SOCIAL DISPOSITION AND ANTHROPOMORPHISM OF SMARTPHONES

by

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THESIS ABSTRACT

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Smartphones are the most personalized and in the meantime the most anthropomorphized computing and communication technology in our society. Existing studies, especially Computers as Social Actors studies, on anthropomorphism and social interactions focus on how to implement and elicit positive anthropomorphic effects but fail to address the motivations and dispositional factors. Through an online survey that incorporates well-tested social psychological scales, this study provides empirical evidences that smartphone users' social dispositions including chronic loneliness, attachment style, and cultural orientations are associated with their acceptance and awareness of anthropomorphism. Findings in this study suggest that existing studies are limited to method of choice and overlooked how people adapt to communication technologies differently in real life settings. Anthropomorphic design in communication technology and anthropomorphized message in advertising strategies need further examination when targeting a diversified or specified demographic.

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CHAPTER I

INTRODUCTION

The smartphone has gained an increasing share in the global cell phone market in recent years. Gartner (2013) estimated that 455.6 million cell phones had sold in Q3 of 2013, 55% of them were smartphones. In some countries like Korea, 67.8% of cell phone users use smartphones (Yap, 2013). In Japan, given the long-time versatile and extensive adoption of feature phones with less options and customizability than smartphones, the smartphone penetration rate still approached 40% as reported in December 2012 (Mitsuhashi, 2013). The Pew Research Center from the United States recently started to survey smartphone ownership of Americans. According to its first report, 56% of all American adults are now using smartphones (Smith, 2013). European countries also witnessed near or over 50% smartphone penetration rate as of December 2012 (comScore, 2012), and it is predicted that some of them will reach a 90% penetration rate by 2017 (Rooney, 2013).

Comparing to traditional feature phones, smartphones are also used differently. Smartphone adoption has gone beyond simultaneous voice communication, short text messaging and simplified xHTML-based web browsing thanks to the success of Apple's iPhone and App Store. Modern smartphones are not primarily used for phone calls anymore, but for Internet surfing, social networking and entertainment, including games and multimedia (Richmond, 2012). Smartphones are generally considered portable computers—they have competent computing power, adequate portability, and various sensory technologies that constantly retrieve all kinds of information/data from the users, with or without their consent. Research and design in computers, including

anthropomorphism, also apply to smartphones. Anthropomorphism is attribution of human characteristics and qualities to non-human beings. In computer science, as scholars in Carnegie Mellon University put it, anthropomorphism are researching and designing robots and humanoids that take anthropomorphic form as well as researching and designing that facilitate anthropomorphic interaction—social behaviors and interactions between users and computers (anthropomorphism.org, n.d.). Researchers have been studying how the anthropomorphic interface on the smartphone screen would affect user's decision making (Bass, Fink, Price, Sturre, Hentschel, & Pak, 2011). The industry generally views smartphones as an anthropomorphic form—not only the physical shape as in the aforementioned research but also the total expression of an object from a designer's point of view—with anthropomorphic interactions. Smartphones feature programmed actions that imitate human behaviors while providing social heuristics on the interface (anthropomorphism.org, n.d.). Smartphones like the iPhone or Android phones offer an option to name them; wording of pop-up messages reflect good manners as well. For example, the option to refuse to rate an app is "No Thanks" on the iPhone screen prompt; using "Thanks" here is completely unnecessary in a machine command. The smartphone not only reacts but also "acts on its own," from simple tasks such as morning clock/alarm to location-based reminders (e.g., Siri on the iPhone could learn the locations like "home," "work," "school," and set location-based reminders for the user). Apple had been promoting its virtual assistant service in an anthropomorphic way—"Siri understands what you say, knows what you mean, and even talks back" (seen in the introduction of iOS 5 on Apple Website), and it had been recruiting Siri editors to

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write "character-driven dialog" to make Siri "known for 'her' wit, cultural knowledge, and zeal to explain things in engaging, funny, and practical ways" (Simonite, 2013).

Siri has also been advertised in such a way. The iPhone 4S Siri commercials employing Zooey Deschanel and Samuel Jackson especially demonstrated this trend. With the messages such as "Today, we are dancing" (Deschanel, 2012) and "Siri, you can take a night off" (Jackson, 2012), they were clearly attempting to convey a message of anthropomorphism—a talking personal assistant. Not surprisingly, the media and markets responded vigorously. Major news outlets reported on the Siri-featured device using anthropomorphic words, such as "The iPhone 4S finds its voice" (WSJ) (Mossberg, 2012) and "iPhone virtual assistant Siri has her flaws, but she's learning" (LA Times) (Xia, 2011). The user community also showed great interest: many Siri advertisement parodies sprung up on YouTube; people share their unexpected human-like conversations with Siri on social networks and user-submitted blogs, such as shitthatsirisays.tumblr.com and siri-isms.com.

As we can see in Siri's case, anthropomorphism is widely used on smartphones—it is used in designing intelligent agents (a term used in artificial intelligence), in warranting the success of advertising in mass media, and in introducing a new set of vocabulary that "has become conveniently intertwined with our descriptions of ourselves in a manner that conveys an immediately understandable message when used in daily conversation" (Marakas, Johnson, & Palmer, 2000, p. 722). Furthermore, as a metaphor, anthropomorphism creates a smokescreen that prevents getting into technical details of the object in our daily communication (Turkle, 1980). Similar to Turkle's example of airline ticket agent blaming the "fouled-up" printer when confronting angry clients—by

referring computer as an autonomous entity she dodges the blame on her incompetency or her company policy and avoids laying blame on her fellow IT maintenance workers, if Siri is considered intelligent enough to be a personal assistant, especially when engineers intentionally add messages just to engage the user, then it is certainly intelligent enough to take blames when the program ceases to work. A malfunction of program becomes a laughable joke; as we can see from many widely spread screenshots of unexpected "conversations" with Siri.

Anthropomorphism on smartphones is also universal across different cultures. In Japan, the major mobile carrier NTT DoCoMo has been running an advertising campaign with the name of "Walk with you" since 2010. Its technique in essence is the personification of smartphones—an imaginary and figurative depiction of the relationship between the user and the device—in anthropomorphic form but also with personalities. So far over more than TV commercials have been released for this campaign, all employing personification with various personalities and relationships portrayed. While the physical smartphone device is rarely seen in the ads, the movie/pop stars play the role of smartphones. By doing this they not only act as the endorser of advertised product but also represents the human traits that the audience can ascribe to the product. In China, the smartphone-human story gets a personified touch. A 42-episode TV drama, *Magic Cell Phone* (魔幻手机), was broadcasted on CCTV-8 in 2008 (Yu, 2008). In this drama, a hyper feature-rich cell phone incarnates as a girl, helping the protagonist overcome many difficulties in his life. This show was quite popular that a second season with 42 episodes got aired in early 2014 (Yu, 2014).

Despite its extended history and universality (Turkle, 1980), our understanding of anthropomorphism, especially on smartphones and media, is rather limited. The media equation studies (Reeves & Nass, 1997) reveal some empirical evidence that people follow social roles when interacting with modern media such as TV and computers, as if they were interacting with real people. Accordingly, people should follow the same social roles when interacting with their smartphones. But why do people personify/anthropomorphize their smartphones and act as if it is a human being? Even with so many anecdotal cases, the motivations behind such behavior remain unclear. Nevertheless, Nass, Reeves, and other researchers of Stanford University's Social Responses to Communication Technologies research group initiated a paradigm named "Computers as Social Actors" (CASA) (Nass, Steuer, & Tauber, 1994; Nass, Moon, & Fogg, 1995), under which direct anthropomorphic effects on the computational device user or advertisement audience have been examined to ensure the effectiveness of product design and advertising (Landwehr, McGill, & Herrmann, 2011; Aggarwal & McGill, 2011; Johnson & Acquavella, 2012). However, the generalizability of laboratory experience is often at question, and the explanatory power is also limited. Like most communication technologies, an anthropomorphized smartphone is designed to be impersonal to the user, suitable for mass production and distribution, and identical out-of-box. The CASA paradigm follows the same mindset, with the "implicit assumption that users of computing technologies are essentially homogeneous with regard to their acceptance of a human-like interface" (Johnson, Marakas, & Palmer, 2006, p. 447). With methodology drew from sociology and social psychology discipline (Reeves & Nass, 1997), however, research under this paradigm mostly works on situational factors—the

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hypothesized external causes and experimental conditions researchers manipulate—when explaining the attributions and behaviors of the subject. The dispositional factors—personalities, internal and often unchangeable characteristics specific to the subject as a person—are largely ignored, whereas these factors may diversify the anthropomorphic effort in real life settings where each person experiences and interacts with the technology individually. Furthermore, the subjects' motivations and attribution of personalities are often considered irrelevant.

Based on reviewing existing perspectives on anthropomorphism in computing technology, the purpose of this study is re-introducing related social psychology theory to provide a new empirical approach to investigation of anthropomorphism of communication technologies such as smartphones. This study suggests that anthropomorphism of the smartphone could be different from the cases of anthropomorphism of gods, nature or mascots. The smartphone started as an appliance for social life but has become something innately sociable. The user's social dispositions, independent from product design and promotion efforts, could relate to his/her acceptance and awareness of the anthropomorphism. The findings of this study could complement the CASA paradigm by adding the dispositional factors to the inquiries (even though demographic factors were ruled out in those early studies), and deal with cases researchers like Lee (2010) suggested, that human-voiced computers fail to achieve social responses in any individual experiment participants. The inquiry on dispositional variables should also help us understand that the effects of anthropomorphic design in computer interface or advertising are not universal and homogeneous. Smartphone-delivered advertisement should consider the dispositional characteristics of the targeted

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audience before applying anthropomorphic cues and assuming a simple and fixed rate of

positive response.

CHAPTER II

LITERATURE REVIEW

Attachment, Dependency, and Addiction

In many anecdotal studies from education and clinical fields, users' relationships

with cell phones are often criticized. Vincent (2006) conducted a series of surveys on

social practices of mobile phone users in UK and Germany. By reciting various anecdotes

obtained through interviews, she summarizes the cell phone users' emotions as "panic,

strangeness, 'being cool,' irrational behavior, thrill, anxiety" (p. 40). It is unclear how she

extends "emotion" to "emotional attachment" in her conclusion, but this

conceptualization is suggestive to future inquiries. Vincent's explanation of such

attachment to mobile phones holds that "it is not the result of a solitary preoccupation

with the device but rather it is (the) relationships with others that provide the stimuli" (p.

42). She defines this relationship as a social investment—social practices surrounding the

use of the mobile phone would appear to result in more intensive relationships.

Computers as Social Actors (CASA)

Anthropomorphism of modern communication technologies such as televisions,

computers and cell phones indicates that the smartphone itself is sociable. The prominent

paradigm on the social relationships between the user and electronic media was initiated

by the media equation theory. The media equation theory holds that individuals'

interactions with the computers, televisions, and "new media" (as was used in 1997) are

fundamentally social and natural; everyone expects media to follow a wide range of

social and natural rules, and their actions follows the same rules (Reeves & Nass, 1997).

