CHALMERS
UNIVERSITY OF TECHNOLOGY

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Exploring Cultural Differences in UI Usage

A Comparative Study of Swedish and Japanese Culture

Master's thesis in Computer Science and Engineering

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Abstract

The purpose of this master's thesis is to explore the impact of cultural differences on the comprehension of user interfaces, with a focus on Swedish and Japanese cultures. Additionally, the aim is to formulate design guidelines that ensure mobile user interfaces are culturally suitable for these two cultures. The research methods employed in this study included a review of previous research to supplement theoretical knowledge. The methodological approach adopted was the design thinking approach, which encompassed various methods such as a survey, focus groups, and affinity diagrams. By examining Swedish and Japanese cultures understanding of mobile user interfaces, similarities, and differences were identified. These findings were synthesized into a set of design guidelines. The guidelines serve as a valuable tool for designers seeking to design mobile user interfaces that are sensitive to the cultural contexts of Sweden and Japan. However, further work is needed to evaluate the design guidelines.

Keywords: Interaction design, user experience, user interfaces, cross-cultural design, cultural differences, Sweden, Japan, guidelines.

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Madeleine Ridderstråle & Louise Östling Sigfridsdotter, Gothenburg, 2023-06-06

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Introduction

In the digital age, the design of digital products and services is increasingly targeting global markets. The term *digital products* is an umbrella term that includes various applications across multiple domains, such as mobile banking, e-commerce, and social media platforms [1]. It is therefore essential to mention mobile phones since it is the device making digital products possible. Mobile phones, commonly known as smartphones, have grown significantly in popularity in recent years, revolutionizing people's daily routines [2]. The versatility of mobile phones has enabled them to be viewed as handheld computers which allow us to use them for multiple purposes [2]. The increased usage of mobile phones can be seen in mobile traffic worldwide. According to a report by Ericsson [3], the average monthly mobile traffic has increased substantially from 3.9 exabytes in 2015 to 32 exabytes in 2019, indicating a widespread adoption of mobile phones worldwide. The report predicts a continued increase in mobile traffic, with monthly usage estimated to reach 288 exabytes by 2027 [3]. The mobile phone has not only provided practical functionalities but also transformed people's social behavior, transitioning from a technical aid to a social object [4]. Not only is the mobile phone used for calling and sending text messages, but the smartphone has also made it possible to become social through different social media applications. The projections from Statista suggested that by 2022, social networking sites would attract approximately 3.96 billion users. This growth is largely due to an increase in mobile device and social network usage in previously ignored markets [5].

These trends indicate that mobile phones are here to stay and likely to continue to become an increasingly integral part of modern life. Therefore, examining how digital products' user interfaces should be adapted to the user is relevant. It is crucial for companies to ensure good design since users are sensitive to poorly designed apps, with many alternatives readily available [6]. However, as companies aim to reach a global audience, cultural differences must also be considered to succeed in a highly competitive market. To retain users, localization of the design is necessary. Thus, it is essential to determine when localization is required and when a global design is effective [7].

TikTok is an example of a mobile application that has successfully reached a global audience without significant localization in its user interface. Initially released in 2016 [8], the app has rapidly become one of the most popular social media applications worldwide with 1.051 million users in 2023 [9]. In early 2022, Swedish TikTok

users aged 18 and above were estimated to be 2.85 million [10], and corresponding 15.19 million Japanese users [11]. This raises the question of why the application has become so popular in such a short time. One reason for TikTok's success lies in its content and the personalized algorithm. The short, endlessly looping video clips require minimal effort from the user and have an addictive quality [12]. Another example of a company that has succeeded globally is McDonald's. However, compared to TikTok, McDonald's has applied localization and uses different applications with different designs for their users worldwide, as seen in Figure 1.1. Though, it is important to remember that McDonald's sells fast food and has another purpose compared to TikTok. This could indicate the reason for having different applications. Regardless of whether we design buttons differently or design a global algorithm, the design must make sure to cater to the users' needs [13]. In turn, one's culture is a great part of being human and products have to match one's culture [14]. Consequently, regardless of the global nature of an application, it is relevant to further examine the level of required localization to detect sensitive areas of the user interface that require adaptation for different cultures. By addressing these considerations, designers can ensure that products resonate with users from diverse cultural backgrounds. Thus, this work will cover relevant topics such as culture, user experience, mobile user interfaces, and cross-cultural design.

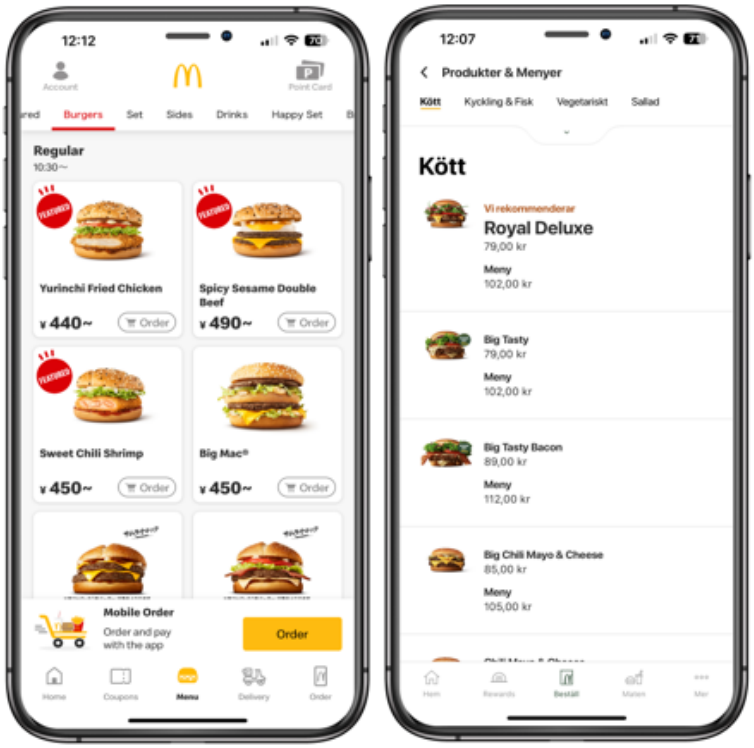

Figure 1.1: McDonald's UI in Japan (left) and Sweden (right)

1.1 The Golf Company

The stakeholder of this study is a global golf company with a mobile application used for playing virtual games in golf. Due to a non-disclosure agreement, the company

will stay anonymous and therefore be referred to as "the golf company" in this study. The company is specialized in creating new experiences for their users at the golf range and has developed a technology for tracing the golf ball using cameras at the range. The company's users can get access to and play virtual games while being on the range via a mobile application or installed monitor screens owned by the company. The company's mobile application was created in Sweden and is used in over 30 countries around the world. Today, the application's user interface is mostly the same regardless of where the user is located and relies on translations rather than using culturally specific designs. The designers in the application development team are located in Sweden and experienced a lack of understanding of how to design for Japanese users. Therefore they reached out to the authors of this study.

1.2 Aim and Problem Statement

It is imperative to conduct more research in this area to gain a better understanding of how companies should adapt their digital products to the diversity of cultural backgrounds. Hence, this study aims to explore and analyze the impact of cultural differences on mobile user interface design, providing valuable insights for designers to enhance their digital products' user experience. The cultures focused on are Swedish and Japanese. The goal is to be able to create a set of design guidelines for Swedish and Japanese users that can be adapted by designers when developing user interfaces.

Therefore, this master thesis project has the following problem statement:

Creating guidelines for designing mobile user interfaces for Swedish and Japanese users.

To answer the problem statement two research questions have been formulated:

1. How do cultural differences between Swedish and Japanese users affect their understanding of mobile user interfaces?
2. What guidelines can be found useful for the identified cultural differences?

1.3 Limitations

There are several limitations to take into consideration for this research. Firstly, this research is limited to mobile user interfaces, and therefore the design guidelines will be mostly applicable to mobile user interfaces. However, some guidelines might be able to be applied to interfaces concerning web applications as well, e.g. guidelines concerning color symbolization.

Secondly, the golf company operates in over 30 countries. It would be interesting to compare and explore all the different cultures but concerning the scope of this study, it becomes too broad. However, this work could give a foundation and serve as a pre-study to a more extensive study in the future.

Since this research explores cultural differences, it is important to define what makes an individual belong to a culture. The definition of belonging to the culture for the participants participating in this research is to live in either Sweden or Japan and define themselves as part of Japanese or Swedish nationality. The reasoning behind this requirement is that the participants need to have experienced the culture by living in their respective countries. However, since it is important that they live in the respective countries this constrains the research to utilize online tools for conducting the research.

Furthermore, the English language will be used to communicate with the Japanese participants. For the Swedish participants, both English and Swedish will be used to communicate, to ease the interaction during the data collection. This is because Swedish is the authors' first language.

This research will be of a qualitative character. One limitation is therefore that the results can not be generalized to the country's whole population since it will only be representative of a small sample size of its populations.

1.4 Ethics

To avoid ethical issues during this research project it is important to address what could be problematic before the study begins, both in the methodological process and in the research in general. Ethical aspects to consider in this research project are informed consent, deception, and privacy. Before agreeing to participate in a study, participants must be informed about its purpose, funding, as well as its potential risks and benefits. This is known as informed consent. The participants' identities should be anonymous and information about the participants should stay hidden. The participants should be free to opt out of the study at any time [15].

Conducting a survey as a method for data collection can raise ethical issues if the research is sponsored by a third party. It is dependent on the sponsor's level of investment in the outcome and should therefore be considered with caution to avoid ethical issues [15]. As mentioned, this research has a stakeholder but the company has no direct profits to make out of this research. Instead, the company views this research as an essential source that can give valuable information to support their designer's work when doing updates in the user interface of their mobile application software. Factors such as the selection of the sample, phrasing of questions, and analysis and reporting of data can also affect the results and can be manipulated to produce favorable results. To ensure the integrity of research, it is crucial to scrutinize the methods and procedures used in the survey [15].

Another ethical issue that could arise is if we do not handle cultural differences in a sensitive way, there is a danger of accidentally stereotyping. Fiske [16] argues that people typically seek other people who are similar to themselves and can have a negative hostility toward people that are not perceived as members of their own in-group. Therefore researchers need to be aware of their own cultural background and stereotypes associated with it to not fall into biases risking stereotyping participants [16].

2

Background

This study establishes connections between various domains, including culture, user experience, mobile user interfaces, and cross-cultural product design. The subsequent chapter aims to provide an overview of the Swedish and Japanese cultures to uncover and explore similarities and differences. This will serve as a background to the research area regarding cultural differences and how it affects user experience. This chapter will also further explore the concept of user experience and how it relates to mobile user interfaces, to better understand how cultural differences may affect user experience. Lastly, the chapter will briefly touch upon the practice of cross-cultural design, designing digital products while considering the diverse cultural backgrounds of users.

2.1 Swedish and Japanese Cultures

To explore the cultural differences and similarities between Swedish and Japanese users, it is essential to understand the concept of culture. Evolutionary psychology defines culture as socially transmitted knowledge acquired through interaction with or observation of others [17]. Culture is a phenomenon that is dependent on one's environment, and cannot be represented by a single individual. In a group, people often act according to their culture, which consists of various layers such as values, rituals, heroes, and symbols. Values refer to what is learned as acceptable, rituals are events such as celebrating specific holidays, heroes represent people who set an example for desired behavior, and symbols are entities such as eating habits [18]. According to Hofstede, culture is defined as *"the collective programming of the mind that distinguishes the members of one group or category of people from another."* [19]. Since culture directly affects how people live their lives [17], it can affect their understanding of digital products differently.

Baron et al. discuss similarities and differences regarding behavior in Sweden and Japan [20]. Similarities found are that both Swedes and Japanese take off their shoes before entering someone's home. The study also found that it is not common to say *Excuse me* when wanting to pass someone in the streets. Instead, both Swedes and Japanese are silent and walk their way around the person. People in Sweden and Japan are more quiet in public places compared to other cultures. Japanese children are taught from an early age not to engage in *meiwaku behavior*. One example of behaviors the term includes is speaking loudly in public spaces and bothering

others. Similarities in Swedish culture can be found in the unwritten Swedish law called *Jantelagen*. This term means that individuals should not view themselves as better than others and bragging is not a desirable behavior [20]. Furthermore, Baron et al. also discuss that there are socio-political differences between Japan and Sweden. In contrast to Japan, Sweden is a welfare state. In Sweden, the law called *allemansrätten* means that outdoor areas are public spaces even if the land is owned by someone [20].

Culture and user experience (UX) are closely connected because culture plays a significant role in shaping how people perceive and interact with digital products. As mentioned, culture influences people's beliefs, values, and behaviors [18], which in turn affects their expectations, preferences, and needs when using digital products. For example, the color schemes, imagery, and language used in a product's design may need to be adapted to align with cultural norms and preferences. Failing to account for cultural differences can result in products that are ineffective and not as popular on the domestic market [7].

2.2 User Experience and User Interface

The term user experience (UX) is defined by Nielsen Norman Group as encompassing *"[...] all aspects of the end-user interaction with the company, its services, and its products"*. This means that it is a total experience that covers all aspects of user-product interaction [21]. User experience is the user's reaction, emotions, and perceptions both before, during, and after the interaction with a product, system, or service. Therefore UX should be considered as dynamic and when evaluating UX one should take notice of all the stages [22]. Additionally, UX can be viewed from three perspectives. Firstly it can be viewed as a phenomenon that can give an overview of what UX is and what it is not. Secondly, as a field of study where the phenomenon is explored. Lastly, UX can be viewed as a practice that can evaluate and deliver designs with the purpose to enable a specific UX [23]. With that in mind, one cannot design a user experience, however, one can design *for* a user experience [24].

User experience and user interface (UI) are closely related and connected as they both play a significant role in the design of digital products (Figure 2.1). In a user experience, the user interface is centered around the visual components such as screens, icons, buttons, and interfaces, in other words, the elements that let the user interact with for instance a product [25]. Beyond mobile user interfaces there are a variety of interface types such as graphical, web-based, voice-controlled, and gesture-based interfaces [24]. One example to help understand the distinction between UX and UI is to think of it as shopping at a store with a self-checkout solution. When you are in a store everything you experience forms your user experience of the store. This is because everything in the store contributes to the store's UX. The temperature, the size of the aisle, and the way it is organized. Finally, when you pay for your items through a self-checkout solution you interact with the store's user interface which therefore is a part of the store's UX [25].

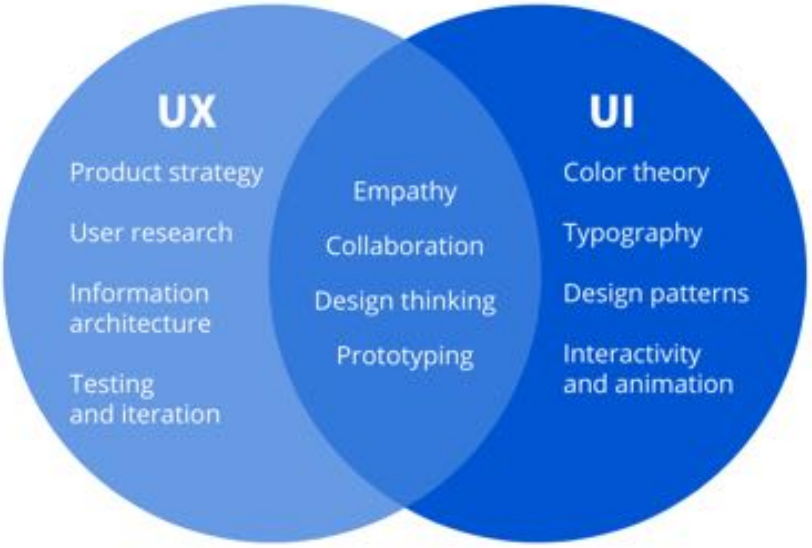

Figure 2.1: User experience and user interface [26]

In summary, UX and UI are interconnected and collaborate closely in the design process to create a cohesive user experience. A well-designed user interface can improve the overall user experience, while a well-designed user experience can ensure that the user interface meets the needs of the user.

2.3 Cross-cultural Design

Cross-cultural design is the practice of designing or adapting products, services, and systems that are meant to be used by people from different cultural backgrounds. It involves understanding and taking cultural differences into account to create products that are usable and effective for a diverse range of users [7]. Cross-cultural design is particularly important in the globalized world where products and services are increasingly accessed by people from different cultures [27].

Ideally, it is advisable to have a customized version tailored to the user's specific culture. This is often a common practice among big global companies. However, there are situations where it may not be practical, cost-effective, or essential to have localized designs for every culture, especially for smaller businesses. In such cases, products or services mainly rely on translation and provide multiple language options. Since there is no universal solution when it comes to modifying designs for global audiences, researching both general and contextual cultural differences is essential to make sure what type of design changes is needed [7].

Because of technology's fast development, the world has become more connected and designers who fail to consider the diversity of users when designing interfaces run the risk of losing them [28]. The UX can be affected by a discrepancy between the interface design and the user's cultural background, as users' needs and preferences may vary depending on their culture [29]. Consequently, designers must be cultur-

ally aware to create appropriate user experiences [30]. It is equally important for designers to be mindful of their own cultural background when working with cross-cultural products [31]. Cross-cultural products are designed to be user-friendly and applicable across cultural boundaries [32].

3

Literature Review

This chapter introduces theories and research conducted in areas relevant to the research field being explored. The chapter presents the complexity of culture in UX and UI, UI elements that this thesis explores, Hofstede's cultural dimension theory, and Hofstede's dimension in relation to UI in order to start answering the research questions.

All the literature presented in this chapter may not directly concern mobile user interfaces or Swedish and Japanese cultures. The literature can still contribute insights into relevant aspects of how previous studies have tackled the subject of cross-cultural UX design in relation to digital products in general.

3.1 The complexity of culture in UX and UI

An interesting aspect of culture is its influence on UX in digital products. De Souza et al. [14] investigated the effects of cultural differences in five socio-economic macro-regions of Brazil on the UX of web-based interfaces. The results showed that cultural differences were notable and correlated with differences in UX in terms of the number of colors and information displayed on the interface. Participants in the North, Northwest, and Midwest regions preferred more colors and information, while those in the Southwest and South regions preferred less [14]. When examining the results of cross-cultural studies, it appears that cultural differences continue to exert an influence on UX. Reinecke et al. [33] argue that it is not possible to design interfaces appealing to users globally. They advocate designing culturally adaptive systems to generate interfaces that match cultural preferences which can generate an increased user experience [33]. A study by Yan et al. [34] also strengthens this and proposes that UX should be designed with different cultures in mind and create different UX for different cultures. Moreover, a study by Alexander et al. [35] found significant differences between Australian and Chinese users and concluded that culture-specific designs can positively impact user performance and satisfaction. Developers and designers are advised to consider cultural differences when designing for users with different cultural backgrounds [36]. However, cultural differences are complex. The study by Alexander et al. [35] also showed that Chinese users are more familiar with Western designs, compared to Western users' experience of Chinese designs, and may find them less disruptive on a website designed for a Western audience which can question the need for culture-specific designs. Though,

Alexander et al. [35] means that cultural differences influence UX, the extent of this impact is still unclear. The impact is dependent and determined by which cultures are in focus, their characteristics, and their similarities, due to their complexity. Despite this, research in the area indicates that making specific designs based on cultural differences is relevant for increasing user satisfaction [36], [35].

The methodology used to assess cultural differences in UX is also critical in determining the need for specific design options or modifications. The majority of UX methods used to identify useful design solutions are developed within a Western cultural context, which raises the question of their applicability when having participants from diverse cultural backgrounds. Because of this, it is not only suggested to adapt the design of an interface, it is also convenient to adapt the methods used [37]. Conducting research cross-culturally can be problematic and demands careful consideration. Since this study aims to research one country from Western culture and one from Eastern culture, it is reasonable to discuss research based on Western, Educated, Industrialized, Rich, and Democratic (WEIRD) societies. The assumption has been that WEIRD subjects are represented globally and findings from WEIRD sample studies are universal. However, this has been shown to not be the case [38].

Moreover, it is not certain that Western methodologies can be used without adaptation for user-centered design when participants are not from Western cultures [39], [32]. A first example is Westlund [40], that found methodological challenges in his research when conducting cross-cultural comparisons. He found differences and problems in using the same method on the participants in both countries since the method postal-based survey was appropriate in Sweden but not in Japan due to privacy restrictions. This led him to adapt his research method [40]. A second example of how research methods can be affected by the participants' cultural differences is from a study by Walsh et al. [32]. They used Hofstede's cultural dimensions for analyzing their data. They found cultural differences in how people respond to the research method and that there are cultural differences in the participant's experience of the product. Participants from collectivistic cultures, such as Asian cultures, answered the question "My Smartphone is best for..." by reflecting on the self through other people. While participants from individualistic cultures, such as Western cultures, reflected based on their own needs [32]. Another challenge of conducting research about cultural differences is to reach the relevant target group. An example of how to tackle the obstacles of having participants located in different countries who speak different languages is shown in a study by Alexander et al. [35] where a remote usability experiment was conducted. They found that an effective way to test and identify key usability attributes of website design was by finding two representative user interfaces and translating them [35].

It is important to consider cultural differences in the development of interfaces [36]. In addition, it is important in research when choosing what methods to use. It has been shown that designers seem to miss tools that can be applied in practical work. This is both because of the complexity of culture but also because the influence of cultural difference is rather seen as theoretical than practical [41]. A common tool to use for designers is the seven fundamental principles of design [42]. However, it is important to address that cultures and technologies change, which can question the

principle's capability to embrace users cross-culturally. Norman [42] states that if the designer adapts the fundamental principles of design to new activities, methods, and technologies, these can still serve their purpose for the twenty-first century. However, since we have passed the twenty-first century, new adaptations might be needed for cross-cultural design tools.

