

# A Qualitative Cross-National Study of Cultural Influences on Mobile Data Service Design

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## Abstract

As the use of mobile data services has spread across the globe, the effect of cultural differences on user requirements has become an important issue. To date, however, little research has been conducted on the role cultural factors play in the design of mobile data services. This paper proposes a set of critical design attributes for mobile data services that takes cross-cultural differences into account. To determine these attributes, we devised a qualitative method and conducted in-depth long interviews in Korea, Japan, and Finland. We found 52 attributes considered important by mobile data service users, and 11 critical attributes that showed a clear correlation with characteristics of the user's culture. The paper concludes with a discussion of limitations and of implications for developers of mobile data services.

**Categories & Subject Descriptors:** *The following is just an example:* H.5.2 [User Interfaces]: User-centered design

**General Terms:** Design, Human Factors

**Keywords:** Culture, Mobile data services, Qualitative research.

## INTRODUCTION

In an increasingly global marketplace, Human Computer Interaction (HCI) practitioners are faced with the challenge of offering usable products and services to an enormous variety of users [13]. Numerous factors may contribute to differences in these users' requirements, including tangible factors, such as language and infrastructure, and cultural factors [6]. Cultural factors exert an influence on how web and other technology applications are used that is above and beyond the

influence of tangible factors [22]. In fact, concrete factors that one can clearly observe are often just surface features of a less tangible, culturally-inflected whole. Culture also has a strong effect on what users look for in a system's interface and how they interpret such interfaces. Thus it is commonly recognized that elements of a user interface appropriate for one culture may not be appropriate for another [9]. Therefore, user interface elements require localized designs for different cultural groups [22]. It should also be noted that, as use of mobile data services has spread globally, cultural factors have had a stronger effect on their use than on the use of traditional stationary Internet applications. This is because mobile devices are designed to interface with wireless networks that operate only in local areas, whereas devices that access the stationary Internet are globally uniform.

Despite the importance of these cultural factors, little research has been performed to study them. Though a few endeavors in the field of HCI have addressed cross-cultural issues [4, 15, 19], most studies have adopted a surface-level approach to interface localization, focusing on such issues as language [3]—addressing, for instance, how software products and online services are localized by translating text from one language into another. But simply translating messages and online documents is not enough to localize them culturally [19]. Because both technologies and online services are cultural amplifiers [17], deeper levels of localization need to be considered, including cultural aspects of the locales where they will be used.

To address this gap in the research, we elicited critical attributes that users in three distinct cultures required of mobile data services. First, we interviewed 24 people in Korea, Japan, and Finland, asking each subject to view video clips of mobile data services and to discuss their impressions. These three countries are considered mature or advanced markets for mobile data services because of their early adoption of these services and the rapid increase in the number of mobile data service users. As for methodology, the interview is one of the best ways to obtain immediate and rich qualitative information that derives from users' actual words. Compared with numerical summaries of survey data, the data from inter-

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views has a more concrete, vivid, and meaningful flavor that indeed often proves far more persuasive [16]. Our long-interview method elicited fifty-two substantial attributes of mobile data services.

Second, we identified relationships between these significant attributes of mobile data services and the culture to which an interview subject belonged. We adopted four cultural dimensions proposed by Hofstede [10] and Hall [7, 8] and applied them to terms used recurrently by our interview subjects as they discussed their preferences regarding mobile data services. In this way, we concluded that users' preferences for design attributes of mobile data services differ from country to country along cultural lines.

## **CULTURE**

Hofstede [10] defines culture as “the collective programming of the mind which distinguishes the members of one group from people from another.” In other words, culture cannot be understood by studying one individual; rather, culture can only be read clearly as a set of shared characteristics within a group of people that affects the behaviors of individual members by providing norms for that group. In addition, culture binds itself not only to the visible aspects of a group, but also to a wider range of intangible aspects that includes thoughts, values, and behavior. Culture can be conceptualized as a set of significant variables that informs the responses of individuals in that culture to new ideas, practices, and technologies, including mobile data services.

Several recent research endeavors in the field of HCI were of particular interest to our study because they bear directly on our interest in cross-cultural aspects of mobile data services. For example, in a comparative study of Chinese software developers, whom Hall [8] had found to carry high-context cultural backgrounds, and American software developers, whom Hall had found to be from low-context cultural backgrounds, Choong and Salvendy [2] observed that Chinese software developers performed better within an iconic or pictorial mode, while their American counterparts were more successful in an alphanumeric mode. Similarly, using focused-group interviews (FGI), surveys, and usability testing, Honold [12] found that while German cellular phone users prioritized clearly-written and comprehensive user manuals, Chinese cellular phone users cared more about the quality of pictorial information.