All these rules come from the world of interpersonal interaction and from studies about

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how people interact with the real social world, while all of them apply equally well to interactions with media (p. 5). These sociology and social psychology theories on those social rules were translated into their 35 studies— replacing "human" with "computer" in the experiment setups. In one experiment, they asked participants to take computer-aided trainings and then evaluate the trainings. They found that those who did the training evaluation on the same computer gave significantly higher ratings than those who did tasks on different computers. This falls in the same rule of politeness in our social world—we tend to give higher rating of the other when do the rating in front of the rated person than do the rating in front of a different person (Nass & Moon, 2000). Nass and Moon (2000) also claim that the social responses about computers are elicited subconsciously by the users, regardless of the "density" of information, forms of message or whether the computer is anthropomorphized. The media literacy of the subjects is considered irrelevant; age, knowledge, distraction, or convenience does not appear to affect the experiments' outcome (p. 7). Furthermore, Nass and Moon (2000) contend that none of the computers used in their experiments were personalized—the computer never referred to itself as "I". In their first experiments, participants interacted with simple text on a screen in examining media and manners (Reeves & Nass, 1997). However, characters and avatars were frequently placed on the interfaces in other experiments.

Media equation theory is not only positivistic but also behavioristic, with little attempt to explain why people do this. Reeves and Nass (1997) simply suggest that our "old" brain could not interact with "new media" in a "new" way (p. 12); what is going on within the brain remains unclear. It is highly possible that the smartphone, as a portable computational device, follows the same social rules. But reiterating the same empirical

study on smartphones does little for us to understand the reason behind such behavior, especially when anthropomorphism/personification of the smartphone is salient in our society. Studies under the CASA paradigm more or less have the same orientation—by identifying universal social rules that also exist in human-computer interactions, researchers can provide suggestions in designing programs and computer interfaces. Scholars were later able to confirm that social responses were triggered more by anthropomorphic cartoon characters than by textual prompts (Lee, 2010). Even though media equation is mindless (Nass & Moon, 2000), it could be the anthropomorphism that is mindless (Kim & Sundar, 2012). Scholars tend to be more interested in studying the consequences rather than causes, and they generally assume that anthropomorphic metaphors and elements in the design or advertisement are communicated effectively (Landwehr et al., 2011; Aggarwal & McGill, 2011; Johnson & Acquavella, 2012).

Anthropomorphism Studies in Computer Science

Computer scientists may not completely agree on the media equation theory but they have similar goals of improving computer interfaces and program designs. Some (Koh & Tsay, 2006) repeated Nass and Moon's (2000) study on politeness and supported that the level of anthropomorphism appeared to affect people's tendency to treat computers politely. Engineering effort matters in this case, since computer interfaces are deliberately engineered with anthropomorphism. As a result, users do not have to make conscious and mindful human-ness attribution but still demonstrate non-conscious and mindless evaluation of the interfaces (Kim & Sundar, 2012). Studies on anthropomorphism in the computer science field are pragmatic; anthropomorphizing efforts aim at increasing the efficiency of application and credibility of the computer

agent, as theorized in Sundar's (2008) heuristic model. Studies funded by Internet companies (e.g., Google Research Award) have particular interests in designing anthropomorphic automations and interfaces on smartphones with which they can achieve higher performance in aiding decision-making tasks by affecting the user's trust and compliance (Bass et al., 2011). While a group of technologists who study long-term relationships with computers (Benyon & Mival, 2008), generally speaking, computer scientists focus on short-term and immediate effects and pay little attention to dispositional factors that may be associated with people's tendency to respond or anthropomorphize. Based on comparing the effects of human voice versus synthetic voice on computers, Lee (2010) suggests that there might be dispositional differences in people's susceptibility to anthropomorphic cues embedded computer interfaces.

Computing Technology Continuum of Perspective

The computing technology continuum of perspective (Marakas et al., 2000) is a recent development of CASA that not only addresses the characteristics of computing technology but also people's own characteristics. Specifically, studies following this theoretical modeling retain consideration of the possibility that an individual's attribution toward computing technology can be different based on his/her self-evaluation and other dispositional factors including the socialness. It is proposed that People's belief about the social role and capabilities of computing technology can be assessed on a continuum with one end being a *local simplex* perspective (considering computers as merely tools) and the other end a *global complex* perspective (considering computers have agency and can influence one's life). Marakas et al. (2000) believe that most people reside somewhere in between rather than at the extremes, and their anchors are largely determined by three

factors: self-evaluations, social character of computing technology, and the context/nature of interaction. A fourth factor, perceived control of rights, is proposed in a later study to validate and develop the scale (Johnson, Marakas, & Palmer, 2008). The determinant modeling and factors are shown in Figure 1. Marakas et al. (2000) further propose that in order to assess people's perspectives on a continuum, the social attribution toward computing technology they make in each circumstance follows the rules revealed in social attribution theory. Whereas attribution theory addresses people's dispositional versus situational attribution toward other people's behavior, Marakas et al. (2000) propose that in the case of computing technology, people make attribution of a computer's behavior ranging from tool attribution to social actor attribution—corresponding to the two extremes of continuum of perspective.

FIGURE 1. Model of Computing Technology Continuum of Perspective (Marakas et al., 2000)
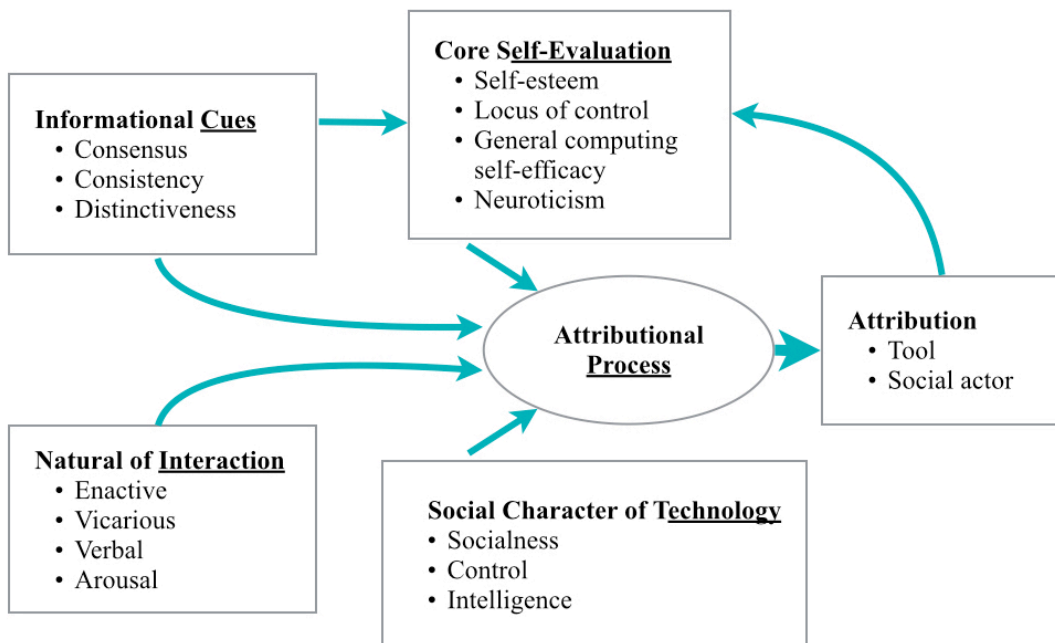
Among the above modeling and variables, self-esteem and locus of control are not quite supported by up-to-date studies. The cited materials are also dated in the model proposal. The construct of self-esteem has not been a sufficient determinant in a later study of social attributions to mobile phones in travels (Tussyadiah, 2013). It is suggestive that although discriminant validity can be archived, the construct is somewhat problematic, since the items have been drastically changed through the three studies (Marakas et al., 2000; Johnson et al., 2006; Johnson et al., 2008). For example, the socialness scale employed in the 2006 study comes from Buss and Plomin (1984), and the items are now part of the UCLA loneliness scale (latest version in 1996), either one aims at assessing some internal characteristics of the subject rather than what was originally proposed in 2000—the social cue of technology. Although the whole socialness scale was eliminated from the most recent theoretical development (see Johnson et al., 2008), other scholars suggest that socialness/chronic loneliness could be associated with anthropomorphism (Epley, Akalis, Waytz, & Cacioppo, 2008).

Although with no direct measurement of anthropomorphism, the factors that Johnson et al. (2008) include to assess the continuum of perspective have abundant items of self-reported anthropomorphic judgment (e.g., "When I play a game with a computer, I worry that it might cheat"). These items help developing a scale of awareness of anthropomorphic agency in this study. On the other hand, the factors proposed have a lot in common but differently structured with elements in the SEEK model, which is supportive to the theoretical choices of this study.

Three-factor Theory of Anthropomorphism in Social Psychology

Psychologists look at anthropomorphism in a different way. As Epley, Waytz, and Cacioppo (2007) contend, although in many fields researchers focus on the accuracy and functionality of anthropomorphism, especially in the case of personifying animals, not much effort has been devoted to a psychological account of when and why people are likely to anthropomorphize nonhuman agents. Although anthropomorphism is considered an automatic psychological process (Guthrie, 1993), it is obvious that people do not anthropomorphize everything and not everyone personifies things to the same extent.

Epley et al. (2007) provided a comprehensive theoretical development on studying anthropomorphism psychologically. They proposed a three-determinant model—SEEK (Sociality, Effectance, Elicited agent Knowledge). The elicited agent knowledge refers to the cognitive determinants of anthropomorphism. This factor can also be seen as a theoretical framework for making anthropomorphic judgments toward non-human agents among the adults—a development of some of the observations that Turkle (1984) acquired in studying 4 to14 years old children making sense of computers and electronic toys in classroom, using a focus group qualitative method. The effectance motivation determinants include the motivations that people have so to fight against the uncertainty and ambiguity and increase the agents' predictability and controllability, in their interactions with the agents that they anthropomorphize or make social actor attribution toward. This is where the CASA paradigm comes into play and the modeling of continuum of perspective further develops under CASA paradigm—by bringing in some of the variables from elicited agent knowledge determinants. The sociality motivation reflects the need to establish and maintain a sense of social interaction with

others including non-human agents. These variables, on the other hand, are not what

CASA mainly focus on; in fact it is what a lot of scholars assume invariant in their

equation. The pioneers of CASA even refute some of the hypotheses (such as social

interaction is caused by pre-anthropomorphized messages) derived from the elicited agent

knowledge determinants. However, as Epley et al. (2007) suggest, these needs would

assist anthropomorphism by increasing the baseline accessibility of social cues of the

agent and increasing people's tendency to actively search for sources of social interaction.

More importantly, rather than suggesting that people's own characteristics would

influence an anthropomorphic attribution process, the SEEK model specifically pinpoints

the independent variables that could be associated with anthropomorphism and cites

empirical studies that supports them. The three determinant factors and independent

variables proposed in this SEEK model are shown in Table 1.