3.2 User Interface Elements

It is essential to identify the fundamental components of user interfaces [43]. When building a mobile application the user interface is the part that is focusing on the aesthetics and visual elements [44]. The user interface consists of several components which, according to Marcus [43], are necessary to identify to understand how they could be influenced by cultural differences. According to Norman [42] a good design is characterised by discoverability and understanding. Discoverability means if it is possible to understand what and where the actions are and how to perform them. The latter, understanding, refers to if it is possible to understand what and how concerning the artifact [42].

The main components of a UI are metaphors, the user's mental model, navigation, as well as appearance which includes colors, sounds, and typography [43]. As mentioned, the term localization in user experience refers to the process of adapting a UI to international users [7]. The visual elements can have different meanings depending on the user's cultural background which means that localization involves more than translating language in a UI [43]. This section will now introduce the relevant UI components metaphors, mental models, navigation, interaction, aesthetics, colors, and language that this research will examine further by focusing on the influence of cultural differences.

Metaphors. Metaphors play a crucial role in both languages and thought, as they establish associations that serve as the foundation for how people conceptualize and discuss abstract ideas [45]. Metaphors in language work in the same manner as they do in a UI. A common example of a metaphor in an interface is the icon "delete" which looks like a trash can and stands for the concept "deletion" [43]. This "delete" icon matches the mental models, how we think, and how we speak about *throwing* away something.

Mental models. Norman has discussed natural mappings and how they can differ between cultures [42]. One example Norman has brought up is the differences between cultures in how people view time. This can affect the mental models people have about how things are mapped in digital products. For example what people expect will happen when pressing an "arrow forward" icon. Certain cultures perceive the past as being in front of them, while for other cultures, the past is seen as behind them. Similarly, there are cultures that perceive the future as being behind them, whereas others view it as being in front of them. Others view time as a horizontal line, but which way does it go? Is the future to the right or to the left? The way people answer this question can be connected with the direction they read in. People from cultures where the written language is read from left to right often view the

future to the right. The way people read and the way they view time affect the user's expectations of an application and what is natural for each user depends on their culture [42]. It is recommended to adjust the UI elements in regard to the language reading direction [43]. Not having a correct mental model of a user interface can lead to user errors. *Slips* and *mistakes* are two categories of user errors. User errors caused by a user being on autopilot are called slips. Mistakes occur when a user has a faulty mental model of an interface and a goal that is unsuitable for the situation [46].

Navigation. The navigational structure is another aspect when designing user interfaces. The navigation in a mobile application is what helps the user reach their goal in an intuitive way with the help of, for example, menus and different control panels [43]. For the navigation to be intuitive it is essential to understand the users' mental model so the users do not have to wonder what the buttons will do and what they will navigate to [47]. Designers are recommended to avoid clutter in mobile applications and to be aware of visual hierarchy. An example to give the users visual relief is the hamburger menu since it can hide several navigation options. However, hiding these options might lead to the user not discovering them [47].

Interaction. The interaction part of UI is the communication between a user and a system [43]. The user gives the system some sort of input, which can be for example through the keyboard, and the system provides feedback. The feedback can for example be that a button changes state, generating a sound or flashing lights. For feedback to work in a UI, it has to be immediate or users will give up. If the feedback is designed badly or is too much it can be worse than no feedback at all. Bad feedback can result in distractions and cause human errors. Feedback is necessary but not if it gets in the way of the user [42].

Aesthetics. First impressions are important and happen quickly [48]. Studies have shown it takes about 50 milliseconds to form an attitude about what we like or not from our first impression. It has also been shown that these attitudes are consistent. Since the visual appearance is the first thing users become aware of when encountering a mobile application, its aesthetics might be more important than its perceived usability [49]. However, just because something is perceived as aesthetic does not mean that it is also perceived as usable [50]. An interface has to match both the user's aesthetic taste and usability requirements [33]. What makes aesthetics complex is that the perception of what is perceived as pleasing is subjective and the user's cultural background also plays a role in what is perceived as aesthetic and usable [33].

Colors. It has been shown that visual elements influence the user experience and can assist as a component for visual usability in a UI [51]. Moreover, the study showed that color, compared to black and white, was an important visual factor in mobile applications regarding the participant's personal perceived preferences. It also found that color can contribute to other areas such as organizing information in mobile user interfaces. However, the study did not consider cultural differences and their results can mainly be applied to Western culture [51]. Other studies have examined what specific colors are preferred in different cultures, one study found

that cultures in Canada, Germany, and Japan preferred grey and blue color schemes over yellow in websites [52]. While another study found that in Japanese culture the color blue is associated with villainy and the color yellow is in East Asia associated with terms of royalty, imperial, and honor [53]. The use of colors in UI design is influenced by cultural differences. This means that colors often are used in different ways since they have different underlying motives depending on the culture [43].

Language. The user interface's visual attributes are a crucial factor that impacts the user experience. Culture plays a significant role in determining the acceptable level of visual density presented in user interfaces. It has been suggested that some cultures are more tolerant of higher visual complexity than others due to their written language. Japanese languages contain symbols with many strokes might explain why Japanese users are more accepting of visual clutter than what is typical for Western countries [43]. Asian languages can be read in several directions and in Japan people read from all directions. However, the most common reading direction in Japan is left to right and up to down. While Swedish is the majority language in Sweden which people read from left to right [43].

3.3 Hofstede's Cultural Dimension Theory

There are several cultural models in the human-computer interaction (HCI) community, one of them is Hofstede's cultural dimensions theory [31], another is Halls high and low context culture framework [54] and one is Trompenaars cultural dimensions [55]. These models can be used as guides for user interface designs [31]. Further, these cultural models can be a way to understand cultural differences which can then be helpful for classifying groups of people [56]. These models differentiate cultural groups, for instance in their way of thinking and acting, from other cultural groups [31]. However, Fitzgerald found that several cultural dimension models appear to be aimed at describing cultures more than working as guides or models for how to best design interfaces for cross-cultural usage [57]. One model to explore further is Hofstede's cultural dimension theory.

Hofstede conducted extensive research in the field of culture and its affection on values in organizations. However, his model is prominent to use when studying cultural challenges in user interface design [56]. The cultural dimensions theory is a framework that identifies cultural differences between countries from six dimensions of national culture. Using this framework is the first step to identifying segments unique to specific cultures and determining their percentage of representation [7]. It should be noted that the dimensions are relative and not absolute, as all individuals possess unique characteristics. Thus, cultures can only be understood by making comparisons between them [58]. The dimensions are described as follows:

1. **Power Distance Index (PDI)**. This dimension pertains to the extent to which individuals of lower social status within a society are willing to accept and anticipate an unequal distribution of power. The dimension asks the fundamental question of how a society handles inequality between people. In cultures with a high PDI, hierarchies in which individuals have a designated

place are generally accepted. However, in societies with low PDI individuals try to equalize hierarchies and the distribution of power and individuals often require justification for inequalities that may exist.

2. **Individualism versus Collectivism (IDV)**. Individualism is symbolized by individuals having the expectation of mainly taking care of themselves and their closest family. The self-identity for this dimension is often defined in terms of "I". Collectivism, on the other hand, is represented by individuals having the expectation of taking care of their family members and relatives, and the individual belonging to a group rather than standing alone. It is often with the expectation of unquestioning loyalty to members of the group. The self-identity is therefore often defined in terms of "we".

3. **Masculinity versus Femininity (MAS)**. A society with a high score on the masculine measurement is represented by individuals who value achievements and self-confidence. It is often combined with the aspiration of material rewards that reflect success and strong gender roles. Its opposite, a feminine society, is when individuals instead prefer cooperation and value having a quality of life. Instead of longing for material success for the individual, a feminine society is more inclined to orientate by consensus.

4. **Uncertainty Avoidance Index (UAI)**. This dimension refers to the level of comfort that individuals of a culture feel in ambiguous or unpredictable situations. Societies with a high level of uncertainty avoidance try to minimize such situations by implementing strict laws and regulations. The core is in how society deals with uncertainty if it controls it or lets it be. Societies with a high UA-Index can be perceived as controversial with their beliefs and ideas among the individuals in that society. In contrast to societies with weak UA-index, it is often perceived as more liberal and not as harsh principles for the individual's beliefs and ideas.

5. **Long-Term Orientation versus Short-Term Normative Orientation (LTO)**. For every culture, it is important to balance the preservation of the past with the challenges of the future. This dimension is a measurement of the degree to which a culture prioritizes this balance between these two entities. Cultures with a high score adopt a more practical approach, valuing thrift and investment in modern education as a means of preparing for the future. On the other hand, societies with a low score on this dimension tend to hold on to traditional norms and view societal change with a sort of skepticism.

6. **Indulgence versus Restraint (IVR)**. Indulgence is a measurement of how much individuals in a society are allowed to gratify basic natural human drives and be delighted in life. However, a society that is characterized by restraint is more strict with social norms that suppress individuals in different ways.

Figure 3.1 shows a comparison between Sweden and Japan measured from Hofstede's six dimensions. From Figure 3.1, it is clear that there is a difference between Sweden and Japan in all of the six dimensions, although some differences are more significant than others. The most prominent difference can be seen in the MAS dimension

where Japan has a score of 95, whereas Sweden only has a score of 5. A society is defined as being masculine when gender roles have a clear distinction between them. Because of this, it affects women and men in separate ways. For example, in Japan, female managers are uncommon. Also, a woman's chance to get married drastically decreases if she has a career of her own. In contrast, Sweden is ranked as one of the most feminine societies in the world and individuals express the same tender values independent of gender roles [59].

Sweden and Japan also differ on the dimension called Individualism versus Collectivism (IDV). Sweden is a noticeably more individualistic society compared with Japan and it has been found that European individualistic societies tend to have a stronger connection to Information and communications technologies (ICT) and use internet services, e.g. shopping online, more frequently than European countries with strong collectivism [59]. However, one can question whether this statement reflects todays rapid development of ICT. Japan scores lower than Sweden on the IDV dimension but statistics about weekly online shopping activities from 2022 reveal a barely noticeable difference between the two countries regarding online shopping habits [10], [11]. Hofstede also states that countries that have done an economic shift can develop a culture to become more individualistic [59]. This might explain the similarities in the usage of ICT despite Japan being more collectivistic than Sweden. At the same time, the IDV is also in a country's history and has unique traits in family, education, and workplace which are more persistent than habits connected to ICT [59].

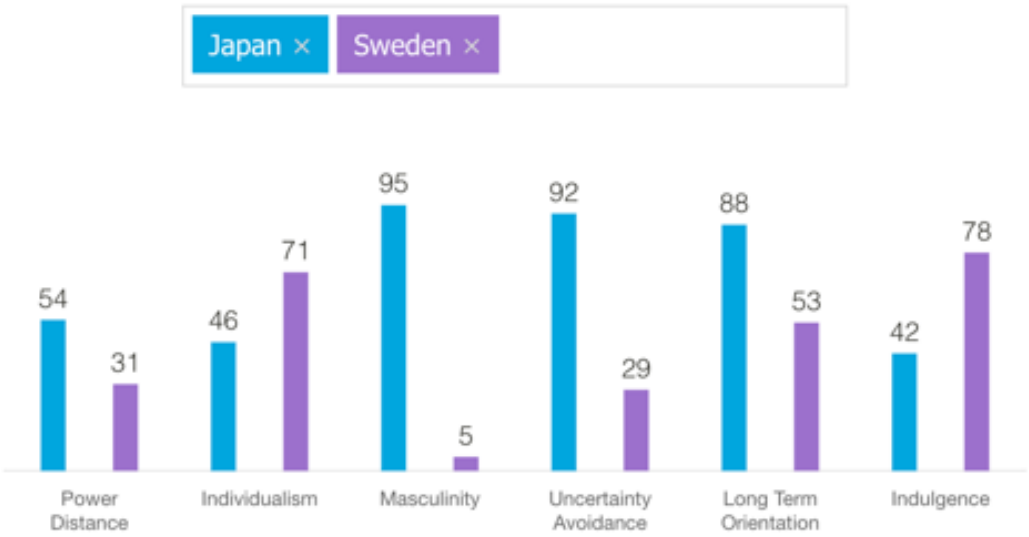

Figure 3.1: Cultural comparison between Japan and Sweden from Hofstede's 6D Model [60].

3.4 Hofstede's dimensions in relation to UI

From Hofstede's definition of the cultural dimensions, Marcus [43] formulated guidelines for integrating the dimensions into the design of user interfaces. These guidelines are supposed to identify segments in interfaces that are connected to each dimension to easier interpret what differentiates interfaces culturally from each other. However, a guideline for the sixth dimension Indulgence versus Restraint is not formulated from the report by Marcus [43]. The guidelines are described as follows:

1. **Power-distance.** Interfaces that are characterized by a high power distance index should offer well-organized access to information, highlight the importance of leaders, explicitly enforce security measures, and emphasize authority. For low power distance index sites, the opposite approach should be taken.

2. **Individualism versus collectivism.** Interfaces designed for individualistic cultures should utilize images of consumerism and materialism to indicate success and should feature content that emphasizes personal achievement, innovation, and controversy. These interfaces should also use images of youth, action, and individuals to attract the user's attention. Personal information should not be required. In contrast, interfaces designed for collectivist cultures should use images of socio-political agendas to signify success and should feature content that emphasizes group achievement, tradition, and history. These interfaces should use images of experienced and wise leaders and groups of people to attract the user's attention. Official slogans should be used, and personal opinions should be discouraged.

3. **Masculinity versus femininity.** Interfaces with a masculine orientation should prioritize fast and efficient results for specific tasks, with a navigation structure that enables user exploration and control. The content should imply a challenge for users to conquer something and include explicit differentiation between genders and age groups. Graphics and animations should have a practical purpose. On the other hand, feminine-oriented interfaces should use aesthetics and poetic language to attract users' attention. Gender roles are less emphasized in such interfaces, which prioritize mutual cooperation and idea exchange.

4. **Uncertainty avoidance.** User interfaces that exhibit high levels of uncertainty avoidance should prioritize minimizing user error by offering only essential menu options, straightforward help features, and a navigation structure that prioritizes preventing users from losing their way. Colors, sounds, and images should be employed to strengthen the conveyed messages. Conversely, interfaces that are low in uncertainty avoidance should motivate user exploration by offering a wide range of menu options, as well as by utilizing colors, sounds, and images to provide supplementary information.

5. **Long-term time orientation.** Interfaces that focus on short-term goals should provide users with a structured and efficient navigation system to enable quick task completion. Rules should be established to ensure the reliabil-

ity of the information, and content should be based on facts and beliefs that are certain. Conversely, interfaces with a long-term focus can have a more intricate navigation style and content, as users are willing to spend more time in order to understand the information. Long-term-oriented websites should provide practical and useful content and can use relationships to ensure that the information is credible.

As presented Marcus [43] developed guidelines for integrating Hofstede's cultural dimensions into the design of user interfaces. It should be noted that the utilization of Hofstede's cultural dimensions theory [58] to handle the subjective aspects of cross-cultural user interface design has been criticized as being rigid or stereotypical [61].

4

Methodology

The following chapter aims to describe the methods used during the research process and declare why these methods were chosen. During this thesis, the design thinking framework was used to guide the work process in three stages and its connected phases.

When conducting research one can have a qualitative or a quantitative approach or a combination of both. Quantitative research involves the collection of numerical data, which is then analyzed using statistical methods. In contrast, qualitative research gathers non-numerical data. Its emphasis lies in exploring subjective experiences, attitudes, and opinions, often through techniques such as observation and interviews [62]. To address the research questions in this work, it was deemed suitable to engage in research that seeks to gather individuals' opinions and insights in order to explore their understanding. Therefore, to effectively answer the research questions, it was more advantageous to employ qualitative research methodologies rather than quantitative ones.

We took inspiration from methods previous research in the area of cultural differences, UX, and UI has utilized. The findings from Walsh et al. [32] indicate that conducting a remote online sentence completion survey is a convenient and efficient method for collecting data from users around the world. Further, Walsh et al. [32] collected qualitative data and used the affinity diagram method to analyze the data they collected from their survey. The research conducted by Wash et al. [32] inspired us to utilize a survey to reach our respondents in Sweden and Japan and to analyze our qualitative data with the affinity diagram method. In a prior study, focus groups were employed to gain a deeper understanding of the user experience of a library website [63]. This study determined that focus groups serve as a valuable research method for collecting both quantitative and qualitative data. Furthermore, the focus group discussions yielded novel insights into how users interact with the website and their overall user experience [63]. The research conducted by Conrad et al. [63] inspired us to utilize the method of focus groups to gather insights from a discussion about user interfaces.

4.1 Design Thinking

This research followed the design thinking approach during the process. Design thinking is described as an ideology associated with a set of practices [64]. It is

an iterative and expansive process that supports finding the right solution by first defining the problem [42]. The core of design thinking is that it is a highly effective process for problem-solving when having undefined or unfamiliar research areas or problems [65], [64], [42]. The design thinking approach involves three key stages mentioned as understand, explore, and materialize. These are further broken down into six distinct phases: empathy, definition, ideation, prototyping, testing, and implementation, which help guide the design process, see Figure 4.1.

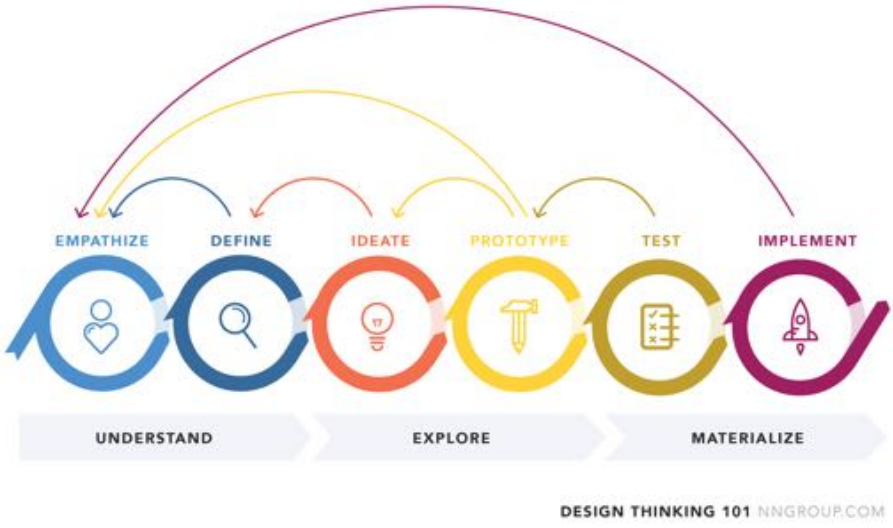

Figure 4.1: The Design Thinking Approach [64]

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This research utilized the design thinking approach for exploring cultural differences based on two reasons. Firstly, cultural differences are complex and influenced by a variety of factors [35]. Therefore, an iterative approach is more suitable for exploring and understanding the problem space. Secondly, the design thinking approach is flexible and can be adapted to meet the specific needs of the research [64]. Instead of following the design thinking process as a step-by-step method, it is beneficial to use it as a scaffold that can assist in achieving research goals, as suggested by Gibbons [65]. However, the prototyping phase has been excluded from this research since the goal is to develop design guidelines and not an artifact. The application of this research approach is explained in Chapter 5 Execution.

The methods used in this thesis are described and categorized depending on which design thinking approach stages they were used in. In the understanding stage, the methods of literature review and conversations with the stakeholders were used. The methods used for the explore stage were brainstorming, competitive analysis, and dot voting. The methods used in the materialized stage for data collection were a survey, focus groups, and pilot tests. Lastly, for analyzing the collected data in the materialized stage the methods of affinity diagramming and thematic analysis were used. The following chapter provides an explanation of each stage and its connected phases, and how these were adapted to better support our research goals.

4.2 Understand

This section will account for methods used to understand the problem space. The methods used in this stage are a part of the phases empathize and define, to explore the problem space to be able to further define a problem definition. It will also provide an explanation of the methods of literature review and conversations with the stakeholders.

4.2.1 Literature Review

Literature reviews can be used to get a deeper understanding of the topic as it gathers and summarizes existing research on a topic [66]. By conducting literature reviews, it is possible to identify gaps in knowledge and define what areas could be supported by further research [67]. The aim of the literature review was first to discover this thesis's direction of research. Later on, the literature review aimed to explore and understand the research area.

4.2.2 Conversations with the stakeholders

Having interviews or ongoing conversations with the stakeholders during the whole design process can provide valuable insights. However, it can be especially helpful during the understanding stage. The stakeholders often have specific knowledge about their processes and users which can be useful to take into account to understand the problems more clearly. Communication with the stakeholders can also ensure that the result is usable for the relevant stakeholders [68]. This method was used in order to ensure that the research would generate usable guidelines for UX designers. Therefore we found it useful to have an ongoing dialog with the golf company.

4.3 Explore

This section will account for methods used to explore different ideas and options. The methods used in this stage are a part of the phase ideate. This section provides an explanation of the methods of brainstorming, competitive analysis, and dot voting.

4.3.1 Brainstorming

In the ideation phase of the design thinking process, brainstorming is a common method for designers to use in order to solve a given problem. Brainstorming is an exploratory method that is advantageously used in the exploratory stage of the design process. What is beneficial is also that it is relatively free in its dimensions of how to conduct the method. A common rule in this method is to go wild with the ideas and not think too much about their applicability. Since the design process is iterative brainstorming can be used in several stages. The essential criteria are that the designers have a predetermined problem that needs to be solved [69]. There are

other methods to use in the ideation phase, however, we preferred to use the brainstorming method since it is easy to adjust to the given situation. We experienced that the method was helpful when we needed to efficiently generate ideas.

4.3.2 Competitive Analysis

Studying the competitors through different methods can improve design decisions and help UX designers to come up with better product solutions [70]. There are several reasons for doing a competitive analysis, one of them is to learn about innovations and trends [71]. The focus of this method is mainly on design and interaction. A competitive analysis is an important part of the research exploratory stage. The purpose of a competitive analysis can be to support user research. The method can also help UX designers understand and empathize with their users better. When beginning a competitive analysis it can be good to set and understand your goals [72]. There are different methods for analyzing competitors and one of them is a comparison chart, with this method it is possible to compare similar products or features to each other [71]. To continue the competitive analysis it can be helpful to create a table of information with around five to ten competitors [72]. When doing a competitive analysis, one can consider the competitors, the designs, and user reviews. This information gathered from the UX research analysis can be created into a summary of what has been discovered. From the summary, design opportunities can be identified. Finally, the competitive analysis can for example be presented to stakeholders and it is at this stage one can act on the findings [72]. We chose to use competitive analysis since it was helpful for getting an overview of current mobile application trends and comparing them.

