TOURISTS' ATTITUDES TOWARDS PROACTIVE SMARTPHONE SYSTEMS

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Abstract

In order to ensure the effectiveness of context-based proactive recommendations in influencing tourist behavior, it is important to understand the factors that drive tourists' inclination to adopt push recommendations from mobile devices. A projective method was applied to tap into tourists' opinions and feelings about their smartphones as intelligent agents, and how these influence their attitudes towards push recommendations they receive while experiencing tourist destinations. While smartphones have a mediating role in the tourism experience, a paradox exists in which tourists recognize an enhancement in certain aspects of a travel experience and a reduction in others. Confidence towards proactive recommendations is largely rooted in perceived proactiveness, autonomy, social ability and intelligence of smartphones, while perceived reactivity and control lead tourists to fear that they will lose control over their tourism experiences. Several managerial implications are provided.

Keywords: mobile technology, intelligent agent, push recommendation, travel experience, projective method, smartphone, intelligent systems.

Introduction

Mobile technology plays a significant role in the tourism experience due to its capacity to assist tourists at different stages of the tourism experience, including pre-trip (anticipatory), on-site (experiential), and post-trip (reflection) experiences (Brown and Chalmers, 2003; Wang, Park, and Fesenmaier, 2012). This role can be attributed not only to the ubiquity and portability of mobile technology, but more so to its various features and functionalities supported by context-aware systems (Gavalas and Kenteris, 2011; Kenteris, Gavalas, and Economou, 2009; Rasinger et al., 2009; Lamsfus, Wang, Xiang, and Alzua-Sorzabal, in press) that make it highly relevant to the spatiotemporal context of travel (Tussyadiah, Fesenmaier and Yoo, 2008). Studies show that the use of mobile technology allows for activities typically associated with pre-trip and post-trip experiences to be enacted on-site (Buhalis and Foerste, 2014; Wang, Xiang, and Fesenmaier, 2014). For example, using smartphones, tourists are able to make informed decisions on trip

itineraries (i.e., activities to partake in, attractions to visit, etc.) with the help of location-based services (i.e., on-site information regarding points-of-interest) using global positioning systems and mobile sensors (Meehan, et al., 2013; Tussyadiah, 2012; Zipf, 2002). Tourists are also able to instantly share travel experiences with their social networks via mobile social media (Wang, Park, and Fesenmaier, 2012). Therefore, it is suggested that mobile technology transforms the tourism experience by muddling the definitive boundaries between the anticipatory, experiential, and reflection stages of the tourism experience (Wang, Xiang, and Fesenmaier, 2014).

Many studies on the development of mobile technology for tourists focus on how to make mobile technology more intelligent and context-aware, and, thus, produce more relevant recommendations to support tourists on the move (Gavalas and Kenteris, 2011; ten Hagen, Modsching and Kramer, 2005). These studies imply that the more relevant the recommendation is for the tourists, the more likely it is to be adopted (Kabassi, 2010; Schmidt-Belz et al., 2002; ten Hagen, Modsching and Kramer, 2005). This development involves integrating various contextual information into mobile intelligence systems, including information related to computing systems (e.g., input method, display), the users (e.g., preferences, habits) and their social systems (e.g., people nearby, socio-cultural situations), the physical environment (e.g., location, weather condition), and time (e.g., time of day, day of week) (Mehra, 2012; Schilit, Adams, and Want, 1994), allowing the characterization of mobile tourism applications as location-aware, time-aware, and personalized (Gavalas and Kenteris, 2011; Meehan et al., 2013; Rasinger et al., 2009).

The development of context-aware mobile systems is often associated with the concept of agency, especially for recommender systems that emphasize proactivity. Indeed, a number of researchers propose an agent-based framework for proactive personalization services which automatically push recommendations to users when the situation is appropriate (Kenteris, Gavalas, and Economou, 2009; Woerndl et al., 2011). This includes smartphone applications that send recommendations about nearby restaurants and tourist attractions based on users' location and history or suggest serendipitous actions (such as Foursquare). Within these systems, an agent is designed to exhibit aspects of intelligent behavior. This agent serves as a layer of mediation to make certain actions autonomously or with permission from the users and, hence, relieves users of the burden of having to carry out tedious or repetitive actions (King and Ohya, 1996) while exploring tourist destinations.

It is suggested that the perceived level of agency of a computing system, which can develop after an initial exposure to the system and through a history of users' actions and preferences observed by the system, influences users' judgment and appraisal of system performance (King and Ohya, 1996). In other words, tourists' assessment and disposition of push contextual recommendations generated by their smartphones (i.e., how good or how relevant the push recommendation is for them, how likely they are to adopt it) depend on the level of trust the tourists invest in their smartphones, as well as the establishment of history and mutual learning between the tourists and their smartphones. Typically, studies on the development of context-aware mobile technologies are supported by an analysis of users' feedback through usability tests and experiments (e.g., Schmidt-Belz et al., 2005). However, due to the complex nature of interactions and relationships between humans and computing systems, especially when autonomous agents are involved, it is important to explore the different factors and processes that guide tourists' attitudes towards contextual recommendations beyond traditional usability testing.

The goal of this research is to better understand the role of agency of mobile technology in influencing tourists' tendency to follow push recommendations generated by smartphones.

Thus far, the understanding of the perceived agency of mobile technology remained untapped. Moreover, extracting information about users' perceived agency may be problematic because it implies asking users to ascribe human qualities (e.g., "smart," "controlling," etc.) to technology devices (McCarthy, 1978). Therefore, this research employs a projective method to tap into insights that lie beneath the surface (Chandler and Owen, 2002; Doherty and Nelson, 2010) by allowing research participants to articulate their innermost thoughts and feelings towards their smartphones in order to extract the perceived agency of smartphones and assess how that may contribute to their attitudes towards travel-related push recommendations. The findings add to the knowledge base of existing literature on technology-mediated experience by emphasizing the increasingly prevalent roles of personal technology in tourists' decision-making processes and experiences. Further, the utilization of a projective method in this research results in rich information to inform the development of mobile agents to support tourists on the move (i.e., to mediate on-site tourism experiences).

Theories of Technology Agency
Technology has developed to mediate people's daily activities, and intelligent agency sits as the key figure in this development (Wise, 1998). Indeed, intelligent agency (and artificial intelligence) has been a focus of a heterogeneous body of research from the creation of agent-based intelligent software, to complex robotics in engineering and computer sciences, to continuing investigation into the complex interactions between humans and computing systems, drawing from philosophy, psychology, anthropology, and sociology (e.g., Galloway, 2004; Kallinikos, 2002). Designing artificial intelligence involves ascription of human qualities to machines (McCarthy, 1978), which can be explained through structural definitions (i.e., given in terms of its internal state and functionalities) and behavioral definitions (i.e., given in terms of its actual or potential behavior).

According to McCarthy (1978), since behavioral definitions do not postulate the internal states of the system (i.e., a system is defined to have a certain quality if it behaves in a certain way), they may not explain certain qualities that do not result in behaviors (i.e., unobservable qualities). As such, structural definitions can be considered more powerful from the design perspective. However, as users may not have the capacity to describe how a system is built, ascription of certain qualities to technology is largely based on their observations of its behavior. In other words, behavioral definitions involving agent metaphors (Baylor, 2000) are more useful for users. Therefore, to achieve the goals of this research, proactive methods were employed to extract the behavioral definitions of agency (i.e., agent metaphors) from smartphone users. Then, these behavioral definitions were verified by the structural definitions offered by researchers in the area of agent technology.

