be counted; (3) left the house for habit and it was only near the house (*e.g.*, vegetable garden; taking a walk near the house.) less 15 minutes walking; (4) functional body, walking without any equipment or people helping; (5) did not have strong rejecting willingness about going-out.

The interview was taken during December 2020 – January 2021, for them, can be relaxing and free comfortable to talk about their personal routine and private, the interview place was in their own house. The interview time continued to be around 30 minutes per person. Before the interview, there was guidance to explain that the whole interview does not have the correct answer and they can feel safe to talk about themselves' life detail and routine, then they got consent for the interview. It was semi-constructed, there were 5 questions to guide them describing their life routine a day, the reason they have a low going-out willingness, and their expectation for going out.

Table 28. Interview Outline

1. Could you describe your daily routine?
2. How often do you go out? And the reason.
3. Why do you not go out?
4. What kind of information will make you want to go out, and how do you receive it?
5. The expectations about going out.

The interview was meant to understand people with low going-out willingness from their daily routine to pick up the possible factors. By protocol analysis and grounded theory to categorize the reason affecting them stay home or only surrounded by the same activities. The results would organize other survey and experiment results to provide a design guideline and design proposal at the end of this research.

PROTOCOL ANALYSIS AND GROUNDED THEORY

Protocol analysis is a qualitative method for organizing the context from the interview. Using speaking to help people to recall and find out the detail and routine in their daily life and going-out willingness. Especially the going-out behavior about when they want to go out, where they want to go, and what obstacles are that stop them. The core is picking up the underlying message.

In the coding process, this study used grounded theory to categorize row data. It requires sectioning the whole conversation into a sentence with a certain meaning and categorizes it into 3 steps to organizes the interview transcript. The first step, as well as coding, is identifying anchors that grant the essentials points of the data to be gathered. The second step, as well as conceptualizing, is collecting codes of analogous concepts that grant the data to be grouped. The third step, as well as categorizing, is putting groups of analogous concepts to generate a theory.

4-4. Results of In-Depth Interview

The result contains 12 people who covered the age (60s, 70s, and 80s), gender (male and female), and living area (downtown and suburban). All the interviewees have movement ability and do not need to severe chronic disease that doctor asking them not to go out or need to stay in hospital. About the career, they are all retired or doing chores, only one female in 70s who selling vegetables from the hobby of farming in their vegetable garden. All the interview was held in their home for they can feel relax, safe and comfortable to talk about themselves. Here is the table for analysis of the elderlies' in-depth interview and what factors that they have mentioned. Based on the table and all the context organized into the four points.

Table 29. The results of Protocol Analysis

Things				Going-out Attitude		
Hobby	Chores	Watching TV	Events	Without purpose	Actively	Passively
3/12	6/12	12/12	8/12	10/12	6/12	6/12
Frequency (a week)				Connections		
Less than once		Less than three times		Family	Friends/ Neighbors	Association
6/12		6/12		12/12	11/12	9/12
Body Condition Problems				Information		
Leg	Waist	Eyes	Chronic	TV	Internet	Other People
1/12	1/12	2/12	6/12	12/12	5/12	11/12

Combining the above table, the protocol analysis by the grounded theory concluded the 4 critical reasons that the elderlies are concerned. The 4 reasons are: (1) Without the purpose of going out; (2) The restrictions of family or their hobbies; (3) The concern of their body condition or being a burden to their family; (4) The transportation of going out.

(1) Without the purpose of going out.

Some of the elderly said that going out for nothing, only walking around the house is ok but further is not an option. If they do not have a destination or purpose, they will not go out too far even more they will choose to stay at home and watch TV or do the chores. Part of the people, their family or friends have asked them to go out, then they have would go out with them. Their family members have would help them to set up the navigation or set the whole itinerary for them, Then, they did not need to be worried about collecting information and using the phone to set a map.

(2) The restrictions of family or their hobbies.

Almost all the females in the interview presented that they needed to cook for their family or do the laundry for the family.

One of the couples said that had to take care of their parents who were suffering from severe chronic disease, they even need to a social worker to help them wash the body twice a week. Besides the washing body, they had to prepare 3 meals a day for parents.

(3) The concern of their body condition or being a burden to their family.

People who have had surgery or had a chronic disease but did not severely affect their going-out behavior at all, just needed to pay more attention to diet and take medicine to control it. Part of the elderly worried about themselves and some of their family provided some help to them, then they did not have to go out. Even the grocery shopping would not have to go.

(4) The transportation when going out.

Living in a suburban and without a driving license meant that they need to ask people to make them go out or ask others to buy something they are necessary. It became a press to the

elderly, especially for those who have had a car or driving license. It is a symbol that means that they cannot do independently. Table 24 is an example of the protocol analysis.

Table 30. Example of protocol analysis

Sentence	Things	Frequency	Body Condition	Going-out Attitude	Connections	Information
After that, I go to bed again. The afternoon wakes up to watch TV, sometimes goes outside.	√					
Go to friends' homes to have a small talk					√	
Usually, it will be once in 2-3 weeks.		√				
My legs are not good, cannot go too far away.			√			
Besides legs also having diabetes.			√			
Go out with nothing to do so did not go outside.				√		
Cannot stand too long.			√			
No one will come.					√	
Not like where I lived, the neighbors went outside to sit in front of my home to talk.					√	
The other reason I do not want to go with them, which is I need to walk with them.			√			
I am afraid of going out.				√		

4-5. Conclusion of Experiment, and In-Depth Interview

The experiment collected the attitudes about the going-out willingness before operating the prototype and after it. The in-depth interview organized the reasons that elderly who are fitting the 5 conditions (for understanding the part of elderly with few going out behavior and through this interview to reveal the core reasons and problems bothering them).

The results of the experiment showed that question “I am willing to go out more in the future” (A7 and B7) both had a significant difference between the above 60 and the 20s groups, and the above 60 higher than the 20s. The reasons are behind it might be: (1) they are retired, so the free time is more than the 20s; (2) the finance is easier than the youth; (3) they are in the group do not need to worry about family; (4) the body functions are still fine or not severely.

Although the results of paired t-test did not show a significant difference in the 2 groups, the results of the chi-square test had a slight change from 4 differences to 2 differences. The 2 are negative phases (A5 and A10) and one is a positive phase (A6), the B8 showed the significant outcome one of the elderlies changed his/her thought from negative to positive.

The C part was asking them about the attitudes and feedback about the prototype. In the C1 series questions, C1-1 presented that people have their reading order of the map; C1-2 that people still read the information about how to arrive the place, more than the information about the place first; C1-3 showed that people used Google Maps more than others digital maps. These brought out that:

- (1) Users have reading orders and they can be used in the map design.
- (2) Two kinds of users are existing, that transportation and destination information priority.
- (3) Google Maps still have the most users than other digital maps.

Besides the above going-out attitude questionnaire (A and B parts), the C part shows that people like actively providing information than passively one. Also, people who do like more

instant information. It is an interactive tool between shop/spot owner or keeper and user. It also presents people have the response in the amount of information and the layout, it also affects to their going-out willingness.

Talking about the in-depth interview that experiment subjects who are above 60 were quite high going-out behavior people than interviewees. It might have a huge different gap between these two groups of elderly. The variety of the elderly is the same as other generations. This research aimed to help the elderly who did not go out. From giving the triggering, providing some information that they might be interested in, to give them an idea/thought that going-out can visit these places.

In the interview, some of the people who needed to take care of their family, worried about their body conditions and their hobbies are not a one-time thing, especially vegetable gardens. They might have a short time to have a break (from half a day to two days) but the itinerary planning is a huge workload for them. So, they chose to go to visit friends/family, this kind of easy and without planning workload things. If the integrated map system can provide the default itinerary to them, or information actively, they may be triggered by the going-out willingness and have actual action to have the going-out behavior.

Also, the four points of the in-depth interview might restrict the elderly to go out. Some can use the integrated map system to solve the problems, but some need the other helps to support them to have the going-out willingness and actual behavior. The first one is providing suggestions of destination to them. The second point needs communication or other people to help them to solve. And the third problem can show the relatively safe route or destination to the elderly and their family at the same time to reduce the concern. The final problem is the transportation company's cooperation with the integrated map system, but it also required public transportation penetration. The penetration rate of transportation is the core external condition for the concern of going-out willingness and behavior.

Chapter 4 consists of an experiment and an in-depth interview. In the experiment, it declares that age does show some part of the attitude of going out and the font size does show the present map font size bothers elderly using Google Maps or others. In the depth-interview, the most of elderly said that if someone asks them to go out or make a schedule for them, it will promote the willingness to go out and feel safe. These outcomes show that the obstacles and information can be reduced and provide in a media integrated with the functions which are not in the existing map. The map can be optimized by adding personal settings, family sharing, and information uploading to appeal elderly with a safe, leisure, and personal going-out behavior.

Reference

English

1. Andersen, G. J. 2012. Aging and Vision: Changes in Function and Performance from Optics to Perception. *Wiley Interdisciplinary Reviews: Cognitive Science*, 3(3), 403-410.
2. Haigh, R. 1993. The aging process: a challenge for Design. *Applied Ergonomics*, 24(1), 9-14.
3. Murray, A., and Musselwhite, C. 2019. Research in Transportation Business & Management Older peoples' experiences of informal support after giving up driving. *Research in Transportation Business & Management*, 30, 100367.
4. Pak, R., and McLaughlin, A. 2010. *Designing displays for older adults*. CRC Press.
5. Ryan, J., and Wretstrand, A. 2019. What's mode got to do with it ? Exploring the links between public transport and car access and opportunities for everyday activities among older people. *Travel Behaviour and Society*, 14, 107–118.
6. Schneck, M. E., and Haegerstrom-Portnoy, G. *et al.* 2014. Comparison of panel D-15 tests in a large older population. *Optometry and Vision Science*, 91(3), 284-290.

Japanese

1. 古田加代子, 流石ゆり子, 伊藤康児: 在宅高齢者の外出頻度に関連する要因の検討, 老年看護学, 9(1), 12-20, 2004.

Chapter 5. Integrated Map System for Conducting to Elderly's Going-Out

Conclusion of Survey, Experiment, and Interview

Discussion of Survey, Experiment, and Interview

Research Limitation and Future Research

5-1. Conclusion of Survey, Experiment, and Interview

Combined with the three stages (survey, experiment, and in-depth interview), the results contain the differentiation of nationality and age. From the survey of maps using habits, the address system affected people how to use map and space consciousness for determining their position and where is the destination. Also, age is a factor that affected people's map using. The potential meaning of map functions can be a reference for digital tourism map design. Nevertheless, map functions in different situations represent distinct meanings when they decided the destination or not. For the integrated map system, the elderly thought shop/spot related information than traffic; hence the map should enhance the information of places. When designed the integrated map system prototype which added the first step which is asking users' age, lifestyles, and habits for providing their much easier operation process and better map using experience.

The experiment is to test the prototype and people's attitudes about the going-out willingness, the results showed that some attitudes changed with significant differentiation. But people's behavior and attitude are not easy to be changed. It is long-term work for triggering the elderly to go out and the willingness to become internal thinking. This integrated map system is a tool, it only can enhance people's going-out willingness possibly. Based on the model in this research, providing the information and the layout can increase and trigger the going-out behavior. But the situation of the elderly is not the same, this tool cannot enforce them to go out.

Even though, the result did not show all the significant differences. But from the in-depth interview, the conclusion shows that the elderly might have other obstacles that need to remove that cannot be solved by the integrated map system. This research means to reveal the factors which affect the elderly's going-out willingness. For the elderly's lifestyle and habits are not easy to be changed. It needs to be a long-time work; the integrated map system is only a tool to trigger for the elderly and raise the willingness. This integrated map system is not

only for the elderly, it also can be a connection for the elderly can provoke their going-out willingness. Going-out behavior is not just only one type such as going out alone, with their friends/families. The aim is to make the elderly interact with others and be willing to leave their house.

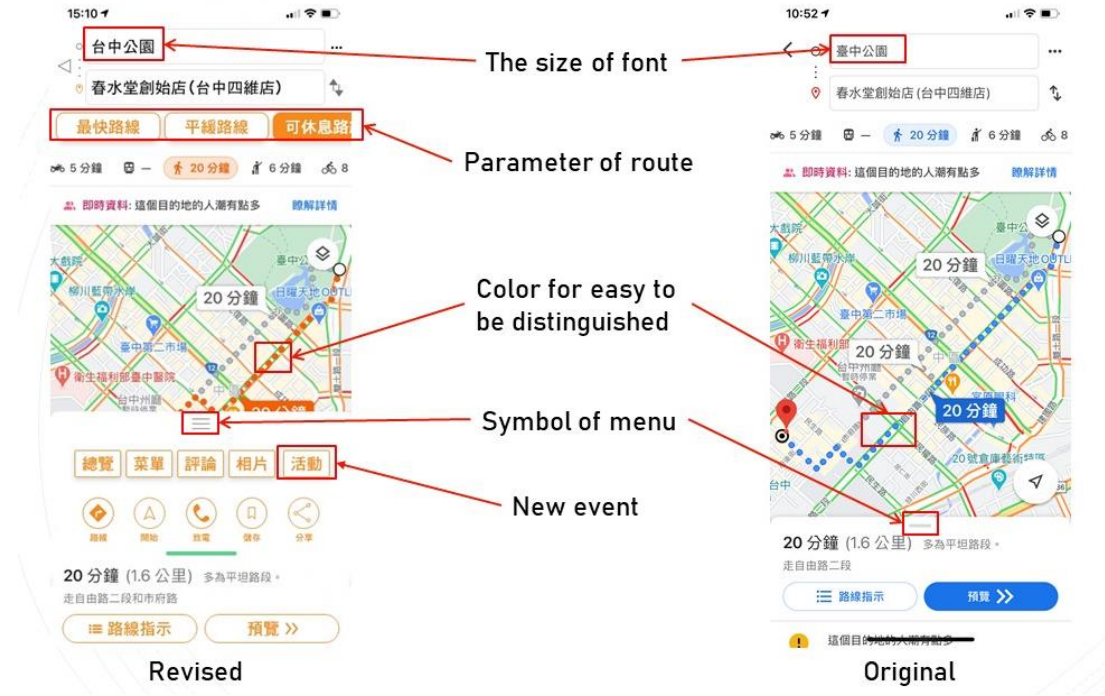


Figure 19. Comparison of Prototype and Google Maps

The prototype has changed some parts for easy to use, especially the people who has the problem with font size, color distinguishment, and no destination. By adding a new event to provide the destination options triggering people to have the going-out willingness. The other one is an optional route with more specific descriptions to understand and easy to find a suitable route to themselves.

5-2. Discussion of Survey, Experiment, and Interview

For achieving WHO provoked active ageing, also, Japan from 1995, Taiwan from 1997, E.U. from 1982 and U.S.A. from 1965 provoked that the policies or laws for the elderly. These policies are related to the elderly's personal life and the whole benefits of the country or organization. The policies are not providing material unilaterally, these also help the elderly can maintain life with independence and self-esteem. Therefore, this research for the elderly to maintain this goal, keeping their physiological, psychological, and social health by the integrated map system to encourage them to go out more. this research aims to make the elderly have going-out willingness which is using the integrated map system to achieve this purpose.

After the survey, experiment, and in-depth interview, this study integrates the five design guidelines of an integrated map system for triggering the elderly's going-out willingness and behavior. The design guidelines are below:

- 1. The color should be eased to distinguish the button or other operation tools from the reading materials.**

During the experiment, the elderly asked that where I should press the button or how could I read the material below. They were confused by the button position or did not notice it was a button there. Also, the words do not help them to distinguish the button from reading information. Based on the survey, the elderlies have a problem identifying the symbol on the map, it is the other point when we design the symbol of the map.

- 2. The new/event information requires providing actively.**

According to the experiment that the elderly and the youth are like the information providing actively. Moreover, the elderly in the interview said that they would like to have more information from the medium. They usually can get the information from TV or

friends/family. If a map can provide information to them, it will be a new information source that is able to help them and trigger them to go out more.

3. Other surrounding potential destinations can provide the traveling itinerary by time.

Some interviewees said that they did not go there for what or just a spot is quite a waste of time, which decreased their going-out willingness. Almost all of them have the willingness for the tour for temple praying is that they did not need to worry about the whole itinerary, they just arrive at the gathering place and wait for the bus to pick them up. After the praying, they have 1-2 hours or just take them to some specific shop for buying souvenirs, then finish the whole trip. Instead of the one place information, then integrating the few spots that they might like. This way can help them to plan a small trip by themselves.

