A Cross Culture Study on Phone Carrying and Physical Personalization

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Abstract. The mobile phone has become one of the essential objects that people carry when they leave home. By conducting a series of street interviews in 11 cities on 4 continents, we attempted to identify the main carrying options in different cultures and how these options affected user experience in interacting with the phone. We also identified several cultural differences ranging from the prevalence of cases, straps, and other physical phone modification to other ways to personalize and protect the appearance of the phone. Phone straps and decorative stickers were more prevalent in cities such as Tokyo, Seoul and Beijing but seldom witnessed in other cultures. Based on findings from this research, we identified a number of factors that affected carrying position and style, which can be summarized as ease of access vs. the need to maintain security. Non-instrumental attributes include: identity, sociability, and aesthetics. Some practical implications on interaction and industrial design are also discussed.

Keywords: Mobile Phone, Mobile Essentials, Culture, Personalization, Carrying, User Experience.

1 Introduction

The mobile phone is the most ubiquitous Information and Communication Tool (ICT) in modern society and widely considered to be one of the three essential objects that city-dwellers carry with them when they leave home, other others being keys and money. For many people the mobile phone is the first thing that they interact with in the morning, and one of the last objects they use before going to sleep at night. The mobile is typically used in pretty much every context in between. (Chipchase, J. et al, 2005). The baseline functionality that cements the role of the mobile phone in everyday life is its ability to enable personal, convenient, synchronous and asynchronous communication. This assumes however that the user is able to notice incoming communication, but to what extent is this true?

This paper outlines a research study aiming to understand the extent to which incoming communication was noticed by mobile phone users. After the initial study in Helsinki the research goals were extended to include other user experience aspects, and the study was re-run in 10 other cities including Tokyo, New York, Kampala,

Delhi and Tehran. In addition to answering the initial research question, the results of the studies are also being used to build an understanding of cultural differences in the way users carry and customize their mobile phones, and provide clues that can support the design of wearables and de-converged mobile phones.

2   Previous Studies

The research team has been involved in a number of studies exploring phone carrying behaviours. The first study in 2003 centered on what, why and how people take items with them when they leave home (Chipchase, J. et al, 2005). The qualitative study adopted methods such as shadowing, in-depth interviews and ad-hoc street interviews. Participants for these studies were recruited in Tokyo, San Francisco, Berlin and Shanghai. The study found that the three core items people always carried, regardless of their culture or gender were keys, money and the mobile phone. These items are subsequently referred to as Mobile Essentials (MEs). The study also introduced the concepts of the Center of Gravity to describe where these objects are kept in the home, the Point of Reflection to support remembering MEs before walking out the door and the Range of Distribution – to describe the extent to which objects are allowed to stray from the body, reach and lines of sight when not in use.

The research ignited interest in understanding the nuances of ME carrying behaviors in a variety of cultural settings. Ichikawa and others published initial findings (Ichikawa, F. et al, 2005) noting that most male participants carried their phones in their front right trouser pocket whilst female participants mostly used shoulder or hand bags. The differences between the cities that were studied were not significant.

The authors have observed strong differences in mobile phone use across cultures. For example, users from Japan, Korea and Chinese urban centers often customize their phones appearance using stickers, straps, the extreme cases being part of the Japanese Deco-Den trend (derived from "decoration" and "denwa", Japanese for "phone") (Chipchase, J. et al., 2006). In sharp contrast, consumers in the USA and Europe do not personalize their mobile, but maintain it in the same state as purchased. One exception is the purchase of new phone covers, which are still more of a sheath than a customization.

As a part of mobile phone usage practices, the psychological underpinnings of mobile phone personalization are examined by using grounded theories or existing frameworks (Blom, J. et al, 2003; Oulasvirta, A. et al, in press). The motivations of ICT personalization are well associated with basic human needs of autonomy, competence, and relatedness. "<Appearance personalization> is intended to have an effect on other people rather than the user herself". Physical appearance personalization may serve the functions of emotional expression, ego- involvement, identity expression, and territory marking.

3   Design Research

The research methodology adopted in this study was detailed in a previous paper (Ichikawa, F. et al, 2005). A team of researchers was deployed to conduct street

interview in pairs, one as the interviewer, and the other as photographer. In countries where the research team did not speak the local language, local students were hired and trained to conduct the study. In most of the 11 cities where this study was carried out the research team were already conducting in-depth qualitative data collection – ranging from interviews, shadowing and observations, typically with a small number (<20) participants (Blom, J. et al, 2005). These 11 street surveys provided the research team with an opportunity to meet a wider variety of locals – typically 100+ per city, and get a sense of local tastes and preferences.