This theory has been partially supported in many studies and is explanatory for

many instances in our daily life. For example, people yell at unresponsive computers and

wonder if their computers are plotting against them. This is because their anticipated

interactions with the computer are not fulfilled. When the frustration causes them to

correct or adjust their previous perception of the computer, they start to deny their

personification and dehumanize it (Lupton & Noble, 1997). It is also out of a similar

mentality that people ask, "Siri, why don't you understand me?" (Willingham, 2012) The

effect of social disconnection on anthropomorphism is supported in some experiments

when the subjects are induced with such feelings from film clips like *Cast Away* (Epley et

al., 2008, as cited in Epley et al., 2007) but can also be verified in real life conditions,

such as sailors giving names to islands and coastal rocks, or drivers feeling emotionally

attached to the cars in front of them on highways (Imgur, 2013). The sociality

determinants in this model have partially been supported in studies on pets and religious

agents (Epley et al., 2008). However, they have not been investigated in the context of

personification of smartphones or other communication technologies.

The SEEK model also inspires possible ramifications of existing studies related

this topic. As in Vincent's (2006) study on emotional attachment, the emotions

summarized are similar to the emotions demonstrated on a preoccupied attachment style.

It is possible that these people with such developmental social dispositions tend to be

preoccupied in close relationships, be the other party a human being or a cell phone.

Other scholars have found that people with insecure-anxious attachment styles are more

likely to be emotionally attached to television characters (Caole & Leets, 1999). The

media equation experiments and studies may also find ramifications from this theory. The

experimental environment in computer laboratories might naturally create a condition of

social isolation (e.g., seating in cubicles, one-to-one communications). The participants

might be induced to anthropomorphize computers regardless of whether the computer/test

program has anthropomorphic cues, as Koh and Tsay (2006) counter-argued. The

laboratory computers may be "strangers" to the participants; therefore more politeness is

needed in such interactions compared to the interactions with their own personal

computers (Gupta et al., 2007). Furthermore, experiments in media equation theory were

mostly conducted in computer laboratories in the mid 90s. Now with the prominent

existence of Wi-Fi and the Internet, computers are possibly only seen as "window to the

Internet," therefore the CASA paradigm may need revision or revalidation (Lang,

Klepsch, Nothdurft, Seufert, & Minker, 2013). The same applies to smartphones—since

TABLE 1. SEEK Model of Anthropomorphism (Epley et al., 2007)

Key Psychological Determinants (Elicited Agent Knowledge, Effectance, and Sociality), Categories of Independent Variables, and Predicted Sources of Influence From Specific Independent Variables on Anthropomorphism

Categories of independent variables	Key psychological determinants		
	Elicited agent knowledge	**Effectance motivation**	**Sociality motivation**
Dispositional	Need for cognition	Need for closure, desire for control	Chronic loneliness
Situational	Perceived similarity	Anticipated interaction, apparent predictability	Social disconnection
Developmental	Acquisition of alternative theories	Attaining competence	Attachment
Cultural	Experience, norms, and ideologies	Uncertainty avoidance	Individualism and collectivism

Note The predicted sources of influence presented in this table are meant to be illustrative rather than exhaustive.

social communication is essential to these devices, merely viewing them as portable computing devices can be questionable.

Because of its tentative synthesis of the sociality motivations of anthropomorphism, the SEEK theory is taken as a major reference in studying the personification of smartphones. Chronic loneliness refers to the long-term feeling of disconnectedness regardless of the person's surrounding environment. Chronically lonely people are not likely to be heavy cell phone users; the smartphone, which is meant to do social activities, is less likely to be anthropomorphized by this group of people if these are only taken as tools. But if smartphones are taken as social actors, we should expect a greater tendency to anthropomorphize smartphones. According to the Pew Research Center's report (Hampton, 2009), people's use of the cell phone and the Internet is associated with larger and more diverse discussion networks. Since the smartphone is apparently commonly personified in our society, it makes sense to test the sociality variables in the case of smartphone anthropomorphism, especially for the two variables of chronic loneliness and attachment styles constructed as social dispositions in this study. The two examples of anthropomorphism that Epley et al. (2007) referenced to in discussion sociality motivation, namely pets and religious agents (gods), also inspire this study. Rather than creating circumstances in experiments to arrive at static conclusion of the natural of human machine interaction, a study could be made by correlating a static assessment of dispositional factors of the subject and a static assessment of attitude and perception toward the anthropomorphic agent.

Cultural Differences in Computer and Smartphone Advertisements

Cultural differences need to be considered since it matters under the CASA paradigm. Katagiri, Nass, and Takeuchi (2001) examined the reciprocity social roles in human-computer communication in Japan and found a similar attitudinal pattern but not a behavioral pattern. Social reciprocity refers to positive actions in response to positive action from another individual (in media equation theory, another computer). Media equation theory was able to identify this by comparing the actions toward the helpful or unhelpful computer that the participants worked with earlier in the experiment to another computer on the other side of the room. It is expected that people exhibit behavioral and attitudinal reciprocity toward the same helpful computer but not the other computer, while Katagiri et al. (2001) found that Japanese participants acted consistently with a collectivist culture, treating the second computer differently only when it was a different brand. Although social interactions are universal and generally encouraged in different cultures, the value placed on social relations and affiliations appears to be greater in collectivist cultures (Markus & Kitayama, 1991; as cited in Epley et al., 2007). Therefore, anthropomorphism widely exists across cultures but may be recognized differently. In the United States, psychiatrist like Ablow (2011) criticizes Siri as a "psychological poison" that people interact with as quasi-beings, which dumbs down people's interpersonal skills and encourages them to treat other people like machines (as Ablow contended on Fox News Website). Some reviewers (Filipovic, 2011; Davis, 2011) are discontented with Siri in a female voice, making it sexualized. They criticize those Siri Easter eggs (hidden message in a computer program that is usually irrelevant to intended features of the application) as well as how Siri is advertised as "blatant in its sexism, objectification, and

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overall misogyny." The opinions from Filipovic as a senior political writer and Davis as a

sociology professor are coincident. Meanwhile in Japan, such critics are rarely seen. The

personification (and possibly sexualization) of Siri fits well in the long time tradition of

making "-*tan*" (personification widely used in Japanese kawaii/cute culture) in consumer

electronics (Ashcraft, 2012), or to trace it even further, the Japanese techno-animism and

even *Shinto* state religion, which is far beyond a modern settlement (Jensen, 2013).

Japanese *Otaku* (people with excessive anime and manga fandom) also takes challenging

DIY projects such as Anime-Comic-Game (ACG) decals for cell phones (*ita keitai/*痛携

帯) ("痛スマホの作り方," 2012). They invest tremendous amount of time, money and

handworks just to personify their cell phones.

Empirical studies in how anthropomorphism of computers or smartphones is

different in different cultures are scarce, however, close reading of advertisement text can

provide a lot of clues of these differences. Personification in consumer electronics has

been around for at least ten years. One of the prominent ones is Apple's "Get A Mac"

campaign, which includes 66 TV commercials from May 2006 to October 2009 (Nudd,

2011). "Get A Mac" campaign has a consistent formula: starting with Justin Long dressed

in casual clothes introducing himself—"Hello, I'm a Mac"—and John Hodgman dressed

in suites introducing himself—"And I'm a PC", the two figures stand against a white

backdrop and have a short conversation about the differences between a Mac and a PC—

in a figurative way. For example, in the first ad ("Better", May 2006), PC is good at

spreadsheets (business stuff) while Mac is better at "life stuff" (as seen in Image 1).

The advertisement works in a mascot endorsing style—the two characters have

deliberately selected dressing code and style of conversation, with "Mac" being fun and

frank and "PC" being stale and grandiose. It appeals because it makes the audience

identify with one of the personification, a Mac *user* or a PC *user*, just as revealed in the

last commercial ("Teeter Tottering", October 2009) where Anne the user puts her stuff in

a box and hands to Mac (as seen in Image 2). It also backfired because the blurring

boundaries between personification of the computer and the user inevitably lead to

stereotyping of people, not just promotion of brand. As much as it intends to use human

IMAGE 1. First Scene in *Better*–First Commercial in Get A Mac Campaign

IMAGE 2. Scene in *Teeter Tottering*–Last Commercial in "Get A Mac" Campaign

beings to innovatively endorse the goodness of Mac in a humorous way, it is also mean-spirited in stereotyping not only the PC users but also the Mac users (Stevenson, 2006).

Across the Ocean, NTT DoCoMo, Japan's largest mobile carrier, has also successfully adopted the personification technique in smartphone advertising. The campaign was announced on May 10th, 2010 with the slogan of "ひとりと、ひとつ。walk with you" (One person with one. Walk with you). Until now there has been more than 40 commercials aired through television, along with several radio commercials and commercials via other channels. Unlike the "Get A Mac" commercials that deliberately deprives the social context of the conversation or story, "Walk with You" commercials are centered with the social context—a social relationship between the user and the smartphone, in a larger social context—where smartphones help users conquer loneliness and solve social problems (as seen Image 3, Horikita Saki on the left is the user, Kimura Kaera on the right in pink is the personification of smartphone). The smartphone can be the best female friend of the user (as seen in Image 3), always with her no matter she is happy or sad. She (smartphone) goes social with her, rests with her, walks with her, reminds her a new phone call (with vocal ringtone), and talks gossip with her about a boyfriend.

In other commercials of this campaign, smartphones also takes incarnation of other social roles, such as an older brother who helps a female freshman to take her adventure in colleague in metropolis (上京篇, 01/13/2011), conforms a chap who just got disappointed in love (とある彼の夏篇, 06/10/2011), or encourage a newbie frustrated at work (とある彼女の夏篇, 06/24/2011). These social roles can be as simple as a as complex as a personal translator who comforts a girl in sorrow (since she just broke up

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IMAGE 3. NTT DoCoMo 2010 Summer Collection Commercial
堀北 と カエラ (Horikita to Kaera)

with boyfriend) and helps her "talk" a foreign student who has a crush on her but they

could not speak each other's language well (とある留学生と私 前後篇, 06/20/2012),

or as intimate as a nervous and sensitive girlfriend who travels with the user to visit his

parents for the first time in the country side (堀北はじめまして篇, 07/02/2011) — a

story about introducing new technology (smartphone) to the older generation. Other than

the social context, it is also noticeable that "Get A Mac" commercials never actually

depict a real computer (other than the closing scene of Macintosh products), whereas in

DoCoMo commercials, juxtaposition of human and smartphone in transitions is

commonly seen, especially when the user is having a voice or touch input (as seen in

Image 4).