Marcus and Gould [15] applied the intangible cultural dimensions suggested by Hofstede [10] to website design. They found that cultural elements are embedded in user interfaces as a set of contextual and social cues that facilitate use. They also suggested that Hofstede's cultural dimensions can be mapped to specific user interface components such as metaphors, mental models, navigation, interaction, and appearance. For example, mapping uncertainty avoidance to navigation, they proposed that high uncertainty-avoidance countries prefer restricted options and simple controls, while low un-

certainty-avoidance countries prefer multiple options and complex controls. This mapping procedure allowed them to suggest guidelines for website user-interface design that were based on the cultural dimensions laid out by Hofstede.

## **CULTURAL DIMENSIONS**

In order to create a basis for localizing product design, we must clearly identify key factors that differentiate cultures from one another [12], and, in order to do that, we need a robust conceptual framework through which we understand culture in the first place. Many researchers have conceived of culture in terms of sets of dimensions [20], and we have, accordingly, adopted two proposed cultural dimensions from Hofstede [11] and two from Hall [9]. These four dimensions are widely considered the most general and thus the most suitable to the comparative study of culture. They have been affirmed by many researchers as a valid and useful means of systematic classification [4, 11], and they are considered to bear directly on the connection between product design and user behavior [4]. An explanation of the four cultural dimensions follows.

### **1.1 UNCERTAINTY AVOIDANCE**

Uncertainty avoidance can be defined as “the extent to which the members of a culture feel threatened by uncertainty and ambiguity, along with their eagerness to avoid such situations” [10]. People in high uncertainty-avoidance cultures view uncertainty as dangerous and show a low tolerance for risk. They tend to avoid uncertain or ambiguous situations by believing in absolute truths and expertise, by seeking stability, and by rejecting unusual ideas and behaviors. In contrast, people in low uncertainty-avoidance cultures deal well with vagueness and can be characterized as risk-takers.

Uncertainty-avoidance may have a significant bearing on the use of mobile data services. Users from a culture that tends toward uncertainty-avoidance are likely to refrain from using mobile services when the quality of the service is uncertain or uneven compared to that of traditional Internet services. They may also refrain from using new mobile data services before others use them widely. These users may also feel uncomfortable when faced with an unusual interface or unfamiliar feedback during the use of mobile data services [5].

### **1.2 INDIVIDUALISM VS. COLLECTIVISM**

Individualism represents a preference for a loosely-knit social framework where people are expected to take care of themselves and their own interests, whereas collectivism indicates an inclination toward a tightly-knit social framework where people expect their companions to look out for their welfare and where personal goals are subordinated to those of the group [10].

Like uncertainty-avoidance, this dimension may have an important bearing on the use of mobile data services. Because users from a culture with individualistic tendencies select services based on personal appropriateness, it can be inferred

that these users will opt for mobile data services that are more personalized. Meanwhile, people with a collectivist inclination may tend to use services that enable them to feel more connected to other people. Also, because highly individualistic cultures emphasize personalized goals [1], users from such cultures may prefer a mobile data service interface they can customize.

### 1.3 CONTEXT

Context is defined by Hall [8] as the information that surrounds an event. A communication or message in a high-context culture is indirect and implicit. In contrast, low-context cultures are characterized by explicit messages and direct communications. Therefore, people in high-context cultures tend to rely on visual elements and symbols, whereas people in low-context cultures tend to rely on hard facts and statistical data.

The degree to which a culture relies on context may affect how it uses mobile data services. Users in high-context cultures may prefer implicative and indirect expressions when they communicate with others using mobile data services [5]. They may also prefer symbolic and animated forms of information and implicative menus with icons [2]. In contrast, users in low-context cultures may want information in the form of explanatory texts and text-based explicit menus.

### 1.4 TIME PERCEPTION

Hall [7] identified two distinct notions of time: monochronic and polychronic. People in monochronic cultures carry out only one task at a time, proceeding in a sequential and linear manner. They are task-oriented, accentuate rapidity, and stick to their plans. People in polychronic cultures perform many things at once and proceed in a simultaneous and concurrent manner. They are more inclined to change plans, and place emphasis on relationships rather than on tasks.