The questionnaires used in the study included more then 16 questions, designed to fit on a single A4 sheet of paper. The questionnaire noted the location where the phone was carried, and later where keys and money were carried and the extent to which each item was personalized. Additional questions to probe why were asked. Interviews were conducted in relaxed public settings such as parks and non-busy streets. The team avoided data collection in extreme weather conditions that would bias the type of clothing worn.

As of January 2007, the study has conducted street interviews with 1549 participants from eleven cities in nine countries on four continents. Data collection started in 2003 with Helsinki, New York (NYC) followed by Milan in 2004. Beijing, Jilin, Hyderabad, Tokyo, Los Angeles (LA) and Seoul were done in 2005. Delhi, Kampala, and Tehran were done in 2006. The research team collected at least 50 male and 50 female participants in each city with additional data collected dependent on the availability of local resources. Gender and age of the participants was balanced for each city. Research is ongoing.

4   Phone Carrying Behavior

For research purposes, we defined the phone carrying location as the place the participant currently held the phone, unless the place was identified as being transitional such as their hand. In these occasions, the participants were asked for the usual places they would carry the phone (only on rare occasions the phone was primarily carried in the hand).

4.1   Carrying Options

Generally women used bags and men used trousers pockets as the primary way to carry their phone. The findings confirmed the early conclusion from European cities (Ichikawa, F. et al, 2005). A diagram on general phone carrying locations is shown in fig. 1. The data on individual cities is present in tab. 1.

More carrying options were identified when the study spread from a unified western society into locations where participants came from more diverse cultural backgrounds. For example, the hand was identified as the main carrying option for approximately 6% of all the studied participants, while the neck was the main location for 1%. The hand was identified as the primary phone carrying location in Delhi, Seoul, Jilin and LA. By carrying phone in their hand, people tend to interact with their mobile phone more often.
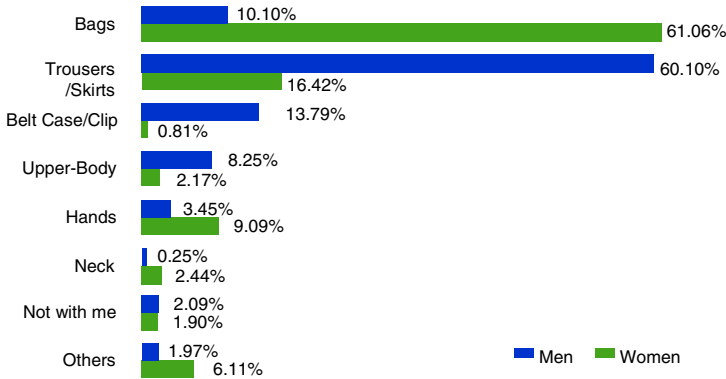
Fig. 1. Location in all the studied eleven cities

Carrying their phones in their bags was a relatively new habit for the women in some studied cities. Approximately 80% of Western (Helsinki, NYC, and Milan), women carried their mobiles in their hand bags but only. 50% or less of their counterparts in less developed cities such as New Delhi and Jilin followed the same practice. In the cities with less prominent culture of using bags e.g. Delhi, trousers pockets were the common carrying location.

Phone carrying is contextually dependent. The study in LA was conducted between Santa Monica and Venice Beach where the contextual factors differed from other cities – for example clothing was more orientated to leisure and beach activities. These contextual differences were reflected in the high difference in carrying options.