4.3.3 Dot Voting

Dot voting is a technique used in UX to help make decisions and prioritize. Dot voting is an easy and straightforward method that works in almost any situation when wanting to narrow down options. Dot voting can be used to help a team find consensus. It can be used for voting digitally too. This method has no rules and should be adapted to what the team needs and the context. In this method, the team members can place a decided number of colored dots individually to vote on for example design ideas or something else that needs to be prioritized. The process for dot voting is to first gather the material needed. Then as a group talk about the purpose of the method and the instructions. The next step is to vote, which should be done quietly to not affect each other. When the voting is done it is time to calculate the results and discuss it. Finally, it is possible to re-vote if needed [73]. The method was used when we needed to make decisions and narrow down our explored options. We preferred to use this method since it could be adapted by us setting our own rules for how to use the method.

4.4 Materialize

This section will account for methods used to materialize the research. The methods used in this stage are a part of the phases test and implementation. The section provides an explanation of the methods of survey, focus groups, and pilot tests for data collection. Further, it provides an explanation of affinity diagramming and thematic analysis used for qualitative data analysis.

4.4.1 Survey

Surveys are used to collect information from people and can collect qualitative or quantitative data, it is an exploratory method. The information collected through a survey is self-reported and aims to gather the participants' attitudes, thoughts, and feelings. However, because of this, it is important to be aware of the bias of participants when analyzing the results since the collected data is self-reported. Though, what is efficient is that it can be used to collect information from a large sample of respondents. There are two main survey technique types, questionnaires, and interviews [66]. Questionnaire research benefits from the use of the internet as it can provide a broad and diverse range of participants and collect responses in a short time [15]. However, the disadvantage of using the internet is the potential for response rate bias and selection bias [15]. Questionnaires can have close-ended questions or open-ended questions or a combination [74]. Open-ended questions are appropriate for when you want the respondents to answer in their own words and longer answers, while close-ended questions let the participants answer from a fixed set of choices [74]. Questionnaires can also have comparative questions which can be used to ask the respondents to judge two or more alternatives [66]. The method survey was used, with the technique type questionnaire, as the first step of the data collection. The purpose of the survey was to answer the first research question. The method survey was chosen because it makes it possible to collect people's general attitudes, opinions, and understandings of different mobile applications.

4.4.2 Focus Groups

Focus groups are a qualitative, attitudinal, and self-reporting method [66]. A focus group is usually a workshop or a meeting. It can be online or in person and it can take around one to two hours. It is usually with a small group of people and a moderator. Therefore, it is a time-efficient way to get insights from many people [75]. The purpose of focus groups is to investigate attitudes and behaviors [66]. The participants are provided with tasks and topics to focus on [75]. Focus groups can lead to closer insights into themes and patterns within the topic [66]. In focus groups the participants discuss experiences and opinions, therefore this method is beneficial for understanding users' mental models [75]. However, this also means that it is important that participants are comfortable with sharing their experiences, perceptions, and needs with each other [66]. A warm-up activity can help as an icebreaker. Before conducting the focus group it is good to have a plan, open-ended questions, and follow-up questions [75]. The method focus groups were conducted as

a second step of the data collection. An alternative discussed instead of conducting focus groups was to conduct interviews. However, we decided on using the method of focus groups. The decision was based partly on that it was possible to conduct them remotely and partly because it was more efficient than interviews since we could collect insights from several people at the same time.

4.4.3 Pilot Test

Pilot tests can be used before one conducts the actual study. It is not mandatory to conduct pilot testing but it comes with several benefits. Pilot testing can be compared to a dress rehearsal, ensuring that essential elements such as consent forms, payments, and locations are prepared. Creating a checklist to double-check everything can be helpful. During a pilot test, it becomes possible to observe if participants face difficulties with the assigned tasks and whether the correct aspects are being tested, and to what extent. Additionally, it is possible to estimate the time for the test. Having the entire team present for the pilot test, at least one day in advance of the actual test, is advantageous. If there are any issues it is important to have time to fix them. When the real test is a one-shot it is extra important to use a pilot test to ensure the test works as it is supposed to. This is especially important when the team is new to the testing method. While pilot testing incurs a time cost, it greatly contributes to ensuring a smooth and without unnecessary mistakes from the team's side. Finally, another benefit of conducting a pilot test is the potential utilization of the collected data if the test proves successful [76]. We used the method of pilot testing in preparation both for the survey and the focus groups. The purpose was to see if the survey and focus group questions were easy to understand, what type of answers could be expected, estimate how much time it would take to complete, and reveal potential errors or ambiguities.

4.4.4 Affinity Diagram

The method of affinity diagramming helps to understand data in the form of insights and concerns [77]. Affinity diagrams can be an effective tool when there is a large number of data to organize and work with [78]. The first step is to gather the data, the next step is to use one Post-its note per "insight". Afterward, all the notes should be placed so it is possible to view them all at the same time. After that, it is time to interpret each note. When doing this, it is possible to start sorting the notes based on their intent. Notes that are similar should be categorized and grouped together. The grouping of the notes is done in a bottom-up process, meaning that there are no predefined groups. Finally, these clustered categories result in general themes. The outcome from the affinity diagram can be used as a ground for ideation or to understand the insights deeper [77]. The method of affinity diagramming was used to analyze the survey results. This method was chosen since the survey collected answers from open-ended questions. Further, affinity diagramming made it possible to turn all the insights from the respondents into categories. For the analysis of the focus groups, the method of affinity diagramming was used in combination with the method of thematic analysis. The reasoning for choosing to analyze by using affinity

diagramming for this data as well was based on the big amount of data points to sort.

4.4.5 Thematic Analysis

Thematic analysis can be used to identify themes in data from focus groups, interviews, or other user studies [79]. The method can be a way to summarize a large set of qualitative data. It is a method where qualitative data gets organized and coded with the aim to find themes. There are several different methods or tools to use in the thematic analysis. Common methods are to use techniques for affinity diagramming, journaling, or using software. Which method to use depends on the researcher's preference, the data, and the context. No matter which method is used for the thematic analysis the data should be coded. Meaning that sentences or words from the transcripts should be labeled. This is often the first step of the thematic analysis. When the coding is completed the text parts that are coded can be compared and sorted in order to analyze the data with the aim of finding differences and similarities in the texts. This process is iterative. Finally, it is possible to find the themes [79]. As mentioned this method was used as a first step in analyzing the result from the focus groups. It was chosen because it is a helpful method when needing to summarize a large amount of data, which the focus groups generated.

5

Execution

As mentioned in Chapter 4 Methodology, the design process followed the design thinking approach [65], [64]. The chapter will begin by explaining the initial phase of investigating the problem space with the use of a literature review and conversations with the stakeholders. This will be followed by an exploration of the methods used for data collection which consists of a survey and focus group discussions. This includes the planning, design, and execution of the two methods used for data collection. We finish the chapter by disclosing the analysis of the collected data made through affinity diagramming and thematic analysis.

5.1 Investigating the problem space

Relevant literature, in terms of research articles and books, was mainly gathered through Google Scholar and Chalmers Library. Other sources used were gathered through Google. The software Notion [80] was used to list the literature and categorize it into different themes by labeling them with keywords. Keywords used for the literature review to find relevant information were "cultural differences", "usability", "user experience", "aesthetics", "mobile interface", "cross-cultural design", "UI elements" and "cultural differences between Sweden and Japan".

During this research, the researchers had ongoing communication with designers from the golf company to ensure that the vision was shared and to get relevant feedback on the process. Getting the perspective of designers in the understanding phase was important since they had valuable knowledge of how cultural differences influenced their work. Their feedback was important to address problems in the field.

5.2 Survey

The survey was exploratory and aimed to answer research question one, "How do cultural differences between Swedish and Japanese users affect their understanding of mobile user interfaces?". In this section, the process of the method survey is explained. It will cover how the survey was planned, created, and pilot tested together with how the data was collected and analysed. The creation of the survey was an iterative process. The survey used for this study collected qualitative data. All respondents received the same version of the survey.

5.2.1 Planning the Survey

The survey needed to be designed in a fashion that could collect self-reported data. This was important since self-reported data allows researchers to directly capture individuals' opinions, attitudes, and beliefs [15]. Furthermore, self-reported data offers a cost-effective and efficient way to collect large-scale data from a diverse range of individuals [15]. This made it possible to reach respondents from both Sweden and Japan despite the physical distance and the time difference.

In order to gain insight into the impact of cultural differences on mobile user interfaces, the survey was designed to evaluate the navigational aspects. As mentioned in section 3.2 User Interface Elements, navigational elements are closely linked to mental models and metaphors, as they play a role in facilitating users' understanding when navigating within a user interface. To accomplish this, a comprehensive examination of various mobile applications was necessary. It was important that the selected applications were globally recognized to avoid any disparity in knowledge between the two cultural groups. Thus, an in-depth market analysis was conducted to identify mobile application trends in Sweden and Japan. This involved employing the method of competitive analysis, resulting in a comparison chart presented in Figure 5.1. This resulted in choosing the mobile applications Adidas, TikTok, and Netflix as they were identified as global and used in both Sweden and Japan.

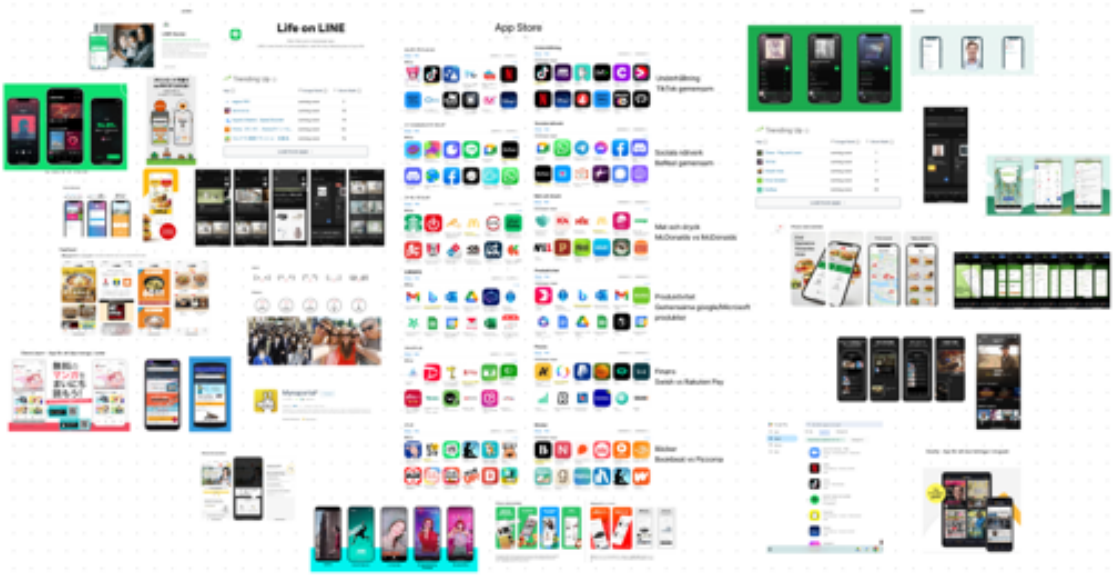

Figure 5.1: Comparison chart of the trends in Japan and Sweden

The survey was created using Google Forms as the chosen software platform. This decision was motivated by its user-friendly interface and that it could be used in both Sweden and Japan. By using this software, it was not possible to create interactive prototypes. Instead, scenarios were created. The scenarios had a description informing the respondent. This was combined with screenshots of the UI and an open-ended question that asked the respondents what they would click to reach the goal by looking at the presented UI. To develop appropriate scenarios and questions

for the survey, the method of brainstorming was employed. This involved generating ideas and concepts, which were subsequently mapped out on a whiteboard, as seen in Figure 5.2. This visual representation facilitated a preliminary outcome of the survey's design before its implementation on the Google Forms platform.

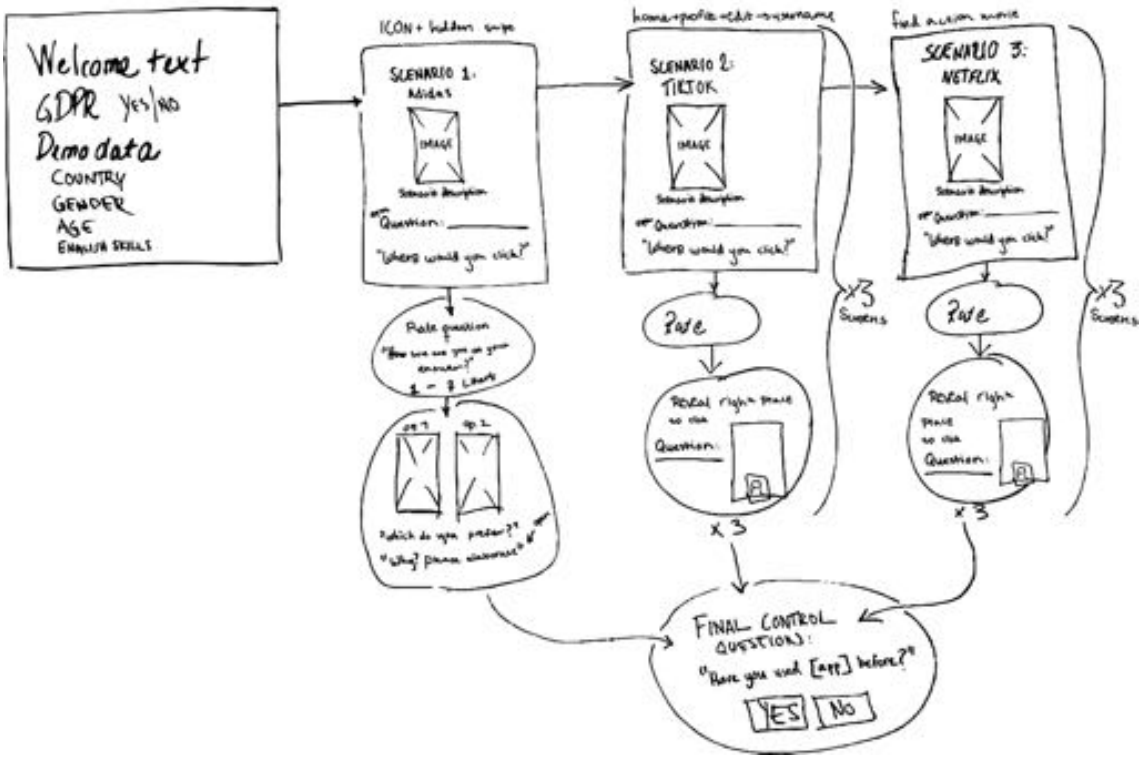

Figure 5.2: The idea for the Survey before Pilot Testing

5.2.2 Pilot Testing

Before the survey was published it was sent to five people for pilot testing design of the survey. The five pilot testers were asked to answer the survey and send feedback. The survey was edited based on received feedback from the pilot tests. The feedback concerned grammar errors and typos. It was suggested to add the option "I did not prefer Option 1 nor Option 2" for the Adidas scenario. The final Survey design can be viewed in Appendix A.1 and is presented in the following section 5.2.3 Survey design.

5.2.3 Survey design

The survey began with general information about the survey, followed by demographic questions. The survey had three scenarios from the mobile applications TikTok, Netflix, and Adidas. Each scenario began with giving an introduction about the application and then a text about the expected goal. This was followed by showing a screenshot of the current state of the interface. The navigation scenarios were based on similar navigation tasks one can find in the golf company's mobile application. The survey utilized a combination of close-ended questions, comparative

questions, and open-ended questions. The three scenarios are presented as follows The Adidas scenario, The TikTok scenario, and The Netflix scenario.

The Adidas scenario. Adidas is a company that sells clothing and shoes. They have a mobile application for their customers. For this task please pretend that you are a customer shopping in the Adidas mobile application. You have added two items to your shopping bag, different types of socks. However, you decide that you only want to order the black socks. Therefore you want to remove the white socks from your shopping bag. What do you do to start the process of deleting the white socks from your shopping bag? (See Figure 5.3).

Figure 5.3: Adidas scenario step 1

1. What do you do to start the process? Please describe what you would do and motivate why.

2. How confident are you in your decision? Scale 1-5, where 1 is not confident at all and 5 is very confident.

In the Adidas mobile application, there are two options to delete the white socks. The options are shown in the pictures and their different processes are described in the text below. Option 1: First click on the "more button" (which is the three dots) on the same row as the item you want to delete, then click on "Remove from bag". Option 2: Swipe to the left on the same row as the item you want to delete. When swiping to the left a part of the row turns red and an icon of a trash can appears. When swiping far enough the item gets deleted (see Figure 5.4).

1. Which option do you prefer? Option 1/Option 2/I did not prefer Option 1 nor Option 2.

2. Please motivate why you chose the option above.

3. Have you used the mobile application Adidas before? Yes/No.

4. How would you describe your overall experience regarding the previous tasks in Adidas?

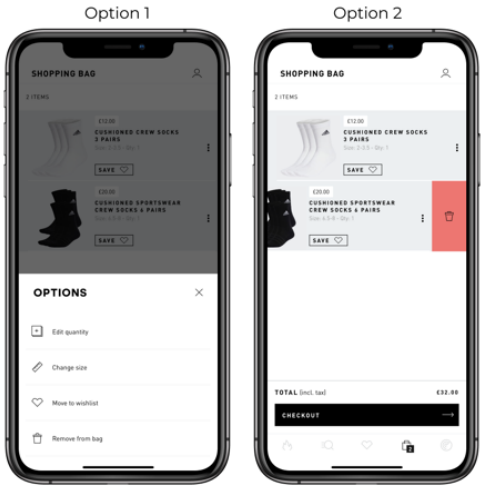

Figure 5.4: Adidas scenario step 2

The TikTok scenario. TikTok is a social media mobile application where users can watch, create and share videos and live broadcasts. For this task please pretend that you are a user of the mobile application TikTok. Your current username is @svangcjvf99 and you would like to change it. What do you do to start the process of changing your username at TikTok? (See Figure 5.5).

Figure 5.5: TikTok scenario step 1

1. What do you do to start the process? Please describe what you would do and motivate why.
2. How confident are you in your decision? Scale 1-5, where 1 is not confident at all and 5 is very confident.

You are now in the Profile and on the second step of changing your username at TikTok. What do you do to continue the process? (See Figure 5.6).

1. What do you do to continue the process? Please describe what you would do

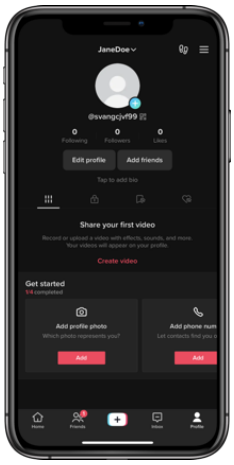

Figure 5.6: TikTok scenario step 2

and motivate why.

2. How confident are you in your decision? Scale 1-5, where 1 is not confident at all and 5 is very confident.

You are now in Edit profile and on the third step of changing your username at TikTok. What do you do to continue the process? (See Figure 5.7).

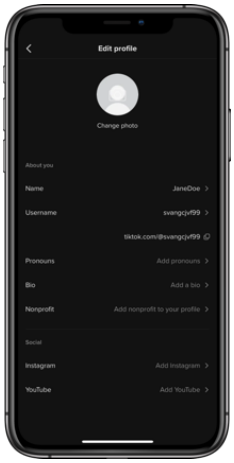

Figure 5.7: TikTok scenario step 3

1. What do you do to continue the process? Please describe what you would do and motivate why.
2. How confident are you in your decision? Scale 1-5, where 1 is not confident at all and 5 is very confident.
3. Have you used the mobile application TikTok before? Yes/No.
4. How would you describe your overall experience regarding the previous tasks in TikTok?

The Netflix scenario. Netflix is a streaming service for movies and TV shows. In

their mobile application users can select between many different films and series to watch. For this task please pretend that you are a user of the mobile application Netflix. You want to watch an action film on Netflix. What do you do to start the process of finding an action film on Netflix? (See Figure 5.8).

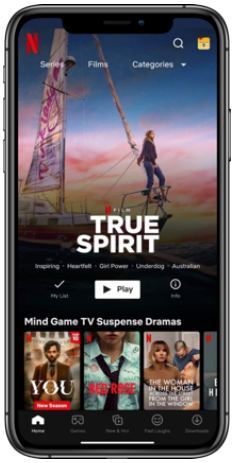

Figure 5.8: Netflix scenario step 1

1. What do you do to start the process? Please describe what you would do and motivate why.
2. How confident are you in your decision? Scale 1-5, where 1 is not confident at all and 5 is very confident.

You are now in Films and on the second step of finding an action film on Netflix. What do you do to continue the process? (See Figure 5.9).

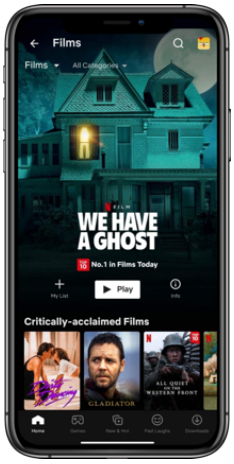

Figure 5.9: Netflix scenario step 2

1. What do you do to continue the process? Please describe what you would do and motivate why.
2. How confident are you in your decision? Scale 1-5, where 1 is not confident at all and 5 is very confident.

You are now in Categories and on the third step of finding an action film on Netflix. What do you do to continue the process? (See Figure 5.10).