IMAGE 4. Juxtaposition in "Walk with You" Commercials

This difference—indicating that attitude toward personification is different across cultures—is amplified in the later imitation of Motorola's smartphone campaign in the United States, the Moto X "Lazy Phone" campaign. Unlike the "Walk with You" campaign, which promotes the mobile carrier, the physical products, features, and even customer services (in which two personifications of smartphones meet in a service center and encourage each other to better serve their "masters"), this campaign consists of the five commercials for one specific product model Moto X. Comedian T.J. Miller plays the personification of other phones in the market, a slummock who is incompetent at voice

input, finding the closest gas station, opening up camera app and keeping quiet in a business meeting. Compared to "him" being "lazy", the Moto X becomes "smart". Personification here is used for humorously belittling, rather than endorsing. Although "Lazy Phone" commercials are designed with imitations of "Walk with You" commercials including depictions of social circumstances and human like conversations between the user and the personification, there is no juxtaposition or personification of Moto X and the commercials clearly attempt to draw a line between human beings and communication technologies. The campaign slogan "It's not you. It's your lazy phone" (as seen Image 5) provides a good indication about this, especially when the slogans of "Walk with You" campaign are utterly poetic and metaphorical.

> 家族でも、恋人でもないけれど、
> どんなときでもいつも近くにいる。
> ひとりじゃムリでも、一緒だったら可能性は拡がってゆく。
> でしゃばらず、でも離れすぎず、
> ちょうどいい関係であなたの人生を幸せにする。
> そんな存在でありつづけたい。
> あなたには、あなただけのドコモを。
> *Not a family, not a lover,*
> *But I'm always with you any time anywhere.*
> *Things you can't do alone, become possible when we are together.*
> *Not demand too much, never let it go,*
> *I bring joy to your life with just a good relationship.*
> *Wanna to be it till the end of time.*
> *I am your DoCoMo just for you.*
> *(Text from official campaign website, Translated by the author.)*

人は、前に向がって歩いて行く。

一歩一歩の積み重ね。

でも、いつしか振り返ってみれば、

それは遥かな道になっているに違いない。

そんなあなたのそばにいて、

少しでもチカラになれたら、うれしい。

つながりたいときに、つながりたい何かへ。

Moving forward, step by step.

What a long trip it's been, when I look back someday.

Wanna be always on your side,

Any little help to you, becomes a delight in me.

Whenever you wanna talk, I wanna be the one.

(Text from official campaign website, translated by the author.)

IMAGE 5. Moto X Lazy Phone Commercial *Navigation with Touchless Control*
Jared's (on the right) lazy phone is bad at Navigation and has no voice command.

CHAPTER III

HYPOTHESES

Based on the literature review of related studies, this study adopts the variables proposed in the three-factor anthropomorphism theory by Epley et al. (2007). This study attempts to construct the social disposition of smartphone users, and test the social disposition variables (chronic loneliness, attachment style, and culture orientation) exclusively on anthropomorphism/personification of smartphones. The hypotheses and research questions are proposed below:

H.1 Chronic loneliness *is positively associated with* people's tendency to anthropomorphize their smartphones.

H.2 People who demonstrate preoccupied attachment style traits, low avoidance and high anxiety, have a higher tendency to anthropomorphize their smartphones.

RQ.1 Does cultural orientation *moderate* H.1 and H.2?

As much as the hypotheses and research questions seemly correspond exactly to the three independent variables under the sociality factor proposed in the SEEK model, this study also draws on the CASA theories and some of the propositions from the computing technology continuum of perspectives. This study opts for SEEK model because it is the most inclusive among the options and comparing to the continuum of perspective, it is supported by empirical studies about other non-human agents.

This study varies from the SEEK model in regard to the categorization of independent variables. The independent variable, social disconnection, is a situational variable not so suitable to be assessed in the survey method this study uses. Therefore it is not included in the hypotheses. Attachment is categorized as a developmental variable

in SEEK model, this study consider it as a dispositional factor in a sense that this is a revelation of how people would deal with close relationships rather than the styles in which they developed from the interaction with main caregiver in childhood. Our current struggle with balancing the personal and business life on a (smart) phone, evidenced by recent development of identity management in Bring-Your-Own-Device (BYOD) at work and the long lasting niche market of bi-SIM card phone models (on which people usually use one number for personal and one number for business purposes), indicate how much the human-smartphone relationship can be a close relationship. Individualism and Collectivism are also altered and considered a dispositional factor instead of cultural factor due to the availability of samples in a single geo-location and recent development of studying cultural differences on an individual level (Sharma, 2010).

Regarding how anthropomorphism can be assessed, this study also develops beyond what has been cited in SEEK model proposition. Waytz et al. (2007) employed a scale consist of 5 anthropomorphic descriptors and 3 behavior descriptors in their study of anthropomorphism in electronic gadgets. These questions may be too confrontational, especially when considering people sometime deliberately dehumanizing things they might subconsciously personify—as evidenced in Lupton and Noble's (1997) study of workplace computers and Turkle's (1984) study of children's description of classroom computers and electronic toys. A different perspective is assessing how much they are aware of the agent in an anthropomorphic way, as employed in Johnson et al.'s (2006) study. In the later analysis, this development appeared to be rewarding.

CHAPTER IV

METHODOLOGY

Overview

This study employed questionnaire-based self-report survey with questionnaire designed to incorporate scales that measure all variables. The questionnaire was designed to take less than 20 minutes to complete.

Participants of this study were recruited from a major northwest university, with a randomized list of email addresses acquired from the university registrar. The questionnaire was hosted on Qualtrics.com and distributed by email to 3000 undergraduate students. One invitation email and four reminding emails were sent with links to the questionnaire.

Scales

Variables including chronic loneliness, attachment style and culture orientation, were measured with scales developed based on the UCLA Loneliness Scale, scale for Experiences in Close Relationships-Revised (ECR-R), and Culture Orientation Scale. Demographic questions as well as scales measuring if the respondents use cell phone heavily and their cell phone self-efficacy were also added to the questionnaire.

The UCLA Loneliness Scale is a question-based scale that measures subjective feelings of chronic loneliness and social isolation. The most recent version 3 is a 20-item 4-point scale in which the participants rate statements like "I feel isolation from others" as "I often feel this way," "I sometimes feel this way," "I rarely feel this way," or "I never feel this way" (Russell et al., 1996). To better incorporate this scale and not to have an extremely long questionnaire that hold back participants, this study employed a shorter

but reliable 8-item version (ULS-8) developed from the original UCLA Loneliness scale (Hays & DiMatteo, 1987). Wu and Yao (2008) have also tested the same version (ULS-8) on Taiwanese undergraduate students and found it reliable in a different culture context. To better integrate the questions with rest of the questionnaire, the four statements were recoded and expanded to seven ranging from "very untrue of me" to "very true of me."

The Experiences in Close Relationships-Revised (ECR-R) (Fraley, Waller, & Brennan, 2000) scale measures people's attachment styles in close relationships especially romantic relationships. As a self-reported scale, ECR-R is fairly accurate in assessing preoccupied attachment style (Bartholomew & Horowitz, 1991). Attachment Style exists and has been tested in a cross-cultural context (Wu, 2005). The Relationship Structure (ECR-RS) (Fraley, Heffernan, Vicary, & Brumbaugh, 2011) scale is a derivative of ECR-R with similar sets of questions that can be used to test close relationships in general. The ECR-R consists of a 36-item 7-point Likert scale (Fraley et al., 2000) while the Relationship Structures (ECR-RS) questionnaire used in this study has 9 of the 36 items and they were phrased to assess relationship with four targets (father, mother, romantic partner and best friend). Although the ultimate result was considered a general attachment style regardless of the roles or targets in close relationships. The scale provided continuous scores on the extent of anxiety and avoidance, with which categorical results was determined, as seen in Figure 2.

The Culture Orientation scale, alternatively called the Individualism and Collectivism Scale, measures dimensions of collectivism and individualism. This is a 16-item 9-point scale in which participants rate statements from "never or definitely not" to "always or definitely yes" on statements such as "I'd rather depend on myself than

FIGURE 2. Dimensions of Attachment Style (Fraley et al., 2000)
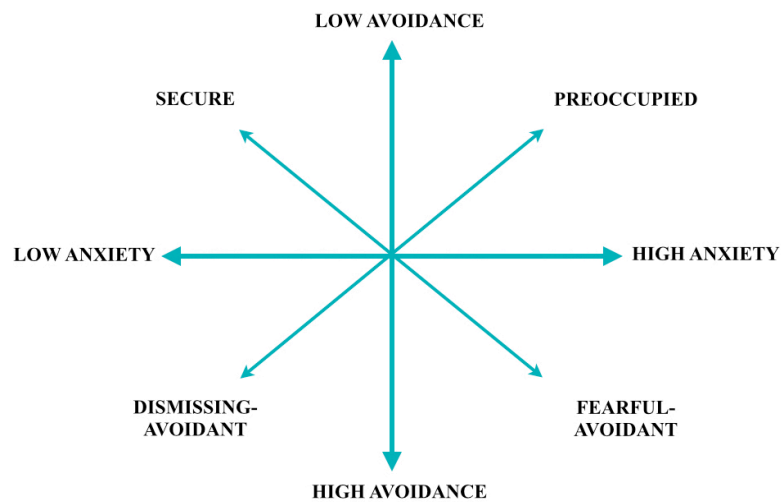
others." The answers provide a continuous score for each dimension (Singelis et al., 1998). The comprehensive Culture Orientation scale can provide assessment in four dimensions: vertical collectivism, vertical individualism, horizontal collectivism, and horizontal individualism. However, these dimensions would further complicate the current issue. This study focused on individual's cultural background, whereas personal cultural orientation would be different from which culture or nation the person is from (Bond, 2002). Therefore, rather than reflecting on the nation-level constructs, this study adopted the constructs of personal cultural orientation and selected "independence" and "interdependence" as key factors that were considered to matter the most. The 10 items to measure independence and inter-dependence personal cultural orientation all come from the original Cultural Orientation scale and the validity has been tested in cross culture studies (Sharma, 2010). The answer for each question was rephrased to 7 points ranging from "strongly disagree" to "strongly agree" in order to be consistent with other scales.

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Measurements of Anthropomorphism

Scales derived from several previous studies were adopted to assess anthropomorphism. One scale developed by Waytz et al. (2007) consists of 5 anthropomorphic descriptors and 3 behavior descriptors. This scale was adopted as a direct reflection on anthropomorphism in this study. The respondents were asked to rate on a 7-point Likert scale their agreement with direct reflection of anthropomorphism, i.e., "My cell phone has a mind of its own." One more item, "My cell phone has personality," was added to complement the scale. Although it is assumed that without visual priming (such as a figure on the screen) people would take these statements less skeptically, this is not warranted since these statements may still be too explicit for a survey. The questions from the computing technology continuum perspective (Johnson, Marakas, & Palmer, 2008) were also adopted to complement the aforementioned attitudinal measurement. These questions were in themselves anthropomorphized to assess how much the participants were aware of their desire to assert control over an anthropomorphized agent. Items from factor of "Control" and "Control of rights" were taken as factor of "Awareness of agency" in this study. The scale based on these questions aimed at assessing the respondents' awareness of smartphone's agency, which was considered the indirect reflection of anthropomorphism.