The structural definitions of agency explain the qualities or attributes that technology agents should exhibit from the design perspective. According to Russell and Norvig (2003), an intelligent agent is an autonomous entity that is able to observe and act upon its environment and direct its activity towards achieving its goals. They further assert that an intelligent agent learns and uses knowledge to achieve its goals. Lange (1998) defines agents as programs that "assist people and act on their behalf" and "function by allowing people to delegate work to them" (p. 1). Comprehensively, Wooldridge and Jennings (1995) suggest the following properties of agents: autonomy (i.e., ability to act without intervention from humans or other agents), social ability (i.e., ability to interact with other agents and humans, such as collaborate or negotiate, to complete their tasks), reactivity (i.e., ability to perceive their environment and respond in a

timely fashion to changes that occur in it), and proactiveness (i.e., ability to exhibit opportunistic, goal-directed behavior and take initiatives when appropriate).

Furthermore, Dautenhahn (1998) defines socially intelligent agents (SIA) as agents that behave socially, are able to recognize and identify other agents, as well as establish and maintain relationships with other agents. Further, Dautenhahn and Nehaniv (2000) argue that SIA possesses different levels of authority and autonomy, which they categorize into: performing standard or routine work (i.e., assistants, comparable to a secretary), sharing workload and solving complex tasks on its own (i.e., associates), entertaining and pleasing users (i.e., playmates, pets), having a strong expertise in a field and guiding users in this domain (i.e., guides), monitoring user performance, and driving users out of the decision loop.

To explain agency from the behavioral perspective, Dennett (1971; 1989) introduces the concept of agents as intentional systems, suggesting that in order to predict the behaviors of others (e.g., people, animals, artifacts including machines and computers), people use the laws of physics (i.e., the physical stance), the idea of how artifacts, animals and humans are designed to behave (i.e., the design stance), and, when neither of these is accessible, the idea that they are rational agents with beliefs and desires (i.e., intentional stance). For example, tourists who are using Apple's iPhone may not know exactly how *Siri* (an intelligent personal assistant and knowledge navigator) is constructed or designed, but they can formulate their interpretations of its beliefs and desires based on observation of its behaviors and subsequently use these to predict its further actions. Hence, considering smartphones as intentional systems, when receiving push notifications on the move, tourists interpret that the smartphones have the intention of doing so due to their beliefs and desires (e.g., the smartphones want to be helpful) as reflected through their behavior (i.e., offering recommendations).

Another notable explanation of users' interpretation of technology agency is the concept of computing technologies as social actors. Indeed, an agent metaphor has been used to explain the perceived social roles of technology in social interactions (Baylor, 2000), as in Negroponte's (1970) description of intelligent agents as digital "butlers" (they are programmed to perform such tasks as filtering emails, scheduling appointments, and making travel arrangements) and Latour's (1988, 1993) metaphor of technologies as people's "lieutenants" (they regulate users' social behavior). Indeed, under a paradigm of Computers as Social Actors (CASA), researchers suggest that users perceive the social characteristics of computing technology and respond socially to computing technology in the same manner as they respond to other people (Nass, Steuer, and Tauber, 1994; Nass et al., 1995). Hence, it is believed that computing technology can be designed in such ways to exhibit social characteristics and social roles such as mentors, coaches, partners, opponents, etc. (Fogg, 2003) in order to influence user behavior. Therefore, conditioning users to think of their smartphones in social roles (i.e., through personification) is considered helpful in stimulating users to describe the behavior of their smartphones and capture the agent metaphor.

Two inter-related processes happen between technologies and humans within the social space associated with agency: (1) people create technologies to take tasks out of their hands (i.e., technologies do what people tell them to do; social determinism) and (2) technologies impose behaviors back on people (i.e., technologies affect people's behavior and people depend on technologies; technological determinism) (Latour, 1988, 1993; Wise, 1998). Indeed, as agents are created to fill human needs, the use of technology changes user behavior and the social environment (Dautenhahn and Nehaniv, 2000). When artificial agents act on users' behalf, users are permitting them control over some of the authority that the users might otherwise exercise

(Dautenhahn and Nehaniv, 2000). As the notion arises that technology is an extension of self, where digital assistants/butlers/servants increasingly carry out human actions, it eventually generates anxiety over the issue of individual agency and control of technology (Wise, 1998).

Indeed, several studies suggest that while users feel comfortable delegating tasks to technology in order to take these out of their hands and out of their minds (Wise, 1998), some would be uneasy with the idea that humans will become enslaved to technology (i.e., users are no longer "in control" of their own actions) (Leonard, 1997), making trust a central factor in designing and dealing with agents. According to Wang and Benbasat (2005), evidence from a variety of literature, especially from CASA researchers, supports the notion that technological artifacts can be objects to trust and users develop trusting relationships with technology. Hence, they define trust in online recommendation agents as an extension of interpersonal trust. Previous studies have identified that users' trust towards online recommendation agents influences their intention to adopt the agents (Wang and Benbasat, 2005), either as a decision aid or as a delegated agent (Komiak and Benbasat, 2006). Therefore, tourists' trust (or anxiety) resulting from the perceived agency of their smartphones will influence their inclination to follow or not to follow push recommendations.

In summary, the conceptualization of technologies as intelligent agents calls for an interpretation of the structural and behavioral definitions of mobile technology agency. Referring to the structural definitions of agency, smart mobile devices pushing relevant recommendations to tourists on the move may signal the notion of autonomy (i.e., capable of working without users' intervention), reactivity (i.e., capable of reacting to environmental stimuli such as locational proximity to points of interest), and proactiveness (i.e., capable of sending relevant recommendations before being asked to do so), all of which are indicators of agency. As tourists may not be aware of the internal states and technical properties of smartphones and smartphone apps, perceived agency can be extracted from tourists' interpretations of observable behaviors of the smartphones. Further, the perceived agency can be analyzed to determine its role in influencing tourists' attitudes towards push recommendations on-site.

Research Methodology
Projective Methods
Qualitative research methods are considered a useful approach in investigating and explaining situations and phenomena involving deeper meanings and attitudes. Typically, qualitative research methods targeting opinions, feelings, and attitudes involve generating information through interviews, discussions, or interpretation of narratives from research participants. However, in some situations, research participants may find it difficult to articulate their feelings, beliefs, attitudes and motivations through a direct questioning technique. Projective techniques are considered useful for researchers to enter the private world of research participants to uncover their inner perspectives in a way they feel comfortable with (Gordon and Langmaid, 1988; Webb, 1992). Projective techniques allow research participants to imbue objects or stimuli with characteristics of meanings that are derived from their subconscious desires, wishes, or feelings (Gordon and Langmaid, 1990). Commonly used methods in consumer research include a completion technique and projective questioning (Gordon and Langmaid 1990). The analysis and interpretation of data generated from projective techniques follow general qualitative methods. Such methods apply phenomenology as well as symbolic interactionism as the projections of the participants require interpretation of what lies beneath and what manifests in behavior (Gordon and Langmaid, 1988; Levy, 1985).

Many studies have shown the usefulness of projective techniques in consumer research (Doherty and Nelson, 2012; Ramsey, Ibbotson, and McCole, 2006). There has been notable criticism of studies using projective techniques in terms of reliability and validity, especially in clinical psychology (e.g., Lilienfeld, Wood, and Garb, 2000). However, research shows that the reliability issue was found in the interpretation of information, but was not inherent in the techniques (e.g., Catterall and Ibbotson, 2000). Hence, when analyzing the responses from projective techniques, it is important to impose a structure on the interpretation process by, for example, having more than one researcher interpret the same sets of responses separately and then comparing results. Further, the issue of validity in projective techniques is related to whether the study has generated accurate findings from the research participants (i.e., internal validity) and whether the findings of a project can be generalized in similar cases (i.e., external validity) (Kassarjian, 1974). Levy (1985) observes that projective techniques often enable research participants to express themselves in fuller, more subtle and fairer ways than they could in responding to direct questioning (e.g., through interviews and discussions). Further, Ramsey, Ibbotson, and McCole (2006) argue that, following appropriate approaches, "projective techniques are reliable, valid, trustworthy, significant and appropriate research instruments that *have* provided insightful reality…" (p. 551). To ensure reliability of this research, three independent coders (two experienced researchers and a graduate student) analyzed the same data set independently, and inter-coder reliability was measured using Krippendorff's Alpha (Krippendorff, 2013). To check for internal validity, a member check procedure was performed with select participants to ensure that the findings accurately represented participants' responses.