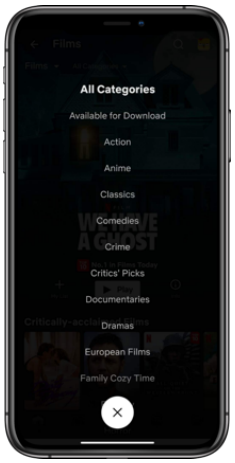

Figure 5.10: Netflix scenario step 3

1. What do you do to continue the process? Please describe what you would do and motivate why.
2. How confident are you in your decision? Scale 1-5, where 1 is not confident at all and 5 is very confident.
3. Have you used the mobile application Netflix before? Yes/No.
4. How would you describe your overall experience regarding the previous tasks on Netflix?

5.2.4 Data collection

The survey was published online on Facebook, and Slack channels and sent to a contact person in Japan to reach Japanese participants. The survey was open for data collection between the 6th of March to the 20th of March, 2023.

5.2.4.1 Participants

Out of the 38 respondents in the study, four were excluded due to being from a different culture. The remaining 34 respondents were divided into two groups based on their cultural backgrounds, see Table 5.1. The Swedish group consisted of 20 respondents, including 11 males, 8 females, and 1 other, with ages ranging from 23 to 60. Among them, 17 respondents rated their English proficiency as fluent. The Japanese group consisted of 14 respondents, including 12 males and 2 females, with ages ranging from 22 to 49. Among them, 4 respondents rated their English proficiency as fluent.

Culture	Total	Male	Female	Other (gender)	Ages	Fluent English
Swedish	20	11	8	1	23-60	17
Japanese	14	12	2	0	22-49	4

Table 5.1: Survey respondents

5.2.5 Analysis of the Survey

When the survey was closed the data gathered was exported from Google Forms to an Excel file (see Appendix A.2). The data needed to be sorted before the analysis. The data was sorted using Post-its in FigJam where each respondent's answer for each question got a Post-it under the question it belonged to. Blue Post-its were used to determine Swedish respondents and red Post-its to determine Japanese respondents. The Post-its were labeled with the respondent's individual number from the Excel file to be able to go back into the Excel file to see all the data and answers from that same respondent.

The next step was to categorize the data based on the questions asking about where the respondents would click in the scenarios. The data was categorized based on correct and incorrect answers. The question about which option was preferred from the Adidas application was categorized based on the question "Which option did you prefer?", which had the options of "Option 1", "Option 2" and "I did not prefer Option 1 nor Option 2" and is highlighted with a purple box (Figure 5.11).

Figure 5.11: Sorting of correct and incorrect answers from the scenarios. The purple box is containing the preferred delete option from the Adidas application

Affinity diagramming was used to analyze the question "How would you describe your overall experience regarding the previous tasks in Adidas/TikTok/Netflix?". It was also used on the question from Adidas asking about the preferred delete option. Each question was sorted into its own affinity diagram and the Swedish and Japanese Post-its were mixed together. First off, the Post-its were sorted into categories and then into subcategories. This first round of analysis was initially undertaken individually by the researchers. It was then repeated by a collaborative session where the researchers discussed and evaluated the created categories. The collaborative session was then repeated once more, but instead of mixing Swedish and Japanese answers, the Post-its were divided into separate affinity diagrams. One containing Swedish respondents and one containing Japanese respondents. At the end of this process, there were two affinity diagrams for each question, one for the Swedish answers and one for the Japanese answers, as displayed in Figure 5.12. When the affinity diagrams were completed, each affinity diagram resulted in categories and subcategories. From those categories, it was possible to draw

conclusions about the analysis and summarize the results.

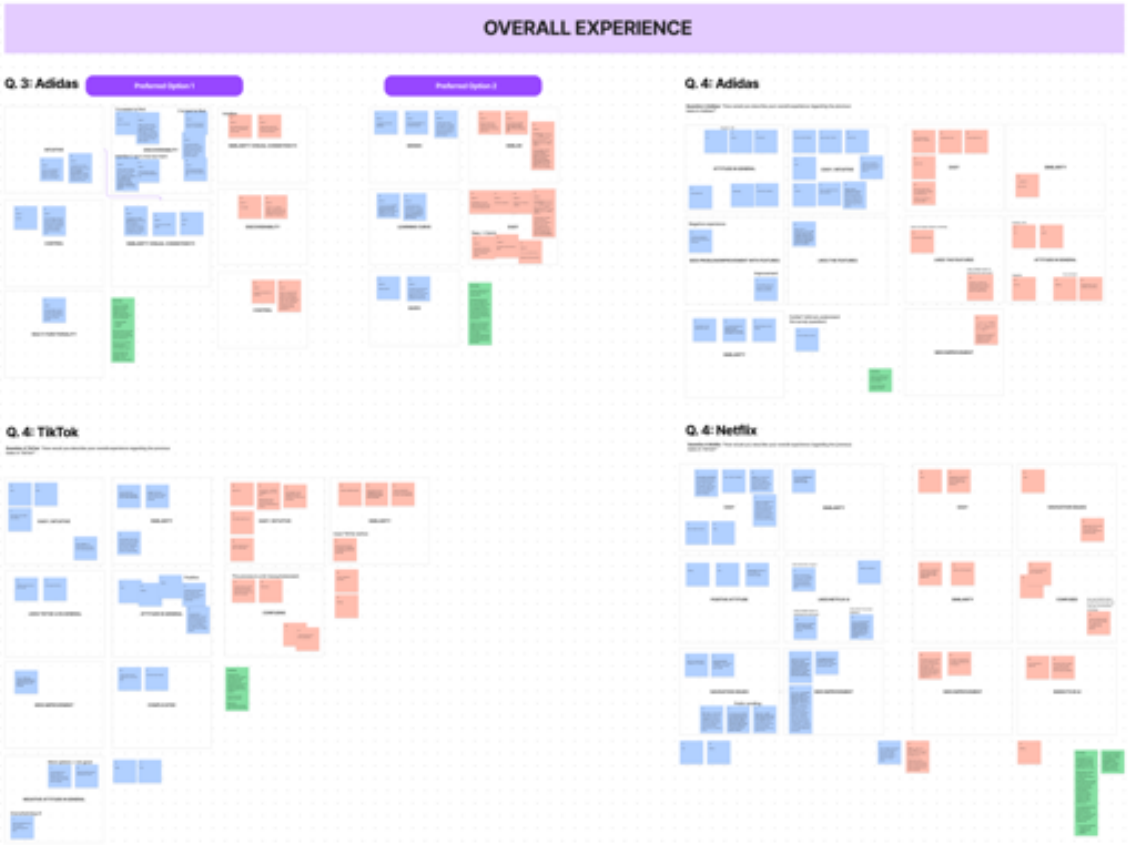

Figure 5.12: Survey Affinity Diagram on the overall experience questions

5.3 Focus Groups Discussions

This section will account for the planning and execution of the focus group discussions and how the collected data was handled and analyzed. The topics for each task used in the focus groups were based on findings from previous literature reviews, competitive analysis, and the results of the survey questions. The creation of the tasks used for the focus group discussions was an iterative process.

5.3.1 Planning the tasks for the Focus Groups

Brainstorming technique was used to start ideating on relevant topics that could bring deeper insights into attitudes toward user interfaces. The brainstorming session ideated on how tasks could be designed and conducted to generate relevant attitudinal data. What was important during this session was to connect the ideas to the UI elements in order to ensure they were connected to the research. At the end of this first iteration of ideation, eight ideas on different tasks were developed. These ideas were written down on a whiteboard (see the first iteration in Figure 5.13).

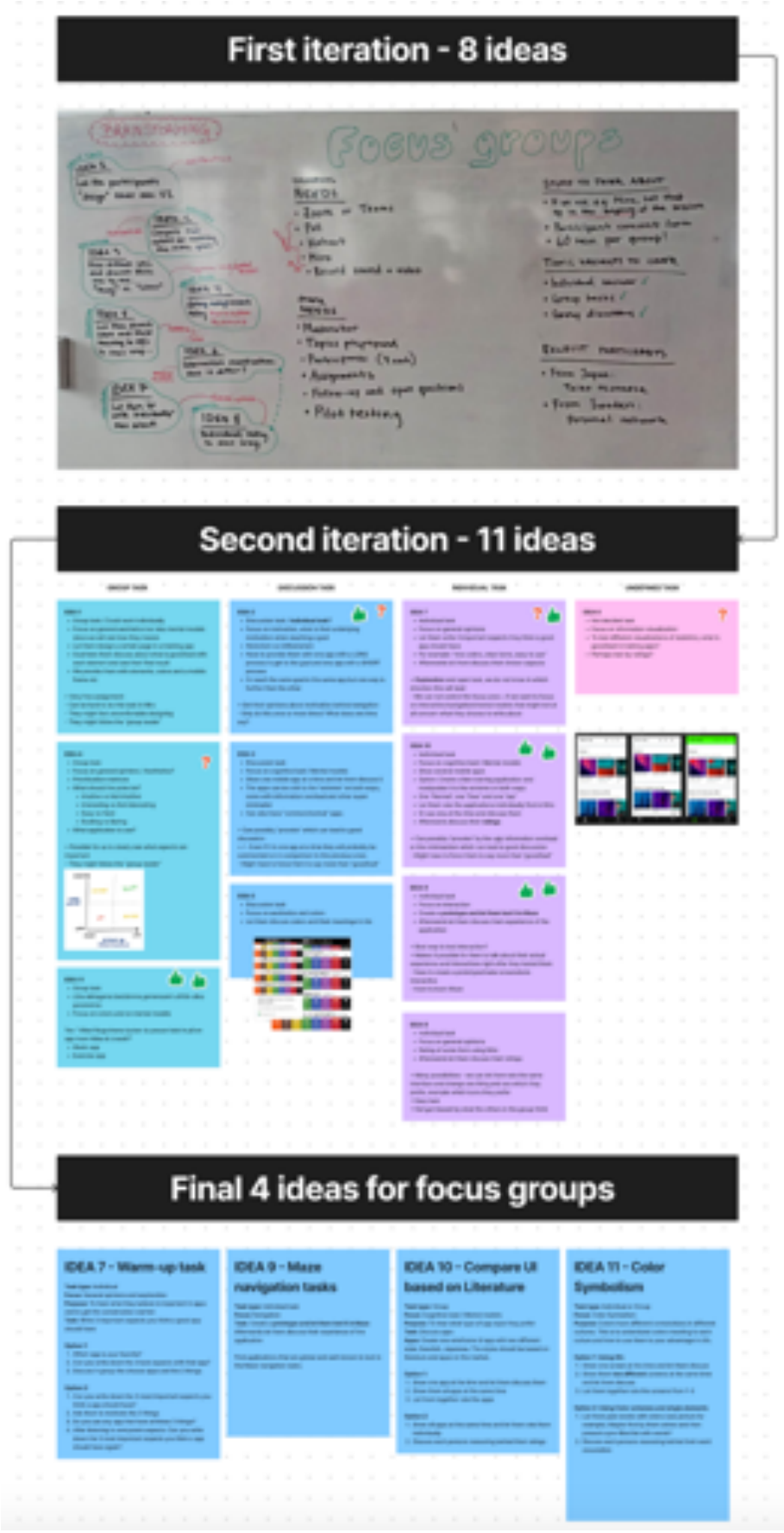

Figure 5.13: Iteration process for developing Focus Groups tasks showing the different iterations

The eight ideas were then iterated once more to decide further details and continue exploring different ways to design the tasks. This was also iterated to view the relevance of the ideas by highlighting their connection to the research questions. This process led to new ideas for the tasks and the process resulted in eleven different ideas connected to different topics. These eleven ideas were then divided into three different categories: group tasks, group discussion topics, and individual tasks. The goal was to have at least one of each category in the focus group for variation (see the second iteration in Figure 5.13).

To define what tasks that should be used in the focus groups as the final ones the method of dot voting was used. After a round of dot voting, there were four ideas that felt most relevant to go further with. Each idea was then supported with literature findings to argue for their relevance and control the task's validity. This step also made it possible to discover if there could be alternative approaches for the tasks, for example, if the task was most suitable being an individual one or if it should be conducted as a group task. After this, dot voting was used in a second iteration of the ideas that contained more details. This process resulted in a decision of four tasks to start developing as the final ones for the focus groups (see the final tasks in Figure 5.13).

5.3.2 The final design of the tasks

In this section, each task that was designed and used for the focus group discussions will be presented. The final focus group tasks that were shown for the participants in Miro are displayed in Appendix B.1.

Task 1: Favorite mobile application and three likable aspects. The purpose of task 1 was mainly to serve as a warm-up getting the participants comfortable with the situation with the hope of getting a better flow in the discussion. The defined topic for task 1 was general opinions and attitudes. This task was performed individually.

The instructions given to the participants were to let them think about a mobile application they use and like. With the particular application in mind, the participants were told to list three aspects that were their favorite reasons for choosing the application. The participants were then told to send their individual answers in the chat. The answers were then copied to the Miro board that was screen shared throughout the discussion. The task finished with a shorter presentation and discussion about the applications chosen by each participant.

Task 2: Navigation tasks in Maze. Task 2 was designed using the software Maze [81]. The purpose of task 2 was to see the participant's actual interaction with different user interfaces and not only talk about their experience. By testing navigation the user's actual interaction with an app in its context could be seen. By also discussing their experience the goal is to reach their mental models. The navigation tasks in Maze were performed individually and were finished with a group discussion where the right navigation paths were shown to ease the discussion (see Appendix B.1).

The participants were presented with four different navigation tasks in Maze. The navigation tasks were from three well-known companies, the reason for choosing the companies was with the hope that the participants might have interacted with them before or knew about them. To avoid bias we did not want to use companies from either Sweden or Japan. The user interfaces used were from the applications YouTube, RunKeeper, and Nike. Each navigation tasks were finished by letting the participants answer a yes or no question about if they had used the particular application before. The four navigation tasks in Maze had the following instructions:

- YouTube 1: Imagine that you are using the Youtube app, you are on the home page and want to save the video "I Got A Speeding Ticket On A Bicycle For Jeff Bezos" to your Watch Later playlist.
- YouTube 2: Imagine that you are using the Youtube app, you are on the home page and want to find your Watch Later playlist.
- RunKeeper: Imagine that you are using the RunKeeper app, you are on the home page. First you want to see all your Activities and then filter them based on the Activity Type Running.
- Nike: Imagine that you are using the Nike app, you are on the home page. First you want to find Mens shoes from the brand Jordan. You like the ones called Zion 2 and want to save them as a favorite.

Task 3: Music application design. For this task, the participants were shown two different designs of the same screen from a made-up music application, displayed in Figure 5.14. The participants were told to discuss the two different options of the user interface designs with each other as a group and share their opinions. The aim was to collect more information about mental models and discover attitudes towards different styles in a UI. The two made-up music application designs were created based on the competitive analysis comparison chart summary.

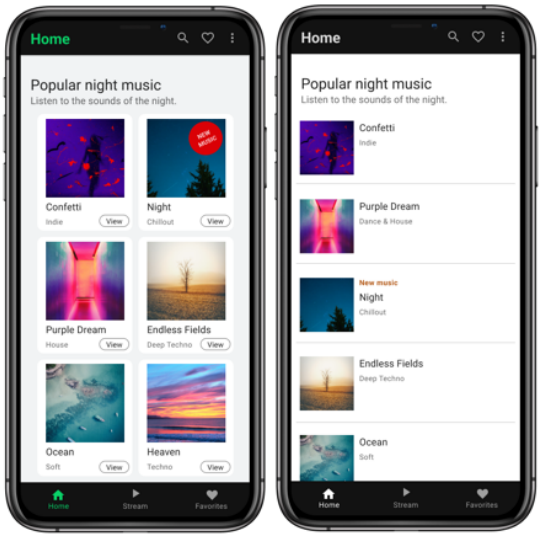

Figure 5.14: The two design options for the music application's UI. Design 1 (left) and Design 2 (right)

Task 4: Four scenarios deciding a color scheme. For the last task, the participants were supposed to discuss and together chose a color palette suitable for four different scenarios with imaginary companies that were in the process of launching a new application. Each imaginary company had value words to help the participants connect the companies with a color palette, displayed in the list below:

- Scenario 1: Meditation Application with the value words *Calm*, *Healing*, and *Relax*.
- Scenario 2: Work-out Application with the value words *Energy* and *Power*.
- Scenario 3: Shopping Application with the value words *Exclusive* and *Modern*.
- Scenario 4: Dating Application with the value words *Love* and *Happiness*.

The task was a group discussion task and the focus was color symbolism. Colors have different connotations in different cultures and this task was meant to understand participants meaning of different colors to understand the optimal usage of colors in a UI. The color palettes are displayed in Figure 5.15. The color palettes chosen were based on the primary colors with an extra twist being two versions one cool and one warm.

Figure 5.15: The color palettes

5.3.3 Pilot Testing

Before conducting the two real focus group sessions with Swedish and Japanese participants a pilot test was conducted. The pilot test had two participants and was held online to simulate the same conditions as for the real focus group sessions. The purpose of conducting a pilot test of the focus group discussion was partly to test the four tasks to ensure its design was able to collect relevant data for the research questions, but also to check that technicalities worked as it was supposed to. For example, it was important to test task 2, which was designed using the software Maze, to test its functionality to ensure it would work to let participants conduct a test online on their mobile phone at the same time as being in the focus group meeting. The pilot test was also used to get additional feedback on the tasks, in which order the task should be presented, and also to give an approximate time

aspect of how long each task would take since we had decided that the sessions should take one hour.

The pilot test resulted in some changes before the actual focus group discussions. It was found that access to Maze could potentially be quite slow or take longer time than expected which resulted in adding more time for task 2. One pilot test participant did also mention that it could be relevant to ask the participants about color blindness before starting task 4. This was noted and added since it could potentially risk the result's validity. The order of the tasks presented was also changed. It was determined that the order of the tasks should be different since task 4, with the different scenarios would take longer than first expected and therefore serve in the end. Task 3 with the made-up music application became prioritized since this task was important and could therefore not risk disrupting it by having it as the last task in the end if enough time was left. We therefore put the scenario task as the last task since it had four different scenarios with similar tasks and we could then disrupt the task without risking losing important data. Lastly, it was decided that the focus group discussion would benefit from having a short introduction at the beginning to let the participants introduce themselves to each other. The hope was that it would make the participant more comfortable when starting to discuss and share opinions with each other.

5.3.4 Data collection

Two focus group discussions were conducted, one with Swedish participants and one with Japanese participants. Since the authors of this thesis are located in Sweden the session with Japanese participants was conducted as an online meeting. To ensure the same conditions for both groups the session with Swedish participants was also conducted as an online meeting. Microsoft Teams were used for the group with Japanese participants and Zoom was used for the group with Swedish participants. A Miro board was used for presenting the four focus group tasks during the discussion. Both sessions were screen recorded with sound. The recorded discussions were later transcribed and the screen recordings were used to observe the participants' facial expressions afterward.

5.3.4.1 Participants

There were seven participants recruited in total, they were all compensated by an Amazon gift card. There were four participants in the Swedish focus group and three participants in the Japanese focus group. The Swedish participants were recruited via personal contact and advertisement through a Slack channel connected to the IT faculty for the Chalmers University of Technology. The Japanese participants were recruited via the golf company. The participants from the focus group discussions are shown in Table 5.2 with a given participant ID in order to present their comments anonymously.

ID	Nationality	Gender
1	Swedish	Male
2	Swedish	Female
3	Swedish	Male
4	Swedish	Female
5	Japanese	Female
6	Japanese	Male
7	Japanese	Male

Table 5.2: Focus Groups Discussions participants

5.3.5 Analysis of the Focus Groups Discussions

To analyze the collected qualitative data from the two focus group discussions, thematic analysis was used combined with affinity diagramming [79]. The data from the focus groups were in two separate documents, one containing transcriptions from the Swedish participants and one with transcriptions from the Japanese participants. These document files can be reached via links in Appendix B.2. The next step of the process was to start coding the transcriptions. The coding of the transcribed material was done by highlighting sentences and words that were seen as relevant to the research questions. After the first coding session each of the authors went through the opposite document to ensure validity. The coded material was then transferred to a FigJam file where each code section was copied to Post-it notes with different colors to separate data from the Swedish and Japanese participants, blue for Swedish participants and red for Japanese participants. At this stage, the analysis method of affinity diagramming was used to find potential themes and patterns from the data. Each task from the focus group was analyzed individually with affinity diagramming containing code material from the two focus group sessions with both Swedish and Japanese participants. This made it possible to compare results to better understand the role of cultural differences in UX.

Since task 2 was designed with navigation tasks that were performed in Maze it generated additional data from Maze showing the participant's results from navigating in YouTube, RunKeeper, and Nike. The data gathered from Maze was the number of clicks on each screen and if the participants had previously used the application before. The data from Maze was sorted in a table (see Appendix C.1) that showed each participant's click rate from each navigation task. The table showed which participants were Swedish and which were Japanese.

The final result from the affinity diagramming resulted in different themes revealing the discussed topics from the tasks (see Figure 5.16). However, since task 1 had the purpose of being a warm-up task to get the discussion going, it did not generate data that needed to be analyzed. The result from this task is therefore omitted in this report.

