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ARTICLE

A cross-cultural comparison of perceptions and uses of mobile telephony

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Abstract

Drawing from the theoretical orientation of apparatgeist, this article explores the cultural similarities and differences in perceptions and uses of mobile telephony. A sample of college students from Hawaii, Japan, Sweden, Taiwan and the US mainland was surveyed to assess: (1) perceptions of the mobile phone as fashion; (2) attitudes about mobile phone use in public settings; (3) use of the mobile phone for safety/security; (4) use of the mobile phone for instrumental purposes; and (5) use of the mobile phone for expressive purposes. The results indicate some differences and several similarities among the cultural groupings and help to lay the groundwork for future research and theory-building.

Key words

apparatgeist • cell phone • mobile communication • mobile phone • mobile telephony

The speed and magnitude of mobile phone adoption is a recent worldwide phenomenon akin to that of the television in the mid-20th century and the internet in the late 20th century (Katz and Aakhus, 2002; Rice and Katz, 2003). Prior to 1990, the mobile phone was a rare and expensive technology with an adoption level too low for the charts to even register. During the 1990s mobile phone adoption exploded, with

subscriptions reaching a half billion worldwide and well into the billions in the following decade. In fact, those who do not use a mobile phone are now in the minority in many countries (International Telecommunication Union, 2005). Although the explosive growth of this technology is remarkable and the social implications are myriad, the amount of social science research in this area is relatively small when compared to other pervasive communication technologies, such as the internet (Rice and Katz, 2003).

The good news is that mobile communication research is on the rise and researchers from all over the globe are making valuable contributions to our understanding of the social implications (see for example, Fortunati et al., 2003; Katz, 2003; Katz and Aakhus, 2002; Ling, 2004). The global impact of its adoption and use and the international composition of researchers in this area have drawn attention to trends in the ways in which people think about and use mobile telephony in various cultures. For example, Katz and Aakhus (2002) identified similarities in communication habits associated with mobile phone use in Bulgaria, Finland, Israel, Italy, Korea, France, the Netherlands and the USA. As the authors explained:

> [D]espite the great variations in cultures – from teen dating to family arrangements and from economic based to social hierarchies – the use and folk understanding of the mobile phone seem to be pressing toward conformity and uniformity. (2002: 313–14)

While there are prominent similarities, the literature also reveals some interesting differences and distinctive cultural characteristics that influence the adoption and use of this growing technology.

The purpose of this article is to explore further the cultural similarities and differences associated with mobile telephony by presenting the findings from a cross-cultural comparison of perceptions and uses of the technology. A sample of college students from Hawaii, Japan, Sweden, Taiwan and the US mainland was surveyed about their perceptions and uses of mobile telephony in order to assess similarities and differences among these members of distinct cultural groupings. As Mante and Heres explained, 'attitudes to and positioning of technology is driven by social location … of individuals and families' (2003: 129). This article aims to contribute to our understanding of the 'social location' of mobile telephony, while adding to the budding body of literature in this area.

THEORETICAL GROUNDING

This study is rooted in the theoretical orientation of apparatgeist (Katz and Aakhus, 2002). As noted previously, Katz and Aakhus identified several cross-cultural trends in the adoption, use and conceptualization of mobile telephony. These trends have emerged in many social contexts, including

participation in social networks, changes in traditional communication habits to accommodate mobile communication, competent mobile communication and unanticipated behaviors resulting from mobile communication. In an effort to explain these patterns and those associated with other personal communication technologies (PCTs), Katz and Aakhus advanced the concept of apparatgeist, which refers to 'the spirit of the machine that influences both the designs of the technology as well as the initial and subsequent significance accorded them by users, non-users and anti-users' (2002: 305).

Apparatgeist draws attention to both the meanings that people construct for technologies and their social consequences. Katz and Aakhus advocated balanced consideration of the social and technological forces that shape the perceptions and uses of PCTs by identifying a number of factors from each of these arenas. For example, values and norms are social factors that help to guide the ways in which people use mobile phones. In addition, technological aspects such as handset size and design also factor into how people think about and use the technology.[1] Katz and Aakhus argued that these factors, and others like them, are important ingredients in the 'spirit' that results in consistent perceptions and uses of PCTs in disparate cultures. The notion that technology embodies a spirit may appear technologically deterministic on the surface. However, Katz and Aakhus recognized and avoided the pitfalls of determinism by likening the influence of media attributes to a cafeteria menu. They explained:

> [Apparatgeist] is not a term that requires technological determinism. In fact, we argue that technology does not determine what an individual can do; rather, it serves as a constraint upon possibilities. Much as a cafeteria menu will not offer infinite meal choices, but rather presents a finite selection of meal choices, so too historically bound technology offers us a flexible menu of extensive, but not infinite, choices. (2002: 307)