Therefore, anthropomorphism in this study was measured with two scales, direction reflection (on anthropomorphism) and awareness of (anthropomorphized) agency (of smartphones). Results from these two scales were put into statistical tests and interpreted independently. The questionnaire that includes all questions used in the web-based survey is attached as an appendix in this paper.

CHAPTER V

RESULTS

Response Rate, Validity, and Sample Characteristics

Of the 3000 students who received invitation and reminding emails, 532 students opened the link to the questionnaire, of which 373 of them completed or partially completed the questionnaire, making the overall response rate 12.4%. A couple measures were taken to ensure the validity of responses in this web-based survey. First of all, the questionnaire was distributed via emails to students and each submission was marked by their university email address. Although the option to participate anonymously was available, only 6 (1.6%) chose to do so. The qualtrics.com system will prevent email recipients from entering the questionnaire for the second time. Original IP addresses of submissions are also recorded in the dataset, therefore the possibility of repeat participation was limited. Secondly, a manual screening was conducted to detect inattentive responses. As a result 6 (1.6%) submissions were dropped because they have exactly same response category (e.g., "Strongly Agree" on a 1–7 likert scale) in two or more sections of the questionnaire. In this web-based survey, questions are randomized in each section and some questions are reverse coded, therefore having exactly same choice across one section is a strong indicator of inattentiveness. Thirdly, duration (time from opening the link to submission of result) of each submission was collected. 95% of responses were completed in less than 24 hours. Sum for scores in section 1, 2, 3 and 5 (as seen in the attached questionnaire deign) are computed. These scores for each section and scores for each key variable in this study are put into correlation with the duration of responses (only those less than 24 hours are put into test). None of them are significantly

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correlated with duration of response. The end date (recoded as time from first recruiting

email) is also put into similar correlation test. Other than a weak correlation (r(338)=0.11,

p=.042) with section score for Section 1, end date is not significantly correlated with

other variables. Therefore, the loose control of working time on the questionnaire or

runtime of survey campaign should have no obvious effect on the attentiveness of

responses or characteristics of participants who chose to take the survey. The

demographic and characteristics of survey respondents are shown in Table 2.

Internal Reliability and Distributions

The data from 367 valid responses were entered into SPSS v.22, using which all

statistical tests were executed. All scales had their reliability tested via Cronbach's alpha

among the 367 cases. In the later statistical tests only cases for smartphone users (N=329)

were selected. Of the eight items employed in the short form UCLA Loneliness scale

(ULS-8), the item "I can find companionship when I want it" was thrown out since it

doesn't fit well with other items. This increases the Cronbach's Alpha from .668 to .776

for the loneliness scale. Of the 5 items employed in the scale for awareness of

anthropomorphized agency, the general statement "Cell phones are capable of infringing

on personal rights and freedoms" does not fit well with other items, therefore it was

dropped from the tests. This increases the Cronbach's Alpha from .697 to .724 for

awareness of agency scale. After dropping these two items, all scales except

independence cultural orientation are considered reliable since the Cronbach's Alpha

exceeds .70 (Hair et al. 1998). The detailed results are shown in Table 3.

TABLE 2. Sample Characteristics of the Survey

Sample	*n*	*%*
Total emails distributed	3000	
Students started survey	532	17.7
Surveys completed	373	12.4
Valid responses	367	12.2
Gender		
Male	129	35.1
Female	238	64.9
Age		
18-24	312	85.0
25-30	26	7.1
Above 30	22	6.0
Race		
White-Anglo	238	64.9
Asian	70	19.1
Hispanic/Latino	20	5.4
Others	39	10.6
Cell phone ownership		
0-5 years	38	10.4
6-10 years	264	71.9
More than 10 years	63	17.2
Cell phone type		
Smartphone	329	89.6
Feature phone	26	7.1

TABLE 3. Cronbach's Alpha Coefficients for All Scales

Scales (possible scores)	Number of Items	Number of Cases	Mean	Variance	*Alpha*
Chronic Loneliness (7–49)	7	367	3.07	2.57	**.78**
ECR-RS					
Avoidance (6–42)	6	348	2.35	1.98	**.86**
Anxiety (3–21)	3	348	2.79	2.95	**.86**
Personal Culture Orientation					
Independence (5–35)	5	367	5.42	1.47	.66
Inter-dependence (5–35)	5	367	5.47	1.52	**.79**
Direct reflection of Anthropomorphism (6–42)	6	367	1.94	1.93	**.91**
Awareness of Anthropomorphized Agency (4–28)	4	367	2.18	2.19	**.72**
Heavy Use of Cell Phone (8–48)	8	367	2.64	1.75	**.78**
Cell Phone Self-efficacy (4-28)	4	367	2.26	2.78	**.73**

A further investigation shows that the scales of direct reflection and awareness of agency, although archived adequate internal consistency (Cronbach's Alpha = .91 for direct reflection; Cronbach's Alpha = .72 for awareness of agency), are more or less skewed toward the lower end on a histogram plot. Chart 1 and Chart 2 below demonstrate the frequencies of their scores. The correlation of these two scores are .78 ($r(367) = .78$, $p < .001$), indicating that the two constructs are different perspectives of anthropomorphism. Therefore, although the two scales combined can still achieve a good

reliability (Cronbach's Alpha = .91, N=367), all the tests in this study still use the two

scales respectively.

CHART 1. Distribution of Direct Reflection Scores

Mean = 11.63
Std. Dev. = 6.946
N = 367
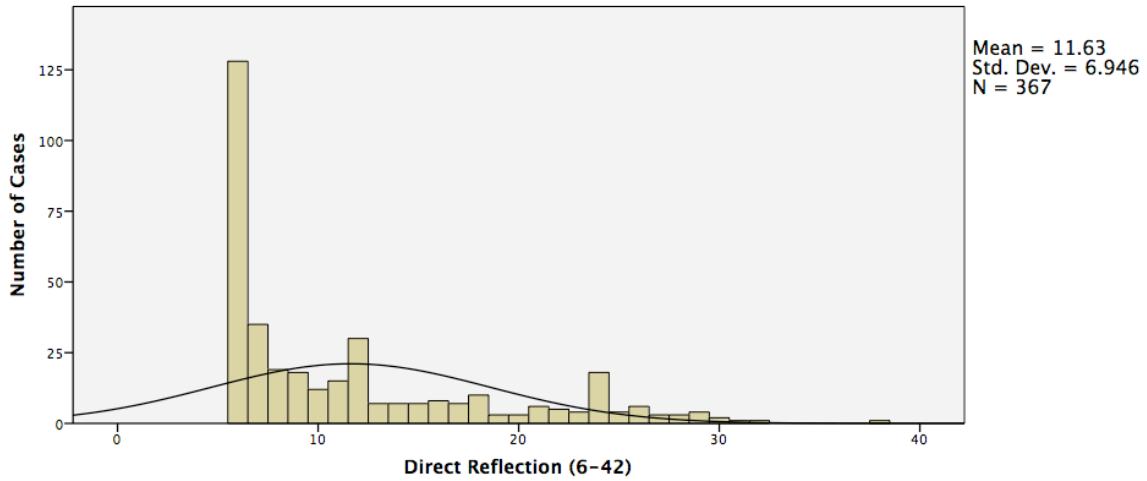
CHART 2. Distribution of Awareness of Agency Scores

Mean = 8.72
Std. Dev. = 4.372
N = 367
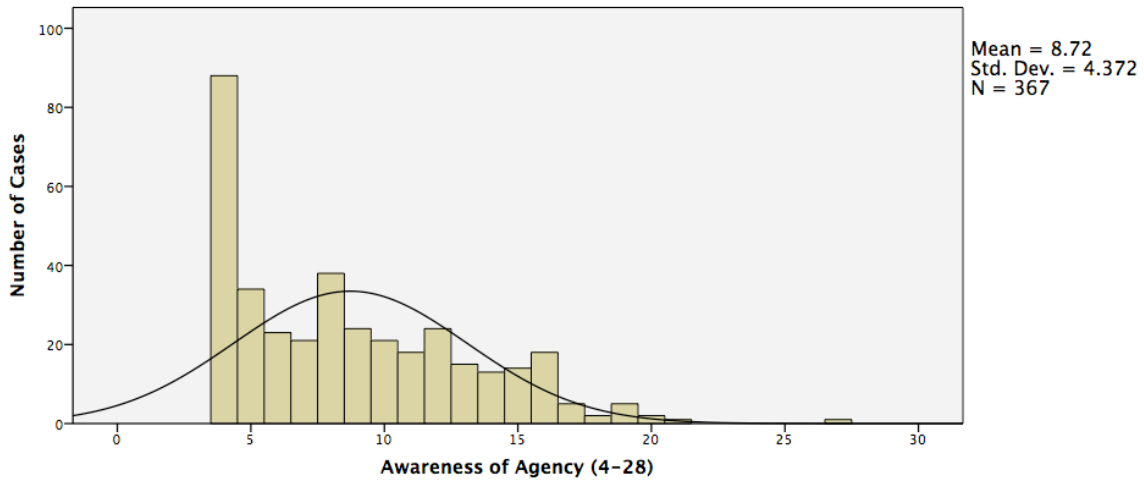
Data Analysis for H.1

Bivariate correlations were calculated to test H.1—chronic loneliness *is positively*

associated with people's tendency to personify their smartphones. The results (as shown

in Table 4) demonstrate that students scored high in Chronic Loneliness scale report

higher direct reflection of anthropomorphism of their smartphones ($r(329) = .17$, $p = .002$). Although the correlation is weak, it supports what Epley et al. (in press) predicted, that a person feeling lonely, isolated, or lacking social connection may attempt to recover from this social pain by anthropomorphizing nonhuman agents—essentially creating social connection by making it up with nonhuman agents. Additional correlation tests also show that the said chronic loneliness has a weak positive correlation with the awareness of agency ($r(329) = .28$, $p < .001$). H.1 is supported via both measurements of anthropomorphism.

TABLE 4. Correlation test for H.1

(N=329)

Descriptive Statistics

	Mean	Std. Deviation
Chronic Loneliness	21.36	7.28
Direct Reflection	11.79	6.95
Awareness of Agency	8.85	4.26

Notes: The mean represents the average score that the respondents get for each scale. Possible score for Chronic Loneliness is from 7 (not lonely) to 49 (very lonely); possible score for Direct Reflection is from 6 to 42; possible score for Awareness of Agency is from 4 to 28.

