HUMAN TECHNOLOGY

An Interdisciplinary Journal on Humans in ICT Environments

Contents

Editor's Introduction:

THE CHALLENGES AND OPPORTUNITIES
OF HUMAN TECHNOLOGY

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Technology is for human use. It is designed to satisfy some human needs and to aid people in reaching their goals. Technology, therefore, is a part of human activities and, for this reason alone, it should always be considered within the context of human life, the human experience. This basic credo forms the foundation for the concept of *human technology*. Instead of seeing technology as a construction following the laws of nature, the challenge of human technology is to explore and understand how humanist and social research can contribute to the conceptualization and implementation of technology.

Early in the 20th century, technical constructions were relatively simple from the human point of view. The use of those technologies normally did not require much skill or practice. Of course there were exceptions. Nevertheless, the development of technology gradually made interaction with hardware of all kinds and, more recently, software more complicated. For example, airplanes are more difficult to use than horse carriages or cars. Industrial environments also became increasingly more complex and therefore it has become imperative today to pay more attention to the human role in the interaction. Concepts such as ergonomy, usability, human-computer interaction, and other human factors have become part of technological thinking (Nielsen, 1993; Rasmussen, 1986; Wickens & Holands, 2000).

Nevertheless, the relatively recent emergence of new information and communication technologies has made the understanding of the human mind in technology even more focal. Today, people buy and use technologies that are increasingly more complicated than anything before. Complex information technologies are commonly used by ordinary consumers. Personal computers and mobile devices offer an increasing number of possibilities. New types of services are offered daily and new types of computational devices are continually being developed. All of this, and more, underscores the essential need to study the human perspective as a fundamental part of technical thinking today and in future (see Carroll, 2004; Norman, 1993, 2004; Shneiderman, 1998).

For decades it has been sufficient to intuitively imagine human interaction with new devices. Today, however, it is necessary to admit that mere intuitions do not give us a sufficiently deep enough understanding of the human mind and social roles to enable us to design really good technical products for people. Scientists working with the human mind and society have naturally known for a long time that simple intuitions and lay science do not provide technologists with an accurate understanding of people. This is why psychology, sociology, anthropology, and other human sciences have developed sophisticated observations, concepts, and theories that make it easier for specialists to understand better human beings.

Therefore, the goal of human technology is to incorporate scientific knowledge about people—their mental, physical, emotional, and social capabilities, actions, desires, needs, and understandings—into ongoing technological discourse. Instead of intuitions, we need serious scientific analysis of human role in and interaction with technology. This online journal, *Human Technology: An Interdisciplinary Journal on Humans in ICT Environments,* has been established to offer an open forum for all of us scientists who wish to improve our understanding of these complex and multifaceted issues.

Human technology is a multidisciplinary field. There is no single theory, language, or empirical and theoretical approach that could be applied to all of the problems, challenges, or opportunities typical for human technology. Therefore, a multidisciplinary and interdisciplinary analysis of these issues is imperative. The nature of the questions determines the best means of exploring and analyzing the human role in technology.

In this first issue, we have contributions from the fields of psychology, cognitive science, anthropology, sociology, and communication. Each has a distinct way of seeing some of the various issues in human technology but, as a whole, the papers serve well the goals of this journal.

In her paper, Dorothy Salonius-Pasternak reviews recent literature on children's electronic game playing. Video and computer games have become a vast industry during the past two decades. Game playing is common a pastime for children (as well as adults) and therefore it is vital to investigate the effects of game playing on children. Understanding the human role, in this case of the young, in electronic play does not mean concentrating only on negative aspect of playing but, as the author discusses, it is necessary to look for the positive dimensions of this new pastime as well. Understanding the play phenomenon from multiple perspectives provides rich data needed to make reasonable policies for coping with the phenomenon.

Raul Pertierra's paper concentrates on the changes mobile phones have made on human communication and interaction in the Philippines. He illustrates the growing role of technology, in particular mobile phones, on users' social and individual identities and means of interacting. He presents several cases and interviews that allow us to see how communication, from politics to private life, may change within the new ICT-culture. Indeed, it seems that people can change their communicative lives with new devices and this leads as well to important socio-cultural changes.

Jim McGuigan discusses the possibilities that sociological concepts can give us to investigate human interaction with new technologies. His focus is understandably on social change. We know that the mobile phone, like any major technology, will impact society. However, from a scientific point of view, it is very important to find rational methodological approaches to effectively conduct user-sociological research. McGuigan investigates the

strengths and weaknesses of some major contemporary methodological approaches and demonstrates their scope and limits in investigating social change initiated by mobile phones.

Antti Oulasvirta and Sacha Helfenstein take the discussion of humans and technology onto a new path. Their focus is on innovative design. New technology does not emerge from nothing, but rather it embodies a huge design challenge. From the human technology point of view, it is important to find effective ways to implement the knowledge we have about the human mind within the design culture so that this knowledge can effectively influence the subsequent products. Oulasvirta develops several ideas about effective design procedures. His paper explores how to organize interaction design at the initial stages of product conceptualization so that knowledge about people can be incorporated appropriately into the thought behind new design ideas. Helfenstein makes a concrete point in this direction. He is interested in the emotions we associate with products we buy and use. He demonstrates both how to measure the emotional ascriptions we make toward products and how our previous experiences may affect the way we later emotionally assess the brands and producers.

Finally, Pertti Hurme focuses on the role of technologies on the communication process. He discusses the expanding roles of new communication tools and means in work life. Most of us are familiar with basic communication processes and with the growing scope of knowledge-based organization and knowledge management. However, new technologies apparently make it necessary to rethink how these two phenomena intertwine through the use of contemporary communication technologies. As a result, the context of work is becoming more mobile, and thanks to the new mobility, the concept of work may be changing.

The papers in this inaugural issue of *Human Technology* demonstrate that a wide variety of questions and an equally wide variety of solutions to be investigated exist in the field of human technology research. Becoming familiar with these questions and potential solutions demands exploration irrespective of the field of research. Organizationally the field of human technology research is somewhat chaotic. New lines of development may emerge any day, or to be more accurate they emerge daily. People—in science and academia, in business and industry, and in government—interested in technology and how humans affect and are affected by technology need to know what is happening in neighboring, and perhaps totally unrelated, research disciplines. Although one single unified conception of human role in modern technology, is not possible—or even desired—*Human Technology* provides one platform that seeks a dynamic unity by discourse.

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THE NEXT LEVEL OF RESEARCH ON ELECTRONIC PLAY: POTENTIAL BENEFITS AND CONTEXTUAL INFLUENCES FOR CHILDREN AND ADOLESCENTS

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Abstract: *Most research on electronic play has focused on its possible negative effects for children and adolescents, and contextual factors such as socioeconomic status (SES) and culture are rarely considered. This article considers the potential benefits of electronic play from a psychological perspective, as well as individual and contextual factors that may shape the influence of electronic play for children and adolescents. Demographics of players and the games themselves are presented, and recommendations for research and policy are discussed.*

Keywords: *child development, context, culture, electronic play, video games.*

INTRODUCTION

Electronic games are a relatively new form of media—but they have already established themselves as an everyday phenomenon for the children who play them extensively around the world. Computer and video games have received increasing attention over the past few decades, from players and professionals alike. The first computer and video games were invented in the 1960s and 1970s, respectively, and their growing prevalence, first in arcades and then in homes throughout the industrialized world, began in the late 1970s (Kent, 2001). The first game that was considered to be controversial, *Death Race*, was published as an arcade game by Exidy in 1976 (Gonzalez, 2004). Computer and video games, and their possible effects on players, have been studied in many fields of scientific literature, with areas of focus including whether games with violent content increase aggression or violence (Anderson & Ford, 1986; Cooper & Mackie, 1986; Funk et al., 2002; Gentile, Lynch, Linder, & Walsh, 2004; Sherry, 2001); whether these games lead to desensitization (Funk, Baldacci, Pasold, & Baumgardner, 2004), real aggression, or violence; the physiological responses to playing computer and video games (van Reekum et al., 2004); addiction (Phillips, Rolls, Rouse, & Griffiths, 1995; Salguero & Moran, 2002); and the use and efficacy of computer and video game ratings (Haninger & Thompson, 2004).

So far, most of the research on computer and video games has focused on possible negative influences and the evaluation of policy designed to minimize risk to children and adolescents. While computer and video games have been a source of concern, they also have the potential to have positive influences on development. In addition to their recently proven effects on improving aspects of visual attention and perceptual-motor skills (Green & Bavelier, 2003), some researchers have begun to explore the possible influences of computer and video games on cognitive skills and development and the possible therapeutic or prosocial effects of computer and video games (Anderson & Bushman, 2001; Chambers & Ascione, 1987; Griffiths, 2003, 2004; Wiegman & van Schie, 1998). In addition, the importance of studying computer and video games as a form of play (Cassell & Jenkins, 1998; Gelfond & Salonius-Pasternak, in press; Goldstein, 2000; Penny Arcade, 2002; Scarlett, Naudeau, Ponte, & Salonius-Pasternak, 2004) and as educational tools (Din & Calao, 2001; Fontana & Beckerman, 2004; Kafai, 1995; Kankaanranta & Nousiainen, 2004; Merchant, 2004; Yelland & Lloyd, 2001) has been raised.

Electronic play is the first qualitatively different form of play that has been introduced in at least several hundred years, and because of its differences, it merits an especially careful examination of its role in the lives of children and adolescents. With most forms of play media, the essence of the game exists in the interactions between the players and the physical media—blocks, sticks, dolls, pinecones, paints, and so forth. Unlike most forms of play media, the essence of electronic play exists in the interactions between the players and the distinctly non-tangible potential for a wide range of experiences, in which the physical properties of hardware and software are less the essence of the game and more simply a means of accessing it.

Whether we are considering the potential benefits or the possible associated risks of electronic play, we must keep in mind that we are studying a complex phenomenon. This complexity is evidenced by the inconclusive and inconsistent nature of many of the studies that have been conducted so far, as well as by the debates and differing perspectives that exist in this growing field of research. In order to continue our inquiry and expand our understanding, it is important to consider both individual and contextual factors that may play a role in shaping the influences of electronic play on children and adolescents. Almost no computer or video game research to date has considered contextual factors such as socioeconomic status or culture.

This article will focus on the possible psychological benefits of electronic play for children and adolescents, as well as individual and contextual factors that may mediate both possible benefits and risks associated with this type of play. The demographics of players and the games themselves are presented, followed by a review of research and theories related to the possible benefits of electronic play. Possible mediating influences of the individual characteristics of contraindication and gender, as well as contextual factors of socioeconomic status and culture, are discussed. Based on this discussion, future directions for research and policy are proposed.

DEMOGRAPHICS OF PLAYERS AND GAMES

The prevalence and popularity of electronic play provide further reasons for in-depth study. While it is difficult to give exact figures, most studies indicate that the majority of American

school-aged children are playing electronic games—on home computers, console game systems (e.g., Nintendo, PlayStation, X-Box), or both (Annenberg Public Policy Center, 2000; Kaiser Family Foundation, 2002; Walsh, Gentile, Van Overbeke, & Chasco, 2002). This is true for European and Japanese children as well (Beentjes, Koolstra, Marseille, & van der Voort, 2001). A recent study of Finnish children, ages 8- to 10-years-old, showed that their most common use of computers and mobile phones is playing games (Suoranta & Lehtimäki, 2004). In these industrialized countries, the older a child gets, the more likely the child is to play computer and console games and to play them for longer periods of time. By adolescence, the most common pattern is playing electronic games for half an hour to an hour daily (Kaiser Family Foundation, 2002; Phillips et al., 1995).

Boys outnumber girls in terms of who is playing computer and console games. This is true throughout the industrialized world. However, the reasons for and implications of this gap are not yet well understood. It may be simply that more games are designed especially for boys (Cassell & Jenkins, 1998).

Currently, the most popular types of electronic play are console and hand-held games. Console games are played through a special game console used with a television, for instance, X-box, PlayStation, and the Nintendo Game Cube. Hand-held games are played on Game-Boys, personal digital assistants (PDAs), and mobile phones. However, this division becomes less distinct as the technology supporting each type merges, and as the same games are frequently produced for each type of technology.

As for the games themselves, there are several category systems for describing different types of games. No one system has emerged to provide a common language. The following categories are used by game designers, and they incorporate the language often used by the players themselves: Real Time Strategy (RTS), First-Person Shooters (FPS), Empire Builders, Simultations, Role Playing Games (RGP), Massively Multiplayer Role Playing Games (MMRPG), Sports, and Puzzles (see Scarlett et al., 2004).

Computer and console games played in a stationary setting are what we traditionally think of when we consider electronic play, but electronic play has become increasingly portable—especially with the advent of Nintendo's Game Boy, and, more recently, with the inclusion of games that can be played on mobile phones and PDAs. The Nokia N-Gage, a combination mobile phone, FM radio, MP3 player, and game deck with high-resolution graphics, increases the potential even further for mobile game play.

Graphics and realism are two elements of computer and video games that make them attractive to players. Sports games not only provide opportunities to play soccer, basketball, or any other sport a player can imagine, they also provide realistic representations of well-known sports arenas, real-life "color" commentators (e.g., American football commentator John Madden plays himself in *John Madden Football*), and all the little gestures that help define a player as being linked to a particular sport (soccer players throwing up their hands when receiving a yellow card, tired-looking basketball players leaning over and gripping the bottoms of their shorts, etc.). This level of detail exists in other types of games as well. Simulation games and RPGs draw children into fantastic worlds that momentarily feel quite real, and they turn children into bona fide city planners, wizards battling evil empires, and a host of other roles that children are eager to try on.

It is important to remember that the concept of realism does not refer to the degree to which a game accurately represents real life—in fact, many games that include realism are quite fantastic in their content. Realism describes how real the game feels to its players, how

vivid the depicted world seems to be. One aspect of technology to power realism (and interaction as well) in games is "real-time 3-D," which allows images to be created instantaneously as players progress through a game, unlike the "pre-rendered" images of earlier technology, whose limited range of possibilities rarely allow players to forget even for a moment that it's only an illusion. The enhanced graphics and freedom of movement of real-time 3-D can promote physiological responses, such as motion sickness or even vertigo, to perceptions of realistic movement (Keegan, 1999).

Another aspect of games' realism is enabled by haptics technology, through which players can experience some of the force and vibration that matches the depicted play. The development of this kind of force feedback, which translates information from the game system into commands for motors or vibrators in the game controllers, draws on neurological research in order to convey, as closely as possible, the sensations that players would experience if the depicted play occurred in real life. Currently, haptics technology is not as advanced as other aspects of game technology, but it may reach that level in the future (Kushner, 2003).

In addition to graphics and realism, another attractive feature of computer and video games is their having levels or graded challenges. The goals of the sports game *Grand Turismo*, in which players immerse themselves in the world of auto racing, include passing several driving tests by racing around a track in a certain amount of time, participating in races to earn money, and handling the business aspects such as buying new cars and improving existing cars. At first, players begin the game at a basic level, without a lot of strategy involved. Players pick their cars based on subjective judgments of how fast they might go, using trial and error to figure out how to make the car move. To succeed at the highest level, players must use complex strategies and think abstractly in order to systematically evaluate different options and to carefully plan their approach to the game. At this level, players must figure out subtleties such as the best timing and speed of braking for particular track conditions so that their cars get around curves quickly and without crashing.

The increasing potential for interactivity is another reason why players are drawn to computer and video games. Most console game systems provide ways for more than one person to play at the same time, and the Internet encourages much more for computer games as well. Although the first online game was created in 1969, it was not until the early 1990s and widespread use of the Internet that online gaming became popular (Mulligan, 1999). As broadband Internet connections become increasingly common, the potential of online gaming grows as well, as higher bandwidth facilitates greater online complexity and sophistication in games (PS3Land.com, 2004). Right now, children on different continents who have never met can simultaneously play computer and console games together through several different types of games. Players often find that the game experience is richer when playing with or against people rather than the computer (PS3Land.com, 2004). In addition, the Internet also has created the virtually unlimited potential for players to trade tips and strategies, access demo versions of new games, and form friendships based on their shared interest.

POTENTIAL PSYCHOLOGICAL BENEFITS OF ELECTRONIC PLAY

Researchers have documented numerous contributions of play to areas of children's socioemotional, cognitive, and physical development, including emotion regulation, peer and

familial relationships, attention, problem-solving, creativity, fine and gross motor skills, and overall physical health (Scarlett et al., 2004). Sutton-Smith (1995) calls this the "rhetoric of progress," that play contributes to children's development through at least short-term, if not long-term, benefits.

However, Sutton-Smith (1995) notes an increasing amount of control and supervision of children's free play, in the forms of more structured activities, moving play inside, and replacing play and recess in school curricula with an emphasis on more academic goals. These changes may be an impediment to the essential functions that freer, less structured play serves in supporting children's emotional, social, cognitive, and linguistic development. Electronic play may have the potential to restore some of the critical elements of children's play that have been compromised due to the increased supervision and control of children's free time and imaginations (Gelfond & Salonius-Pasternak, in press).

Computer and video games offer unique opportunities for a child to play with rules within a make-believe setting. In the video game *Tony Hawk's Pro Skater 4,* for example, the child, by identifying with the main character, is able to transcend the rules of physical reality by leaping higher and turning faster on a skateboard than she ever could in reality. Not only does the child playing this game transcend the ordinary rules of physics, she also experiences a sense of mastery—if only symbolically—over the physical world and her body in it. In other games*,* the children can play with breaking other types of rules—societal laws. This is likely to appeal to an older child who appreciates that laws govern society and who is just beginning to negotiate the expectations of adult society to follow such rules.

While the world of computer and video games allows a child to break the rules of ordinary daily life, he or she must still *follow* the rules of the game. Thus, there are limits and boundaries to this kind of play. It is not that there are no rules. It is simply that the nature and boundaries of these rules are rearranged. This rearrangement of reality can be adaptive in a child's development (Leslie, 1987; D. G. Singer, 1985; Singer & Singer, 1990). In other words, not only is it pleasurable for children to have a chance to break rules that are continually imposed on them, but make-believe play—including breaking the rules of the ordinary world in this make-believe setting—serves the important function of helping children to understand *more* about reality and thus the laws that make it up (Leslie, 1987; Singer & Singer, 1990). That is, make-believe play, which allows a child to compare varied possibilities of the natural and social world, helps children to *clarify* reality while they are experimenting with altering it.

As discussed previously, Sutton-Smith (1995) believes that the over-structuring and organizing of children's time, while there are certain benefits, can have deleterious effects upon children's play, including taking away important time spent with one's own imagination—what Jung (1937) calls "dream space," or what Winnicot (1977) refers to as an "intermediate space," where children can create a dialogue with themselves. The advent of particular video games, on the other hand, has taken an opposite approach. McNamee (2000) describes the video game world as a "heterotopia" using Foucault's term, where "...the playing of video games by children can be seen as a strategy for contesting spatial boundaries" (p. 484) within the real world. McNamee further argues that as children's leisure is increasingly supervised, "…playing video games may, then, provide those who play them with the adventures that they are no longer allowed to have, in spaces which they do not inhabit in any real sense" (p. 485).

One of the most popular and controversial games of recent times, *Grand Theft Auto III* (*GTA III*), may owe some of its popularity with children (and perhaps adults as well) not to the antisocial behaviors and violence for which it has become known, but rather for its lack of rigid structure and the opportunity for exploration in its form of play. In *GTA III*, released as a *PlayStation* console game at the end of 2001 and also released as a computer game midway through 2002, the main plot of the game involves "…walking around the city mugging, maiming, killing, and car jacking" (Armchair Empire, 2002, ¶4). However, a unique and particularly appealing aspect of the game is its "fully realized and dynamic" free-form design. This design allows players to entirely disregard the main plot lines and instead explore the virtual city complete with a plethora of interactive details, including delivering pizza and driving the injured to the hospital in an ambulance, that make the game one of the most realistic games currently available. Furthermore, unlike many other games, disregarding the violent plot line does not result in play ending through a character's death. Since *GTA III's* release, other games that incorporate these characteristics have been published, including *GTA Vice City*, *True Crime: Streets of LA*, *Driver, Simpsons Hit & Run, Jak II, Tony Hawk Pro Skater 4, Tony Hawk's Underground, Mafia,* and *The Getaway.* The next game in the *Grand Theft Auto* series, *Grand Theft Auto: San Andreas*, was released in October 2004 (Rockstar Games, 2004).

Through the incorporation of their imaginations, children who immerse themselves in electronic play assume the role of spies, wizards, policemen, skateboarders, and a host of other characters. In addition, there are other aspects of certain popular video games, those allowing the player to explore the environment, that support a more free and unstructured space for play where imagination can flourish.

In addition to providing children with opportunities to negotiate society's rules and roles, electronic play may facilitate children's developing their self-regulation of arousal. Adventures within computer and video games allow children to confront danger and the concomitant feelings of fear and anxiety, mastery and defeat, power and powerlessness, all in a world that arouses fear but that is ultimately safe. As with other types of play, it is the very aspect of safety, emerging from the fact that the danger confronted is only pretend or make-believe, that allows the child to self-regulate and calm those feelings of fear and anxiety associated with such danger. Goldstein (1995) explains, "One characteristic of rough-and-tumble play, war play, and other forms of potentially dangerous or frightening entertainment is that they occur within a framework of safety and comfort" (p. 138). Goldstein goes on to suggest that these types of play give children the opportunity to self-regulate their states of arousal, and that their switching between feelings of fear and safety may in fact be an aspect of play that children find enjoyable.

One function of make-believe in play is to facilitate children's making sense of the world around them. According to Scarlett et al. (2004), the fantastic abilities of characters in children's play are actually based on motives and conditions that exist in the real world, for example, dragons being able to fly because of wings or superheroes fighting the bad guys to resolve an injustice. When children incorporate frightening or perverse themes into their imaginary play, for example, aspects of violence or sexuality, these themes sometimes arouse concern in the adults who care for them, fears that these themes in play imply that children will carry them out in the real world. However, J. L. Singer (1995) argues that "...even some of the more outrageous forms of make-believe play may have an adaptive role in clarifying for child players some of the necessary distinctions they must make in confronting the

genuine difficulties of daily living" (p. 196). Thus, in the context of normative development, frightening or perverse themes provide children with opportunities to further distinguish between fantasy and reality, and to make sense of real world rules, and to gain a sense of mastery over difficult issues.

Aggression is one potentially difficult issue that children can make sense out of in the context of electronic play. Electronic games with violent content can be viewed as a form of aggressive play, which is inherently different from actual aggression because of its lack of intent or attempt to injure a living person (Bensley & Van Eenwyk, 2001; Goldstein, 2000). This can be seen as analogous to Pellegrini's (2003) clarifying comparison of rough-and-tumble play (R&T) and aggression in school-age children: While R&T may resemble real fighting, its play tenor clearly differentiates it for its participants.

Pellegrini (2003; Pellegrini & Bartini, 2001) discusses the changing role of R&T for adolescents, who begin to use it as a way to learn about aggression through socialization processes, establishing peer status through dominance but without causing physical harm to participants. It may be that electronic play with aggressive or violent themes may serve a similar purpose for adolescents. From this perspective, rather than promoting aggressive or violent behavior, playing electronic games with violent content may be a healthy way for children and adolescents to safely experiment or grapple with the complicated issues of war, violence, and death, without any real world consequences (Bensley & Van Eenwyk, 2001; Goldstein, 1998). Of course, as with physical aggression, some children and adolescents will deviate from normative uses of electronic play with aggressive or violent themes, or they may extend behavior inappropriately to other non-play contexts. However, this is likely more to do with the interactions between the individual characteristics of the players and the games themselves, so while some children and adolescents will have no difficulty resulting from their electronic play experiences, others may.

Perhaps the more active role that children and adolescents take in electronic play, as opposed to other kinds of media, could enable them to develop a deeper understanding of the depicted violence through the exploration of characters' motivations, moral dilemmas, and consequences of action. This could result in greater reflection about violence than exists in typical television watching, given players' active role in the game. Jenkins, in an interview with the online forum Penny Arcade (2002), points out violence in humankind has been represented in all forms of story-telling media, and we should take advantage of the opportunity to think and learn about the nature of violence in these stories. While they are not yet widespread, increasingly games are being developed that encourage and sometimes require players to consider the meaning and consequences of their actions, violent or otherwise, in order to succeed in the game. These games include *Neverwinter Nights, Morrow Mind, Black & White* (Penny Arcade, 2002)*, Swat 3,* and *Combat Mission* (Osborne, 2001). Jenkins suggests that games like this could help us as a society to understand the nature of aggression and violence (Penny Arcade, 2002).

In their review of the empirical literature of video game violence, Dill and Dill (1998) describe the game *Killer Instinct* as "...a game that pits two macabre characters (or, more to the point, its two young players) against one another in harsh, bloody combat to the death" (p. 408). This presentation implies that the game's "two young players" would not understand that the depicted characters do not exist in reality, outside the game—that they would see themselves, and not just the depicted characters, as engaging in a real "harsh, bloody combat to the death." This is not an implication that should be hastily presented, for it is precisely the

players' understanding of reality versus fantasy in the game that is likely to influence whether they will be more likely to display aggression or violence after playing such a game.

Computer and video games may also be beneficial in the context of therapeutic play and play therapy. Studies have shown that electronic play may also contribute positively in the contexts of physiotherapy; occupational therapy; pain management; facilitating the development of social skills in children and adolescents with learning disabilities, mental retardation, and autism spectrum disorders; reducing impulsivity in children and adolescents with attention-deficit disorders; and improving problem-solving strategies, self-regulation of arousal, cooperative behavior, and self-esteem (Demarest, 2000; Gardner, 1991; Griffiths, 2003, 2004; Spence, 1988). Electronic play may be a particularly effective method to develop relationships and facilitate cooperative activities with adolescents in clinical settings (Griffiths, 2003).

When we consider therapeutic play, we are referring to play that occurs naturally or spontaneously, or that is facilitated by clinicians; in either case, therapeutic play is naturally beneficial or is designed to be beneficial in some way, by following the child's agenda. Play therapy is a more formalized approach that takes advantage of the inherent benefits of play in a clinical setting, with established goals of treatment (Scarlett et al., 2004). Electronic play has the potential to be therapeutic without clinicians' facilitation, in naturally occurring, normative play experiences. The responsibility of supervising play in these cases rests with parents, and, in some cases, teachers. When clinicians use computer or video games in the context of therapeutic play or play therapy, it is crucial to carefully devise a treatment plan that appropriately matches the themes of the games, player interface, duration of play, and other relevant characteristics of the games and the play experience with the child's or adolescent's particular issues, needs, or condition (Griffiths, 2003).

INDIVIDUAL AND CONTEXTUAL FACTORS

It is expected that any benefits or risks associated with electronic play will be influenced by both individual and contextual factors. These include gender, cognitive and socioemotional development, trait aggression, socioeconomic status, and culture. While it is important to consider these factors, acknowledging their presence and studying their association with benefits and risk does not bear any explanatory value. As we continue to further our understanding in this area of study, we must begin to study the processes and mechanisms that underlie these factors, for it is at this deeper level that we can begin to address how positive and negative influences occur.

Gender

Differences exist in how boys and girls play computer and video games. Boys, on average, play video games more frequently and for longer periods of time than do girls. Furthermore, they choose different games and playing strategies than girls choose (Kafai, 1995). The main differences follow gender stereotypes. Boys are more likely to play games that feature action (shooting, running, etc.), individual prowess, and winning through competition. Girls are more likely to play games that feature in-depth social interactions and character development through story telling; these games often feature aspects of fashion or dating. There are also

differences in girls' and boys' game playing that influence how sessions continue and end. Girls, more often than boys, can name characters, describe storylines, and accurately articulate relationships between characters. Girls tend to work together and socialize while playing games, while boys tend to focus on the competitive aspect of electronic play. Girls also tend to prefer games that have more than one way to win. Regarding the ending of game-playing sessions, girls are more likely to simply stop playing when they get bored, whereas boys are more likely to stop playing when they either win or lose the game, or when their depicted character runs out of lives (Cassell & Jenkins, 1998; Swanson, 2001).

It is possible that these variances in how boys and girls play computer and video games may result in differential effects or influences from this play. However, while gender differences in game interest, use, and performance do exist, they are not universal, nor are they consistent. Games such as fantasy and role-play tend to show equal appeal for boys and girls, and gender differences in performance disappear over time (Kafai, 1995).

