9-2010

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Abstract

Mobile devices are common communication tools, which deeply affect social engagement practices. Smart-mobile devices move beyond voice and textual communication: they enable ubiquitous online connectivity, and bring changes to mediated social interaction. In this paper we bring the results of a study of the meditated social practices of students who use smart mobile devices on a university campus and beyond it. While the common premise is that smart mobile devices enable continuous collaborative interaction, our study shows this interaction is limited than previously believed. Two distinct factors were found to affect mobile interaction: sociability and usability. While sociability entices users to engage in continuous mobile-mediated interaction, usability issues encumber the full embracement of mobile-social applications. The tension between the two creates a new form of interaction - "intermittent participation" - in which users are constantly attuned to absorb notifications and updates, but rarely respond to them, unless a response is absolutely necessary.

1   INTRODUCTION

In the past 15 years mobile devices have shifted from being an exclusive tool used by business people to an everyday device for facilitating communication and coordination among users. The fast and extensive diffusion of wireless communication outpaced that of any other communicative technology (Castells, Fernandez-Ardevol, Linchuan Qiu, & Sey, 2007), and affected socialization, consumption and entertainment habits, as well as work experiences. Mobiles are believed to enhance coordination and cooperation among users (Farnham & Keyani, 2006; Richard Ling, 2004). Smart mobile technology offering perpetual online connectivity brought further changes, not only to voice and textual communication practices but also to *mediated* social interaction. Thus, mobile devices are believed to be not only facilitators of improved coordination and collaboration among users (Ling & Yittri, 2002), but the creators of a new culture. The perpetual connectivity afforded by smart mobile devices is believed to create a culture of constant engagement through the use of social networking applications and mediated collaboration tools, in which users are continuously connected to their friends and colleagues. Despite the growing popularity of smart mobile devices, their actual effect on mediated interaction and collaboration has yet to be widely researched. Most of the research has focused on specific applications for smart mobile devices (e.g. Borcea, Gupta, Kalra, Jones, & Iftode, 2007; Braun & Gerther, 2007; Cochrane 2006; Eagle & Pentland, 2005; Jung, Blom, & Persson, 2006), and not on the changes smart mobile devices have brought to mediated interaction. The contribution of this paper is in addressing the existing gap in literature related to mobile mediated interaction; specifically their informal use on and around a university campus.

The research question guiding this study is "how do novel smart mobile devices shape college students' mediated social interaction practices?" The aim of this expoloratory study is to reveal the practices of mediated social interaction that are facilitated by smart mobiles, through users' perspectives and experiences. Surprisingly, we found that despite the common premise that smart mobile devices create a continuous collaborative culture in which students are constantly using mobile-social networking and communication applications, this interaction is more limited than previously believed. In the following sections, we describe how the mobile mediated interaction practices of students are governed by several factors creating an interesting phenomenon – "intermittent participation" - a passive online presence which allows users to remain in the background of ongoing mediated interaction, and stay attuned to incoming updates and exchanges, without actually participating in them unless absolutely necessary.

The remainder of the paper is organized as follows: the next section details previous work and introduces the theoretical framework upon which this study is based; we then discuss the methodology used and the study's findings, and conclude by discussing the implications of the findings and suggesting future research and potential implications for design.

2   PREVIOUS WORK

Mobile communications "affect every aspect of our personal and professional lives either directly or indirectly" (Katz & Aakhus, 2002). The new generation of smart mobile devices which enable continuous internet connection, were enthusiastically received, and were lately reported as holding 13.5% of the global mobile market, with Apple's iPhone growing to a 10.8% market share (Milanesi, et al., 2009). Social applications were among the first developed for smart mobile devices , and especially for the iPhone interface. The role of mobile devices in facilitating new forms of social interaction is widely recognized in popular and academic literature. Previous work addressed the relationship between mobile technology and the social context affecting its acceptance and use (Ito, Okabe & Matsuda, 2005 ; Ito & Okabe, 2005; Ling & Yittri, 2002; Oksman & Turtiainen, 2004), as well as the ways spatial and temporal barriers are diffused and new patterns of social engagement, based on personal affiliation, are integrated into users' lives (Horrigan, 2009; Katz & Aakhus, 2002; Ling, 2004). Whereas once online social networking took place in a stationary computer-mediated

environment, these days it can be done anywhere, anytime, on the move. Constant connectivity to social media, which is enhanced when smart mobiles are used, also contributes to a sense of constant "presence" with others and continuous mutual awareness.