4. Knowing the demographic of users can give a more personal suggestion.

As the interview results, the elderly has their interests. The variety also shows on the personal suggestion. The going-out behavior is related to people's information. There is a chance that they get the information suitable, then their going-out willingness will be awaked. The whole process of having an idea is the critical factor in the hypothesis of this research. The results of the survey show when people use maps in different situations, the functions present different meanings. The personal suggestion also can consider that asking the situation first, then decide what kind of information can provide to the user.

5. The integrated map system is not just for the elderly; it is also a tool for communicating with family and friends.

Some of the elderly described that their family or friend would invite them to go out. Sometimes they would accept the invitations because of the place which they like or necessary to go. They are afraid of asking to go somewhere because they do not want to see themselves as a burden to family or friends. Then the other to show that where they are

interested in visually, it might change the awkward situation. Or the other way, their family/friends can show the information in the visual and detailed, it might appeal them to have the going-out willingness. According to the survey, the elderly see the shop/spot information as more important.

The above 5 points are just the design guidelines for the idea of a digital map, but it still needs to be based on fundamental research about users. The interview and experiment show Taiwanese's opinions and the survey only can present part of Japanese and Taiwanese about their using habits. The other background should be to do more research, then it can provide a more specific and precise operation experience to the user. The results show the new possibility of digital map usage, part of people's habits of operating the digital map, and the people are influenced by the information. The digital map is a potential media that might affect people's going-out willingness and behavior. Also, a tool is for the elderly to have successful active ageing.

Figure 20 shows the revised hypothesis model of the integrated map system for promoting the elderly to go out more, the most important triggers are the "Information for movement" and "Information for purpose". Both types of elderly need the "Information for movement", even though they have had the purpose already the way of being the destination is a crucial criterion that making them have the willingness of going out and next step is actual behavior happen.

The other one is "Information for purpose", it is for type 2 which is people do not have something to trigger them to have the purpose to go out. Therefore, have the new information that might give them have a new idea of willingness to go out and combine other criteria to make the actual going-out behavior is also major for the elderly to have the willingness to going-out.

The constraint is not clarified in the research; however, it still plays an important role in the whole model. Therefore, it is being kept in the final model in the research. It can be opposite of factors in the trigger, such as lack of information, without the movement supporting and so on. It can be surveyed more in the future research for helping the elderlies to go out more and having a better active ageing process.

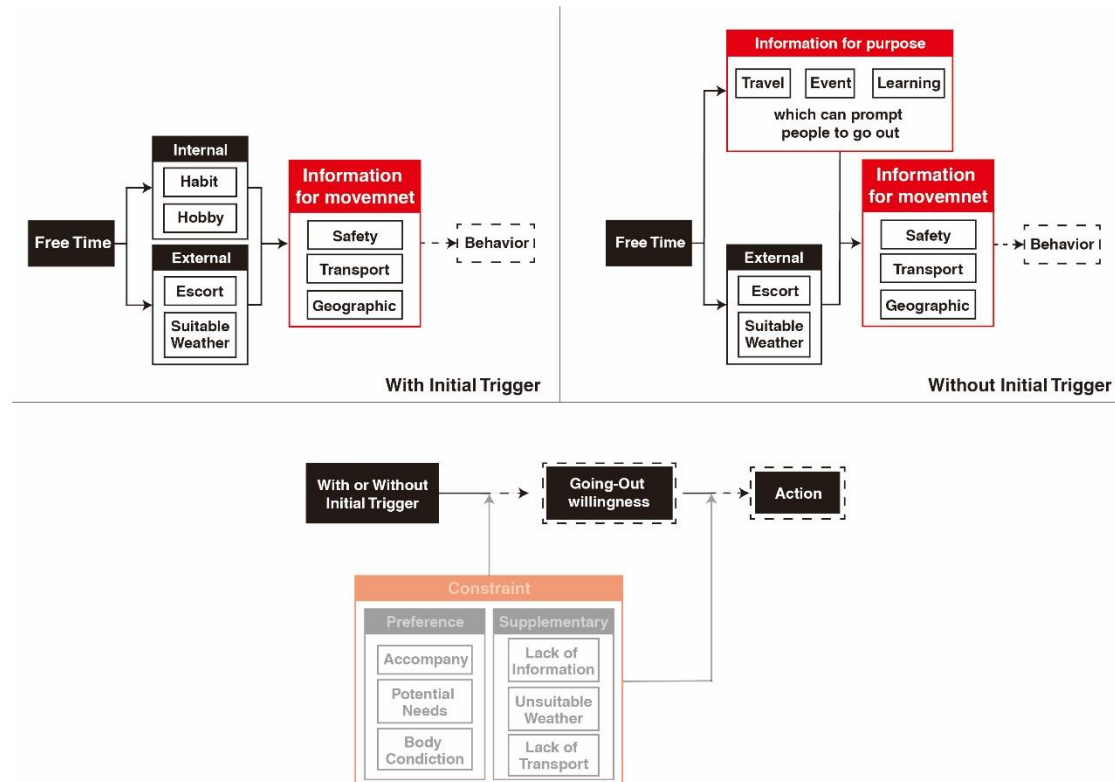


Figure 20. Revised hypothesis model

Figure 21 is the operation process that users need to input their personal data than the integrated map system will following by the research data. When the users start the system, the second time using the system; depending on they have a destination or not, it will provide the proper information for users to choose or check, then promoting them the going-out willingness.

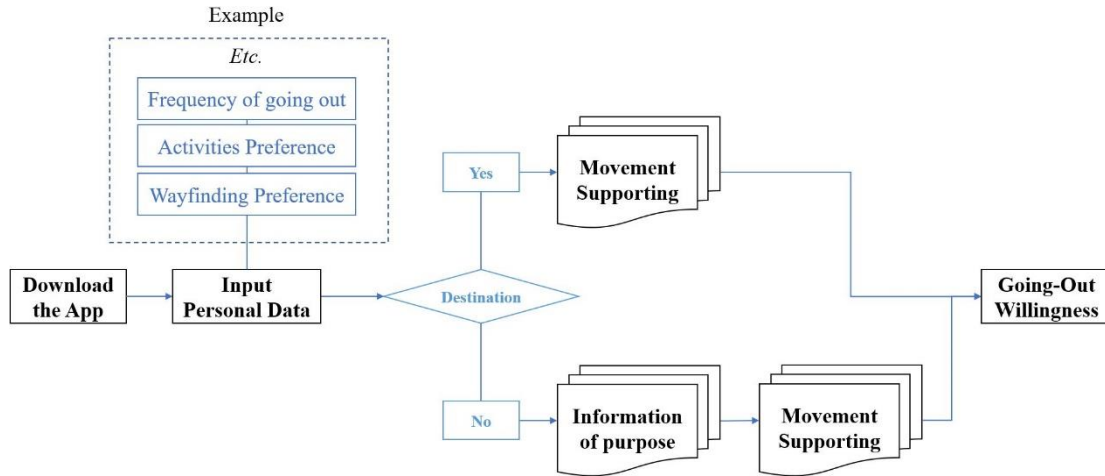


Figure 21. Operation process

Based on the 5 points of design guidelines, there is a proposal of the essential functions. The first step when they download the map is to fill in their preferences, then next time it can provide more specific information to the user (Figure 22). The next one is when they open the map, it will ask user's plan and get into a different route (Figure 23). If they have a plan, then move into the map page directly to search where they want to go (Figure 24). Figure 25, not just shows the destination also provides the new event of the shop that the user is going to. Figures 26 and 27 are using orange for easy to distinguish functional button from the reading information.

Figure 22. Input page

Figure 23. Welcome



Figure 24. Search page



Figure 25. Actively Hint



Figure 26. Destination

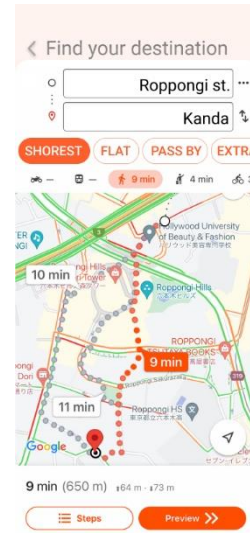


Figure 27. Route

If the users do not have a plan, then they will be guided to the itinerary part then there are three examples like asking are hungry at mealtime; the new event is proving the hobby related information; surprise them is a piece of information not related to their preference but for exposing them the experience they might not have had it (Figure 28). In figure 29, the category is providing options for different types of places to users if they click to choose your destination. Figure 30 shows the different layers that restaurants providing. Figure 31 enlarges the return button and adds a new button for putting the place into an itinerary.

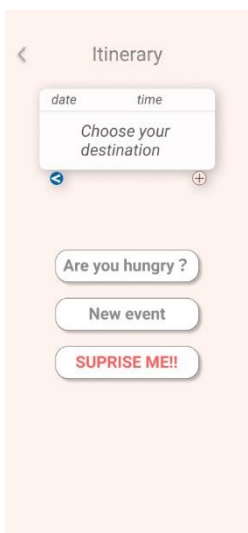


Figure 28. Itinerary

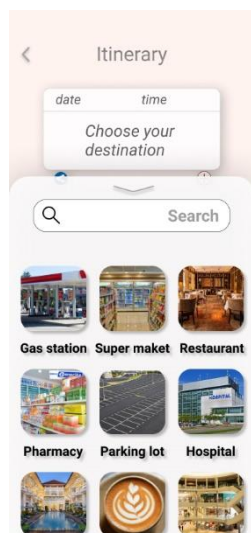


Figure 29. Categories



Figure 30. Restaurant



Figure 31. Recommendation

In figure 32 and 33, they can arrange their itinerary and share it with other SNS (Social Networking Service) media or other map users to connect with friends or family. It provides a possibility for them to go out together.

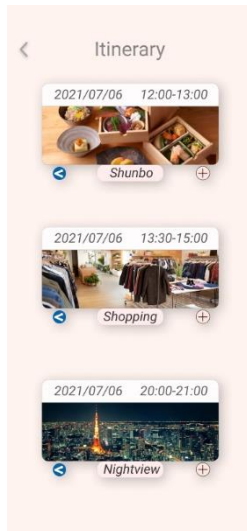


Figure 32. Completed itinerary

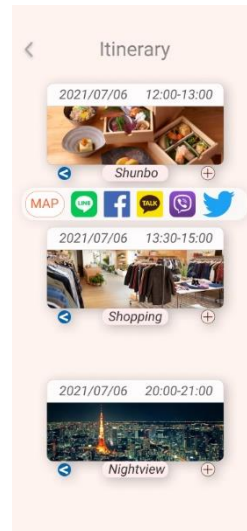


Figure 33. Sharing

5-3. Research Limitation and Future Research

RESEARCH LIMITATION

This research only pointed out the possible elderly going-out behavior model, hence there are still lots of details and theories that need to be revised into it.

About the hypothesis model:

The model focuses on the information from the map which only provides a small part of a limited kind of information and real situations. The realistic environment contains more complex situations, this model is just a possible tool for the elderly to have a better active ageing process. The hypothesis is focused on the information that can be seen, the elderly with severely hearing obstacles or do not understand words (without the education). They need other information providing a way to help them.

About the subjects:

Generation's map operation consciousness survey only collects Taiwanese and Japanese who are in the 20s and above 60. The age segment is not very clear to every age, and the other countries may have other factors that could affect people's consciousness when they are using a map. In the usability test, the subjects are only including the elderly who are in their 60s and 70s. The age can be segmented into more. Also, the elderly who cannot use a smartphone are excluded from the research. In the in-depth interview, the subject is a healthy senior in Taiwan, the demographic might produce different results. The perspective of universal design and inclusive design is also a possible approach to know the elderly and other users.

FUTURE RESEARCH

Nevertheless, a personal situation can be a perspective such as holding a driving license or not, holding a car/scooter, and so on. According to Ryan and Wretstrand (2019) some of the elderly in the UK after giving up their driving license, their grocery routine, going-out behavior have been changed. For increasing their going-out willingness or behavior, what the essential factors are for them also can be considered.

The culture, traveling patterns, habits can also affect the information needs for the elderly are different. Based on the model, the demographics affect people's operating process and their consciousness of the map. Culture combines complicated factors, in this research is focus the personal age and nationality, but the householder and friends did not be included which might be a critical parameter for their going-out willingness.

For traveling, going out with friends, families, or community association members is different. Especially, the community association activities could have seemed like a chance when the elderly go to somewhere not familiar. When only the elderly go out, they need to find out the destination or some interesting place. The integrated map system might help them to abroad their possibilities. When they do not need to worry about a traffic issue. These association activities have solved one major problem for the elderly. They could focus on the destination they want to visit. It is a perspective for further research.

Reference

English

1. Li, M. L., and Chen, M. S. *et al.* 2020. Digital Map Design Elements for Local Tourism Comparing User Cognition Between Age Of 20S and Above 60. *KEER 2020: Proceedings of the 8th International Conference on Kansei Engineering and Emotion Research*, 55-65.
2. Li, M. L., and Chen, M. S. *et al.* 2020. Digital Map Design Elements for Local Tourism: Comparing User Basic Consciousness Between Taiwan and Japan. *Journal of Science of Design*, 4(2), 67-74.
3. Murray, A., and Musselwhite, C. 2019. Research in Transportation Business & Management Older peoples' experiences of informal support after giving up driving. *Research in Transportation Business & Management*, 30, 100367.
4. Ryan, J., and Wretstrand, A. 2019. What's mode got to do with it ? Exploring the links between public transport and car access and opportunities for everyday activities among older people. *Travel Behaviour and Society*, 14, 107–118.

Appendix 1. Questionnaire Context

JAPANESE VERSION

私は、千葉大学融合理工学府 創成工学専攻 デザインコース 博士後期 1年李銘倫です。
このアンケートは台湾人と日本人を対象に、地図の使い方や習慣、観光案内地図の嗜好性を調査し、観光地図の改善策を提案するためのデータを得ることを目的としています。調査データは研究スタッフのもとで厳重に管理され、統計的に処理されます。個人情報の保護については十分配慮いたしますので、あなたにご迷惑をおかけすることはありません。また、ご協力いただきました調査データは、研究目的以外には使用いたしません。

回答には 5-7 分程度かかります。不明な点がありましたら、下記にご連絡ください。

<本研究の問い合わせ先>

千葉大学 融合理工学府 創成工学専攻 デザインコース 博士後期 1年

氏名：李銘倫

指導教員氏名：佐藤公信 教授

何卒、ご協力よろしくお願い申し上げます。

一、案内地図に関する経験と観光地図に対する使い方

- A. 紙地図（ガイドブック含む）の使用頻度 使ってない 1 2 3 4 5 よく使う
- B. 電子地図（ナビ含む）の使用頻度 使ってない 1 2 3 4 5 よく使う
- C. 紙地図（ガイドブック含む）を買ったことがありますか？ 1.はい 2.いいえ
- D. 紙地図（ガイドブック含む）をもったことがありますか？ 1.はい 2.いいえ
- E. 電子地図（ナビ含む）を買ったことがありますか？ 1.はい 2.いいえ
- F. 電子地図（ナビ含む）をダウンロードしたことがありますか？ 1.はい 2.いいえ
- G. 好きな地図タイプは？
- 1.紙地図（ガイドブック含む） 2.電子地図（ナビ含む） 3.どちらも同じ
- H. 地図を使った時、困ることは何ですか？（複数回答可）
- 1.凡例の意味が分からない 2.文字が小さい 3.自分が向いている方向が分からない 4.データ量が多すぎる 5.データが古い 6.その他_____
- I. 方向を識別する時、利用する補助物は？（複数回答可）
1. 道路名 2.目的地以外の店やスポット 3.ランドマーク 4.目的地の外観 5.サインや看板
- 6.人に聞く 7.直感 8.その他_____