According to Katz and Aakhus, apparatgeist is fueled by the socio-logic of 'perpetual contact', which is rooted in an innate human desire for social connection, even to share one's mind with another (Peters, 1999). The authors reasoned that mobile phones provide the means for perpetual contact and therefore people tend to conceptualize the technology in coherent ways. As they argued:

> [I]t seems that certain conceptual perspectives arise in people's minds as a result of their interaction with technologies and these are remarkably consistent across cultures. If this is indeed the case, future research should continue to detect this phenomenon. (2002: 316–17)

Drawing from this line of reasoning, the aim of the present study was to test whether select perceptions and uses of mobile phones are consistent among a sample of participants with very different cultural backgrounds.

LITERATURE REVIEW[2]

Mobile communication and culture

Cultural characteristics play an important role in how people make sense of their social reality (see for example, Geertz, 1983; Hall, 1959). Mobile telephony is no exception to this axiom. Although there are notable similarities in the dissemination and appropriation of the mobile phone in various countries, the ensuing literature demonstrates that distinctive cultural characteristics play into its rate of adoption and how people use the technology.

Finland is an appropriate starting point for this review of the literature. Despite their reputation for silence, the Finns are renowned for embracing the mobile phone. In fact, at the turn of the millennium Finland had the highest per capita mobile phone adoption rate in the world (Puro, 2002). This high rate of penetration was influenced by the presence of Nokia, a leader in the telecommunications industry. Puro explained: 'Every child in Finland learns that there is one name, Nokia, that is somehow very special in Finnish life. It is something monumental and important and affects everyone in Finland' (2002: 28). The Finns even use the word 'nokialization' to describe this phenomenon.

Israel is also among the world's leaders for mobile phone use. Unlike the Finns, Israelis are known for their propensity for talk and Schejter and Cohen (2002) attributed the unprecedented growth of mobile phone ownership in Israel to this distinctive characteristic of Israeli culture. Schejter and Cohen argued that mobile phones are particularly appealing to Israelis because of 'their need to be connected, their need to chatter and their basic audacious (*chutzpadic*) temperament' (2002: 38).

As with Nokia's presence in Finland and Israel's tradition for talk, cultural characteristics also help to explain the rapid penetration of the mobile phone in South Korea (Kim, 2002). Mobile communication providers are among the top national advertisers in Korea, which allowed the mobile phone to be a familiar technology when it entered the Korean marketplace. Korea suffers from a lack of telephone lines and the mobile phone helps to alleviate this problem. When it was introduced, the mobile phone made a positive social impression on Korean society; early adopters tended to be wealthy businesspeople, so the mobile phone was a symbol of success. Further, the mobile phone suits the Korean custom of informal gatherings at very short notice (Kim, 2002).

The Netherlands is a country with an exceptionally high diffusion rate for the mobile phone and other communication technologies (Mante and Heres, 2003). The Dutch have come to regard the mobile phone as a necessity. One explanation for this may be that Dutch citizens progressively are becoming 'technologically smart' (Beckers et al., 2003). That is, Dutch citizens tend to have low levels of anxiety regarding the use of digital technology. This phenomenon may be due to the education system in the Netherlands, which is on the rise, as is the proliferation of technology in Dutch classrooms (Beckers et al., 2003).

Socio-economic and political forces also influence the adoption and use of mobile telephony. Vershinskaya (2003) discussed how profound social and economic changes in Russian society have resulted in an information and communication technology (ICT) revolution in the mid-1990s. From the 1960s to the 1980s Russia was perceived as lagging in the sphere of information technology. Gorbachev's restructuring, democratization and openness in the late 1980s and early 1990s opened the door for dissemination of ICTs such as the internet and the mobile phone.

Not surprisingly, the collapse of the former Soviet Union has affected the technological landscape of other nations. One of its former satellites, Bulgaria, has only a recent history of economic, cultural and technological autonomy. At the beginning of the millennium, owning a mobile phone was not a priority for many Bulgarians, who had more serious concerns and were struggling just to survive in the relatively poor country (Varbanov, 2002). However, mobile phone adoption has been growing and is expected to explode in the upcoming years. Varbanov (2002) explained that because of the cultural and economic landscape of Bulgaria, the mobile phone has become an important symbol of the future for this developing nation.

As with Russia and Bulgaria, China has undergone profound political and economic changes in the late 20th century, which have fostered mobile phone adoption and use (Yu and Tng, 2003). Increased privatization of the marketplace has given rise to an increase in personal space and personal choice. In addition, the Chinese have a tradition of developing personal networks (*guanxiwang*). In the past they have relied on these networks to secure goods and protection. In the new market economy, personal networks help them to navigate social and economic changes. Fueled by privatization and the building of *guanxiwang*, 'The mobile phone as an artifact of daily living has taken on a set of connotations that are specific to the larger socioeconomic processes occurring in China' (Yu and Tng, 2003: 192).