Young users received special attention in research (Ito & Okabe, 2005; Campbell & Russo, 2003; Gant & Kiesler, 2002; Oksman & Turtiainen, 2004; Thulin & Vilhelmson, 2009). Called "the multimedia generation" (Oksman & Turtiainen, 2004), or "digital natives" (Palfrey & Gasser, 2008), these users were born after 1980, grew up with digital technology and are naturally able to use it in diverse and innovative ways for information seeking and communication. A substantial segment of these users' social lives is mediated by technology. For them, a computer is an essential tool, augmented by various mobile devices: mobile phones, media players and gaming consoles. Their lives have been constantly connected by technology, long before smart mobile devices were commonly available. However, their adoption of smart devices introduced new opportunities and challenges to their existing mediated interaction experiences. Castells et al. (2007) posited that "*there is a youth culture that finds in mobile communication an adequate form of expression and reinforcement. Young people in their teens, twenties and early thirties not only constitute the largest proportion of users, they were also the early adopters, who invented uses that had not been foreseen by the initial designers of the technology*" (p.128-129).

To a large extent, existing studies of young users' adoption of mobile devices addressed the pioneers among young users: the early adopters who used simple mobiles to devise complex mobile communication and coordination schemes. Use of smart mobile devices has been studied to a lesser extent, perhaps because of their novelty, or their price which positioned them outside the reach of relatively young users. The effect of smart mobile devices on users' mediated practices has yet to be described. This study commences from the premise that technology and society are inseparable, their relationship is complex, and often continuously negotiated (Katz, 2003). Following Haddon's claim that "how we experience [mobile connection] is not totally predetermined by technological functionality or public representations but is also structured by social life" (Haddon, 2001), we explore the affect smart mobile devices have on shaping students' mediated interaction patterns, and address the gap which exists in current literature in regards to the ways in which smart mobile devices and mobile-social applications enable new interaction patterns, as well as the ways their use is shaped by social forces.

3   METHODOLOGY

This study is explorative look into the effect of perpetual connectivity, as facilitated by smart mobile devices, on users' mediated interaction patterns. Such exploration is best served by triangulating qualitative inquiry techniques which allow the researcher to "*interpret phenomena in terms of the meanings people bring to them*" (Denzin & Lincoln, 2008), and quantitative techniques which provide an additional frame of reference. In this study, triangulation of methods was done by using focus groups and personal interviews, which were later analyzed based on Grounded Theory principals (Corbin & Strauss 2007); they were augmented by cooperative inquiry (Druin, 1999; Holtzblatt & Jones, 1993) artifacts and quantitative questionnaires. While in several cases the various methods elicited similar responses from the participants, in others the different methods offered diverse perspectives.

3.1. Participants and recruitment

In fall 2008, The University of Maryland introduced a "Mobility Initiative" in which 147 incoming honors undergraduate students received iPhone mobile devices, to be used on and off campus. The pilot program aimed to enhance the academic experience of students, by creating ubiquitous internet access through the mobile network. Of the 147 original recipients of smart devices, about 90 were active participants in the mobility initiative. Another group was that of 33 students, who recieved

iPhones as part of their communications class. The two groups comprised the overall population for this study.

Theoretical sampling (Corbin & Strauss 2007) was implemented rather than systematic sampling, as this was an exploratory study, focusing on users' experiences and views. Thus, participants were not randomly selected, but rather purposefully because of the richness of data they may convey (Cutcliffe, 2000). Recruitment for the study was done through a personal and email invitation to all possible participants, followed by direct emails encouraging notably active users to take part in the study.

12 students of the first group (about 13% of the active participants in the mobility initiative; mean age 18.7, $SD = .5$), and 21 students of the second group (about 64% of students in that class; mean age = 20.1, $SD=1.1$) participated in the study. Female to male ratio was 3:2. All students were familiar with the use of mobile devices in general and smart mobiles in particular. They were computer savvy (100% computer ownership). They were also relatively experienced users of social applications: all had at least one social network profile, and the large majority (78%) had more than one profile. All participants' names have been changed, to protect their privacy.