Research Procedure

The main goal of this research was to explore the factors that drive tourists' attitudes towards push recommendations by smartphones while on the move. Projective techniques were utilized to explore the attributes of agency that tourists perceived from their smartphones and analyze how these influenced tourists' attitudes towards smartphone recommendations. A total of 275 undergraduate and Master's students enrolled in a university in Hong Kong SAR, China, participated in this research. The younger demographic group (i.e., most participants were in their 20s) was chosen due to the importance of this group as a driver of growth in smartphone adoption and use, especially in Asia and the Pacific (Hakuhodo, 2013), as well as the prevalence of smartphone use for travel among millennials worldwide (Expedia, 2013). Therefore, the relevance of young travelers as heavy users of smartphones during travel signifies the selection of this group as participants in this study.

In order to access users' feelings towards their smartphones and attitudes towards push recommendations in a tourism setting, participants in this research were given two sentence completion tasks and a cartoon test with bubble drawings. The sentence completion tasks followed a personification technique (Doherty and Nelson, 2010) by asking participants to imagine their smartphone as a person and as a body part:

   "If my mobile phone was a person, it would be _____ because _____"
   "If my mobile phone was a body part, it would be _____ because _____"

These tasks were targeted to facilitate the projection of human qualities on their smartphones by personifying them and, simultaneously, their desires, wishes, and fears for their devices. At the same time, the tasks were targeted to access participants' perceptions of the functionalities and observed behaviors of their smartphones as well as the patterns of use. By thinking of their smartphones in terms of a person and/or a body part, research participants were conditioned to think more deeply about smartphone qualities that mimic the characteristics of human agents

(i.e., social actors [Negroponte, 1970; Latour, 1988; 1993]) and about smartphone intentionality based on their behaviors (i.e., intentional stance [Dennett's, 1971; 1989]). The behavioral definitions of agency extracted from participants' responses were then interpreted to match the structural definitions.

After completing these sentences, participants were given a very simple cartoon character (i.e., a figure of faceless head and bust) and were asked to fill out three bubbles to describe what the character would think, say, and feel about proactive contextual recommendations (i.e., think bubble came from top of head, say bubble came from where a mouth should have been, and feel bubble came from where a heart should have been). The textual scenario describes the character as a traveler exploring a tourist destination (i.e., on-site, experiential stage of travel); his/her mobile phone is capable of understanding his/her needs and preferences and suggesting actions for him/her while traveling. The statement and bubbles are as follows:

> *"The mobile phone recommended something to do…"*
> > Bubble 1: *"…[I] would think_____"*
> > Bubble 2: *"…[I] would feel_____"*
> > Bubble 3: *"…[I] would say _____"*

This completion test was specifically directed to the projection of perceived meanings and attitudes towards proactive contextual recommendations from an intelligent agent (scenario: a mobile phone is capable of understanding its user and suggesting actions) that can be an extension of self (scenario: a smart mobile phone makes its user smarter and more skillful). After answering the previous tasks in which they had to think about the mental qualities and capabilities of their smartphones, participants were confronted by these scenarios and asked to think more critically and project their innermost feelings toward intelligent agents in the context of tourism. This task was targeted to access possible inner conflicts and anxiety regarding control over decision making (i.e., are smart phones in control of users' decisions?) and experiences (i.e., do smart phones determine and frame the tourism experiences?), which represent the duality of social and technological determinism (Latour, 1988, 1993; Wise, 1998). More importantly, the task was targeted to assess tourists' inclinations to follow push recommendations and whether the agency factors can be associated with anxiety and trust and, consequently, with this inclination (Wang and Benbasat, 2005; Komiak and Benbasat, 2006). The research procedure is illustrated in Figure 1.

All participants were given the same stimuli and were asked to finish the tasks within the same time frame (about 20 minutes). Their responses were recorded into textual data and interpreted following the analytical procedure that involves a series of coding and interpretation: (1) three independent coders used an open coding technique to explore emerging themes from the data and then developed separate code books; (2) code books were compared, discussed and negotiated (i.e., several codes were collapsed together, new codes were created, etc.) to create a unified code book; (3) coders re-coded samples of responses independently; (4) inter-coder reliability was measured; (5) themes and patterns were extracted from the refined codes; and, (6) patterns and themes were linked to broader, higher-level concepts of agency and technologies as social actors as well as technology-mediated tourism experiences.

Figure 1. Research Procedure

Concepts	Methods	Outcomes
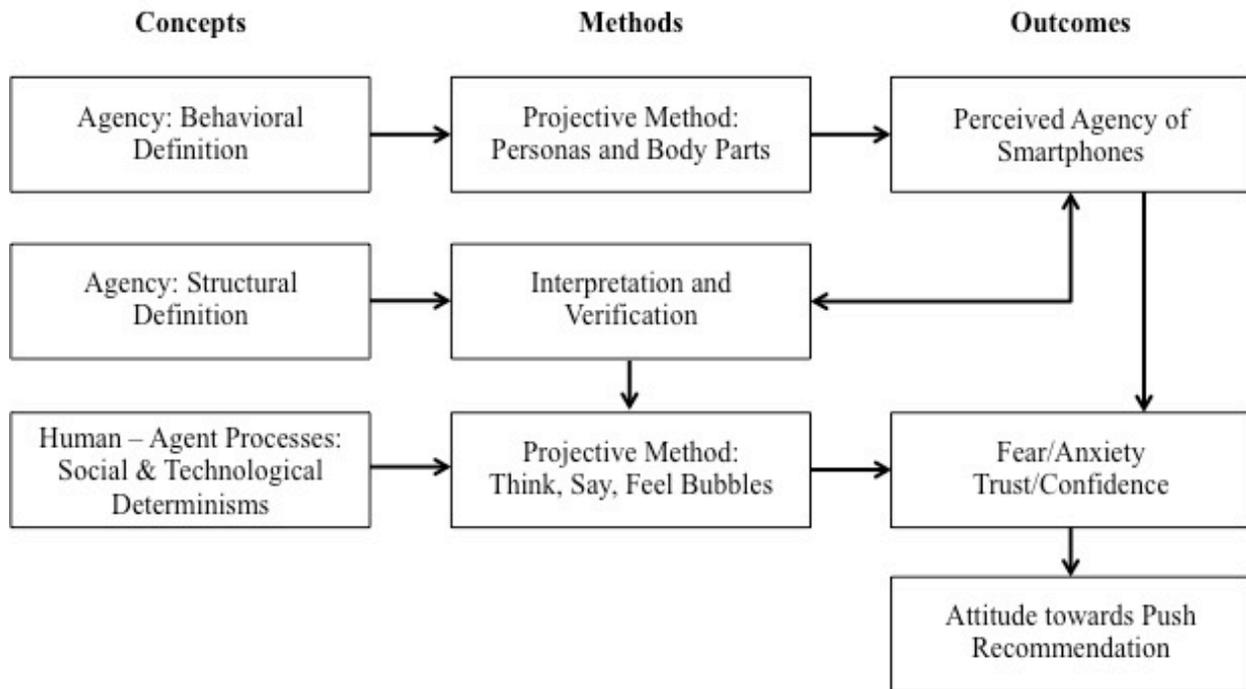
Results and Discussion