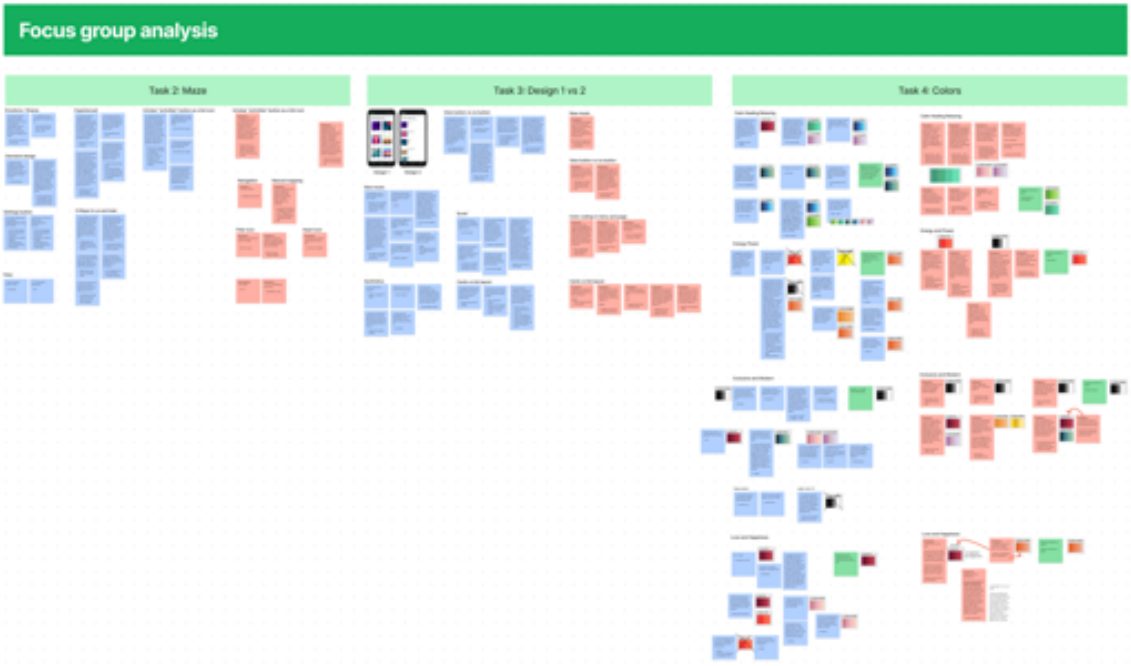

Figure 5.16: Focus Groups Affinity Diagram analysis

6

Results

This chapter outlines the result of the research made. First, the chapter will present the results of the survey. Secondly, it will present the results from the focus group discussions.

6.1 Results from Survey

The survey was designed to find out how users of Swedish and Japanese cultures understand a user interface with the use of three navigation scenarios, explained in section 5.2 Survey. The applications used were Adidas, TikTok, and Netflix. The results from each scenario will be presented in the coming sections.

6.1.1 Adidas preferences and mental models

The general understanding of how to navigate in the Adidas scenario was similar across both groups. The analysis of the first question, presented in section 5.2 Survey, revealed that the majority would press the visual icon (Option 1) to reveal more options (Figure 5.11). Most respondents from both groups had an understanding of the visual icon's functionality. Respondents from both groups seem to think it was easy and intuitive.

In the analysis of the second and third questions in the Adidas scenario, presented in section 5.2 Survey, the Japanese respondents were more in favor of the hidden feature accessed by swiping (Option 2). Japanese respondents reported that Option 2 was preferred since it was easy and quick to use. The feature was recognized since it was similar to using other applications.

Quote from Japanese Respondent 24: *"It's easier to remove it with one choice than to search through the options."*

Quote from Japanese Respondent 30: *"Because similar user interfaces are used in email and other shopping applications."*

The results from the Swedish respondents, from the second and third questions in the Adidas scenario, showed that they were more in favor of Option 1. Most of the Swedish respondents did not seem to know of Option 2's existence due to the lack of discoverability. Despite this, Swedish respondents reported that the hidden feature was perceived as efficient when they knew about its existence.

Quote from Swedish Respondent 3: *"How could I know about Option 2's functionality?"*

Quote from Swedish Respondent 7: *"Option 2 does not have any indicator of existing, Option 1 is more clear here. Option 2 is however more efficient and smooth so if it was possible to add some indicators I would prefer Option 2."*

6.1.2 Attitudes towards TikTok

The results regarding the TikTok scenario were similar between the two groups. Both groups seemed to think the Edit Profile page was partly unclear and overwhelming. This was shown by respondents confusing usernames and names with each other, see Appendix A.1. When asked about the general experience of the scenario in TikTok the Swedish respondents showed a more negative attitude towards TikTok in general compared with the Japanese respondents.

Quote Swedish Respondent 4: *"Quite straightforward, but also a bit of an overwhelming profile page."*

Quote Japanese Respondent 24: *"It seems easy to confuse usernames and names, but it doesn't seem to be a particular obstacle."*

6.1.3 Navigation in Netflix

The affinity diagram analysis of the respondents' responses revealed that the Netflix scenario had the highest number of incorrect answers compared to the scenarios in Adidas and TikTok (Figure 5.11). The incorrect answers were reported from both Swedish and Japanese respondents but the Japanese respondents had a larger number of incorrect answers. Only one Japanese participant got this question correct. Incorrect answers were shown in the first question, explained in section 5.2 Survey, where the respondents were supposed to choose the "Film" tab. The respondents' prominent failure was their selection of the "Category" tab as the first step, which was an incorrect response according to the goal of the task.

In the results from the question about the overall experience in Netflix, Japanese Respondent 30 reported *"It would be nice to be able to choose whether it is a movie or a TV drama from the category. I also thought it would be nice if the search tabs could also allow the same choice of category, etc."* However, despite the Swedish respondents demonstrating comparatively better performance in this task, a negative attitude was also found among the Swedish respondents in the question regarding their overall experience. The results indicate respondents from both groups had a lack of an understanding of how to navigate Netflix.

6.1.4 Summarized results of the Survey

The results from the Adidas scenario indicate that Japanese respondents in greater occurrence had a mental model of the hidden swiping feature functionality (Option 2). The results from the Swedish respondents indicated that they were more in favor

of Option 1 due to Option 2's lack of discoverability. Further, the results from the TikTok scenario indicate a similarity between the two groups as they both seemed to think the Edit Profile page was partly unclear and overwhelming. However, the Swedish respondents seemed to have a more negative attitude in general towards TikTok. Lastly, the results from the Netflix scenario indicate that both groups had trouble with the scenario's navigation questions and failed to reach the goal. Though, the Japanese respondents had a larger number of incorrect answers. The Swedish respondents reported a negative attitude toward their overall experience. This indicates that the respondents did not have an understanding of how to use the filtering function on Netflix.

6.2 Results from Focus Groups Discussions

The focus group discussions consisted of four main tasks designed with different topics and approaches, explained in section 5.3 Focus groups discussions. In this section, results from the tasks will be presented. Task 1 had the purpose of being a warm-up task therefore the results from this task are omitted.

6.2.1 Task 2: Navigational understanding

Task 2 was designed using the software Maze [81] which had the purpose of viewing the participant's interaction by navigating in four navigational tasks. It generated click rates for each of the four tasks, as seen in Appendix C.1.

The overall attitude from both the Swedish and Japanese focus groups was that the navigation tasks presented in Maze felt natural and quite easy to understand.

The participants said the navigation tasks in the YouTube app were overall easy with the motivation that the participants had used the app before. Except for one part in the second YouTube task where some participants thought that finding the "Watch Later" playlist was found by clicking the profile icon at the right top corner. In reality it was found by clicking the field called "library" in the bottom menu.

The navigation in the Nike app was also reported as overall easy to understand, even though not all the participants had used it before. The motivation for it being simple was that it was similar to how other shopping applications worked that the participants had used before.

Only one of the participants had used the RunKeeper app before and in spite of this, the participants thought the navigation in the RunKeeper application was, in general, easy to understand except the first step in the process. This was motivated for instance by this quote from Japanese Participant 6: *I agree it's mostly the same icons that are used across multiple apps that we've seen before.* However, as mentioned the first step in the RunKeeper app was difficult for most of the participants from both groups. Some argued that they tried to press the "settings" icon since it usually is a button that can lead to filtering. Another participant tried to press the "total distance" under the profile picture. It seemed like the "list" icon did not represent "all activities" for the participants.

6.2.2 Task 3: Evaluating two design options for a music application

Task 3 presented two different designs of the same screen from a made-up music application (Figure 5.14). The task resulted in discussions referring to layout, a particular feature used to promote new music, and perceived overall aesthetics which are presented below.

6.2.2.1 Layout

During the user interface design evaluation of the music application, participants from Swedish and Japanese groups exhibited varying attitudes toward the layouts. The Swedish group preferred Design 2, which presented items in a list layout instead of cards. This was primarily due to its ability to provide a better overview of the presented information, making it easier to interpret. Furthermore, the Swedish participants appreciated the increased interaction offered by the list layout, allowing users to scroll through the list and view more alternatives. This was considered to be more of a natural behavior than clicking on the cards. It was also mentioned that the layout in Design 1 made it unclear whether users could scroll on the screen to view more. Compared to Design 2 which indicated to the user that more items can be shown by scrolling down since the last item in the list was partly shown.

Quote Swedish Participant 2: *"Yes, it somehow offers more interaction [...] it's kind of like a more natural movement."*

Quote Swedish Participant 1: *"[...] but the image on the right still shows that you can continue scrolling a bit more because only half of the image is visible."*

In general, the Japanese participants expressed a preference for the card layout, citing its ability to maximize UI space and create a more compact design. This viewpoint was exemplified by Japanese Participant 7, who stated that the card layout was *"really compact so you can see it on one screen."* While a list layout was acknowledged as a potential alternative, its limitations in displaying a large number of items were noted, as it would require excessive scrolling on the screen. Participant 6 also mentioned that the cards had visible buttons telling the user where to click, which was preferred since it reduced the chance of clicking on an item mistakenly while scrolling. As a result, a shared attitude among the Japanese participants was that the card layout, as demonstrated in Design 1, was the safest option for displaying items.

Quote Japanese Participant 6: *"It depends on how long this scroll on the screen is. If it's like 30 items listed in a vertical format, that's somewhat unfriendly as far as UI. So I would prefer design one, but if the list is only like six items, then maybe design two."*

6.2.2.2 Promote new music feature

Another topic both groups discussed was the "New Music"-feature in the UI. Design 1 featured new music by using a red circle with the white text "NEW MUSIC" as

an overlay on the album cover (see Figure 6.1). Design 2 displayed the feature in a more tuned red color only using the written text "New music" above an album title (see Figure 6.1).

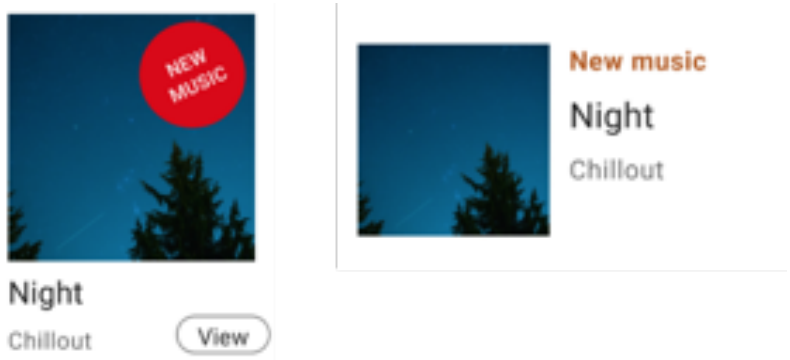

Figure 6.1: Overlay in Design 1 (left) and text in Design 2 (right)

The general attitude among the Swedish participants toward the overlay in Design 1 was it was perceived as visually disturbing. The reasoning behind this was mainly the red color used but also the combination with the round shape. Participant 4 mentioned that the red color makes the overlay alternative in Design 1 stand out too much which Participant 4 was not used to seeing when looking for new music in other applications. Participant 2 expressed that the combination of the red color and round shape reminded them about something being on a reduced price or used to signalize a warning which did not make it suitable for its purpose of featuring new music.

Quote from Swedish Participant 2: *"Often when you see something like red and a round shape together, it's often because something is at a reduced price or look here or like a warning of something."*

Quote from Swedish Participant 4: *"Maybe that's something I'm not used to see when I'm scrolling for new music."*

Participant 4 associated the overlay feature in Design 1 with commercials. Participant 3 agreed with the other participants but also mentioned that the overlay in Design 1 made a bigger visual impression and therefore was more conspicuous. However, Participant 3 still expressed that it was not as visually pleasing compared to how the feature was displayed in Design 2.

Quote from Swedish Participant 3: *"The way it's featured in design two is a little bit prettier, but it's more noticeable on design one. It becomes clearer that it is new music."*

The Japanese group did not discuss the "New Music"-feature in the UI as much in comparison to the Swedish group. However, it was mentioned that the overlay feature in Design 1 was visually disturbing since it covered the album art. This was mentioned as an eventual future problem depending on what art was used for

the particular album. Other participants agreed with Participant 6 regarding this statement.

Quote from Japanese Participant 6: *"Well, I prefer how it looks in design two. Design one sort of covers the album art, and that's kind of distracting and depending on what the album it is it might be hard to notice that."*

6.2.2.3 Aesthetics

One topic that was recurrent in the Swedish focus group in task 3 was the importance of the aesthetic look and overall feeling of the UI. In this discussion, the whole group leaned more towards Design 2 of it being more aesthetically pleasing since it gave a cleaner overall look. Design 1 was mostly referred to as being outdated and reminded of web designs rather than mobile applications. What was mentioned as not being aesthetically pleasing in Design 1 was both the layout using cards and how the view-button looked that was used on the cards.

Quote from Swedish Participant 1: *"[...] but design one I feel is more of a web view and not a phone view. The view button feels odd, you never really see that in an app today [...] so the view button feels rather irrelevant. It is not needed in my opinion."*

The color coding in Design 1, meaning the use of color for the bottom menu and the actual page was mentioned as likable in the Japanese focus group. Participant 7 meant that color coding gives good feedback on where the user is in the application and that it looks aesthetically pleasing. Participant 6 agreed with Participant 7 about color coding but also stated that it is not crucial for getting the feedback needed and that only using some kind of contrast could be enough. This was agreed upon by Participant 5. However, Participant 6 mentioned that *"using color is always nice"*.

6.2.3 Task 4: Color symbolization in application scenarios

In task 4 the participants discussed four scenarios with imaginary companies in order to decide on a suitable color palette. The scenarios with associated color palettes can be seen in Figure 5.15 in Chapter 5 Execution. To view the thematic analysis code words for all the color palettes discussed see Appendix D.1.

6.2.3.1 Scenario 1: Meditation App

Calm, healing, and relaxation

The Swedish group chose the color palettes of cool blue and warm blue for the meditation app. Their motivation for these colors was that they associate these colors with nature and the ocean which go well together with meditation and the value words.

The Japanese group decided that a meditation app with this purpose should have color palettes of cool green and warm green. The reason for the color green was that it is connected to nature. Specifically to trees but also to tea.

6.2.3.2 Scenario 2: Work-out App

Energy and Power

The color palette the Swedish participants chose for the workout app was warm orange. Their reasoning was connected to what those colors represent emotionally. The colors made them think about summer and sunshine and therefore the colors give a positive emotion. The Swedish participants clarified that they thought that colors that generate positive emotions can contribute to the inspiration for exercising.

The Japanese group chose the color palettes warm red and black and white. The motivation behind this decision was that warm red symbolizes happiness which gives energy. Black and white were motivated by it being the colors used in gym environments and for gym clothes.

6.2.3.3 Scenario 3: Shopping App

Exclusive and Modern

The Swedish participants first decided on the color palette of black and white for the shopping app. However, the optimal color palette was reported as not found among the options presented. The Swedish participants argued that a beige color palette would be most suitable for the shopping application. The reasoning was that beige is a neutral, earthly color that feels luxurious.

The Japanese group decided on the color palette of black and white with the motivation that they had seen it in similar apps.

6.2.3.4 Scenario 4: Dating App

Love and Happiness

In the Swedish group, they chose the color palette cool red for the dating app. Their explanation for this decision was that the deeper red color was highly associated with romance and love.

The Japanese group had issues finding a color for the dating app. However, they decided on using the color palette warm orange because it can represent both happiness and love.

6.2.4 Summarized Results of the Focus Groups Discussions

The results from task 2 indicate a similarity between both groups' understanding of navigation. The participants found the navigation tasks presented in Maze quite easy to understand. The results from task 3 concerning layout indicate that the Swedish participants preferred Design 2, whereas the Japanese participants expressed a preference for Design 1. Further, to summarize the results concerning the "New Music"-feature, both groups' found the overall in Design 1 visually disturbing. The Swedish participants associated it with warnings or commercials. The Japanese participants

mentioned that it could be a problem using the feature in Design 1 depending on the album art. The results from task 3 about aesthetics indicate that the Swedish group preferred Design 2 with the argument that it was aesthetically pleasing. Whereas the Japanese group indicated that the color coding in Design 1 was likable due to given visual feedback and that using colors is aesthetically pleasing. Lastly, the results from task 4 indicated a difference between the Swedish and the Japanese group's understanding of what different colors symbolize and are associated with. Figure 6.2 presents an overview of the summarized results.

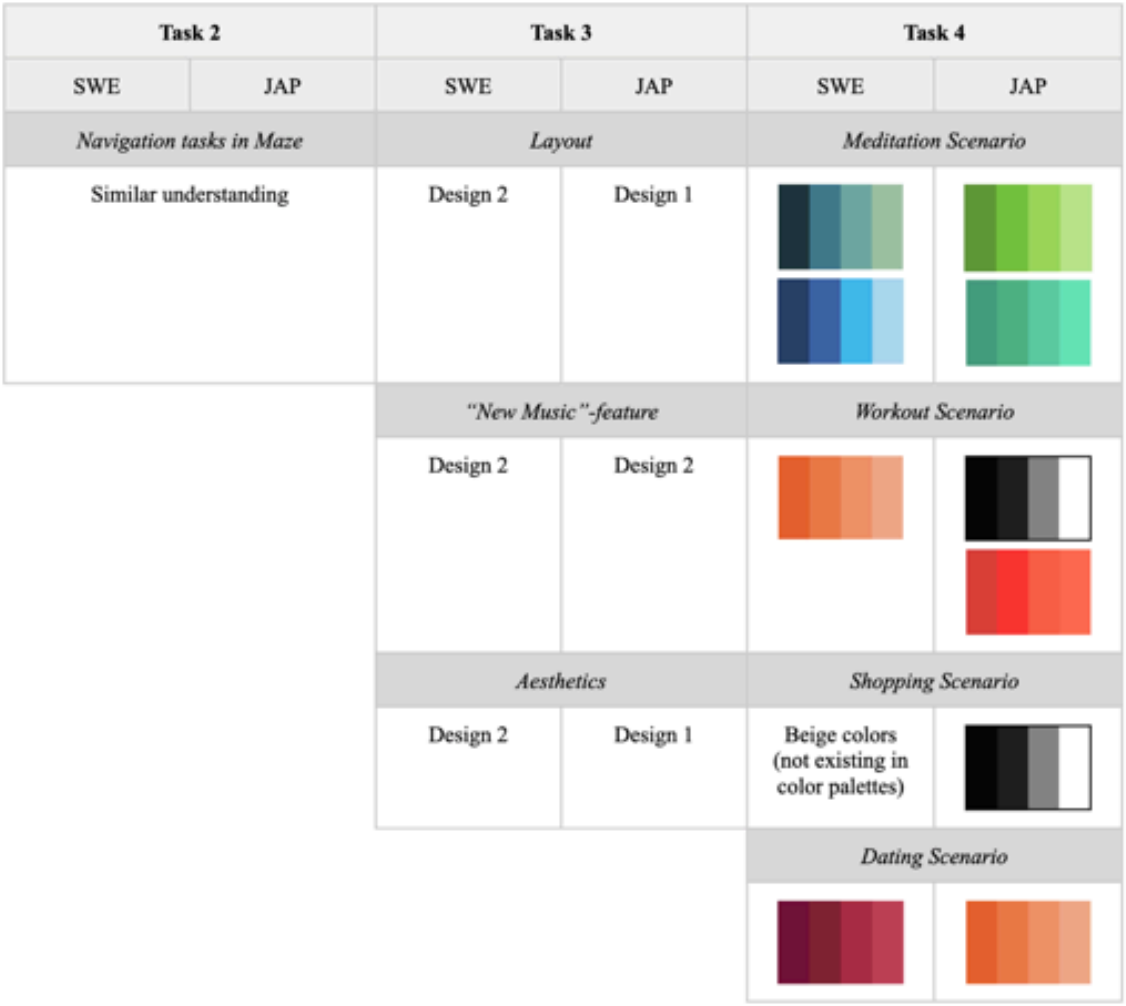

Figure 6.2: Overview of the summarized results of the Focus Groups Discussions

7

Design Guidelines

In this chapter, the final design guidelines are presented. The final design guidelines are developed based on the results from the survey and focus group discussions. The guidelines are discussed according to which user interface element they encounter. Thus they are presented in the following sections 7.1 Navigation design guidelines, 7.2 Layout design guidelines, 7.3 Aesthetics design guideline, and 7.4 Color design guidelines. The guidelines are also discussed in relation to previously presented literature in Chapter 3 Literature Review.

7.1 Navigation design guidelines

- Both Swedish and Japanese cultures: Provide non-linear navigation for the user to reach the same goal when designing a filtering functionality.

Based on the results from the survey, the understanding of how the filtering flow works in Netflix seems to not match with the Japanese respondent's mental model leading them to make a mistake in the first step of finding an action movie. Instead of choosing "Films" as a first step, the majority wanted to go directly to "Categories". Pressing "Categories" as a first step would make it possible to choose the right category but the results after filtering would then contain both films and series. Since it is impossible to filter between films and series after choosing "Categories", this user mistake is severe, which can lead to the user feeling confused [46]. On the other hand, the Swedish respondents seemed to have a better understanding of the filtering flow as the majority chose "Films" as the first step, leading them to the intended goal. It could be argued that they did not make a mistake due to having a mental model. However, the attitude from being questioned about their overall experience was still reported as negative. Since user experience is depending on more factors than only succeeding in reaching an expected goal [42], the proposed guideline should be applied to both cultures as it could improve the user experience.