The insights above illustrate the effects of social climate on mobile phone adoption through the eyes of researchers peering into particular cultures. There are also a number of studies comparing perceptions and uses of mobile phones cross-culturally. For example, Oksman and Rautiainen (2003) observed similarities in the ways that teenagers in Finland and other Nordic countries use mobile phones to develop and maintain social networks, resulting in their own communications culture. Katz and Aakhus (2002) drew similar connections between the ways that Finnish and Norwegian youth integrate the mobile phone into their daily lives.

In a comparison of a sample of Chinese and American mobile phone users, Caporael and Xie (2003) found that Chinese participants regarded mobile phone calls from employers as acceptable during non-work hours. In contrast, the Americans found work-related calls during these times to be largely unacceptable and tended to screen these calls. Additionally, the Chinese

participants tended to turn their mobile phones off only during sleep, while the Americans turned theirs off at various times, such as while not making calls out or charging the batteries. Caporael and Xie (2003) also reported cultural similarities, most notably where participants felt that a ringing phone would be a public disturbance.

In a comparison of western European countries, Fortunati (2002) found significant differences in the degree to which the mobile phone was viewed as a means for facilitating social relationships. Italians reported the highest scores for this attitude, followed by the French, British, Spanish and Germans respectively. Fortunati also reported that, in comparison with other western European countries, Italians, along with the French, tended to adopt the mobile phone more for personal rather than work-related reasons. In another study of the same countries, Haddon (1998) reported similarities in mobile phone use. In all of these western European countries, mobile phone users were least likely to have their handsets on while attending a public event such as a show or a play and most likely to have them on while traveling in the car.

Mante (2002) found both similarities and differences in a comparison between the Netherlands and the USA. Participants from both countries were increasingly mobile and relied on their communication devices to support this increased mobility. Another similarity is that both the Dutch and American participants were sensitive to the intrusion of the mobile phone in public settings and only wanted to talk on the mobile phone during convenient times. However, the Americans reported a stronger sense of responsibility for being reachable by their colleagues and friends, while the Dutch reported a greater need for personal choice in the matter. Similarly, the Dutch participants were less willing to let their work lives interfere with their personal lives. Mante (2002) concluded that although there were noticeable differences between the Dutch and the Americans, they were not as pronounced as expected.

In a cross-cultural comparison of perceptions of various portable technologies, Katz et al. (2003) found that Koreans viewed the mobile phone as more expensive, more stylish and more of a necessity than participants from the USA. However, like Mante (2002), Katz et al. were more impressed by the similarities than differences in their comparison. Overall, attitudes toward mobile phone characteristics tended to cluster for participants from Korea, Namibia, Norway and the USA. According to Katz et al. (2003), these findings may indicate an international mobile phone culture and/or universals or near-universals in the perceived role of communication in our lives.

The literature reveals some interesting similarities and differences in the adoption, use and conceptualization of mobile phones in numerous countries. Various types of cultural characteristics are associated with the mobile communication practices in these countries, ranging from psychological or relational tendencies to socio-economic and political conditions. It is

important to point out that the specific reasons for cultural similarities and differences (whether social–psychological or sociological in nature) are beyond the scope of this study and that the aim here is restricted to providing a descriptive, exploratory, cross-cultural comparison of perceptions and uses of mobile telephony to help establish the groundwork for future research and theory-building. Accordingly, the following research question is advanced to guide this investigation:

> RQ1: To what extent do perceptions and uses of the mobile phone differ among a sample of mobile phone users from Hawaii, Japan, Sweden, Taiwan and the US mainland?

The perceptions and uses selected for examination in this study are rooted in the following themes from the literature on mobile telephony:

1. perceptions of the mobile phone as fashion;
2. attitudes about mobile phone use in public settings;
3. use of the mobile phone for safety/security;
4. use of the mobile phone for instrumental purposes; and
5. use of the mobile phone for expressive purposes.

The first theme refers to the extent to which a person considers their mobile phone to be an article of personal display or fashion. Because it is worn on the body, many users regard the technology as an extension of their physical selves (Gant and Kiesler, 2001; Hulme and Peters, 2001) and characteristically fashionable (Katz et al., 2003). For this reason, the style of a mobile phone is a primary influencing factor in brand selection for some users of the technology (Lobet-Maris, 2003). Numerous studies show that adolescents are particularly conscious of handset styles and tend to view the mobile phone as a symbolic artifact of personal display (Alexander, 2000; Green, 2003; Ling, 2003, 2004; Lobet-Maris, 2003; Skog, 2002).