If My Smartphone was…

Responses to *"If my smartphone was a person…"* range from attribution of specific social roles, such as a friend and a teacher, to specific people, such as Steve Jobs and Bill Gates. Based on the frequency of responses, the top personas include *Friend* (26%), *Mother* (16%), *Secretary/Butler* (16%), *Teacher* (7%), *Spouse* (5%), and *Father* (4%). While *Secretary* and *Butler* were grouped into one persona, *Mother* and *Father* were kept separate because of the distinctive characteristics and qualities associated with them. A few participants mentioned specific occupations such as a *Doctor*, an *Artist*, a *Singer*, etc., and fictional characters, such as *Superman* and *Doraemon* (a futuristic character from a Japanese animation program). The reasons provided by participants for selecting a persona indicated the roles of smartphones in their lives (see Table 1); most pointed to the tasks they assign to their smartphone and the functionalities they benefit most from. As a *Friend,* a smartphone is seen as having the qualities that allow it to help, accompany, entertain, play, and share with its users. Participants who think of their smartphone as a *Mother* observed that it provides them with help, is always there to remind them of certain tasks, and, thus, takes care of them. While the *Mother* persona is seen as having the quality of caring (i.e., making sure that users are doing their job right), the *Father* persona is highly associated with knowledge and wisdom. As a *Secretary/Butler,* most participants viewed their smartphone as one that is capable of organizing their schedule, assisting them with necessary information needs, and generally managing their lives. Finally, the *Teacher* persona is associated with knowledge and problem-solving qualities.

Table 1. Sample Responses for "*If my smartphone was a person…*"

Persona	Reasons
Friend	"…it seems like a friend to stay beside me every day. It also entertains me a lot and let me have opportunity to learn more." (Participant #8)
	"…it accompanies me everywhere and every time. It shares everything [with] me without hiding the truth when I am happy or when I feel sad." (Participant #79)
Mother	"…she always reminds me what I need to do in the upcoming week and she always tracks me down to see where I went and what I was doing." (Participant #65)
	"…she can take care of me by giving different kinds of information, also, she can check my locations if she wants." (Participant #195)
Secretary or Butler	"…it helps me a lot on my daily matter like waking me up in the morning, remind[ing] me on some appointments, help[ing] me to contact other people and provid[ing] me [with] sufficient information." (Participant #20)
	"…it helps me memorize and handle all the things during my life [with] calendar, reminder, email, [and] text message. [It] also helps [me] to search the information that I need." (Participant #30)
Teacher	"…it contains a lot of information just like a professor who is very knowledgeable. [W]henever I have inquires/questions, I can always get the answer from it." (Participant #98)
	"…every time when I encounter problems, I would think about my mobile phone first. I use it to search for knowledge and solutions to the problems." (Participant #172)
Spouse/Partner	"…I cannot help myself checking it every ten minutes and I would be anxious if it was not in my hands." (Participant #71)
	"…I am so close with him and sometimes I may feel uneasy or even panic without taking the mobile phone with me. But when the mobile phone is broken, I have to have another relationship." (Participant #50)
Father	"…he always helped me answer lots of questions, just like my smart phone, provides lots of information and knowledge to me when I need help." (Participant #109)
	"…he knows everything of me, also he can predict many things, he can [tell] me what I don't know and what [I need] to know." (Participant #120)

Responses to "*If my smartphone was a body part…*" are dominated by *Brain* (53%), followed by *Eye(s)* (23%), *Heart* (6%), *Hand* (5%), and *Mouth* (5%). The reasons participants provided for selecting a body part to symbolize their smartphone mostly included the perceived capabilities of the smartphone and its importance (i.e., how much the smartphone means) to the users (see Table 2). A smartphone is regarded as a *Brain* mostly because it has the capacity to think, store, and process a large amount of information and, thus, assist users in memorizing, calculating and making decisions. Participants who think of their smartphone as their *Eye(s)* stated that it allows them to see and explore the world around them by providing them with information, news, and images from around the world (i.e., it broadens their horizons) and facilitates capturing pictures. The association with a *Heart* was made due to the central role of a smartphone to its users; they cannot live without it and feel a deep emotional connection to it. These participants stated that their smartphone knows and understands them as they share their

deepest secrets with it. Attribution to a *Hand* signified the role of smartphones as the extended self (i.e., smartphones are to pick up tasks from users' hands). Participants who selected a *Mouth* reasoned that the chief use of their smartphone was for communication (i.e., it facilitates in expressing their feelings to others).

Table 2. Sample Responses for "*If my smartphone was a body part…*"

Body Part	Reasons
Brain	"…it can help me memorize a lot of things and also do some difficult tasks like calculation." (Participant #5)
	"…I think mobile phone is very similar to a human brain. It can take lots of course of actions such as generating and recording information. It is functioning like a brain." (Participant #16)
	"…it can sync with my thought and know what I need to know and remember, download the apps that I need automatically." (Participant #123)
Eye(s)	"…it opens my eyes to lots of the things that I have never seen or learnt before. It's like an eye to explore different things in the world." (Participant #15)
	"…it represents me to explore the globe without traveling [physically]. It widens my horizon and keeps me updated. It also helps to share my happiness and tears with friends." (Participant #65)
Heart	"…it is essential in my life now so as to communicate and get information. Also it contains the most secret part [of] my life, which [I] may not show to other[s] easily." (Participant #94)
	"…without your heart, your body cannot function and live. It [is] just an important tool for me to live with." (Participant #145)
Hand	"…it does lots of things for me, like 24 [hours] a day to keep working." (Participant #48)
	"…it helps me to do many things that skip the time I need to spend if [I] do [it on] my own. Therefore, it [is] like an invisible hand and helps me do more and faster." (Participant #214)
Mouth	"…it helps me [to] communicate with others, I can present my thoughts and feel[ings] by my phone. It is so similar with my mouth." (Participant #170)
	"…[it] helps me to express [my] feelings, affects my emotions, [and helps] to communicate with my friends through apps [and] social networks." (Participant #272)

Indications of Agency

Responses to the two sentence completion tasks were interpreted in terms of mental qualities participants ascribed to their smartphones that represent agency. Based on the attributes of agents suggested by Wooldridge and Jennings (1995) and Dautenhahn and Nehaniv (2000), the mental qualities indicating the agency of smartphones are intelligence, autonomy, social ability, reactivity, proactiveness, and control. Most responses indicated intelligence (85%) as a prominent quality of a smartphone (i.e., participants perceived their smartphone to exhibit knowledge within it), which is expressed by perceived strong computational power (i.e., ability to calculate, multi-task, and solve complicated problems), as well as the large storage capacity (i.e., capacity to store and process a large amount of information). The attribute of autonomy (17%) was extracted mostly from descriptions about the smartphone's ability to conduct

processes without being asked (e.g., applications running in the background), such as tracking users' locations and "thinking" independently to recommend decisions (consistent with Jennings and Wooldridge, 1998; Wooldridge and Jennings, 1995). Social ability (48%) was another prominent quality that participants stated, mostly referring to their daily interactions with smartphones (e.g., chat, play, share, answer questions, etc.), which is consistent with the definition of SIA (Dautenhahn, 1998). While not as dominant as the previous qualities, reactivity (11%) was found in responses regarding the smartphone's ability to sense the environment, as well as users' preferences or moods, and use this contextual information as well as prediction for the future to suggest actions, which is also consistent with the concept of context-awareness (Mehra, 2012). Proactiveness (29%) was the quality that most participants perceived from their smartphone in terms of its capacity to take initiative in alerting, reminding, and suggesting actions to its users even when such initiative is unwanted. Proactiveness, to some extent, also led to the perception of control (13%), indicating the capability of a smartphone to influence users' behaviors (e.g., controlling user-device interactions) and decisions (e.g., controlling what users do or buy). This is consistent with Dautenhahn and Nehaniv's (2000) highest level of authority, where social agents drive humans out of the decision loop, and Leonard's (1997) suggestion that users no longer have control over their own decisions. Finally, indications of perceived control were also captured from participants stating that they became highly attached to and dependent on their smartphone and that they could not live without it. Samples of responses indicating smartphone agency are presented in Table 3.