3.2. Data collection

3.2.1. Focus groups

Focus groups were used to elicit and validate collective testimonials, and produce particular experiences, practices and insights (Morgan, 1997). In this study, 5 focus groups were conducted, with 3-6 participants (both male and female) in each. Their length was 60-90 minutes. The focus groups were comprised of a series of open ended questions, which allowed the discussion to flow independently, with little guidance from the moderator. In order to gain deeper understanding of the data that came from the focus groups selected participants were chosen to be contacted for follow-up interviews, based on the richness of the data they conveyed during the focus groups. The focus groups and interviews were audio and video recorded, transcribed, and supplemented by notes that were taken during the meetings.

3.2.2. Cooperative inquiry

During the focus groups, participants also engaged in Cooperative Inquiry, a unique form of creating Contextual Inquiry (Beyer & Holtzblatt, 1999), used for critiquing existing technology. Cooperative Inquiry involves users as design partners, and aims at improving design through users' reflection upon the current technology they use, their likes and dislikes, as well as suggested improvements to the technology (Druin, 2005; Druin, Bederson, Massey, Rose & Weeks, In Press). With the aid of the participants, an informal frequency analysis, in which similar ideas were grouped together, was used to uncover personal preferences and design-related needs, which might not have been discussed in the focus groups**.**

3.2.3. Personal questionnaires

Both groups received the same questionnaire, in which demographics and data about their interaction habits (e.g. perceived time spent using different communication tools, their reasoning for using these applications the effect hierarchical relationships had on their actions, etc.) were elicited through closed and open ended questions

3.3. Data analysis

Grounded theory (Corbin & Strauss 2007; Cutcliffe, 2000) was used as the major mode of analysis in this study. Grounded theory calls for building successive levels of data analysis and conceptual development through codes and themes that are derived from the data itself (Charmaz, 2005). Transcripts of the focus-groups and interviews, and artifacts derived from the cooperative inquiry were

systematically coded (manually) until conceptual saturation was achieved. Codes were extracted from value-laden transcribed sentences or from the content of the artifacts created in the Cooperative Inquiry. They were then constantly compared to reveal higher-level themes, and then integrated and interpreted to form the theoretical framework for this study. For example, many participants discussed the types of mobile social applications they use; while the applications differed (e.g. social networks, social games, online communities, etc.), and were coded seperately, the primary use participants have made of these applications were similar: maintanance of existing social ties. Thus, use of mobile social applications was collapsed into one code: "Tie Maintanence". Similar processes were applied to all other codes. Segments of the data from the grounded theory analysis (specifically those related to mobile usage frequency and preferences) were supplemented and contrasted with the quantitative data obtained through questionnaires.

4 FINDINGS

The analysis of both qualitative and quantitative data revealed a complex communication behaviour employed by users. This behaviour and its causes are described in this section, corresponding with the high-level themes that were synthesized from the data. The most important finding of this study is a new pattern of interaction, which can be termed "intermittent participation". This interaction pattern, created by the tension between sociability and usability constraints, enabled users to passively absorb information and stay attuned to updates from their interaction partners, while not responding to it unless it was extremely enjoyable or absolutely necessary.

4.1. Communication practices of the perpetually connected

Smart mobiles' users employed a complex communication scheme of device choice (e.g. computers and mobiles), which was based on their ease of use, purpose of the interaction and the communication recipients.
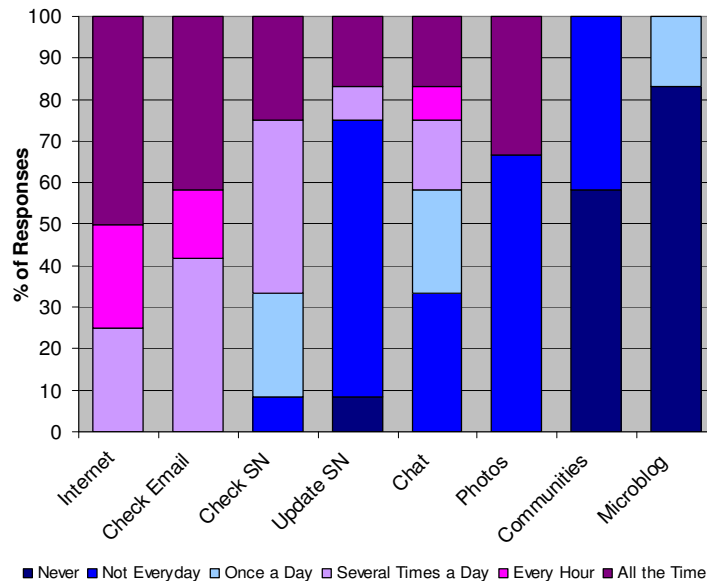