Another theme from the literature pertains to attitudes about mobile phone use in public settings. Users who speak on their mobile phones in public often do so at the expense of others around them. Bystanders are unwittingly cast into the role of spectator when mobile phone users talk too loudly while around others (Fortunati, 2003). Some are curious about what is being said (Paragas, 2003) and even treat it as a 'linguistic treasure hunt' (Fortunati, 2003: 11). However, others have voiced complaints about being forced into eavesdropping (Ling, 1996). This problem stems from the conflicting nature of private and public space, resulting in ambiguous norms for mobile phone use in public (Gant and Kiesler, 2001; Love and Kewely, 2003; Palen et al., 2001). However, individuals are making efforts toward developing norms by explicitly discussing appropriate and inappropriate mobile phone use (Campbell and Russo, 2003; Ling, 2004; Ling and Yttri, 1999, 2002). In addition, there are some noticeable trends in where mobile phone users tend to silence their

handsets or turn them off. Mobile phone users frequently leave their handsets off in certain public settings such as theaters, concert halls, churches and some meetings (Caporeal and Xie, 2003; Haddon, 1998). Movie theaters and classrooms are perceived as particularly inappropriate locations for mobile phone use (Campbell, 2006; Campbell and Russo, 2003), while public sidewalks, grocery stores and buses appear to be more suitable settings (Campbell, 2004). There is also evidence that certain behaviors during mobile phone use in public help mitigate the social intrusion, especially speaking quietly and keeping conversations brief (Campbell, 2004). The present study explores the extent to which one's cultural background plays a role in tolerance for mobile phone use in public settings.

The remaining variables examined in this study reflect primary uses of mobile telephony. Ling and Yttri (1999, 2002) identified three primary uses: safety/security, microcoordination and hypercoordination. Safety/security refers to mobile phone use for emergencies and general security; microcoordination refers to mobile phone use for instrumental purposes; and hypercoordination refers to mobile phone use for these reasons as well as expressive purposes. Studies illustrate that mobile phone use for expressive purposes can demonstrate and reinforce social networks (see for example, Johnsen, 2003; Licoppe, 2003; Plant, 2001; Taylor and Harper, 2001) and the way in which one uses the mobile phone is at least partially influenced at the micro-level through interaction in personal communication networks (Campbell and Russo, 2003). This study explores whether mobile phone use is shaped at the larger cultural level as well.

Age, gender and mobile communication practices

A number of studies indicate that certain trends in the adoption, perceptions and uses of mobile communication technology are linked to age and gender. Adolescents tend to regard the technology as fashion (Alexander, 2000; Green, 2003; Ling, 2003, 2004; Lobet-Maris, 2003; Skog, 2002) and use the mobile phone for expressive purposes (Fortunati, 2002; Johnsen, 2003; Licoppe, 2003; Ling and Yttri, 1999, 2002; Taylor and Harper, 2001), while older adults have been found to emphasize mobile phone use for instrumental purposes and safety/security (Ling, 2004; Ling and Yttri, 1999, 2002). As for gender, there is some evidence that men have had more access to mobile phones than women in Norway (Hjorthol, 2000; Ling, 2000; Ling and Haddon, 2003) and other signs that males and females in that country have developed similarly high levels of ownership (Skog, 2002). Skog also found that males stressed the technical functions of mobile phones, while females valued their social aspects, such as design, ring tone and color. The following research question explores the effects of age and gender on perceptions and uses of mobile phones among the cross-cultural sample:

> RQ2: To what extent do perceptions and uses of the mobile phone differ among age and gender groups in the sample?

METHOD

Participants

At a private university in Hawaii, 318 students taking courses volunteered for this study. This university was well suited for a cross-cultural comparison because of its exceptionally diverse student body. This diversity can be attributed to the university's geographic location and its mission to promote global citizenship by bringing students from around the globe together in scholarship. The 318 volunteers were citizens of 30 countries from all over the world. In order for each group to be large enough to find significant differences, only the cultural groupings with 25 or more participants were included in this study. In addition, only mobile phone users were included in the analysis. The subsequent sample consisted of 231 participants (65% female, 35% male). Eighty-nine participants were from the US mainland, 53 from Hawaii, 34 from Taiwan, 29 from Sweden and 26 were from Japan. For the purposes of this study, participants from the US island state of Hawaii were treated as belonging to a separate cultural category than individuals from the US mainland because of their distinct heritage, social and physical environment, dialect and geographical location. On average, the students from Japan, Sweden, Taiwan had been living in Hawaii for slightly under two years and participants from the US mainland had been in Hawaii for a little over three years. The mean age of participants was 25. Of the participants, 50 percent were studying for an undergraduate degree, 42 percent were studying for a graduate degree and the remainder (8%) were taking courses, but did not report a degree sought. Participants reported an average of 750 minutes per month for mobile phone calls and all other services, sent an average of 10 text messages per week, received an average of 11 text messages per week and had an average of four years' experience using a mobile phone.