**Table 3. Sample Responses Indicating Agency in Smartphones**

Attributes	Definition and Literature	Sample Responses
Intelligence	Ability to learn and use knowledge to achieve its goal (Russel & Norvig, 2003).	"…it's smart and knows everything in the world. [It] thinks fast and can remember a lot of things." (Participant #53)
		"…it provides all the things I want to know. It gives me the right direction if I am lost in the destination." (Participant #59)
		"…[it] can answer some questions that I don't know. [It] has a lot of information and knowledge. [It] can guide me when I feel lost." (Participant #76)
Autonomy	Ability to act without intervention from humans or other agents (Jennings and Wooldridge, 1998; Wooldridge and Jennings, 1995).	"…[it] always tracks me down to see where I went to and what I was doing." (Participant #65)
		"…[it] can check my locations if [it] wants to…" (Participant #195)
		"…it can process different types of information at the same time and helps people to decide, [it] selects the most suitable [decision] for the user." (Participant #269)
Social Ability	Ability to interact with other agents and humans, such as collaborate or negotiate, to complete their tasks (Jennings and Wooldridge, 1998; Wooldridge and Jennings,	"…I could chat with [it] anytime and [it] won't disturb me when I'm busy." (Participant #52)
		"…It would not get grumpy even [if] I have thousands of questions to ask and it brings me a lot of entertainment." (Participant #15)
		"…it gives me gossip through Facebook, it plays games with

	1995)..	me, it keeps me company when I'm bored… it is a very important thing in my life." (Participant #151)
Reactivity	Ability to perceive their environment and respond in a timely fashion to changes that occur in it (Jennings and Wooldridge, 1998; Wooldridge and Jennings, 1995).	"…it senses [and acts] as a reference guide to me, a knowledge reference [that] enables me to understand better of the culture, the food, and the history [of the destination], also the direction…" (Participant #67) "…[it] can forecast the future and make the right decisions..." (Participant #87) "…it would provide advice when I need [one], also it would understand what I feel and listen to me." (Participant #210)
Proactiveness	Ability to exhibit opportunistic, goal-directed behavior and take initiative when appropriate (Jennings and Wooldridge, 1998; Wooldridge and Jennings, 1995).	"…it keeps telling [and] advising me what to do, it provides me a lot of reminders..." (Participant #69) "…[it] knows what I want to know, thus, [it] helps to filter those useless calls or messages away. Also [it] is good at scheduling, which helps me to squeeze out more free time." (Participant #72) "…it can make decision for me or provide suggestions for me to choose." (Participant #118)
Control	Ability to direct or supervise interactions with users (Dautenhahn & Nehaniv, 2000); Ability to affect users' behavior (Latour, 1988; 1993; Wise, 1998).	"…it controls everything I do every day." (Participant #1) "…I don't need to buy the app, but [it] persuades me to buy [it]; I need to do something else, but [it] attracts me to do what [it] wants me to do." (Participant #56) "…it fully integrates into my mindset, [it is] the way of thinking as well as controlling my behavior." (Participant #163)
	Users depend on technologies (Latour, 1988; 1993).	"…I can't keep my eyes off of my mobile phone, I am so attached to it that I need to keep looking at it once in a few minutes to see what's going on around the world." (Participant #65) "…it is important to me and I can't do anything without my mobile phone." (Participant #91) "…I can't live without it." (Participant #139)

Figure 2 illustrates the relationships between each of the attributes of agency and the personas and body parts participants associated with their smartphones based on the number of co-occurrences in participants' responses. The thickness of the lines connecting attributes of agency with personas and body parts represents the number of co-occurrences. Notable relationships include perceived intelligence and *Brain* (119 co-occurrences; 43% of participants) and social ability and *Friend* (52 co-occurrences, 19%). Other relationships with 30 or more co-occurrences are between intelligence and *Friend* (36 co-occurrences, 13%), intelligence and *Eye(s)* (34 co-occurrences, 12%), and social ability and *Eye(s)* (36 co-occurrences, 13%). In terms of personas, while *Friend* is highly associated with intelligence and social ability, *Mother* is highly associated with intelligence (27 co-occurrences, 10%) and proactiveness (25 co-occurrences, 9%). Krippendorff's Alpha (Kalpha) values for control, reactivity, and social ability

are 0.80 or larger (indicating high reliability), while Kalpha values for intelligence and autonomy were between 0.80 and the acceptable cutoff point of 0.67 (indicating reliability). A member check procedure with nine participants also confirmed the internal validity of this study with participants indicating agreement to the interpretation of agency.

Figure 2. Co-occurrences between Agency and Personas and Body Parts
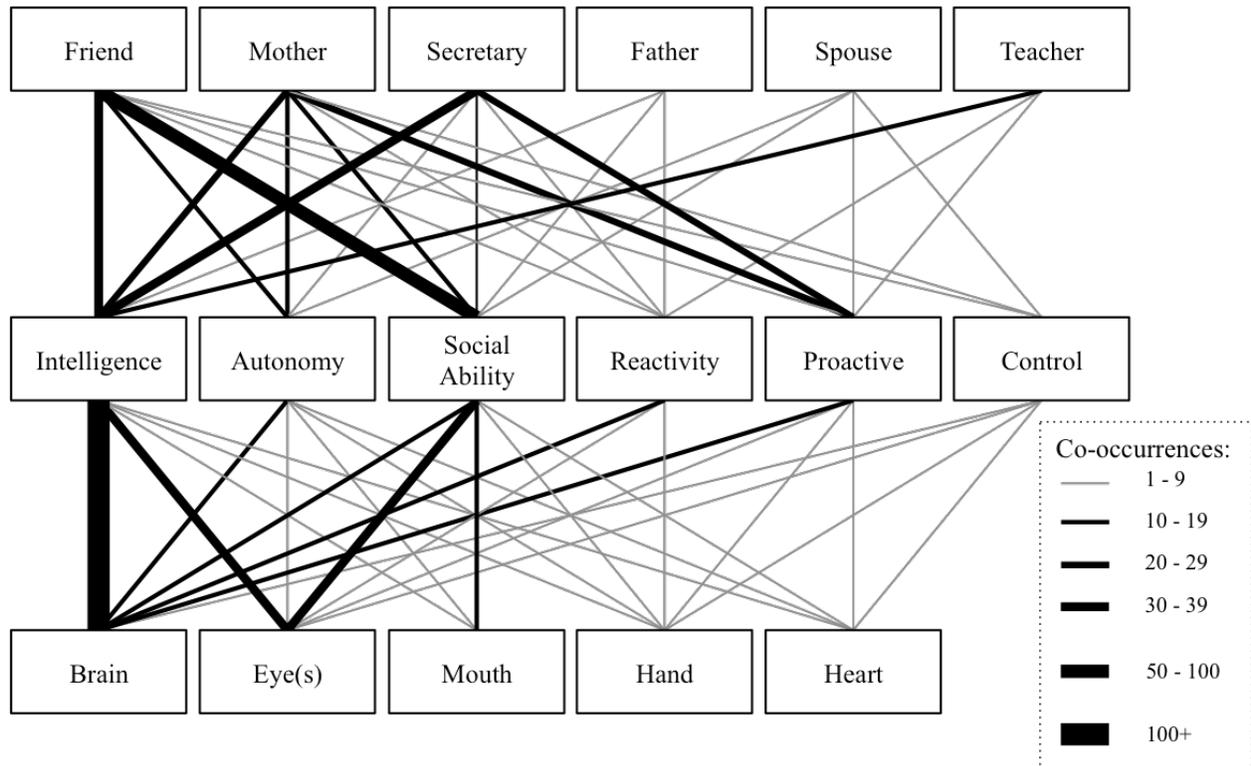
These findings demonstrate how research participants perceive agency in their smartphone by describing its mental qualities (i.e., social ability, reactivity, proactiveness, etc.) as interpreted from its observed behaviors. These mental qualities, which are consistent with the structural definition of agents (Jennings and Wooldridge, 1998; Wooldridge and Jennings, 1995), were observed through a history of interactions between users and their smartphone (i.e., participants use their smartphone for various tasks) involving mutual learning (i.e., they know what their smartphone is capable of and their smartphone knows their preferences; they share their deepest secrets with their smartphone). Hence, participants were able to observe patterns of behavior and could use these to predict what their smartphone would/could do in the future, which is consistent with the concept of intentional stance (Dennett, 1989). Hence, it can be concluded that research participants think of their smartphone as an agent capable of executing actions without their interference, collaborating with others to finish the tasks assigned to it, responding to the environment and suggesting certain actions, and, to some extent, controlling their actions.