Figure 1.   *Perceived frequency of use of mobile mediated communication channels. Participants reported that updates and checking of email and social networking applications as their most prevalent actions. Microblogging and online communities are seldom accessed from mobile devices.*

According to participants' reports in their questionnaires, mediated communication applications are used extensively and frequently (**Figure 1**), albeit participants tended to segment their overall mediated interaction and did not differentiate between mobile and computer use. Mediated communication is used in conjunction with texting, which outranked other communication options in its popularity, and with face-to-face interaction, which was found to be as popular as social networking. Surprisingly, none of the participants referred to email as their preferred communication channel.

During the cooperative inquiry participants singled perpetual connectivity as a significant motivation to adopt mobile-social practices. In many cases participants reported that the mobile device replaced, at least in part, the use of personal computers. Yet computers still play a substantial role in participants' lives, and in their social interaction practices, especially when they are located at stationary environments (e.g. homes, dorms). Users reported that the average time spent on email or chatting from mobile devices is still less than half the time spent doing the same task from a personal computer; for example, the average time spent daily on chatting from mobile devices was 8 minutes, while 55 minutes were spent on chatting from a desktop; the difference was found to be statistically significant ($p=0.005$, Wilcoxon signed-ranks test).

Because of the perpetual connectivity they offer, smart mobile devices often played a significant role in enabling management of personal resources and routine tasks. As one participant noted: *"my daily life revolves around my iPhone, I just have everything on my iPhone, my music, my email, my calendar, Facebook, reminders. I can write myself notes, just everything on one spot" (Kate, female)*

Users reported discussing and coordinating academic assignments, social events and personal tasks mostly through mediated channels (such as BlackBoard or Facebook). They naturally augmented the abilities conveyed by perpetual mobile connectivity in their daily lives. In many cases participants questioned their ability to manage their lives lacking perpetual connectivity, which made their lives easier. A couple of users claimed that, unlike their friends who do not own smart mobile devices, they would "never be caught off guard", missing out on crucial information due to lack of connectivity.

4.2. Sociability

Preece (2000) defined sociability as built upon "Purpose, People, and Policy" (p. 79). While originally referring to online communities, these constructs resonated in the themes that were derived from the data, and can easily be adapted to mediated mobile communication: (1) *Purpose* is the message content (2) *People* are the communication partners; and (3) *Policy* relates to the etiquette governing their interaction practices. In the case of mobile mediated interaction, these constructs are supplemented by another aspect of sociability: subjective norm. Together, they can be collapsed to represent the new theme of "mobile sociability", which governed the choice of appropriated application for collaboration, the level of engagement, and to a lesser extent – the device choice.

4.2.1. Message content

Many of the participants differentiated their communication medium according to the purpose of their message. While professional or academic matters were limited to email or face to face interaction, other mediated communication channels, specifically social networks and chats, were extensively used for banter and social coordination. The purpose and content of communication not only influenced participants' choice of application, but also their choice between a mobile device or a stationary computer: *"I check my email, if I have to send an email or if it's something I can write quickly, that's more urgent, then I do send it off my mobile. But for any type of professional email, even if it's short, I'll never use my mobile, I'll always wait to get home to my laptop, because I like to look at … all the sentences, and make sure that the formatting is the way that they'll see it too." (Ben, male)*

Most users agreed that email applications and computers were considered preferable platforms for constructing detailed, thoughtful messages, which are perceived by their recipients as articulate, clearly reflecting the writer's writing capabilities and intensions. As such, they were reserved for more

"official" communications, or where the content of the message was significant. Mobile social applications were used where users cared less about the eloquence of the message and more about the interaction itself, as in ongoing social coordination, brief acknowledgment and exchange of pleasantries among acquaintances.