二、電子地図使用の嗜好性

A. 好きな地図のタイプは？

- 1. 案内情報を含む観光地図 □2. 経路を示す機能式地図（グーグルマップ、アップルマップ）

B. 好きな地図のスタイルは？（図面は参考事例）

□1. シンプルな平面地図



□2. シンプルな鳥瞰地図



□3. 観光スポットなどをイラストで表現した平面地図



□4. 観光スポットなどをイラストで表現した鳥瞰地

図

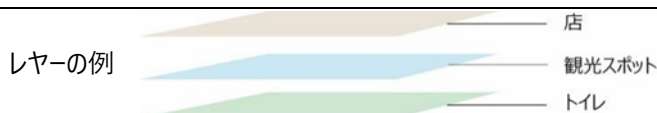


■ 目的地を決めている時、地図にどのような情報が重要ですか？

質問項目	全く重要でない	やや重要でない	どちらとも言えない	やや重要	とても重要
C.グーグルマップで表示できるストリートビュー	1	2	3	4	5
D.ランドマークとして外観のイラストを表示すること	1	2	3	4	5
E.自分が向いている方向を表示すること	1	2	3	4	5
F.歩行時、ルートを示すナビゲーションで矢印を表示すること	1	2	3	4	5
G.店や観光スポットの基本情報	1	2	3	4	5
H.必要に応じて、お店や観光スポット・トイレ等のある場所を切り替えて地図上にで表示できること（下図参照）	1	2	3	4	5

■ 目的地を決めていない時、地図にどのような情報が重要ですか？

I.グーグルマップで表示できるストリートビュー	1	2	3	4	5
J.ランドマークとして外観のイラストを表示すること	1	2	3	4	5
K.自分が向いている方向を表示すること	1	2	3	4	5
L.歩行時、ルートを示すナビゲーションで矢印を表示すること	1	2	3	4	5
M.店や観光スポットの基本情報	1	2	3	4	5
N.必要に応じて、お店や観光スポット・トイレ等のある場所を切り替えて地図上にで表示できること（下図参照）	1	2	3	4	5



三、回答者属性：

- A. 性別：□1.男 □2.女
- B. 年齢：□1. 20才以下 □2. 21-30才 □3. 31-40才 □4. 41-50才 □5. 51-60才 □6. 60才以上
- C. 最終学歴：□1.中学校以下 □2.高校 □3.専門学校／短大 □4.大学 □5.修士以上
- D. 職業：□1. 公務員/教員 □2.学生 □3.会社員 □4.農業 □5.デザイナー □6.主婦／主夫 □7.無職 □8.その他_____

質問は、以上です。ご協力ありがとうございました。

MANDARIN VERSION

親愛的受訪者，您好：

我們目前正在進行「電子觀光地圖使用性與設計元素異文化比較－以台日為例」之研究，目的希望透過探討，增加對研究主題的了解，並且了解大家對於電子地圖設計偏好與使用習慣。

本問卷分為五部分，依次是「受測者背景、使用習慣、電子地圖使用偏好、目的地已決定時的機能、目的地為決定時的機能。」

問卷填寫時間大約僅需 5-7 分鐘

採「匿名方式」進行調查，獲得之資料僅供本研究統計分析之用，敬請放心填寫。此外，所有問題均無標準答案，請依照您真實的情況及感受填答，誠摯地感謝您撥冗協助。

千葉大學 融合理工學府 創成工學專攻 設計學程博士後期：李銘倫

千葉大學 融合理工學府 創成工學專攻 設計學程 教授：佐藤公信

● 使用習慣

1. 紙本地圖的使用頻率(包含旅遊書) 不使用 1 2 3 4 5 很常使用
2. 電子地圖的使用頻率(包含車用導航) 不使用 1 2 3 4 5 很常使用
3. 曾購買過紙本地圖 有 沒有
4. 曾拿取過免費紙本地圖 有 沒有
5. 曾購買過電子地圖 有 沒有
6. 曾下載過電子地圖 有 沒有
7. 偏好的地圖媒介 紙本地圖 電子地圖 沒有特別偏好
8. 使用地圖時，曾碰到過的困難(可複選)
看不懂圖例 字太小 行進方向搞不清楚 資訊過多 資訊老舊 其他

9. 辨識方向常用的周遭輔助(可複選)
路名 其他店家 地標 目的地的外觀 指標或招牌 問人 憑直覺 其他

● 電子地圖的使用偏好

10. 地圖的類型

觀光型地圖(小範圍, 只顯示當地店家, 有吉祥物等插畫) 機能型地圖(Google 或蘋果地圖)

11. 地圖視角與風格(圖片僅供參考)

簡單的平面地圖



簡單的鳥瞰地圖



有插畫的平面地圖



有插畫的鳥瞰地圖



個人屬性

1. 性別：男 女
2. 年齡：20歲以下 21-30歲 31-40歲 41-50歲 51-60歲 61歲以上
3. 最終學歷：國中以下 高中 專科學校 大學 碩士以上
4. 職業：公務員/教師 學生 行政職(業務、作業員相關包含在此類) 農業 專門職(工程師、設計師等) 家庭主婦/主夫 無職(包含退休、待業、當兵) 其他_____

非常感謝您的協助

Appendix 2. Experiment Analysis Results

Table 31. Symmetric Measures of A1

		Value	Asymptotic Standard Error ^a	Approximate T ^b	Approximate Significance
Ordinal by Ordinal	Kendall's tau-b	-.070	.172	-.408	.683
	Kendall's tau-c	-.084	.207	-.408	.683
N of Valid Cases		30			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

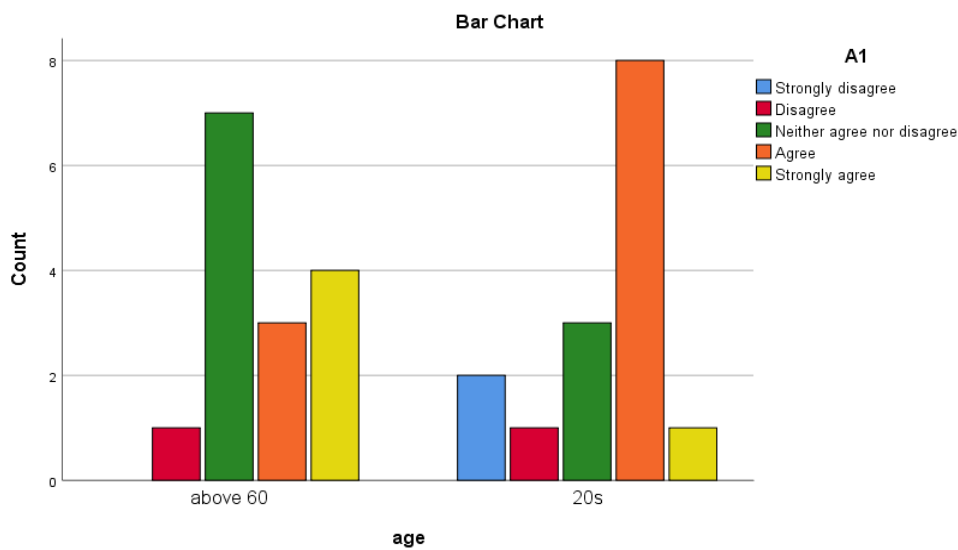


Figure 34. The attitude of A1 for the 20s and above 60 groups

Table 32. Symmetric Measures of A2

		Value	Asymptotic Standard Error ^a	Approximate T ^b	Approximate Significance
Ordinal by Ordinal	Kendall's tau-b	.180	.162	1.105	.269
	Kendall's tau-c	.218	.197	1.105	.269
N of Valid Cases		30			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

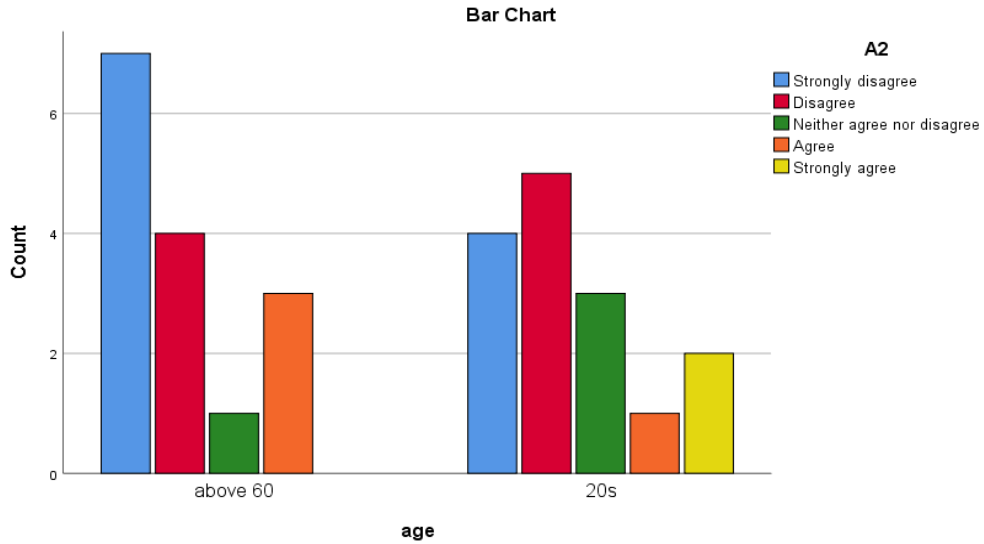


Figure 35. The attitude of A2 for the 20s and above 60 groups

Table 33. Symmetric Measures of A3

	Value	Asymptotic Standard Error ^a	Approximate T ^b	Approximate Significance
Ordinal by Ordinal Kendall's tau-b	.071	.170	.420	.675
Kendall's tau-c	.084	.201	.420	.675
N of Valid Cases	30			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

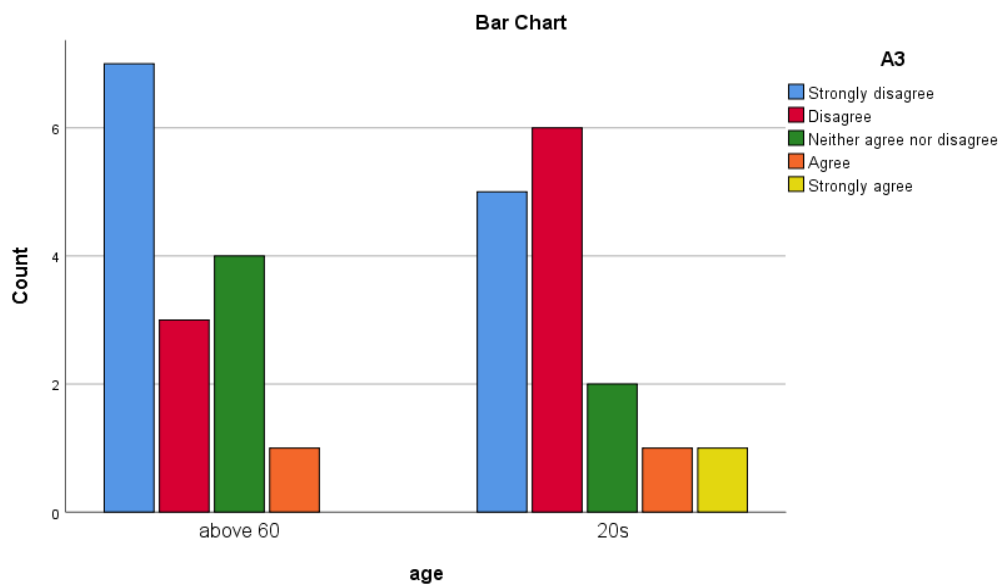


Figure 36. The attitude of A3 for the 20s and above 60 groups

Table 34. Symmetric Measures of A4

	Value	Asymptotic Standard Error ^a	Approximate T ^b	Approximate Significance
Ordinal by Ordinal Kendall's tau-b	.198	.161	1.230	.219
Kendall's tau-c	.244	.199	1.230	.219
N of Valid Cases	30			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

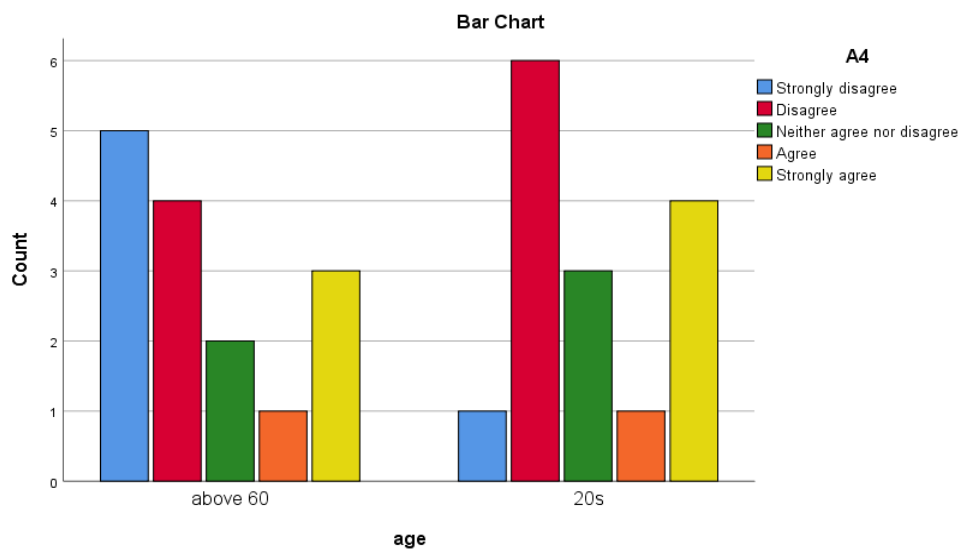


Figure 37. The attitude of A4 for the 20s and above 60 groups

Table 35. Symmetric Measures of A5

	Value	Asymptotic Standard Error ^a	Approximate T ^b	Approximate Significance
Ordinal by Ordinal Kendall's tau-b	.373	.156	2.422	.015
Kendall's tau-c	.431	.178	2.422	.015
N of Valid Cases	30			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

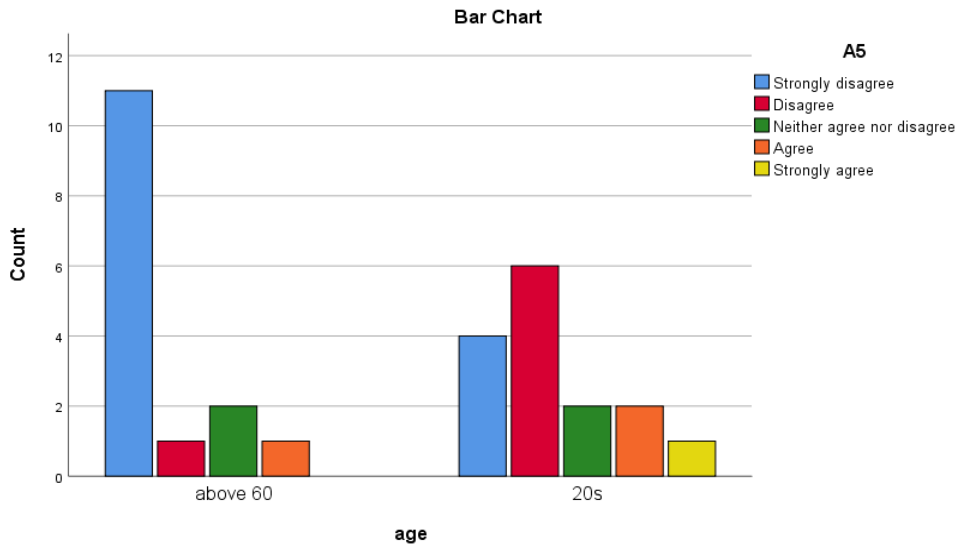


Figure 38. The attitude of A5 for the 20s and above 60 groups

Table 36. Symmetric Measures of A6

	Value	Asymptotic Standard Error ^a	Approximate T ^b	Approximate Significance
Ordinal by Ordinal Kendall's tau-b	-.314	.153	-1.993	.046
Ordinal by Ordinal Kendall's tau-c	-.351	.176	-1.993	.046
N of Valid Cases	30			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