While mental models could be a contributing factor, there may be other reasons for these results. According to Marcus [43], cultures that are defined as high levels of uncertainty avoidance, based on Hofstedes cultural dimension theory [58], prefer user interfaces that prioritize minimizing user error by offering only essential options and a navigation structure that prevents users from losing their way [43]. Japan is scoring high on this dimension, however, the results gained from this research indicate both Swedish and Japanese users preferred when the UI provides a navigation structure

that lets the user explore, rather than having limited choices. As seen in Figure 7.1, a non-linear flow for Netflix filtering would enhance the user experience, independent of the user's culture. The current filtering flow in Netflix is forcing the user to start over if they make a mistake at the start page. Though, if the user does not understand how the system changed as a result of their actions, meaning they understand that they need to start over, it can lead to frustration. When adding the additional flow, the navigation allows the user to choose whatever filter they want on the start page and allows them to later change variables without forcing them to start over. This is what we refer to as non-linear navigation. Our results indicate the additional flow would minimize the confusion and improve the overall user experience.

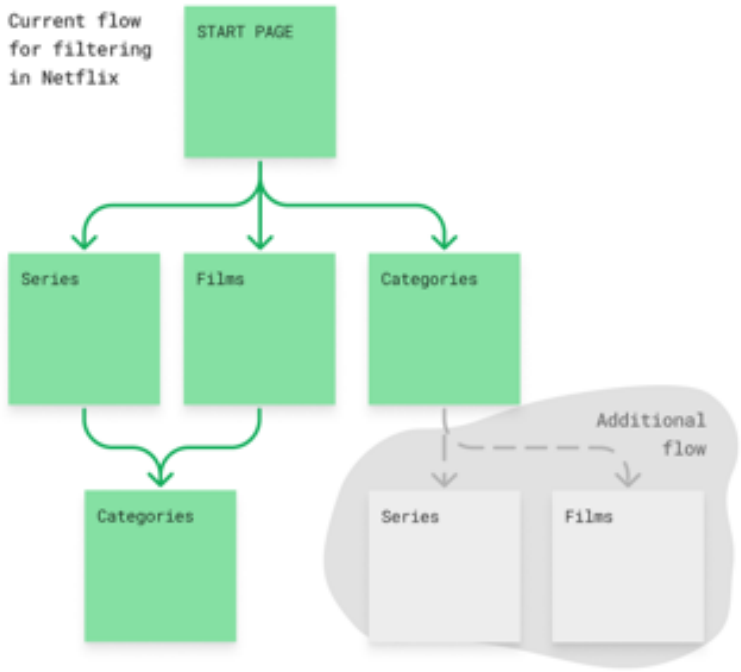

Figure 7.1: Flow chart showing how the navigation flow for filtering in Netflix application could be improved

- Swedish culture: If designing a deletion feature using hidden gestures in the user interface, provide indicators about their existence for the first usage.

This guideline is based on the Adidas scenario where respondents were asked to delete a pair of socks from the shopping cart. There were two options available: a visible icon on the right side of the socks or swiping from right to left. The analysis showed that Swedish respondents preferred the first option, while Japanese respondents preferred the hidden swiping option. Japanese respondents found swiping easier due to having used similar applications, which could indicate that they have a mental model for these kinds of hidden features that aims to delete an item by swiping. In contrast, Swedish respondents did not seem to have this mental model for this feature according to the navigation tasks. Despite this, the analysis of their

overall experience showed that the feature was appreciated since it was perceived as quicker. However, this only applies if they had known of its existence. Therefore, this guideline is set to be mainly for when designing for a Swedish audience since they appreciate the hidden functionality but need some sort of indication about their existence when first encountering it due to a lack of discoverability. There can be situations where there may not be sufficient space to display all functions within a UI without causing visual clutter [47]. Though, making features hidden can risk their discoverability [42], which is shown in our results. Therefore, it is important for designers to know when to provide the user with indications about their existence for first-time encounters. This guideline informs designers that for users from Swedish culture, who encounter hidden features with swipe gestures intended for deletion, it is important to provide an indication of their existence for the first usage.

7.2 Layout design guidelines

- Japanese culture: When presenting information utilize the space of the UI by using cards as the layout.
- Swedish culture: When presenting information use a list as the layout to enhance the indication of scrolling.

These guidelines are mainly based on results given from task 3 from the focus group discussions. Swedish participants preferred Design 2 since it had a modern layout that initiates scrolling. Design 1 was mentioned as unmodern and associated with a web-based UI. However, Japanese participants perceived Design 2 as having a higher risk of accidentally clicking a list item, favoring Design 1 for its easy information overview.

One reason the Japanese preferred Design 1's layout could be that the cards were combined with a button telling the user where to click to view more information. This is explained by Japan's culture is defined as having high levels of uncertainty avoidance, and interfaces should focus on minimizing user errors [60], [43]. Having a visual button to show the user where to click could increase the feeling of having control and reduce mistakes [46], which is important to reduce eventual uncertainties for Japanese users. Further, Japan is a culture with a long-term focus [60] and interfaces with a long-term focus can have more complex content as users do not mind spending time to understand the information presented on an interface [43]. While Sweden, on the contrary, is less of a long-term focused culture [60] which therefore corresponds with our results. Having a layout utilizing a list creates a quicker overview of the content since it enhances scrolling.

What else might affect the result is the difference between the written languages. This is because the language of the culture can affect the amount of visual density a user can tolerate [43]. As Japanese languages contain symbols they can be written and read in several directions which might indicate preferring a layout with cards since the text can be utilized in a better way compared to a list where the text only can be written in lines from left to right. Further, this might explain why Swedish

people preferred lists since they might be influenced by the Swedish language, which is written and read from left to right [43].

To conclude, the discussion highlighted the importance of considering cultural differences when designing interfaces, as what may be considered modern and appealing to one group may not necessarily be viewed the same way by another group.

7.3 Aesthetics design guideline

- Swedish culture: To enhance the aesthetics of the user interface make a minimalistic design.

This guideline is developed based on recurrent discussion topics about the perceived aesthetic when participants discussed the interfaces in task 3. It was noticeable that the perceived aesthetics was valued as an important aspect for the Swedish participants and Design 2 met their expectations regarding the aesthetics to a greater extent than Design 1.

According to Norman [49], aesthetics might be more important than perceived usability. Ideally, products should offer more than just functionality which designers achieve by focusing on aesthetics [42]. Our results indicate a cultural difference regarding the importance of aesthetics but also for what is perceived as aesthetic between Swedish and Japanese culture. This is in line with Reinecke et al. [33] statement meaning that what is perceived as aesthetic is influenced by the user's cultural background. Consequently, Sweden is defined as a feminine culture [60] and interfaces that are feminine-oriented use aesthetics to attract user's attention [43]. On the other hand, the underlying factor behind why Design 2 is perceived as more aesthetic by the Swedish participants is somewhat unclear. As discussed in the guideline concerning layout, since Design 1 overall contained more visual features, it may be related to differences in language which affects how much visual clutter each culture accepts [43].

Based on the discussion, our recommendation when having a Swedish audience is to design with a minimalistic approach to make sure Swedish users' requirements are met for both functionality and aesthetics in order to improve the overall user experience.

7.4 Color design guidelines

For Swedish culture:

- Use cool and warm blue colors when designing with the aim to create a sense of calm, healing, and relaxation.
- Use warm orange colors when designing with the aim to create a sense of happiness and positivity to increase a feeling of energy and power.

- Use cool red colors when designing with the aim to create a sense of happiness and love.
- Use beige colors when designing with the aim to create a sense of exclusiveness and modernness.
- Avoid using the combination of red and round as an overlay if the goal is not for it to be perceived as a warning or a sale.

For Japanese culture:

- Use cool and warm green colors when designing with the aim to create a sense of calm, healing, and relaxation.
- Use warm red colors when designing with the aim to create a sense of happiness and positivity to increase a feeling of energy and power.
- Use black and white colors when designing for areas such as work-out and work-out statistics.
- Use warm orange colors when designing with the aim to create a sense of happiness and love.
- Use black and white colors when designing with the aim to create a sense of exclusiveness and modernness.
- To enhance the users feeling of control, use colors to provide feedback.

These guidelines are mainly based on results given from task 4 from the focus group discussions where participants discussed four scenarios with imaginary companies to decide on a suitable color palette (Figure 5.15). Though, two guidelines are also based on task 3, discussing Design 1 and 2 from the made-up music application (Figure 5.14). To view the coding from the thematic analysis for all color palettes discussed see Appendix D.1.

The results revealed cultural differences in color symbolization, which have been shown by previously conducted research [52], [53], [51]. However, the scenario tasks used in this research were not designed to examine colors in the context of a user interface. The result could have a different outcome if tested in the context of a user interface instead of scenarios. Despite this, the results could give designers an indication of how to use colors when designing interfaces for Swedish and Japanese cultures. This is of high value since colors influence people's experience of a user interface [51]. Our results strengthen the reasoning that color conveys meaning to the user and affect the user's perception [52].

The Swedish participants associate both the warm blue and the cool blue palette with the words calm, healing, and relaxation. Aykin and Milewski [53] claim that West European cultures associate the color blue with authority, calm, peace, and masculinity. Though it is important to note that West European cultures include several other cultures beyond Swedish culture, and their result is not isolated to the Swedish culture alone. However, our results give an indication of being in line with Aykin and Milewski [53]. On the other hand, Aykin and Milewski [53] claim that

Japanese culture associates the color blue with villainy. In our study, the Japanese participants did not choose any of the blue color palettes as the final decision for either of the four scenarios. It is interesting to mention that the blue color palettes, independent of cool or warm, did not seem like popular colors. The warm blue color palette was only mentioned as not suitable for selling summer clothes, see Appendix D.1. In addition to the color design guidelines developed, this finding could potentially serve as an indication for designers to consider testing the use of the color blue if designing for Japanese culture. This is to further validate the color blue's appropriateness in the interface design. However, it might be perceived differently depending on the application usage context. This study has only tested scenarios regarding meditation, work-out, selling luxury clothes, and dating.

As mentioned, colors convey meaning and influence users' perceptions of an interface [52]. However, our results indicate that the interpretation of color can also be affected by combinations with other design elements. Swedish participants perceived the combination of the color red with a round circle as a warning, as seen in Design 1 (Figure 5.14). While it attracted their attention, the attitudes were not positive in the context of promoting new music. The Swedes' cautious attitude towards visual clutter may have contributed to this interpretation, as red colors are typically associated with danger in Western Europe [53]. Consequently, the feature may not be suitable for Swedes as it stands out too prominently and is interpreted as a warning rather than a positive signal. Designers must be mindful of this aspect and consider employing such features for functionalities with more significant implications, such as deleting a user account, rather than highlighting newly released music.

Another finding from task 3 regarding color was that the Japanese participants preferred the usage of color coding of the bottom menu icon and title of the page, as seen in Design 1 (Figure 5.14). It was mentioned as giving better visual feedback to the user. This goes in line with Marcus [43] suggestion that user interfaces that emphasize high levels of UA can benefit from utilizing redundant cues, such as colors, to reduce ambiguity. However, the Japanese participants did not fully agree with each other. Therefore, this guideline should be considered as an indication rather than an absolute truth.

To summarize, the study reveals cultural differences in color symbolization, confirming findings from previous research. While the results may differ if tested in the context of a user interface, they can provide guidance to designers in using colors for interfaces designed for Swedish and Japanese cultures. Further, it is suggested that designers must consider color combinations with other design elements as they can affect the interpretation of colors depending on the user's culture. Also that the usage of color coding in interfaces can benefit the user interface by giving better visual feedback, especially for cultures with high levels of UA.

8

Discussion

In this chapter, the design process is discussed. The chapter will also discuss other relevant topics concerning the research, such as generalizability, and ethical considerations. The expected result of this work was to answer the problem statement: *Creating guidelines for designing mobile user interfaces for Swedish and Japanese users*, by exploring the research questions. In accordance with what previous research in the area has found [14], [33], [34], [35], [36], our results showed that the cultural differences between Swedish and Japanese users affect their understanding of mobile user interfaces in several ways and we find it reasonable to adapt the UI based on the cultural differences. The most prominent identified differences and similarities from the findings were possible to turn into guidelines, as this research expected.

This research makes a valuable contribution to the field of cross-cultural UX design. Furthermore, it is of great importance because of the effect of the fast digitalization of today's society which in turn contributes to digital products being designed for global markets.

8.1 The methodological process

As presented in Chapter 4 Methodology, a combination of exploratory research methods was used to answer the research questions. During this work, we have tried to consider that we come from a Western culture and that the cultures we examined were one Western and one Eastern.

We were aware that there is research based on WEIRD societies and wanted to tackle this research with that in mind and adapt our methods to not be in favor of Western participants. However, we did use research methods that are standard in Western societies but took into consideration what we learned from previous research by Walsh et al. [32], Alexander et al. [35], and Westlund [40].

In correspondence to Walsh et al.[32] we noticed contrasting responses between Japanese and Swedish participants during the analysis of the focus group results. The Swedish participants often answered the questions by reflecting on their own needs, whereas the Japanese participants more frequently responded by considering the needs of others. This suggests that even if research methods are adjusted to accommodate cultural differences, people may still respond and behave in accordance

with the prevailing norms within their respective cultures. This noted variation could be attributed to the collectivistic nature of Japanese culture and the individualistic nature of Swedish culture [32].

8.1.1 Language barrier

During the analysis of the results from the survey, it was shown that some of the respondents from Japan might have struggled to express themselves in English. Some of the respondents answered in Japanese. This was also reflected in the question regarding rating their English skills where 85 percent of Swedish respondents rated themselves as "fluent", and only 29 percent of Japanese respondents rated themselves as "fluent". In hindsight, to gain more accurate and natural reflections from the respondents we should have had the survey in the respondents' respective languages. We chose to utilize English in the survey because of efficiency and lack of knowledge of the Japanese language.

As mentioned, the focus groups were limited to using online meeting tools in order to collect data. Using remote online meetings unfortunately comes with its disadvantages. The meeting format made it harder to observe the participants' body language and might have made the conversations less natural. Moreover, when we held the focus group with the Swedish participants it was in Swedish because it felt unnatural to speak English in a meeting with only Swedish-speaking people. But, when we conducted the focus groups with the Japanese participants English was used in order for us to be able to communicate. This is one possible parameter as to why the focus group with the Swedish participants felt more natural, and relaxed, and generated more conversations. This language barrier was noticeable in the focus group with the Japanese participants whereas there were times when the participants were searching for ways to express themselves. To not encounter this issue we should have had the same conditions for both groups and let the Swedish participants speak English as well to create this language barrier for both groups as it may have affected the results.

8.1.2 Reflection of the Survey

Based on the final question for each scenario, asking the participants about their overall experience, we received feedback regarding the design of the survey. Some respondents wrote that they did not understand the tasks in the survey which might have led to wrong answers from their side due to feeling that the instructions were unclear. Furthermore, some respondents wrote that they felt forced by the survey to proceed in a certain way in order to answer correctly. It is understandable that they felt forced since these tasks were not natural for them to complete since the motivation did not come from what they actually wanted to do but from what we asked them to do. This is a general issue with testing, it is complicated to make it feel natural.

8.1.3 Reflection of the Focus Groups

When analyzing the collected data from the focus group discussions it was noticed that some tasks generated more valuable data for this research compared with others. In the focus groups, we got some feedback directly on how they experienced the tasks in Maze. Some participants thought the whole experience of the Maze tests was confusing. They said that they forgot what they were supposed to do, which led to many wrong clicks in the Maze results. However, they could have scrolled up to reread the instruction. Another critique of the Maze task was that the participants felt forced to complete the tasks in a specific way. It is more natural to use a shopping application when one has a mission of their own. Ideally, the applications used should have been designed to be fully interactive, allowing users to explore and simulate the real context of using the applications. However, the time was not enough for making fully interactive applications. Additionally, the tasks would have consumed a considerable amount of time for the participants to complete, potentially resulting in reduced discussion time. Another issue we found was that Maze did not work as expected for all the participants which led to data loss. Furthermore, a fault found from our side was the Nike task in Maze where they could have pressed "Jordans" and "shoes" but we only allowed them to press one of them which led to misleading results in the data.

8.2 Limitations of the results

The current study has focused exclusively on the cultures of Sweden and Japan. Hence, generalizing the findings to other cultures is not applicable. The focus groups conducted during this research included only seven participants, whereas the Survey received responses from 34 respondents. Given the limited sample size, it is insufficient to generalize the study result. However, the study had a qualitative approach focused to collect subjective opinions, the results could give designers an indication when designing for Swedish and Japanese users. To ensure the validity of the results, additional research is necessary involving a larger number of participants from Swedish and Japanese cultures. Further, ensuring validity also applies to the design guidelines. These were not evaluated in this study due to a time limit. A suggestion for future studies could be to evaluate the guidelines as implemented to a mobile user interface.

The analysis of the results revealed that culture is an extensive domain with numerous variables that play a crucial role in the interpretation of interfaces. When conducting research it is important to keep factors isolated in order to know what affects what. On the other hand, this is difficult to achieve when conducting qualitative research. Therefore, unknown factors might be contributing to the result.

Finally, the conducted tests were mostly in English. The focused cultures in this study do not have English as a native language. This can have impacted the participant's user experience in the way of not being fully accurate.

8.3 Ethical considerations

The ethical aspects were addressed in Chapter 1 Introduction, in order to guide the work. There we presented ethical issues that are important to consider when conducting research [15] and we will now discuss how we handled these issues.

Thus, at the beginning of the survey, the respondents were informed about the conditions and had to accept them in order to participate. The participants in the focus groups were informed about the conditions both via e-mail three days before their participation and by attending the focus groups they agreed to the conditions. The conditions for the survey and focus group concerned that their answers would be kept anonymous, that no data would be stored, and that they were free to drop out at any time. In addition to the common conditions, the focus group was concerned that the participants would be recorded. To be transparent the transcripts from the focus groups and the Excel file with the raw data from the survey are included in Appendix A.2 and Appendix B.2. These files do not include any personal data and the results cannot be traced back to any individual as it has been anonymized.

Additionally, in Chapter 1 Introduction, we tried to consider the research presented by Fiske [16] and be aware of our own cultural backgrounds so we would not fall into accidentally stereotyping based on them. This also applies to designers following these guidelines without reflecting if they are applicable in the specific situation would be accidentally stereotyping. Especially from an in-group perspective trying to design for the so-called out-group [16]. However, without using guidelines when designing for cross-cultural usage, designers might risk designing based on their own biases and stereotypes. Using these design guidelines as an indication could decrease the risk since they are based on both literature and data-collected research.

9

Conclusion

This work has been focused on exploring the research questions to understand if it would be possible to create a set of design guidelines for how to design user interfaces for Swedish and Japanese users. This research answered the problem statement: *Creating guidelines for designing mobile user interfaces for Swedish and Japanese users*, by exploring the research questions:

1. How do cultural differences between Swedish and Japanese users affect their understanding of mobile user interfaces?

2. What guidelines can be found useful for the identified cultural differences?

The research questions were explored by conducting user research and reviewing previous research. The aim of the first research question was to investigate and analyze the impact of cultural differences between Swedish and Japanese cultures on the user's understanding of mobile user interfaces. From the survey and the focus groups, similarities and differences were found between the cultures' understanding of mobile user interfaces. The results from the survey showed that the Japanese respondents in greater occurrence had a mental model of the hidden swiping feature functionality. The Swedish respondents seemed unfamiliar with the hidden swiping feature functionality. Both groups seemed to think the Edit Profile page in TikTok was partly unclear and overwhelming. Both groups had trouble understanding the navigation and the filtering function on Netflix. The results from the focus groups indicate a similarity between both groups understanding of navigation. The results also suggested differences in preferences between the groups regarding how to utilize layout space in user interfaces. The results from the "New Music"-feature indicated differences between the groups' understanding of what is aesthetically pleasing. The results from task 4 proposed a difference between the two groups understanding of what different colors symbolize.

The findings of this research enabled the development of design guidelines discussed in Chapter 7 Design Guidelines. By developing the suggested guidelines the second research question was successfully addressed. However, considering the complex nature of culture, it remains uncertain whether these guidelines represent the optimal approach for designing mobile user interfaces tailored to users from Swedish and Japanese cultures. This research exclusively focuses on examining the impact of cultural differences, specifically in relation to navigation, layout, aesthetics, and colors, as observed within the context of Swedish and Japanese cultures.

The conclusion of this study is that cultural differences influence users' understanding of mobile UI in specific ways, based on particular differences and perceptions adopted in Swedish and Japanese culture. The conclusion drawn from this study's results and analysis refers only to these aspects and their influence on users' understanding of mobile user interfaces. Given the complex nature of culture, which extends beyond individual representation, it is imperative to supplement this research with studies using larger participant samples and quantitative data collection methods.

Consequently, it is not feasible to definitively claim that the first research question has been fully addressed. However, the proposed guidelines serve as a valuable framework to guide designers in cross-cultural mobile application design for Japan and Sweden. Moreover, this study contributes significantly to the field of cross-cultural design and serves as a basis for future research in this field.

It is important to note that this study did not involve an evaluation of the suggested design guidelines. However, a proposed future direction would be to develop a prototype based on these guidelines and assess their practical effectiveness. Replication of this research is necessary to establish its validity. As mentioned, further advancement can be achieved through future studies involving a larger participant sample and employing a combination of qualitative and quantitative research methods.

In conclusion, in the digital age, technology continues to evolve. Designers will have to adapt to new tools to meet tomorrow's expectations. Simultaneously, culture undergoes transformations. Therefore, it is crucial for designers to continuously modify and adjust these guidelines to ensure their relevance and applicability in the dynamic context of the digital age.