Attitudes towards Proactive Recommendation
Three patterns of attitude emerged from responses to the cartoon test with a scenario describing it as a traveler receiving a push recommendation from his/her smartphone: (1)

following/adopting the recommendation (i.e., favorable decision, 67.4%), (2) rejecting the recommendation (i.e., unfavorable decision, 7.2%), and (3) treating the recommendation as a reference for later decision making (i.e., smartphone's recommendation alone was not considered sufficient to warrant decisions, 17.4%). Samples of responses indicating disposition towards the push recommendation are presented in Table 4. The majority of those who were to follow the smartphone's recommendations indicated a positive evaluation and appreciation towards the smartphone (i.e., by expressing gratitude), and some indicated a behavioral commitment to adopting the recommendation (e.g., using expressions such as "...*let's do this!*" or "...*let's go for it!*"). Participants indicating rejection specifically stated their behavioral intention to not follow the recommendation (e.g., using expressions such as "*No, thanks*."). Finally, those who considered the recommendation as a reference for decision making were to search for more information to confirm the acceptability of the recommendation and/or to clear doubts about the recommendation.

Table 4. Sample Responses Indicating Disposition towards Push Recommendation

Disposition	Sample Responses
Adopt/Follow	"[I think] your ideas should be good because you know me well, I should follow your ideas." (Participant #95)
	"[I say] it sounds interesting, let's go for it." (Participant #98)
	"[I say] thank you as this may save my time to think everything over and do research. Simply following the recommendations makes me more relaxed and makes my trip more enjoyable." (Participant #161)
Consider	"[I think] shall I follow what it says? Is it a good recommendation? Is everyone receiving the same advice?" (Participant #66)
	"[I think] is it really good for me? I need to think more before I take this advice." (Participant #96)
	"[I think] whether I should go there to have a look or not. It might be a good place." (Participant #102)
Reject	"[I think] I could not follow its recommendation because planning traveling is part of [the] traveling experience even though option provided by it [may be] better." (Participant #105)
	"[I think] maybe it is a good idea, but I don't like [when] everything is [based on] following suggestions. I want to do whatever I want even [if] it is not the best choice." (Participant #214)
	"[I think] if I follow what it suggests and let it make every decision of my life, I wouldn't be needed to think and it wouldn't be my life anymore." (Participant #254)

Further, it was identified that participants with positive attitudes towards push recommendations mentioned the reasons behind the disposition, which are associated with perceived benefits from following the recommendation and higher levels of confidence in adopting the recommendation due to trust that smartphones are capable of making relevant recommendations and being reliable travel partners (see Table 5). The perceived benefits of following the push recommendation from a smartphone include ease of planning (i.e., significant decrease of the importance of pre-trip planning), which leads to reduced planning costs and time as well as increased enjoyment at the destination (i.e., enhancement of on-site experiences), as planning and, to some extent, decision tasks are delegated to the smartphones. Moreover, the

positive attitudes were also associated with participants trusting that smartphones can generate good, useful, and helpful recommendations to support tourists on the move, as well as perceiving smartphones as reliable travel companions. These led to the positive feelings of happiness, comfort (e.g., participants would feel relaxed while traveling with the assistance of their smartphones) and safety (e.g., participants would feel safe exploring unknown destinations knowing that smartphones will assist them with necessary information).

Table 5. Sample Responses Indicating Trust/ Benefits of Proactive Smartphones and Push Recommendation

Opinions, Feelings, Attitudes	Sample Responses
Trust Interpretation: smartphones can generate reliable recommendation.	"[I think] it is very useful. It can guide/help me to make [decisions] easily." (Participant #20) "[I feel] that it is so helpful. Since it knows everything and it can search all the information when I need [it]. I will not be afraid of getting lost in destination." (Participant #165) "[I think] it should be a good recommendation, it is so helpful and smart." (Participant #237) "[I think] anything I am struggling with, just pass it to the mobile phone and let it decide for me." (Participant #251)
Trust Interpretation: smartphones can be reliable travel companions	"[I feel] very happy and excited as it acts as my friend/partner [during traveling]." (Participant #119) "[I feel] safe and happy as there's someone I can trust and can talk to [during traveling]." (Participant #138) "[I feel] happy and safe if someone can always stand by me [during traveling]." (Participant #207) "[I think] my mobile phone is my good travel partner." (Participant #220)
Benefit Interpretation: perceived positive consequences from following push recommendation.	"[I think] it is very helpful and it's my best [travel] buddy, [because] I don't need to worry [that] important things are missed." (Participant #174) "[I feel] comfortable because I think it is so hard to think about some activities to do during traveling. If my phone can offer me help, I can travel around more easily." (Participant #181) "[I think] it lowers the time cost for me to do research on destination, also design the best route for me when traveling." (Participant #257) "[I feel] …really happy as it reduce my anxiety of travelling to a new place." (Participant #270)

On the other hand, rejection against push recommendations from smartphones is associated with fear of the negative consequences of following the recommendation and anxiety over being too reliant on smartphones or on technology in general (see Table 6). The anxiety and fear take root in the idea that when users are increasingly reliant on technology; it has a more significant role in controlling people's behavior and, consequently, replaces people's roles in determining their own experiences. This is consistent with the fear of being enslaved by

technology and stripped from making one's own decisions as suggested by Leonard (1997). Participants rejecting push recommendation further elaborated that planning and decision making are an essential part of the tourism experience and, hence, should not be delegated to technology even if the recommendation generated by smartphones may be a better option. In that, they were willing to take the risk of making bad decisions in exchange for retaining their ability to control their own tourism experiences. The Kalpha value of attitude towards push recommendation (trust or anxiety) is equal to 1, indicating perfect reliability. A member check procedure with nine participants also confirmed the internal validity of this study with participants indicating agreement to the interpretation of confidence/trust and anxiety/fear.