Cognitive and socioemotional development

Currently, there is a paucity of studies that consider electronic play from a developmental perspective (Kirsh, 2003). It is expected that aspects of cognitive and socioemotional development are likely to shape the possible influences of electronic play. Kirsh (2003) highlights aspects of adolescent development, including psychosocial factors and biological changes, which make individuals more likely in early adolescence, and less likely in late adolescence, to engage in aggressive behavior and conflict. At various points in development, some children may be more at risk for negative effects that may be associated with violent media, including those who are unpopular, less intelligent, or who experience low parental supervision of their media engagement (Huesmann & Skoric, 2003).

However, these associations may indicate that children who are already experiencing cognitive or socioemotional difficulties are drawn to computer and video games. One study showed that, contrary to researchers' hypotheses, playing video games did not limit the sociocognitive abilities of empathy, cognitive complexity, or cognitive abstractness in elementary school children. Rather, the results suggested that video game use was influenced by children's sociocognitive abilities: Boys who displayed lower sociocognitive abilities reported more frequent use of video games (Sakamoto, 1994).

Trait aggression

Some researchers have explored the potential for the amplification of possible negative effects of computer and video games with violent content in individuals who have trait aggression or an aggressive personality. Anderson and Bushman (2001) have proposed the General Aggression Model (GAM), a theoretical model that takes this hypothesis into account. The GAM posits that electronic play with violent content play may promote aggression and violence in children through the "…learning, activation, and application of aggression-related knowledge structures stored in memory (e.g., scripts, schemas)" (Anderson & Bushman, 2001, p. 355). According to this model, situational input variables, for instance exposure to violence through violent computer or console games, can promote aggressive behavior by impacting players' current internal states, which are represented by cognitive, affective, and arousal variables. The GAM suggests that individuals with a higher level of trait aggression or

aggressive personality may be at a higher risk for displaying aggressive or violent behavior than individuals with a lower level of trait aggression. This theory is compatible with earlier theories applied to aggression (Kirsh, 2003), including social learning (Bandura, 1986), the cognitive neoassociation model of aggression (Berkowitz, 1984), and hostile attribution bias (Dodge, 1980).

Research exploring trait aggression or aggressive personality has focused on studies that demonstrate that electronic play can increase players' arousal, as players manipulate controllers, assume the role of the hero character, fight enemies, or compete for higher scores. Lab studies have shown that computer and console game players have increased heart rate, blood pressure, and oxygen consumption after playing. In addition, these effects are greater after engaging in electronic play than they are after engaging in more traditional activities such as watching television, reading, or listening to music (Fleming & Rickwood, 2001). Since heightened arousal can amplify predisposed responses, it is possible that even subtle effects of electronic play could have a greater impact on behavior than other types of play, for individuals who display trait aggression or aggressive personality. However, there is currently no conclusive evidence to support these claims.

Socioeconomic status

Research has demonstrated that socioeconomic status (SES) often has a significant influence on children's development, and this influence may have implications for the possible effects of electronic play. There is evidence of the influence of SES both in terms of individual families' SES, as well as overall neighborhood SES.

Children in poor families have a higher risk for behavioral and cognitive problems than children in nonpoor families (Kim-Cohen, Moffitt, & Caspi, 2004).

Family economic hardship is associated with parents behaving with less responsiveness, patience, and nurturance toward children and adolescents (Lamb, Hwang, & Ketterlinus, 1999). It may be that the risk of behavioral and cognitive problems for children in families with a low SES may exacerbate possible negative effects of electronic play.

Results from a longitudinal study of children in Rochester, New York, demonstrate that it is not socioeconomic level itself that is associated with negative outcomes, but rather the number of associated risk factors, with multiple risk factors leading to cumulative effects (Sameroff, Seifer, Barocas, Zax, & Greenspan, 1987). Children in families with lower SES not only experience more negative life events than children in families with higher SES, but their stress appraisal is higher for any given event, which can lead to higher incidences of depression and anxiety. In addition, a higher stress appraisal in the context of a dangerous neighborhood may also lead to a lack of trust in others, greater hostility, and less optimism about the future (Chen, 2004). A study of high school students showed that lower SES is associated with a greater interpretation of threat in ambiguous situations; this finding was partially explained by a lack of positive life events, rather than specific negative life events (Chen, Langer, & Raphaelson, 2004). It is possible that children who are predisposed to have a greater interpretation of threat in ambiguous situations may be at increased risk for aggression or violence after engaging in electronic play with violent content.

While studies of SES have primarily focused on its associated risks for children in poor families, children in affluent families may also have increased risks associated with their SES, including substance abuse, anxiety, and depression. Possible mechanisms for these

associations include an overemphasis on achievement and isolation from parents (Luthar, 2003). SES may have a curvilinear relationship with parental supervision, which may indicate that a lack of supervision of children's electronic play would be likely to occur in families with either a low or a high SES.

In their national study of children's media use, Roberts, Foehr, Rideout, and Brodie (1999) found that children in the lower income subgroup, as well as the lower education subgroup, experienced greater total exposure to media than children in the higher income and education subgroups. While the differences in exposure to video games were more subtle than the differences in total media exposure between the groups, these differences do raise questions about the possible effects of greater versus lesser exposure, especially regarding the quality of the children's experiences as well as families' perceptions of the role of media, and video games in particular.

Culture

Research has demonstrated that culture influences individuals' perspectives on aggression and violence, in terms of what constitutes aggression and violence, what is acceptable, and how it is handled. This variation occurs in the context of both broad and nuanced cultural differences. Both cultural values and experiences influence individuals' perspectives on aggression and violence. These influences of culture are likely to extend to electronic play as well, not only in terms of how children respond to computer and video games with violent content, but also in terms of how others respond to children who engage in this kind of play.

Jenkins (Penny Arcade, 2002) pointed out that games that incorporate attitudes and beliefs already dominant in the player's culture may encourage the acting out of game content in the real world. For instance, the amateur games that were circulated around the Internet after the terrorist attacks of September 11, 2001, in which players could shoot depictions of Osama bin Laden, could have been more likely to promote aggression or violence, particularly against Arab-Americans, because the games mirrored other aspects of American culture that were promulgating fear of and negative attitudes toward Arab-Americans after the attacks (Penny Arcade, 2002).

According to a study of moral reasoning in children in Bosnia and Herzegovina, children's preferred moral orientations (care and concern or justice and fairness) reflected Bosnian children's experiences of being displaced and their concerns about the role of physical power in conflict resolution (Garrod, Beal, & Jaeger, 2003). Cultural variation in moral orientations, as well as in perspectives on whether weak individuals should be protected in a given society, has influenced the selection and training of peacekeepers in conflict situations around the world (Thakur & Schnabel, 2001). Moral orientation and perspectives on appropriate versus inappropriate circumstances for aggression or violence are likely to influence children's responses to electronic play with violent content.

A study of college students, preschool teachers, and preservice early childhood teachers showed that individuals' gender, experience with children, and personal experience engaging in war play may influence perceptions of whether children's play is aggressive. In turn, these perceptions may cause differences in whether individuals will intervene and stop children's play that has been deemed to be aggressive (Connor, 1989). Certainly electronic play would be subject to these judgments.

FUTURE DIRECTIONS

Research

Currently, there are more questions than there are research-based answers—questions about the potentially beneficial versus potentially harmful aspects of electronic play, and how individual as well as contextual factors may shape these influences. Further research is needed in order to develop a better understanding of the complicated issues that seem to be involved in this area.

Especially when studying a complex phenomenon such as electronic play, it is necessary to carefully establish methods and operational definitions. So far, there have been few well-designed, well-executed experimental studies of electronic play that employ solid operational definitions of independent and dependent variables. This lack of clearly defined variables calls into question the construct validity of both the independent and dependent variables (Sherry, 2001), making it impossible to demonstrate causality. For example, studies often do not distinguish between aggression and aggressive play as outcome variables (Bensley & Van Eenwyk, 2001). In addition, as the pace of development of new technology for computer and video games accelerates, it is crucial for researchers to pay close attention to these developments in order to maintain a sense of current relevance with regard to research questions and designs (Griffiths, 2000).

So far, the possible long-term effects of electronic games have not been studied. It has been supposed that negative long-term effects may be more significant and more influential than short-term effects, and consequently may warrant greater concern, but as of yet, there is no evidence to support these claims.

There is also a lack of research with any subsets of the population that may bear particular predispositions toward aggression or violence. Again, hypotheses point toward groups of people that may be especially vulnerable to any negative effects of games with violent content, yet we do not have any empirical basis for assessing these effects or for taking appropriate action to handle them (Bensley & Van Eenwyk, 2001). The different ways in which young children and adolescents understand the distinction between fantasy and reality is one example of a developmental factor that is likely to influence how young players respond to electronic play. In addition, adolescents display great interest in electronic play as well as a greater propensity for aggression in general. Studies that adopt a developmental perspective are necessary to further our understanding of groups that may be at particular risk (Bensley & Van Eenwyk, 2001; Kirsh, 2003).

Another significant gap is the lack of research on the influences context, including SES and culture (Griffiths, 2000). As was discussed above, it is likely that both SES and culture would influence the characteristics that players bring to the game experience as well as how the game experience fits into their lives. Families' SES may influence parents' availability and resources for supervising children's electronic play.

Policy

In Europe, Asia, and North America, policies regarding electronic play focus on limiting the potentially harmful aspects of computer and video games, through game rating systems, plans and goals to educate parents about games and their ratings, and limits on the advertisement of

games with mature content to children and adolescents, and by encouraging or mandating retailers to restrict the sale or rental of games with objectionable content to minors. While there is some variation of what constitutes "objectionable content," most cultures have focused on violence, sexuality, addictive substances and behavior, racial slurs, and offensive language. Currently, no policies exist in the USA, Australia, or Europe regarding the study or promotion of any potential benefits of electronic play (Entertainment Software Rating Board, 2004; Office of Film and Literature Classification, 2004; Pan European Game Information, 2004; Salonius-Pasternak, 2003).

In most countries, with the United States being the most notable exception, governmental agencies are responsible for establishing and implementing policies regarding electronic play. In the United States, policies regarding electronic play are independent of government involvement. Typically, governmental agencies, game developers and publishers, retailers, and parents are the most active parties in the context of policy, although their roles vary across cultures (Entertainment Software Rating Board, 2004; Salonius-Pasternak, 2003).

The questions of what kinds of policies should be implemented in order to handle issues related to the possible negative influences of electronic play, what parties should share responsibility for regulating children's exposure and access to electronic games with objectionable content, and what should be done to address the possible positive influences of electronic play are complicated. When players, parents, policy makers, and game designers make decisions regarding issues of aggression and violence relating to electronic play, value judgments often play a large role in influencing these decisions. This tendency is especially likely given the current status of research in this area: We have only just begun. In reading, researching, and discussing these issues, it is important to be aware of whether statements are based on value judgments or scientific research. Both are important to consider, but they each come from entirely different bodies of knowledge that influence their appropriate roles and applications.

In addition, as researchers publish their findings and as organizations involved in policy decision-making interpret these findings, it is critical to pay attention to the limits of generalizability that exist in every study and to use language that is direct and specific. In their 2001 policy statement that stipulates media violence as a public health threat, the American Academy of Pediatrics (AAP) stresses that the strength of the relationship between "media violence" and aggression is greater than the strength of relationships among commonly accepted associations, including tobacco and lung cancer (AAP, 2001). Backing up this claim, the AAP refers to research that examined the effect size of violent content in television on aggression, a study that does not include any other form of media other than television. So while the reference to the strength of the relationship between this particular type of media violence and aggression is valid, it is misleading to use it to back up a claim regarding media violence in general. In order to improve our understanding of and our ability to respond effectively to any public health threat that may exist regarding media violence, it is necessary to work toward a common ground of responsible communication that avoids misleading implications, however unintentional they may be.

CONCLUSIONS

While most of the research on electronic play has focused on its possible negative influences on children and adolescents, particularly the possibility of increased risk resulting from games with violent content, electronic play may also have potential benefits for young players. These include providing children with the opportunity to negotiate society's rules and roles, allowing children to experiment with aggression in a safe setting without real world consequences, facilitating children's development of self-regulation of arousal, and serving as an effective tool in clinical settings.

Further research is needed in order to assess the possible benefits of electronic play for children and adolescents. Future studies should consider both individual and contextual factors that may shape the influence of electronic play, including gender, cognitive and socioemotional development, trait aggression, SES, and culture. Researchers need to carefully design empirical studies with clearly operationalized variables in order to expand our understanding of the relationships that may exist among these variables.

The individuals who are concerned about the presence and possible influences of computer and video games come from a variety of backgrounds: children, parents, teachers, researchers, politicians, advocacy organizations, religious groups, and the designers and publishers who create the games. Even the heading of researchers includes individuals from a variety of academic disciplines: child development, education, psychology, psychiatry, pediatrics, communication, media studies, computer science, and public health, to name a few. Given the different cultures scientific backgrounds that are represented here, if we are to advance our understanding of the role of electronic play in the lives of children and adolescents, it is important to incorporate interdisciplinary cooperation in the design, implementation, and dissemination of our research.

As we continue to improve our understanding of both the possible benefits and risks of computer and video games for children and adolescents, it is important to ensure that this understanding is disseminated among those who actively work with children, particularly parents, teachers, and clinicians. Greater knowledge of and appreciation for the positive and negative aspects of electronic play can facilitate these individuals being better able to make effective decisions regarding the presence and use of computer and video games in their respective settings—at home, in school, and in treatment facilities.

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MOBILE PHONES, IDENTITY AND DISCURSIVE INTIMACY

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Abstract: *This paper deals with the sociocultural effects of mobile phones in Philippine society. In particular it looks at how mobile phones have affected notions of identity and the rise of the sexual subject. It also deals with the political possibilities and implication of this new communicative technology in a society with previously poorly developed telephonic and other communicative technologies. Mobile phones allow absent subjects to exercise a daily presence in their communities of origin. This absent presence generates virtual subjects interacting primarily via the mobile phone.*

Keywords: *computer-mediated-interactive-communication-technology (CMICT), cyber-world, scribed spaces, texting subjects, post-corporeal, coup-d'text.*

INTRODUCTION

A major consequence of late modernity is the increasing intercalation and accumulation of information. The United Nations has recognized this by holding a World Summit on the Information Society in Geneva in 2003 (see World Summit, 2005). In this informationally based global order, new sources of inequality are developing. Access to the generation, distribution and consumption of information becomes a crucial component of the economy, politics and culture. The new technologies of information have not only exponentially increased their capacities but have also the potential to share and distribute information at very low costs. A world of almost unlimited information accessible to most people is technically within reach but its utopian possibilities remain unfulfilled. Like all other technologies, social and political factors eventually determine their relevance and effectiveness. The United Nations has accepted the crucial role of information technology but it is still unable to suggest political solutions for its employment towards attaining a more equitable, stable and prosperous world.

Information and global networks

During the past decade, global change has been shaped by the new paradigm of trade facilitated by information technologies (Kuvaja & Mursu, 2003). Industrial societies have been increasingly turned into informational societies in which economic success is determined by the capacity to process and exploit information. This has resulted in a more networked world where inclusion and exclusion are determined by access to the Net.

The variety of the writings on globalization indicates that the interpretations of this phenomenon are multiplex. Globalization is often understood either in its narrow sense, referring only to economic interaction, or as a more complex process of interdependence between nation-states, cultures, politics and economies. The World Commission on the Social Dimension of Globalization, established in February 2002, defines globalization as the progressive integration of economies and societies (see World Commission, 2004). The Commission points out that globalization involves trade, investment and technology that bring societies closer. Castells and Himanen (2002) have argued that the information and communication technologies have encouraged globalization but also threatened the viability of the welfare state. As economies struggle to compete in the global market, social services hitherto taken for granted are being eroded. While technologies have intensified globalization by bringing prosperity to some countries, they have also undermined the participation of the weaker ones. Moreover, accompanying globalization are also various processes of localization. Greater mobility and constant connectivity have encouraged the resurgence and maintenance of local communities. A global culture generates its own local resistances.

The new interactive media

Although the applications of information technology (e.g., Internet, mobile phones, etc.) are often similar, their specific social and cultural impact varies nationally, as these technologies are influenced by particular cultural traditions, power structures and economic resources. Societies and information technologies engage dialogically, where each is shaped by the needs of the other. This, however, does not mean that societies will be determined by information technologies or that societies can dictate the course of information and communication technology (ICT) development. The case of mobile phones in the Philippines demonstrates how a globally introduced information technology application interacts with local sociocultural conditions. This interaction is not only materialized in indigenized applications of the global technology but it also represents the way that modernity, as a social condition of globalization, is manifested in a Philippine context.

The concept of the digital divide refers to inequalities in the access to and the use of the ICTs. The digital divide, or digital inequality, is not only about the existence or nonexistence of infrastructure. The provision of the physical access is necessary but it is not sufficient. Digital inequality refers to "real access," which includes cognitive and cultural capital as well as technical resources (Kuvaja & Mursu, 2003; Warschauer, 2003). Real access goes beyond infrastructure and refers to people's actual possibilities to use technology to improve their lives. The technology itself does not ensure its equal and efficient use but real access is ensured only when appropriate technologies are introduced into political, economic and social environments conducive to people's participation.

Mobile phones are increasingly taking a major role in this communication revolution and are often referred to as one of the "new media." (Each of these new media is characterized as a computer-mediated-interactive-communication technology, or CMICT.) The interconnectivities of mobile telephony, desktop computers, radio, television and print are producing new communication structures with often unpredictable consequences. But it is certain that the new media will bring about important social changes at distinct levels of social structures, from personal identity to political mobilization, from consumer choices to global corporations, from virtual spaces or simulated models to lived realities and embodied geographies. Hopefully, the new media may assist in gathering and disseminating alternative information sources, creating virtual public spaces where citizens can debate vital issues and organize appropriate political action.

Cosmopolitanism and glocalization

This new informational order is usually seen as a process of cosmopolitanization but it is also associated with the return of locality and the revitalization of diasporal and virtual communities. In the recent past, the new media mainly involved the Internet and its associated technologies. The term *new media* evoked cyberspace, constructed as a virtual environment detached from the physical world, a place where people could inhabit and create new types of communities. Often this involved hybrid spaces combining the global with the local (glocal).

Virtual communities have often been studied as narrative spaces where users create collective environments composed mainly of texts. More recently, the idea of a virtual world, a simulated space, completely disconnected from our physical environment, is challenged by the emergence of mobile devices. These communities of mobile phone users, or phoneurs, result in diasporic collectivities whose members inhabit embodied but transhumant mobile spaces.

Unlike desktops and other immobile technologies, mobile phones more closely resemble tools or prosthetic devices as extensions of the body. They become extensions of the hand, allowing us to connect anytime, anywhere, with anybody. Bodies themselves become writing devices as phoneurs negotiate new urban spaces. Urbanity itself becomes a feature of the new mobility. This new urbanity is complemented by other communication technologies such as video, DVD, and other multimedia interfaces. With the aid of nomadic technologies, virtual social communities in diaspora emerge in physical spaces. In this context, CMICTs play an active role in creating new types of communication and social networks.

Nomadic technologies and new physicalities

Cyberspace has frequently been regarded as utopian spaces in which users are able to project their imagination. When communities are shaped in a hybrid space, CMICTs become new tools for creating novel and unpredictable imaginary spaces, renarrating lived space. While fixed Internet users do not have the ability to move through physical space, the emergence of nomadic interfaces makes possible mobile imaginary spaces to be enacted and constructed within physical space. Hence, nomadic technologies have a role in the construction of narrative spaces. They allow virtual spaces to be mobile, bringing them into the physical world.

Communities on the Internet are formed independently of the physical location of their members. With nomadic technology, it is possible to communicate with people both distant and nearby. Location awareness embedded in mobile devices strengthens the connection to

physical spaces, creating new geographies of mobility. Mobile devices and interfaces make us aware of the importance of physicality when dealing with digital spaces. It is in this sense that mobile phones can be perceived as writing devices. Writing in a broader sense (not only SMS or MMS) means the creation of narrative and imaginary spaces. Cell phones are new media devices writing in both physical and hybrid spaces, transforming them into textographic, or scribed, spaces.

Concrete and embedded theorization

This paper is part of a project that examines how CMICTs, and in particular the mobile phone, work their way through social and cultural sectors in the Philippines. The extraordinary adoption of the mobile phone, and to a lesser extent the Internet, may be expected to bring about important changes. No other modern technology has had such a rapid and extensive acceptance within Philippine society (Pertierra, 2003). I explored how CMICTs (i.e., mobile phones and the Internet) are absorbed into the routines of everyday life. This should give us a clearer understanding of why, how, and for whom these practices are so consequential. This paper limits itself to the effects of mobile phones on notions of identity and subjectivity, given its ability to extend discourses of intimacy.

While this project examines the practical effects of CMICTs in specific communities, it is also concerned with a theoretical conceptualization of this new technology. Part of the problem with CMICTs is not just their novelty or almost immediate impact on society but their lack of adequate theorization. It is often difficult to distinguish media hype from sober reality. Even academics, mesmerized by CMICTs' postmodern promises, often abandon their usual critical and skeptical positions. The virtual and cyber worlds made possible by CMICTs have not only seduced politicians, media commentators, and policy planners but also scholars. Most research in this field limits itself to descriptions or to wild speculations about post-corporeal life (Kirby, 1997).

We have already explored some of these theoretical issues in earlier studies (Pertierra, et al., 2002) but further theoretical and empirical research is necessary before we acquire an adequate understanding of the significance of CMICTs in developing societies such as the Philippines.

CMICT bases for constituting identities and structures

The capacity to store and transmit large amounts of information, combined with instant, interactive and perpetual connectivity, is the main feature of these technologies. Their applications are virtually endless but their effects are often unpredictable. Societies and cultures hitherto built on face-to-face oral communication are reconstituting themselves along unexpected grounds.

Overseas Filipinos enjoy an "absent presence" in their original home communities. Diasporic and cosmopolitan identities are taking new and radical hybridities. CMICTs are not only used to connect, they also mediate and shape relationships. For example, the capacity of the technologies to make an absence present ensures that virtual subjects exercise a post-corporeal agency.

Mobile phones

These new technologies pose particular problems as well as promises for developing countries such as the Philippines. The Philippines has shown that the acceptance of technology (i.e., mobile phones) has a leap-frogging capacity. There are now seven times the number of mobile phones compared to subscribed landlines in the country (Lallana, 2004). Mobile phones have not just overtaken landlines but have opened hitherto economically unprofitable regions. Prepaid cards make mobile phones accessible to most Filipinos (28% penetration rates and growing rapidly; Lallana, 2004). This has not only facilitated communications in formerly isolated areas but has allowed Filipino overseas workers (8 million) to remain in contact with their families.

The Filipino diaspora have produced a more cosmopolitan outlook, often replacing a local or even national orientation. An expression of this new cosmopolitanism is the recently passed law enabling Filipinos to hold dual citizenship. This development recognizes that identities are now more plural than hitherto. CMICTs encourage and facilitate such cosmopolitan orientations.

The Philippines is known as the texting capital of the world. Filipinos send over 200 million texts daily, ten times the per capita world average (Lallana, 2004). Texting allows Filipinos to express themselves in new ways. They text what they would not normally say in a face-to-face encounter. This has led to new ways of relating with others as well as opened areas of inner-subjective reflection. New and radical identities become possible.

However, these technologies have also had less immediately beneficial consequences. Cell phone theft is now a major criminal problem in urban areas. Youth gambling has also become a major concern, given its close association with recreational texting. But civil society has also used it to organize political protests, aiding in the overthrow of President Estrada in January 2001 (Pertierra et al., 2002). This capacity of CMICTs to mobilize people has also been reported for countries such as Venezuela during its current strife. CMICTs enable what are referred to as "smart mobs," loosely organized groups capable of micro-coordinating their activities for specific purposes (Rheingold, 2002).

Smart mobs differ from political demonstrations by the lack of a controlling center. Instead, they consist of loose networks, often P2P (person-to-person) linkages resulting in the close coordination of otherwise independent members. The model of center-periphery or a central hierarchy is replaced by multicentric nodes of mobilization. Each node is autonomous but capable of microcoordinating its movements with other nodes for a specific and often single-issued end. Their relative autonomy allows for diverse nodal centers representing distinct interests to participate collectively. After such events, each node reverts to its original and individual condition.

Post-modern revolutions

In 1986, President Marcos was overthrown in what has been described as the first electronic revolution. More recently, the replacement of President Estrada in 2001 has been described as a *coup-d'text* (Pertierra et al., 2002). For these reasons, the Philippines is a test case for assessing the political consequences of this technology. The lack of violence and the central role of the media (e.g., the press, radio, television and cell phones) characterized both these revolutions. These political events mainly consisted of a clash of hastily organized press

conferences, public announcements, televised images, rambunctious crowds, and the possibility of violence rather than its actual enactment. Ideological differences were temporarily suspended as political foes merged seamlessly into a mass celebration and grand spectacle. EDSA (the revolution against President Marcos in 1986) and EDSA 2 (the overthrow of President Estrada in 2001) consisted mainly of simulacra and spectacle. Anthropologists have described them as rituals of rebellion, characterized by displays of *communitas* and the momentary dissolution of difference (Pertierra, 2002). This rapid mobilization brought about by CMICTs generates the new phenomena of smart mobs. Other examples include the demonstrations during the U.S. Republican (2004) convention in New York. These occasions resulted in the micro-coordination of large crowds to achieve maximum political effect through the use of CMICTs.

The powers of spectacle and simulacra have been greatly enhanced by these new communicative technologies. They offer not only new realities but reinforce older ones by their capacity to simulate connectedness and coevalness. They constitute states of simultaneous presentness rarely achieved before, except during states of ritual resulting in communitas. CMICTs make these states of communitas easily and sometimes routinely achievable. They have the capacity to evoke communality even before the existence of community. They recreate *gemeinschaft* in the midst of *gesellschaft*. Or so it seems. The microcoordination of loose groups becomes a regular phenomenon of contemporary life. Such groups are often simulacra of organic community.

PRELIMINARY FINDINGS

A survey of 364 respondents was conducted June through August 2004 to investigate the ways in which cell phones impact on their users' lives. While the respondents consisted mainly of students from the cities of Manila, Cebu, Iloilo, Davao and Laoag (Ilocos Norte), it also included ordinary workers, rural dwellers and other community members. All informants had access to cell phones. Although this sample is not fully representative of the Philippine population, it is sufficiently general for our limited purposes. We focused in more detail on two communities, Salisi, Ilocos Norte and Hulugan, Iloilo, to find out how mobile phones were used during the recent 2004 national elections. Neither of these communities made significant use of the cell phone during the election period. This result was surprising given the mobile phone's importance in national political campaigns. It seems that face-to-face communication is still the preferred mode in rural communities for local events. Organic communities do not seem to require or benefit from the microcoordinating capacities of the cell phone.

In the context of a functioning local community, with its dense network of multiple ties, the importance of the cell phone seems to diminish. Its main role in transmitting local information is only part of a broader system of communication encompassing consociation, gossip, rumor, ritual, and more traditional structures of communication.

In the survey, we explored whether and how people use mobile phones to extend existing social relationships. The facility in extending one's social network using these technologies may be an important factor in constituting networks of intimacy across space. These new networks of intimacy enable the creation of new forms of subjectivity. The cell phone is an ideal medium for the extension and exploration of new subjectivities outside the constraints of

everyday face-to-face life. In particular, we are interested in exploring whether notions of individualism and cosmopolitanism are encouraged by the use of cell phones. If so, what are the consequences for networks of intimacy?

Not surprisingly, mostly young respondents (aged 14-23; 50%) use the mobile phone to expand their circle of relationships. A significant number do so as a result of mis-sent messages. More men use the mobile phone to extend their friendship network than do women. While some informants use mis-sent messages to extend their social networks, many informants resent receiving text messages from strangers. This resentment may be due to factors such as class and status. Interclass networks appear to be as unusual in the cyber world as they are in the physical world. Informants who expand their networks do so mostly for fun and to involve people from outside their local areas. Older users generally are less likely to exploit the opportunities to expand networks of intimacy using these communications technologies.

Most respondents claim that they are truthful to their virtual friends and this is particularly so among older informants. Young respondents do not consider virtual friends as good as "real" friends but older respondents do so. For most respondents, personal problems are the main topic of discussion with virtual friends but young users also discuss topics such as love and sex. Most respondents are interested in meeting virtual friends.