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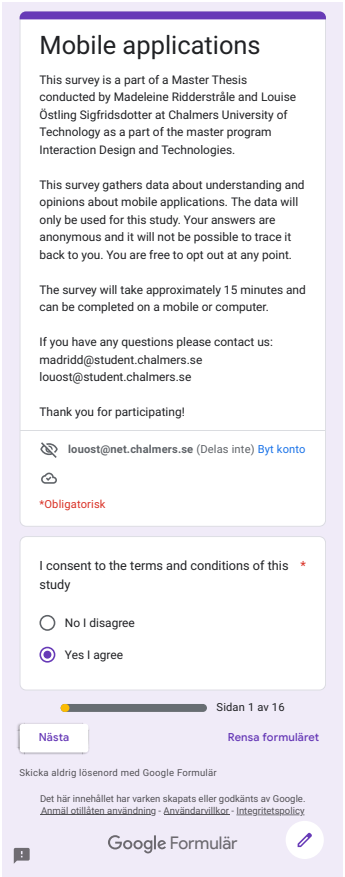
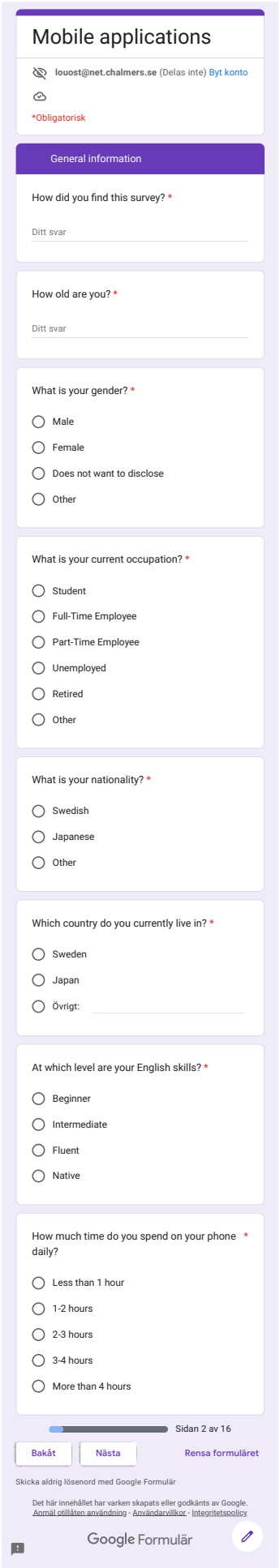
A

Survey

A.1 The Survey design

The following appendix contains images displaying the survey made in Google Forms. The images are screenshots of the survey from a mobile device.





Mobile applications

louost@net.chalmers.se (Delas inte) Byt konto

*Obligatorisk

General information

How did you find this survey? *

Ditt svar

How old are you? *

Ditt svar

What is your gender? *

- Male
- Female
- Does not want to disclose
- Other

What is your current occupation? *

- Student
- Full-Time Employee
- Part-Time Employee
- Unemployed
- Retired
- Other

What is your nationality? *

- Swedish
- Japanese
- Other

Which country do you currently live in? *

- Sweden
- Japan
- Övrigt:

At which level are your English skills? *

- Beginner
- Intermediate
- Fluent
- Native

How much time do you spend on your phone daily? *

- Less than 1 hour
- 1-2 hours
- 2-3 hours
- 3-4 hours
- More than 4 hours

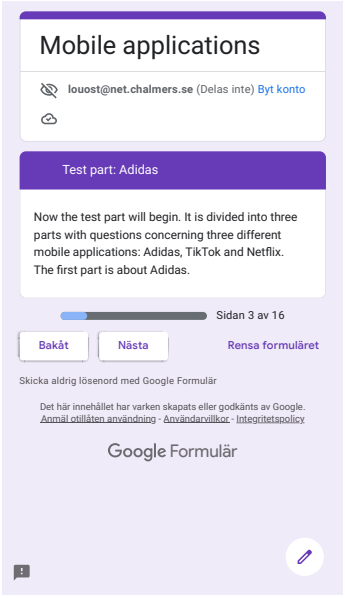
Sidan 2 av 16

Bakåt Nästa Rensa formuläret

Skicka aldrig lösenord med Google Formulär

Det här innehållet har varken skapats eller godkänts av Google.
Anmäl otillåten användning - Användarvillkor - Integritetspolicy

Google Formulär


Mobile applications
louost@net.chalmers.se (Delas inte) Byt konto
Test part: Adidas
Now the test part will begin. It is divided into three parts with questions concerning three different mobile applications: Adidas, TikTok and Netflix. The first part is about Adidas.
Sidan 3 av 16
Bakåt
Nästa
Rensa formuläret
Skicka aldrig lösenord med Google Formulär
Det här innehållet har varken skapats eller godkänts av Google.
Anmäl otillåten användning - Användarvillkor - Integritetspolicy
Google Formulär

Mobile applications

louost@net.chalmers.se (Delas inte) Byt konto

*Obligatorisk

Adidas

Adidas is a company that sells clothing and shoes. They have a mobile application for their customers.

For this task please pretend that you are a customer shopping in the Adidas mobile application. You have added two items in your shopping bag, different types of socks. However you decide that you only want to order the black socks. Therefore you want to remove the white socks from your shopping bag.

What do you do to start the process of **deleting** the white socks from your shopping bag?

What do you do to start the process? Please describe what you would do and motivate why. *

Ditt svar

How confident are you in your decision? *

Not confident at all

1 ○

2 ○

3 ○

4 ○

5 ○

Very confident

Sidan 4 av 16

Bakåt Nästa Rensa formuläret

Skicka aldrig lösenord med Google Formulär

Det här innehållet har varken skapats eller godkänts av Google. Anmäl otillåten användning - Användarvillkor - Integritetspolicy

Google Formulär

Mobile applications

louost@net.chalmers.se (Delas inte) Byt konto

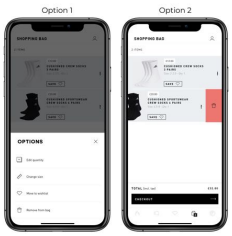
*Obligatorisk

Adidas

In the Adidas mobile application there are two options to delete the white socks. The options are shown in the pictures and their different processes are described in text below.

Option 1: First click on the "more button" (which is the three dots) on the same row as the item you want to delete, then you click on "Remove from bag".

Option 2: Swipe to the left on the same row as the item you want to delete. When swiping to the left a part of the row turns red and an icon of a trash can appears. When swiping far enough the item gets deleted.



Which option do you prefer? *

- Option 1
- Option 2
- I did not prefer Option 1 nor Option 2

Please motivate why you chose the option above. *

Ditt svar

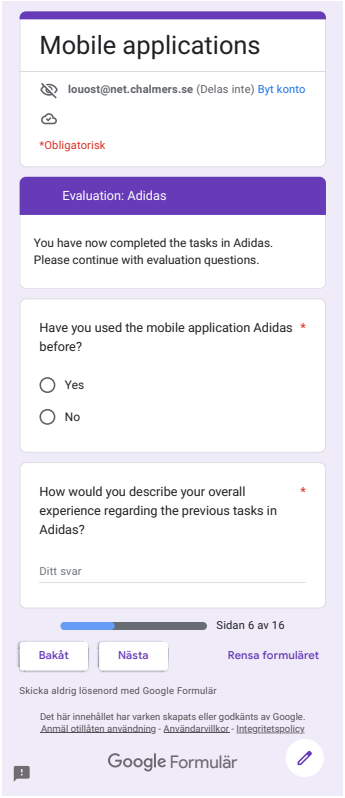
Sidan 5 av 16

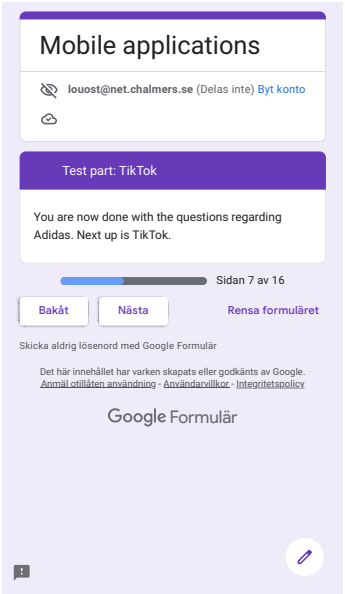
Bakåt Nästa Rensa formuläret

Skicka aldrig lösenord med Google Formulär

Det här innehållet har varken skapats eller godkänts av Google. Anmäl otillåten användning - Användarvillkor - Integritetspolicy

Google Formulär


Mobile applications
louost@net.chalmers.se (Delas inte) Byt konto
*Obligatorisk
Evaluation: Adidas
You have now completed the tasks in Adidas. Please continue with evaluation questions.
Have you used the mobile application Adidas before? *
Yes
No
How would you describe your overall experience regarding the previous tasks in Adidas? *
Ditt svar
Sidan 6 av 16
Bakåt
Nästa
Rensa formuläret
Skicka aldrig lösenord med Google Formulär
Det här innehållet har varken skapats eller godkänts av Google.
Anmäl otillåten användning - Användarvillkor - Integritetspolicy
Google Formulär


Mobile applications
louost@net.chalmers.se (Delas inte) Byt konto
Test part: TikTok
You are now done with the questions regarding Adidas. Next up is TikTok.
Sidan 7 av 16
Bakåt
Nästa
Rensa formuläret
Skicka aldrig lösenord med Google Formulär
Det här innehållet har varken skapats eller godkänts av Google.
Anmäl otillåten användning - Användarvillkor - Integritetspolicy
Google Formulär

Mobile applications

louost@net.chalmers.se (Delas inte) Byt konto

*Obligatorisk

TikTok

TikTok is a social media mobile application where users can watch, create and share videos and live broadcasts.

For this task please pretend that you are a user in the mobile application TikTok. Your current username is @svangcjvf99 and you would like to change it.

What do you do to start the process of **changing your username** at TikTok?

What do you do to start the process? Please describe what you would do and motivate why. *

Ditt svar

How confident are you in your decision? *

Not confident at all

1 2 3 4 5

Very confident

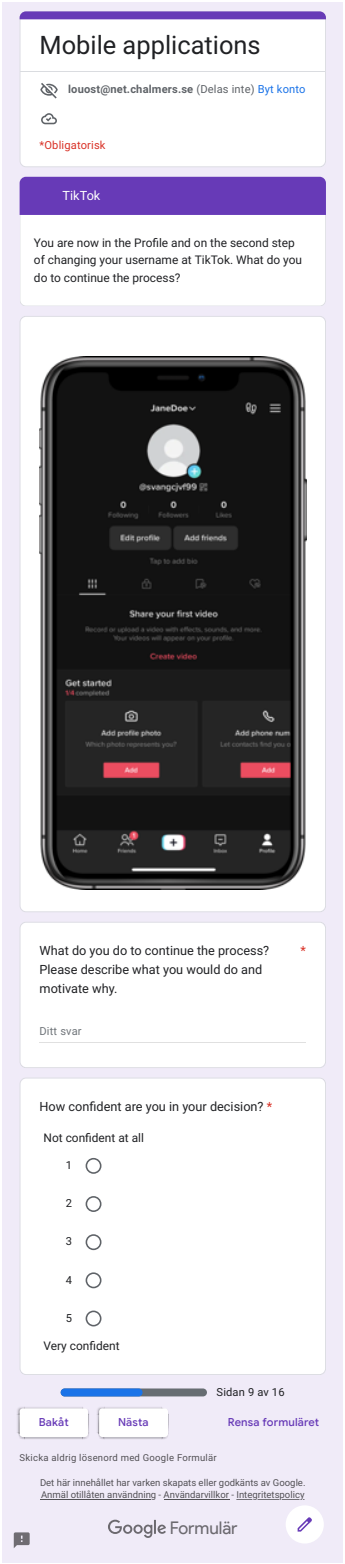
Sidan 8 av 16

Bakåt Nästa Rensa formuläret

Skicka aldrig lösenord med Google Formulär

Det här innehållet har varken skapats eller godkänts av Google.
Anmäl otillåten användning - Användarvillkor - Integritetspolicy

Google Formulär



Mobile applications

louost@net.chalmers.se (Delas inte) Byt konto

*Obligatorisk

TikTok

You are now in the Profile and on the second step of changing your username at TikTok. What do you do to continue the process?

What do you do to continue the process? Please describe what you would do and motivate why. *

Ditt svar

How confident are you in your decision? *

Not confident at all

1 ○

2 ○

3 ○

4 ○

5 ○

Very confident

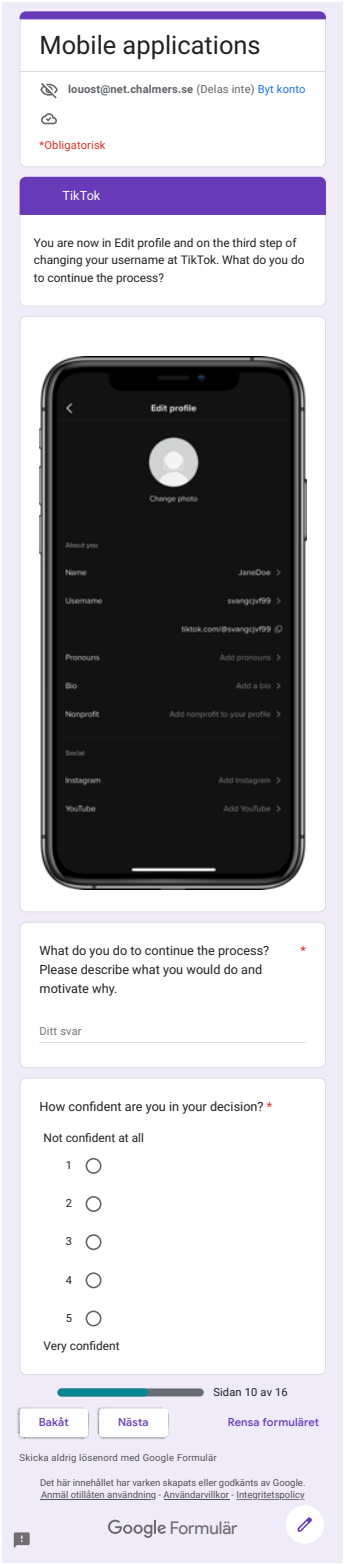
Sidan 9 av 16

Bakåt Nästa Rensa formuläret

Skicka aldrig lösenord med Google Formulär

Det här innehållet har varken skapats eller godkänts av Google.
Anmäl otillåten användning - Användarvillkor - Integritetspolicy

Google Formulär



Mobile applications

louost@net.chalmers.se (Delas inte) Byt konto

*Obligatorisk

TikTok

You are now in Edit profile and on the third step of changing your username at TikTok. What do you do to continue the process?

What do you do to continue the process? Please describe what you would do and motivate why. *

Ditt svar

How confident are you in your decision? *

Not confident at all

1 ○

2 ○

3 ○

4 ○

5 ○

Very confident

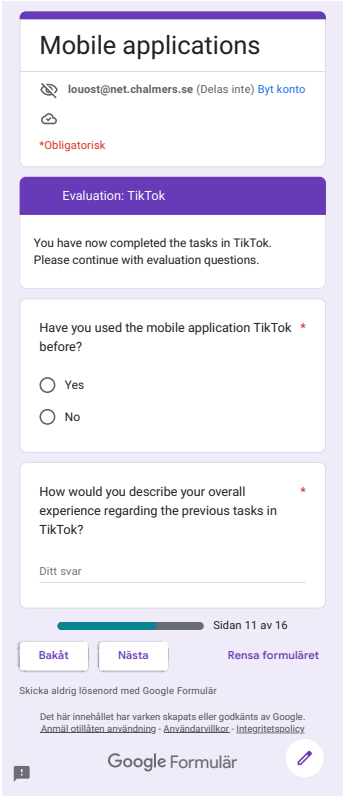
Sidan 10 av 16

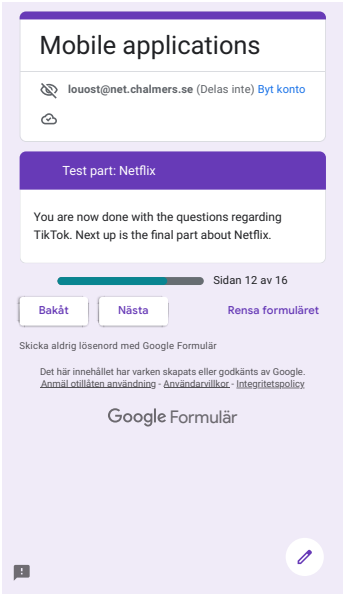
Bakåt Nästa Rensa formuläret

Skicka aldrig lösenord med Google Formulär

Det här innehållet har varken skapats eller godkänts av Google.
Anmäl otillåten användning - Användarvillkor - Integritetspolicy

Google Formulär


Mobile applications
louost@net.chalmers.se (Delas inte) Byt konto
*Obligatorisk
Evaluation: TikTok
You have now completed the tasks in TikTok. Please continue with evaluation questions.
Have you used the mobile application TikTok before? *
Yes
No
How would you describe your overall experience regarding the previous tasks in TikTok? *
Ditt svar
Sidan 11 av 16
Bakåt
Nästa
Rensa formuläret
Skicka aldrig lösenord med Google Formulär
Det här innehållet har varken skapats eller godkänts av Google.
Anmäl otillåten användning - Användarvillkor - Integritetspolicy
Google Formulär


Mobile applications
louost@net.chalmers.se (Delas inte) Byt konto
Test part: Netflix
You are now done with the questions regarding TikTok. Next up is the final part about Netflix.
Sidan 12 av 16
Bakåt
Nästa
Rensa formuläret
Skicka aldrig lösenord med Google Formulär
Det här innehållet har varken skapats eller godkänts av Google.
Anmäl otillåten användning - Användarvillkor - Integritetspolicy
Google Formulär

Mobile applications

louost@net.chalmers.se (Delas inte) Byt konto

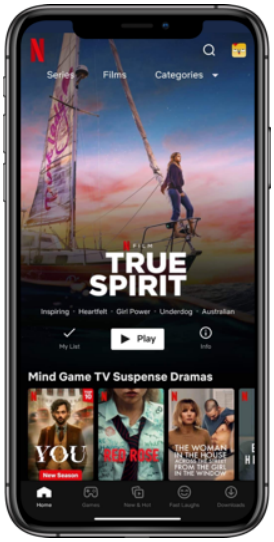
*Obligatorisk

Netflix

Netflix is a streaming service for movies and TV shows. In their mobile application users can select between many different films and series to watch.

For this task please pretend that you are a user in the mobile application Netflix. You want to watch a action film on Netflix.

What do you do to start the process of **finding an action film** at Netflix?



What do you do to start the process? Please describe what you would do and motivate why. *

Ditt svar

How confident are you in your decision? *

Not confident at all

1 ○

2 ○

3 ○

4 ○

5 ○

Very confident

Sidan 13 av 16

Bakåt Nästa Rensa formuläret

Skicka aldrig lösenord med Google Formulär

Det här innehållet har varken skapats eller godkänts av Google.
Anmäl otillåten användning - Användarvillkor - Integritetspolicy

Google Formulär

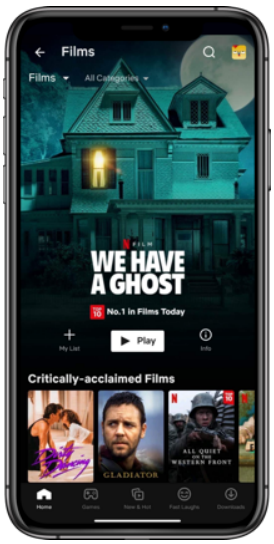
Mobile applications

louost@net.chalmers.se (Delas inte) Byt konto

*Obligatorisk

Netflix

You are now in Films and on the second step of finding an action film at Netflix. What do you do to continue the process?



What do you do to continue the process? Please describe what you would do and motivate why. *

Ditt svar

How confident are you in your decision? *

Not confident at all

1 ○

2 ○

3 ○

4 ○

5 ○

Very confident

Sidan 14 av 16

Bakåt Nästa Rensa formuläret

Skicka aldrig lösenord med Google Formulär

Det här innehållet har varken skapats eller godkänts av Google.
Anmäl otillåten användning - Användarvillkor - Integritetspolicy

Google Formulär

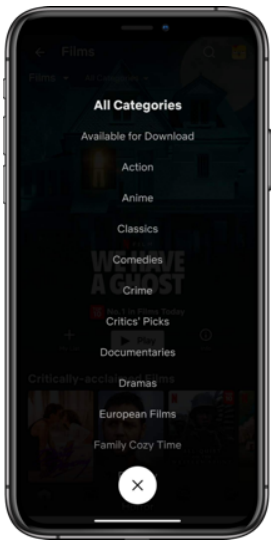
Mobile applications

louost@net.chalmers.se (Delas inte) Byt konto

*Obligatorisk

Netflix

You are now in Categories and on the third step of finding an action film at Netflix. What do you do to continue the process?