Like the other dimensions discussed here, time perception may play an important role in the use of mobile data services. Since polychronic people are less organized [11], such users might use mobile data services not only for planned purposes but also those for unexpected ones. Time perception may also influence users' perceived waiting time. Rose et al. [18] found that participants from polychronic societies were less troubled by download delays and perceived the delays to be shorter than people from monochronic cultures did. Therefore, when users of mobile data services perform a task that involves a given time delay, polychronic users will likely be more resilient to the delay than monochronic users.

### DATA COLLECTION

For this study, we performed long interviews in which subjects discussed their impressions of video clips. The use of video clips has been advocated in cultural studies because it embeds the study firmly in a realistic paradigm of an actual environment [1]. In addition, as it was impossible to use mobile data services outside of the original countries (subjects in

Korea, for instance, could not use mobile data services available in Japan), use of video clips of mobile data services allowed us to perform the necessary cross-cultural comparisons economically.

To prepare the video clips, we recorded the actual process of using mobile data services in four specific use cases in each of the three countries. Four services popular in all three countries were selected as use cases: downloading ring tones, downloading games, reserving movie tickets, and reading sports news.

For the ring-tone download service, we adopted this use case:

- Find the menu where you can download ring tones.
- Select the fourth most popular ring tone on the menu.
- Preview the selected ring tone before downloading.
- Download the ring tone to your mobile phone.
- Listen to the ring tone you downloaded.

The game-download service use case took place as follows:

- Find the menu where you can download mobile games.
- Select the fourth most popular game on the menu.
- Preview the selected game before downloading.
- Download the game to your mobile phone.
- Play the game you downloaded for 5 minutes.

The use case for reserving movie tickets was as follows:

- Find the menu where you can reserve movie tickets.
- Select the fourth movie on the menu list.
- Select the fourth theater on the list.
- Select the latest time on the list and reserve one movie ticket.

Lastly, the use case for reading sports news was as follows:

- Find the menu where you can read sports news.
- Select the fourth newspaper on the menu list.
- Select the fourth news item on the list.
- Read the sports news you selected.

In most cases, we selected the fourth items on the menus to show our interviewees more of the navigation process. We recorded video clips of the same four use cases in Korea, Japan, and Finland, producing 12 video clips in total. While recording these use cases, we read the menu items out loud three times, first in the native language, and then in the other two languages, so that people in the other two countries could follow the process.

For the pilot test, one Japanese, one Finnish, and four Korean users who had lived in their own countries for more than ten

years were shown the video clips and then interviewed. Details of the interview procedure were revised based on the pilot test results. Following this revised procedure, we interviewed 24 people, eight of them Korean, eight Japanese, and eight Finnish. Among the Korean participants, the average age was 23.6, and gender was balanced at 50% male and 50% female. Five of the Korean subjects were university students, two worked for a game company, and one managed a small website. Among the Japanese participants, the average age was 26.8, and gender was again balanced at 50% male, 50% female. In this group, six were students and two were housewives. Among the Finnish participants, the average age was 31.1. Five were female and three male. As in the other two countries, the majority (six) were university students; one was a system engineer, and one a housewife.

During the interview process, each interviewee watched the video clip of his or her own country's mobile data service first, and then video clips of services in the other two countries. We instructed participants to watch each video clip at their own pace, taking as much time as they needed to verbalize what they "thought and/or felt." Whenever a participant had something to say, the video clip was stopped by the interviewer. Similarly, if a participant wished to see a past screen, the interviewer rewound the video clip and found the requested scene.

Interviewees were also asked some general questions when they finished watching one country's video clips. To avoid leading or biasing their answers—that is, to get at the users' thoughts and feelings with the least possible filtering through the perceptions of the interviewers [14]—all interview questions were open-ended and designed to encourage spontaneous and natural responses. For example, subjects were asked questions like "What do you think of the overall process of the Japanese mobile data services?" and "Is there anything about the Korean mobile data services you didn't like?" In addition, if interviewees had their own questions about the video clips, we answered them faithfully. Each interview took more than three hours. We obtained each participant's agreement ahead of time to recording the entire interview. Reviewing the recordings, we transcribed all 24 interviews verbatim. The transcripts were prepared in the native language first, and then translated into Korean by bilingual transcribers.