Table 1. Gender difference in phone carrying options

Gender		Helsinki	NYC	Milan	LA	Beijing	Tokyo	Tehran	Seoul	Kampala	Delhi	Jilin	Sub Tota
Female	Bags	85.33%	83.08%	79.63%	37.50%	67.33%	66.67%	65.85%	61.22%	52.63%	41.03%	39.80%	61.06%
	Trousers/skirts	1.33%	15.38%	11.11%	16.07%	23.76%	15.87%	7.32%	8.16%	8.77%	30.77%	25.51%	16.42%
	Upper-body	2.67%	-	1.85%	-	0.99%	6.35%	-	2.04%	3.51%	-	5.10%	2.17%
	Hands	-	-	-	16.07%	5.94%	1.59%	7.32%	24.49%	-	26.92%	15.31%	9.09%
	Neck	-	-	-	1.79%	1.98%	1.59%	4.88%	2.04%	-	-	11.22%	2.44%
	Belt case/clip	1.33%	1.54%	-	5.36%	-	-	2.44%	-	-	-	-	0.81%
	Not with me	9.33%	-	7.41%	5.36%	-	-	-	-	-	-	-	1.90%
	Others	-	-	-	17.86%	-	7.94%	12.20%	2.04%	35.09%	1.28%	3.06%	6.11%
	Base	*75*	*65*	*54*	*56*	*101*	*63*	*41*	*49*	*57*	*78*	*98*	*737*
Male	Bags	17.86%	12.94%	14.29%	13.64%	13.51%	24.59%	1.85%	7.69%	1.72%	1.23%	1.92%	10.10%
	Trousers/skirts	42.86%	67.06%	62.50%	54.55%	58.56%	62.30%	66.67%	75.00%	74.14%	74.07%	41.35%	60.10%
	Upper-body	13.10%	3.53%	10.71%	1.52%	6.31%	9.84%	11.11%	11.54%	8.62%	12.35%	5.77%	8.25%
	Hands	-	-	-	9.09%	1.80%	-	-	-	-	7.41%	13.46%	3.45%
	Neck	-	-	-	-	-	3.28%	-	-	-	-	-	0.25%
	Belt case/clip	14.29%	16.47%	3.57%	10.61%	18.92%	-	12.96%	1.92%	8.62%	4.94%	37.50%	13.79%
	Not with me	11.90%	-	7.14%	3.03%	0.90%	-	-	-	-	-	-	2.09%
	Others	-	-	1.79%	7.58%	-	-	7.41%	3.85%	6.90%	-	-	1.97%
	Base	*84*	*85*	*56*	*66*	*111*	*61*	*54*	*52*	*58*	*81*	*104*	*812*

4.2   Incoming Notification

The carrying option had an impact on a person noticing incoming notifications, such as calls or messages. When carrying a phone in trousers pockets, approximately 70% of the participants claimed they always noticed the incoming messages or phone call.

This rate was 50% for the participants keeping their phone in their bags. The difference was also reflected between genders since the bag was the primary carrying option for women, and trousers pockets the primary option for men. Approximately 60% of women claimed that they always noticed their incoming communications. The percentage was 71% for men.

Table 2. Incoming notification under different carrying options

Gender	Notice	Bags	Trousers/skirt	Belt case/clip	Hands	Upper-body	Not with me	Neck	Others	Grand Total
Female	No	26.54%	8.47%	-	15.63%	-	35.71%	-	8.33%	20.26%
	Sometimes	24.88%	15.25%	-	10.94%	37.50%	7.14%	6.25%	5.56%	20.26%
	Yes	48.58%	76.27%	100.00%	73.44%	62.50%	57.14%	93.75%	86.11%	59.48%
	Base	*422*	*118*	*5*	*64*	*16*	*14*	*16*	*36*	*691*
Male	No	24.69%	16.59%	8.57%	14.29%	14.75%	25.00%	50.00%	18.18%	16.40%
	Sometimes	23.46%	12.17%	6.67%	3.57%	9.84%	6.25%	-	9.09%	11.90%
	Yes	51.85%	71.24%	84.76%	82.14%	75.41%	68.75%	50.00%	72.73%	71.69%
	Base	*81*	*452*	*105*	*28*	*61*	*16*	*2*	*11*	*756*

4.3 Carrying Decisions

The decision of where and how to carry a phone was made based on a number of factors. These factors can be categorized into 3 categories. "Instrumental" concerns were those factors that were more practical. "Non-Instrumental" concerns were those factors that were more based on preference or opinion. "Contextual Restriction" included those factors that restricted the number of options available to a user based on their current situation.