About half of our informants who cultivate virtual friendships end up meeting them face-to-face, mostly just to hang out but occasionally to date and have sex. These virtual friends often become real friends, especially among older informants. The text services most often used are "Text God" (a service involving biblical quotes), news services and games. This indicates that cell phones are seen as sites for religious communication, indicating that authentic and even spiritual relationships are possible in cyber-reality, and as reliable sources of information as well as entertainment. Government services are rarely accessed through texting by our informants.

Cell phone use in Salisi, Ilocos Norte and Hulugan, Iloilo

Salisi and Hulugan are rural municipalities that have many of their members as overseas workers. Mobile phones have become a common feature of local life as a consequence of the absence of many of its adult population. While not totally typical, these municipalities represent a major element of Filipino rural society.

Salisi is a fifth-class municipality in Ilocos Norte. The following data was collected in two barangays [villages]: Langi is in the municipal center, while Barikir is an outlying barangay.

> **Barangay Langi**
> Number of households surveyed: 236
> Number of households with cell phones: 119
> 50% of households have cell phones.
> Ratio of cell phone/household is 1.2.

Cell phones in Langi are often shared but individual use is growing significantly. While there may be more than one cell phone in the household, practical constraints such as "no load" or "low batt" often require sharing with other household members. Of 32 informants who provided information on usage from households with cell phones, 24 (75%) reported exclusive

use while 8 (25%) shared cell phone use. These figures more likely indicate ownership rather than exclusive use since most informants indicate a willingness to allow others to use their cell phones.

In comparison to the above, when customers in an e-load facility (users renew their load capacities at this facility) were asked about usage, the results were as follows: 18 (38%) reported exclusive use of the cell phone while 53 (62%) allowed the reading of and responding to messages by other members of the household. When they were asked who owned the cell phone, 61 (85%) reported individual ownership while 10 (15%) were family owned.

These results indicate that ownership and usage are not always congruent. Indeed, the Philippines has a culture in which household members generally share resources. Therefore, when we tried to reconcile the differences in the data between that gathered in the survey of the households and that at the e-facility, we concluded that this incongruity can be explained in part by a misinterpretation by the household survey respondents regarding ownership and usage. It is quite possible that some the 75% of that household study who claimed exclusive usage in fact meant that they own their own phone, even if they allow other family members to use it from time to time. This assessment of the data needs to be confirmed through additional research in Barangay Langi. Nevertheless, in a culture where household members generally share resources, the rate of exclusive and personal use of mobile phones indicates that new patterns of individualism may be emerging.

Barangay Barikir
Number of households surveyed: 127
Numbers of cellular phone users interviewed: 66
50 % of households have cell phones.
Ratio of cell phone/household is 0.9.

Of the 66 informants with cell phones, 25 (30%) reported individual or exclusive use while 41 (70%) reported shared use. These figures when compared with Langi, (38%) and (62%) respectively, indicate that about a third of cell phone users do so individually, while two thirds share its use. In Barikir the most frequent users of cell phones are between 20 and 39 years old (50%). Moreover, people with a college education tend to use the cell phone twice as often as other members of the community. The average cost for cell phones is about P300 monthly (mostly spent texting), representing about 5% of household income. Most users receive and send 10 texts a day.

At least 39% of respondents have utilized cellular phones to make new friends. This figure is likely to be underreported since many informants were clearly hesitant to admit making new friends through texting in the presence of family members. Of those who had cyber-friends, 12% admitted meeting them personally. They often obtain the numbers of virtual friends through other friends or relatives. For example, a woman working in Italy obtained the number of a friend's son who lived in Ilocos. She became his textmate, and eventually married him. Another common way of extending friendship networks is by sending or receiving random messages, such as "May I be your textmate?" These exchanges are often expressed in a mixture of Ilocano, Tagalog and English. A 50-year-old man met a young woman from the Bicol region through a mis-sent message. They became friends and exchanged texts for months thereafter. Much less commonly, people text numbers found in magazines advertisements.

Hulugan, a rural municipality in Iloilo
(Data gathered in a barangay in the municipal center.)
Number of households surveyed: 94
Number of households with cell phones: 71
75% of households have cell phones
Ratio of cell phone/household 1.4

Cell phone use during the elections

Cell phones did not play a major role during the local elections in Salisi. Candidates and their supporters preferred to use more traditional ways of courting peoples' votes, such as face-to-face meetings and political rallies. However, the cell phone was important in coordinating the movements of candidates and their supporters as well as keeping a close watch on the activities of opposition members. Events such as weddings, baptisms, burials, and senior citizens meetings always draw large crowds and candidates made sure that they were present. The cell phone played an important role in keeping track of these activities and in passing on the information to relevant parties. This often involves microcoordination since these occasions draw their crowds in sporadic ways. Candidates had to be aware of when to turn up to ensure maximum exposure to potential voters and to avoid a possible confrontation with rivals. I was present at a necrological service where a local candidate addressed the bereaved family in the traditional manner and finished his speech with instructions on how to vote.

The results above indicate that local communities still rely principally on face-to-face communication for practical information. The organizational potential of cell phones is not significant in communities whose members are still in regular consociation. This consociation generates dense networks of exchange where the value of information is highly contextualized. Voting patterns in local communities are not a function of simple information communicated by cell phones but require more complex interactions available only in face-to-face exchanges.

Since provincial and national elections were also taking place, candidates used the cell phone to keep in touch with party headquarters in order to arrange local visits for national politicians. Information from Manila and Laoag about the elections was frequently relayed through texting, particularly for spreading rumors and other general information. Rumors and scatological information spread quickly in local communities. The cell phone simply provides the initial impulse.

Interview with Mr. Carlos Talaman
Candidate Municipal Councilor, 36 years old
(Mr. Talaman is a peasant leader of the Hulugan United Peasant Alliance).

Q: How useful was the cell phone to your candidacy in the last elections?
It was not very useful because in Hulugan there are "blind spots" where there
is no signal. So I was not able to maximize the use of my cell phone.

Q: What about your party mates? Did they get in touch with each other by cell phone?
Not that often. We contacted each other if there were scheduled meetings in barrios during our campaign. We also texted our campaign leaders. We were able to monitor the moves of the other political group through our cell phones.

Q: What about during the counting of votes and early results?
We did not use our cell phones extensively because we assigned motorcycle "runners" in various precincts. They gave us more accurate information.

Q: What is the advantage of owning a cell phone?
Now I can get in touch with my family, though, it's costly, P300.00. So I try to stretch its use for more a month. I limit my calls only to important matters. It's also easier to contact other organizers and to gather members for important meetings at short notice.

Interview with Mr. Armie F. Almero
Bayan Muna Party Coordinator, Province of Antique, 37 years old
(Bayan Muna is a leftist party that is often the victim of political harassment.)

Q: Do you have any plans to acquire a new cell phone?
Yes. I want the new Erickson with built-in camera. My job requires me to take pictures of disasters and using them to write funding proposals for relief and rehabilitation. My need for a cell phone with a camera is job related. With my job, I often make voice calls rather than send texts. Texting is not enough. It's difficult for me to fully explain and for our clients to comprehend text messages.

Q: Do you allow your family members to use your cell phone?
No, never. Each of us has a cell phone, though there are times when they allow me to use their cell phones. They text me a load [the electronic transfer call credit]. Sometimes I course my calls through their cell phones. My office often checks on me from time to time for decisions and questions, also to verify my whereabouts.

Q: As coordinator of Bayan Muna party list, how useful was your cell phone in the last elections?
Earlier, I was assigned as a municipal coordinator but later as provincial coordinator of Antique. One can't be a provincial coordinator without a cell phone with good features, with extra battery and enough load. With cell phones, our work was easily systematized during elections. The set up was like this: various municipal coordinators forward reports to me and I pass them on to the national office of Bayan Muna in Manila as well as our regional office in Iloilo City.

Q: Earlier, in the campaign, how useful was your cell phone?
I used it to contact the 18 municipalities of Antique province. Our party list coordinators in these municipalities usually prepared the ground for orientation

and chapter-building activities. When they contacted us, we were ready to proceed to towns prepared for such activities.

Distances between towns of Antique are considerable. With cell phones we can coordinate our schedules effectively. Moreover, supporters can quickly inform us regarding "black propaganda" thrown against Bayan Muna—and there were such cases. We, who were at the provincial level in San Jose, reacted by contacting local radio stations. During the campaign period, the quickness in responding to issues was of crucial importance.

Cell phones also "secure" our coordinators in a game of psy-war. Our political opponents with bad intentions are less likely to harm our members knowing how quickly we can react. An example was in San Remegio where our coordinators were threatened. Using our cell phones, other members quickly responded and came to the rescue. I can easily monitor the movements of my coworkers, their locations and arrival times at our staff house. I am responsible for their safety.

We also made use of chain-texts during the campaign. An example was the news from a GSIS (government insurance institution) insider who disclosed that President Arroyo withdrew 50 million pesos to be used in elections. We often cited this in our public meetings around the province and passed these texts to other people.

Q: Did you receive news and instructions from Bayan Muna national office through your cell phone?
Yes. News about the killing of our campaign leader in Quezon province reached us. We were informed to take precautions, usually for coordinators in far-flung parts of the province. We were also warned about cheating taking place mostly at the municipal level and so to be extra watchful and vigilant. As provincial coordinator, I passed these news and instructions to municipal coordinators.

Q: In the campaign period and during the canvassing of votes, was the cell phone very useful?
Yes. Antique is a backward place with limited landline connections—our staff house at San Jose is still without a landline. In these circumstances our cell phones were essential. Although there are now three telephone companies servicing San Jose, they have not expanded outside the capital. Meanwhile, we have our cell phones.

These two examples indicate the varied use of cell phones for elections. Localities are still sufficiently dense and reliable information is best transmitted directly. But occasions arise when rapid communication takes precedence and cell phones become crucial in its transmission. Local organizations with national structures benefit most from cell phones since they must maintain communications across dispersed networks.

Case Studies

Interview with James Guerrero
BS Architecture student, 20 years old
Poblacion, Hulugan, Iloilo venue

I got my cell phone this year, given to me by my parents.

Q: Do you really need a cell phone?
Yes, it helps with my school assignments and coordinated group work. With it, I can communicate with my classmates. I can also call my parents in Hulugan from Iloilo City.

Q: Do your parents check on you using the cell phone?
Yes, once in a while, but not always.

Q: What are the personal uses of your cell phone?
I trade texts with my barkadas [gangmates]. *We text about basketball games and our favorite teams. We banter, we discuss. In a day sometimes I can send as many as 30 text messages but not when I'm busy preparing for my exams.*
     I also text my teachers about class assignments. This happens when I am absent and need to know about missed lessons. I also accessed the dictionary through my cell phone. After the examinations, my classmates and I organize group outings by texting.

Q: Were there instances when members of your family used your cell phone?
No. Each of us has a cell phone. For my part, I don't mind if my parents use my cell phone, after all they pay for it. My parents also don't mind if I use their cell phone in making important calls.

Q: How do you protect the privacy of your messages?
I can hide my messages easily, put them in folders or activate a password. My parents are not aware of my cell phone's features.

Q: Were you able to make new friends through your cell phone?
There was one from Surigao del Sur. She dialed a wrong number which happened to be my phone. We became text mates; she's a disc jockey at a radio station in Surigao. Sometimes, she plays music on the radio for me. But how can I hear it? I am in Iloilo City and she is in Mindanao.

Q: How important was that experience for you?
It was a matter of luck. If someday there is a chance for us to meet, it's okay with me.

Q: What are the advantages of having a cell phone?
I get to meet a lot of people. I contact my clientele through my cell phone. I do sketching and drawing for students and teachers who need visual aids. I am doing

this sideline for a fee. Sometimes, my teachers at school recommend my name to do charcoal pencil portraits for my clientele.

James has successfully integrated the cell phone into his lifestyle as a working student. It is useful for his studies, his social network as well as for work. This functionality of cell phones across different aspects of everyday life is more significant for people like James whose interests span distinct networks than it is for locals with more limited networks. This is one reason why cell phone use, particularly in rural areas, is associated with higher education and youth.

The example above also indicates how routine the mobile phone has become for many Filipinos, including those living in rural areas. This technology has been so easily incorporated into everyday practice that life without the mobile now seems to belong to the "distant" past.

Anna and Dave

[This is a case of a textual exchange resulting from a mis-sent message. Anna mistakenly texted Dave and an exchange ensued.]

Anna: Jun, come to our place. My brother is having a birthday party. Pls text back.

Dave: Miss, I think you sent your message to the wrong person. By the way, I'm Dave of Cubao. I'm 27 years old.

Anna: I'm sorry to bother you. I am Anna from Cainta. I'm working here in Sta. Lucia Mall. I'm 22 years old. Where are you working Dave? What's your real name?

Dave: Dave Sanchez, I work near Ali Mall. If you won't mind me asking, do you already have a boyfriend?

Anna: Yes, but he's been working in Saudi Arabia for two years now. I'm sorry but I have to do something.

Dave: Okay, always take care of yourself. Don't forget to pray to God everyday. Can we be textmates?

Anna: Ok, but you can only reach me at night. I usually turn off my cell phone at work. Ok, take care also.

[The following day]

Anna: Why did you text? It's already late.

Dave: I'm just bored and I can't sleep. Why are you still up, you should be sleeping.

Anna: You woke me up with your text. I have to wake up early tomorrow because we have visitors in the office. Just try to go to sleep. Sweet Dreams!

Dave: Thanks, I'm sorry if I disturbed you. God Bless.

[The next day]

Anna: How are you, my friend?

Dave: I just finished taking a shower. I'm ironing clothes.

Anna: I just finished taking a shower also. We do not have work today. Do you already have a girlfriend?

Dave: I don't have a girlfriend yet. Maybe, we were taking a shower at the same time. Isn't it nice?

Anna: Why are you saying that? Well, maybe. Where is your girlfriend from? How old is she? What is she doing now?

Dave: I told you we already broke up. Don't you miss the thing you did with your boyfriend?

Anna: Yes, I miss it a lot. But there's nothing that I can do. Life is just like that.

Dave: I also miss the things that I did with my ex-girlfriend.

Anna: You're rude.

Dave: Would you like to have sex text with me? We can do it to have fun together.

[The text exchanges that followed describe detailed sexual activities by both partners, culminating in orgasm. The text exchange continues.]

Anna: That was good.

Dave: I hope we can do it again.

Anna: You're so horny, we just finished doing it. The next time I hope it's the real thing.

Dave: What!! You told me we'll just be doing it through texting. You're the one who's horny. Ok, I'm running out of text load. Thanks take care always.

How common are such text exchanges in difficult to assess, although most of our informants have admitted receiving mis-sent messages that could have led to similar

experiences. Apart from fortuitous exchanges resulting in sex text, various cell phone service providers offer text chat rooms where one can meet people interested in friendship and companionship. Many people use these chat rooms to engage in sex text.

In addition, there are several television channels that offer 24 hour texting services to their viewers. People send messages that are displayed on the television screen. Most of these messages are exchanges of information among friends or about common interests such as music, sport, and fashion but others are explicit invitations for sexual trysts.

Cristina
28 years old, married
former member of a rock band

Presently, I just have a dial-up Internet service and a cell phone. On average I use a P300 load monthly but when I have a hectic schedule I use more. I usually ask my friends to use my landline since I don't like texting.

I have agoraphobia so I can't leave the house. The cell phone and the Internet are my main links to the outside world. But they aren't enough. I enjoyed shopping for clothes, going to the supermarket and doing other normal things. Since I don't have a credit card, I only have a limited range of things I can buy online. Many things are not listed; for example I can't buy French mustard online.

I used to get very depressed about my illness. I felt isolated, misunderstood and guilty about not living a normal life, like playing music and enjoying married life. Friends text me about where and what bands are performing in Manila. I know what people are wearing when they go to parties, about the new spas in Boracay and the latest ways of being cool. Knowing all this makes me feel much better, less isolated and more hopeful.

I am estranged from my family but keep in touch with a younger sister. She sends me text messages but I ask her to use the landline so we can have a proper conversation. I receive information about my mother's health and other family news. I often receive messages on my cell phone like, "Let's be friends," or "Can we be textmates?" I ignore them, but if they keep texting, I tell them to drop dead. I don't know why but I don't trust these messages.

Since my daughter attends school, I often check the weather by cell phone to find out if classes are cancelled. I usually text people to call me on my landline because cell phone reception is often bad. Or sometimes I text my husband to find out if he'll be late coming home—just boring domestic matters. On average, I probably send about 10 texts a day. My texts are about practical matters. I don't send greetings. But sometimes my husband is away from home for days. He takes care of visiting performers. During such times I get very lonely and send him messages like, "I miss you and hope you're doing well." Yucky love stuff like that. But it takes me a long time to send these messages since I am a slow texter. I also send practical message like, "When are you coming home?" If I want him to call me I make a missed call, and if there is an emergency I text him 911. This is our code.

In an earlier study (Pertierra, et al., 2002, p. 47-48), we provided several examples of the capacity of cell phones to lessen the feelings of isolation encountered in contemporary society. Following several articles on clinical depression featured in a major Philippine newspaper, readers sent supportive texts about their own problems. These messages generated a community of therapeutic discourse, mainly by text, among the readers.

The anonymity and intimacy provided by texting encourage self-disclosures that could be seen as threatening in other contexts. It is this capacity for generating discourses of intimacy that allows the exploration of hitherto nondiscursive identities such as clinical depression. These new discourses also assist in the development of other identities, such as the sexualized or religious subject.

Buddy
29 years old, has a live-in partner
is active in local music scene

Sometimes I don't check my email regularly, particularly when I'm on vacation. I heard there's a way you can do it using your cell phone but I haven't done it yet. Having no signal for my cell phone is much more important since I usually have to make urgent calls or texts. Once I was stopped by the police and when I tried to ring my lawyer, discovered that there was no signal. I cursed loudly.

I use my cell phone often, particularly to communicate with my girlfriend. I prefer to text unless it's really important, then I make a voice call. My texts are usually functional like, "I'll meet you later," or "Where are you now?" I also use texts for my business. I have my cell phone number on my card and prefer people to initially text me their queries. Texting not only saves money but works better than voice calls in areas with poor reception.

I am more dependent on the cell phone than on the Internet. The cell phone is just so convenient for people on the move like me. With a cell phone you are always in contact no matter where and when. But when there's no signal or your battery is low then it's a real problem. When I first went to Boracay, there was no signal in the area. At first, I felt really annoyed but slowly adjusted to the situation and before long actually enjoyed being out of contact. I started feeling "Wow, shit no cell phone," then, "Fuck it, just turn it off." I was there for a month and really enjoyed not being bothered by calls or texts. So, while I can live without a cell phone, I choose to live with it. Not having one is not the end of the world but it's an awful hassle.

For my cell phone I still use prepaid. It also has internet access like WAP but I'm not too familiar with this function. I use my cell phone everyday for both personal and business matters. I even text when I'm driving. I send my business cards through text. I also use the infrared function. This allows you to send free texts to people nearby who also have the infrared function.

At times I prefer voice calls. When I need an immediate answer or have to relay complex details, than I make a voice call. At other times, when I don't particularly like to talk to the person, I just send a text. Some of my relatives are very curious about my private life, so I just text them to avoid direct conversations. Cell phones facilitate but sometimes also prevent effective

communications. I can ward off inquisitive relatives by sending them short and noncommittal texts. I send about 50 texts daily and sometimes more. I also frequently send texts to friends abroad.

I think the cell phone has greatly facilitated connectivity. Both voice calls and texting now allow us to contact people anywhere, anytime. But this connectivity can also be used negatively, to prevent real communication. My friends and I often use it to not communicate with inquisitive relatives. It's so much easier to lie, particularly by texting. Children can deliberately misinform their parents about their location and activities. There is also the serious problem of text gambling. This fad is very popular among students and has recently made headlines. Students are easily tempted to gamble by texting and many of them get into very serious trouble because of this. I know 14-year-olds who are addicted to text gambling.

I've heard of people who use texting to court their partners even before meeting them. It's like chat rooms. I don't think such relationships will last. You might end up meeting a stalker. This must be for desperate people who have no other way of establishing relationships. I do send my girlfriend texts saying that I love her and we often exchange emotional messages but I would never do this with others. I really hate it when I receive texts like, "Hi, can I be your textmate?" Shit, I don't even know them. I never respond but if they persist I bar their numbers. I am tempted at times to ask them how they got my number but that would probably only encourage further exchanges.

I still remember when I had a pager. That was a big help but nothing compared to a cell phone. I would now find it very difficult to manage without one. My life is so dependent on instant communication that I would have to drastically rearrange it in order to manage without the cell phone. It does happen that some people are not contactable either because you've lost their number or they have lost their cell phone.

Cell phones make life more convenient but other things remain basically the same. I don't think one is necessarily less connected without the cell phone but people increasingly think so. They think, "Now I can contact my friends and relatives." It makes them feel more connected but I'm not sure if it improves their life.

I'm more likely to respond to texts about work than personal matters except my girlfriend. Often I don't bother to answer texts from friends or family. If they persist I simply deny receiving their earlier texts. But work related texts are more important and I always try to respond to them quickly. Whenever I have misunderstanding with friends or relatives, I prefer to text my explanations. You can compose your texts carefully, without interruptions, and make your points clearly. You are more objective and less emotional than when using voice calls. I easily lose my temper when I use voice calls in dealing with difficult emotional issues.

Melanie
28 years old, married to a Filipino cameraman
an American expatriate reporter

The cell phone has affected my life significantly, especially in relation to my Filipino family. The cell phone helps smooth out relationships in the family. My brother-in-law recently sent me a text: "Hi mel, I am very shy telling you this but no one can help me, only the two of you. I don't have any money to support my kids for their daily needs as of now." We've helped him a lot in the past, but now we are preparing for our own expenses because of the baby. Texting this request is much less awkward than making a voice call. The last time he asked my husband for help it created much trouble in the family. Using texting I can respond carefully and not give offense. In this way texting helps maintain family relationships by avoiding difficult situations or being able to deal with them more sensitively.

Cell phones and the Internet are great enablers. They allow you to stay in a social and information loop or network. For example, last Friday I decided to invite some friends to watch a movie I had just downloaded from the Net. I texted my friends in Makati and Quezon City and 15 of them turned up on Sunday. Some of them didn't know one another and so they exchanged cell phone numbers when they met at my place. The next day I helped one of them search for a new apartment that had been suggested by another guest. All of this would have been much harder to organize without texting and the Internet. I don't have time for five telephone calls but I can easily send 15 text messages.

I have a P750 Globe plan for my cell phone but often pay more, about P1000. I prefer calling rather than texting. During the day I send texts so as not to intrude at work but in the evenings I make more voice calls. I don't particularly watch my phone when at home but occasionally look at it when I pass by. I use the clock in my cell phone particularly when I was timing my contractions. I also use the alarm clock and the calculator and occasionally use it to write down notes. But my cell phone was really important during the election period. I made many voice calls and send countless texts. My mobile phone bill was over P4000. I often interviewed candidates by telephone but would often first send them a text message asking if I could talk to them. This was a real ice-breaker, particularly if I didn't know them. I would provide them with enough information via text and would follow it up with a voice call. People are also more likely to read a text from a stranger rather than accept a voice call particularly if they are busy in the middle of an election campaign. They often store the message and contact you later.

I think I'm less dependent on my cell phone than other people. I don't pay much attention to it when I'm home and don't feel compelled to immediately answer every text I receive. I try to maintain a certain etiquette and formality even when texting. My texts are usually very functional and rarely send greetings just for the sake of it. I feel intruded upon if mere acquaintances were to do that to me. During Christmas time in the Philippines I often get annoyed when people send me greetings. I know they expect you to respond and I would rather spend that time enjoying the occasion. But my husband feels very differently and gets excited whenever he gets a text message. I guess there is a major cultural

difference here. Yet my husband often asks me to send text messages for him. But he always likes receiving and sending holiday greetings. My life, both as a journalist and an expatriate, would be very difficult without the cell phone and the Internet. These technologies not only affect my efficiency but as importantly, enable me to maintain social relationships locally as well as overseas. It makes communication much easier. Life today requires constant communication at work and for social survival.

These last three examples are not meant to reflect typical users of mobile phones but rather to indicate the range of existing users. Cristina is clearly more depended on this technology than most, given her medical condition, but her use of it is nevertheless common. Melanie is privileged both by her professional and cultural background but her example illustrates how easily she has adapted it to her expatriate status. Her Filipino husband, despite coming from a far less privileged background is equally adept at adjusting his life around this new technology. Buddy leads a fast and varied lifestyle. The mobile phone allows him to navigate through the unpredictable demands of business and pleasure. Once more these examples indicate how ordinarily but essentially mobile phones have become for Filipinos.

CONCLUSIONS

Based on the results above, we can draw certain conclusions. The first observation is the pervasiveness of mobile phones even in rural areas of the Philippines. The cell phone has joined earlier commodities such as radio and television in most Filipino homes. But the mobile phone has achieved this level of penetration much faster than was the case for radio and television. The average household ownership rate of mobile phones in the rural municipalities we investigated varies from .9 to 1.4. In other words, most if not all households have a cell phone. The rates in urban communities are much higher, probably approaching 2 cell phones per household. Admittedly, since these figures are averages, they do not reveal existing inequalities in access to communication media. Compared to other domestic goods, the mobile phone has enjoyed the quickest rate of diffusion in Philippine households (Pertierra, 2003). Cell phone ownership is becoming a major index of modernity and the basis for a new form of inequality. The increase in cell phone theft now demonstrates that its possession has become an imperative.

The attitude towards CMICTs is generally very favorable, particularly for cell phones. However, there are some qualifications about CMICTs, particularly when their usage is abused. Cell phone theft has become a leading criminal problem and electronic gambling has raised some concerns, especially among the youth. Online gaming increasingly takes up more of people's time, possibly affecting more useful activities. Virtual relationships are becoming more common and while many are advantageous, others may be disruptive. The cost of CMICTs has become a concern in most families with limited incomes. Cell phones, despite their relatively low costs, are now a major expense for many families. Costs are estimated to be about P300 per month or 5% of average income.

However, the communicational advantages of mobile phones far exceed its disadvantages. Some people may spend more money and time using their mobiles than is advisable but the gains are easily recognized. Parents can maintain contact with children;

friends can exchange practical information and share affective ties. The cell phone is used for entertainment as well as a source for news. It also provides opportunities for extending networks of intimacy. The mobile phone is particularly useful for people overseas to maintain contact with their village kin. It allows them to enjoy an absent presence. This enables mothers in Hong Kong to participate in daily decision making for their families in Ilocos. They text detailed instructions as to how remittances are to be used and offer advice on families problems. In this case, cell phones don't just connect; they also mediate and shape relationships (Katz, 2003). Children can text their mother questions they would not normally ask in her presence.

Texting has become the major use of cell phones for most Filipinos (Lallana, 2004). Presently Filipinos send over 200 million texts daily, about 10 texts per user. This contrasts with Europeans who send about 3 texts daily (Ling, 2004). However, the latter are moving from SMS to MMS, as Europeans upgrade their mobile phones to include multiple functions such as cameras and Internet connections. While these advanced cell phones are also present in the Philippines, their numbers are presently negligible.

Texting is a cheap and effective way to relay basic information. Its informal nature also lends itself to novel uses, from sending greetings, to initiating friendships, to mending misunderstandings. Texts are also effective devices for eudemonic purposes. They are sources of pleasure, from sending and receiving picture greetings to making seductive propositions. Sex jokes are extremely common and are often exchanged even between parents and children. Texting combines the informality of oral communication with the reflexiveness of writing. It fuses the saying with the said (Ricoeur, 1971). Most Filipinos enjoy this conflation, but some find it corny and intrusive.

There are slight gender and age differences in the use of mobile phones. We strongly suspect that there are also class differences but will have to investigate this in the future. Men are more likely than women to use the cell phone to explore new relationships. These relationships tend to be local, whereas women prefer to initiate new relationships outside their locality. Older users are more likely to be truthful to their interlocutors than younger users, who exploit the medium's capacity for subterfuge. Men are more interested in using cell phones to initiate sexual liaisons, whereas women tend mainly to discuss personal problems. As a consequence, men are more likely to meet their hitherto unknown interlocutors than are women.

Contrary to expectations, cell phones often encourage authentic relationships. They expand networks of intimacy more readily than opportunities for subterfuge or seduction. They are seen as providing reliable knowledge. Many people depend on cell phones for the news as well as for entertainment. Services such as Text God are simply one indication of the medium's capacity to elicit deeply personal and interior experiences.