Instrumentation

A self-report survey was used to assess perceptions and uses of mobile telephony, demographics and frequency of mobile phone use. Participants completed an instrument with 61 items. Thirty-two items pertained to this study and the rest were used for another investigation. The factors assessed in this study (i.e. fashion, public use, safety/security, instrumental use and expressive use) and the survey items that comprised them were derived from an instrument developed and used by Campbell and Russo (2003). This instrument also assessed attitudes about mobile phone use while driving and comfort with mobile communication technology. These two factors were left out of the present study because they are not as salient in the mobile communication literature and due to a desire to prevent response fatigue. The resulting structure of the scale fit with the expected one.

For items assessing perceptions and uses of mobile telephony, participants were asked to respond using a five-point Likert-type scale, with response options ranging from 'strongly disagree' to 'strongly agree'. For items assessing

culture, experience with mobile telephony, degree of use and age, participants were asked to provide written responses. The participants were asked to circle the correct response option provided for gender and level of education. After data collection, a principal components factor analysis was conducted with a varimax rotation for the 24 items assessing perceptions and uses of mobile telephony. The criteria for loading on a factor were: a factor loading of at least 0.52; maximum loading on a secondary factor no more than 0.36; and an eigenvalue greater than 1.00. Four items were removed from the analysis for not meeting these criteria. The 20 remaining items yielded five interpretable factors for perceptions and uses of mobile telephony. Table 1 (below) shows eigenvalues, Cronbach's alpha and descriptive statistics for each factor. Descriptive statistics (range, mean and standard deviation) for factors with multiple items are reported at the composite level (i.e. on a scale of 1–5), rather than the aggregate level (e.g. 5–25).

Three items loaded above 0.72 on the first factor. These items were labeled 'expressive use' because they reflect mobile phone use as a form of self-expression and maintaining social relations. The expressive use factor was assessed using items such as the following: 'I use my mobile phone to catch up with friends or relatives', 'I use my mobile phone for personal reasons, like chatting with friends, catching up on gossip, or telling a joke'.

Four items loaded highly on the second factor, with one item loading 0.59 and the others above 0.71. These items reflect the degree to which one regards the mobile phone as an artifact of personal display or fashion; therefore, the factor was labeled 'fashion'. The following survey items illustrate the fashion factor: 'The way a mobile phone looks would be an important consideration to me if I were to purchase a new one'; 'I would like to be able to personalize the way my phone looks'.

Four items loaded above 0.55 on the third factor. The items for this factor were labeled 'safety/security' because collectively they reflect mobile phone use for this purpose. The following survey items represent the safety/security factor: 'I carry my mobile phone around at night because it makes me feel safer'; 'I don't think of my mobile phone as a security device'.

Five items loaded above 0.54 on the fourth factor. These items, labeled 'public use', assess generalized attitudes about mobile phone use in public, as well as the acceptability of use in particular public settings, including grocery stores, restaurants and buses. The following survey items illustrate the public use factor: 'There is nothing wrong with taking a call on a mobile phone while in a public setting'; 'I find it irritating to hear someone talking on a mobile phone while in a restaurant'.

Four items loaded higher than 0.52 on the fifth factor. These items were designated 'instrumental use' because they assess mobile phone use for logistical coordination. The following survey items demonstrate the factor of instrumental use: 'If I am running late to meet people, I often call them on

• Table 1 Factor eigenvalues, scale reliabilities and summary statistics

FACTOR	EIGENVALUE	ALPHA	M	SD	RANGE
Expressive use	5.04	.79	3.79	.93	1.00–5.00
Fashion	2.57	.71	3.26	.77	1.00–500
Safety/security	2.38	.68	3.70	.72	2.00–500
Public use	1.97	.75	3.24	.73	1.00–480
Instrumental use	1.24	.64	4.08	.58	2.25–500

my mobile to let them know'; 'I frequently use my mobile phone to schedule appointments'.

Procedure

With permission from the university's institutional review board, surveys were administered in the classrooms of undergraduate and graduate level courses in a variety of subjects. Only mobile phone users completed the instrument used for this analysis; non-mobile phone users were asked to complete another instrument that is beyond the scope of this study. The surveys took about 10 to 15 minutes to complete on average. All the participants received an informed consent form notifying them that participation was voluntary and confidential.