## DATA ANALYSIS

First, raw data in the transcripts was broken down by theme and analyzed to conceptualize, label, and categorize the design attributes interviewees considered important when viewing clips of the four mobile data services. A total of 52 mobile data service attributes were elicited. All 52 attributes are shown in Table 1, along with the preferences our interviewees expressed regarding each attribute. To ensure reliability in the classification process, two independent coders classified interviewee comments into the 52 categories. The Kappa ratio

for inter-coder reliability was found to be 0.83, significantly higher than the 0.70 threshold value suggested by prior studies [21]. Discrepancies between the two independent coders were reconciled through mediation by the authors.

We then investigated participant preferences for the 52 attributes, based on comments explicitly made by the interviewees. It was found that among the 52 attributes, some, such as "scroll-by-page" and "home-button," were mentioned only by a small number of interviewees. To isolate design attributes considered important in the three countries, we eliminated attributes that were not referred to at least once by at least 90% of each country's interviewees. Forty-one attributes were eliminated in this way, leaving 11 attributes commonly considered important by interviewees in the three countries. These attributes are shown in Table 2.

Lastly, we investigated each interviewee's cultural characteristics and related them to those 11 attributes. We coded each interviewee's cultural characteristics based on their verbal comments, and then grouped those with similar characteristics together according into the four cultural dimensions. In cases where an interviewee expressed different opinions regarding the same attribute for different reasons, we coded those responses into different cultural dimensions. For example, most Japanese participants preferred a variety of contents to avoid vagueness. However, at the same time, they did not like a variety of contents because it impeded their search for their own favorite contents. Thus we coded the Japanese participants as liking a variety of contents from the perspective of uncertainty-avoidance, and as disliking the same attribute from the perspective of individualism.

## RESULTS

Hofstede [10] and Hall [7, 8] measured cultural traits at the national level. For example, according to Hofstede [10], Korean and Japanese societies belong to the high uncertainty-avoidance group, whereas Finnish society belongs to the low uncertainty-avoidance group.

Similarly, our interview results found that people in the same country demonstrated similar cultural characteristics in terms of their preferences in mobile data services. Most subjects of the same nationality were inclined to prefer or dislike the same design attributes, and the reasons why they had those preferences tended to be affected by their cultural characteristics. Moreover, cultural characteristics of most participants in each country matched Hofstede [10]'s and Hall [7, 8]'s classifications, except in the case of time perception: although Hall [7] identified two discrete notions, the interview results indicate that participants in all three countries had only monochronic time perception.

Meanwhile, there were some people who expressed preferences opposite to those of other subjects from the same country. It may be that as individuals they had traits that diverged from those of their national culture.

No	Attribute	% of subjects preferring			No	Attribute	% of subjects preferring		
		Korean	Japanese	Finnish			Korean	Japanese	Finnish
1	Minimal Step or Keystrokes	+100%	+100%	+100%	27	Providing Search Facilities	+30%	+80%	+80%
2	Logical Ordering of Menu Items	+100%	+90%	+90%	28	Ability to Send Contents as Gift	+50%	+/- 50%	-50%
3	Efficient Layout or Space Usage	+100%	+90%	+80%	29	Preview Function Provided	+50%	+50%	+/- 50%
4	Variety of Font Sizes	+90%	+100%	+30%	30	Selection of Contents through CP List	-50%	+/-50%	-50%
5	Variety of Font Colors	+90%	+90%	-90%	31	Fast Contents Downloading Speed	+60%	+50%	+40%
6	Iconic Menu Style	+90%	+90%	-90%	32	High Graphic Quality	+40%	+60%	+30%
7	Clear Menu Labeling	+100%	+90%	+40%	33	High Sound Quality	+40%	+30%	+30%
8	Large Amounts of Information within a Screen	+90%	+100%	+/- 50%	34	Appropriate Font Style	+30%	+40%	
9	Various Options for Contents	+30%	+100%	+100%	35	Prompt Updates of Contents	+40%	+10%	
10	Secondary Information about Contents	+100%	+/- 90%	-90%	36	Bookmark Function Provided	+/- 60%	+/- 40%	+10%
11	Variety of Contents	+90%	+/- 90%	+90%	37	Proper Screen Size	+50%	+80%	+30%
12	Ordering of Contents List Based on Popularity Ranking	+80%	+/-80%	-80%	38	User's Navigation History Provided	+30%	+10%	
13	Proper Menu List Length	+80%	+80%	+80%	39	Page Number Cues Provided	+30%		+30%
14	Fast Page Loading Speed	+80%	+80%	+60%	40	Related Items Provided at End of Contents Page	+30%	10%	+30%
15	Number Key Provided	+80%	+/- 80%	+60%	41	Direct Access through Keying URL	+10%	+40%	+10%
16	Representation of Long Menu in a Single Line	+80%	+60%	-80%	42	Convenient Way of Operating Keys	+30%		+10%
17	Colorful Screen Design	+80%	+80%	-60%	43	Consistent Location of Buttons	+40%	+40%	+10%
18	Network Connection Fee	+80%	+80%	+60%	44	Information of CP Provided	+40%		-50%
19	Page Partition	-80%	-60%	+80%	45	Progressive Bar Provided	+30%	+10%	
20	Meaningful Classification or Categorization of Contents	+80%	+80%	+40%	46	Requiring Personal Information	-30%	-30%	-30%
21	No Advertisements	+ 50%	+/- 80%	+ 80%	47	Cue for the Present Location within a Page Provided	+30%	+10%	
22	Proper Contents Price	+80%	+80%	+30%	48	Other Users' Experience Provided	+10%		
23	Proper Charging System	+80%	+60%	+50%	49	Hot Keys for Screen-Up Provided	+30%	+10%	+10%
24	Fast Reaction Speed for Operating Keys	+80%	+40%	+30%	50	Scroll by Page	+10%		+10%
25	Proper Space between Lines	+60%	+80%	+50%	51	Home Button Provided	+10%		+10%
26	Personalized Service	+30%	+50%	+80%	52	Proper Service Classification	+50%		+60%