Correlations

		Direct Reflection	Awareness of Agency
Chronic Loneliness	Pearson Correlation	.170	.281
	Sig. (2-tailed)	.002	< .001
Direct Reflection	Pearson Correlation		.767
	Sig. (2-tailed)		< .001

Data Analysis for H.2

Linear regression analyses were carried out to test whether the preoccupied attachment style traits could predict direct reflection of anthropomorphism. The results of the linear regression demonstrate that the two predictors, avoidance and anxiety in close relationship, account for 7% of the variance ($R^2 = 0.07$, $F(2, 310) = 11.51$, $p < .001$). It is found that low avoidance significantly predicts the direct reflection of anthropomorphism ($\beta = 0.23$, $p < .001$), while high anxiety is not a significant predictor of direct reflection ($\beta = 0.14$, $p = .15$). The same linear regression test carried out with the variable awareness of agency demonstrated that the two predictors explained 10% the variance ($R^2 = 0.10$, $F(2, 310) = 16.76$, $p < .001$), as seen in Table 5. Low avoidance appears to be a significant predictor ($\beta = 0.12$, $p = .004$), as does high anxiety ($\beta = 0.18$, $p = .001$). Therefore, H.2 is partially supported for anthropomorphism measured by direct reflection, while fully supported for anthropomorphism measured by awareness of agency.

TABLE 5. Multiple Regression Model for H.2 (Awareness of Agency)
(N=310)

	Unstandardized Coefficients	Standard Error	Standardized Coefficients	t	*p*-level
Low Avoidance	.115	.040	.174	2.876	.004
High Anxiety	.184	.057	.195	3.227	.001

Notes: variable is Awareness of Agency; predictors are low avoidance and high anxiety. High anxiety and low avoidance is also identified as traits for preoccupied attachment style.

To put this analysis into a different perspective, the cases that score lower than mean in avoidance and higher than mean in anxiety are considered those with preoccupied attachment style. The rest may belong to secure, dismissing avoidant, or fearful avoidant attachment style according to Bartholomew's model (Bartholomew &

Horowitz, 1991). An in sample t-test was executed to find out if preoccupied group is different from the rest in smartphone anthropomorphism. The result shows that when measured by direct reflection, students with preoccupied attachment style ($M = 12.80$, $SD = 7.55$) reported significantly higher direct reflection on anthropomorphism than the rest of the students ($M = 10.44$, $SD = 5.85$), $t(264.57) = 2.88$, $p = .001$; when measured by awareness of agency, these students ($M = 9.85$, $SD = 4.47$) also demonstrated higher level of awareness than the rest ($M = 7.82$, $SD = 3.73$), $t(261.56) = 4.03$, $p = .013$.)

Data Analysis for RQ.1

Hierarchical linear regressions were used to investigate whether personal cultural orientation can be a moderator variable in the relationship between chronic loneliness and anthropomorphism, as well as the relationship between preoccupied attachment traits and anthropomorphism (RQ.1). Since the two variables in the relationship are moderately correlated ($r(311) = .44$, $p < .001$), a new variable, preoccupation, was calculated based on the scores of avoidance and anxiety ($preoccupation^2 = avoidence^2 + anxiety^2$). Standard Scores (z-) were calculated for chronic loneliness, preoccupation, and personal cultural orientation (independence and inter-dependence) to avoid collinearity in distinguishing moderation effects (Aiken & West, 1991). The pre-test shows that the direct interactions between personal cultural orientation (interaction variables) and anthropomorphism (dependent variables) are not significant (as shown in Table 6).

Among the hierarchical regression tests, the moderation effect of independent cultural orientation on the prediction of preoccupation on Anthropomorphism appears to be significant (p < .05). The entering of moderator (z-Preoccupation × z-Independence) brings in significant increase of predictability in the hierarchical linear regression test of

TABLE 6. Correlation tests of Cultural Orientation and Anthropomorphism (N=329)

		Direct Reflection	Awareness of Agency
Independence	Pearson Correlation	-.095	-.039
	Sig. (2-tailed)	.085	.479
Inter-dependence	Pearson Correlation	-.041	-.042
	Sig. (2-tailed)	.464	.453

preoccupation and direct reflection (ΔR^2 = .03, F(1, 307) = 9.58, p = .002), as shown in Table 7. Similar results are also found in the hierarchical linear regression test with awareness of agency as dependent variable (ΔR^2 = .02, F(1, 307) = 6.64, p = .010). Therefore, it is supported that independence, as one key personal cultural orientation, has moderating effect on the relationship between preoccupied attachment style and anthropomorphism of smartphones.

In the case of direct reflection as dependent variable, the unstandardized simple slope for students below the mean of Independence is .14; the unstandardized simple slope for students above the mean of Independence is .02, as shown in Chart 3. In the case of Awareness of Agency as dependent variable, the unstandardized simple slope for students below the mean of Independence is .14; the unstandardized simple slope for students above the mean of Independence is .04. This reveals that Preoccupation is positively associated with Anthropomorphism, but anthropomorphism is more strongly related to preoccupied attachment style in students that demonstrate lower level of independence cultural orientation.

TABLE 7. Moderated Regression Model for RQ.1 (Direct Reflection)

(N=311)

Coefficients [a]

Model		Unstd. Coefficients		Std. Coefficients	t	Sig.
		B	Std. Error	Beta		
1 [b]	(Constant)	10.191	3.091		3.291	.001
	Preoccupation	.236	.056	.239	4.243	< .001
	Independence	-.085	.101	-.047	-.837	.403
2 [c]	(Constant)	9.102	3.069		2.966	.003
	Preoccupation	.232	.055	.235	4.227	< .001
	Independence	-.051	.101	-.028	-.506	.613
	Moderator z-Preoccupation × z-Independence	-1.276	.412	-.170	-3.096	.002

a. Dependent Variable: Direct Reflection
b. Predictors: (Constant), Preoccupation, Independence personal cultural orientation
c. Predictors: (Constant), Preoccupation, Independence personal cultural orientation, Moderator

However, the moderation effect was not found significant with interdependent cultural orientation ($p = .44$ for direct reflection as dependent variable, $p = .09$ for awareness of agency as dependent variable). Nor did such effect found significant with chronic loneliness as predictor ($p = .296$ for direct reflection as dependent variable, $p = .609$ for awareness of agency as dependent variable).

CHART 3. Scatter Plot of Cultural Independence's

Moderation Effect on Preoccupation Predicting Direct Reflection of
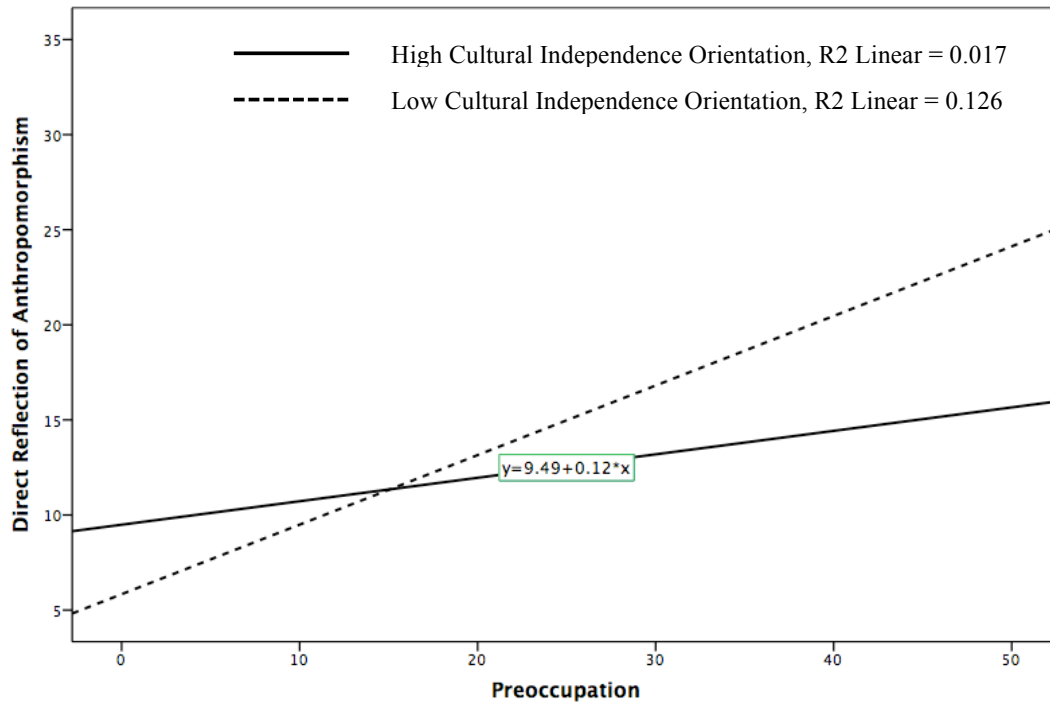
Anthropomorphism

CHAPTER VI

DISCUSSIONS

Reflecting on Existing Studies

In this study, the sociality variables proposed by Epley et al. (2007) in three-factor theory of anthropomorphism are reconstructed and investigated in the context of anthropomorphism of smartphones. Based on the statistical analyses, each hypothesis proposed in this study is at least partially supported. Chronic loneliness is positively associated with higher tendency of anthropomorphism, measured by direct reflection on anthropomorphism and awareness of anthropomorphic agency. Preoccupied attachment style traits, low avoidance and high anxiety in close relationships, are significant predictors of anthropomorphism. Students of preoccupied attachment style have a greater tendency to personify their smartphones, project emotions onto them and develop long-term social relationships with them. Cultural difference in personification of smartphones also seems relevant. This study appears to be of a divergence from Epley et al.'s (2007) original proposal of "individualism versus collectivism." The key factors analyzed here are independence and interdependence in individual cultural orientation, instead of collective cultural orientation. This is on one hand due to that the accessible sample are students in a single state university instead of multiple universities in different cultural regions, on the other hand a draw of recent development on dimensions of cultural orientations (Sharma, 2009). The findings of this study do refer well to a divergence on anthropomorphism in different ethnic groups with other demographic similarities (as shown in Table 8). Asian students (Asian American or international students) demonstrate higher level of anthropomorphism than students from White-Anglo

backgrounds do (for direct reflection, $t(271) = 5.85$, $p < .001$; for awareness of agency, $t(271) = 5.49$, $p < .001$). It would not be a big leap to assume that most Asian students identify their native culture with collectivism and most White-Anglo students identify with individualism. Therefore findings of this study, that independence cultural orientation moderates the relationship between per-occupation and anthropomorphism, are consistent with what Epley et al. (2007) proposed.

TABLE 8. Demographical Characteristics of

Asian and White-Anglo Students Who Participated in The Survey

Demographics			**Asian**	**White-Anglo**
Gender	Male	N	24	86
		Percent	34.3	36.1
	Female	N	46	152
		Percent	65.7	63.9
Age		Mean	22.46	24.03
		Std. Deviation	**1.95**	**5.34**
Cell phone ownership		Mean	9.24	9.58
		Std. Deviation	2.61	2.85
Cell phone type	Smartphone	N	64	209
		Percent	91.4	87.8
	Feature phone	N	4	20
		Percent	5.7	8.4

Notes The great difference between the standard deviation of age is accounted for by 9.9% of White-Anglo participants older than 19 years old. There is no significant correlation ($r > .05$), however, between age and anthropomorphism.