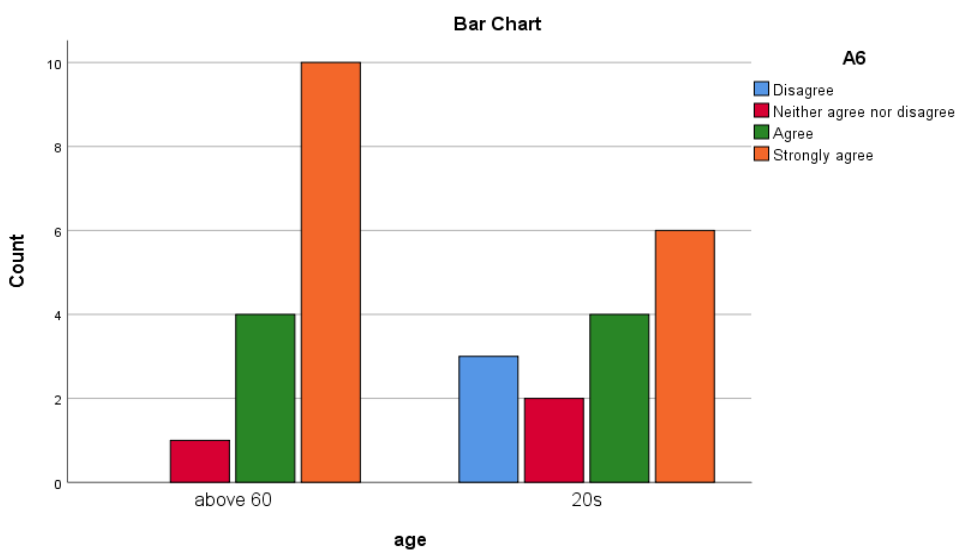


Figure 39. The attitude of A6 for the 20s and above 60 groups

Table 37. Symmetric Measures of A7

		Value	Asymptotic Standard Error ^a	Approximate T ^b	Approximate Significance
Ordinal by Ordinal	Kendall's tau-b	-.357	.147	-2.400	.016
	Kendall's tau-c	-.418	.174	-2.400	.016
N of Valid Cases		30			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

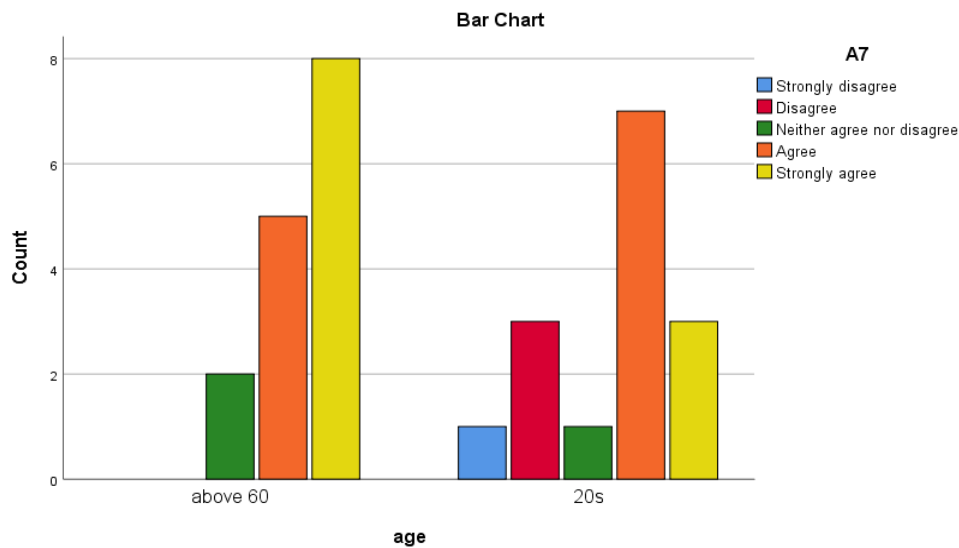


Figure 40. The attitude of A7 for the 20s and above 60 groups

Table 38. Symmetric Measures of A8

		Value	Asymptotic Standard Error ^a	Approximate T ^b	Approximate Significance
Ordinal by Ordinal	Kendall's tau-b	.231	.163	1.350	.177
	Kendall's tau-c	.204	.151	1.350	.177
N of Valid Cases		30			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

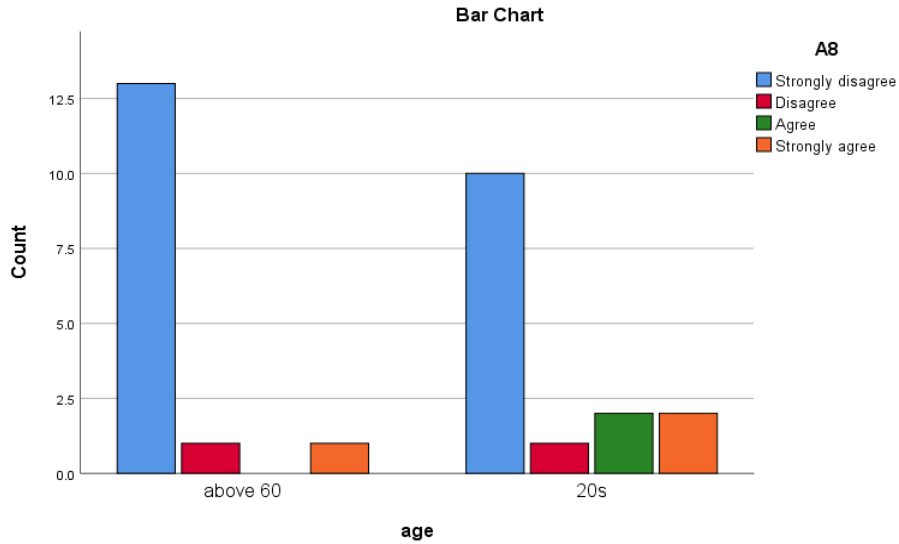


Figure 41. The attitude of A8 for the 20s and above 60 groups

Table 39. Symmetric Measures of A9

	Value	Asymptotic Standard Error ^a	Approximate T ^b	Approximate Significance
Ordinal by Ordinal Kendall's tau-b	.264	.160	1.619	.105
Kendall's tau-c	.284	.176	1.619	.105
N of Valid Cases	30			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

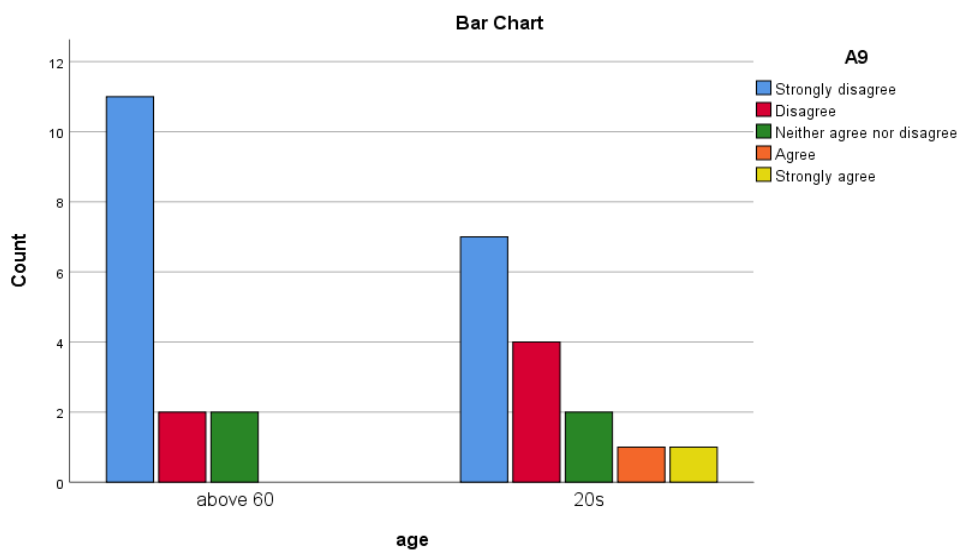


Figure 42. The attitude of A9 for the 20s and above 60 groups

Table 40. Symmetric Measures of A10

	Value	Asymptotic Standard Error ^a	Approximate T ^b	Approximate Significance
Ordinal by Ordinal Kendall's tau-b	.327	.143	1.973	.048
Kendall's tau-c	.271	.137	1.973	.048
N of Valid Cases	30			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

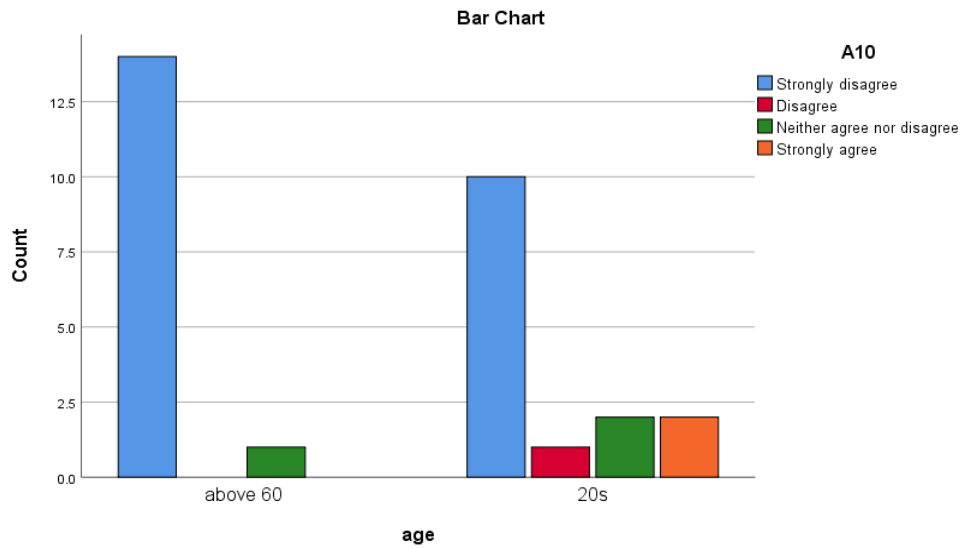


Figure 43. The attitude of A10 for the 20s and above 60 groups

POST-QUESTIONNAIRE

Table 41. Symmetric Measures of B1

	Value	Asymptotic Standard Error ^a	Approximate T ^b	Approximate Significance
Ordinal by Ordinal Kendall's tau-b	-.052	.167	-.308	.758
Kendall's tau-c	-.062	.202	-.308	.758
N of Valid Cases	30			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

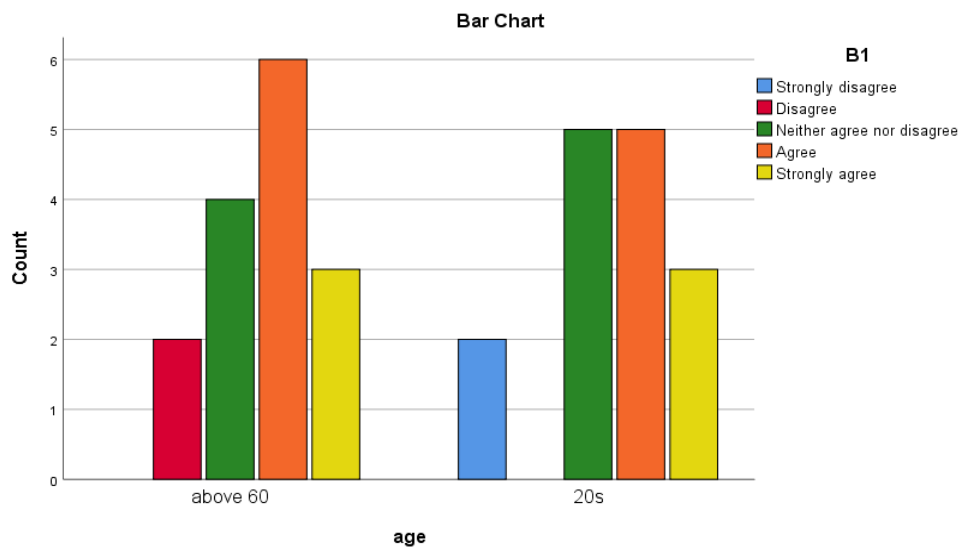


Figure 44. The attitude of B1 for the 20s and above 60 groups

Table 42. Symmetric Measures of B2

	Value	Asymptotic Standard Error ^a	Approximate T ^b	Approximate Significance
Ordinal by Ordinal Kendall's tau-b	.249	.161	1.555	.120
Kendall's tau-c	.298	.192	1.555	.120
N of Valid Cases	30			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

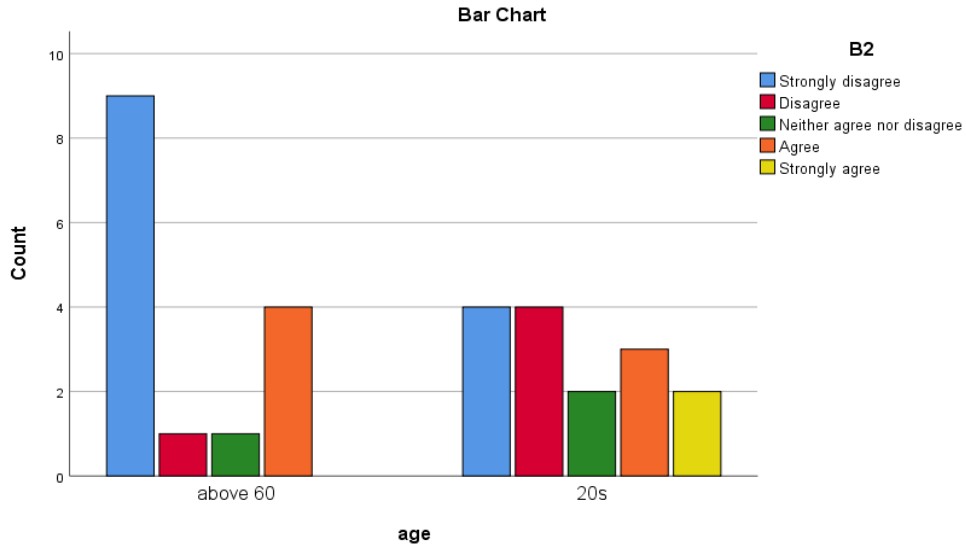


Figure 45. The attitude of B2 for the 20s and above 60 groups

Table 43. Symmetric Measures of B3

	Value	Asymptotic Standard Error ^a	Approximate T ^b	Approximate Significance
Ordinal by Ordinal Kendall's tau-b	-.022	.168	-.133	.894
Kendall's tau-c	-.027	.201	-.133	.894
N of Valid Cases	30			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

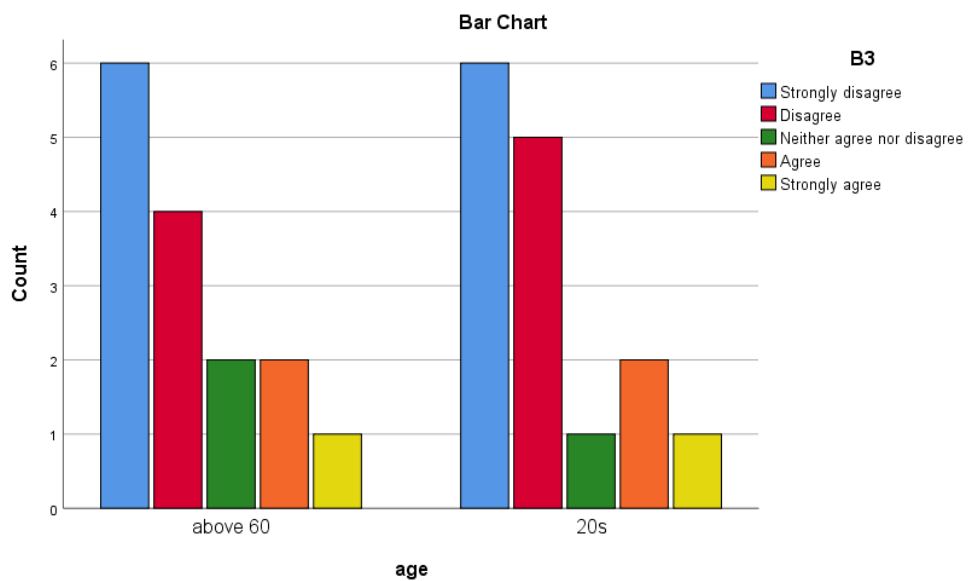


Figure 46. The attitude of B3 for the 20s and above 60 groups

Table 44. Symmetric Measures of B4

		Value	Asymptotic Standard Error ^a	Approximate T ^b	Approximate Significance
Ordinal by Ordinal	Kendall's tau-b	.201	.162	1.250	.211
	Kendall's tau-c	.249	.199	1.250	.211
N of Valid Cases		30			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