We were surprised by the relatively rare use of cell phones for local elections. While in some cases this was due to poor signal coverage, other factors also intervened. Local communities prefer face-to-face interactions and direct communication is often still the best way to achieve one's goals. But the cell phone was employed for coordinating purposes, particularly to surveil the actions of opponents.

However, for national organizations such as Bayan Muna, whose members are often the victims of political harassment, the cell phone proved invaluable. Not only were they able to coordinate activities spread throughout the province but they were also able to communicate with other media, like radio, to counteract the accusations of their opponents. The personal

safety of many of their members was greatly improved by being able to communicate effectively with one another.

In Melanie's case the cell phone proved invaluable not only to contact her election-related informants but as importantly to mediate relationships with strangers. In the midst of an election campaign, people respond more favorably to text inquiries from strangers than to voice calls. Texting allowed Melanie to initiate a virtual acquaintanceship with potential informants before embarking on more direct communication.

This chapter has briefly examined the consequences of cell phones on notions of individualism and cosmopolitanism. We assume that CMICTs encourage their users to extend and particularize their notions of agency and subjectivity. Cell phones, in particular, often shift from being mobile to being personal devices. Mobility often involves the personalization of technology to suit people's varied lifestyles. Such lifestyles require greater facilities in communication for maintaining coherent and stable relationships. Hence, mobility and individualization are inverse sides of contemporary life. The mobile phone encapsulates this dyadic relationship; it expresses the tempo of the times; it's apparatgeist (Katz & Aakhus, 2002).

Several of our informants indicated that they valued the privacy afforded by the cell phone but generally most people shared its usage. The technology has the potential of significantly expanding its users' network of intimacy. This particularization has effects on identity construction. But in many rural households, the cell phone is used by all members of the household, much like the telephone.

The cell phone encourages an exploration of the world beyond its local boundaries. The increasingly individual use of cell phones as reported by our informants encourages them to develop notions of individualism relatively free from earlier collective constraints. Hence young people can cultivate friendships with people whom their parents may not normally approve of. As we saw from the interviews, even older informants from rural villages take advantage of this opportunity to expand their network of intimacy.

All these examples simply reaffirm what has become obvious in our research: mobile phones have become thoroughly incorporated into most Filipinos' lives. For some, it is used mainly to improve an acute lack in communication structures such as contacting family, friends or work colleagues. For them, CMICTs make it possible to participate in contemporary life, with its spatial separations or temporal adjustments. For others, CMICTs are more crucial for their personal and professional lives since their identities are primarily dependent on it. Cristina, Buddy and Melanie are good examples of the latter but so is James in Iloilo. In all these cases CMICTs are centrally important. A major use of CMICTs is not just to keep in touch but also to generate social and cultural capital. As an informant puts it, "Life today requires constant communication at work and for social survival."

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TOWARDS A SOCIOLOGY OF THE MOBILE PHONE

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Abstract *Use of the mobile phone is an immensely significant social and cultural phenomenon. However, market hype and utopian dreams greatly exaggerate its importance. The fundamental issue for sociology is the process of change. Bound up with contemporary issues of change, the mobile phone is a prime object for sociological attention both at the macro and micro levels of analysis. This article considers the strengths and weaknesses of four methods for studying the sociality of the mobile phone (social demography; political economy; conversation, discourse and text analysis; and ethnography), the different kinds of knowledge they produce, and the interests they represent. Recent ethnographic research on the mobile phone, particularly motivated by issues around the uncertain transition from 2G to the 3G technology, has examined the actual experience of routine use. Interpretative research is now supplementing purely instrumental research, thereby giving a much more nuanced understanding of mobile communications. Critical research on the mobile phone, of which there is little, is beginning to ask skeptical questions that should be pursued further.*

Keywords: *instrumental research, interpretative research, critical research, ethnography, Apparatgeist.*

INTRODUCTION

To begin, I would like you to consider this quotation from Howard Rheingold's celebration of the cooperative properties of person-to-person wireless communications, *Smart Mobs*:

> On January 20, 2001, President Joseph Estrada of the Philippines became the first head of state in history to lose power to a smart mob. More than 1 million Manila residents, mobilized and coordinated by waves of text messages, assembled at the site of the 1986 "People Power" peaceful demonstrations that had toppled the Marcos regime. (Rheingold, 2002, p. 157)

Do you notice anything odd about that statement? Rheingold is illustrating the value of mobile telephony in organizing popular protest with reference to the overthrow of Estrada in 2001. Yet he underlines this point by reference to a much earlier and comparable event in 1986 when, presumably, mobile phones had not played a significant role in mobilizing the masses.

That's one example; here's another. My 18-year-old daughter and my 21-year-old son find social life virtually inconceivable without a mobile phone. Maintaining a friendship network and arranging meetings would be just too much hassle without the mobile. Yet, when I was 18 or 21, I had friends too and, somehow, I managed to meet up with them.

I make these observations merely to reflect upon how a recent luxury has become a current necessity and to register a note of skepticism concerning the allegedly transformational capacities of newer information and communication technologies. Commercial hype and utopian anarchism, to my mind, mystify rather than illuminate the significance of the mobile phone. Which is not to say it is insignificant. The mobile phone is an immensely significant social and cultural phenomenon.

At the beginning of his book, *Constant Touch: A Global History of the Mobile Phone*, Jon Agar (2003) smashes up his mobile phone to scrutinize what it contains. The raw materials in its many components are culled from around the world, such as nickel for the battery from Chile, microprocessors and circuitry from the USA. Petroleum for the plastic casing, molded, say, in Taiwan, and for the LCD (liquid crystal display) comes from somewhere like the Persian Gulf, the North Sea, Russia or Texas. The rare metal tantalum, essential for capacitors that store electrical charges, comes, most likely, from the aboriginal lands of Western Australia or the Democratic Republic of Congo. During the 1990s the price of tantalum per pound shot up from US$30 to $300. Columbite-tantalite (coltan), mined in the North East of Congo, is a source of civil war over mineral rights and the revenue from its mining continues to fund hostilities there. This process is one way of defamilarizing what has become a very familiar object over the past few years.

The mobile phone is not reducible only to a material object, a commodity circulating in the global economy of transnational operations, of course; it is also a means of communication with considerable social and cultural significance. For some users, the sign value of this object might actually exceed its use value, functioning as a magical fetish, which is certainly the message of much advertising. The mobile is a symbol in itself, an obscure object of desire and a sign of the times. Early efforts have been made to map out a general sociology of the mobile phone (Geser, 2003; Katz & Aakhus, 2002). This paper has no such comprehensive ambition. The following notes towards a possible sociology of the mobile phone aim to identify key issues in theory and methodology. It is important to situate the mobile phone in relation to the sociology of change, the macro level, and everyday sociality, the micro level.

SOCIAL CHANGE AND NEW COMMUNICATIONS TECHNOLOGY

The core subject matter of sociology is change. As a discipline, sociology emerged historically in order to make sense of modernization, to put it very summarily. Classical sociology was preoccupied with analyzing the differences between tradition and modernity. Social life was changing dramatically and sociology sought to understand and explain the emerging modern condition. Towards the end of the twentieth century, sociology returned to

its focus upon the dynamics of macro-change in making sense of the emergence of what had been called "the postmodern condition" (Lyotard, 1979/1984). Many commentators discerned a transition occurring between epochs, comparable to the shift from tradition to modernity, and named the new condition in various ways, for instance, "post-industrialism," "reflexive modernity," "global neo-liberalism," and "the information age," as well as "postmodernity." The most compelling account of epochal change at the turn of the millennium was given by Manuel Castells (1996, 1997a, 1998) in his three-volume magnum opus, *The Information Age*. The first volume is entitled *The Rise of the Network Society*. Castells places great emphasis on the role of information and communication technologies (ICTs) in contemporary change, though it has to be said that modes of communication are integrally related to any social formation. The general argument is transhistorical. If you want to understand any kind of society you should look at how its members communicate with one another.

According to Castells (1996, 1997a, 1998), it is the complex, proliferating network principle that characterizes computer-mediated communications. Complex networking also characterizes social relations in the information age. This seemed to imply that changing social relations were an effect of technological change. Castells's thesis is vulnerable to the critique of technological determinism (Williams, 1974; Winston, 1996). On the topic of technological innovation in communications and its social impact, there are two general questions to ask. First, how do new communication technologies come about? Second, what is the relation of new technology to social and cultural change? The ideology of technological determinism awards absolute primacy to technology. It assumes a linear process of autonomous scientific discovery that is more or less swiftly applied to technical invention, resulting in smooth diffusion and eventual social transformation. When the history of any such technology is looked at closely, however, it becomes evident that a combination of cultural, economic and political determinations are involved in putting the accelerator or brake on technological innovation. Against sheer determinism, intention comes into the process, involving decisions, wise and unwise, along the way, which have unintended as well as intended consequences. Always alternative decisions could have been made that would have resulted in different outcomes and might yet still do so. However, it is in the interests of corporations in the business of developing and marketing new technologies to make extravagant claims about inevitable and beneficial effects on society and social relations.

Castells is careful to defend himself against the criticism of technological determinism. He argues that there are two other major dynamics, in addition to the information technology revolution, shaping network society. These are the three interrelated processes identified by Castells (1997b):

1. *The information technology revolution* since the 1970s (the micro-chip, desktop computers, telematics, exploitation of the Internet, etc.).
2. *The restructuring of capitalism and statism* in the 1980s (shift from Fordism to post-Fordism, globalization, collapse of communism, undermining of the welfare state and trade unionism, etc.).
3. *The cultural social movements* that emerged from the 1960s (peace, feminism, ecology, etc.).

John Urry (2000) has explored the implications of such change for sociology itself in his book, *Sociology Beyond Societies*, which is subtitled *Mobilities for the Twenty-First Century*.

Urry places less emphasis on technological development than does Castells. His view is closer to Zygmunt Bauman's (2000) notion of "liquid modernity." In the late-modern world, change is about increasingly rapid movement. According to Urry (2000):

1. Sociology has neglected mobility, particularly of people, as a cardinal feature of sociality.
2. Mobility does not only refer to the movement of people but also "of other entities, of ideas, images, technologies, monies, flowing across various scapes" (Urry, 2000, p. 188).
3. The object of social analysis can no longer be conceived of as "society" in the static form of a nation state but, instead, sociology should study global flows.

Curiously, in his treatise on mobile sociology, published in the year 2000, Urry barely registers the mobile phone. There are a few passing mentions, however, such as his noting of ring tones in the social landscape: "The 1990s sound icon is the mobile phone" (Urry, 2000, p. 102). Around the turn of the millennium, then, neither Castells nor Urry saw much social significance in the mobile phone itself, except as one feature of ICT development and of a pervasive mobility in the late-modern world. This may just indicate how even the most up-to-date and far-sighted sociologists can be taken somewhat by surprise, just like everyone else.

The shift from first generation (1G) to second generation (2G) during the 1990s, from be-suited business users with their bricks on display to mass-popular use, particularly as a leisure medium for the young, was astonishing. Nobody genuinely believes that the same kind of sudden tipping point will occur in the transition from 2G to 3G, although Nokia and other companies talk it up incessantly. In the business, there has been great uncertainty over the launch and viability of third generation (3G) mobile telephony in the opening years of the twenty-first century.

In 1997, the British government commissioned a games strategy unit at University College London, led by Ken Binmore, to design an auction for the sale of 3G frequencies. This succeeded spectacularly. At the height of the dot.coms boom in 2000, five 20-year licenses were sold at a combined total of £22.5 billion to Orange, BT, One to One, Vodaphone and Hutchison (see e.g., Radiocommunications Agency, n.d.). Very soon this "license to print money" looked far from guaranteed with the collapse of financial confidence in dot.coms. Similar lucrative auctions took place in other countries with similarly shaky results. Perhaps the Finnish government was wise to give its licenses away for nothing.

Around the time of the British auction there was a health scare concerning mobile phones. Might the radiation emitted from them cause brain cancer, especially in the vulnerable young? A current public inquiry in Britain was recommending caution in the use of mobiles while the government, before publication of the Stewart report (Independent Expert Group on Mobile Phones [IEGMP], 2000), leaked its findings inaccurately as providing a clean bill of health for mobile telephony.

Adam Burgess (2004) has surveyed the health issues concerning the effects of radiation in heavy use of mobile phones and proximity to the communication towers that have sprung up all over the place. Stories regularly appear in the media about the effects especially on children living close to towers, not dissimilar to stories about ill health in the locality of nuclear power stations. Public protests against the emplacement of towers have brought the issue to widespread attention. However, Burgess is skeptical of the evidence of adverse effects on health and comes to the conclusion that anxiety in this respect is unfounded because mobile telephony is not a proven health hazard.

This is a classic risk society issue where nobody really knows the long-term effects for good or ill of a massive real-life experiment on the public, the results of which may not be known for several years when it is too late for the sufferers (Beck, 1986/1992). The phone companies are acutely aware of the possible risks and have patented protective shields for mobiles. In spite of occasional media panics and much less publicized concern within the industry, however, the public is not so well informed of the potential health hazards of mobile telephony.

Anxiety over health is not what has held up a swift transition to 3G. This has more to do with business finance, building infrastructure, spiraling consumer costs and the search for a "killer application," in the unfortunate term used by the industry. The long sought after killer application, it is thought, will persuade everyone to switch from comparatively inexpensive 2G to the inevitably more expensive, yet more expansive in application, third generation multipurpose mobile device. In the meantime (writing in 2004), we have the fad of picture messaging.

QUESTIONS OF METHOD

The theories of Castells (1996, 1997a, 1998) and Urry (2000) may set the general framework for a sociology of the mobile phone but they do not prescribe how to study it. Here, it is necessary to say something about knowledge and interest. Jürgen Habermas (1968/1972) once distinguished between three kinds of knowledge interest, each in turn defined by its different research orientation.

1. Instrumental research oriented towards utility, similar to Jean–Francois Lyotard's (1979/1984) performativity principle. Lyotard argued that postmodern knowledge is not about the search for truth but, rather, for pragmatic results. This is undoubtedly the main knowledge interest and orientation of scientific research now and, most consequentially, funding and investment.
2. Interpretative research oriented towards understanding, framed by the values of mutuality irrespective of cultural differences.
3. Critical research oriented towards emancipation, that is, political amelioration of injustice.

Lyotard (1979/1984) was dismissive of both interpretative and critical research as passé, yet both can be seen in play, as well as prevalent forms of instrumental research, in sociological study of the mobile phone.

The orientations themselves do not necessarily specify methodological principles and research techniques. There are many potential ways of framing research problems and strategies regarding the mobile phone. Here, I shall identify four broad and appropriate methodologies in relation to knowledge interests.

Social demography

This is where most effort is put into data gathering, identifying the scale and range of usage in different segments of the population. It is useful to business and government. Phone companies want to know about the market, to open up new markets, and to develop products that are marketable. From a policy point of view, governments require facts and figures too.

We know, for instance, that Finland has the highest number of mobile phones per head of population in the world (Puro, 2002) and, perhaps surprisingly, the per capita use is comparatively low in the USA. That does, indeed, tell us something about culture and society in Finland, a large mass of land on the northern edge of Europe with a relatively small and dispersed population, and in the USA, where local landline telephone calls are usually free. The mobile phone and related industry is the leading element of the Finnish economy and a matter of national pride. However, generally speaking, social demography is not so much sociology in the explanatory sense but a means of description, providing evidence that may be interpreted and used according to various interests, and not necessarily the interests represented in its construction.

Political economy

The term *political economy* is used to distinguish a particular kind of research from positivistic economics. Politics and economics cannot be divorced from one another. Political economy of communications is usually critical. It looks at how corporations command the field and increasingly usurp the role of government. Typical issues, from this perspective, are media imperialism, neo-liberal communications policy, deregulation, privatization and "the digital divide" (see e.g., Schiller, 1999). Business structures and processes of mediated communication amplify economic inequality and political power relations. Even Castells (1996, 1997a, 1998) says this is so of ICT development, with sub-Saharan Africa, in particular, hugely disadvantaged. However, the Internet was also seen as a new means of communicative access. Recently, attention has shifted on to the mobile phone as the means of emancipation. It is relatively cheap to access and, for regions with poor landline telephony and digital connectedness, the mobile phone and the all-purpose communicational device are said to leap a stage of technological development.

Conversation, discourse and text analysis

Social demography is useful and political economy essential. Neither, however, has much to say about meaning. Here, we turn to various techniques of linguistic analysis. Obviously, conversation analysis is relevant. Language, however, is more than the minutiae of conversational turn taking and so on (see Schegloff, 2002). Mobile communications have discursive properties linked to social behavior in different contexts. The very design and representation of the object itself and its diverse social uses are meaningful. Then, of course, there is the surprising phenomenon of text messaging that has caught on, especially among young people, to an extent that nobody predicted. The abbreviated language of text messaging is a new kind of shorthand, which may have an impact on language generally. It is also a medium of sub-cultural identification. Many older people just can't get the hang of it.

Ethnography

This takes us into the territory of ethnography, which derives from the anthropological practice of immersion in other cultures in order to grasp and convey social reality from the point of view of "the native." This qualitative approach to studying everyday life has become popular in sociology and cultural studies where the researcher may be studying his/her own

culture and society. Seldom is research of this kind conducted with the depth of classical anthropology. There usually is not enough time and insufficient resources for such detailed research. Often the work is small-scale and brief, deploying unstructured and semi-structured interviewing and focus group techniques, and, normally to a lesser extent, observation. In practice, the selection of interviewees and groups aims to be representative but not in the statistical sense.

Ethnography is subject to criticism for being slight and unrepresentative by those who prefer large-scale sample surveys. However, qualitative research in an ethnographic mode has its own criteria of validity that are not quantitative. It is concerned with typicality, the rich texture of everyday life and fine differences of culture. When done well, this works better than attitudinal surveying and opinion polling, though qualitative and quantitative methods may complement one another and be combined together in a project. Facts and figures give a broad picture of what is going on whereas ethnography is better at representing the nuances and complexities of everyday life. Incidentally, the use of focus groups has become increasingly common in market and political research as well as in "disinterested" research.

Ethnographic Studies

Here, I shall concentrate on ethnographic research with regard to the mobile phone and its social use. I want to discuss three recent British studies of the mobile phone's social use: *Mobile UK—Mobile Phones and Everyday Life*, by James Crabtree, Max Nathan and Simon Roberts (2003); *Mobilisation—The Growing Public Interest in Mobile Technology,* by James Harkin (2003); and *On the Mobile*, by Sadie Plant (2002).

All three studies use ethnographic methods. None of them, however, can strictly speaking be regarded as "disinterested." *Mobile UK* was funded and conducted by the charity the Work Foundation, which is dedicated to research in the interests of British business (Crabtree et al., 2003). *Mobilisation* was commissioned by the British-based firm O2, and conducted by the New Labour think tank Demos (Harkin, 2003). *On the Mobile*, which can only be accessed through cyberspace, was done for Motorola, the American-based phone company (Plant, 2002).

Mobile UK

The *Mobile UK* report must be seen within the business context and anxieties around the launch and viability of 3G mobile telephony in the opening years of the twenty-first century (Crabtree et al., 2003). In effect, *Mobile UK* seeks to bring a bit of realism to the telecommunications industry. It criticizes research that gives disproportionate attention to certain groups of mobile users—"young urban professionals, mobile business people, and teenagers" (p. 6)—who are generally said to be the early adopters of newer communication technologies. *Mobile UK* is concerned, instead, with more mundane and widespread use. An earlier piece of research (Crabtree, Nathan, &. Reeves, 2002) by the same organization had distinguished between "enthusiasts," "quiet pragmatists," and "aversives" but, this later research found these categories to be less fixed and more overlapping. It is advisable, then, to explore how the mobile phone is embedded in the most typical routines of everyday life. To this end, ethnographic research is appropriate.

It must be said, however, that the ethnographies conducted for *Mobile UK* are very limited in scope. There are just four case studies of individuals and their social interactions

through mobile telephony. They are, nevertheless, insightful. The case studies are focused upon Denise, a hairdresser who is married with children; Jack, a plumber; Louise, an unemployed single mother; and Darius, an IT worker. The case study of Denise, for instance, illuminates how family relations are managed with the aid of the mobile phone, especially childcare. The case of the plumber, Jack, is also very interesting. If you have ever tried to get hold of a plumber in an emergency, knowing his/her mobile number is handy. However, Jack often has his phone turned off because he isn't short of work and doesn't want to be disturbed on the job. He is also reluctant to move on to 3G because it might suggest to his customers that he is too well off through charging them too much.

These examples may be considered merely anecdotal. Nonetheless, they do illustrate the mundane character of mobile use and redress the balance of attention from more extreme and less routinely practical uses and extravagant predictions concerning future use. *Mobile UK* stresses the practicalities of everyday life, the embeddedness of 2G in routine habits, and advises caution about the take-up of 3G (Crabtree et al., 2003). It also points to the financial realities of mobile use. With the explosion of mobile use in the late '90s it was possible to sell phones very cheaply or even give them away. Pre-pay deals were popular since they enabled people to control their expenditure on mobile telephony. It is very difficult to wean people off such deals and sensible habits, encourage them to spend much more casually, and access expensive new services.

The recommendations to the industry made by *Mobile UK* are less than amazing. It is suggested that upgraded devices should facilitate specific tasks, exploit networking, be priced reasonably, target users' mobility, and be simple to use. Thus is the wisdom revealed by instrumental, market-oriented research concerning the advent of 3G mobile telephony.

Mobilisation

The Demos report for O2, *Mobilisation,* is also anxious about take-up for 3G but its message is aimed more directly at government than business (Harkin, 2003). It displays the typical features and, indeed, contradictions of New Labour/Third Way politics. If *Mobile UK* is instrumentally market-oriented, *Mobilisation* is instrumentally government-oriented. It is more socially concerned but in what may be regarded as a patronizing and, indeed, unrealistic manner.

Mobilisation registers a certain social hostility in some quarters to the mobile phone but argues that this is largely mistaken. The full potential of mobile telephony is yet to be realized and, in this, government has a role to play. The report says that "government bodies will need to open up their intestines to mobile users" and mobilization offers "more flexible models for public service delivery" (Harkin, 2003, p. 10). The aim of the report is to issue "a wake-up call for Britain" (Harkin, 2003, p. 10).

The research conducted by Demos is rather more extensive than the Work Foundation's project. Four focus groups were studied, and ten individual users and nine experts interviewed. One of the focus groups was on the Isle of Man where O2 has been conducting a pilot study of 3G with 200 participants. Another group—in Bromley, Kent—consisted of 16- to 18-year-olds.

For regular users, the mobile phone has become a prosthetic, an extension to the body. It has several different functions already. The industry has mistakenly promoted it as a toy, thereby trivializing its actual and potential uses. Particularly important, according to *Mobilisation,* is the "declining reserves of trust in modern society" (Harkin, 2003, p. 18). The

mobile is a means of protection and a bonding device for friends and family. This is particularly so for young people: it overcomes shyness and facilitates subcultural formation through SMS (short text messaging) and shared use. Still, however, the mobile is a "locus of social anxiety" (Harkin, 2003, p. 26), particularly regarding health and crime.

Perhaps the most interesting observation made by the *Mobilisation* report is that if the Internet is about globalization, then the mobile is about localization. It tends to cement local social bonds and, with further technical development, it will be an easily usable location device, a means of orientation in place. This illustrates its capacity to do things other technologies cannot do.

Typical of Third-Way thinking, *Mobilisation* recommends the mobile's potential for marketing and customer relations while simultaneously calling for tough anti-spam laws that it admits are hard to enforce. The author of *Mobilisation*, James Harkin (2003), is also struck by the fact that in just one hour of November 2002, 200,000 votes were cast by SMS for contestants in the television program, *Popstars*. While some might see this as an instance of a popular cultural trivialization of democracy and distraction from it, not Harkin. Government should learn from the public's enthusiasm for mobile voting. Perhaps, in future, party political manifestos could be downloaded and clips from political speeches viewed in this way as well as remote voting in elections, not only in game shows.

Other political suggestions flowing from *Mobilisation* include restricting police accessing of mobile location data to cases of serious crime and terrorism, online government information accessible by mobile, and a mobile government forum for stakeholders. There has been considerable public disquiet about the location of masts and base stations. However, Harkin (2003) argues, local authorities should not be allowed to restrict such development; so much for democracy.

On the Mobile

Sadie Plant's (2002) research for Motorola, *On the Mobile*, is the most interesting of the three studies under consideration here and it is more properly sociological in a theoretical sense than the others. Plant is formerly of Birmingham and Warwick universities, now a freelance author of well-regarded books on French situationism, on women and computing, and on drugs and writing.

Her research for Motorola is an international comparative study with data from Tokyo, Beijing, Hong Kong, Bangkok, Peshawar, Dubai, London, Birmingham and Chicago. Plant conducted face-to-face interviews with individuals and groups. She also interviewed people by email. And, like a good social anthropologist, Plant observed behavior with the mobile phone in public places. In order to explicate her data, Plant draws on ideas from sociologists Erving Goffman (1959/1971) and David Riesman (1961/1989). In effect, she produces a fairly rich cultural analysis of mobile phone use.

The most conspicuous use of the mobile phone is in Tokyo. Mobile use is largely confined to the elite in Peshawar. Mobiles are most used in Nordic countries. And, there is a very high rate of use among the young in Britain. Otherwise, however, according to Plant, mobile use does not differ as much as you might expect from country to country.

Plant (2002) is observant of the rituals of use in public places. Being "on the mobile" in public is itself a ritual act. There are, however, different types of response to a call. Some take flight on receiving a call, that is removing themselves from the immediate social situation,

stepping outside or whatever. Others put the people they are with in suspension while they take the call. Another typical kind of response—that of persistence—occurs as well, whereby communicative interaction is maintained in copresence when simultaneously taking and making the call. Plant (2002) also distinguishes between what she names as "innie" and "outie" behavior by mobile users. Innies use their phones as unobtrusively as possible whereas outies integrate phone conversation into the situation of copresence. These different kinds of response and habitual behavior are associated with complex rules of etiquette that have developed around mobile phone use. For instance, Plant compares formal restaurant and informal café situations in England. Mobile phone use is often banned in formal situations and, in any case, people tend to keep their phones turned off or use them very unobtrusively in smart restaurants. The hubbub of an informal café includes the placing of phones on tables and a great deal of mobile chatter.

Differences between masculine and feminine behavior are noticeable, though not always as sharply different as might be expected. There is a tendency for men to show off more with their phones—stage phoning—and there tends to be a certain competitiveness between men, particularly with the alpha male's newer model on display. The young in general—both male and female—also tend to be concerned with the fashionable value of the phone. Women tend to be more discrete, usually with their phones tucked away in bags, except that is for single women in public places who are apt to display and use the mobile as a kind of protective device.

There are sets of stances, gestures and body movements associated with the phone. Plant distinguishes between "speakeasy" and "spacemaker" stances. The speakeasies are extravagant with their gestures, throwing their heads back, bouncing around and so forth. The spacemakers are more introverted and make cocooning gestures in public when on the mobile. And, there are different styles of grip and touch.

As Plant (2002) notes, the advent of the mobile was bad news for philanderers, dropping clues of illicit behavior, like the phone turned off unaccountably in the middle of the day and messages left carelessly on the phone for a suspicious partner to find. The mobile has all sorts of other emotional functions too. Texting may be used more readily than speech by the shy and reserved. Generally, the mobile helps to maintain established relationships. This is particularly noticeable in girls' friendship groups, whereas boys tend to use the mobile more as a toy.

Plant sees the mobile as a feature of fragmented identity, as a kind of prop for the self, and she gives animal and bird analogies to identify typical modes of use, such as "the hedgehog way" of managing privacy. Her bird analogies are the Swift Talker, the Solitary Owl, the Calm Dove, the Chattering Sparrow, the Noisy Starling and the Flashy Peacock.

As a less amusing but more sociologically grounded typology, Plant (2002) draws upon Riesman's (1961/1989) distinctions between "tradition-direction," "inner-direction," and "outer-direction." Tradition-directed people are still likely to be scandalized by the use of mobiles in public places in that they cross the boundaries between public and private. The inner-directed person may use the mobile but be concerned about not breaking the traditional conventions of appropriate conduct in public. The outer-directed person embraces the boundary breaking of mobile telephony as part of a looser and more flexible lifestyle. These three types are associated with specific fears: for the tradition-directed, fear of dependence; for inner-directed, fear of guilt; for outer-directed, fear of isolation.