Table 3. Factors that influenced phone carrying

	Bags	Trousers/skirts	Belt case/clip	Upper-body	Hands	Others	Grand Total
Instrumental	**56.45%**	**69.77%**	**80.17%**	**78.21%**	**82.95%**	**75.00%**	**67.34%**
Uncategorized esasiness in carrying	*20.81%*	*20.56%*	*38.79%*	*19.23%*	*15.91%*	*16.67%*	*21.57%*
Easiness in fetching the phone	*9.25%*	*26.19%*	*19.83%*	*29.49%*	*35.23%*	*19.44%*	*19.97%*
Noticing the incoming call or msg	*4.62%*	*6.68%*	*2.59%*	*11.54%*	*23.86%*	*9.72%*	*7.07%*
Security and prevention for phone	*19.27%*	*15.11%*	*15.52%*	*14.10%*	*6.82%*	*27.78%*	*16.71%*
Health concerns	*2.50%*	*1.23%*	*3.45%*	*3.85%*	*1.14%*	*1.39%*	*2.01%*
Non instrumental	**3.28%**	**3.51%**	**4.31%**	**2.56%**	**1.14%**	**1.39%**	**3.19%**
Fashion or stylish	*2.50%*	*2.46%*	*4.31%*	*1.28%*	*1.14%*	*0.00%*	*2.36%*
Being discreet	*0.77%*	*1.05%*	*0.00%*	*1.28%*	*0.00%*	*1.39%*	*0.83%*
Contextual restrictions	***30.06%***	***10.90%***	***6.03%***	***11.54%***	***10.23%***	***9.72%***	***17.34%***
Best or no other place	*18.69%*	*8.08%*	*1.72%*	*5.13%*	*5.68%*	*6.94%*	*11.03%*
Phone size fit or not for the option	*8.09%*	*1.76%*	*1.72%*	*2.56%*	*2.27%*	*1.39%*	*4.09%*
Not disturbing ongoing activities	*3.28%*	*1.05%*	*2.59%*	*3.85%*	*2.27%*	*1.39%*	*2.22%*
Others	**10.21%**	**15.82%**	**9.48%**	**7.69%**	**5.68%**	**13.89%**	**12.14%**
Total number of commetns	519	569	116	78	88	72	1442

Factors that were seen as Instrumental concerns included: how easy the phone was to carry, or "Ease in Carrying"; how easy it would be to access to phone to receive incoming notification; how easy it was to answer or retrieve the phone; protecting the phone from dropping, losing, scratching or having it stolen, or "Security and Prevention". Factors seen as Non-Instrumental include: local trends or personal style, or "Fashion and Stylish", disliking the presence of a mobile phone, or "Being Discreet". These factors affected each user, culture or location differently. Factors seen as Contextual Restrictions included the following: no other options, big phone size, and not interfering with an ongoing activity. These factors can change with time

for each used based on what they are doing at the time, and so it would change a user's normal or default behavior.

From the chart in Tab 3, we can see a few trends. "Contextual Restriction" played a significant role for users who preferred carrying the phone in their bag. These users relied on the bag to cluster and carry mobile items. "Easiness in Fetching the Phone" was more often a reason for the participants who chose to carry the phone in their trousers, skirts, upper body clothes, and hand as the main option. "Health Risk" was also listed as the primary reason by 2% of participants. These users usually tried to keep their phone distant from their body.

5   Appearance Personalization

Based on the pilot study, we observed that users were likely to personalize their phone's physical appearance using three mechanisms: covers, straps, and stickers. Cover is any type of bag that used to enclose the phone (fig 1, 1-3). Strap is any kind of add-on items with a string that is placed on the strap hole of the phone (fig 1, 4-7). Sticker is a piece of paper or other item that is pasted onto the phone (fig 1, 7-8).

5.1   Personalization Practice

The practice of using phone covers and straps was studied in 8 of the 11 cities, and the practice of stickers on phones was studied in 5 cities. All studied cities witnessed the usage of cases and straps. Sticker usage were commonly found in all Asian cities but for example was barely present in the LA study. Personalization was generally higher for women than for men. The exception to this is that men are more likely to use straps in Kampala, Tehran, and Seoul.

Fig. 2. Covers, strap, and sticker as physical personalization

Covers were more common used in the regions known for their dusty environment in part caused by unpaved roads. 32% of participants in Kampala used phone cases followed by 11% in Jilin and 9% in Delhi. We hypothesize that cover usage is higher in rural environments. Cover usage was surprisingly common in Seoul perhaps explained by a high societal awareness of bacteria and general hygiene – for example carrier shops often include cleaning stations where phones can be scrubbed, airbrushed and irradiated. All eastern Asian cities witnessed the high popularity of

phone strap and sticker usage with approximately 70% of users in Seoul and Tokyo used straps compared to less than 10% for LA and Kampala.