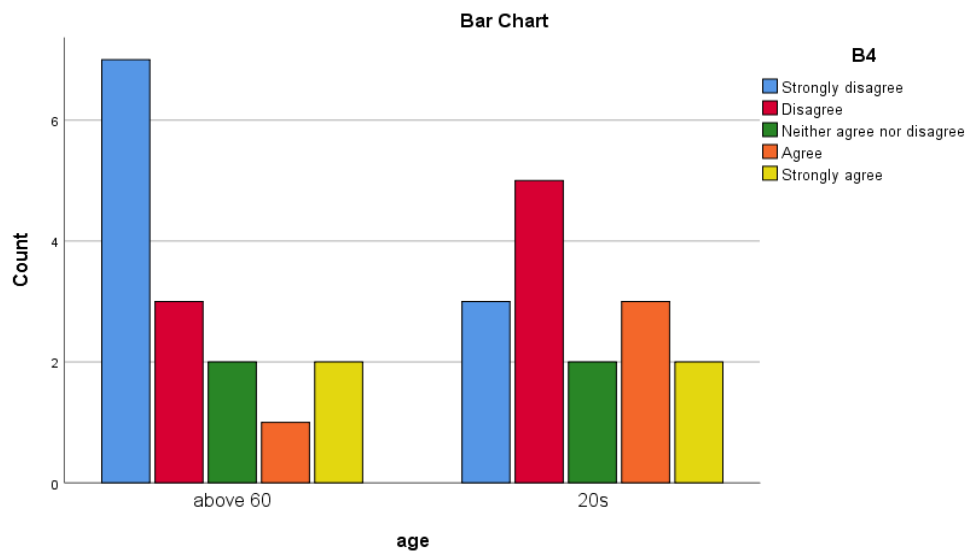


Figure 47. The attitude of B4 for the 20s and above 60 groups

Table 45. Symmetric Measures of B5

		Value	Asymptotic Standard Error ^a	Approximate T ^b	Approximate Significance
Ordinal by Ordinal	Kendall's tau-b	.288	.161	1.788	.074
	Kendall's tau-c	.320	.179	1.788	.074
N of Valid Cases		30			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

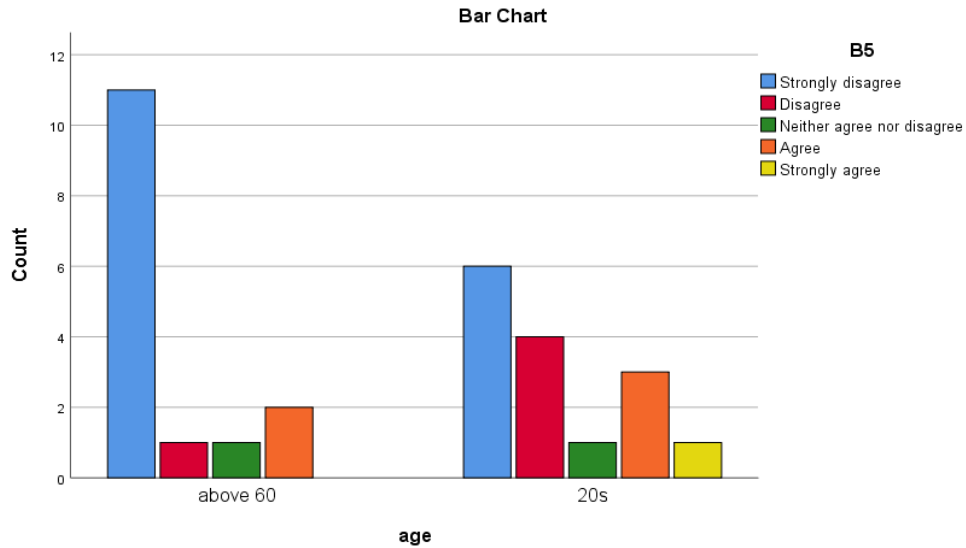


Figure 48. The attitude of B5 for the 20s and above 60 groups

Table 46. Symmetric Measures of B6

	Value	Asymptotic Standard Error ^a	Approximate T ^b	Approximate Significance
Ordinal by Ordinal Kendall's tau-b	-.270	.157	-1.680	.093
Ordinal by Ordinal Kendall's tau-c	-.307	.183	-1.680	.093
N of Valid Cases	30			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

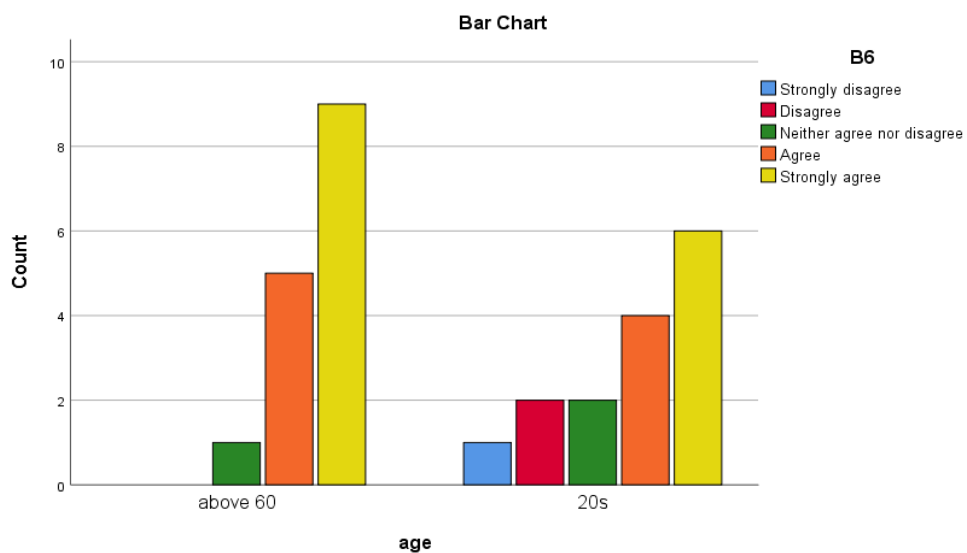


Figure 49. The attitude of B6 for the 20s and above 60 groups

Table 47. Symmetric Measures of B7

		Value	Asymptotic Standard Error ^a	Approximate T ^b	Approximate Significance
Ordinal by Ordinal	Kendall's tau-b	-.355	.147	-2.301	.021
	Kendall's tau-c	-.400	.174	-2.301	.021
N of Valid Cases		30			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

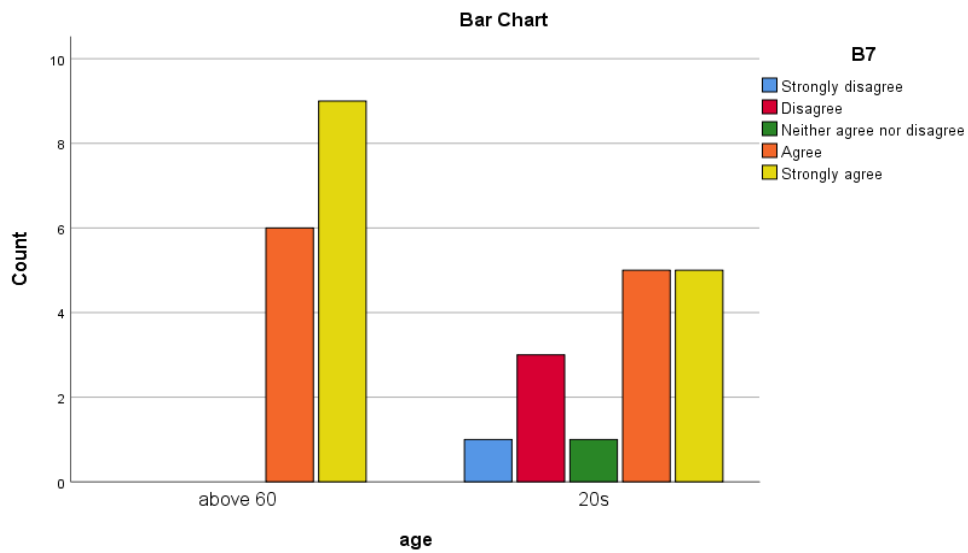


Figure 50. The attitude of B7 for the 20s and above 60 groups

Table 48. Symmetric Measures of B8

		Value	Asymptotic Standard Error ^a	Approximate T ^b	Approximate Significance
Ordinal by Ordinal	Kendall's tau-b	.395	.130	2.501	.012
	Kendall's tau-c	.351	.140	2.501	.012
N of Valid Cases		30			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

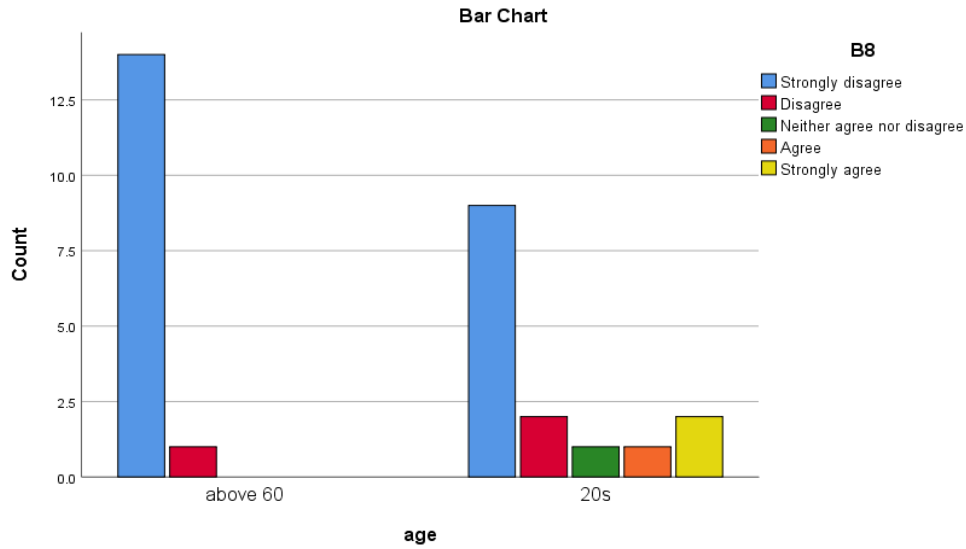


Figure 51. The attitude of B8 for the 20s and above 60 groups

Table 49. Symmetric Measures of B9

	Value	Asymptotic Standard Error ^a	Approximate T ^b	Approximate Significance
Ordinal by Ordinal Kendall's tau-b	.113	.172	.658	.510
Kendall's tau-c	.116	.176	.658	.510
N of Valid Cases	30			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

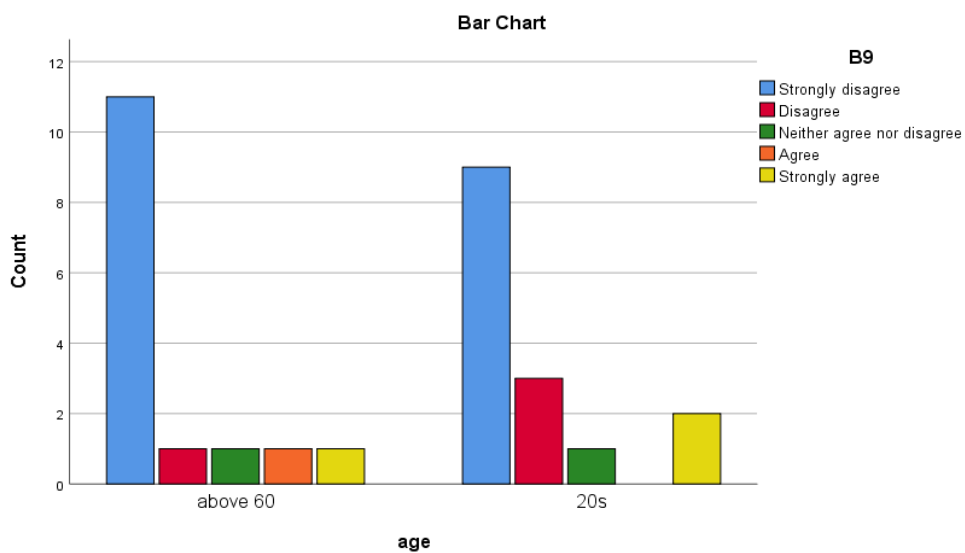


Figure 52. The attitude of B9 for the 20s and above 60 groups

Table 50. Symmetric Measures of B10

			Value	Asymptotic Standard Error ^a	Approximate T ^b	Approximate Significance
Ordinal by Ordinal	Kendall's tau-b		.220	.164	1.291	.197
	Kendall's tau-c		.196	.151	1.291	.197
N of Valid Cases			30			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

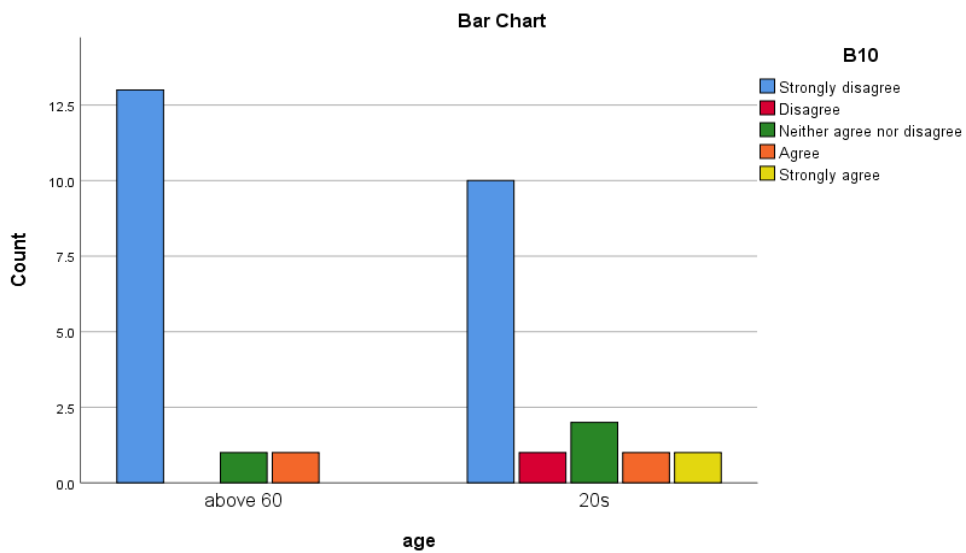


Figure 53. The attitude of B10 for the 20s and above 60 groups

Table 51. Symmetric Measures of C2

			Value	Asymptotic Standard Error ^a	Approximate T ^b	Approximate Significance
Ordinal by Ordinal	Kendall's tau-b		-.029	.168	-.174	.862
	Kendall's tau-c		-.036	.205	-.174	.862
N of Valid Cases			30			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

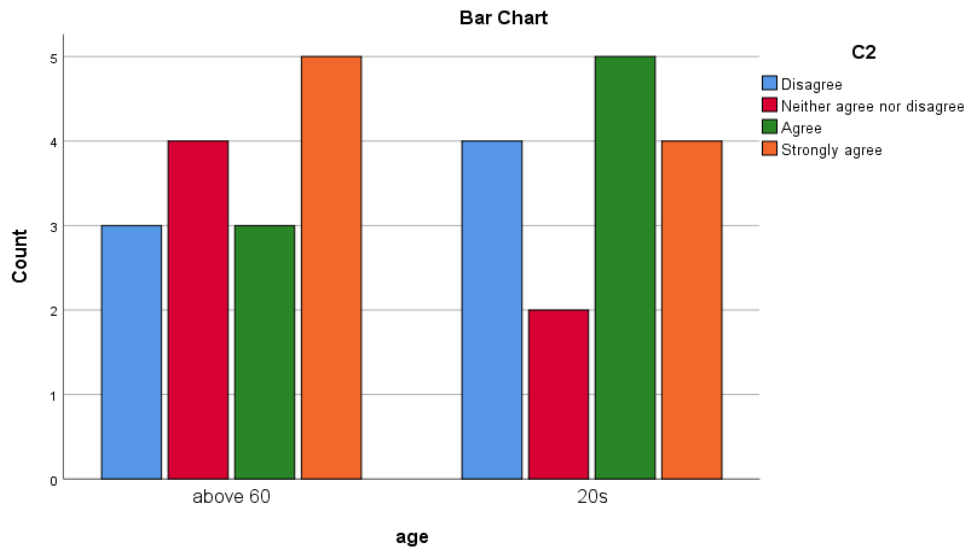


Figure 54. The attitude of C2 for the 20s and above 60 groups

Table 52. Symmetric Measures of C3

	Value	Asymptotic Standard Error ^a	Approximate T ^b	Approximate Significance
Ordinal by Ordinal Kendall's tau-b	.050	.177	.283	.777
Ordinal by Ordinal Kendall's tau-c	.058	.204	.283	.777
N of Valid Cases	30			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