Plant is obviously on the side of the mobile phone, viewing it as a tool of emancipation, not only for the relatively well off but for the poor of the world, a stimulus to growth and

modernization in developing countries. For her, the critics are just fuddy-duddy old traditionalists. That conclusion may have been consoling to Motorola, though I am not sure quite how useful it is for stimulating the sale of upgraded 3G devices.

CONCLUSION

You will look in vain to find genuinely critical research on the mobile phone that opens up debate on its cultural value and social purpose, especially any such research commissioned by the likes of Motorola. On the other hand, the mobile has been studied and extolled as a valuable tool for organizing public protest (Rheingold, 2002). There is, of course, a good deal of carping about the mobile in public life, usually by what a recent television series in Britain called "grumpy old men." I suppose these are Plant's tradition-directed types. This is unfortunate since there is a critical question to be asked of the mobile phone to which perhaps anyone might be interested in the answer. While the mobile phone extends and increases the sheer volume of communications, does it actually improve the quality of communication?

Some would say this is an illegitimate question for social science, not least because it is methodologically impossible to answer. However, we can think and argue about it. In this respect, I would recommend a little book by the literary academic, George Myerson (2001), entitled *Heidegger, Habermas and the Mobile Phone*. Myerson compares the theorizing in social philosophy on the constitution of and blockages to satisfactory communication between people with the promotional discourse of the mobile phone industry that seems to promise imminent realization of the philosophers' dream. However, the industry's claims are shallow market speak, not serious grounds for a communicative utopia. To quote Myerson (2001, p. 27): "In the mobile version, we have millions of goal-seeking atoms, making basic contacts through the power of the network. In the philosopher's version, you have the slow, distinct 'conversation' through which parties seek a deeper contact…." In Myerson's estimation, the mobile functions to systematize the life world, "replacing meanings with messages, consensus with instructions and insight with information" (Myerson, 2001, p. 65).

Myerson's philosophical critique is challenging and should be taken seriously. The problem with such critique, however, is that it tends to be idealist rather than materialist. It may even inspire those who believe the clock should be turned back to some bygone age, as did Martin Heidegger but not Jürgen Habermas; that an Apparatgeist, in Katz and Aakhus's (2002) neologism for the mobile phone, could somehow be disinvented. This is hardly likely or desirable. It bespeaks a hopelessly romantic technophobia. The spirit of the machine in our mobile age of neo-liberal globalization is not a phantasm to be wished away but deeply embedded already in routine social practices and relationships, which is not to say it is beyond criticism. The mobile phone is most popular with youth and designed and marketed to be so, catching them young before maturity sets in. It is a "cool," miniature, and mystified gadget, no longer considered a luxury but felt to be a necessity by many. The mass-market potential of mobile telephony has been exploited to a remarkable degree in a very short period of time. Current and future developments in the industry are about further market expansion without limit, keeping the commodity process turning over relentlessly. The all-purpose mobile communication device linked to the Internet, providing a plethora of novel services such as film clips and the latest goals from the Premiership, video phoning and much else besides do not come cheap. The industry is desperate to persuade people to switch from 2G to 3G, throw

their old mobiles away and pay for new and much more expensive models and services. It is yet to be seen if that will happen to the extent sought by the telecom companies that are, in any case, not so sure about it as a few years ago when they shelled out huge sums for the franchises. Whether or not the latest thing is all that it is cracked up to be and catches on widely is always questionable and not only a matter of intellectual skepticism but also of popular judgment and consumer reluctance as well as enthusiasm. From a sociological point of view, actual and potential social uses across the generations and in different circumstances of life are more important topics for discussion than sheer technological capability and over-hyped marketing gimmicks.

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GROUNDING THE INNOVATION OF FUTURE TECHNOLOGIES

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Abstract: *Mobile and ubiquitous technologies can potentially change the role of information and communication technology in human lives. Empirical, human-centered approaches are emerging as an alternative to technology-driven approaches in the innovation of these technologies. Three necessary empirical stages, intertwined with analytical ones and with each informing and grounding the succeeding stages, are analyzed. First, needfinding is utilized to discover societal and individual demands for technology. Second, observational and experimental studies examine the social and cognitive preconditions for interaction. From these two steps, a hypothesis is formulated regarding how technology will change existing practices. Finally, this hypothesis, embodied in the design of a prototype, is tested in a field trial. Four design cases illustrate the value of empirical grounding.*

Keywords: *user-centered design, mobile human-computer interaction, ubiquitous computing, technology innovation, design process, user studies.*

GROUNDING THE INNOVATION OF FUTURE TECHNOLOGIES

Recent advances in hardware and software technologies have led many to believe that we are on the edge of a shift regarding the current information technology frame. Processors, memories, wireless networking, sensors, actuators, power, packing and integration, optoelectronics, and biomaterials have seen rapid increase in efficiency with simultaneous decreases in size. Moore's law (see Schaller, 1997) on the capacity of microchips doubling every 18 months and growing in order of magnitude every 5 years has been more or less accurate for the last 3 decades. Similarly, fixed network transfer capacity is growing in order of magnitude every 3 years, wireless network transfer capacity every 5 to 10 years, and mass storage every 3 years. Significant progress in power consumption is less likely, however. Innovations and breakthroughs in distributed operating environments, ad hoc networking, middleware, and platform technologies have recently begun to add to the software side of the vision. Innovations in input and output technologies are shaping the way as well.

(M. Mäntylä, personal communication, January 5, 2004; Satyanarayanan, 2001; Tennenhouse, 2000; Weiser, 1991).

From a human perspective, these mobile, personal, and ubiquitous technologies are transforming the nature of interaction with computers. Most researchers accept that human-computer interaction (HCI) is shifting from stationary desktop computers towards interaction that takes place in rich use situations "beyond the desktop." The ubiquitous computing enterprise envisions a world with thousands of computers per user embedded within their everyday environment (Weiser, 1991). The vision builds on the idea that computers adapt to the surrounding use situation, the context. What context concretely entails has important implications for the design of interaction and the user experience. Initially, context was mostly synonymous with location, but was soon extended to cover other aspects as well. For example, wearable computing (Mann, 1996) looks at wearable personal computers able to help us remember and capture our everyday experiences through video and sound recording of our daily contexts. Tangible bits (Ishii & Ullmer, 1997) examines context not as something that had to be reacted to, but as the user's surroundings that could be augmented with tangible (i.e., "graspable") computers and as ambient media that display digital information using distraction-free output channels. Context has been a thorny issue in the past, and the debate still continues.

In many other respects as well, the research is currently in an anomalous state. New concepts and new approaches are introduced frequently, and there seems to be no consensus for what and how the new technologies are going to be used, or how to develop them rigorously. To mention a few controversies, some claim that the new era of interaction is going to be more physical, engaging, and tangible, whereas others want future computers to be ambient, disappearing, or even invisible. Some proposals seek to provide resources for spontaneous user-initiated action, whereas some think it should be proactive—anticipating events and acting autonomously without user intervention. Moreover, the tenet "access to information anywhere, any time" has been criticized, and a more relaxed, asynchronous interaction style that leaves more room for reflective cognition has been called for. One might ask if controversy and the richness of approaches is a natural element of progress or an indication of diverged research efforts that cannot systematically tackle the fundamental interaction problems in future human-computer interaction. One situation hinting that the latter might be true is that there are few if any mass consumer products featuring context-aware computing, even after almost 15 years of research (For details, see Oulasvirta, 2004a; Oulasvirta & Salovaara, 2004).

This unfortunate situation stems partly from the lack of empirical work that would help innovators to *ground* their ideas. The design of technological artifacts is essentially a cognitive activity that can be characterized as problem-solving activities undertaken by individuals (Simon, 1969). "In essence, artifacts are implicit psychological hypotheses that are tested through subsequent empirical evaluation" (Ball & Ormerod, 2000, p. 148). Since the 1990s, it has been increasingly clear that the artifactualized hypotheses must be grounded in knowledge about the user, about her practices and about the use contexts (Ehn, 1988; Wixon, Holtzblatt, & Knox, 1990). Designers, therefore, need to assess how technological artifacts can support and transform the understandings about users' practices. This knowledge can be informative (providing useful research findings), predictive (providing tools to model user behavior), or prescriptive (providing advice regarding how to design or evaluate) (Rogers, 2004). Moreover, hypotheses must be explicated, verbalized, and communicated in

the social practices constituting design processes. Without explication and proper formulation, hypotheses cannot be confirmed, tested, confronted, questioned, or rejected by additional, novel evidence. Put briefly, grounding is as an activity in the design process that explicates hypotheses based on factual, testable knowledge about users' needs and behaviors and use contexts, which results in better design choices.

According to a recent review of mobile HCI research methods, most research is driven by technological motives rather than user-centered principles (Kjeldskov & Graham, 2003). An underlying, albeit false, presumption among technology-driven researchers is that the main problem in research is a technological one, of constructing the apparatus. This is understandable, as in technological breakthroughs such as the invention of the ubiquitous computer the lead researchers tend to be technologists who often lack education in behavioral or social sciences. However, the relevant interaction phenomena are so complex, multidimensional, and dynamic that empirical grounding—that is, truly understanding the needs and uses of technology by users—is necessary.

This paper argues that innovation, development, and evaluation of design ideas cannot be based only on the designer's intuitions but must be grounded in users' actual needs and behaviors. We need to apply social and psychological sciences to understand how technology could qualify a positive change for the users (Oulasvirta, 2004a). The user-centered design tradition serves as a natural starting point for this agenda.

Having said that most innovation of future technologies is technology driven, it is important to see that an alternative approach is slowly emerging. Since the breakthrough years of 1996–97, increasingly more user-oriented researchers have embarked on studying the ubiquitous computer. Socially oriented researchers have started to emphasize the social context and issues in people's practices and everyday conduct. These approaches give special consideration to activities that people engage in and highlight their complex nature (Dourish, 2004). Activity-centered approaches emphasize turntaking in communication between the user and the applications (e.g., Fischer, 2001), and the knowledge of the situated and time-varying natures of the user's needs in daily life (e.g., Greenberg, 2001). This line of research highlights the difficulties that exist in computers making correct inferences about a user's tasks through impoverished sensor information data. Considerations of social issues in ubiquitous computing design include questions such as how to fit computational intelligence into people's routines in an unremarkable manner (e.g., Tolmie, Pycock, Diggins, MacLean & Karsenty, 2002) and how people's patterns of interaction with humans and computers change when computationally augmented artifacts are adopted for use.

Although these considerations raise important points, especially regarding the boundary or preconditions for the acceptance of ubiquitous computing (e.g., alignment of interaction to social practices; Tolmie et al., 2002), they are silent regarding how to innovate use purposes in the first place. Importantly, this gap in research has been recognized in several recent discussions. As another indicator of the turn in the research on future technologies, within the past 4 years or so, more and more stringent criteria have been imposed within HCI literature on publications introducing new mobile or ubiquitous interaction mechanisms. For example, field evaluation with representative users (not researchers themselves) is often required.

TOWARD AN EMPIRICAL FRAMEWORK FOR THE INNOVATION
OF FUTURE TECHNOLOGIES

This paper sketches a framework for empirical grounding of innovation of future technologies. Inevitably, such empirical grounding restructures the processes of innovation, development, and evaluation. The value of such approach is justified and several illustrative example design cases are provided.

The foundation of this emerging framework is tied to the tradition of user-centered design in HCI. User-centered design (UCD) has conventionally embraced as its values (a) the role of human needs in directing innovation and design (A. Kankainen, 2003), (b) the importance of understanding users in their natural use contexts (Beyer & Holtzblatt, 1997), and (c) the goal of enhancing people's activities and tasks through technology. However, new directions are seen within UCD as well. Social computing (Schuler, 1994; for an application in ubiquitous computing, see Dryer, Eisbach, & Ark, 1999) emphasizes the embeddedness of technology within social context and also studies the social change it causes. The value-sensitive design approach (Friedman, 1996) adds to the previous ones by emphasizing the role of human values and morals in deciding which features of technology are relevant and worth pursuing in design (e.g., user autonomy).

Three fundamental empirical stages can be distinguished from, yet interweaved with, consequent and necessary analytical stages. They differ in terms of the objective of the research and methods, and the function of expected outcomes. First, empirical research is conducted to discover user needs related to future technologies. In the following analytical stage, user needs are analyzed and selected for further inspection while keeping in mind the capabilities of the intended class of technology. These studies are succeeded by the analytical stage of selecting the studied user groups and the parameters of the use situations. These decisions should be based on how representative or desirable the user group or the use situation is, but in practice issues are posed by access to groups (often the user group comprises easily accessible people, such as other researchers or students) and the limitations of technology.

Second, empirical studies are needed to understand and concretize the use situations related to the user needs. The understanding gathered at empirical stages one and two serves as the basis for articulating hypotheses regarding how technological intervention will introduce a change to the existing human practices. This analytical phase is followed by a one that translates this hypothesis into design and embodies it in a prototype. In the last empirical stage, the hypothesis is tested in a prototype intervention study. The hypothesis is either rejected or retained, the former leading to reformulation of the underlying user needs, and the latter to improving the design and again testing it in a field trial until satisfactory results are obtained.

In Jürgen Habermas' (1971) terms, all three empirical stages are only secondarily hermeneutic in regard to their interest of knowledge, but primarily technical. That is, instead of just describing or explaining user behavior, findings from empirical stages must enable counterfactual thinking—to entertain, predict, and simulate alternative behaviors mediated by technology.

From the perspective of design, three principles are endorsed. First, design is based on the understanding of the social and individual needs and qualities of the use situations. Second, design is an embodiment of a hypothesis regarding how technology will change social practices or communities. Third, design is evaluated by testing the hypothesis in the field.

The rest of the paper is organized according to the three empirical stages. Four design cases are provided to illustrate the ideas.

Stage I: Empirical Studies to Discover User Needs

The first empirical challenge is to discover and articulate what users' motivations and needs could be addressed by a new technology. That makes it much more challenging theoretically at the initial stage.

Corporations have traditionally used market research methods, such as surveys, to investigate needs. Surveys have worked well in quantifying customers' preferences but they cannot really help in discovering new needs that might not come from existing applications. In technologist-driven research, supposed needs are recognized in the personal lives of the researchers or adopted from previous research. In both cases, they do not necessarily generalize to the larger population. Moreover, in both cases, they are not articulated concretely enough to enable design choices.

Discovering motivational needs, *needfinding* for short, is useful for three main reasons. First, human need lasts longer than any specific solution. Second, needs are opportunities for design, not just guesses at the future. Innovation of use potential does not have not to depend only on predicting future because a crucial part of that future already exists in the form of human needs. And third, human needs provide a "roadmap" for design (Patnaik & Becker, 1999).

One conceptual basis for needfinding in the future technology innovation context has been suggested by A. Kankainen (2003), who distinguished between two types of human needs: motivational needs and action needs. *Motivational needs* rationalize and motivate taking a certain action in a context. Motivational needs are experienced as emotional and behavioral potentials that are activated by particular situational incentives (see also Atkinson, 1982). For example, the social need of affiliation is activated by the incentive of having an opportunity to please others and gain their approval, which in turn causes the person to want to act in a certain way constituted by that situation, thus an *action need*. Furthermore, it is helpful to elaborate a distinction between two types of motivational needs: basic and quasi-needs. Any given user may harbor a multitude of *basic needs* related to a given HCI situation, some of which are related to regulating bodily homeostasis (physiological needs such as pain avoidance, thirst, hunger, and sex), some to providing psychological nutriments for growth and healthy development (organismic psychological needs such as self-determination, competence, and relatedness), and some preferring some aspects of the environment rather than others (social needs such as achievement, affiliation, intimacy, and power; e.g., Reeve, 2001). *Quasi-needs*, on the other hand, are more ephemeral, situationally induced wants that "create tense energy to engage in behavior capable of reducing the built-up tension" (Reeve, 2001, p. 151). They are not full-blown needs in the same sense as basic needs, but they do affect how we think, feel, and act. For example, the desire for an umbrella in the rain or for money at the store would be considered a quasi-need. Both basic and quasi-needs are instantiated in a given situation where the user eventually wants to perform a certain action that takes him/her closer to satisfying the motivational need.

Motivational needs provide a promising starting point for discovering design opportunities. Needfinding at the individual level can be complemented by looking at societal demands for technology (Oulasvirta, 2004a). In the following case, user needs related to

mobility are presented to illustrate how these needs are found and how they can direct the innovation of new concepts.

Example I: Personal, Social, and Cognitive Needs in Mobility

The aim of A. Kankainen and Oulasvirta (2002) was to discover motivational needs for mobility in public and semipublic urban areas. In order to gather rich data, focus groups, photodiary studies, interviews, and observation studies of 25 urbanites were conducted. The idea in triangulation (using many methods to study the same phenomenon) is to gather both third-person and first-person data to describe what, how, and why the person did something. Situations that participants consider problematic, such as where they fail, where they have to come up with workarounds, or where they are forced to deviate from routine action, provide the bases for discovering motivational needs. Over 1,300 travel episodes (descriptions of a person moving within a city in pursuit of a goal) were analyzed in this manner.

Three classes of needs related to mobility were found. The first class is personal needs. For example, when paying or sharing costs with other people in public places, participants expressed concerns about losing control over their money. And while moving, certain places often trigger memories and opinions that are considered worth preserving. Other needs in this category are finding silence or privacy in the middle of crowd, finding bargains, and expending time by seeking fun and exceptions.

The second class of needs relates to navigation or wayfinding, and these are cognitive in nature. Many participants expressed a need to know and optimize routes. For example, a participant got lost after returning home from picking flowers in an unfamiliar place. Similarly, journalists often received e-mail invitations to events in unknown locations around the city. Reaching the navigation goal in time is considered important, but equally important is having enough time for sidestepping (i.e., unplanned deviations from the planned route). Packing and carrying items received plenty of attention, as they are related to the need to anticipate and prepare for predicted events (e.g., taking an umbrella for a forecasted rain). Other needs are related the ability to combine several sites to one route, finding the shortest route, locating missing objects, and safety (avoiding potentially dangerous areas).

Third, a class of social needs was identified. For example, an amateur theatre group had to decide their new rehearsal schedule, but not all of the group members were present when the decision took place. However, it was decided that the absent members would be informed through a call ring. As it turned out, however, somebody had forgotten to call another, and some of the actors did not show up for the first rehearsal. This reflects a need for awareness of changes in shared schedules. Many situations were observed in which participants had a need to be continuously aware of social surroundings. They often expressed a need to be aware of acquaintances when moving in the city. Some participants also had a need to meet new likeminded people while expending extra time. When such a situation was realized, however, finding something to talk about was difficult. A similar need for discussion topics was also gathered in a situation in which three friends who were waiting in a café skimmed through a newspaper and discussed the headlines. Participants were also curious about events taking place in their environment, eager to share opinions with peers, and expressed needs to shop with a friend, to get an opinion from a friend about a product, or to delight others by dropping into a promising store and buying gifts.

Example II: Needs of Mobile Elderly People

Tiitta (2003) conducted a similar study to discover the needs of elderly people related to mobility and communication. The study revealed that needs for maintaining contacts with family (some participants even had learned to use e-mail and the Internet for this purpose) and with friends met before retirement. They also had more time and the curiosity to get to know their surroundings better and find new places, yet they were often afraid of getting lost or for their safety. They expressed doubt over changes in their environment and wanted to share these opinions, and spent considerable time monitoring their neighborhoods. Aesthetics and nature in the environment were also important. They are able to combine experiences with routine tasks, such as going with friends abroad to shop. While traveling, they reserved extra time to arrive early at the bus stop or station. They appreciated fast, reliable, and quiet transportation, where platforms were not slippery in winter. Traveling alone during the nighttime was considered unpleasant, and they were eager to share their experiences of unsafe areas, practices, or services.

Example III: EventTagger Prototype

The EventTagger prototype is presented here to illustrate how needfinding can inform innovation of product concepts and direct design choices. EventTagger was inspired by observations of and interviews with elderly people who have difficulties in remembering past events and objects (e.g., products), which indirectly hampers their ability for social sharing of experiences and their freedom for mobility. It was hypothesized that by supporting remembering and organizing everyday events elderly people's impaired memory abilities could be improved and their sharing of life events among peers supported. Empowering aging people in their everyday social-cognitive practices is also an important societal demand; it is needed to prevent early solitude and displacement.

EventTagger consists of a small button (see Figure 1), wirelessly connected to a handheld computer kept in a pocket, backpack or handbag. Upon pressing the button, EventTagger "tags the moment" by gathering all information available from the digital and physical environment, including a 15-second audio clip, current calendar of events, time, location (from GPS), and a list of other nearby system users. This information is saved to a log file that can be accessed and edited by the user on the device. The tagged information serves as a retrieval cue that helps the user to later do mental, episodic "time travel" by bringing to mind the to-be-remembered information.

EventTagger attempts to eliminate one important factor, namely poor memory for experiences, that causes isolation and immobility among elderly people. Other factors, of course, exist and they need to be addressed by other means. This case highlights that empirical groundwork provides design ideas that are better justified and motivated than those based on intuition. Needfinding is a promising method that can be used for eliciting design ideas in the early phase of development.

Figure 1. EventTagger is a wireless button that upon pressing sends a signal to the host PDA to gather and record all available context information into a log entry.

Stage II: Empirical Studies of Preconditions for Use

The second challenge is to try to understand the future use situation in which the new technology is going to intervene. The chief methods used include ethnographic (Tamminen, Oulasvirta, Toiskallio, & A. Kankainen, 2004), ethnomethodological (Kurvinen & Oulasvirta, 2004; Oulasvirta & Tamminen, 2004), and experimental (Oulasvirta, 2004b; Oulasvirta, Tamminen, Roto & Kuorelahti, 2005) studies of mobile behavior.

Example I: Mobile Resources and Restrictions

As an example, we present studies of mobility. Mobility poses a distinctive challenge to future technologies because mobile contexts differ from desktop contexts in many important ways. Internal factors such as task goals are different and external factors such as social resources and physical surroundings are dynamic and unpredictable. Indeed, when mobility-related phenomena in our mobility data were classified, several items were frequently cited: shopping, observing passers-by, selecting routes, ad hoc meetings, SMS messaging, relaxing, waiting, surprising and delighting others, arranging meetings, being late, remaining safe, acquiring information, collecting memories, and playing gags. These are in stark contrast to what is commonly attributed to desktop contexts.

Tamminen et al. (2004) conducted ethnographic studies to find distinctive (in comparison to static contexts), general (from the point of view of frequency), and useful (from the point of

view of design) socio-psychological aspects of mobile contexts. It was argued that these characteristics would be useful to understand regarding what restrictions and resources prevail in mobile use contexts.

The results show that mobility is socially structured around navigation. Situational acts are embedded within planned acts of navigation—dropping by, ad hoc meetings, and other forms of sidestepping are socially motivated and require flexibility from the plans related to navigation. Second, it was recognized that since mobile places are normally public, personal spaces must be actively constructed and claimed by socially recognizable acts (e.g., picking up a newspaper on the metro creates a personal space). Third, temporal tensions (fluctuations of importance of time in relation to space) were identified—waiting, for example—that pose radically different cognitive and social demands for behavior. Think about, for example, the cognitive and social restrictions to use imposed by a typical waiting place, a bus stop, and compare these to rushing through a city in a hurry. Fourth, it was observed that most problems in navigation were solved by utilizing social contacts and only rarely by using artifacts such as schedules, maps or the like. Aspects of multitasking were also identified, in particular how different cognitive and social restrictions for multitasking are posed at various stages in navigation (e.g., reaching the goal vs. calibrating speed in the beginning of the journey).

Social practices are always embedded in a socio-psychological framework that determines many aspects of use. The most important result of this research has been the simple, yet powerful concepts that make some of the obvious aspects of this framework visible to researchers. Personal spaces, temporal tensions, multitasking and so forth both restrict and enrich mobility and should be taken into consideration in the design of future technologies. In current research, we have investigated the possibility of conducting lighter, in situ ethnographic observations during concept innovation. The best benefit of this method, coined "bodystorming," comes from the fact that many essential context factors that might be hidden or not explicated in observation documents are immediately observable in situ (Oulasvirta, Kurvinen & T. Kankainen, 2003).

Example II: CoffeeMug Prototype

This case illustrates how understanding the nature of distributed cognition in an editorial office helps in innovating functions and features of a design.

The CoffeeMug prototype was inspired by participant observations conducted in an editorial office. The study uncovered a social practice of a editor-in-chief walking to the kitchen to fill his coffee mug and, on the way back, casually dropping by coworkers' desks with the tacit purpose of delegating jobs and monitoring ongoing work. Often during the discussion, a need arose to view documents that were not readily available, and fetching them caused an interruption to the activity. The design goal was to support these short-term, spontaneous, face-to-face social practices by creating a fluent and invisible access to digital documents during journal editing activities.

CoffeeMug is a tangible container interface that provides a link between a physical object (here, a normal RF-ID tagged coffee mug, see Figure 2) and recently edited documents on a desktop computer. When the user takes the CoffeeMug upon leaving his or her workstation, recent documents are automatically uploaded to a server, and the documents can be selected for downloading to another computer if the owner authorizes this by scanning the mug by a reader.

Figure 2. CoffeeMug is a tangible container interface that can be
used to provide access to owner's recently edited documents.

The instantaneous, portable, and tangible access to most recent documents provided by CoffeeMug is less disruptive and poses fewer cognitive demands than alternative workstation-based access methods (e.g., e-mail, intranet) because CoffeeMug users don't need to manage access rights, memorize what files to send to a colleague after a discussion, or anticipate what documents will be important in a future discussion. The empirical analysis showed that the design features that make the design better understood and better controlled, in this situation, are tangibility (for privacy and spontaneity of action), simplicity (does not tax cognitive resources), and transparency (the algorithm that decides which documents are selected is simple and predictable).

Stage III: Empirical Evaluation in the Field

Thus far, it has been argued that significant empirical effort has to be made in understanding the needs and preconditions that constitute use situations. These findings, then, are analyzed to formulate a hypothesis of why and how a design could change the practices and communities of users. Finally, I turn to the question of evaluating the design in such a hypothesis-testing framework. The two cases, InfoRadar and ContextPhone, illustrate that evaluation is built on a much firmer basis when it draws on this kind of explicated hypothesis rather than on an exploratory approach in which there is no clear criterion for selecting what outcome variables indicate a positive or negative change in behavior.

Example I: InfoRadar Prototype

It has been widely accepted that traditional usability testing is not suitable for evaluating context-aware services, as it neglects social issues, is too concerned with task-based issues such as performance, and is based on the (invalid) assumption that interaction should be as attention intensive as it is in the usability-testing situation. For evaluating a technological

hypothesis, it is possible to employ a method that could be called the *subtraction method*. Essentially, from observations or other data, we gather a baseline of behavior that is being subtracted from behavior indicated by a field study with an actual prototype. This leftover, or "added value," indicates a change in practices that is then assessed. In the case of community building, one would be interested to see if a communication device would inspire communication among people who did not know each other beforehand (the result of the subtraction would be the additional, or previously absent, practices of communication), or if it created new forms of discussion among a well-integrated group.

InfoRadar is a location-aware messaging system implemented on a handheld computer (here, a Compaq IPAQ) and based on a positioning system, an electronic compass, and GPRS (see Figure 3). Participant observations and diary studies conducted as part of the InfoRadar investigation suggested that a location-aware communication system that aims to cater to mobile communication cannot be based on just one channel (e.g., location-based messages). Instead, it must include auxiliary channels that help users to both initiate and sustain communication. To this end, InfoRadar includes multiple synchronous and asynchronous and location-dependent and location-independent channels. It involves functionality to track and locate nearby associates, a social activity indicator, a voting system to raise awareness of communal issues, a capability for attaching digital pictures to messages to encourage other users to read messages, and a chat function to sustain communication in a location-independent and asynchronous manner.