4.2.2. Communication partner

All participants partitioned their use of communication channels according to the identity of their communication partner: preference for a particular channel was the result of the communication partner's identity. While social applications play a substantial part in users' interaction habits, these applications are used mostly within the users' cohort and to a lesser extent with family or in professional communications. Communication with friends was done through a myriad of tools, both off and on line. Chats and social networking were the most prominent mediated channels, but face to face communication was favored, where possible. Family members, on the other hand, were mostly contacted by traditional phone calls, with email used to a lesser extent; social networking or chatting were not often used among family members, and especially when communicating with parents. Communication with professional counterparts, such as professors, was limited to conservative, structured channels, such as email. The communication partner's identity affected not only users' choice of the communication channel but also the platform they used for communication. Most users wanted to be constantly in touch with their friends through their mobile devices; communication with their family and professional counterparts was less frequent and usually done from personal computers.

4.2.3. Etiquette

The choice of communication channel also reflected issues of etiquette and hierarchy: when communicating with users outside their cohort, participants preferred more conservative communication methods, ranging from phone calls to emails, rarely using social media as an interaction tool: *"I would never Facebook a professor, I don't even know if any of my professors have Facebook. Unless they personally say "I'm on Facebook" I'll always email a professor. I don't think I'll even call a professor on the phone. Texting – depending on the professor, probably not, though." (Andrea, female).*
This segmentation of communication channels was attributed to norms or etiquette, resulting in the exclusion of communication channels which are considered inappropriate in hierarchical interactions (such as between a professor and a college student) or when their communication partner is considered older than them, and possibly less technology-savvy.

4.2.4. Subjective norms

Subjective norms (Ajzen & Fishbein, 1973), or peer pressure, determines to a large extent which social applications will be preferred and utilized. This is strongly related to one of the interesting findings of this study - the limited use participants made of varied social applications, mobile or stationary. Almost all their mediated social interaction was done on Facebook, which was deemed "The" place to get news of their friends or updates of social happenings. In a mobile environment Facebook was also utilized as a coordination mechanism, in a manner similar to the hyper-coordination phenomenon detailed by Ling (2002); meetings and events are created by micro-coordinating on the go, through Facebook's "wall". Facebook's dominance was apparent in its position among other social networks. Social networks that participants previously used were deemed irrelevant or outdated, while applications such as Twitter and Flickr, which are better geared towards mobile engagement, were perceived as befitting older users.

Participants were unanimous: the main reason for Facebook's dominance is social. They wished to be included in their peers' social spaces and be noticed by others. Thus, as Facebook reached an iconic

status among their cohort, users did not venture to other, less popular or known social applications, but remained entrenched in Facebook. Curiosity, experimentation or diversion were not found to be reasons enough for engagement with social applications. Peer influence was the imperative reason for participants' social media adoption. Albeit most users perceived subjective norms as a positive motivation towards social media adoption, several participants elucidated the conforming pressures which led them to use specific social applications, so that even users who are hesitant or opposed to using a social application feel complled to join the crowds: *"I feel that when technologies like this arise, it sort of unhinges upon my privacy; not because I have to use it, but because there is now a social pressure or expectation, like "why aren't you using it?". And the answer is – I don't like it. But it's problematic" (Dave, male).*

In summary, sociability can be seen as having two distinct influences: the first one affecting their preferred communication channel (or application) choice under specific circumstances, and the other affecting the level of their actual participation practices in mediated social interaction, which is influenced by users' need to align their online behavior with their communication partners and peers.

4.3. Usability

The other factor effecting mobile mediated interaction patterns is usability. Usability is, essentialy, ensuring that interactive products are easy to learn, effective to use and enjoyable from the user's perspective (Preece, 2000; Shneiderman, 2009). Mobile usability - the ability to access various applications on the go, or the perpetual connection that enabled access to online resources in an efficient manner - was cited by participants, across all data, as the main reason for adoption of mobile devices for various communication practices.

Several participants mentioned time efficiency when using mobile-social applications on the move as the main motivation to use mobile connectivity extensively. Another aspect of convenience was the ease of access to a wide array of popular interaction-facilitating applications that offer one-button access, and do not entail long login process. However, usability was hindered by design constraints and functionality problems.