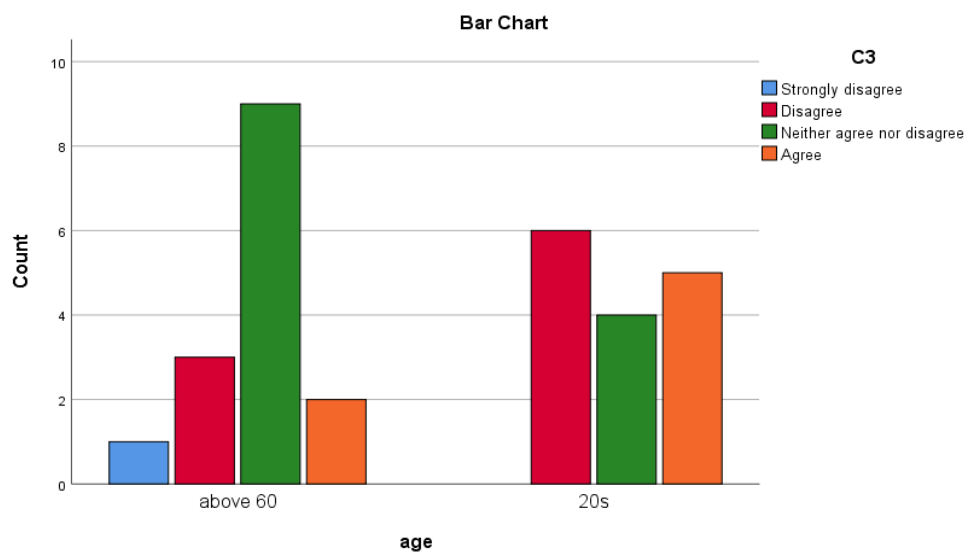


Figure 55. The attitude of C3 for the 20s and above 60 groups

Table 53. Symmetric Measures of C4

			Value	Asymptotic Standard Error ^a	Approximate T ^b	Approximate Significance
Ordinal by Ordinal	Kendall's tau-b		-.222	.161	-1.362	.173
	Kendall's tau-c		-.262	.193	-1.362	.173
N of Valid Cases			30			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

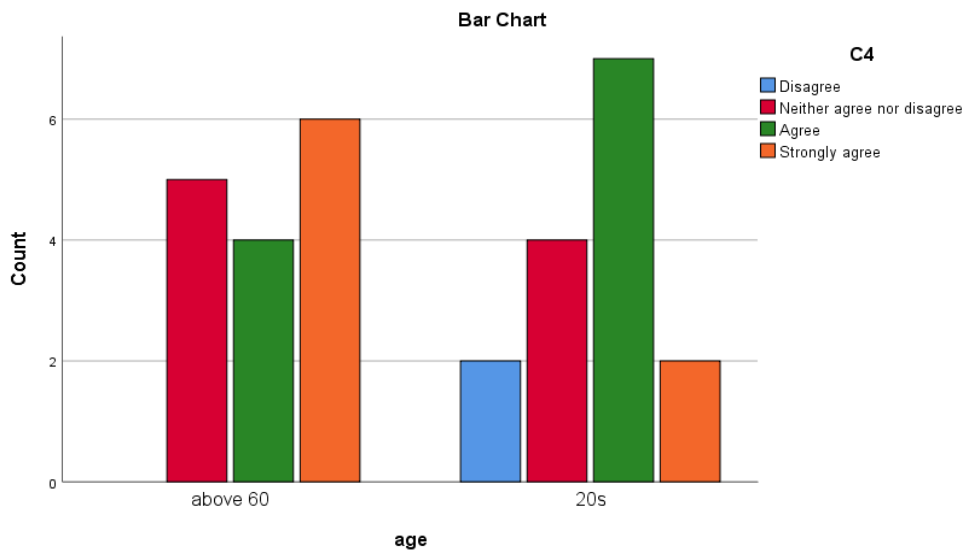


Figure 56. The attitude of C4 for the 20s and above 60 groups

Table 54. Symmetric Measures of C5

			Value	Asymptotic Standard Error ^a	Approximate T ^b	Approximate Significance
Ordinal by Ordinal	Kendall's tau-b		.026	.170	.155	.877
	Kendall's tau-c		.031	.200	.155	.877
N of Valid Cases			30			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

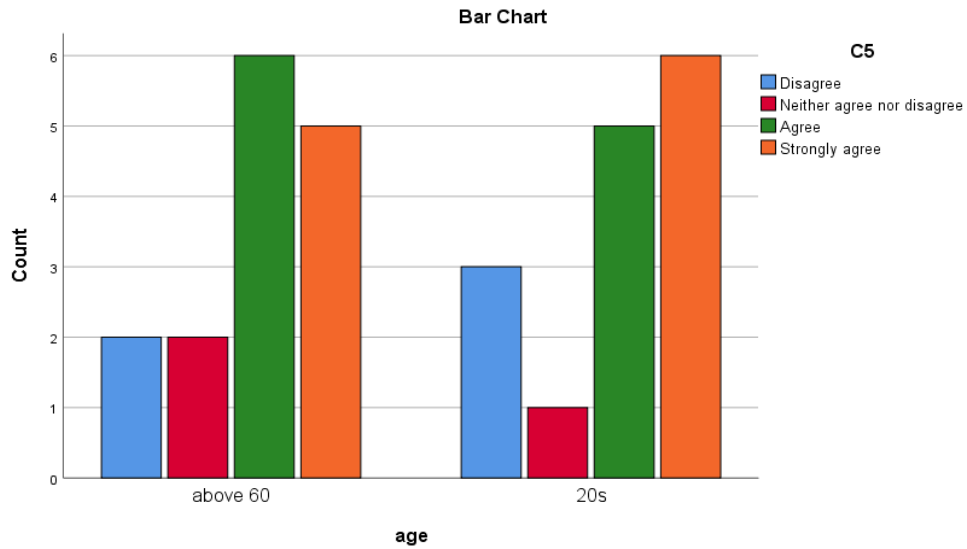


Figure 57. The attitude of C5 for the 20s and above 60 groups

Table 55. Symmetric Measures of C6

	Value	Asymptotic Standard Error ^a	Approximate T ^b	Approximate Significance
Ordinal by Ordinal Kendall's tau-b	-.135	.165	-.817	.414
Kendall's tau-c	-.164	.201	-.817	.414
N of Valid Cases	30			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

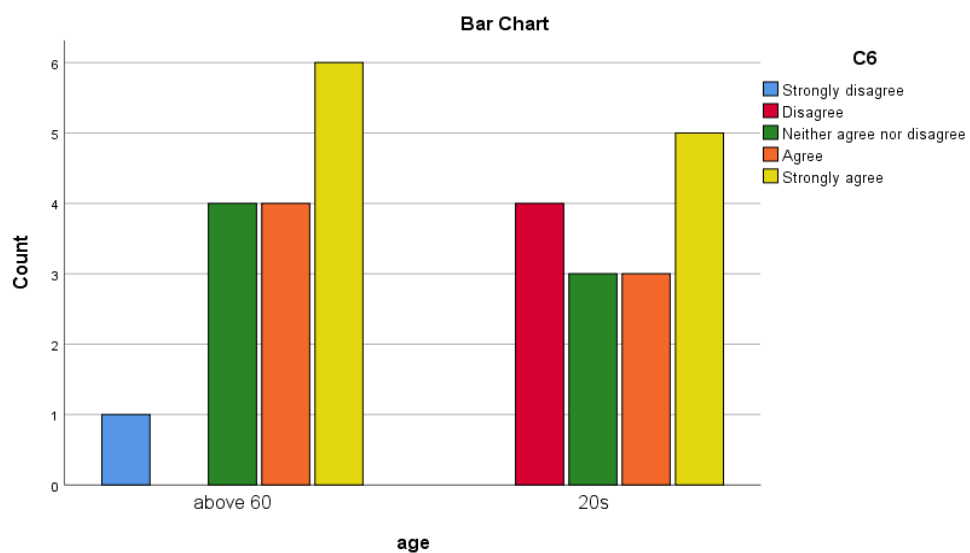


Figure 58. The attitude of C6 for the 20s and above 60 groups

Table 56. Symmetric Measures of C7

			Value	Asymptotic Standard Error ^a	Approximate T ^b	Approximate Significance
Ordinal by Ordinal	Kendall's tau-b		-.377	.143	-2.546	.011
	Kendall's tau-c		-.436	.171	-2.546	.011
N of Valid Cases			30			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

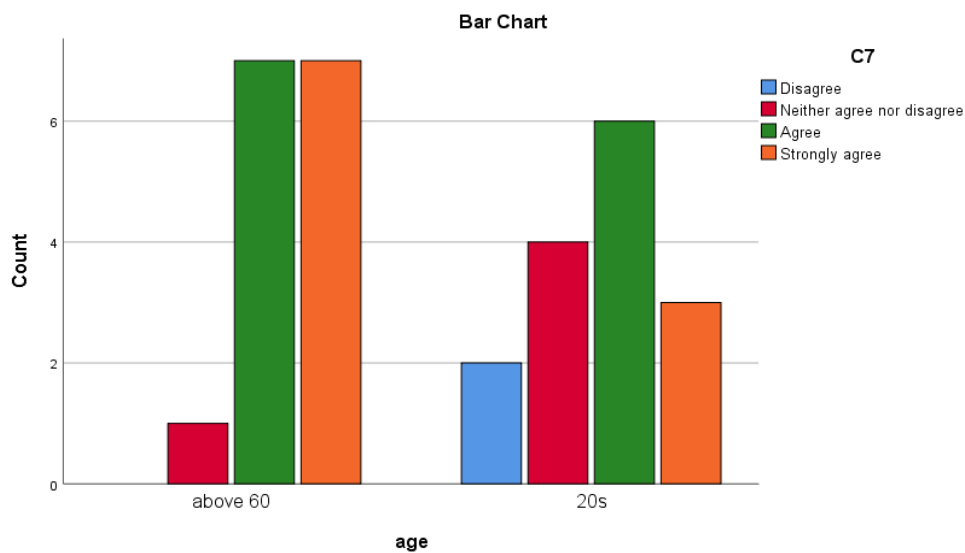


Figure 59. The attitude of C7 for the 20s and above 60 groups

Table 57. Symmetric Measures of C8

			Value	Asymptotic Standard Error ^a	Approximate T ^b	Approximate Significance
Ordinal by Ordinal	Kendall's tau-b		-.015	.172	-.090	.928
	Kendall's tau-c		-.018	.198	-.090	.928
N of Valid Cases			30			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

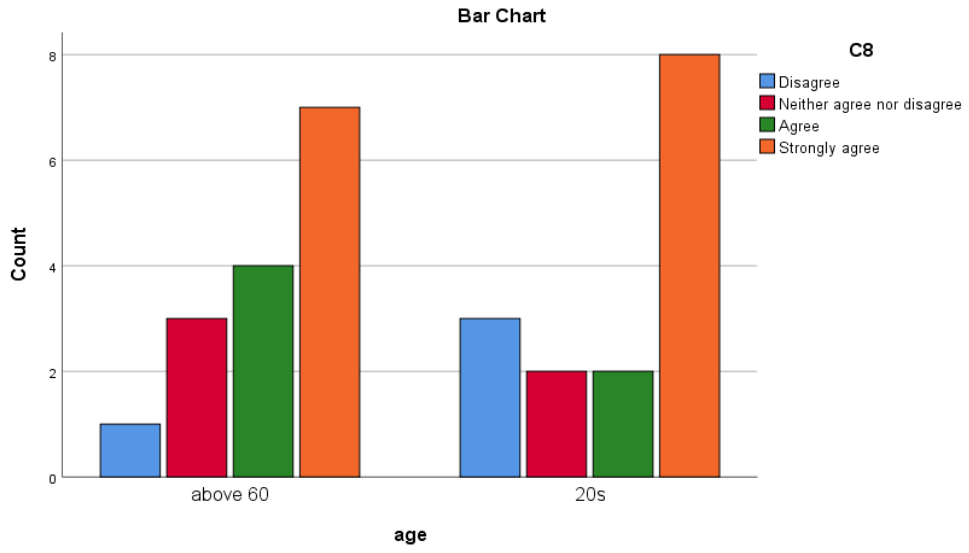


Figure 60. The attitude of C8 for the 20s and above 60 groups

Appendix 3. Interview Context

1. Television type- female, 80s, urban, 3-generation family (children & grandchildren)

*Could you describe your daily routine?

11:30 go to sleep, around 7:30 wake up to eat breakfast. After that, I go to bed again. The afternoon wakes up to watch TV, sometimes goes outside. Go to friends' homes to have a small talk, to the neighborhoods' houses. Usually, it will be once in 2-3 weeks. But this time is quite long, more than 1 month. Because it is chilly. After watching TV, around 15:00 then go there till 17:00 and come back. Go to have tea. Will not go outside with them, just stay in their home. Just having tea then comes back home. After dinner and shower, watching TV before going to bed.

*What does the frequency and purpose of going out?

Except that, did not go outside. My legs are not good, cannot go too far away. So, I was afraid to go outside. and did not go outside. Besides legs also having diabetes. Before, my legs hurt, I am not a people who like to go outside; go to travel. Go out with nothing to do so did not go outside., and now do not go out. After my sister's died, I have not gone to travel. Otherwise, I went to Taipei, Taoyuan, or ChungLi every year. But now, no one is alive, then never been there. Otherwise, I went to visit them every lunar new year. Went to Taipei to have a lunar new year.

*Besides going to visit sisters, where do you go usually?

No.

*How about the travels or activities holding by the local elderly association?

No, I have never participated in it. Cannot stand too long; stand for a while, then want to sit; walking for a while, then want to sit. So, I do not go out.

*How about the neighbors, will they come to visit you?

No, No one will come. Everyone just stays at home., and, after moving here, we have never interacted with others. Only one family, I just nod my head to them, when I see them., and the next door is not.... Not like where I lived, the neighbors went outside to sit in front of my home to have a small talk.

*Have you gone back there? How about the friends who playing Mahjong with you?

No, they are not the same group.

*So how long have you been to move here?

Around 15 years since my grandson went to 5 grades around.

*What have you do to sit in front of your house?

Just talked.

*What do you interest in?

It used to play Mahjong. But now, I have not played it for a while, because I cannot sit too long., and played the game it calls Dajale. But now, has been a while to go to friends' homes, therefore, stop playing all these games., and the legs will be sore, cannot stand for it. Around only playing 2 rounds. Just quits it for a while. After quitting playing these games, I have not visited them.

*How about walking? Waling with friends or neighbors.

No, I never go to have a walk. Just exercise at home, between the TV programs, or during ads. Just have stretch.

*If the legs were not hurt, do you want to go out?

No. Just only me, where I can go. Do not have any purpose. Just only one person, how I can go outside.

*What if someone were willing to go out with you? what would you like to go or to do?

Just go with them. Do not have any desire or request them to go somewhere. As an old person as me, so I tell them I do want to go outside. Therefore, they have not invited me.

*How about your daughter invite you to go out, will you go?

I am not willing to go out with them. Because they are not willing to have me go out with them. The other reason I do not want to go with them, which is I need to walk with them, but my legs cannot walk for so long.

*How long can you walk? 10 mins? Or 20mins?

I do not know. I have not noticed that. For several years, I have not gone out with them.

*How about walking up the stairs?

I can walk up the stairs.

*Will your legs hurt?

Nothing special. Sometimes feel sore.

*Will the TV program make you want to go out?

No, I know my legs cannot afford the walking too long. Therefore, I am afraid of going out.

*Do you have expectations about going out?

Just someone is willing to go out with me, or around the neighborhood.

2. Television type- female, 60s, urban, 2-generation family (parent), No. 3's wife

*Could you describe your daily routine?

I usually wake up at 8:30, then stretching for half-hour. After that, I wash my face, brush my teeth, and have breakfast. Then....do the laundry, it is my duty. Until noon, then my husband will cook lunch and watch TV. After that go for a nap. I am not used to going out in the morning. Then After a nap just takes the clothes in. Or another laundry needs to be done. So, these are my afternoon activities. Sometimes after dinner, I go to the gym.