RESULTS

A factorial multivariate analysis of variance (MANOVA) was conducted to determine the effects of three independent variables (culture, age and gender) on the following five dependent variables: (1) perceptions of the mobile phone as fashion; (2) attitudes about mobile phone use in public settings; (3) use of the mobile phone for safety/security; (4) use of the mobile phone for instrumental purposes; and (5) use of the mobile phone for expressive purposes. The independent variable of culture contained five levels: Hawaii (N=53), Japan (N=26), Sweden (N=29), Taiwan (N=34) and US mainland (N=89). The variable of age was divided into three groupings: 18–22 (N=109), 23–29 (N=82) and 30-plus (N=38). Two participants did not report their age. Gender had two levels, male (N=79) and female (N=150). Two participants did not report their gender.

Before analyzing the results of the factorial MANOVA, Box's Test for homogeneity of dispersion matrices was evaluated in order to determine whether the variances and covariances among the dependent variables were the same for all levels of the factors – an assumption for the MANOVA test. Results showed that Box's Test was significant (F (240, 7, 493)=1.22, p<0.01), indicating that there were differences in the matrices and that the assumption of homogeneity of variance was violated for at least one of the independent variables in the study. Additional tests for homogeneity of variance revealed that this assumption was met only when both age and gender were removed

from the analysis. Box's Test was not significant when culture was used as the sole independent variable ($F=(60, 40, 488)=1.02$, $p<0.42$). Therefore, RQ2 was removed from the analysis and culture served as the sole independent variable (RQ1).

A one-way MANOVA was conducted to determine the effects of culture (Hawaii, Japan, Sweden, Taiwan and US mainland) on the five dependent variables (attitudes about mobile phone use in public, perceptions of the mobile phone as fashion, use for safety/security, instrumental use and expressive use). Significant differences were found among the cultural groupings on the dependent measures (Wilks' $\eta=0.73$, F (20, 734)$=3.61$, $p<0.001$, multivariate partial $\eta^2=0.08$). Table 2 reports the means and standard deviations of the dependent variables for the five cultural groups.

Analysis of variance (ANOVA) was conducted for each dependent variable as follow-up tests to the significant MANOVA. A Bonferroni procedure was used to protect against type 1 error, so each ANOVA was tested at the 0.05 divided by 5 or 0.01 level. The ANOVA on the safety/security scores was significant (F (4, 225)$=7.22$, $p<0.001$, partial $\eta^2=0.11$), as was the ANOVA on the public use scores (F (4, 225)$=5.20$, $p<0.001$, partial $\eta^2=0.09$). Although the ANOVA for instrumental use was not significant, it approached significance (F (4, 225)$=2.87$, $p<0.02$), as did the test for expressive use (F (4, 225)$=2.36$, $p<0.05$). The ANOVA for fashion (F (4, 225)$=0.93$, $p<0.45$), was not significant.

Post-hoc analyses to the univariate ANOVAs for the safety/security and public use scores consisted of pairwise comparisons, using Tukey's Honestly Significant Difference (HSD), to determine which cultures differed significantly for each of these dependent variables. Post-hoc tests for the safety/security scores revealed significant differences between the Swedish ($M=3.14$, $SD=0.57$) and US mainland participants ($M=3.83$, $SD=0.67$, $p<0.001$). Significant differences for the safety/security scores were also found between the Swedish participants and those from Hawaii ($M=3.91$, $SD=0.77$, $p<0.001$). These findings show that participants from the US mainland and Hawaii regarded and used their mobile phones significantly more for safety/security than those from Sweden did.

Follow-up comparisons for the public use scores revealed significant differences between participants from Hawaii ($M=3.44$, $SD=0.73$, $p<0.001$) and Japan ($M=2.71$, $SD=0.70$). In addition, significant differences were found between the Japanese and Swedish participants ($M=3.40$, $SD=0.56$, $p<0.003$). These results show that the participants from Hawaii and Sweden were significantly more tolerant of mobile phone use in public than those from Japan.

DISCUSSION

Summary

Participants from Hawaii, Japan, Sweden, Taiwan and the US mainland were surveyed to assess differences and similarities in their perceptions and uses of

• Table 2 Means and standard deviations on the dependent variables for the five groups

	Fashion		Public Use		Safety		Instrumental		Expressive	
Culture	M	SD	M	SD	M	SD	M	SD	M	SD
Sweden	3.23	.77	3.40	.56	3.14	.57	4.29	.42	3.93	.71
Taiwan	3.50	.68	3.28	.64	3.61	.66	3.83	.54	3.43	.90
Japan	3.22	.65	2.71	.70	3.62	.69	3.99	.69	3.55	.71
Hawaii	3.24	.77	3.44	.73	3.91	.77	4.11	.55	3.85	.91
US mainland	3.21	.84	3.22	.76	3.83	.67	4.12	.62	3.92	1.04

mobile telephony. Examination of differences and similarities among age and gender groups was included in the original design of the study (RQ2), but these independent variables were removed from the analysis due to a lack of homogeneity of variance across the levels of the age and gender groupings. Homogeneity of variance was observed across the five levels for culture, so the primary research question (RQ1) exploring cultural differences and similarities in perceptions and uses of mobile telephony was analyzed using a one-way MANOVA and follow-up post-hoc procedures.