Most users found the usability of mobile-social applications lacking. Although some applications offer mobile versions, these versions do not completely mirror their computerized analogues. Users found it hard to adjust to the mobile version's limitations and different design; frustration arose when navigation was problematic, and layout confusing. Malfunctioning buttons or tabs caused users to abandon mobile applications in favor of their stationary versions. Limited mobile options curbed what interaction intentions users had.

Other design issues relate to the functionality of the mobile devices. Issues of size and structure were raised by participants as detriments for the use of mobile devices for social interaction. Forms of social interaction that are widely embraced in other mediated environments failed to migrate to the mobile one because of design constraints. In most cases, usability and functionality prevented users from fully using the attributes of smart-mobiles. For example, online communities suffered from the small screen size, on which long threaded conversations were poorly displayed:*"(online community participation) is not something I would do on my mobile. Mostly because… it's set up as a long list of threads and if I hold it (the screen) horizontally you can't really see many of the threads, but holding it vertically you can't really read what they are. I guess screen size is an issue there" (Dave, male)*

Participants were unanimous in their resentment of the virtual keyboard, and had difficulties adjusting to it. Keyboard design was the most often cited reason for their refusal to engage in mobile-social interaction that entailed extensive typing. Chatting, writing comments, posts or email messages were all postponed until a computer keyboard was available to them.

4.4. Intermittent participation

The functionality constraints of smart mobile devices, and the lacking usability of mobile applications contributed to a new pattern of mediated mobile engagement – "*intermittent participation*". In order to maximize the affordances of mobile connectivity for mediated interaction, while circumventing usability obstacles, the majority of participants maintained constant background connection to passively retrieve notifications, updates and social exchanges, but refrained from actively participating in these exchanges. While users constantly and actively sought new information by refreshing their social network profiles and email inboxes, and read every bit of information that came their way, this information was filed as "important" or "unimportant", yet rarely replied to while on the move. *"I can check it (Facebook) on my mobile too, but I don't reply to anyone on this; I don't send out any information. I check my email, my Gmail, if I have to send an email or if it's something I can write quickly, that is more urgent, then I do send it off my mobile…. But if I have my laptop I would probably take out my laptop and use it" (Ben, male);*
 "I check my emails a lot. I noticed that I don't really send out as many emails as I receive. When I get on Facebook I don't really do anything. I kind of think "I'll get a look at this later"" (Audrey, female);
"If I have messages or check into chat, I'm not going to reply to all of them. I just like to check and know that, yes, I have to reply to these messages" (Samantha, female).
This new engagement pattern, a passive behavior somewhat similar to lurking (Nonnecke & Preece, 2001), allows users to be "in the know", and avail themselves to others as they see fit, while minimizing the frustration arising from usability problems. Users reported that they rarely replied to the messages they read. Though very uncommon, replies were sent when the message was urgent, important (especially when it was sent by someone hierarchically superior) or if it was very entertaining.
Although perpetual connectivity allows users to be hyper-responsive, the limitations posed by the current mobile design prevent them from actually doing so, and impede complete adoption of all the social and practical affordances mobile-social connectedness offers. As a result, the actual scale of their interaction is less than previously assumed.

5   DISCUSSION AND FUTURE DIRECTIONS

This study addressed the practices of a relatively young, technology-savvy group of users who are "digital natives"; living constantly connected lives, both online and offline. They use their mobile devices extensively to implement a complex scheme of communication and coordination channels for various audiences: social and professional alike. However, contrary to what could be expected from such savvy users, their mobile mediated interaction was not extensive, and consisted mostly of passive reception and rare response.