Table 6. Sample Responses Indicating Anxiety towards Proactive Smartphones and Push Recommendation

Opinions, Feelings, Attitudes	Sample Responses
Anxiety Interpretation: fears and anxiety over consequences from following (or not following) push recommendation.	"[I think] if I lost the phone, can I rely on myself to continue my journey?" (Participant #120) "[I think] it kills my creativity and suppresses my ability in making decisions on my own. It seizes my opportunity to understand about myself, my personality." (Participant #211) "[I say] it will make me much more lazier, it makes me rely more on mobile phone […], if I lost my phone, I can't do anything." (Participant #248)
Anxiety Interpretation: general fear and anxiety toward smartphones and technologies.	"[I think] that's odd. […] technology should always remain a tool we use when necessary. [It] shouldn't take control and power over us. Nowadays, people [are] dependent [on technology]." (Participant #143) "[I think] it is crazy to let the electronic device to suggest some places and affect my decision." (Participant #169) "[I feel] …quite good, but sometimes I want some adventures that not planned or arranged so well before. Also, it is quite unsecure that if someone else get my phone, my privacy would be exposed." (Participant #265)

Even though participants who stated their willingness to adopt or follow the push recommendation are more prevalent than those who rejected it, their responses present the paradox associated with using technology to experience tourist destinations. Ihde (1990) suggests the paradox resulting from using technology to mediate experiences with the world, which he elaborates on as the co-occurrences of amplification and reduction. He argues that as technology mediates experiences, users will have an increased capacity to engage with the world in a particular way that is accompanied by a reduced capacity to engage with it in other ways. Participants who showed a certain level of anxiety (i.e., about 17% of total participants, which include those who rejected recommendation and a handful of those accepting and considering it as a future reference), suggested that the use of technology enhances the tourism experience through improved navigation and better information regarding tourist destinations (i.e., mediation causes enhancement in tourism experiences), but it also reduces opportunities for users to learn from encountering problems at tourist destinations that results from their own "trial-and-error" decisions (i.e., mediation causes reduction in tourism experiences).

Effects of Agency on Attitudes towards Proactive Recommendation
While the majority of participants showed positive attitudes towards smartphone recommendations, it is important to understand how the observed mental qualities of smartphones results in the mediation paradox that may hinder the adoption of these push recommendations. Based on the number of co-occurrences between attributes of agency and attitudes towards push recommendations, the associations between smartphone agency and fear/anxiety as well as confidence/trust are presented in Figure 3. The links represent the percentages of co-occurrences relative to the total occurrences of the specific attribute in participants' responses (i.e., among participants who perceived that their smartphone shows intelligence, 21% of them reporting having anxiety/fear).

Figure 3. Co-occurrences between Agency and Confidence/Trust and Fear/Anxiety
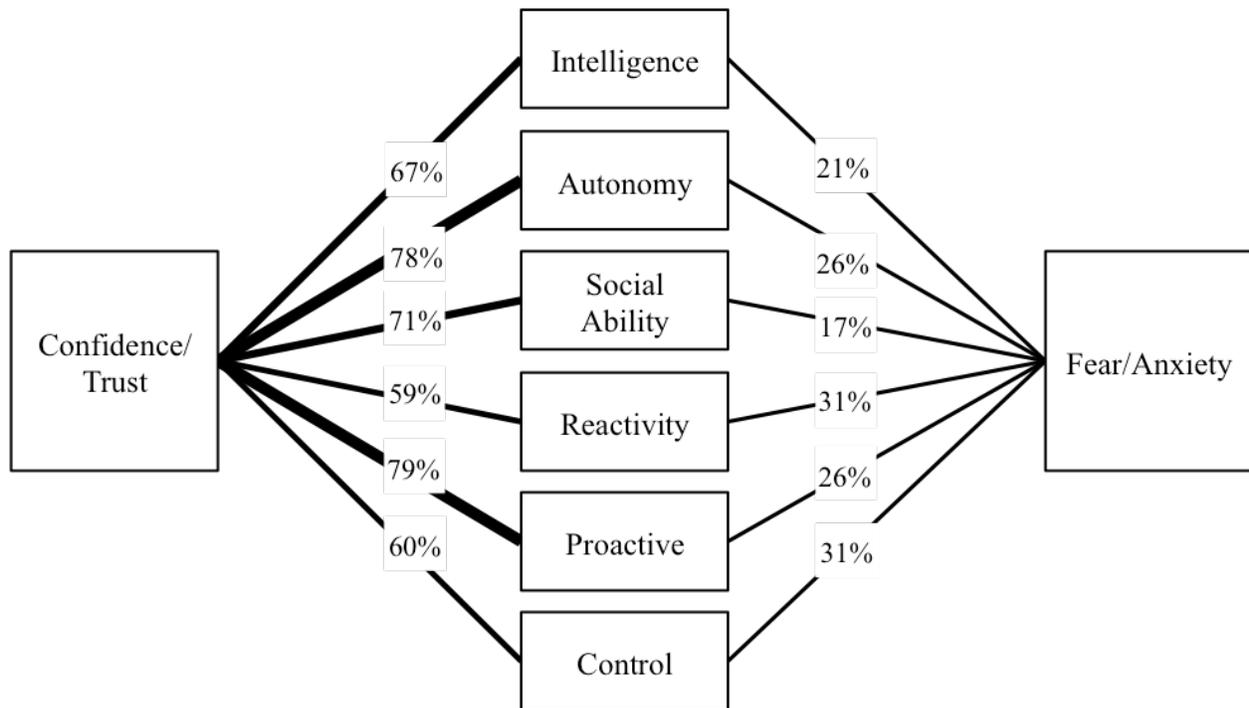
The effects of agency on participants' feelings and attitudes as triggered by push recommendation from their smartphone can be summarized into three patterns. *First*, perceived intelligence and social ability led to a majority of participants being confident and trusting the recommendations (67% and 71%, respectively), while a handful of others were anxious (21% and 17%, respectively). Indeed, these two qualities resulted in the lowest percentages for fear/anxiety among participants, who mostly stated that their fear was rooted in the worries about having a piece of technology that is smarter than they are (i.e., intelligence), as well as concerns about which kind of behavior this intelligence will manifest into. The confidence resulting from intelligence and social ability explains participants' perceptions that smartphones can increase their cognitive abilities (i.e., intelligence) to make the right choices at a tourist destination and their comfort with their smartphone as a travel companion (i.e., social ability). *Second*, while the majority of perceived reactivity and control resulted in confidence/trust (59% and 60%, respectively), more participants reported fear and anxiety (both 31%). Indeed, the two qualities show the highest percentages of participants reporting anxiety, with the majority of them being

concerned with their smartphone taking over control of their tourism experiences and their lives in general. In terms of its effect on confidence, perceived reactivity is associated with its ability to provide solutions for tourists (e.g., navigation based on location data) or to take care of tourists' issues. *Third*, the effects of perceived autonomy and proactiveness were the highest in leading to confidence and trust (78% and 79%, respectively), but were also quite significant in terms of anxiety/fear (both 26%), making the total effect of each quality higher than 100%. These effects are best explained as the mediation paradox, in which users feel that certain qualities of technology will enrich their experiences in one aspect and detract from them in another. Autonomy and proactiveness were mostly perceived as leading to usefulness of the smartphones for users to assist in tourism and daily experiences (i.e., using such phrases as *useful*, *helpful*, *considerate*, etc.) and, thus, resulting in confidence and trust (e.g., "[I feel *[that my] mobile phone is very considerate and takes care of me so much*." – Participant #87). However, some participants stated that they were confident and anxious at the same time, mostly due to different aspects of their experiences with smartphones (i.e., spending less time planning a trip, but losing the experience from serendipity or surprise factors of travel and tourism), which is consistent with Ihde's (1990) paradox. Taking these effects further, perceived helpfulness and usefulness of a smartphone due to its autonomy and proactiveness led to participants recognizing the convenience offered to users, but also the risk of being too reliant on technology. For example, Participant #16 (who reported qualities of intelligence, autonomy and proactiveness) conveyed feeling relaxed as technology makes a human's life easier (i.e., confidence, trust), but also worried whether she can still survive if she loses her phone in a tourist destination (i.e., anxiety due to dependence on technology).