The results of RQ1 revealed some significant differences as well as several similarities in how members of the cultural groupings perceived and used mobile telephony. Most notably, participants from the US mainland and Hawaii used their mobile phones significantly more for safety/security than those from Sweden. In addition, the participants from Hawaii and Sweden were significantly more tolerant of mobile phone use in public than the participants from Japan. The other comparisons did not yield statistically significant differences among the cultural groupings, although the tests for instrumental and expressive uses approached statistical significance.

Interpretation of the findings

It is plausible that participants from Japan reported significantly lower tolerance for mobile phone use in public than those from Hawaii and Sweden because of the relatively high population density in Japan. Data from the previous decade show that Japan was three times more densely populated than Europe and twelve times more densely populated than the USA during this time (US Library of Congress, 2003). It may be that the high population density in Japan causes mobile phone use in public to be more of a social intrusion than it is in less densely populated areas. Ling (1996) found that individuals took offense to being forced into eavesdropping when they could hear others speaking on mobile phones around them in public settings. Although this supposition is speculative, it is reasonable to conclude that in more densely populated areas it is more difficult to avoid eavesdropping on mobile conversations in public settings.

The finding that Swedish participants used the mobile phone significantly less for safety/security than participants from the US mainland and Hawaii is more difficult to explain. The obvious explanation for this finding would be a lower crime rate in Sweden, resulting in a heightened sense of security and less of a need to use the mobile phone for this purpose. However, studies indicate that the crime rate in Sweden is fairly comparable to that in the USA. For example, in 1994 there were 713 cases of violent crime (murder, assault, rape and robbery) per 100,000 citizens in the USA compared to 705 per 100,000 in Sweden (Lee, 1997). Another study comparing the prevalence of crime (both violent and non-violent) from 1989–2000 in numerous industrialized countries showed that citizens in Sweden actually had a higher

rate of overall reported victimization than citizens of the USA during this time (Van Kesteren et al., 2000). Additional research should be conducted to verify and explain the finding that Swedish mobile phone users regard and use the technology significantly less for safety/security than mobile phone users in Hawaii and the US mainland.

While the cultural differences uncovered in this study are interesting, the number of non-significant differences is also a noteworthy finding. Cross-comparison of the five dependent variables among the five levels of the independent variable could have resulted potentially in 50 cases of statistically significant differences between cultural groupings, yet statistically significant differences were found in only four cases. On the surface, these results appear to suggest that the real story of this study lies in the cultural similarities rather than in the differences that were found. However, before arriving at this conclusion, closer scrutiny of the results is warranted. Although the follow-up ANOVA tests for instrumental and expressive use were not statistically significant at $p<0.02$ and $p<0.05$ respectively, these tests approached statistical significance and would have been so had a Bonferroni procedure not been used. Given the limitations of this study (discussed in the next section), it is important to acknowledge the exploratory nature of this research, which may have influenced the tests for differences. With a larger, more representative sample, it is quite possible that the nearly-significant tests in this study would have resulted in more definitive differences among the cultural groupings. Therefore, the results of this study are interpreted as indicative of both similarities and differences in perceptions and uses of mobile telephony in the cultures examined.

The findings of this study may be interpreted further using theoretical frameworks from research on communication technologies. The cultural similarities indicated in this study may be viewed through the lens of apparatgeist (Katz and Aakhus, 2002). According to apparatgeist, there is an underlying spirit that guides the adoption and use of personal communication technologies and this spirit is wrought with both social and technological 'reasonings' that tend to be consistent across different cultures. Social considerations include roles, norms, network externalities, reference groups, folk theories and other visages of social context and social applications. Although social context can vary widely in disparate cultures, Katz and Aakhus argue that people have a universal drive for perpetual contact, a socio-logic that 'underwrites how we judge, invent and use communication technology' (Katz and Aakhus, 2002: 307). Technological factors such as size, ease of use and media exposure also contribute to patterns of communication technology use. The theoretical orientation of apparatgeist helps to bring into focus the interplay between social and technological characteristics, which plays a role in coherent patterns of mobile phone use and conceptualization in dissimilar cultures.