Smart mobile devices may serve multiple purposes in students' lives - from a merely functional communication tool to a miniscule computer providing constant access to information and online interaction. However, contrary to expectations, the role of smart mobile devices in participants' mediated interaction is limited and determined by two somewhat contradicting powers: sociability and usability. As smart mobile devices became a hub of complex interaction channels sociability determined, to a large extent, how users manipulated these channels to address various communication partners (e.g. family, friends, and professors), types of content, and the way users adhere to etiquette norms. Another aspect of sociability - subjective norms - affected the variety of social applications participants used. Most notably, sociability affected users' application choice. Subjective norms are often cited as a factor affecting technology adoption (Bijker, Hughes, & Pinch, 1987; Mahler & Rogers, 1999; Markus, 1987), and as Katz and Aakhus (2002) posited, users of personal communication technologies "*operate within a networked environment. That is, behavior relative to the system is affected by who else is available currently and potentially*" (p. 310). The sense of social image and the belief that "everyone is doing it" may be extremely important to young adult users who rely on their peers' cues to discern which behavior is considered "cool" and socially acceptable, and

which is not. Thus, if users want to belong to a certain social circle they must adhere to its interaction norms and common tools, making sociability a crucial component in their mediated behavious.

While sociability dictated, to a large extent, which mobile applications users will utilize, constantly pulling users towards and away from their mobiles. Usability determined the actual use of smart mobile devices for interaction and collaboration. Technological systems' characteristics were previously found to indirectly affect users' intentions or behavior, leading them to adopt or reject certain technological tools (Davis, 1989; Davis, Bagozzi & Warshaw, 1989). In the case of smart mobile devices the perceived usability is obvious as they allow perpetual connectivity and facilitate potential interaction on the move. However, users found smart mobile devices' actual usability and functionality lacking, especially when continuous and carefully articulated communication is required, pushing users away from their mobile devices. The intersection of sociability needs and usability problems created a tension that impeded the use of smart mobile devices as interaction facilitating tools. The outcome of this tension is the phenomenon of "intermittent participation", which has yet to be fully discussed in research literature.

Intermittent participation is based on the perpetual connectivity of smart-mobiles, allowing users to be constantly attuned-to and aware-of notifications and exchanges around them. In some cases, users actively seek this awareness by constantly looking for updates or refreshing the appropriate applications. This awareness, though, is not translated into positive synchronous actions, as users avoid the inconvenience associated with usability obstacles by not responding to the messages they receive, unless absolutely necessary or very entertaining.

Previous research by Whittaker et al. (1998) found that communication overload created a similar pattern of filtered reciprocity: short messages promoted interactivity and reciprocation more than long ones. In analogy, users employing intermittent participation are attuned to social occurrences through mobile-social applications, monitor messages and updates from the background, but do not respond to them without a substantial incentive. When messages are brief, alluring or require response, they will address them using mobile-social applications. If the messages do not fit these criteria, they will be filtered, temporarily ignored, and answered at a later time, or – if a user is forgetful – will be altogether ignored. Sociability factors, such as the identity of the sender (especially within hierarchical relations) and etiquette also determine, to a large extent, which messages are answer-worthy. This behavioral pattern allows users to benefit from both worlds: the sense of inclusion, companionship and "being in the know" created by perpetual connectivity on the one hand, and avoiding the cumbersome usability limitations posed by smart mobile devices, on the other hand. This is not surprising, considering the extensive amount of constantly ongoing communication which the users have to absorb and filter, and the limited usability of their devices. Thus, the social expectation that smart-mobile users will utilize the perpetual connectivity to create a constant online presence did not cause users to act accordingly. Users calibrated their level of mediated interaction mostly in accord with social factors, as can be deemed from the fact that intermittent participation was prevalent not only within their cohort, but also in hierarchical and professional relationships.

Intermittent participation may have substantial effects on the way users engage in mediated communication for social and professional purposes. Mediated mobile interaction, which could have benefited from the perpetual connectivity mobile devices offer, has essentialy become an a-synchronous belated response pattern, creating a limited continuous exchange, contrary to the perpetual connectivity that is associated with mobile devices. However, while the two forces creating intermittent participation may seem negating, we conclude that essentially the outcome of the tension between them is positive: creating a background awareness of others while circumventing usability constraints allows users to calibrate their participation to the most desired and useful level.

The confluence of sociability and usability issues resulting in intermittent participation, has not been fully tapped into within HCI research. This paper is a first step in addressing the concept of intermittent participation; its effect on mediated interactions and collaborations should not be disregarded when considering design and use of such devices. Future research into the factors

affecting these practices, their prevalence among different population strata and across cultures, as well as the implications intermittent participation presents for other forms of mobile and non-mobile social interaction practices, is needed, to enable better use of the affordances smart mobile devices, and specifically mobile-social applications, offer user communities.

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