*What is the specific time of going to the gym?

Not really, but usually I take the final class, 9:40-10:40. After coming back, just take a shower then go to bed.

*The time to go to the gym is between 18:00-22:00?

If there is a class I like, then I will go. Or just watching TV, having tea, and talking. If do not go to visit my sister or friends, then just having tea and talking.

*Besides going to the gym, you do not go out in the evening?

Not really, sometimes will have tea with a friend outside in the afternoon.

*What is the frequency?

Around once for two weeks.

*Anything else?

Just go out with my husband to some suburban spots. Some spots of Chiayi. Cause 2 elderly at home. Before they were sick, we went hiking. Besides, go with the hiking club, we went to Lan lake the route around it. Since we have come back that several years., and with the hiking club.

*Do not you go downstairs or park to walk?

I do not like to go downstairs, because will face some neighbors. I do not like gossip. But sometimes someone like my sisters or friends are coming to take something back, I will go downstairs first to wait for them. To see the parterre those flowers my husband planted, or some vegetable., and take the flower home. (laughing). You can see it later, there are some roses I put in the bathroom which my husband plants. I took it last night, then usually I will find a vase or something to put them in.

*Why do not you like to go downstairs?

Cause they like to ask some gossip and talking that. Also, the parents are home. You know, those gossipers like to ask some private questions. We do not like to tell them, so we try to avoid meeting them. If we are going out, we just take the elevator to the basement to drive a car or ride a scooter. Just go out directly. Try to avoid going in or out from the first floor. Sometimes you will meet elderly who are taking sunbathe or talking, then you need to say hi to them. Therefore, we just go out of the basement.

*What kind of information will attract you to go out?

I watch TV a lot. Like exhibitions.

*What kind of exhibition?

About book, 3C, technology, or interior. I like to see those. When I still work, if there has been a famous artist painting in Taipei, I took a day off to see it. By myself. Cause children needed to go to school and my husband worked. They are busy, so they could not participate in it. I especially bought the introduction manual to share with them., and told them the situation about the exhibition., and now in Chiayi, you know it is a cultural desert, we do not have lots of exhibitions here. The new art museum just opens at the end of November (2020), and the local museum of culture agency. Because while we came back here, I was working there part-time. The museum is quite boring and went there a lot of times. (laughing)

*Because they usually only have the permanent exhibition?

Yes, the permanent exhibition is only about Chen Chen PO, or some statues of monkeys or “Cochin ware”. Only the traditional culture of Chiayi, nothing special. While I was working, fortunately, I was in the performance department, there were lots of activities held by us. No matter the “Chiayi City International Band Festival”, or the new year. I was responded to information organization, such as key in, or print it. We were a quite busy department. In contrast, we can see some performance behind the stage.

*Did you said that you like to see flowers?

Yes. We went to lots of flower exhibitions, like the Wushulin orchid exhibition. Then book exhibitions, and the...interior one. My husband likes to see technology or 3C exhibitions. But there is not much in Chiayi.

*So... you like to go to exhibitions...? If you know there is an exhibition you would like to go out to?

Yes, there is a nudge. Then will arrange like... one-night or two-night trip. Then, usually once a week or two weeks, I must go to the bookstore. In the evening, if nothing is having to be done, I will tell my husband that I want to go to a bookstore. Sometimes, after that, I will have a coffee in the café. Because I like the atmosphere.

*If there is a new bookstore, you would like to go to?

Absolutely! Must see it!

*If they offer you some information, especially the exhibition or new bookstore, you would like to go out?

Yeah, yeah, yeah. I will arrange a schedule. Because my husband is at home, then I can go out for a long time. Like my daughter asks me to Tainan to go to some historic sites or have local foods, like a one-day trip.

*If someone asks you to go out, it will make you like to go out?

Yes, just tell me earlier then I can arrange it. Cause we like it (the activities), try to make it work.

3. Chore type- male, 60s, urban, 2-generation family (parent), No. 2's husband

*Could you describe your daily routine?

Wake up at 6:30-7:00, then prepare breakfast for parents and dog & cat. After that just go to the park which is near my home for walking or stretching.

*Do you go to the park every day?

Not really. Around....depends on the weather or if nothing to do then go there for walking. Long or short.

*What is the frequency?

Average... If the weather is good. Around...mmm....at least 4 times.

*When do you usually go to the park? After 8 o'clock? Or Afternoon?

Around 8:30 till 9:30. Then after coming back.... We have parterre besides the condo, the public greenfield land, then go there to organize the parterre which I adopt. Between 10:00-10:30 come back home and take a rest. Around 11:00, going to prepare lunch. Then having lunch, watching TV then take a nap. After 15:00, getting up, then talking with my wife and watching TV. Meanwhile having coffee. Then 16:30, preparing dinner. Sometimes instead of preparing dinner, going to have takeout, then will be 17:00-17:30. All most preparing the 3 meals.

*No matter is a weekday, holiday, or weekend. It will be like this every day?

All most. So, the bedtime will be 11:30-12:00.

*Do not you go out in the evening?

Yes. Otherwise, for grocery shopping then I will go to the supermarket. Not usually.

*You usually go out to the park or parterre?

Yeah, yeah, yeah...

*Besides the park and parterre, do you go out? Is there any other purpose when you go out?

For grocery shopping, walking the dog, and...visiting friends or relatives.

*What is the frequency of visiting friends or relatives?

Sometimes is once a week, sometimes is once to two weeks. You know, too frequently kind of disturbing them too much, and too often there is nothing to talk about.

*The friends are all around here?

Yes, almost around here. Just riding the motorcycle for 5 or 10 minutes.

*How about the food shopping? Is near here?

Yes, around...3-kilometer radius. Cause in this city, there are several big and small markets, depends on what you want to buy, then go to the specific one.

*The reasons of do not go to the other places or a little faraway place?

Because we need to take care of two elderly. We are worried about them, and they have chronic diseases. We are afraid of some emergency problems happening. So, we do not go too far away. Their heart and lung functions are not so good.

*Before you need to take care of your parents, what kind of information will appeal to you to go out?

We went hiking with the hiking club. Or a one-night trip.

*Is the one-night trip activity with any club?

No, just us (with wife), we drove by ourselves. Or maybe a two-night trip. We just went to some places. Booked a hotel then had a trip. Then went (hiking) with the hiking club, just one day trip. Entry-level hiking is just leisure hiking.

*What was the frequency of hiking?

mmm... Once two weeks.

*The trip you went, did you get information from somewhere or just have been there before?

Normally, we will have an afternoon break once or twice a month to go to the suburban to relax. We prepare parents' dinner first then go for dinner outside, then come back. Trying to not leave home too long. Some spots around Chiayi city.

We usually go to "PanTienYen" for a walk, or JenYi lake, or PaiHo for lotus during the flower season. Then, having dinner. But before we go out, we must prepare the dinner for parents then we can set the mind to go out, to have dinner.

*What information will appeal to you to have the idea of going out.

I want to see the lotus, it must be flower season. Would like to see lots of flowers. But recently, there are few and few flowers planted. The additional value that "Purging Cassia", it also the flower season. We like the atmosphere when walking through the tree tunnel. Around April, it will have "Pink Cassia". Then May will have lotus and "Purging Cassia" not the only lotus.

*Is it usually these kinds of nature spots?

Yeah.

*Is any kind of information that may appeal to you more to go there?

Such as remind me of the flower season. Tell us the time of the lotus festival, it will be more people and some activities. Usually will be a weekday, but if there are any special activities will go there.

*Does it every time that you and your wife go out together?

Yes, cause life is around taking parents, we need to stay home a lot.

*How about grocery shopping? Do you also go out together?

No, because we apply the supply home caring. There is a social worker and volunteers who come to the home to help parents shower. There must be someone at home. My wife needs to answer the door. Every Monday, Wednesday, and Friday. They usually come at 9:00 leave at 10:30. If my wife is sick then I will stay home to await their coming. So there have someone stay at home.

*Do you have expectations about going out?

Not really.

4. Chore type- female, 80s, suburban, 3-generation family (children & grandchildren)

*When do you usually get up?

5:30 get up and start to prepare breakfast, and lunchbox for son will 6:30. Next, do the laundry and clean vegetables till 8:30. Then the clean house sometimes goes to market with husband by motorcycle, come back around 10:30.

*How often do you go to market?

Around.... Twice a week. Then sometimes will go to visit my brother when I go to the market. But not every week., and sometimes some friends or relatives will come and talk. Even forget the time, then did not prepare lunch.

*Then....what did you eat when you forget to cook?

Like noodles or dumplings.

*How long do you usually talk? Till 12:00?

Sometimes 12:00, sometimes 11:30. Or around 10:00. If I sit in the front yard, they see me then they will come to talk to me.

*How about the afternoon?

Just watch the news, then go to take a nap and wake up around 14:00.

*How long do you watch the news?

Form 12:00-13:00. Then 13:00 go to take a nap.

*How about the afternoon?

Just do some chores or sit in the front yard. Nothing special.

*Do not you go out for a walk or something?

Sometimes the weather is cool then I go for a walk.

*How long do you walk?

From home to the corner, it is around 30 minutes.

*Sometimes? How is the frequency?

It is hard to say, sometimes every day, and sometimes....no. I cannot walk too far away, but I try to walk almost every day.

*Just to the corner?

Yes... My waist is not good, so I cannot walk too far.

*Is waist or feet pain?

Waist pain.

*Nothing else? Did not you just go visit another brother in Taichung before?

Yes...Taichung the second brother, a couple of days before. I think is the last month to visit them.

*How often do you go to visit them?

Quite not often, because needs to take a taxi to there. Afraid of taking a bus. Even though I take a bus, I still need to take a taxi. Still far away (from the bus stop). I would rather take a taxi at the first.

*Anything else? Like local elderly club Travel?

Yeah....

*Is it every month?

No, they only hold the trip twice a year. September and April. Twice a year.

*Anyone else will invite you to go out for travel?

It is rare.

*Do the most travels you participated in 3-4 times a year?

Around that....It is rare that someone else to invite. Last time we went to Yilan. The daughter of my husband's sister invited me.

*In all the trips you went, are they all the package tours?

Yes...the elderly club or local association.

*Anything else?

Sometimes go to the vegetable garden to see my husband plants vegetable. (laugh) Otherwise, I cannot do the work in the garden.

*How do you go there?

By the electric bicycle.

*Does the waist pain make that you do not want to go out?

Not go out, then just stay at home relaxedly. If did the work, it will pain. Cannot do some heavy work.

*Besides the waist, does anything make you do not have the urge to go out?

Not really, just had eye surgeries. (Cataract, two weeks ago)

*Before the surgery, did you go out for a walk?

Yes..., I went for a walk. It was not able to see at all, just cannot see clearly. If there were someone, I could tell who the person is until very close to me.

*You only go out with someone inviting? And go out with your husband?

Yes, I go with my husband now.

*How about before?

I went travel (alone) rarely. Like the temple near there, they have activity-JingShiang or RauJing. The lunar calendar, 8th March. The god goes to another temple. In the March (lunar calendar).

*Do you go every year?

Yes, every year, but not this year(2020). Because of the disease (COVID-19). Then afraid to go.

*To where? Any specific place?

To the....., north (Taiwan) and south (Taiwan). Yilan and Pingtung, the Lingbian.

*Do they go to two places at a time?

No, just one place a year. They take turns. Besides this year (2020) did not go, I have gone every year.

*How long does it take in one trip? One day? Two days?

In one day. But if go to Pingtung, then two days. Just go to the temple, have lunch, then come back immediately.

*Do they depart very early?

Yeah... they depart very early, then arrive home very late.

*Would you like to go out?

No..., my daughter always says let us go to Japan. But I do not want to. I am afraid of taking an airplane.

*Why?

Because when I take aircraft then my ear is just like plugged. Like fufufufufu (describe the ears are plugged feeling) and headache a lot. Like, go to some higher places., and go to travel, if someone provides coffee, I cannot drink it, or the almond tea, I do not like it.

*How about somewhere nearby? Such as Taichung?

Taichung is ok. I go to some faraway place, then the ears might be plugged. Feel weird. Last time I went hiking to Chitou Forest Recreation Area. (sigh) When I got to their higher place, I felt uncomfortable. The ears just were plugged, like honhonhonhon (describe the ears are plugged feeling). When others were talking, I could not hear what they said clearly.

*You do not feel that you want to go out?

I would not go out.

*How about someone invites you (to go out)?

I just do not have much feeling to go out. I do not like to visit other's homes.

*Why?

We are free, but we do not know they are also free, too. Because we are farmers, we kind of, like...do not have time to go other's home. Otherwise, like...rainy day, or kind of free. Or the farmer is not so unbusy to visit others.

*Are they still that busy?

Only the elderlies are still farming. They need to be weeding, planting, and harvest. They outsource some works, but some works that they still need to like.... Fertilizing by themselves.

*What if not go to others' home, how about like the other places?

Yeah..., sometimes like Sunday. My granddaughter or daughter asks me to supermarkets, some malls or....

*Like these kinds of places that you would like to go to.

Yeah..., or my daughter has a day off on Saturday then Saturday. Like this weekend, they were saying to go to Carrefour. I said you guys go.

*Why will not you like to go?

If I would not like to go, she complains... You need to go out if you sit too long then you would like to have brain damage. They say I sit too long at home; I might have brain damage.

*Usually, the family asks you to go out then you go out?

Yes, usually is like that.

5. Hobby type- male, 70s, suburban, 3-generation family (children & grandchildren)

*Could you describe your daily routine?

Around 6:30, then ancestor worshipping. Washing face and brushing teeth then having breakfast around 7:30.

*What do you usually do in the morning?

Morning.... I feed the chicken after that go to the vegetable garden. From 8:00-10:00. Then come back home to watch TV from 10:00-11:00. After watching TV, just to wait for lunch.

*When do you have lunch?

12:00.

*Do you take a nap after lunch?

Yes, around one and half hours.

*Do you take a nap while you just finish lunch?

Mmm... after lunch, I usually watch the news till 13:00, then go to bed until....14:00 or 14:30.

*What the next?

Next....sometimes go for exercise and sometimes go to the vegetable garden to take a look.

*Where do you go to exercise?

Just go for a walk around here.

*How long do you walk?

Around an hour....or a little more.

*So...you come back home at 16:00 around then what the next?

Yes....and wait for dinner.

*When is dinner time?

Around....18:30-19:00 while watching TV with a specific program.

*Then, after dinner, you just watch TV until bedtime?

Yes, between 10:30-11:00.

*What is your purpose and frequency of going out?

The vegetable garden is every day., and hospital if I get the appointment.

*What is the frequency of going to the hospital?

1-3 months a time.

*How about walking? Is it also every day?

Not really, just around 3 times a week.

*Do you go to visit friends or relatives?

Not much, sometimes people will come. We do not have the routine to visit them, in the contract they also usually do not come here. For some special purposes will call them first, then go to visit them.

*How about travel, like an elderly club or local association?

Yes, we do., and the retirement club activities. Like have a dine together and travel, and the elderly club's travel twice a year. I am also a council member in the mail agency retirement club so I need to go to meet a quarter to Nantou City.

*What is the frequency of the retirement club's travel and dine?

The frequency....soonce in three months. So once a quarter., and the dining together is three times a year. In three festivals. The lunar new year, dragon boat festival, and moon festival.

*Besides these, anything else?

Go to visit a friend.

*What is the frequency? Like how many times in a month?

When specific occasion, like sick or...others... to concern them. The relatives need to concern about each other.

And sometimes go to buy some flowers or exhibitions.

*Where do you go to buy flowers? In the flower market? Or...

A lot of places, markets, or shops, or nursery ground. Sometimes to buy and sometimes just look around. Sometimes we go to Sun Moon Lake or Taichung, but irregularly. Because we have senior citizen cards, we can take a bus for free. So, we also go to Chingjing Farm for a walk and so on. While cherry blossom season, we take the bus to watch it. Free bus. Take a free bus to Wushe to watch the flowers. It's quite good.

*Usually, will be flower season to go out?

Yes, mostly flower season. Normally, when I feel bored, then go somewhere like SiTou for hiking.

*What is the frequency?

Irregularly. The senior citizen card is good.