InfoRadar was tested in two 3-week field trials (see Rantanen, Oulasvirta, Blom, Tiitta & Mäntylä, 2004). In the first study a group of participants who did not know each other in advance used InfoRadar in a shopping mall. The hypothesis was that by stimulating asynchronous discussion about location-related issues, InfoRadar could create new virtual friendships. This, indeed, was observed as some of the participants formed friendships that would not have emerged without InfoRadar. In this respect, InfoRadar succeeded in community building among strangers. In the second study a group of friends (normally telecommunicating only through SMS and phones) used InfoRadar. It was hypothesized that InfoRadar could enhance their community by supporting asynchronous location-triggered discussion (e.g., leaving comments and votes regarding shared sites). Indeed, InfoRadar was observed to inspire and sustain relatively long chains of discussion that were triggered by location. In this respect, InfoRadar succeeded in enhancing communication resources of an existing community.

Hypothesizing how technology transforms human practices is the key for evaluating designs. The idea in the subtraction method is simple, but it requires explicating a baseline and a hypothesis of how the design might introduce a change. Essentially, it is a step towards transforming the evaluation of future technology from exploratory studies to hypothesis testing.

Example II: ContextPhone Prototype

The idea of ContextPhone is based on the findings that many of mobile phone calls never reach the intended receiver and in about 70% of calls, people communicate their present location (e.g., "I'm at the train station"; see Arminen, 2003), a figure that is radically smaller (< 5 %) in landline calls. In addition, research has found that knowing the availability of friends, an awareness of friends' present activities, communicating one's own availability,

Figure 3. InfoRadar is a radar-like user interface to location-based messaging.

and reminders of contextual changes (e.g., somebody is going to a certain night club) were important communication needs for a close group of people dispersed in a wider urban area (A. Kankainen & Tiitta, 2003). Given these findings, an idea was surfaced to provide context information (i.e., cues regarding a friend's availability and interruptability) to reduce the number of failed communication attempts.

The user interface consisted of the normal Nokia mobile phone contact book but with added contextual information about the entries. Context information included the current location (and time spent there) of the contact, an indicator of how recently the person has used the phone, and the current profile (audio and vibration alarms on/off). Consult Figure 4 for details on how these were implemented. One of the main design principles was to integrate the added functionalities into existing ones instead of making a separate application. This would be more familiar to the users. In addition, they would not have to learn new ways to use the phone, thereby decreasing technological disruption to social and communication practices. A second design principle was to make context communication automatic so that users would not have to initiate it. This was deemed important based on our studies of the cognitive and social resources people have while mobile. It was discovered that mobile people have just very limited (roughly speaking, about one third) attention capacities while mobile in comparison to desktop situations (Oulasvirta et al., 2005). Therefore, all unnecessary interaction steps were to be eliminated.

For the field study, the hypotheses were that (a) ContextPhone reduces the number of failed communication attempts and, more importantly, (b) Contextphone increases group awareness within the group that uses it. To test these hypotheses, we employed the ABA intervention methodology adopted from clinical psychology, which has three phases of investigation. In the A phase, we established a baseline of behavior with just the use of the

normal phone. In the B phase, the technological intervention was made using the enhanced phone. Then, in the last phase, the A situation was reintroduced, meaning the instrument of the baseline study (a normal mobile phone) was returned and the data measured again. Data analysis of this process provided the ability to assess, by comparing behavior in the A phases to the B phase, whether the changes in behavior during Phase B were technology-induced rather than arbitrary contingencies or regression towards the mean. This methodology, then, provides a better protection against threats to validity in very complex settings where researchers have poor control over nuisance variables.

In the study, a four-person single-parent family was provided with ContextPhones and instructed on their use. Participants' interactions with the phone, phone calls and SMSs within the family were logged for each week of the ABA process. Family members were interviewed separately after each of the 3-week phases. As the results are still under analysis, they are not presented here. For the purposes of this paper, however, the most important point in this case was to illustrate how the hypothesis-testing framework inspired us to adopt a more rigorous testing methodology than the prevailing exploratory field study methodology had to offer.

Figure 4. ContextPhone is a context/information-enhanced contact book for mobile phones. Next to each contact, the phone automatically updates information on how recently the phone has been manipulated by the person (the hand icon on the left), his/her current location (and time spent there), and phone profile (audio and vibration alarms on/off).

DISCUSSION

Even a brief inspection of scenarios proposed in key articles on interaction beyond the desktop reveals a need for discovering useful design ideas. Consider, for example, two key scenarios underlying a research project (Satyanarayanan, 2001): a video projector that warms up proactively before the presenter comes to the room (saving 30 seconds) or an agent that prevents an audience from seeing a confidential PowerPoint slide that was accidentally left in a presentation (saving the one click needed to skip to next slide). Despite the fact that the development of technological potentials and enablers is necessary, it must not do so in a manner overlooking the real users and the actual uses. Innovating design ideas that are useful and usable, however, requires effort. In innovating and developing socially relevant design ideas it is necessary to justify the ideas through observations from the field, instead of from intuition. Empirical studies not only help to innovate design ideas and derive functionality and interaction features but also to identify preconditions for uses, such as the recently debated issues of privacy and trust that are increasingly more important for the future technologies. Most importantly, empirical studies are needed to explicate and justify a hypothesis about how a design is going to be useful for the users, and this hypothesis can be operationalized and tested in a field study.

The empirical framework sketched in this paper is however largely an idealization. In the circumstances of modern HCI research where time and other resource constraints loom behind every effort, one or more of the three empirical stages are almost always compromised, which of course subjects research to several threats at the end design. When needfinding is not conducted, or the underlying needs are not articulated, it is easy to err in design, for two main reasons. First, choosing one feature or function over another in the design stage requires a choice in which the use purpose is assumed. Second, in operationalizing the evaluation of the system, the whole trial should be informed by the intended purpose. Often, if this is not the case, the study is beset by several serious threats to validity and to the usefulness of its outcomes. Three of these problems are worth mentioning here: the study situation may not reflect the actual use; the methods and selected dependent variables may not be tuned to be sensitive to signals of how well the technology suits user needs; or, finally, there may be no possibilities for the experiment to *fail* to show support for the technology (for example, no baseline for comparing if the technology has improved previous practices).

One should have no illusions, however, that needfinding is being established as a mature methodology. First, the notion of user need is inflated by the panoply of definitions and uses seen in the HCI literature, not to mention that the notion is under debate in psychology. Second, to make things worse, there is almost no linkage between the use of the needfinding notion in HCI and in modern psychology, which means that no common, shared typology exists in HCI for speaking about the kinds of needs relevant in interaction. It has been mainly cognitive psychology that has had an impact in modern HCI, whereas other branches of psychology have lagged behind. Modern psychology, with its emphasis on motivation, personality, and emotion, has distinguished and sophisticated concepts to describe cognitive structures intrinsic in behavior, such as goals, strivings, tasks, projects, scripts, strategies, current concerns, life narratives, and so on (McAdams, 1996). As categorizations of user data are inherently laden with the preconceptions of the researcher, ensuring that they are based on sound, scientific theories is of high importance for future research. Third, a user need is a

mentalistic entity, which means that attributing these needs to users is not a straightforward process, and therefore must include inferences on latent variables based on observations of behavior. Nevertheless, needs are generally carelessly postulated based on scanty evidence and without proper triangulation, without proper testing of the hypothesis by collecting evidence from multiple sources by multiple methods. Fourth, the notion of user need is almost entirely individualistic, and emergent needs that pertain to groups and organizations of users cannot be addressed. However, despite the shortcomings and obvious need for further conceptual work, one must not underestimate the value of the concept in guiding the design process.

By failing to investigate the preconditions for use, the first iteration with full prototypes is almost certain to be unsuccessful. HCI in a world of ubiquitous and mobile computers is plagued by interaction problems that have only recently become known to HCI, and large areas of the territory still remain uncharted. Recent research has begun to identify and explicate reoccurring problems, some of which include the absence of needed resources (cognitive, computational, social, physical, artifactual), the suitability of user interface for mobility, the acceptability of the manifestation of the computer in the intended use context (e.g., agent-like representations vs. direct manipulation interfaces in smart home applications), the fit for multitasking and management over multiple contexts (e.g., especially interleaving of tasks, rapid task-switching, and interruptability features), leaving room for both situated and planful action (planful opportunism), alignment with social and organizational practices, usability in a multidevice and multiterminal ecology, the responsibility sharing between proactive computer agents and humans, and the support for accountability over unequal communication platforms. Most of these contentions are germane to many future technologies, and they must be tackled carefully to minimize the need for costly iteration with prototypes.

Finally, failing to conduct empirical evaluation of a technology is obviously disadvantageous. As has been known for decades in Computer Supported Cooperative Work, domestication, appropriation, and repurposing of technology are complex processes that are almost impossible to be foreseen by researchers. Moreover, the evolution of social and individual practices with and through new technologies is difficult to capture in the circumstances of a typical field trial because of insufficient resources, difficulties in reaching critical mass, etc. Nevertheless, as it is exactly these processes that determine the success of a technology, addressing them, at least in the limited way field trials allow for, is essential. Yet, while striving to make the currently idealized hypothesis-testing framework a reality, we all must face the realities of day-to-day research. Often, we are unable to operationalize a hypothesis in a manner that allows for exhaustive testing of the dependent variables, or we are unable to leave enough space for spotting potentially interesting phenomena that are not related to the initial hypotheses. Moreover, in investigating the transformation of human behavior due to new technology, simple comparisons such as the one presented in the case of ContextPhone may not suffice in actually informing design at a practical level. Simply noting that an introduced technology is better than nothing helps little in actually improving the design. On the other hand, adding more comparison conditions is obviously costly.

Taken together, empirical grounding throughout the design process is an important step forward from the prevailing attitude where researchers so easily fail to elicit anything meaningful from the numerous (and often arbitrary) outcome variables in an exploratory study with prototypes. As we have argued, empirical work has the potential to guide and structure the whole process of innovation, development, and evaluation. Furthermore, it

provides a natural union between the analytical and constructive approaches toward technology development, which are too often seen as mutually exclusive rather than complementary.

It goes without saying that the empirical framework loosely sketched here needs more work. The associated concepts and methods need to be crafted and elaborated. However, an even more pressing objective for the more immediate future would be to effectively communicate the idea to technologists, designers, and other practitioners. We need to educate and guide developers in utilizing the results and in employing the methodology. Furthermore, keeping in mind the complex and elusive nature of the studied phenomena, another challenge will be to conduct such studies that provide convincing yet concrete information from the field to inform developers in decision making. An implication is that we need to clarify the ideas and go beyond the fuzziness of the theoretical concepts. Aiming for clarity and communicability is obviously necessary to ensure impact in decision making in organizational settings. Ultimately, focusing holistically on the human role early in technology development pays off in the quality of end products.

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PRODUCT MEANING, AFFECTIVE USE EVALUATION, AND TRANSFER: A PRELIMINARY STUDY

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Abstract: *The first part of this investigation explored the multidimensional nature of product meaning, referring to the variety of connotations and functions a consumer associates with a particular product category. The subsequent experiment examined the moderation effects of product meaning and other attributes of the user on (a) the affective evaluation of an obstructed use interaction, and (b) the transfer of emotion between devices presented as being either of the same or a different brand. Although the failure experience essentially caused frustration, this reaction varied substantially among consumers depending on product meaning, age, and gender. The results also showed that the emotion dimensions of pleasure, arousal, and dominance were affected in distinct ways, and that, in addition to the consumer variables, transfer was mainly dependent on the brand relation. Nevertheless, user frustration did not cause general brand aversion, indicating that poor designs do not unconditionally threaten the customer relationship.*

Keywords: *product meaning, affective evaluation, transfer.*

INTRODUCTION

Engineers, designers, and marketers must expect that every potential user has some preconception and attitude toward their product and its use already at (or even before) the initial interaction with the device. People's pre-encounter beliefs about products are, for instance, encapsulated into the general product values they hold as consumers of certain product categories, as well as concrete experiences they have had earlier as users of related devices. As consumers and users of products, people continuously carry over such experience-based information contents to novel interactions with product devices. Consequently it is natural to assume that these contents incessantly affect the mental representations people construct of products and their use.

Here, the concept of *product meaning* is used to refer to the variety of instrumental and symbolic connotations an individual associates with both tangible and intangible attributes of a particular product or product category. Insight into the origins and nature of product meaning is of great application value to scientists and practitioners alike. Because product meaning reveals how consumers relate to certain products, it may predict how they respond to actual designs, and it allows one to explore the manner and extent to which past experience (e.g., frustrating product encounters) biases future use interaction.

In this context, the current article attempts to investigate the types and dimensions of consumers' product meanings and to link them to people's *affective evaluations* of two concrete devices during their use. The latter part of the analysis addresses two questions that deal specifically with the *carry-over,* or cross-context influence, of the evaluations and experience: (a) the way a consumer's product meaning influences the affect-related evaluation of the use of a device belonging to the same product category, and (b) the way and extent the user's affective evaluation, as expressed by basic emotion dimensions, is transferred from one device to the judgment of another, related one.

Transfer is used as the key concept to express the relations between mental representations, relations that stem from the carry-over of individually relevant information contents in apperception (Helfenstein & Saariluoma, in press). On a very general level, transfer can also be described as the phenomenon in which prior experience influences a person's current attempt to understand and cope with an actual learning situation. In the present study this idea is applied to the evolvement of people's product representations over related instances of consumption and use. This study is explicitly concerned with the emotion dimension of transfer, namely the carry-over of affective evaluations as contents of consumers' and users' mental representations.

Affective transfer is involved in any psychological process where previously experienced feelings and attitudes toward a situation, object, or task are re-evoked in a current engagement with related "symbols" (Hobson & Patrick, 1995). This includes the transfer of affective connotations to situations or the socio-emotional values attached to an object, as well as the trans-situational transfer of emotional and social skills, attitudes, and values in general (Damasio, 1995). In reviewing transfer literature it becomes easily evident that the Thorndikean tradition, favoring the study of stimuli-bound, cognitive, and senso-motor aspects of learning, has been very influential, especially in the field of Human-Machine Interaction (HMI; Kieras & Polson, 1985; Singley & Anderson, 1989). The current study makes an important contribution to transfer research by focusing on contents that transcend perceptually accessible elements and go beyond cognition and senso-motorical functioning in a confined sense.

As concerns the selection of representational contents examined in this study, product meaning and the affective user experience are both believed to be of great value to the domain of HMI. This assessment takes into account the various efforts of the community to attain a more comprehensive understanding of the user; to promote human-centered approaches to design, engineering and marketing; and to integrate socio-emotion dimensions into HMI research (Saariluoma, 2004). Indeed, I propose that by studying HMI—in particular IT devices—usability concerns (i.e., the instrumental, functional, and ergonomic value of a device) and concerns of "consumability" (i.e., the affective, symbolic, and expressive values of a device as a commercial and marketing product) can be bridged well. This is principally because information technology involves products that are of high concern to users in social

and emotional regards. In addition to this, the development of the IT segment has been very fast and users are continuously compelled to purchase and adapt to new product standards.

The meaning of a product to a person can be seen as closely related to the individual's values in terms of his or her *trans-situational goals* (see Schwartz, 1994) or needs and the degree to which the product possession and use can elicit and satisfy the various functions incorporated in these needs. In dealing with the vast field of human values and needs (e.g., utilitarian, expressive, symbolic, social, ritualistic), it is of great theoretical and eventually practical use if one can identify a few key value dimensions in terms of the meanings and evaluations individuals attach to a particular product or device. The affective and social dimensions of people's relation to products naturally have been subjected to numerous studies in the past. The approaches valued here build on such notions as *meaning* (Csikszentmihalyi, & Rochberg-Halton, 1981; Friedman, 1986; Osgood, Suci, & Tannenbaum, 1957; Richins, 1994), *human values* and *attitudes* (Braithwaite, 1982; Fishbein, 1967; Rokeach, 1973; Schwartz, 1994), *involvement, preference*, and *choice* (Cohen, 1983; Kim, 1991; Mittal, 1988; Mittal & Lee, 1989; Zaichkowsky, 1985), and the *self-concept* (e.g., in the study of self-product congruency; Claiborne & Sirgy, 1990; Sirgy et al., 1997; Zinkham & Hong, 1991).

In HMI, the emotion theme has been particularly prevalent within research related to *emotional design* (Jordan, 2000; Norman, 2004) and *affective computing* (see Picard, 1997, for a bibliography). Furthermore, the increase in the pace and degree with which technological aids pervade people's everyday lives has brought more attention to the downsides of the user experience. User frustration, computer anxiety, and technophobia have all been identified as plausible antagonists of effective, efficient, and satisfying use (Beckers & Schmidt, 2001, 2003; Bowers & Bowers, 1996; Bradley & Russell, 1997; Henry & Stone, 1997). Again, this is especially true for transfer settings, for example, the resistance to developmental changes of the technology (Toffler, 1970), the aversion to certain types of systems and applications and attachment to others, and the transfer of negative affective content among different contexts and purposes of IT use. Understandably, prior obstructive learning experiences are generally a significant factor in the evolvement of negative expectations, performance anxieties, and unpleasant experiences in the future, with the quality of past experience being more central than the quantity (Bandura, 1986; Bradley & Russell, 1997; Horwitz, 1986; Miller & Seligman, 1975; Weiner, 1985; Zimmerman, 1994). The present investigation contributes to this perspective on affective transfer in that it involves the element of use interference to create an emotionally more intense and negativity-laden experience.

Whereas the investigation of affective transfer represents a rather uncommon perspective in HMI, both the measurement and representation of product meaning and affective use experience have been very critical issues in nearly all of the above-mentioned studies and research domains. The quest for core psychological dimensions or critical contents in product representation appears to be an especially important theme in consumer research. Allen (2000) offers an overview of the application of such concepts as meaning, values, self-concept, and involvement within consumer psychology, with a perspective on users' product choice behavior (see also Allen & Ng, 1999). Much of the methods used in the current paper must be seen as linked to this type of research. Products are believed to serve psychological functions that embody a person's needs based on his or her utilitarian, affective, and symbolic product values. And these psychological functions are naturally related to the basic dimensions of human experience and behavior: cognition, emotion, and social or environmental relation.

As concerns the measurement and representation of emotional responses during and after use interaction, dimensional and attributional approaches to emotion have been identified as being the most promising for the type of affect-orientated user research pursued here (Osgood, Suci, & Tannenbaum, 1957; Weiner, 1985; Zajonc, 1980). Like a series of other theories related to the dimensional paradigm, Mehrabian's (1995, 1998) Pleasure-Arousal-Dominance (PAD) Emotional State Model suggests that all emotions can be represented in a continuous manner using a limited number of underlying aspects or contents to describe their meaning (Marx, 1997; Russell & Mehrabian, 1977; Schlossberg, 1954; Spinoza, 1677/1883; Traxel & Heide, 1961; Wundt, 1896/1922). The use of Mehrabian's PAD model to measure affective use experiences represents a very generic way to gather self-report-based user data regarding emotions. It is well distinguishable from approaches related to discrete theories of emotion (see Frijda, 1986, and Power & Dalgleish, 1998, for overviews) and was intended to contrast common methods where the users' responses to a product is studied in terms of a single attitudinal construct or item, such as satisfaction (Churchill & Surprenant, 1982; Kirakowski & Corbett, 1988; Lindgaard & Dudek, 2003; Shneiderman, 1987; Söderlund, 2003).

OVERVIEW OF THE STUDY

The study comprised two separate phases of assessment: a pre-experimental phase and an experimental phase. Product meaning and involvement were assessed prior to the experiment in absence of a concrete stimulus, that is, on the bases of questionnaire self-report data alone. The experimental phase of the investigation consisted of virtual interactions with two different emulated mobile phones, interrupted by short self-assessments to capture the elicited affective reactions to the devices. Figure 1 gives an overview of the general design of the study and the relationships between the assessed constructs.
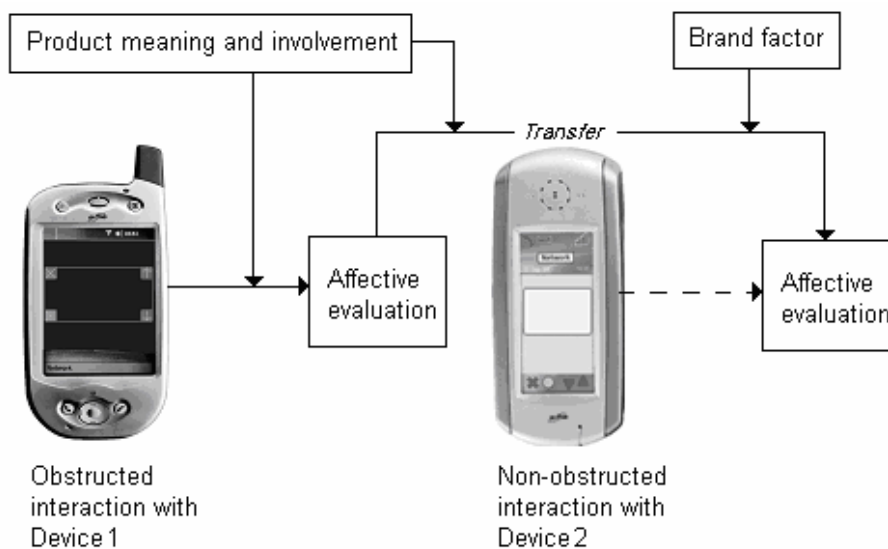

Figure 1. Conceptual design of the investigation.

Although much of the investigation was exploratory, there was a clear research agenda concerning the examination of the nature and relations among the various phenomena. The main objectives were (a) to reveal a dimensional character of consumers' product meaning, (b) to characterize the emotional experience of interacting with mobile phone devices in experimental settings and to verify the frustration caused by unsuccessful use, (c) to consider the relative advantages of the PAD emotion dimensions (Mehrabian, 1995, 1998) over direct questions to assess the user's affective evaluation, (d) to identify which aspects of the consumer profile, comprising product meaning, involvement with mobile phones, gender, and age, moderate the type and intensity of the affective evaluation of the phones, and (e) to examine the carry-over of emotional content from the use of one device to a related one.

PHASE 1: THE QUESTIONNAIRE SURVEY

Beyond the collection of basic socio-demographic descriptives, the pre-experimental questionnaire was intended to reveal how concerned individuals and various consumer groups are with the consumption and use of mobile phones and what kind of general, value-related, and concrete purchase criteria flow into the selection of a consumer electronic product. The collected data served to construct product meaning scales, and subsequently to explore the relationships among different aspects of product meaning as well as their underlying structure.

Method

Participants

Five hundred students at the University of Jyväskylä, Finland, filled in and transmitted the questionnaire within one week after it was uploaded to a University server (63% female; age range: 19-53, $M = 24.90$, $SD = 5.40$; all, except two, of Finnish nationality). Invitations to participate were made through different e-mail lists and students were offered a movie ticket as reward for their participation if they were selected for a later on-campus experimentation.

Unfortunately it is impossible to determine the exact magnitude of the return rate to the questionnaire because the e-mail lists used undergo great fluctuations in subscription and many of the university students are subscribed to more than one of the lists. Estimating that the invitation was sent to 1,000-1,500 students, the success rate laid at 30-50%, without the use of either an instant incentive or a follow-up letter to recipients who didn't fill in the questionnaire.

Material and data

The questionnaire consisted of between 53 and 87 items, depending on the person's profile. Divided into a priori defined groups, the core of the items measured (a) the hedonic product relation (5 items), (b) the symbolic and expressive values of the product (9 items), (c) the functional meaning (8 items), (d) the cognizant versus affective mode of product choice (12 items), and (e) the involvement with mobile phones (6 items). The items are briefly described along with the construction of the scales at the beginning of the Results section.

For the construction of these items, the scales from Mittal (1988) on product expressiveness and choice mode, from Zaichkowsky (1985) and Munson and McQuarrie

(1987) on the involvement construct, and Allen (2001) on consumer values were used (see Berkman, Lindquist, & Sirgy, 1997; Bloch & Richins, 1983; Cohen, 1983; Hirschman & Holbrook, 1982; Houston & Rothshild, 1978; Jamal & Goode, 2001; Laurent & Kapferer, 1985; Rokeach, 1973).

Results

Scree plots of maximum likelihood factor analyses of the items proposed for each of the four product meaning scales (representing hedonic, expressive and symbolic, and functional dimensions, as well as cognizant vs. affective choice mode) suggested that the sets of questions concerning both hedonic and symbolic product meaning can each best be described by a single factor. The functional meaning and choice mode appeared to be more multidimensional in nature, although, here too, the first factor was far more powerful than the others with eigenvalues greater than 1. The latter observation, combined with conceptual considerations, led to the decision to continue pursuing one choice-related and three value-related facets of product meaning. The next challenge therefore laid in the construction of scales that reliably measure these constructs.

Four of the five items proposed to measure product hedonism could be reliably synthesized into one construct with an internal consistency of $\alpha = .73$ (Chronbach's alpha). The question specifically asking about the importance of the "fun-factor" in product use was left out of the scale construction because of its low communality with the extracted factor (loading $a < .40$). The remaining items captured the consumers' opinions concerning the importance of a product's pleasantness to one's senses, its optical appeal, and the importance of a product being representative of or reflecting upon oneself.

For the symbolic and expressive values of products, the selection of seven items seemed appropriate, $\alpha = .78$. Two items needed to be excluded from the scale construction due to their low factor loadings ($a < .30$). These were the resistance to owning a product that everybody owns and the significance of the retailer's opinion. Apparently they assessed slightly different dimensions of symbolic meaning than questions concerning the image and social prestige of a product, the glamour it transmits, the degree to which it is currently in fashion, friends' approval of the product, the feeling of ownership pride, the question about who owns one and who doesn't, and the product's fit to one's self image.

Only three of the eight proposed items on functional meaning allowed for the construction of an acceptably consistent scale, $\alpha = .56$. The items were selected based on their loadings ($a > .40$) on the first factor extracted in the factor analysis, eigenvalue = 1.79. The favorability of this scale was underscored by the fact that it included the two core characteristics of utilitarian usability, namely the issues of whether a product is practical and purposeful in use. The third item evaluated the relevance of compatibility to other owned products. The discarded items covered such characteristics of products as its price, extendibility, feature minimalism, simplicity, and multi-functionality.

Ten items were synthesized into a construct measuring the two opposite styles of decision making in consumption: the affective versus cognizant product choice mode, $\alpha = .74$. Two items were not included in the reliability analysis due to their low loadings on the first extracted factor in the factor analysis ($a < .20$). In these items students were asked how much they think about themselves when considering products, and it might be that these types of questions address characteristics that are too distant from the product itself.

The affective end of the scale was directly addressed by asking people about their readiness to base their purchase decision on an immediate affective evaluation, a gut reaction of "rightness," if you will, about the product. Questions focusing on cognizant product relations assessed the importance of calculating clear-cut reasons and the engagement in vigilant, piecemeal, and logic-based search and evaluation of information through consideration of all the features of a product, its pros and cons, and alternative options. The items were marked in the way that a strong agreement with affective choice criteria and low scores on cognizant items were coded into low scale scores, representing the affective pole of the choice code variable. High scale scores therefore reflected a strong cognizant and weak affective mode of choice.

Finally, involvement assessments were best represented by one single dimension. The item analysis yielded a reliability of $\alpha = .81$. None of the originally included items needed to be discarded. These assessed the essentiality, usefulness, desirability, and appeal of mobile phones, as well as how exciting the consumer finds them and how concerned he or she is with choosing the right one.

Table 1 contains the distributions of the scores based on the summation of the items included in each of the discussed scales: hedonic meaning, expressive meaning, functional meaning, choice mode, and involvement. Normal distribution can be assumed for each of the five constructs, using a .20-level of significance.

Correlations among the five constructs show that all product meaning dimensions are associated with each other (see Table 2). Concretely, the data suggested a strong association between hedonic and expressive product meaning and a moderate link between a functionalistic and cognizant approach towards products, $r = .60$ and $r = .32$, respectively. At the same time, choice mode was negatively correlated with both hedonic and expressive product meaning. Finally, it appeared that attaching a strong expressive value with consumer electronic products is a better indicator for involvement with mobile phones than is the functional importance of the products.