**Table 1. Fifty-two attributes and percentage of subjects preferring (+: preferred, -: not preferred, +/-: both preferred and not preferred)**

Before we explain the national and individual differences, let us first present one attribute that was mentioned by all 24 study participants. All of the interviewees said that “minimal steps or keystrokes” was a significant attribute when using mobile data services. This attribute was preferred by all participants because it enabled them to perform their tasks in a shorter time. Therefore, minimal steps or keystrokes may be an attribute that can be generalized to all three countries. At this point, we will describe the cultural differences detected at the national level for each of the four cultural dimensions. We will explain different propensities at the individual level only when necessary. The relationships between the 11 attributes and different cultural characteristics at the national level are summarized in Table 3.

### 1.5 UNCERTAINTY AVOIDANCE

According to Hofstede [10], Korean and Japanese societies show a high degree of uncertainty-avoidance, while Finnish society has a low propensity for uncertainty-avoidance.

Similarly, we found that when using mobile data services, Korean and Japanese participants had a greater tendency than Finnish participants to avoid the ambiguous and to reject unusual ideas. In other words, Korean and Japanese participants showed a high degree of uncertainty-avoidance, while Finnish participants showed a low inclination for uncertainty-avoidance.

Over 90% of Korean and Japanese participants preferred an efficient layout or space usage, a large amount of information within a screen, clear menu labeling, and secondary information about contents. In particular, all participants from these two countries mentioned efficiency of layout or space usage at least once.

For example, one Korean interviewee remarked:

“I think space usage is one of the bits of useful information that makes me differentiate the menu items and perceive their

Attribute	Description
Minimal Steps or Keystrokes	Service requires minimal steps or keystrokes in search for desired contents.
Iconic Menu Style	Menu items are represented by icons.
Secondary Information about Contents	Service provides additional information about contents, such as ranking points, movie ratings, or related pictures.
Variety of Contents	Service provides a wide assortment of contents to choose from. For example, for games, number of games, game genres; for movie ticket reservations, number of movie theaters; for ring tone downloads, number of ring tones, musical genres; for sports news, number of news items.
Logical Ordering of Menu Items	Service orders menu items or contents logically.
Clear Menu Labeling	Menu labels tell users clearly what they can find behind them.
Efficient Layout or Space Usage	Service uses small the screen space of the mobile phone efficiently.
Variety of Font Sizes	Service menus use a variety of font sizes for different menu types.
Variety of Font Colors	Service uses different colors for different menu items.
Large Amount of Information within a Screen	Service displays a large amount of information on a given screen.
Various Options for Contents	Service provides various options for contents. For instance, for games, stage option, difficulty option; for movie ticket reservations, seat selection; for ring tone downloads, chord selection; for sports news, choice of amount of information to display

**Table 2. Eleven main attributes of mobile data services**

hierarchy. Besides, if the user interface of a mobile data service does not provide an efficient layout, I have to scroll more, and it is hard to foresee the next menu. For the same reason, I would like to see a large amount of information within a screen. I am tired of pressing the button to see the next menu items.”