Table 4. Covers, strap, and stickers in different cities

		LA	Kampala	Delhi	Tehran	Jilin	Beijing	Seoul	Tokyo	Subtotal
Cover	Female	10.71%	33.33%	8.97%	19.51%	20.41%	12.87%	22.45%	4.76%	16.02%
	Male	6.06%	31.03%	9.88%	11.11%	2.88%	2.70%	13.46%	1.64%	8.52%
	All	8.20%	32.17%	9.43%	14.74%	11.39%	7.55%	17.82%	3.23%	12.12%
Strap	Female	16.07%	3.51%	11.54%	31.71%	61.22%	60.40%	69.39%	77.78%	43.65%
	Male	3.03%	10.34%	9.88%	33.33%	33.65%	37.84%	73.08%	57.38%	31.35%
	All	9.02%	6.96%	10.69%	32.63%	47.03%	48.58%	71.29%	67.74%	37.26%
Sticker	Female	-%		5.13%	14.63%			12.24%	38.10%	13.94%
	Male	1.52%		1.23%	1.85%			-%	18.03%	4.46%
	All	0.83%		3.14%	7.37%			5.94%	28.23%	8.99%

5.2 Reason Analysis

The reasons for personalization can be categorized as either being more practical, "Instrumental", or more subjective, "Non-instrumental". Some examples for Instrumental reasons are "Usability" related meaning the ease of performing certain tasks, such as pulling the phone from your bag. "Security" of the device is another Instrumental reason. Examples of Non-instrumental reasons include "Aesthetics" and look of the phone, "Identity" and "Sociability", how a user to promote themselves or their group affiliation.

Table 5. Primary reasons in using phone physical personalization

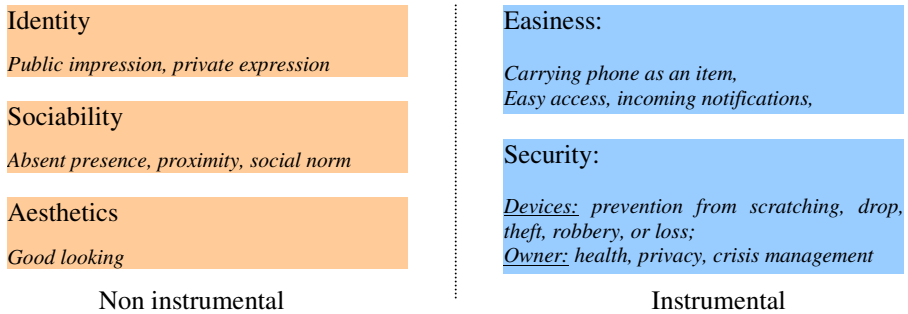|	Cover (F: 38/M: 18)	Strap (F: 152/M:123)	Sticker (F: 32/M: 10)
Instrumental	**79%/73%**	**46%/55%**	**6%/30%**
Usability- Easiness in fetching, carrying, cleaning	*3%/0%*	*36%/40%*	*3%/0%*
Security- Protection from scratch, dust, sweat	*71%/67%*	*/*	*0%/10%*
Security- safety from loss, drop, theft, and robbery	*5%/6%*	*10%/15%*	*/*
Security- Protection of privacy in public place	*/*	*/*	*3%/20%*
Non instrumental	**19%/17%**	**61%/46%**	**96%/50%**
Sociability- Received as gift from others	*3%/0%*	*24%/19%*	*3%/0%*
Relatedness- representing thing, moment, or person	*5%/11%*	*16%/5%*	*59%/40%*
Indentity- Changing things into my style	*/*	*5%/3%*	*25%/21%*
Aesthetics	*11%/6%*	*21%/19%*	*12%/-%*
Other reasons	**5%/6%**	**1%/11%**	**6%/20%**

Tab. 5 detailed the reasons for personalization. Covers were more likely to be driven by Instrumental needs, especially for security purpose; stickers were driven by Non-Instrumental purpose. The use of a strap was balanced between Instrumental and Non-Instrumental factors.

6 Discussions

6.1 User Experience Attributes in Carrying

The mobile phone is a portable item and is used in various contexts. As a result, the perspective of how it is carried is essential part of the mobile phone user experience,

which can be studied through carrying options and decision making process. Some aspects are also reflected on how it is personalized.