Additional correlations of the product meaning dimension and involvement with gender and age suggested that women attach generally more hedonic value with consumer electronic products than do men, they are more guided by their affect during purchase decision making, and they tend to be more involved with mobile phones, $r = .21$, $p < .01$, $n = 484$; $r = .18$, $p < .01$, $n = 471$; and $r = .16$, $p < .01$, $n = 482$, respectively. A more detailed look into the involvement dimensions showed that women predominantly hold mobile phones to be more essential, appealing, and desirable than men. However, they are by and large of the same

Table 1. Distributive Descriptives of the Scales Assessing Product Meaning Dimensions and Involvement

Product Meaning	n	M	SD	Min.[a]	Max.[a]	Min.[b]	Max.[b]
Hedonic	489	18.73	4.37	4	28	4	28
Expressive	473	22.77	6.83	7	42	7	42
Functional	492	17.05	2.38	3	21	4	21
Choice Mode	476	32.70	8.03	10	70	12	64
Involvement	487	30.29	5.47	6	42	8	42

[a]theoretical range; [b]empirical range

Table 2. Bivariate Intercorrelations Between Product Meaning Dimensions and Involvement

Product Meaning	Expressive	Functional	Choice Mode	Involvement
Hedonic	.60 ** (.56**)	-.03 (.20**)	-.27** (-.19**)	.19** (.06)
Expressive		-.24** (-.24**)	-.28** (-.09*)	.28** (.21**)
Functional			.32** (.30**)	-.03 (-.01)
Choice Mode				.05 (.14*)

Note. In parentheses partial correlations.
$n = 451$ *(n = 446)*
*$p < .05$, **$p < .01$

opinion as are male consumers with respect to the judgment of mobile phones as being useful as such and the concern about owning the right type of mobile phone.

Older people generally indicated that they attached slightly less hedonic and expressive meaning to consumer electronic products, $r = -.15$, $p < .01$, $n = 479$ and $r = -.17$, $p < .01$, $n = 463$, respectively. So, in a sense, their relation to products appears to be more pragmatic. It must be made clear, however, that gender and age together can explain only a very small amount of variability in, for instance, hedonic product meaning (roughly 5%). Many other personal factors, which have not been assessed here, are involved in creating such differences in product representation.

When interpreting the intercorrelations among product meaning variables, two major dimensions seemed to emerge: (a) the aspects that involve socio-emotional values (hedonic and expressive meaning) and (b) those that relate to a product's utilitarian (functional meaning and cognizant choice mode) functions. However, the fact that the variables measuring these two dimensions tend to be negatively correlated suggested a certain mutual exclusiveness between consumers' socio-emotional and utilitarian attitudes. For instance, people who based their product choice more on piecemeal evaluation did seek electronic devices to be mainly functional but found them of less symbolic importance, whereas those who did not choose products in a cognizant way (i.e., the affective appeal of a product predominates) focused more on hedonic and symbolic values.

Factor analyses were performed to shed more light on the dimensional structure underlying the different aspects of product meaning. The random split-sample method was applied, using 50% of the participants to calibrate a factorial model and the other half to evaluate it. The analysis of all 24 questionnaire items that were included in building the four product meaning constructs revealed several factors with an initial eigenvalue greater than 1. Judging from the large drops in eigenvalue after extraction of the first two factors and the smaller, but still considerable, drops after the third and fourth components, a two- to four-factorial design seemed fairly adequate (see scree plot in Figure 2). This conclusion was also supported by the analysis of χ^2 statistics from the maximum likelihood estimations of the different models[2], suggesting the three-factorial solution as a good cut-off point, $\chi^2(207, N = 228) = 401.93$, $p < .01$.

The evaluation of the model with the second subsample of students revealed a very similar picture (see Figure 2), although, here, the χ^2 analysis suggested the four-factor model to fit slightly better than the three-factor solution, $\chi^2(186, N = 229) = 339.77$, $p < .01$ and $\chi^2(207, N = 229) = 453.86$, $p < .01$, respectively. Nevertheless, the fourth factor seemed very difficult to interpret
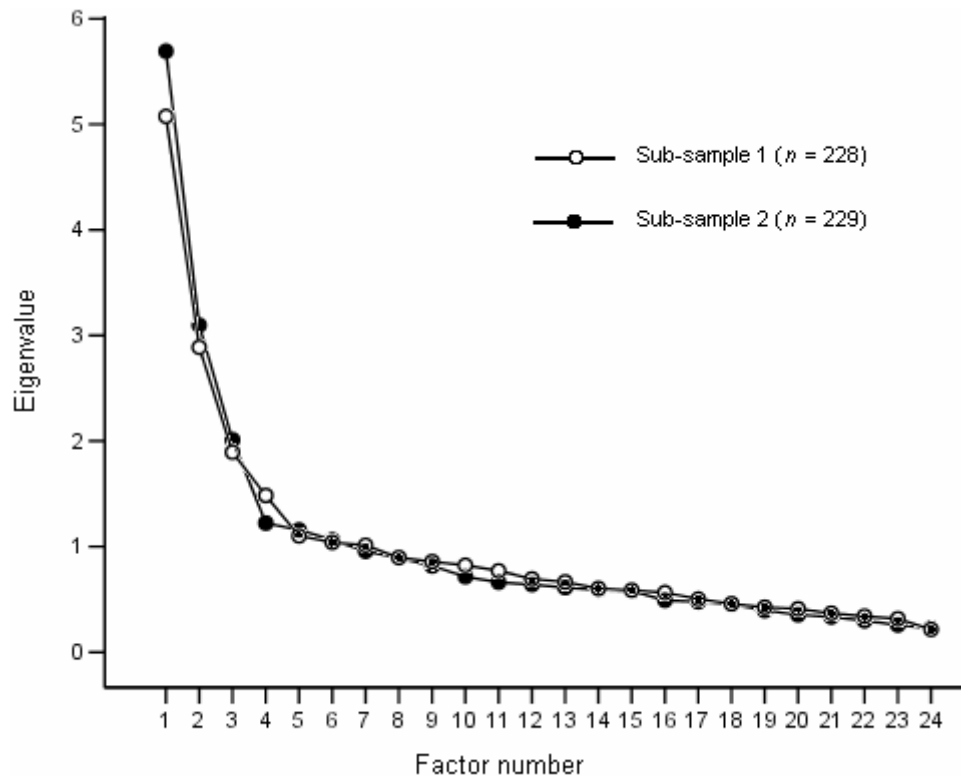
Figure 2. Eigenvalue scree plots of Maximum Likelihood factor analyses of the product meaning variables in two random sub-samples.

because no variable loaded exclusively or specifically high (e.g., a correlation above .50) on this dimension.

The three-dimensional model was therefore applied to the complete sample, using a principal component analysis with rotation (see Appendix for factor loadings). Two main observations could be made. First, the three extracted components together accounted for less than half (Component 1: 20%; 2: 13%; 3: 10%) of the variance among the intercorrelations of the 24 original product meaning variables, thus rendering a rather weak model. Second, the items directly assessing the consumers affective approach to products were associated with the large part of other socio-emotional product meaning issues and loaded strongest on Component 1, whereas questions that directly addressed the students cognizant consumer attitudes and behavior loaded on Component 2. The third component seemed to represent the functionality aspect of product meaning.

Discussion

The consumer data collected in the questionnaire allowed for the construction of four product meaning scales, assessing hedonic, expressive, functional, and cognizant (vs. affective) types of product evaluation. These various aspects were not independent of each other, however, and the values attached to products seemed also to vary slightly between different groups of consumers. In particular, the affective and symbolic relevance of products was stronger for younger and female consumers.

Further factorial analyses of product meaning suggested that it may be problematic to have a single bipolar choice mode variable combining the cognizant and affective factors in product relevance. Rather it appeared that emotion-based evaluation of products and their social significance are somewhat similar issues and, at the same time, independent of rational judgments of products and their utilitarian meaning. The analyses also revealed difficulties concerning the structure, strength, and amount of dimensions that should be assumed when attempting to reduce the issues raised in people's representation of products to only a few dimensions. Very similar problems have also haunted the development of dimensional approaches to other meaning-related constructs, such as emotion (Marx, 1995; Mehrabian, 1995). As in the current study, it appears that between two and four dimensions best represent meaning. Which model is preferred will depend on the particular research question and design.

In preparing the experimental part of the study, some important model-related decisions needed to be made. Because the initially constructed scales proved reasonably consistent and measured product meaning according to an a priori defined four-dimensional model, it appeared statistically and theoretically acceptable to continue using them as basis for the characterization of the consumer profiles. It was further found desirable to develop a minimal model that would include only two major dimensions of product meaning. The feasibility of this approach was underscored by the scree plots of the factor analyses (see Figure 2) and the obvious relationship among socio-emotional product evaluations on the one hand and functional and cognizant evaluations on the other.

PHASE 2: THE EXPERIMENT

The idea of the experiment was to invite the participation of people with diverse attitudes and approaches toward electronic products in order to examine their affective response to the interaction with virtual designs of two different mobile phones. In order to test for moderation effects of consumer variables on user experience, product meaning shall be reduced to two dimensions only: a *socio-emotional* component (combining hedonic and expressive values) and a *utilitarian* component (combining functional meaning and cognizant product choice). Involvement, gender, and age were included as additional moderators.

Because the experimentally induced emotional transfer between the use and evaluation of the two devices was believed to be related to a wide variety of factors[1], it proved important to limit the current experiment's focus on one alternation, namely the degree of commercial (i.e., brand name) similarity between the learning and the transfer device. Hence, the participants were made to believe the phones were either of the same brand (*same-brand condition*) or from two different producers (*different-brand condition*). Further, in order be better able to evaluate the validity of the emotional assessment, it was decided to operationalize an emotionally intense and potentially frustrating user experience by deliberately obstructing the interaction with the first device (Ceaparu, Lazar, Bessiere, Robinson, & Shneiderman, 2004). The core assumption concerning affective transfer was that, based on the failure experience with the first phone, users in the same-brand condition will evaluate the transfer device more negatively (i.e., transfer more of the negative connotations) than users who believe to have received a phone of a different brand.
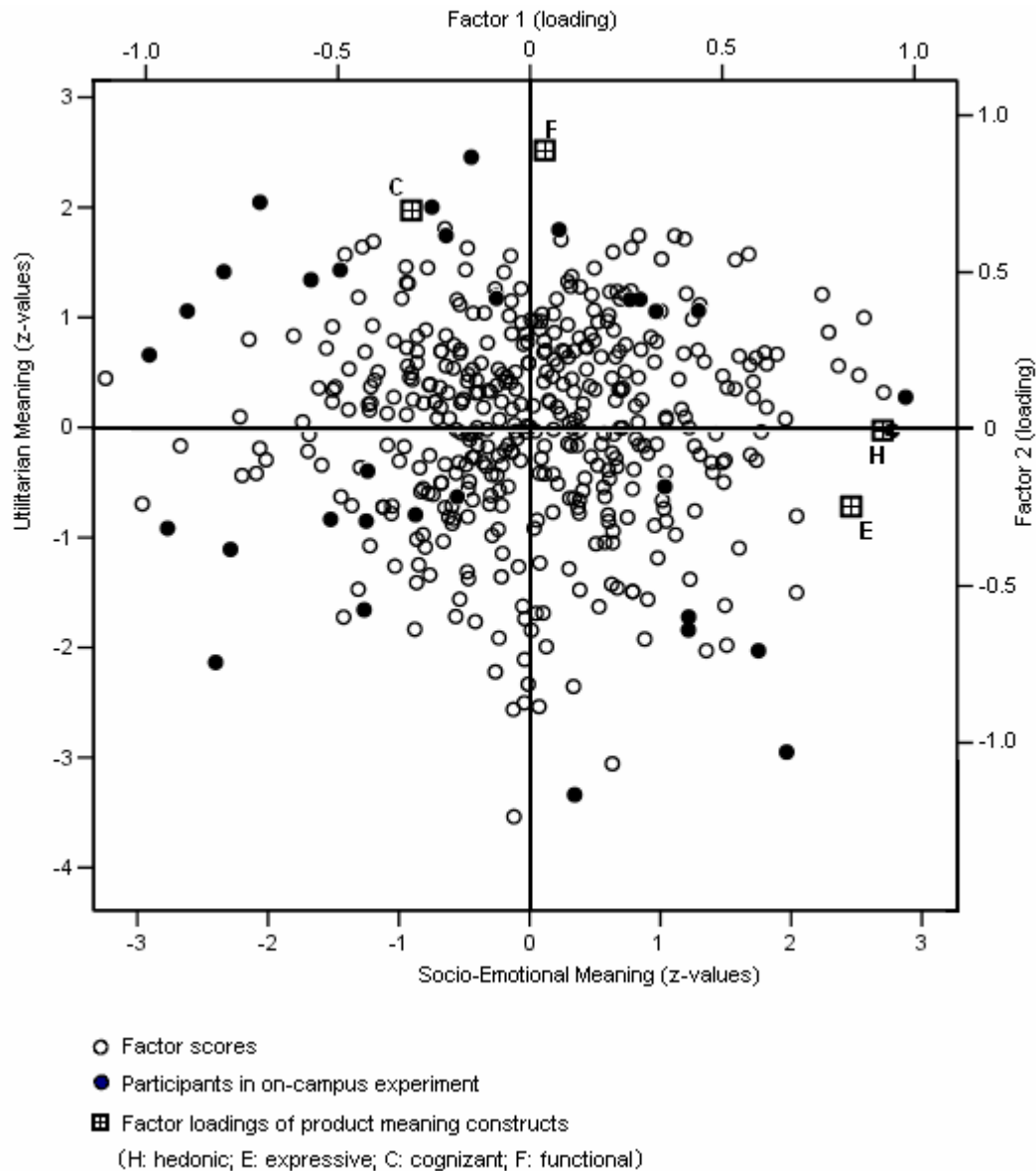
Figure 3. Participants' factor scores and factor loadings of the product meaning constructs on the two extracted components.

Method

Participants

Fifteen female and 17 male students of Finnish nationality and with an age range from 19 to 42 ($M = 25.50$, $SD = 5.80$) took part in the on-campus experimentation. Seventeen users were assigned to the same-brand and 15 to the different-brand condition.

In order to preserve the weight of the initial product meaning constructs and their association, participants were selected if their score was in the lowest or highest 15th percentile on at least one of two dimensionally related scales, while at the same time not

figuring in the opposite extreme on the second variable. As depicted in Figure 3, this selection is roughly based on a 2x2 matrix with users scoring (a) below average, both on functional/cognizant and hedonic/expressive product meaning items (Group 1), (b) below average on functional/cognizant but above on hedonic/expressive meaning (Group 2), (c) above average on functional/cognizant but below on hedonic/expressive meaning (Group 3), or (d) above average on both dimensions (Group 4).

Out of the 500 students, 118 matched the selection criteria for one of the four groups. (In order, the number of subjects for Groups 1 to 4 were 15, 42, 46, and 15; gender distribution: 61% female, 39% male; age range 19-50, $M = 25.50$, $SD = 6.20$.) Fourteen (3 to 5 in each group) did not provide us with contact addresses so they were discarded from the selection. Of the remaining 104, a random subsample of 55 participants was invited for experimentation, driven by the objective to collect an equal amount of experimental data for each of the four groups. A test session could be arranged with 58% of those invited. Six did not respond and four declined our invitation, while 13 individuals did not appear for experimentation due to schedule or geographical problems. The individuals who arrived for the experiment are marked in Figure 3 according to their factorial scores in a two-dimensional representation of the four product meaning scales (see also Phase 2 Results section). Although these scores do not directly correspond to the criteria used for their selection, the scattering reveals that it was hardest to find users who held high values on all product meaning dimensions.

Stimuli and material

The experimentation took place at the Agora Center in Jyväskylä, Finland, 2 months after the pre-experimental assessment. Users interacted with two virtual mobile phone devices that were emulated on a Dell Latitude notebook. The pressing of the phones' touch screen fields was executed by use of a mouse-controlled pen-shaped cursor.

In order to increase the credibility of the interfaces, navigation menus, and brand names, the designs were partly based on real phones and concept studies found on the Internet (see Figure 1 for the phone covers and Figure 4 for the two invented brand names: i-tel and e.me). Data collected in the questionnaire ensured that the experimental devices did not overtly resemble phones that the participants have owned themselves.

Self-assessment instruments were used at two different instances during the experiment: a postlearning questionnaire after the skills and knowledge had been tested with Device 1 (40 items), and a posttransfer questionnaire after participants completed working with Device 2 (43 items). Both questionnaires assessed the general and specific affective reactions to the devices, measured in two distinct ways: (a) The abbreviated (12-item) version of the PAD Emotion Scales (Mehrabian, 1995, 1998) was used to get a dimensional assessment of users' emotional state; and (b) a variety of statements were designed to capture users' concrete opinions about the phone, its navigation menu, their own emotion and self-efficacy beliefs, as well as their performance and performance attribution.

Figure 4. The logos used for the two brand names e.me and i-tel.

The PAD Emotional State Model employed the semantic differential technique, with each dimension (Pleasure-Displeasure, Arousal-Nonarousal, Dominance-Submissiveness) being represented by four adjective pairs. Concerning the direct questions, participants indicated the degree to which they agreed or disagreed with the favoring and rejecting remarks about the phone and its use on 7-point Likert scales

The construction of these items was based on the study of item dimensions in a wide variety measurement approaches, including the Questionnaire for User Interface Satisfaction (QUIS; Chin, Diehl, & Norman, 1988), Software Usability Measurement Inventory (SUMI; Kirakowski, 1996), Computer Satisfaction Inventory (CUSI; Kirakowski, 1987), Usefulness, Satisfaction, Ease-of-Use-Questionnaire (USE; Davis, 1989; Lund, 2001). Other freely available attribution scales, self-efficacy measures, and satisfaction questionnaires were consulted as well.

To the author's knowledge, the current paper features the first attempt to adapt the PAD emotional scale to the Finnish language. Two considerations led to the decision to translate the scale: (a) the fact that the emotion terms used in the original English language scale were very difficult to understand for native Finnish speakers, and (b) the hope that the measurement will find wider domestic and international application in future, especially in the area of user psychology. The test norms were, however, taken from the original PAD manual (Mehrabian, 1998). Three psychologists and two laymen translated the stimuli terms independently, then later agreed upon a single set of emotion expressions.

Finally, video footage of the users' facial expressions was recorded, mainly to support the validity of the frustrating experience (ca. 15 min per participant).

Design and procedure

The experimental design consisted of one within-subject and one between-subject manipulation. For all participants the use of the first device was deliberately obstructed, while the use of the second device was non-obstructed (*obstruction treatment*). The obstruction intervention was operationalized by instigating implicit modifications to the system's menu tree (i.e., alternation of nodes and changes of their loci). The participants were further split into two groups, representing the same-brand and different-brand conditions (*brand treatment*). This division, although arbitrary in its appearance, was counterbalanced for gender, product meaning, and the used brand logos.

Before the transfer part of the experiment, the participant drew from a cup of allegedly randomly mixed cards one on which it was noted whether he or she needed to continue on a transfer device belonging to a new generation product of the same brand as the learning device belonged, or on a competitor's product. In reality, the user interface and menu of the two devices were the same for all users, except for the brand logos displayed on the virtual covers.

Throughout the experiment participants were engaged in task-guided navigation through text-based, hierarchical user menus (i.e., the type with which most users are familiar from traditional GSM models). For both the learning and transfer parts, users' training on the phone (Device 1: 28 training tasks; Device 2: 9 training tasks) was followed by a brief test of their acquired knowledge and skills (Device 1: 7 test tasks; Device 2: 3 test tasks). After completing the test tasks the participants filled in the questionnaires.

Results

Overall device evaluations and performance attributions

The expectation concerning users' affective response to working with Device 1 was to be one of frustration. Mehrabian's (1995) PAD emotion model associates frustrating (e.g., upsetting, distressing, bewildering) experiences with displeasure, arousal, and submission. After computing the participants' z-transformed values on the three emotion scales (i.e., Pleasure-Displeasure, Arousal-Nonarousal, and Dominance-Submissiveness), the prediction was that, on average, participants would score negative on the first and last dimension, while being generally aroused. The means (with standard deviations in parentheses) for all 32 participants were -0.34 (0.47) for Pleasure, -0.07 (0.44) for Arousal, and -0.19 (0.51) for Dominance, with the former and latter ones deviating significantly from zero, $t(31) = 4.12$, $p < .01$ and $t(31) = 2.15$, $p < .05$, respectively. The three dimensions were not correlated with each other.

This meant that the obstructed use of Device 1 caused overall displeasure and a feeling of lack of control. It did not, however, substantially arouse people, which the PAD model translates as a mixture of frustration and despair. With scores not exceeding -1.37 (Pleasure dimension) for negative values and 1.04 (Dominance) for positive ones, it is further obvious that users refrained from giving very extreme types of answers about their emotional states. (Kurtosis was positive for Arousal-Nonarousal and Dominance-Submissiveness, and slightly negative for Pleasure-Displeasure.)

Because the use of Device 2 was not obstructed, the expectation was that participants would experience working with the transfer phone as generally more pleasurable and feel more in control. The mean scores revealed that participants felt more positive ($M = 0.30$, $SD = 0.38$, $n = 30$), but they were equally aroused ($M = 0.02$, $SD = 0.48$, $n = 32$) and did still not feel in charge ($M = -0.27$, $SD = 0.63$, $n = 32$). The changes in the emotion dimensions can be discerned from Figure 5. Paired-sample t-tests substantiated the increase in positive valence of the affective response, $t(29) = 7.39$, $p < .01$, and that there was no significant difference for Arousal and Dominance. Although the distributions tended to be very peaked and extreme evaluations rare, the PAD scores indicated that users felt generally more pleased and maybe slightly amazed when working with Device 2.

An interesting relation between the pleasure of working with the second device and the experienced arousal was found, r = .62, p < .01. This interrelation is not typical for the PAD scales but has been documented in other research that focused on specific emotional states (Mehrabian, 1995).

When asked in a more direct manner (i.e., by use of concrete statements), participants did not display many extreme opinions about either of the phones. The discussion of these results is therefore limited to those issues where average judgments deviated significantly from the ideal mean (i.e., $M = 4$ on a 7-point scale; see Table 3 for the median scores on these items). Looking at the keenness of working with the devices, users indicated they had been well motivated before performing the test tasks on the learning phone. Remarkably, this high motivation remained unchanged when moved to working with the transfer device, despite the fact that participants quite clearly noted that they did not perform well on the first device. A preliminary look at the effect of the brand manipulation revealed, however, that there was a trend for a difference in motivation about working with Device 2 between the experimental groups, $t(30) = 1.66$, $p = .05$, one-tailed. This difference was mainly due to an increase in

Table 3. Median Scores for the Participants' Judgments of the Virtual Mobile Phone Devices and Their Performance

Questionnaire item	Device 1	Device 2
When I started I was generally in a good mood and motivated	6**	6**
Before the task I was very confident and felt that I would perform successfully	5*	6**
I think all went very well	2**	6**
My performance was largely a product of how the phone was designed	5**	-
I think there was a bug in the system of the device	2**	-
My performance was an effect of the amount I was allowed to learn	5*	-
My performance was pure coincidence or luck	2**	-
Mobile phones are generally hard to learn for me	1.5**	-
I think the phone was... frustrating vs. satisfying	3*	-
complicated vs. easy	3**	-
confusing vs. intuitive	3*	-
flawed vs. reliable	5***	-
I would probably be willing to buy a product of the brand I just used	-	3*
If I came across a phone of the brand I just used, I would care to explore it	-	5**

Note: The enclosed values represent median scores. Judgments were made on seven-point scales (1 = *fully disagree*, 7 = *fully agree*). Only items where the arithmetic average deviated significantly (*p < .05; **p < .01) from the ideal mean (*M* = 4) were included. Dashes indicate that the question was not asked for a particular device.

motivation for users who received a phone from a different brand. No group difference was found for Device 1.

Users did not overtly agree that they had become frustrated while using Device 1 (*Mdn* = 4, *M* = 3.90, *SD* = 1.78), although they described the learning phone as being more frustrating than satisfying. Hence, whereas the PAD scales uncovered user frustration or some form of despair, people restrained from acknowledging the presence of negative emotions when asked directly. The potential validity dilemma was resolved by analyzing the video footage, which provided evidence that all participants displayed clear signs of frustration and distress, such as frequently frowning, sighing heavily, grumbling, and exhibiting other signs of unease, anxiousness, and nervousness.

More in accord with a negative evaluation of the phone, users judged the menu of Device 1 as slightly more complicated than easy and more confusing than intuitive, although reliable as such. The assessment of reliability, combined with the fact that users did not think that there were flaws or bugs in the system of the first device, was important to ensure the authenticity of the obstructive use experience.

The students were generally very confident about their phone skills as applied to the use of the learning device and the types of navigation tasks they needed to perform. Interestingly, they upheld their confidence when progressing to the transfer device. This indicated that, rather than attributing their mediocre performance to themselves, coincidence or bad fate, they identified the specific design of the virtual mobile phone and the amount of available learning time as probable cause for their failure.

In contrast to the obstructed use experience with Device 1, almost all participants were of the opinion that working with the transfer device went well. And although most did not estimate it as "very probable" that they would be willing to buy a future product of the

transfer brand, a majority answered that they would be inclined to try such a phone if it were marketed in the near future.

Moderation effects on affective device evaluation and transfer

The final step in the analysis of the data addressed moderation effects of product meaning, involvement, gender, and age on the user's affective experience and its transfer. Measuring the effects of the product meaning by a variance analytic extreme group design was found problematic because the groups comprising the individuals participating in the experiment were (a) not distinct enough with respect to their product meanings, (b) small (9, 8, 11, and 4 participants in the four groups respectively), and (c) varying in size (see also Figure 3). Hence, a correlative design, checking for dependency of the affective reactions to the devices on consumer personality variables, was preferred.

In order to obtain individual scores for the two product meaning dimensions (socio-emotional and utilitarian aspects), the solution of a rotated two-factorial principal component analysis of the four original product meaning constructs was used. The two extracted components allowed for the explanation of three quarters of the overall variance, with Component 1 (identified as Socio-Emotional Meaning; 48%) being a stronger factor than Component 2 (identified as Utilitarian Meaning; 27%). The loadings read .92 and .84 for hedonic and expressive meaning on Component 1 and .89 and .71 for functional meaning and cognizant product choice mode on Component 2. All variables correlated below .30 with the component they were not associated with. Figure 3 displays the loadings and the scattering of the consumers' factorial scores.

Finally, because the PAD scores appeared the most valid so far (see also Phase 2 Discussion), the moderator analyses were limited to the evaluative dimensions of Pleasure-Displeasure, Arousal-Nonarousal, and Dominance-Submissiveness.

Multiple regressions of the affective evaluation of Device 1 on consumer variables were performed, with involvement entered in Block 1, Socio-Emotional Meaning in Block 2, Utilitarian Meaning in Block 3, and gender and age in Block 4. There were no missing cases. (Table 4 contains the β-coefficients for all models, including those predicting the affective evaluations of Device 2, to which the text refers later. In the text, unstandardized B-coefficients are presented.)

For the Pleasure-Displeasure dimension, the analysis yielded a significant model with involvement and Socio-Emotional Meaning as predictors, $B = 0.23$, $pr = .33$, $t(29) = 1.85$, $p = .08$ and $B = -1.13$, $pr = -.41$, $t(29) = 2.45$, $p < .05$, respectively. Together these explained 23% of the variance as compared to 28% when including all variables, $F(2, 29) = 4.20$, $p < .05$. This result meant that people who attach strong socio-emotional meaning to electronic products in general also reacted more negatively to the frustrating learning experience with Device 1, whereas high involvement with mobile phones in particular seemed to counterbalance this effect. Gender was the strongest of the factors not included in the regression model, indicating that women were slightly more frustrated than men from the use of Device 1.

No significant regression models could be constructed for the remaining two PAD dimensions (Arousal and Dominance), using an alpha level of .05. There was, however, a significant correlation between Arousal and age, with older people tending to be more aroused

Table 4. β-Coefficients and R^2 for the Regression Models predicting Pleasure-, Arousal-, and Dominance Assessments When Working with Device 1 and Device 2

PAD-Dimension	P1	A1	D1	Brand	S-EM	UM	I	Sex	Age	Model R^2	Total R^2
P1	-	-	-	-	-.40*[a]	.14[b]	.30[a]	-.17[b]	-.02[b]	.23*	.28
A1	-	-	-	-	-.05[b]	.09[b]	-.15[b]	-.18[b]	.31[b]	-	.15
D1	-	-	-	-	.14[b]	-.08[b]	-.20[b]	.03[b]	.01[b]	-	.07
P2[c]	.48*[a]	-.10[b]	-.10[b]	.30[a]	-.18[b]	-.02[b]	-.10[b]	-.28[b]	-.32[a]	.29*	.39
A2	.50*[a]	-.02[b]	.13[b]	-.22[a]	-.07[b]	-.26[a]	-.13[b]	.01[b]	-.02	.22	.26
D2	-.02[b]	.61**[a]	-.02[b]	-.11[a]	-.07[b]	-.13[b]	-.09[b]	.13[a]	.25[a]	.33*	.36

Note: Dashes indicate that analysis for this cell was not applicable or redundant. S-EM = Socio-Emotional Meaning; UM = Utilitarian Meaning; I = Involvement; P1, A1, D1, P2, A2, D2 = Dimensions of Pleasure, Arousal, and Dominance associated with Device 1 and Device 2 respectively.
[a]Variable was included in the prediction model. [b]excluded variable. [c]$n = 30$ (for all others $n = 32$).
*$p < .05$. **$p < .01$.

than younger users, $r = .32$, $p < .05$. Dominance was negatively correlated with the original choice mode scale, $r = -.32$, $p < .05$, indicating that people who judge mobile phones in a cognizant way felt more intimidated by the obstructed learning experience.