What do you do to continue the process? Please describe what you would do and motivate why. *

Ditt svar

How confident are you in your decision? *

Not confident at all

1 ○

2 ○

3 ○

4 ○

5 ○

Very confident

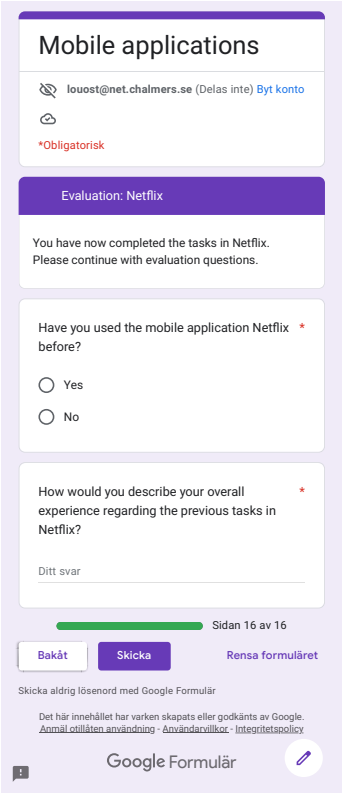
Sidan 15 av 16

Bakåt Nästa Rensa formuläret

Skicka aldrig lösenord med Google Formulär

Det här innehållet har varken skapats eller godkänts av Google.
Anmäl otillåten användning - Användarvillkor - Integritetspolicy

Google Formulär



A.2 Link to Survey data

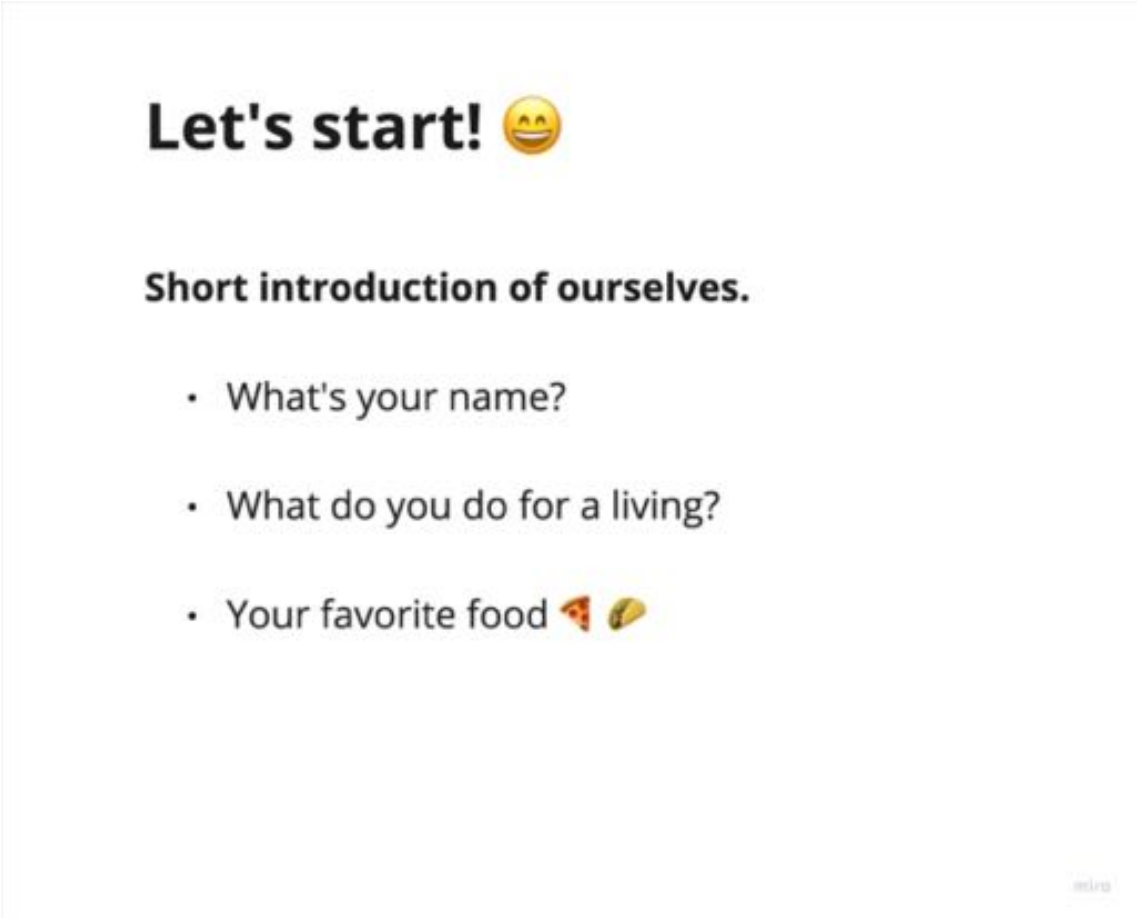
Link to Excel file of survey data: `https://docs.google.com/spreadsheets/d/1EVEQh7BdYJSBm8XdUNKT5NHr7aL8obbeYNp8VEv0avs/edit?usp=sharing`

B

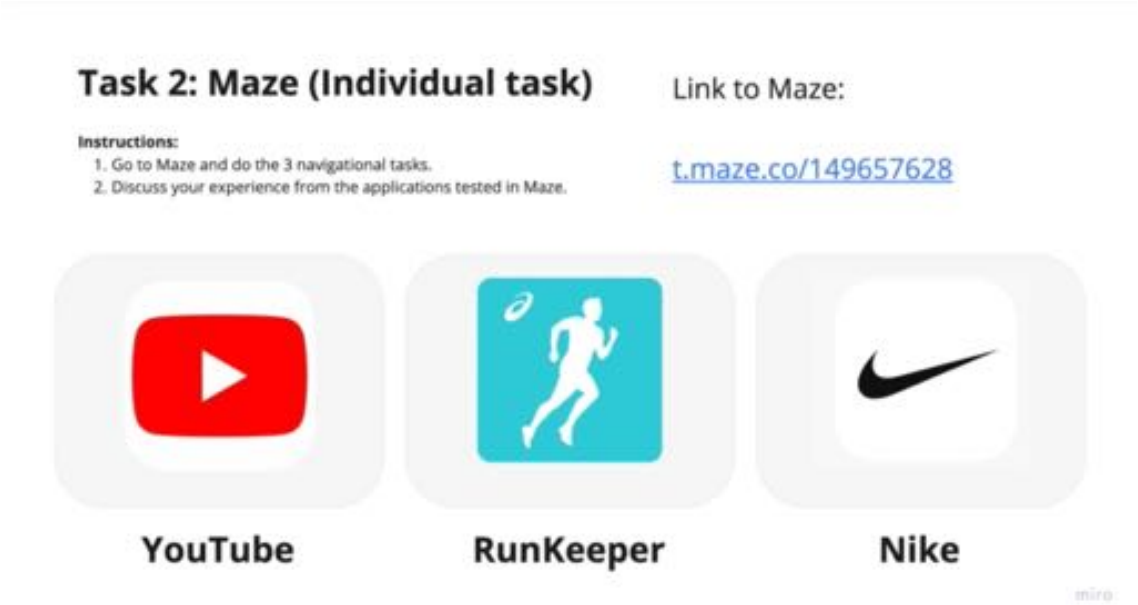
Focus Group Discussions

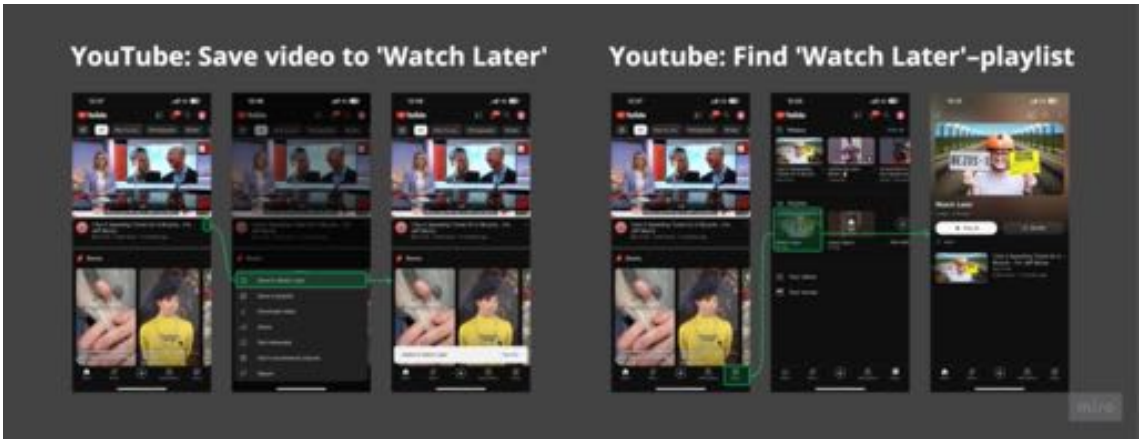
B.1 The Focus Group Discussion Tasks

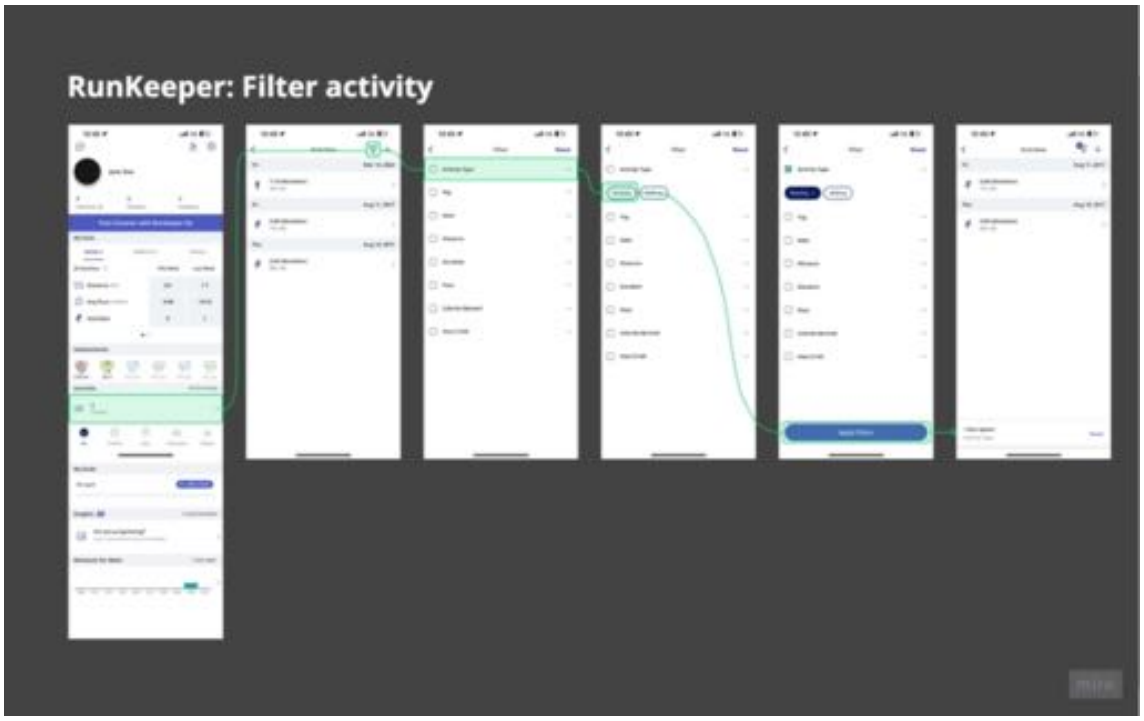
The following appendix contains images displaying the focus group discussion tasks made in Miro. The images were displayed to the participants during the two focus group discussions by screen-sharing.

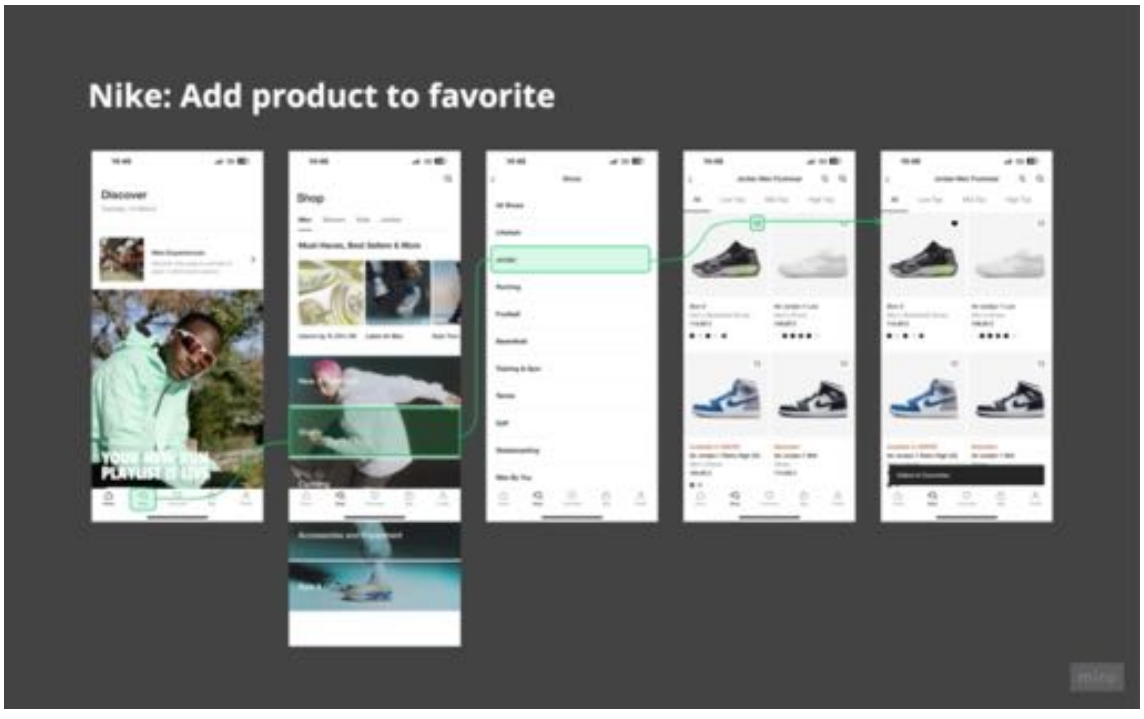

Let's start! 😄
Short introduction of ourselves.
• What's your name?
• What do you do for a living?
• Your favorite food 🍕 🌮
miro


Task 1: Favorite App and Aspects (Individual task)
Instructions:
1. Think about an app you use and like.
2. Write down the name of the app and the 3 best aspects of that app.
3. Send your answer in the chat.
miro


Task 2: Maze (Individual task)
Instructions:
1. Go to Maze and do the 3 navigational tasks.
2. Discuss your experience from the applications tested in Maze.
Link to Maze:
t.maze.co/149657628
YouTube
RunKeeper
Nike


YouTube: Save video to 'Watch Later'
Youtube: Find 'Watch Later'-playlist


RunKeeper: Filter activity


Nike: Add product to favorite
Discover
Shop

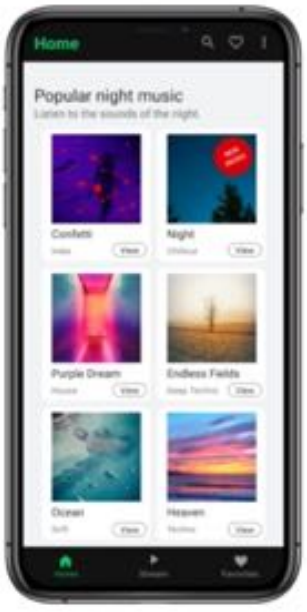
Task 3: Music App Designs (Group discussion)

Instructions:
In this task we will show you two different designs of the same screen from a fake music application.

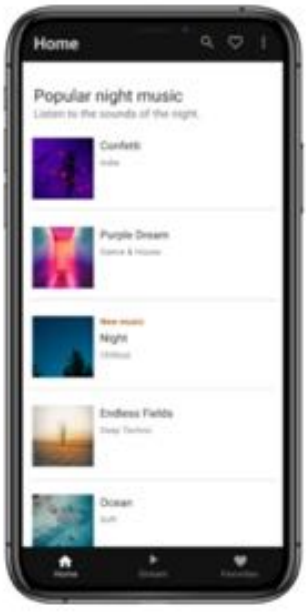
Your task is to together discuss the two design options.

miro

Design 1



Design 2



miro

Task 4: Scenarios (Group task)

You will now as a group look at **4 different scenarios** about companies that are about to launch their new applications. The companies need to decide what colors to use for their new apps.

Instructions:
Your task as a group is to choose a **color scheme** that you think is **best to use** for each company.

There is no right or wrong, only your own opinions.

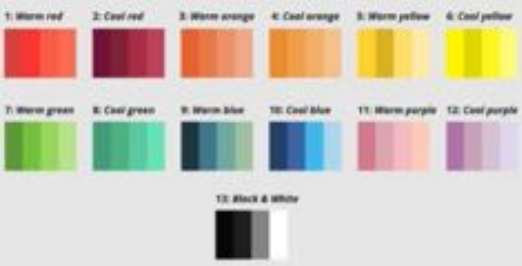
miro

Scenario 1: Meditation App

A company focused on **Health** and **Wellbeing** needs to decide what color scheme they will use for their new application. The app is supposed to guide users on how to meditate and relax by using different breathing exercises.

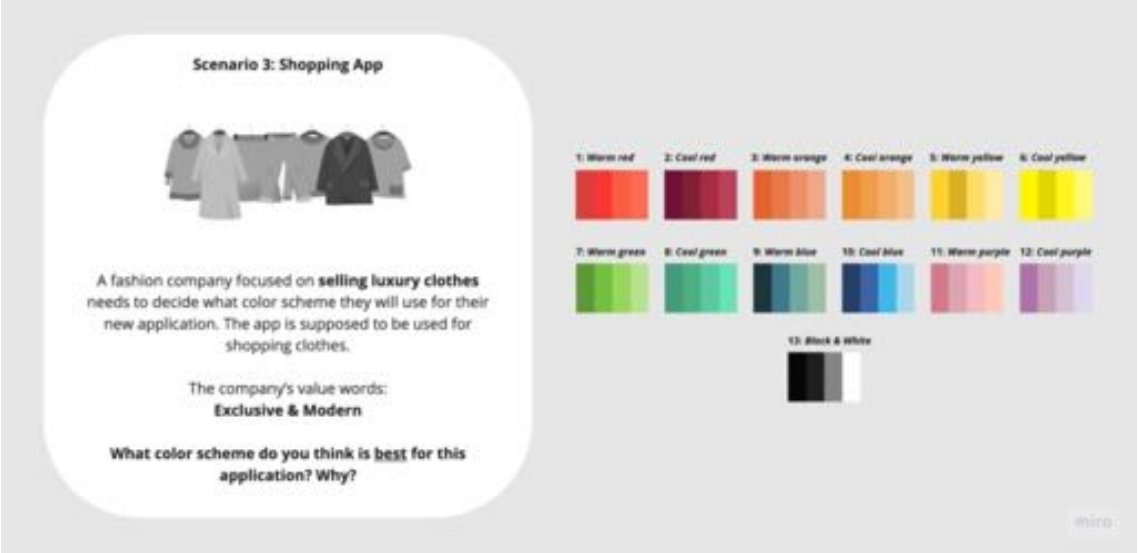
The company's value words:
Calm, Healing & Relax

What color scheme do you think is best to use for this application?



miro


Scenario 2: Work-out App
A company focused on Exercise and Fitness needs to decide what color scheme they will use for their new application. The app is supposed to be used to get inspiration for exercises and seeing results/statistics.
The company's value words:
Energy & Power
What color scheme do you think is best for this application? Why?
1: Warm red
2: Cool red
3: Warm orange
4: Cool orange
5: Warm yellow
6: Cool yellow
7: Warm green
8: Cool green
9: Warm blue
10: Cool blue
11: Warm purple
12: Cool purple
13: Black & White
miro


Scenario 3: Shopping App
A fashion company focused on selling luxury clothes needs to decide what color scheme they will use for their new application. The app is supposed to be used for shopping clothes.
The company's value words:
Exclusive & Modern
What color scheme do you think is best for this application? Why?
1: Warm red
2: Cool red
3: Warm orange
4: Cool orange
5: Warm yellow
6: Cool yellow
7: Warm green
8: Cool green
9: Warm blue
10: Cool blue
11: Warm purple
12: Cool purple
13: Black & White
miro

B.2 Links to Focus Groups transcripts

Link to Transcription Swedish focus group: `https://docs.google.com/document/d/1JMIhcLAx5PJPbPiOa79FhGXExxz0vvgTOdvs_73gnrE/edit?usp=sharing`

Link to Transcription Japanese focus group: `https://docs.google.com/document/d/15VoVI8Vr-qgyrSoXaBclKgAulPmfUP6Lyd7DP8V-67c/edit?usp=sharing`

C

Maze results

C.1 The Maze click results

The following appendix contains tables displaying the click results generated from the focus group discussion task in Maze (Task 2).

YouTube Task 1			
Participant ID	**Clicks to reach goal (screen 1)**	**Clicks to reach goal (screen 2)**	**Used the app before**
1	1	1	YES
2	1	1	YES
3	8	Unfinished	YES
4	1	7	YES
5	5	1	YES
6	1	1	YES
7	3	Unfinished	NO

YouTube Task 2			
Participant ID	**Clicks to reach goal (screen 1)**	**Clicks to reach goal (screen 2)**	**Used the app before**
1	4	1	YES
2	21	8	YES
3	17	5	YES
4	1	3	YES
5	2	1	YES
6	3	2	YES
7	17	2	NO

RunKeeper						
Participant ID	**Clicks to reach goal (screen 1)**	**Clicks to reach goal (screen 2)**	**Clicks to reach goal (screen 3)**	**Clicks to reach goal (screen 4)**	**Clicks to reach goal (screen 5)**	**Used the app before**
1	8	1	1	1	1	NO
2	34	1	2	1	4	NO
3	7	7	4	1	1	YES
4	Unfinished					
5	3	1	1	1	1	NO
6	4	2	1	1	1	NO
7	2	7	1	1	2	NO

Nike					
Participant ID	**Clicks to reach goal (screen 1)**	**Clicks to reach goal (screen 2)**	**Clicks to reach goal (screen 3)**	**Clicks to reach goal (screen 4)**	**Used the app before**
1	1	1	1	2	NO
2	1	3	1	2	NO
3	5	2	21	153 Unfinished	NO
4	1	1	1	19	NO
5	3	1	1	3	YES
6	1	4	1	4	YES
7	1	6	1	2	NO

D

Color symbolism

D.1 Table of the color palettes symbolism

The following appendix contains a table displaying all coding made from the analysis of the focus group discussion task about color symbolism (Task 4).

Color palette	Sweden	Japan
Warm red	Loud Sales Gender neutral Price tag	Happiness Energy Power
Cool red	Romance Love Happiness Relaxing Lipstick	Wine Grown up color Not for summer Love Happiness
Warm orange	Energy Power	Love Happiness
Warm yellow		Luxury and expensive (gold)
Cool yellow	Sales Discount Cheap	
Warm green	Nature	Nature Trees Te Calm Healing Relaxing
Cool green	Nature	Nature Trees Te Calm Healing Relaxing

Warm blue	Nature Ocean Calm Healing Relaxing Could associate to luxury	Not for summer
Cool blue	Nature Ocean Calm Healing Relaxing	
Warm purple	Feminine Could associate to luxury	Feminine
Cool purple	Feminine Could associate to luxury	Feminine
Black and white	Bad weather Rain Exclusive Modern	Dark mode in mobiles Work out clothes Gym environment Common in apparel shopping Energy Power Exclusive Modern