Identity *Public impression, private expression*	Easiness: *Carrying phone as an item,* *Easy access, incoming notifications,*
Sociability *Absent presence, proximity, social norm*	Security: *Devices: prevention from scratching, drop,* *theft, robbery, or loss;* *Owner: health, privacy, crisis management*
Aesthetics *Good looking*	
Non instrumental	Instrumental

Fig. 3. User experience framework: phone as a carried item

The human practice of carrying a mobile phone is a compromise process between emotional and instrumental purposes. The first instrumental attributes was ease of use, as a carried object and a communication tool. E.g. phone is carried in bag since it is easy to transport, take out although this is compromised by the limited chance of noticing vibration for incoming calls. Next instrumental attribute concerned security, both in terms of the device and its user. E.g. participants used phone cases to protect it from scratch or theft; the phone was placed far away from body since the radiation was perceived as a health risk.

Three non-instrumental attributes were identified in the project. "Identity" addresses the aspects that phone was a way of impression management in public space. "Aesthetics" is a very much related to Identity. "Sociability" refers to how the phone is used for social associations. E.g. phone personalization items were given as a gift. It was common in Seoul for couples to use matching straps.

6.2   Cultural Differences

There were a number of cultural differences in how users personalized, or did not personalize, their phones and how they carried phones. Generally, Asian participants were more likely to physically personalize their phones using straps or stickers than their counterparts in Europe or US. There were also differences in carrying styles - more Asian users carried their phone in hand, for example.

There are a number of different aspects that can explain these cultural differences. The theory candidates range from national culture of dimensions to social context examination. In the theories of cultural dimension, individualism- collectivism can be used in explaining the regional difference well (Hofstede, G. 2004). In a collectivist culture, such as eastern Asia and some part of Africa, people are more likely to create, show, and treasure the association with other people, especially people with strong social-ties such as families. The people also care more about their impression in public. Phone personalization serves as a platform to facilitate their social association and impression management for these cultures.

Other theories such as design culture evolution and social-economic development may also be useful in explaining the regional difference. In economically developing countries, people often place covers on their consumer electronics simply to prolong the life of that product, and to retain its value for possible resale.

6.3 Design Implications

The phone is designed for the primary purpose of synchronous and asynchronous communication. However, in our project, we found these fundamental functions were compromised by the limitation of carrying options. Generally 30% of men and 40% of women do not always notice the incoming calls or messages. The figure was particularly high for bag users i.e. mostly women, at over 50%.

The profile feature on phones can be a useful solution by providing different phone settings for when the phone is in different locations, such as an in-bag profile. The profile features are created for the purpose of (i) avoiding call handling by accident when the user is not aware, (ii) Alternative notification mechanisms to ensure immediate response, (iii) easiness in fetching phone from carrying option, (iv) communication initiator being timely notified about the possible delay.

7   Conclusions

Where a phone is carried is an important part of understanding the total user experience. By conducting a series of street interviews in 11 cities, we tried to identify the main carrying options in different cultures to understand how these options influenced user interacting with the phone. The project confirmed our initial finding that women tend to use bags and men use front (right) trousers pockets as the primary means of carrying their mobile phone. Different carrying options would affect the user's ability to notice incoming calls or messages, with incoming calls frequently being missed when carried in a bag.

The project also identified cultural differences in using phone covers, phone straps, and stickers to personalize the physical appearance of a mobile phone. Phone cover use witnessed in the regions where phone were used in dusty environment, which in turn effects the quality of the user interaction. Phone strap and sticker usage were more often used in Asian cities, especially eastern Asian cities whereas stickers were seldom witnessed in studied in American or African cities. We applied the cultural dimension of individualism and collectivism to explain the regional differences. People from collectivism cultures customize their phone's appearance more often because they are more likely to be used as a platform to create, show, and treasure the association with other people, especially group with strong social-ties such as families.

Based on the findings from phone personalization and carrying behaviors, we identified two types of user experience attributes concerning carrying: Instrumental and Non-Instrumental attributes. Instrumental attributes include: ease of use and security, the Non-Instrumental attributes include: identity, sociability, and aesthetics. The finding of this study can also be used for interaction and industrial design work, and was discussed in the paper.

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