From his comments, it appears that efficient layout or space usage and a large amount of information within a screen help high uncertainty-avoidance users comprehend the overall structure of menu items without moving to the next page.

Regarding clear menu labeling, one Japanese participant said:

“Clear menu labeling is vital for me to find what I want to get. For example, I do not like labeling like ‘Surprisingly fantastic ring tones’ because it is very ambiguous. I prefer a short and concrete label that represents the core of the contents.”

Similarly, another Japanese participant said she was able to predict the quality and characteristics of contents more clearly when secondary information about the contents was provided. We infer from comments like these that providing clear menu labeling and secondary information about contents was an important factor for Korean and Japanese subjects because it minimized uncertainty about contents.

Thus, it can be said that high uncertainty-avoidance users, who feel threatened by ambiguous situations, tend to prefer efficient layout or space usage, a large amount of information within a screen, clear menu labeling, and secondary information about site contents. These features help users avoid vague conditions [10] when they use mobile data services by helping them predict the results of an action before the act itself [15].

In contrast, more than 90% of Finnish subjects did not like secondary information about contents. They thought most such information was useless; if they wanted to use content, they preferred to go ahead and use it, without spending a long time investigating what it was. For instance, one Finnish participant said:

“I don’t like too much information about contents. I think that information about past and present rankings is useless. There’s so much worthless information. The title is enough for me to know whether or not it’s what I want.”

People in low uncertainty-avoidance cultures usually deal well with ambiguity and can be characterized as risk-takers. They also enjoy trying new things [10]. This characteristic can explain why low uncertainty-avoidance interviewees in Finland had a negative attitude toward secondary information about contents.

Meanwhile, some subjects expressed preferences opposite to those of others in the same country. For example, even though seven Finnish participants disliked secondary information about contents, the eighth considered such secondary information to be critical. She tried to avoid vagueness by using the secondary information, such as related pictures and ranking points. Interestingly, she was older than the other Finnish participants, and had the least experience using mobile data services. In general, as people get older, they tend to grow more afraid of new things and to value security.

Moreover, people with little prior experience with new technologies are inclined to avoid new menus and contents. Therefore, this individual difference regarding uncertainty-avoidance might be a result of age and inexperience rather than a cultural factor.

Uncertainty Avoidance			
High		Low	
Korean & Japanese		Finnish	
Attribute	Prefer	Attribute	Prefer
Efficient Layout or Space Usage	+	Provision of Secondary Information about Contents	-
Large Amounts of Information within a Screen	+	Variety of Contents	-
Clear Menu Labeling or Hyperlink Connotation	+		
Provision of Secondary Information about Contents	+		
Variety of Contents	+		
Minimal Steps or Keystrokes			

Individualism vs. Collectivism			
Individualism		Collectivism	
Finnish & Japanese		Korean	
Attribute	Prefer	Attribute	Prefer
Variety of Options for Contents	+	Provision of Secondary Information about Contents	+
Variety of Contents	-	Variety of Contents	+
Minimal Steps or Keystrokes			

Context			
High		Low	
Korean & Japanese		Finnish	
Attribute	Prefer	Attribute	Prefer
Iconic Menu Style	+	Iconic Menu Style	-
Variety of Font Colors	+	Variety of Font colors	-
Variety of Font Sizes	+		
Minimal Steps or Keystrokes			

Time Perception			
Monochronic		Polychronic	
Korean & Japanese & Finnish		None	
Attribute	Prefer	Attribute	Prefer
Iconic Menu Style	+	None	
Logical Ordering of Menu Items	+		
Minimal Steps or Keystrokes			

**Table 3. Eleven attributes related to four cultural dimensions (+: preferred, -: not preferred)**

## 1.6 INDIVIDUALISM VS. COLLECTIVISM

According to Hofstede [10], Finnish and Japanese people demonstrate more individualistic tendencies than Korean people do. In our interviews with mobile data service users, we too found that Finnish and Japanese interviewees were inclined to take care of themselves and their own interests, while Korean subjects had an inclination to look after their companions. In other words, Finnish and Japanese interviewees had a propensity for individualism, whereas Korean subjects had a tendency toward collectivism in the use of mobile data services.