*What if there was no senior citizen card, then you would not go out so much?

Yes. Because of the benefit then we will use it. If there was no senior card then, the amounts of going out would be fewer. Sometimes the flower season we will ask friends to go together. 3-4 people go to scenic areas is also good, irregularly.

*How did you know the time of flower season?

From the news or see the calendar. Or newspaper. It is quite interesting.

*What if there is another way that can tell you when is the flower season? Would you like to use it?

Of course, yes! That is good because we lack the ways to get information. Then if this kind of app or website will be great. Usually, just from the newspaper, also like exhibitions, food exhibit, travel exhibit and so on. Any kind of exhibition.

*Where do you usually go?

Taichung.

*How about the exhibitions in Taipei?

Quite a few, once...or twice only., and the flower exhibition in Taipei, we stayed there for 3 days.

*You usually get the information from TV or newspaper?

Yes. Or....someone tells us or invites us to travel. Like "we are going to watch flower, are you going?" Sometimes we participate in that. Or children take us to temple, such as the lunar new year or....Lugang or Dajia to TingHo temple to worship.

*Usually, will be the lunar new year that children take you there by car?

Yes, the other time we take a bus to Dajia or Lugang. It is near here.

*How about the Jingshang?

Sometimes. Not often. Like this village temple, usually will go. Or...the other place someone to ask me, I reject them more. Because the age is quite high, the weather is too hot then will feel not good.

*So, the weather will impact your willingness to go out?

Yes. Too hot or too cold also influence too., and now the disease too. Do not have the willingness to go out.

6. Television type- female, 70s, suburban, 3-generation family (children & grandchildren)

*Could you describe your daily routine?

I usually get up at 5:00., then brush my teeth and wash my face. After that, sometimes I watch TV first, a program for introducing Mainland China from 5:00 to 6:00 but recently I did not do that, cause it is quite cold. When the show finished, I prepare breakfast. From 6:30-7:00, I read the newspaper roughly. Then have breakfast. Around 8:00, I do the laundry. After the laundry, sometimes I watch TV about finance news and stock or do the chores, like clean the house or front yard once two days till 11:30. After 11:30 prepare lunch for around 30 minutes. 12:00-14:00 watch news or TV and have lunch at the same time. After 14:00 go to take a nap for about 1-1.5 hours. After a nap, I sometimes go to the vegetable garden or do chores. Around 17:30 start preparing dinner, then around 18:30 start having it. After that watching TV and do the chores (clean the vegetable just harvested from the vegetable garden). Around 11:00 go to bed.

*How often do you go out?

Sometimes go to visit friends or relatives and go to retirement club activities, flower viewing, or exhibitions with my husband (No.5). Inviting friends to flower viewing because we share the same interests. We always go out together., and I like planting flowers. The flower season coming we usually go to flower viewing.

*Do you be influenced by the weather?

Like this kind of weather, I usually do not go out. Like a chilly day. Spring or Autumn is more suitable for traveling.

*What kind of information would trigger you to go out?

Like the free bus for the elderly or...mmm

*How about the exhibition that you mentioned? Is it free?

Usually half the price after 65-year-old. But the national museum is free. Then go to the Chitou Forest Recreation Area is ten NT dollars for personal insurance.

*Do you usually go to this kind of noncharged place?

Not limited, usually will be something that I am interested in, like food, flower exhibition. This kind of exhibition must go, even if in Taipei. Like the flower exhibition for 3 days, we have been there., and we did not have breakfast at 5:00, we took the taxi to buy the tickets just for going in first. It is winter and drizzling at that time.

*Where did you get the information to know about this kind of information (flower exhibition)?

From newspaper. Getting the information from the newspaper. If the exhibition that I am interested in, then I might go.

*Do you have any other media that let you receive the information besides TV or newspaper?

We usually get some information from my daughter. She usually prints out Google Maps or opens the websites for me.

*Do you have a smartphone?

We have but we do not have internet package from phone company only the phone call and some basic functions. I usually use a computer to use "Line" because the font size is bigger. Because it (font size) is too small for the elderly. My son-in-law set it up on the computer. So, for the elderly, it must be a bigger font size.

*Are there other people inviting you to go out?

My sisters or those friends will invite us to go out.

7. Chore type- male, 60s, suburban, 2-generation (children)

*Could you describe your daily routine?

I get up at 4:00, then wash my face and brush my teeth., and at 4:30 go for a walk till 6:00 if the weather is good. Around 4 kilograms. After that prepare breakfast and do the laundry till 8:00 almost every day. All the chores are done. I go to the vegetable garden to grub up weeds till around 11:00-1130. Then prepare lunch and have lunch with watching TV till 13:00. If there is something that needs to be done then do it, or I karaoke at home once in two or three days.

*What kind of "something" must need to be done?

Like going to visit friends or friends will come, and sometimes running errands. When I have free time then karaoke at home. After 3:00, do the chores, then prepare dinner. 18:00 have dinner. Go to shower, then watch TV or the news. After news time, clean the kitchen then go to bed around 20:30.

*Besides going for exercise, do you go out?

To visit friends, sometimes relatives. (Not very often) Usually on the weekend.

*Anything else?

Just like these, my interest exercises.

*Do you do exercises by yourself? Or any other company?

Sometimes meet up with someone whom I have known than have a small talk for 10 minutes then turn back to the walking route. Just like a punch-in.

*Besides these things above, why do not you go somewhere else?

If someone asks me to go for travel, I usually go before (8-10 times a year). Now less than before., and sometimes funeral and wedding ceremony. But it is not regular. I would like to go out, but do not have time. Because I need to do the chores.

*Have you asked people to go for travel?

Of course! Sometimes I ask my girlfriend to go out when her work is finished. To some near tourism spots. But I seldom go for travel alone. One person goes out is not possible, only go to visit friends than might be by myself.

*Where do you get the information? From the local community? Elderly community?

I almost participate in local community activities, like travel.

*How about family? Will they ask you out?

Quite rare. It is not the time because I can go out by myself. They will not think of that.

I just do not have time, or I would like to go out. All kinds of chores and errands. Just start to do that, then several hours pass.

Like do and hang up the laundry in the morning, then take the laundry in and fold it., and prepare 3 meals a day. Times fly. Spend a lot of time.

*If the news said there is flower season or exhibition, would you go?

Sometimes, if I have time. Someone tell me some interesting then I might go for it. Just do not have time.

*Do you go alone?

With my girlfriend. I seldom go out alone.

*So, if someone asked you to go out, would you go?

Yes, I almost say yes. But it needs to have a destination, I do not like to go out without a purpose.

8. Hobby type- male, 70s, urban, single-generation

*Could you describe your daily routine?

I usually wake around 5:00, after brush teeth and wash face, go to the vegetable garden till 8:00. From 8:00-8:30 have breakfast, then neighbors or friends come to my house to have tea (almost every day) till 10:00 and watch TV till 11:00. I usually have lunch from 11:00 and watch TV (drama) till 15:00. After watching TV, I go to vegetable again for around 3 hours. Around 18:00 go home to have dinner, then watch TV and take shower around 21:00, then go to bed.

*How about going out?

I go out very few times. Go to the doctor once a month and go to visit friends twice and 3 times a month. Not really would like to go out.

*Why do not you go out more?

Because neighbors always come to the home., and do not have a specific destination, also a little be afraid of going out too far. Also, the vegetable garden needs to take care of.

*Why?

I am afraid of going and having an accident. Not really have the motivation. I do not have a destination. Because I had cancer before. Although, it is healed at all but still afraid of driving, then reducing the frequency to go out.

*How about the elderly association's activities?

No, I would not like to go out with that. Not interested.

*How about the other days or like the new year?

New year? Usually, just visit families or relatives. No furthermore.

*How about kids? Do they ask you out?

Not real. Because they are married, and a little far away. They cannot ask me out.

Usually, visit 2 bigger sisters then go home.

*How about the frequency of visiting friends or relatives?

Twice a month. If I still owned a car, I have could visit them more. Like the rainy day is not a problem. I do not have the car now, hence I would not like to go out.

*Why do not you have the car now? Did you sell it? Or another reason?

The traffic is so busy and too complicated now.

*How long did you not drive?

Almost a year.

*While you still own a car, did you go out more? Like travel or flower viewing?

No. Usually visit friends, families, or relatives. Just visit them.

*What kind of information will make you want to go out?

Friends or Family ask me.

*Do you have any expectations about going out?

Not really.

9. Hobby type- male, 80s, suburban, 3-generation (children & grandchildren)

*Could you describe your daily routine?

Wake up at 5:30 then wash face and brush. Before going to the vegetable garden, I drink milk. Then go to vegetable garden from 6:00 till 7:00-7:30. To harvest vegetables. After that come back home to have breakfast till 8:00, then go to vegetable garden again to give the water to vegetable. Around 11:00-11:30 come back and have lunch and watch TV. 12:30-13:30 take a nap. After napping, I go to the vegetable garden till 17:30. Then come back to have dinner and watch TV (news) till 19:30-20:00, depending on watching the weather forecast or not, then go to bed. Also, participate in the elderly association's activities.

*Are the elderly association's activities frequent?

Once a year.

*What do they usually do in the activities?

Gate ball, watering speed contest, card games.

*How about going out? Do you go out often?

Traveling about 4 times a year. For the religious activities, community, and the elderly organization activities., and go to the market with wife (No.4) once or twice a week in the weekend morning around 8:00-10:00. About once per 10-15 days to visit friends or relatives.

*What is the reason that makes you do not go out more?

Do not have time. I need to go to the vegetable garden every day. The vegetable garden needs to take care of, and no one can cover me. I know how to go there but I do not know how to come back. If there is no company, I am afraid of going out too far away. Also, the traffic information is hard to understand. I only know some friends' and relatives' houses.

*Is the plating vegetable important to you?

But do not have a vegetable to eat., and it also can be exercise.

*What kind of information will make you want to go out?

Someone else asks me for going out, I would like to go out. I do not have a destination or purpose alone. But I go to visit friends. I do not have a specific place to want to go.

*How about the TV or other information source show something that flower season or something else?

My friends asked me out before.

*Did you go?

Yes, to LuGang. To have an oyster omelet. They took me to take a bus. To have a practice for taking a bus.

*Is this kind of thing often?

Not often, quite a few. They are also busy.

*You do not know how to take a bus?

I do not know how to come back home.

*Do you have any expectations about going out?

The same, someone asks me to go out. I would like to go out with friends and family.

10. Television type- male, 80s, suburban, single-generation

*Could you describe your daily routine?

I usually get up at 6:30, then wash my face and brush my teeth. Then go to buy breakfast. Around 7:00 to have breakfast and watch TV (news) till 8:00 and go to the vegetable garden from 8:00-9:00 to harvest or water the vegetable., and sometimes take a nap because I just had eye surgery (cataract). If I feel not very well, I just take a rest. Then come back home to watch TV (mostly stock and news) and at 12:00 have lunch. At 13:30 take a nap for about half-hour. Then go to the vegetable garden again, then come back to watch TV. Sometimes take a walk or have a talk with neighbors and friends come to visit till 18:30 come home to wait for dinner time. Then 19:00 watch TV go to bed around 20:30, sometimes listen to wait for the mood to sleep. On the weekend, I usually go grocery shopping with my wife or visit my kids by car.

*How about the going-out frequency?

I usually visit friends' or kids' houses once or twice a week. Buy some foods to visit my kids and participated the religious activities before the knee surgery.

*How about the kids, will they ask you to go out?

No, no, no. I can walk too far. So, I cannot go out to travel. Or I had made rice about 20,000 m2 before.

When did you retire?

From 13-80.

*Because of the knee surgery, then you retired?

No, that is 2 years ago, and I had surgery last year.

*Did you travel before?

No, being a farmer is not possible to travel.

*Never? Like one day or two days?

Then yes. I have been near spots. To visit friends, sometimes they will ask me to go to their houses. Before the meal then I leave.

I drove to lots of places.

*Do you still drive?

Yes, I just drove my daughter to DangSui (about 213 kilograms). That I have been several times.

*How about the TV or news present the information about flower season or new spots?

I never follow that to go. I have been to several places to do business, so I am not interested in that kind of information. About the 70s, I have been to all the spots of north or east of Taiwan by car.

*How often did you go?

Once a year. Not only me, but I also had company. But I drove.

*Why did you go over those places? Did someone tell you or from any sources?

My friends said that they want to go, then I drove them there. Or I did not know the place. If no one mentioned that I would not know about it.

*How about kids? Do they ask you out?

They are busy with their business., and I lend the money to people, sometimes they live far away like Taoyuan or other places, when I am going to collect the interest of the loan, I visit my kids.

*Have you asked your wife to go out?

No. Because I usually go out to collect the interest of the loan I lent. Or not really have the time to go out for travel.

Just pass by the place or I am not going to travel on purpose.

*What is the reason that makes you do not go out more?

I had eye surgery this year and knee surgery last year. Therefore, I am still waiting for the recovery. Even though I have rent out the rice field, I still have a vegetable garden.

*What kind of information will make you want to go out?

Friends or family ask me for going out.

*Do you have any expectations about going out?

Not really. I have been to lots of places before and my body condition is not recovered yet.

11. Chore type- female, 60s, suburban, single-generation

*Could you describe your daily routine?

Wake up around 7:00 then prepare breakfast and chores, like laundry, grocery shopping until about 9:00. Then I go to my parents' house to visit them (4-5 times a week) or do the chores left. I go back home at 10:30, then prepare lunch. About 12:00 have lunch and watch TV till 14:00, then take a nap not really fall asleep sometimes just lay down. About 2 hours, I wake up to go for a walk around the house, watch TV, or stretch an hour. Start preparing dinner, about 18:00 have dinner, wash dishes, and watch TV till 21:00 then go to bed and listen to the radio. About 21:30-22:00 fall asleep.

*How about the going-out frequency?

I come to my parents' house 4-5 times a week. Go hiking once a month before my spine surgery. I usually go out to the market for grocery shopping. Or my kids ask me to go out. Twice a year the elderly association's travel and take a walk 3-4 times a week. Sometimes you sit too long, also feel tired and bored.

*When you get the information, will you say that you want to go there?

Not really, Because I do not have a car. I need someone to take me there. I do not know how to drive.

*What are the reasons that make you go out less?

I had spine surgery last year and I do not know how to drive. Also, my husband does not have the willingness to go out.

*What kind of information will make you want to go out?

My kids asked me to go out on the holiday. Sometimes I would go out with them.

*Any kind of expectations about going out?

I would like to flower viewing. Near Lantern Festival, there is a river. By the riverside grows the garden cosmos a lot. To take a walk with friends.

*I saw that you watch the stock, does that make you not want to go out?

It does not matter. I watch it on the phone. So, I can watch it everywhere.

12. Chore type- female, 70s, urban, single-generation

*Could you describe your daily routine?

Usually, I wake up around 4:00 and go to the vegetable garden then go to the market to sell the vegetable just harvested or do the chores till 9:30 and take a rest to watch TV or while watch TV doing some simple chores at the same time. About 10:30, go to prepare lunch, then 11:30 have lunch and watch TV. 12:00 go to take a nap for about one hour. From 13:00-15:00 watch or continue the chores. I usually go to the vegetable garden again or walk around near the house or watch TV till 17:00 and prepare dinner then have dinner at 18:00. From 19:00 watch TV and go to bed at 20:30.

*How about the going-out frequency?

went to visit friends or relatives, sometimes to my daughters' house while my husband has had a car.

Or my kids sometimes would ask me out for near tourism spots or shops.

*What are the reasons that make you go out less?

I want to take a rest rather than go out and going-out makes feel makes me tired. Kids and grandkids will come back on the weekend. I do not have a car.

*How about news or TV, the information will make you want to go?

No, I do not feel want to go.

*What kind of information will make you want to go out?

Do not really think about going out.

*Any kind of expectations about going out?

Or I need someone to ask me to go out. Sometimes friends ask me to go out. I will go.

*Before your husband got cancer, will you two go out more?

No. He does not like to go out. He usually grows vegetables and I take them to market to sell vegetables.

* How long do you start selling the vegetable?

I have worked in the factory until 60. Before I retired, usually give vegetable to neighbors or friends. After retired, then I go to the market to sell vegetables.

*How about before selling vegetables, did you go out more?

Not really., and after I retired, I have nothing to do. Then start selling it.