This study revealed some interesting cultural differences which also merit theoretical analysis. The present study was essentially a follow-up to one conducted by Campbell and Russo (2003), which used the same instrument to reveal statistical consistencies for the perception and use factors within personal communication networks. That is, Campbell and Russo found evidence that these perceptions and uses are socially influenced through interaction within micro-level social networks. The findings in Campbell and Russo's study support the Social Influence Model of technology use, which suggests that media perceptions are socially constructed, at least partially, in tight-knit social networks (Fulk, 1993; Fulk et al., 1990, 1995; Schmitz and Fulk, 1991). The present study was conducted to explore the extent to which the perceptions and uses examined by Campbell and Russo are also shaped in larger cultural networks. Using the Social Influence Model as theoretical framing allows one to view the cultural differences in the present study as indicative of the social construction of meaning that takes place at the macro-level as well as the micro-level.

LIMITATIONS OF THE STUDY

While this study offers valuable insights into perceptions and uses of mobile telephony among members of disparate cultural groups, some important limitations should be acknowledged that hinder generalization of the findings. As noted, the participants in the study comprised a convenience sample of university students. Due to a lack of resources, the study was not able to utilize randomized sampling techniques. Being of similar age and education level, the participants were too demographically homogenous to truly represent their respective cultures. Examination of the effects of age was hindered also by the nature of this sample. Age has played a prominent role in previous mobile communication research and future studies of this nature should strive for a wider range of age groups in order to to examine better how this variable is associated with perceptions and uses of the technology. Further, representativeness is limited by the relatively small number of participants in each group and the fact that, although the participants were members of disparate cultures, they were living (temporarily) in the same geographic region at the time that the surveys were administered. It is possible that these distinctive characteristics of the sample caused the responses to be different from a random sample from the same population strata. Therefore, this study should be regarded as exploratory in nature. In addition, the number of cultural groups included in the study is also a limitation. Additional cultural groupings would have shed light on more differences and similarities in how mobile communication technology is perceived and used around the globe. It would be especially interesting to include participants from less industrialized countries. Due to these limitations in scope and methods, this investigation should be regarded as a preliminary study which offers one glimpse into how

people from distinct cultures think about and use mobile phones. Additional research is needed to explore these matters further.

CONCLUSION AND DIRECTIONS FOR FUTURE RESEARCH

First, follow-up research should be conducted to understand better the differences that were found in this study. Additional research will help to verify the findings and illuminate why individuals from the US mainland and Hawaii apparently regard and use the mobile phone more for safety/security than the Swedes. Further, additional research should be conducted to understand better why Japanese participants reported being less tolerant of mobile phone use in public than participants from Hawaii and Sweden. Also, the near-significant differences in instrumental and expressive uses of mobile telephony should be examined in future studies. As noted, the sampling limitations may have hindered the ability to yield statistical significance and therefore additional research is needed to investigate the extent to which members of disparate cultures use the mobile phone in these ways.

In addition to cultural differences, future research should explore further the similarities in how people think about and use mobile telephony. Many of the results of this study are consistent with those of other studies highlighting cross-cultural similarities in perceptions and uses of mobile phones and other communication technologies (see for example, Katz et al., 2003; Mante, 2002). Future research should be conducted to help explain these similarities. Katz et al., offer three possible explanations for cross-cultural similarities found among young people:

- there is an international culture of the mobile phone that spans continents;
- there is an international teen culture in which the mobile phone plays a role; and
- there are universals or near-universals in the way people perceive the role of communication in their lives (2003: 85).

This last bullet point lies at the heart of apparatgeist. Considering the fact that communication itself is a universal aspect of humanity, it is reasonable to suggest that there are universals in how people conceptualize its role in their social lives. This is not to say that communication practices are the same for different societies, groups and individuals, but rather that there are latent aspects of human communication that run deep and are pervasive. Several of the findings of this study help to support this perspective. However, this is a young theoretical orientation that warrants further development. Future research and theory-building of cross-cultural perceptions and uses of communication technologies are needed to understand better whether and why 'the tendency is for people to operate by identifiable, consistent and

generalized patterns and to rely on a common set of strategies or principles of reasoning despite individual creativity and worldwide cultural diversity' (Katz and Aakhus, 2002: 310).

Notes

1 See Katz and Aakhus (2002) for an expanded list of social and technological considerations identified in their explication of apparatgeist.

2 The author would like to acknowledge that since this manuscript was accepted for publication, a number of additional valuable books and articles have appeared in the literature examining mobile communication within and across cultural environments. To identify just a few: Castells et al. (2007), Ishii (2006) and Ito et al. (2005).

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