This study follows Marakas's (2000) proposition—for each attribution of a tool or a social actor is circumstantial, individual, and reciprocal to one's practical or social needs—that our understanding of anthropomorphism or social interactions with computers should not exclude the dispositional factors. This study opts for chronic loneliness in the construct of social disposition. While just as chronic loneliness and self-esteem are at different levels of the self (Bednar, 2000), the evidence discovered is supportive, from a different perspective to Marakas's extension on CASA.

Limitations, Implications, and Future Studies

The generalizability of this study is limited. Due to the limited time to run the web survey and insufficient motivations, this study is based on less than 400 cases. How much the findings reflect the realities of the student group remains unclear. Furthermore, the student group this study sampled have a much higher smartphone adoption rate (close to 90%) than the general population of the United States or worldwide. To what extent we can generalize the findings to a broader demographic is still at question. Future studies may choose to use a more diversified group. Researchers can either recruit from a broader audience or use a better sample from other research institutions and further validate and develop upon this study.

Although the scales used in this study are acquired from existing studies with little modifications, some items still have to be dropped to achieve adequate internal reliability. To achieve adequate internal reliability, the item "I can find companionship when I want it" was dropped from the short-form UCLA loneliness scale (Wu, 2008). Perhaps this statement has a different connotation nowadays and among the subject demographic. The item "Cell phones are capable of infringing on personal rights and

freedoms" was dropped out of Awareness of agency scale. Although adopted directly from the computing technology continuum of perspective (Johnson, 2008), it is in fact a general statement about cell phones instead of a feeling/attitude toward what the participant owns and uses personally. It is rational to drop this out so that the rest four items are all about "my cell phone."

Although are adapted to existing studies, the measurements of anthropomorphism, direct reflection and awareness of agency did not produce well-distributed results. Both are skewed toward the lower end, suggesting there might be social desirability bias—people are less likely to admit they personify their cell phones once asked directly or once they give a second thought. Although analysis based on these scales appears to be statistically significant, and these scales have been used in other studies, further research that could address the social desirability issues, or develop a more valid instrument to measure anthropomorphism, are needed.

The statistical support to the two hypotheses about chronic loneliness (one's social disposition in general) and attachment style (one's disposition in a close relationship) suggests that most experiments employed in studies under Computer as Social Actors paradigm, although might archive high level of internal validity through randomization of sample and control of variables, are possibly problematic if the researchers attempt to extrapolate their findings to a daily life settings or to a more diversified demographic. Advertising strategies that assume a personified message will evoke positive reactions all the time, regardless of the audience demographic or characteristics, especially their social disposition factors, are also questionable if put into practice. Additional data analyses indicating that students will consider the smartphone

more trustworthy if they have higher level of direct reflection and awareness of agency (for direct reflection, $r(329) = .39$, $p < .001$; for awareness of agency, $r(329) = .38$, $p < .001$), is at least suggestive to the above claim.

Based on the tested hypotheses, this study suggests that the individual difference on social dispositions may indicate their different attitudes and/or behaviors toward anthropomorphism, especially in the case of personifying smartphones. Personification of the smartphone serves as the sociable agent for users; it creates a virtual relationship that complements or even substitutes the actual person-to-person relationship mediated by cell phones/smartphones nowadays. A good example is discussed in a recent article from the *New York Times* about how Apple's Siri became one autistic boy's best-friend-forever (Newman, J., 2014). The statistics support that heavy users of smartphones also demonstrate higher level of anthropomorphism (for direct reflection, $r(329) = .17$, $p = .002$; for awareness of agency, $r(329) = .17$, $p = .002$), whether the user has a long smartphone ownership or how good the user is at using the smartphone seems not to matter. At least the relationships are not statistically significant according to the data collected in this study. Smartphones are far beyond palm-size computers nowadays. The applications that run on smartphones, the interactions, as well as the programming language/framework and user profile that developers could leverage in development, are vastly different from the time CASA started. Back in the time, the user's dispositions were not easily addressed and the assumption was made due to the method of choice. Nowadays, smartphones are like people's companions. Applications like Siri constantly collect the data about users' habits and behavior; it is technologically possible to build each user's profile and in the mean time design and implement different interfaces and

interaction prompts/flows that can be rigorous to those who are less likely to personify and accustomed to command and control style and can be responsive to the feelings of those who are accustomed to a blurring boundary between humans and machines. After all, it was those who didn't know how to turn off the "Clippy" in Microsoft office that found it annoying and less socially desirable, while it is possible someone who likes to have an on-screen pet widget find the feature playful initially. Different people have different expectations in the social interactions that modern computing and communication technologies could offer and it is the industry and researcher's mission to reveal those individual differences and provide guidance for more user-friendly devices and applications. This study provides some preliminary evidences for some variables that future studies can develop upon.

Findings in this study also have the implication that the same message, especially those phrased in a personified flavor, may be perceived differently on personal devices due to the relationship dynamics between the device and the user, an example of this is what Nass and Yen (2010) referenced in their book about how BMW had to recall and rework on its navigation systems in 5 series cars due to that "the system had a female voice, and male German drivers refused to take directions from a woman " (p. 8). So much as cars are another kind of object that is commonly personified even though they were less "smart", they are now integrated with smartphones as Apple and Google are promoting CarPlay and Android Auto—transferring smartphone experience to driving experience. It is foreseeable that cars are getting ultimately sensor-rich—not just on mechanical and electrical conditions of the vehicle but also physical and psychological conditions of the driver—and are capable of social interactions for good.

It is as well suggested that understanding of anthropomorphism, whether in communication technologies or advertising, needs to be addressed in a diverse cultural context. Personification of the smartphone apparently has different representations in different cultures. People in Japan witness large advertising campaigns employing personification techniques. Personified animations and cartoons are more commonly seen in Japanese culture, in informal user communities or formal official social campaigns. In the United States, although user-submitted parodies of personified Siri commercial are commonly seen, Apple doesn't personify Siri (voice-based personal assistant iOS app) explicitly in their official commercials, even though they had Mac vs. PC advertisement campaign through 2009 with up to 66 commercials aired (Nudd, 2011). Personification of smartphones in the United States usually does not have visual representations. After years of success with NTT DoCoMo's smartphone personification advertising campaign in Japan, such advertising technique and success was finally imitated in Motorola's Lazy Phone campaign in 2013 (McDermott, 2013).

The reason that such moderating effect was not significant across all the independent variables and dependent variables might be that the instruments for measurements are all in English, making it only accessible to Asian students capable of speaking English, and that the survey was conducted in a English context. Future studies would ideally be conducted in a real cross-culture context with instruments accessible in two or more native languages.

Findings of this study have a number of suggestions to future studies. The most critical one is probably the need to develop a proper scale to measure anthropomorphism in communication technologies. The two scales this study adopted, although do not have

a good distribution, still provide a good level of support to the hypothesized associations between the users social dispositions and anthropomorphism. Should a better scale be available, a development or expansion of this study should be promising. More importantly, just as this study reveals, people tend to follow some social norms when asked about direct reflection of anthropomorphism. Such technique is still widely used in some CASA studies. A ramification would be necessary for studies in that realm. As mentioned above, the significant correlation between students' tendency to anthropomorphize smartphones and the extent they consider smartphones trustworthy. It is possible that their trust in the smartphones is associated with some of the dispositional factors ultimately, although this study does not assume that anthropomorphism of smartphones plays a mediating role in such connections. A thorough examination with a more in-depth measurement of trust in communication technology would be ideal.

APPENDIX

QUESTIONNAIRE USED IN THE SURVEY

Informed Consent Statements
[Department, School]
Investigator: [Investigator Name]   Type of consent: Adult Consent Form

Introduction
We reach out to you because you are an undergraduate student of [School name], and we are conducting a study on emerging adults about cell phone usage and social relationships. This study is to reveal empirical evidence about the connection between people's attitudes toward social relationships and cell phone as a mediation of their social relationships. Please read this form and ask any questions that you may have before agreeing to be in the study. If you are under 18 years old or not a cell phone owner, Your data will not be included or reported in the study.

Study Procedures
You are asked to respond to this questionnaire hosted online. The complete questionnaire consists of five sections. The complete process will take approximately 20 minutes.

Risks/Discomforts of Being in the Study
We expect minimal risks. If there were some emotional unease, we expect that to be no more than what you may encounter in daily conversations in real life. You can also contact [contact name] to seek help.

Confidentiality
All data obtained from participants will not be able to link to individuals; we will only report combined results. The collected data will be kept confidential and stored in the HIPPA-compliant, secure database and deleted by June 2016. **You will be entered into a drawing for one of six $15 gift cards for either the iTunes store or Google. For this sole purpose, you will be asked for email address at the end of the questionnaire.**

Benefits and Voluntary Participation
Your participation is voluntary; you are free to withdraw at any time, for whatever reason. If you desire to withdraw, simply close this survey window/tab. There are no direct benefits for participants, although you may find it helpful to reflect on your social or closed relationships.

Contacts and Questions
For questions or more information concerning this research you may contact the investigator [investigator name]. If you have any questions about your rights as a research subject, you may contact: Research Compliance Services, [Department, School].

By Clicking "Continue" below, you indicate that you have read and understand the information provided above and agree to participate. You are encouraged to keep a copy of this form to keep for your records and future reference.

Section 1
This section is purposed to assess how well you get along with others. Indicate how true each of the statements below is descriptive of you.

Q.1 I lack companionship.

□	□	□	□	□	□	□
Very untrue	Untrue	Somewhat untrue	Neutral	Somewhat true	True	Very True

Q.2 There is no one I can turn to.

□	□	□	□	□	□	□
Very untrue	Untrue	Somewhat untrue	Neutral	Somewhat true	True	Very True

Q.3 I am an outgoing person.

□	□	□	□	□	□	□
Very untrue	Untrue	Somewhat untrue	Neutral	Somewhat true	True	Very True

Q.4 I feel left out.

□	□	□	□	□	□	□
Very untrue	Untrue	Somewhat untrue	Neutral	Somewhat true	True	Very True

Q.5 I feel isolation from others.

□	□	□	□	□	□	□
Very untrue	Untrue	Somewhat untrue	Neutral	Somewhat true	True	Very True

Q.6 I can find companionship when I want it.

□	□	□	□	□	□	□
Very untrue	Untrue	Somewhat untrue	Neutral	Somewhat true	True	Very True

Q.7 I am unhappy being so withdrawn.

□	□	□	□	□	□	□
Very untrue	Untrue	Somewhat untrue	Neutral	Somewhat true	True	Very True

Q.8 People are around me but not with me.

□	□	□	□	□	□	□
Very untrue	Untrue	Somewhat untrue	Neutral	Somewhat true	True	Very True

Section 2
Please indicate to what extent would you agree or disagree with the following statements if apply to your cell phone(s).

Q.1 My cell phone has intentions.

☐ Strongly Disagree	☐ Disagree	☐ Somewhat Disagree	☐ Neither	☐ Somewhat Agree	☐ Agree	☐ Strongly Agree

Q.2 My cell phone experiences emotions.