Over 90% of the Finnish and Japanese participants preferred a variety of options for contents, but did not like a wide variety of actual contents. In particular, Japanese participants preferred a variety of options for contents because it allowed them to avoid uncertainty, but did not like a wide variety of contents because it interfered with individualistic goals.

One of the Japanese participants responded to the variety of content options in this way:

“I need the options that fit my level. If there are games only for experts and I am a beginner, it will be too hard for me, and I can’t play the game. Similarly, if there are games only for beginner, and I am an expert, it will not be fun! So I want to have diverse options.”

At the same time, one of the Finnish participants spoke as follows about variety of actual contents:

“Too many contents! It is really confusing. I just want to get my own favorite content. I might get exhausted seeing all of these. It takes too much time. And there are so many new ones that I am not interested in.”

Comments like these suggest that individualistic Finnish interviewees wanted to focus just on what they were interested in. In sum, since individualistic people tend to base their actions on personal goals, they may prefer diverse options for contents that correspond to their purposes [1], and, at the same time, to react negatively to a wide variety of actual contents, since too many contents might impede their search for material that suits their own interests.

Meanwhile, over 90% of Korean interviewees preferred to have content-ranking information—a kind of secondary information about contents—and popular contents which were classified as a part of ‘the variety of contents.’ They wanted to see as much ranking information as they could get. For example, one Korean participant said:

“I want to see the names of ring tones with ranking information and to see how many people have downloaded the ring tone already. I usually decide whether to download it or not based on this information, because having a popular ring tone is a good way to be connected with other people.”

Similarly, Korean participants liked to have a variety of contents so they could know and use content that was popular.

They felt less anxiety when using content that many other people had used, and wanted to form friendships by using popular content.

Thus, it can be inferred that Korean interviewees, who have more collectivist tendencies than subjects in the other two groups, often use services that enable them to feel more connected to other people. This is unsurprising, as individual behaviors in collectivist societies are mostly defined by group behaviors [10].

However, while seven of the eight Korean interviewees hardly mentioned variety of options for contents, one thought that such variety was indispensable in mobile data services. He had worked for a small web-based company for years and had a tendency to achieve personal satisfaction and seek personal gratification through mobile data services. He said he understood the importance of satisfying each person's individual interests through working for the web-related company, and that achieving personal satisfaction through a variety of options for content would also be important in mobile data services.

Thus his work experience with a web-related company seemed to bias his responses toward a greater individualism than typical of his culture.

## 1.7 CONTEXT

Hall [8] proposed that most Asian societies are high-context cultures, and most European societies low-context cultures. In our interviews, we too discovered that both Korean and Japanese participants relied on visual elements and symbols, whereas Finnish participants preferred explicit information and a text mode when using mobile data services. In other words, Korean and Japanese participants were inclined to have high-context characteristics, and Finnish participants to have low-context preferences regarding mobile data services.

More than 90% of the Korean and Japanese participants preferred to have an iconic menu style, a variety of font colors, and a variety of font sizes. For example, one Korean participant said:

“I can understand the meaning of this menu quickly if I see the icons for the menu items. Look at this baseball icon. I can perceive at a glance that this menu is about sports. Moreover, I can predict what kinds of contents this menu will have more easily with an iconic menu than with a text menu. Since there are a lot of text menus on this screen, it is hard to read them all. I think an iconic menu style is definitely better in a mobile data service.”

Users from a high context-culture prefer implicative menus with icons or animations over text-based explanatory menus [2]. The comments of this Korean participant also suggest that high-context users tend to like an iconic menu style because they can comprehend its meaning faster.

One of the Japanese participants discussed variety of font color and font sizes in these terms:

“If different menu items have different colors and font sizes, it may be easy to understand the structure of the menu list. For example, I can easily recognize that the menu is important from the red color and the large font size. And just seeing many font colors and different font sizes makes it more fun when I use mobile data services.”

It seems that high-context people get information about the menu from diverse font colors and sizes. They can obtain more information from an implicit menu style than low-context people can [8], and font color and font size may be one of the cues they use to understand the relationships between menu items quickly and easily.

In contrast, more than 90% of the Finnish participants disliked both an iconic menu style and a variety of font colors. For instance, one Finnish participant said:

“Font colors and icons have no meaning for me. Again, for me, visual attributes are not important when I am searching for what I want. Because I think numbers and texts are enough, I don't know what's different if there are small icons. If the screen size is much bigger, it is okay to have a few pictures. But for now, I prefer the simple background. I don't need anything else.”