Next, the determination of the user's affective evaluation of the transfer device needed to be examined. In particular, the question remained whether differences exist between the users who believed the two phones were of the same brand and those who believed they transferred to a device of a different brand. A preliminary visual analysis of the illustrations in Figure 5 indicated that the increase in pleasure is less steep for participants in the same-brand condition. At the same time they appeared to experience slight increases in arousal and the feeling of control, both of which diminished for participants in the different-brand group.

Correlative and regression analyses were used to identify the main covariates that needed to be controlled in testing for the effects of the brand manipulation (between-subject treatment) and the obstruction treatment (within-subject treatment) on the individual changes in Pleasure,
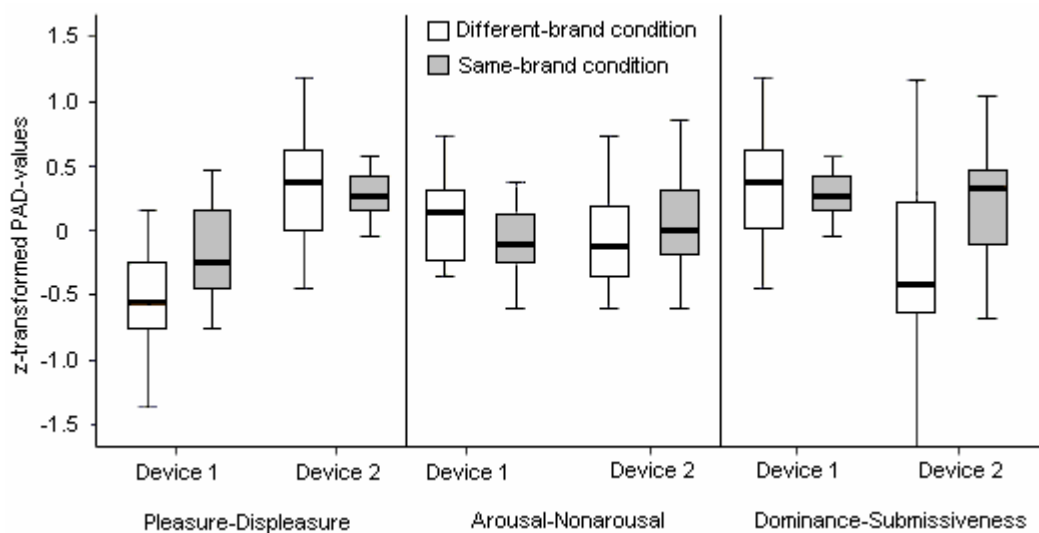

Figure 5. Mean changes in the scores on the three PAD emotion dimensions between the evaluation of Device 1 and Device 2, separated for brand conditions.

Table 5. Correlations Between the PAD Emotional Responses to Device 1 and Device 2, Separated by Brand Condition

	Device 2								
	Pleasure			Arousal			Dominance		
		Brand condition[a]			Brand condition[a]			Brand condition[a]	
Device 1	Total	Same	Different	Total	Same	Different	Total	Same	Different
Pleasure	.34*	.30	.50*	.38*	.41	.41	-.04	-.18	.11
Arousal	-.20	.30	-.43	-.11	.49*	-.47*	-.51*	-.50*	-.54*
Dominance	.02	.30	-.09	.08	.31	.02	.03	.22	-.08

[a] n = 15 for each of the two brand conditions.
*p < .05. **p < .01. All one-tailed.

Arousal, and Dominance. Table 5 lists the associations between the affective evaluations of the two devices for the whole sample, and separated for the two experimental groups.

Overall, the pleasure-related evaluation of Device 2, referred to as Pleasure 2[3], appeared to be dependent upon how enjoyable or frustrating the first device had been found. No such association was found for Arousal and Dominance (see correlations under Total in Table 5). However, when split by brand condition the Pleasure relation was significant only for participants in the different-brand condition. Noteworthy further was the inverse relation within Arousal. Arousal 2 was substantially negatively related to Arousal 1 for users in the different-brand group, whereas this association was positive for participants in the same-brand condition. The data in Table 5 also show an interesting positive correlation between prior Pleasure and Arousal during transfer, and they suggest that Arousal 1 explains more than one fourth of the variance of Dominance 2. These associations were the same for users in both brand conditions.

Discussion

The users' affective reaction to the obstruction of their initial interaction with the virtual mobile phone was, although moderate, of the expected negative type (i.e., frustration and despair). Concerning the measurement of the user experience, the opaque dimensions of the PAD emotion assessment appeared superior to direct question forms. Participants tended to disguise their feelings of discontent when asked in an overt manner, and rather attributed their emotion to the device as "being frustrating." Nonetheless, the parallel measurement of affective issues through the prompting of concrete statements provided valuable contextual information. An interesting observation with regard to attribution was, for instance, that the users' overall motivation and self-confidence did not clearly decline after the obstructive experience with the first device. In fact, it increased for those who received a new phone of a different brand. This indicates that skilled users having an unsuccessful use interaction do not readily internalize or over-generalize this negative experience to the producer or the product, but consider it a specific characteristic of a particular design.

The effects of failure were, however, not homogeneous, and the assessments of the three emotion dimensions (Pleasure, Arousal, Dominance) were affected in distinct ways by the variables of the consumer profile. Hedonic and expressive product meanings, as well as the level of involvement with mobile phones, appeared to affect the negativity of the affective response. The user's age was most predictive for the level of arousal, and the degree of

cognizant product evaluation influenced the level of the users' feeling out of control. An ideal prototype for a user that is "easily frustrated" was, thus, an older person who is in general less concerned with the type of device in question, but who makes very piecemeal judgments about similar products, and holds these products to be essential for hedonic and symbolic reasons.

Concerning the transfer of the affective evaluation to a new device, the brand modified the evolvement of the user's emotion and this was found mainly with regard to the experienced pleasure. Although the feeling of pleasure generally increased when users worked with the nonobstructed device, this effect was substantially weaker for those who received a phone from the same brand. Overall, there was only a slight change in the levels of Arousal and Dominance when users worked with a new phone. Even so, prior arousal appeared to be somewhat decisive for the type of stimulation an individual experienced from the brand of a new device, while the experience of a well-functioning second phone of the same brand increased the feeling of control especially for those who judge products in a functional and cognizant way.

The associations among the PAD dimensions across situations contribute also to the study of adjacent emotional states. In contrast to assumptions related to mood or chronologically based excitation transfer (Zillman, 1983), the results suggest that the emotional carry-over depends on relevant aspects in the way the situations are related to each other (i.e., the brand relation).

Age was generally more significant than gender in moderating people's emotional experience of product use, with older people being more negatively affected by the failure experience. Additionally, older people were more ready to transfer their anxiousness to a new design, especially when it was believed to be of the same brand. The fact that younger users recover more easily from errors was also shown in other research (Dulude, 2002).

GENERAL DISCUSSION

The presented study intended to advance consumer and HMI research on a variety of frontiers. Its accentuation of emotional and social implications of consumption and use is pivotal and reflects wide spread interests in the field (Norman, 2004; Picard, 1997). The investigation addressed key methodological and conceptual domain issues and contributed to a better understanding of the dimensional character and measuring of product meaning and affective user experience. It advanced ideas and insights into how these variables that are often researched in a detached manner within the domains of consumer and user psychology can be studied in an associated way. And finally, it promoted the use of the well-known concept of transfer in a novel context to study the relation between users' affective evaluation of different designs. This type of affective transfer is, for instance, closely related to work on self-efficacy (Compeau, Higgins, & Huff, 1999; Igbaria & Iivari, 1995) and an extension to the Technology Acceptance Model (TAM; Davis, 1989; Davis, Bagozzi, & Warshaw, 1989; see also Taylor & Todd, 1995). And on a theoretical level, the focus on emotional aspects encourages the study of nonperceivable contents in people's mental representation, which has so far been largely neglected in traditional transfer research (Helfenstein & Saariluoma, in press; Thagard & Shelley, 2001).

The findings of the consumer inquiry are well in line with other research arguing that products serve a variety of functions pertaining to hedonic, symbolic, expressive, and

functional values, and that the relevance of these various aspects is not equal for all people (Allen, 2000). Two-, three-, and four-factorial models have been discussed as viable alternatives to represent the semantic space of product meaning. The potential of the three-dimensional solution is consistent with well-established findings about the nature of meaning (Csikszentmihalyi & Rochberg-Halton, 1981; Osgood, Suci, & Tannenbaum, 1957) and is taken as evidence that the three basic psychological factors of cognition, emotion, and social reference may indeed compose a hidden structure underlying people's relation to products. The results obviously question the appropriateness of any experiment's chosen approach to differentiate only between symbolic and functional product meaning (e.g., Allen & Ng, 1999; Fournier, 1991), and they demonstrate the difficulties involved in representing emotional and cognitive aspects of product evaluation as opposites on a single dimension. As it was employed in the current investigation, I suggest, however, that the level of detail and exhaustiveness of a particular research aim and design must be considered when deciding upon which model to assume.

The PAD Emotional State Model (Mehrabian, 1995), with scales assessing the three emotion dimensions of Pleasure, Arousal, and Dominance, was easy to use and performed well in revealing the user's affective reactions. Nevertheless, direct questions about the interaction and its affective evaluation did enrich the portrait of the user experience in essential ways, which supports the call for mixed-method approaches (Arhippainen & Tähti, 2003). Obviously, future research with a Finnish version of the PAD instrument is needed for its validation, and I support the use of all three dimensions because each appeared to represent an aspect of distinct relevance to a comprehensive description of the user's affective experience.

Overall, the experimental part of the investigation provided evidence that different meanings of products and other aspects of the consumer profile moderate the affective evaluation of a design and its use in distinct ways, not only with regard to the experience of an obstructive event, but also with respect to the transfer of these connotations to the evaluation of a related device. There was further proof supporting the predicted influence of the brand knowledge upon emotional transfer.

The effect of the brand relation and the found associations between product meaning, age, and affective evaluation all had intuitive validity. And although many of these results are preliminary, it is, for instance, considered a relevant finding that prior frustration may hamper the relationship between a consumer and a brand with regard to the users' acceptance of a future design, but it does not cause actual rejection. The relations between the dimensions of product meaning and emotion were also consistent with the results of previous research (e.g., Kempf, 1999) even though it is conceivable that their discovery in the current study was partly favored by the way the research was designed (i.e., through the selection of participants that score in very disparate ways on the respective dimensions).

Finally, the exploratory character of research definitely intends to instigate further development of the research questions, the design and its measures. This pertains especially to the adopted dimensions of product meaning and emotion, the systematic use of extreme user-group designs, and the inclusion of a variety of alternative transfer relations between different designs.

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ENDNOTES

1. These include (a) artifactual context similarities, such as the chronological adjacency of the measures within a common experimental context, (b) device similarities, such as the correspondences in their (menu) systems, (c) the surface resemblance between the user interfaces, (d) brand associations between the products, as well as (e) the use similarities such as the alikeness of tasks, commonalities in the purpose of interaction, and similarities in the general symbolic and utilitarian functions of the devices themselves.
2. Bollen (1989, p. 256ff.) discusses the size of the ratio $\chi^2 / df < 2$ to be a good indication for an adequate fit of a Maximum Likelihood solution.
3. All affective evaluations related to the second phone carry henceforth the index 2, while those related to the first phone are followed by the index number 1.

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APPENDIX

Factor Loadings for the Three-Factorial Model of Product Meaning Variables

Basis/aspect of product evaluation	Component		
	1: Socio-Emotional	2: Cognizant	3: Functional
Compatibility to ideal self	.726	-.128	.138
Social prestige	.701	-.135	-.099
Pleasantness	.643	-.205	.316
Appearance	.618	-.273	.292
Gut-reaction	.616	.294	.148
Inner reaction	.608	.057	.245
Trend	.562	-.152	-.261
Expensive appeal	.556	-.311	-.099
Pride	.555	-.330	-.089
Reflection of oneself	.533	-.166	.330
Self-expression	.509	-.336	.025
Feel right	.442	-.047	.225
Concrete features	.439	.214	-.156
Friends' approval	.429	-.229	-.290
Vigilant search	.275	.644	.316
Piecemeal evaluation	.316	.640	-.024
Feature pros and cons	.159	.582	.192
Mental evaluation	.008	.543	.323
Rational choice	.394	.501	-.053
Criteria based	.287	.483	-.174
Compatibility	-.185	-.399	.292
Practicability	-.329	-.155	.603
Social reference	.300	-.111	-.548
Effective use	-.253	-.375	.491

Note: Three-factorial Principal Component analysis with Varimax rotation converged in 7 iterations.
$N = 457$.

MOBILE COMMUNICATION AND WORK PRACTICES IN KNOWLEDGE-BASED ORGANIZATIONS

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Abstract: *This paper examines the role of mobile communication, mobile tools and work practices in the context of organizations, especially knowledge-based organizations. Today, organizations are highly complex and diverse. Not surprisingly, various solutions to incorporating mobile tools and mobile communication in organizations have been devised. Challenges to technological development and research on mobile communication are presented.*

Keywords: *mobility, mobile communication, ICT, work practices, knowledge-based organizations.*

INTRODUCTION

For carrying out work, people tend to organize themselves, often for the simple reason that together they can do things that they cannot do alone. People organize themselves into groups, communities and networks of varying size and cohesion. An organization is often defined as a group of people who work together. Organizations show much variety. They can be for instance large or small, hierarchical or flat, centralized or distributed.

There are many types of organizations. One way to analyze them is through the use of metaphors, which according to Morgan (1986) shape the way in which organizations are conceptualized and understood. The machine served as a metaphor for the hierarchical and centralized organizations of the industrial era. Later on, other metaphors emerged, reflecting changes in societal values: organizations as living systems in the 1970s, organizations as cultures in the 1980s. In the 1990s, the organization-as-computer metaphor emerged, to be followed by the organization-as-network metaphor current today (Contractor, 2002). The shift from earlier metaphors to computers and networks is undoubtedly related to advances in information and communication technologies (ICTs).

Today, there is an array of organizational forms, among them the knowledge-based, alternately known as the knowledge-intensive or virtual, organization. *Knowledge-based organizations* are characterized by the importance of information seeking and utilization, as well as knowledge creation, team and project work, collaboration and competition, and the use of information and communication technologies. There are also *distributed organizations*,

uniting geographically distant members or parts of the organization by means of ICT. It is evident that such organizations need tools for communication and collaboration at a distance (see e.g., DeSanctis & Fulk, 1999). Recently, networks have received much attention as novel forms of organizing for work (e.g., Monge & Contractor, 2003), undoubtedly to some extent concomitant with the rise of knowledge as the crucial asset of an organization and the advent of the Internet. Knowledge work comprises seeking existing information, creating and sharing ideas, and knowledge of products and services. Knowledge work often takes place in networks, knowledge networks, which can be seen as networks of knowledge-generating relationships between persons linked by face-to-face and electronic forms of communication. Such networks are based on human interaction and have a constant need for up-to-date information and innovative ideas.

This paper examines the role of mobility, mobile tools and human interaction in the context of organizations, especially knowledge-based organizations. The paper opens with a review of mobile work practices, to be followed by an analysis of mobile tools and their social context. The paper concludes with challenges for development and research.

MOBILITY AND MOBILE WORK

Mobility refers to several phenomena. People can be mobile, for instance when commuting to work and when traveling on business. Tools can be mobile; common examples are mobile phones and portable computers. Communication and work can be mobile, when people interact and collaborate at a distance through ICT.

The nature of work and the workplace is changing. Work practices are being diversified (Kakihara, 2003), as workers are increasingly mobile and ICT enabled. Telework, or distance work, and flexwork, which is a combination of office work and out-of-office work, are commonly practiced. Two variants can be distinguished in telework and flexwork. The first variant is *wired* telework and flexwork, where landline telephones and wired computers are used as tools for working and communicating. In the second variant, *wireless* telework and flexwork, mobile devices such as mobile phones and laptop computers wirelessly connected to the Internet are used. By means of such mobile devices it is possible to collaborate with fellow employees outside the office. For instance, members of a team can collaborate even though they are geographically distributed; they can also be away from the "home base," visiting clients or traveling, and still be in contact with the other team members. Telework and flexwork with mobile tools can be called *mobile work*.

Mobile work involves operating at multiple locations and traveling between them—in moving vehicles, in waiting areas, and in hotel rooms. Mobile work is made possible by communication technologies, from landline phones to current and emerging information and communication systems, such as mobile phones, and wireless and wired computers (Brodie, 2003).

The emerging work practices of mobile workers have received some attention during the last few years. Churchill and Munro (2001) sum up that there are workers who themselves are mobile (moving between fixed offices equipped with stable ICT) and there are workers who carry wireless mobile technologies to be able to work in various unpredictable locations, where resources (e.g., connection to the Internet) may or may not be available. They point out that in mobile work the entire environment where work takes place contributes to the use of mobile technologies. In other words, the interface to mobile technologies includes the

environment. Therefore, the health and safety of mobile workers is an important issue. For instance, hotel rooms frequently have poor ergonomy for work.

Mobile work can be analyzed from several aspects. Kakihara and his colleagues (Kakihara, 2003; Kakihara, Sørensen & Wiberg, 2002) conducted a study of 60 mobile professionals in Tokyo. Among these, they chose three examples to illustrate the consequences of mobile technology in work: an independent town planning consultant, a freelance computer graphics designer, and a software entrepreneur. According to the researchers, emerging mobile professional work can be analyzed from three interrelated aspects of mobility, represented to a varying degree in the professionals investigated. The three aspects are locational mobility, concerned with the workers' extensive geographical movement; operational mobility, in relation to their capability for flexible operation as an independent unit of business; and interactional mobility, associated with their intense and fluid interaction with a wide range of people.

Thus, people can be mobile; people can work or operate from anywhere; people can interact with others who also are mobile and working from anywhere via mobile tools. When interacting with each other, people constantly need to negotiate whether the interaction is desirable or disruptive. From the perspective of many workers, the flexibility of mobile communication is definitely an advantage (Kakihara & Sørensen, 2002). For instance, a plumber can take new work orders while visiting a client. On the other hand, mobile communication can also be a nuisance. If the plumber´s phone continually keeps ringing, he or she can't get any work done. Thus, the plumber has to make a choice regarding the priority, or must find a balance between accessibility and undisturbed work.

In many lines of work, the possibility of arranging appointments through mobile devices and accessing the company database from a distance helps in organizing and coordinating work practices (O'Hara, Perry, Sellen & Brown, 2001). Mobile devices make it possible to negotiate with clients and fellow employees while away from the office. In fact, often an office is not needed at all. However, it appears that mobile communication is infrequently included in the information system of an organization, even though access from mobile devices to organizational databases would be highly useful (Brodie & Perry, 2001).

How do employees cope with their work in environment where both wired and wireless ICT is used? A study of workplace communication by Valtonen (2004), based on interviews with employees working in a large Finnish machinery company with worldwide clientele, highlights two areas where changes have taken place. First, the pace of interaction with clients has increased, and second, work and spare time have fused together. Such changes can lead to higher productivity, but how do the employees feel about them? According to the interviews, the fusion of work and spare time is not regarded as a problem; the interviewees are used to it. What they especially value is the possibility of having connections with their spouse and children while at work. However, as knowledge workers can operate at an intense pace for a great many hours a day, indeed, fatigue and stress may result (Anttila 2005).

MOBILE TECHNOLOGY

Alongside with changes in organizations and work practices, a new kind of information environment is emerging. With mobile devices, be they phones or computers, people can reach each other as well as sources of stored information, such as company documents and

databases, electronic libraries, and encyclopedia. Lyytinen and Yoo (2002) refer to such an environment as a *nomadic information environment*. According to them, the main drivers for this environment are mobility, digital convergence and mass scale (meaning that digital gadgets are available for a large number of people on a global level).

Mobile phones have been used in organizations for some time already. They have become everyday communication devices in industrialized countries and they show great promise for building the communication infrastructure in developing countries. Mobile phones are extensively used both in the workplace and in the family, during travels and at home, for business and for fun. Mobile telephony is clearly a global success. It is not only a gadget or technology but also a social and cultural phenomenon. The mobile phone can be used for many purposes. Ling and Yttri (2002) distinguish three main uses: for safety or security in emergencies, for microcoordination in the logistics of everyday life and work, and for hypercoordination, using the mobile phone as a tool for self-presentation, personal expression and social interaction.

Mobile phones are a facet of information and communication technology, the technology developed for information processing. ICT has its roots in stand-alone computers, the "number-crunchers." With the advent of electronic networking, computers have gained the capacity to communicate with each other and, through them, people can communicate with each other. Thus, computers have developed into communication tools, permitting such activities as e-mail, instant messaging, videoconferencing and Internet telephony.

Mobile phones have conceptually (though not technologically) evolved from landline telephones, the traditional way for interpersonal technologically mediated communication at a distance. Currently, mobile phones are in the process of developing into handheld computers (known as "smart phones"), permitting activities such as word processing, e-mail and browsing. Computers are increasingly mobile, too. Mobile, also known as portable and laptop, computers are getting ever more popular, often at the expense of desktop computers. With wired or wireless connections they can be used both for communication, via e-mail, chat and so on, and for accessing stored information. Clearly, computers and mobile phones are technologically converging.

One of the fears often expressed in connection with ICT is that there will be less face-to-face communication, fewer social contacts, in the future. Such fears have been manifested both in everyday life and working life. Computers and the Internet, as well as mobile phones and text messaging, often have been blamed for the experienced degeneration of close contacts (e.g., Sleek, 1998) and work relationships.

It is certainly possible that there may be adverse effects. In Japan, there are quite a few cases of *hikikomori*: young (usually) men socially isolating themselves from the world often by locking themselves in their rooms and immersing in the Net or computer games or both (Watts, 2002). Disturbing as this may be, to regard ICT as the cause for such behavior is unfounded. There are contributing factors other than ICT for this kind of behavior, such as general unwillingness or inability to fulfill expected social roles. The Japanese educational system as well as the society at large are extremely competitive, imposing strong demands on individuals and families. In spite of all these pressures, by far the great majority of Japanese adolescents and young adults live perfectly normal lives, with ICT playing a part—and only a part—in their lives.

Actually, both in everyday life and in work organizations there is ample evidence of mobile phones and ICT reinforcing social contacts and networks (e.g., Johnsen, 2003; Katz &

Rice, 2002; Licoppe, 2003; Ling & Yttri, 2002; Taylor & Harper, 2002). Research on technologically mediated communication appears to show that people use whatever means they have at hand to communicate—if they want to communicate (Chenault, 1998; Walther & Burgoon, 1992). As Valo (2003, ¶ 1) puts it in her study of Finnish and American students collaborating in the web:

> However, technological systems per se determined neither the type of personal
>
> relationship created nor its characteristics. In the students' experience, their
>
> relationships and interactions with their transatlantic partners were not "virtual" or
>
> "cyber-space" but a slice, though captivating, in their everyday communicative life.

In the working life, the medium used does not determine the characteristics of communicative behavior. Instead, people use the available media in ways that suit their intentions and their preferences. Technology-based theories such as media richness (Daft & Lengel, 1984; see also Buchel, 2000) claim that people make rational choices matching a particular communication medium to a specific task and to the degree of richness required by that task. However, the media richness theory can be criticized for failing to take into account the social context in which media choice decisions are made in organizations. There is need for a much broader social and political framework to complement the media richness theory. Mobile phones and ICT are not simply technological devices but social and cultural phenomena as well; people and technology have a reciprocal relationship. Users shape the technology they use to fulfill their needs, and communication can be rich even when the medium is not.

The consequences of the mobile phone for organizations have been examined by Geser (2004, pp. 25–31; The word *consequences* that he uses may not be the best word here, as there hardly exists a causal relationship). He presents, among others, the following trends, connected to mobile phones:

- Organizational communication is decentralized. Members of the organization can use informal channels for communicating irrespective of organizational hierarchy or boundaries (which is sometimes referred to as back channel communication).
- The importance of cultural traditions and internalized norms is reduced, and the impact of particular current conditions (determined by the interaction between organization members) is heightened. Collectives may be weakened; networks may be strengthened.
- Interaction between clients or citizens and organizations is intensified. For instance, emergency services can be alerted by passers-by.
- A shift from rigid bureaucratic organizations to "adhocracies" is facilitated, where timetables and cooperation patterns are constantly reshaped.

Even though Geser specifically examines the relationship of the mobile phone and societal phenomena, his ideas are probably valid as well for other mobile communication tools, such as wireless computers. Geser (2004, p. 40) comes to a radical conclusion: "It can well be

argued that cell phones have a certain 'subversive' capacity to shift the weights from dominant to less powerful individuals and from formal institutions to informal social systems."

Thus, there may be emancipatory potential in the use of mobile tools in organizations. However, the issue is not that simple. When looking in general at ICT use in organizations, there are contradictory studies, some claiming that ICT may lead to empowerment and flexibility and others that it may lead to oppression and rigidity (Robey & Boudreau, 1999; see also Buchel, 2000). ICT appears to have a dual function. It can be an enabler, but the outcomes depend on how it is implemented in an organization (Pinsonneault and Rivard, 1998). It is important to realize that ICT, whether mobile or stationary, cannot be separated from an organization's social context: line of business, mission, management, structure, and culture.

CHALLENGES FOR RESEARCH ON MOBILE COMMUNICATION

Discussions about organizational communication and work often start from a simplified notion of the office. Few employees are confined to their cubicles, to be stationary for the entire duration of the working day. Employees go to meetings, visit clients, chat with colleagues, have lunch, and so on. Employees differ much in how stationary or mobile their work practices are. In an organization, there probably is a continuum from stationary to mobile work. Besides, many workplaces are not offices, but factories, shops—or even geographically distributed knowledge-based organizations.

Consequently, the communication and work practices of employees in different organizations, in various professions, and in various lines of work should be investigated. Questions include: How do different groups of workers and employees use mobile devices for communication (e.g., knowledge workers versus those working in agriculture and forestry)? How are interaction patterns and social relationships formed in organizations where work is mobile and flexible and where mobile devices are used, as compared to more traditional organizations? How can employees be assisted in functioning efficiently in a nomadic information environment? These are but a few questions that future research needs to answer.

A nomadic information environment, where ambient information and communication technology is abundant, presents challenges to the development of information systems. Krogstie and his colleagues (2004) emphasize that information systems need to be designed for mobile use, too. Mobile wireless computers are not particularly problematic (though low connection speed may sometimes be a nuisance). A bigger question is to what extent information systems need to be customized for mobile phones.

The organization-as-computer metaphor of organization can be associated with the idea of organizational memory, an information system where information related to work tasks is stored. Access to the system is necessary for efficient work. Naturally, information needs to be explicit in nature, as it is codified into the information system. When organizations are viewed through the organization-as-network metaphor, both face-to-face and ICT-enabled interaction and collaboration are highlighted. Even though information systems continue to be important for efficient work, the creation of knowledge and innovations requires that implicit and tacit information (Polanyi, 1966) be put to use through human interaction. The relationship of these two approaches is crucially relevant for knowledge-based organizations; further studies are needed.

Research on mobile communication, mobile tools and work is carried out from the perspective of many areas of research. Recently, Kakihara (2003) has suggested a new area of research, *mobile studies*, to address the challenges. According to him, the roots of this area of research are in computer-supported cooperative work, mobile informatics, and information systems. However, such a narrow view is not at all sufficient. Alongside with such mainly technological aspects, research is needed in the social and cultural aspects of ICT-enabled mobility, with an emphasis on human interaction and the sharing and creation of knowledge.

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