☐ Strongly Disagree	☐ Disagree	☐ Somewhat Disagree	☐ Neither	☐ Somewhat Agree	☐ Agree	☐ Strongly Agree

Q.3 My cell phone has personality.

☐ Strongly Disagree	☐ Disagree	☐ Somewhat Disagree	☐ Neither	☐ Somewhat Agree	☐ Agree	☐ Strongly Agree

Q.4 My cell phone has free will.

☐ Strongly Disagree	☐ Disagree	☐ Somewhat Disagree	☐ Neither	☐ Somewhat Agree	☐ Agree	☐ Strongly Agree

Q.5 My cell phone has a mood of its own.

☐ Strongly Disagree	☐ Disagree	☐ Somewhat Disagree	☐ Neither	☐ Somewhat Agree	☐ Agree	☐ Strongly Agree

Q.6 My cell phone is credible.

☐ Strongly Disagree	☐ Disagree	☐ Somewhat Disagree	☐ Neither	☐ Somewhat Agree	☐ Agree	☐ Strongly Agree

Q.7 My cell phone is conscious.

☐ Strongly Disagree	☐ Disagree	☐ Somewhat Disagree	☐ Neither	☐ Somewhat Agree	☐ Agree	☐ Strongly Agree

Q.8 My cell phone is efficient.

☐ Strongly Disagree	☐ Disagree	☐ Somewhat Disagree	☐ Neither	☐ Somewhat Agree	☐ Agree	☐ Strongly Agree

Q.9 My cell phone is attractive.

☐ Strongly Disagree	☐ Disagree	☐ Somewhat Disagree	☐ Neither	☐ Somewhat Agree	☐ Agree	☐ Strongly Agree

Q.10 My cell phone is powerful.

☐ Strongly Disagree	☐ Disagree	☐ Somewhat Disagree	☐ Neither	☐ Somewhat Agree	☐ Agree	☐ Strongly Agree

Q.11 My cellphone can learn from its experiences.

Strongly Disagree	Disagree	Somewhat Disagree	Neither	Somewhat Agree	Agree	Strongly Agree
☐	☐	☐	☐	☐	☐	☐

Q.13 When I play a game with my cellphone, I worry it might cheat.

Strongly Disagree	Disagree	Somewhat Disagree	Neither	Somewhat Agree	Agree	Strongly Agree
☐	☐	☐	☐	☐	☐	☐

Q.14 I have used a cellphone who didn't like me.

Strongly Disagree	Disagree	Somewhat Disagree	Neither	Somewhat Agree	Agree	Strongly Agree
☐	☐	☐	☐	☐	☐	☐

Q.15 My cellphone is capable of controlling my actions.

Strongly Disagree	Disagree	Somewhat Disagree	Neither	Somewhat Agree	Agree	Strongly Agree
☐	☐	☐	☐	☐	☐	☐

Q.16 Cellphones are capable of infringing on personal rights and freedoms.

Strongly Disagree	Disagree	Somewhat Disagree	Neither	Somewhat Agree	Agree	Strongly Agree
☐	☐	☐	☐	☐	☐	☐

Q.17 I have had my cellphone invaded my privacy.

Strongly Disagree	Disagree	Somewhat Disagree	Neither	Somewhat Agree	Agree	Strongly Agree
☐	☐	☐	☐	☐	☐	☐

Section 3
Please indicate your response to the following statements about yourself or the society.
Note that there is no right or wrong whether you agree or disagree.

Q.1 I would rather depend on myself than others.

☐ Strongly Disagree	☐ Disagree	☐ Somewhat Disagree	☐ Neither	☐ Somewhat Agree	☐ Agree	☐ Strongly Agree

Q.2 My personal identity, independent of others, is important to me.

☐ Strongly Disagree	☐ Disagree	☐ Somewhat Disagree	☐ Neither	☐ Somewhat Agree	☐ Agree	☐ Strongly Agree

Q.3 I reply on myself most of the time, rarely on others.

☐ Strongly Disagree	☐ Disagree	☐ Somewhat Disagree	☐ Neither	☐ Somewhat Agree	☐ Agree	☐ Strongly Agree

Q.4 It is important that I do my job better than others.

☐ Strongly Disagree	☐ Disagree	☐ Somewhat Disagree	☐ Neither	☐ Somewhat Agree	☐ Agree	☐ Strongly Agree

Q.5 I enjoy being unique and different from others in many respects.

☐ Strongly Disagree	☐ Disagree	☐ Somewhat Disagree	☐ Neither	☐ Somewhat Agree	☐ Agree	☐ Strongly Agree

Q.6 The well-being of my community members is important to me.

☐ Strongly Disagree	☐ Disagree	☐ Somewhat Disagree	☐ Neither	☐ Somewhat Agree	☐ Agree	☐ Strongly Agree

Q.7 I feel good when I cooperate with my community members.

☐ Strongly Disagree	☐ Disagree	☐ Somewhat Disagree	☐ Neither	☐ Somewhat Agree	☐ Agree	☐ Strongly Agree

Q.8 It is my duty to take care of my family members, whatever it takes.

☐ Strongly Disagree	☐ Disagree	☐ Somewhat Disagree	☐ Neither	☐ Somewhat Agree	☐ Agree	☐ Strongly Agree

Q.9 Family members should stick together, even if they do not agree.

☐ Strongly Disagree	☐ Disagree	☐ Somewhat Disagree	☐ Neither	☐ Somewhat Agree	☐ Agree	☐ Strongly Agree

Q.10 I enjoy spending time with my community members.

☐ Strongly Disagree	☐ Disagree	☐ Somewhat Disagree	☐ Neither	☐ Somewhat Agree	☐ Agree	☐ Strongly Agree

Q.1 Do you consider yourself a …?
     1) Male
     2) Female

Q.2 Do you consider yourself … ?
     1) White/Anglo
     2) Native-American Indian
     3) Hispanic/Latino
     4) Asian
     5) African-American
     6) Other _____

Q.3 Tell me about your ownership of cell phone.
     What year were you born? _____
     How old were you when you got your first cell phone? _____
     How many years have you owned your current cell phone? _____

Q.4 According to the definitions below, what type of cell phone do you have?

* A **smartphone** is a cell phone that has a modern operation system with standard HTML web browser and is able to install apps, including iPhone (but not iPad or iPod touch), android phone and Blackberry phone.
* A **feature phone** is a cell phone that has voice feature, multi-media feature, non-HTML web browser but is not able to install apps.

     1) Smartphone
     2) Feature phone
     3) I don't have a cell phone

Q.5 Please specify what do you usually use your cell phone for and how much time do you spend on average in a day.

	Not at all	Less than 30 minutes	30 minutes to 1 hour	1 hour to 2 hours	2 to 3 hours	More than 3 hours
Phone	□	□	□	□	□	□
Texting	□	□	□	□	□	□
Web Browsing	□	□	□	□	□	□
Social Networking	□	□	□	□	□	□
Gaming	□	□	□	□	□	□
Informational Apps	□	□	□	□	□	□
Others _____	□	□	□	□	□	□

Q. 6 If you could not use your cell phone <u>at all</u> tomorrow, how much would this affect your daily routine and activities?
      1) Not at all
      2) Very little
      3) Some
      4) A lot
      5) Extremely

Q.7 Does your cell phone have a name or nickname? (Tell me its name if choose yes)
      1) No, it doesn't.
      2) I did not name it, but it does have a default name, such as [myname]'s iPhone
      3) Maybe, I might give it a name in the future.
      4) Yes, and its name is _____

Q. 8 A number of studies have shown that cell phone can play certain social roles in people's lives. Imagine if you were to choose one role of your cell phone, what would its role be like?
      a) Like my father / father-like figure
      b) Like my mother / mother-like figure
      c) Like my dating / marital partner
      d) Like my best friend / close friend

Q.9 Since your cell phone is called a smartphone, please rate how much do you think it has intelligence.

☐	☐	☐	☐	☐	☐
Not at all	A little	Somewhat	A lot	Extremely	It's like a human

Q. 10 How good are you on using cell phones?
I can describe how it works.

☐	☐	☐	☐	☐
Not at all	A little	Somehow	For the most part	Fully capable of this

I can understand, identify and correct common operational problems

☐	☐	☐	☐	☐
Not at all	A little	Somehow	For the most part	Fully capable of this

I can remove information if no longer needed.

☐	☐	☐	☐	☐
Not at all	A little	Somehow	For the most part	Fully capable of this

I can customize it.

☐	☐	☐	☐	☐
Not at all	A little	Somehow	For the most part	Fully capable of this

Section 5
Please answer the following questions about your relationship with a) your father or a father-like figure b) your mother or a mother-like figure c) your dating or marital partner d) your best friend.
Note: If you are not currently in a dating or marital relationship with someone, answer these questions with respect to a former partner or a relationship that you would like to have with someone.

Q.1 It helps to turn to this person in times of need.

☐	☐	☐	☐	☐	☐	☐
Strongly Disagree	Disagree	Somewhat Disagree	Neither	Somewhat Agree	Agree	Strongly Agree

Q.2 I usually discuss my problems and concerns with this person.

☐	☐	☐	☐	☐	☐	☐
Strongly Disagree	Disagree	Somewhat Disagree	Neither	Somewhat Agree	Agree	Strongly Agree

Q.3 I talk things over with this person.

☐	☐	☐	☐	☐	☐	☐
Strongly Disagree	Disagree	Somewhat Disagree	Neither	Somewhat Agree	Agree	Strongly Agree

Q.4 I find it easy to depend on this person.

☐	☐	☐	☐	☐	☐	☐
Strongly Disagree	Disagree	Somewhat Disagree	Neither	Somewhat Agree	Agree	Strongly Agree

Q.5 I don't feel comfortable opening up to this person.

☐	☐	☐	☐	☐	☐	☐
Strongly Disagree	Disagree	Somewhat Disagree	Neither	Somewhat Agree	Agree	Strongly Agree

Q.6 I prefer not to show this person how I feel deep down.

☐	☐	☐	☐	☐	☐	☐
Strongly Disagree	Disagree	Somewhat Disagree	Neither	Somewhat Agree	Agree	Strongly Agree

Q.7 I often worry that this person doesn't really care for me.

☐	☐	☐	☐	☐	☐	☐
Strongly Disagree	Disagree	Somewhat Disagree	Neither	Somewhat Agree	Agree	Strongly Agree

Q.8 I'm afraid that this person may abandon me.

☐	☐	☐	☐	☐	☐	☐
Strongly Disagree	Disagree	Somewhat Disagree	Neither	Somewhat Agree	Agree	Strongly Agree

Q.9 I worry that this person won't care about me as much as I care about him or her.

☐	☐	☐	☐	☐	☐	☐
Strongly Disagree	Disagree	Somewhat Disagree	Neither	Somewhat Agree	Agree	Strongly Agree

Exit Page

Thank you so much for participating in this survey.

Since you have been taking the survey anonymously, I will not be able to identify you through the collected data. If you would like to be entered into the drawing for iTunes/Google Play Store gift card, please enter your email address below:

_____

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