From his comments, it appears that the Finnish participant thought meaningful colors and icons were fine in principle, but in practice he rarely understood their meaning, and so he preferred the mono-color, text-oriented screen. These responses coincide with the characteristics of low-context cultures [8].

Meanwhile, some differences regarding context were noticed at the individual level. For instance, while almost all Japanese participants preferred a variety of font colors, one preferred to have a single color. He was an engineering student and said that too many colors made him confused, and that he needed simple and accurate information given in a single color. In this respect he resembles the low-context tendencies found in Finnish participants. This anomaly may result from his background in engineering, a field that relies on hard facts and statistical data.

## 1.8 TIME PERCEPTION

Hall [7] identified two distinct notions of time, monochronic and polychronic. According to Hall, most Asian societies have monochronic time perception, most European societies polychronic perception.

However, in our interviews, we observed a monochronic tendency in all three groups. According to the comments of our interviewees, almost all participants in the three countries performed only one task at a time, using mobile data services in a sequential or linear manner. They were task-oriented,

emphasized promptness, and stuck to their plans while using mobile data services.

Over 90% of the participants preferred logical ordering of a menu list. One of the Korean participants discussed the iconic menu style and logical ordering of a menu list in this way:

“Because I only find what I plan to, when I see the iconic menu, it takes less time to get what I want. Therefore, if it does not take too long for a system to download an iconic menu, I would like to use the iconic menu.”

According to these comments, she liked making a plan before using a mobile data service, and was sensitive to the amount of waiting time. According to Hall [7], monochronic individuals tend to make a plan before acting, and then to stick to their plans. Rose et al. [18] found that people from monochronic societies were bothered by download delays and perceived those delays to be longer. Along the same lines, one of the Finnish participants said:

“The ordering of the menu list is important. A reasonable order helps me find what I want quickly. I do not like to spend a long time finding the game I want to download. There should be an obvious standard for arranging menu items.”

He cited logical ordering of the menu list as a feature that helped him achieve his goal in a short period of time. His reference to a logical ordering of the menu corresponds to the characteristics of the monochronic group, namely, high sensitivity to the delay time [18].

## DISCUSSION

Using long-interview data gathered in Korea, Japan, and Finland, this study identifies mobile data service design attributes that users from these three cultures value. It also identifies relationships between the attributes they value and key characteristics of the cultures to which they belong.

The study has several limitations. First, the number of interviewees was small. We are planning to conduct additional interviews with more people in the three countries, as well as with mobile data service users in other countries. Second, familiarity with certain attributes in their own countries could influence our interviewees' preferences regarding those attributes. It is also possible that interviewees did not cite familiar home-ground attributes they considered important, simply because they were so familiar that they did not seem to warrant mention. Third, the interviews were conducted without any real use of mobile data services. Users' opinions and preferences might be different when they actually use mobile data services themselves, rather than watching somebody else using them. Finally, culture may not be the only factor in the differences observed across countries. Differences might also be caused by technology infrastructure, economic situation, physical environment, and language. Thus, future research is necessary to account for the role these other factors play in

determining which design attributes are critical for mobile data services.

In spite of these limitations, this study has valuable theoretical and practical implications. From a theoretical perspective, the study identifies important design attributes for mobile data services, and identifies clear relationships between these attributes and the cultural characteristics both at the country and at the individual level. Also, the study extends our knowledge in the field of HCI by incorporating the concept of cultural dimensions, and by studying the relationship between these dimensions and critical design attributes of mobile data services. Lastly, this study presents a cross-cultural research method that uses video-clips of use cases. It is hard for mobile users to use another country's data services when such services can generally only be accessed within their own countries. The long interview with video-clips of use cases may be used as a substitute of actual usage, when actually using services is impossible for technical or economic reasons. Our research method allowed us to elicit 52 main attributes useful in explaining user requirements for mobile data services even without any direct use of those services.

On the practical side, designers of mobile data services can use the 52 main attributes directly to develop strategies for new services in the three countries. Moreover, this study can provide valuable information to companies considering overseas expansion. Our findings suggest a benefit to minimizing steps or keystrokes for mobile applications in any culture, as well as particular benefits to maximizing certain critical attributes in some cultures but not others. Finally, because our study uses cultural dimensions that prior studies have already measured in other countries [11], companies can apply the present results to more countries than the three we have considered here.

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