Conclusion and Implications

This study aims at exploring the factors and processes that influence tourists' attitudes towards proactive contextual recommendations pushed by smartphones while experiencing a tourist destination. Projective techniques were utilized to explore tourists' perceived agency of their smartphone and to analyze how the behavioral qualities of smartphones influence tourists' attitudes towards smartphone recommendations while making on-site decisions. Projective techniques were used to allow research participants to reflect on the characteristics of meanings that are derived from their subconscious desires, wishes, or feelings regarding their smartphones and the use of smartphones for the tourism experiences. First, a personification technique was conducted to allow participants to imagine their smartphone as a person and as a body part in order to give them opportunities to think of the human qualities that they attach to their smartphone as observed from its behaviors. Based on their responses to these sentence completion tests, attributes representing the structure of agency as suggested in previous literature on intelligent agents and artificial intelligence (Jennings and Wooldridge, 1998; Wooldridge and Jennings, 1995; Dautenhahn and Nehaniv, 2000), were extracted.

The utilization of personification techniques allows participants to imbue their smartphone with the mental qualities that they might otherwise find difficult to articulate and/or divulge. In order to describe their smartphone as a person or a body part, participants were conditioned to think of certain qualities as observed from the behaviors of their smartphone. While some qualities seemed to be easier to recognize (e.g., intelligence – ability to show knowledge), fewer observations leading to other qualities were detected from the responses. This is most likely influenced by the dominant role of smartphones in users' daily lives in terms of the tasks users assign to them. A large number of participants stated such activities as searching for

information, problem solving, communication, and entertainment, which emphasize the capability of smartphones to find, provide and share information and knowledge, as well as to collaborate and provide social support and entertainment.

The majority of research participants were likely to adopt and follow proactive recommendations from their smartphone while experiencing tourist destinations. For them, smartphones are considered travel companions and/or guides that accompany and/or assist them in making their experiences more enjoyable (i.e., most of them attributed the benefits to ease in on-site itinerary planning and navigating themselves in unfamiliar places). They perceived that the mediation of mobile devices provides convenience and enhances their experiences at tourist destinations. On the other hand, rejection was largely due to participants' fear that being too reliant on smartphones to make on-site decisions would deter them from having a meaningful tourism experience. Even though this tendency was found in a minority of research participants, it is important to address the cause of their fear and anxiety. Among participants who needed more information to make decisions, both positive and negative tendencies were present to varying degrees, revealing a certain level of confidence and anxiety at the same time. It can be suggested that some users perceive that mobile-mediated interactions with tourist destinations may result in simultaneous enhancement and reduction of certain aspects of the tourism experience.

Based on the co-occurrences of perceived agency and attitudes towards recommendations, the roots of confidence and anxiety from participants' observations of their smartphone's behavior were examined. It was found that confidence/trust came largely from perceived proactiveness, autonomy, social ability and intelligence, indicating that that when users are able to perceive that their smartphone demonstrates an ability to process information and knowledge, to act without intervention, to take initiative when appropriate, and to collaborate or negotiate with others to complete certain tasks, they are able to trust the device and, most likely, adopt its recommended actions. Perceived reactivity and control contributed significantly to fear/anxiety, because their smartphone knows too much (i.e., senses changes in users' environment) and eventually will take over control of their tourism experience. Interestingly, perceived proactiveness and autonomy contributed significantly to confidence/trust, also quite notably to fear/anxiety. That is, the characteristics of mobile phones as proactive, independent agents might result in a contradiction in which, on the one hand, users are confident to rely on technology to make decisions and, on the other hand, are afraid of being "left out" of the decision loop.

The findings in this study provide practical implications for the development of mobile technology to support tourists on the move. In general, the majority of technology users perceive the benefit of mediation as improving tourism experiences. That is, mobile technology can be designed in such ways to provide triggers in the form of proactive, contextual, personalized recommendations to influence tourist behavior and enhance their experiences. Therefore, this research supports previous studies regarding the importance of triggers in behavioral design (Fogg, 2003; Fogg & Hreha, 2010), specifically in using intelligence systems to design tourism experiences (Gretzel, 2011; Tussyadiah, 2014), and the roles of technology in enhancing tourism experiences (Brown and Chalmers, 2003; Wang, Park, and Fesenmaier, 2012; Wang, Xiang, and Fesenmaier, 2014; in press). In a broader context, this research enriches the discussion on the transformation of destination marketing and management as a result of the development in ICT. Specifically, the emergence of social media and mobile technology drives an emphasis in real-time integration of tourist insights and behaviors into strategic destination marketing efforts (e.g.,

Gretzel, 2011; Mistilis, Buhalis, and Gretzel, in press). Understanding tourists' attitudes towards contextual recommendations will inform tourist destinations in formulating strategies to induce the patterns of tourist mobility that will be advantageous for all tourism stakeholders. Applying strategies informed by contextual intelligence, destinations will be able to synergize tourism attractions, businesses, and other stakeholder networks in the destination.

Moreover, the results provide design requirements for technology developers. While certain attributes of agency result in confidence and trust among tourists, leading to adoption of push recommendations, other attributes lead to anxiety and fear. Therefore, the development of mobile technology for tourists should take into consideration the presentation of certain qualities manifested in observable behaviors that inspire confidence and trust. Specifically, intelligence and social ability are found to assure confidence and trust and result in less anxiety, while reactivity and control may generate more anxiety and fear than other attributes. Meanwhile, autonomy and proactiveness result in a higher degree of confidence, but, in some groups of users, contribute to anxiety. Therefore, it is important to design mobile applications that entice tourists with the feeling of being "in control" by combining proactiveness and reactivity (i.e., pushing contextual recommendations based on changes in users' environment) with certain user interference in the form of collaboration (e.g., letting users verify recommendations) and negotiation (e.g., suggesting alternative recommendations). This approach will increase confidence and reduce anxiety among tourists, resulting in positive attitudes towards recommendations. For some users, albeit a minority in this study, it may be necessary to give recommendations only when asked (i.e., reducing proactivity, autonomy, and control).

This study confirms the behavioral definition of agency from users' interpretations of smartphone behavior, which is consistent with the structural definition suggested in literature on intelligent agents (Dautenhahn and Nehaniv; 2000; Jennings and Wooldridge, 1998; Wooldridge and Jennings, 1995). From a methodological point of view, while it is confirmed that user perception regarding the mental qualities of mobile phones could be extracted comprehensively using a projective method, it is recognized that as participants were conditioned to think of their smartphones as living beings (and parts of living beings), it was easier for them to project mental qualities on their smartphones. Hence, future studies utilizing different methodologies would assist in confirming the findings of this study.

This study also provides support for the development of context-aware mobile systems and applications to support tourists on the move, as the findings confirmed major tendency of tourists to adopt contextual recommendation due to its perceived benefits. It is acknowledged that the adoption of contextual recommendations may also depend on the specific travel context, such as travel companions' opinions, the overall arrangement of itineraries, and the heterogeneity of tourists. This study focuses on the impact of perceived agency on tourists' attitudes towards contextual recommendations. Therefore, future studies can be developed to apply the study in different tourism situations (e.g., varying degree of familiarity with tourist destinations, purposes of trip, etc.). Further, whereas the majority of tourists find mobile mediation enhances the tourism experience, and a handful of them find it reduces the tourism experience, a paradox was also detected in this study. That is, even though literature on tourism and information technologies emphasizes the positive aspects of technology mediation in tourism (Tussyadiah and Fesenmaier, 2009; Wang, Park and Fesenmaier, 2012; Wang, Xiang, and Fesenmaier, in press; 2014), it is important to further investigate the negative aspects that come with the transformation of the tourism experience due to technology mediation. Lastly, since all participants in this study were younger (the majority of them in their 20s), studying, and residing

in Hong Kong, a similar study capturing different demographics (e.g., age, occupations, geographic locations, etc.) will assist in confirming the applicability of these findings to the general tourist population.

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