The Value of Unproductive Time with Personal Ubiquitous Technologies

Qualitative Study of Smartphone use in Korea.

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Abstract: We explored the phenomenon of smartphone use in Korea through a Grounded Theory study. The preliminary theory that emerged during our data analysis centered on the role of *temporal* experiences among young 'tech-savvy' Koreans. Within this focus, we theorized that Korean youths exploit smartphone features in form of practices that manipulate time perceptions in personally meaningful, yet effectively unproductive ways. Accordingly, we argue that personal ubiquitous computing, enabled through the smartphone, requires research approaches to time that question the prevalence of productivity. We support this notion of a non-functional approach to time that plays with time's fluidity rather than its scheduled rigidity, by proposing the concept of *Intrinsic Technology Integration* as a temporal quality factor of personal ubiquitous technologies. Through this, we implicate an alternative research direction for time in HCI.

Key words: Smartphone, personal ubiquitous computing, time, productivity, user experience, grounded theory

1. Introduction

Current research confirms the temporal ubiquity of smartphone use [10], which is spread across the whole day, as people get on their devices the moment they wake up and continue using them until late at night [6]. As people perform these tasks within their own timeframe, whenever they feel like it and regardless of the context or activity, they redefine the idea of productivity. Against this backdrop, our paper explores the grounds of smartphone use by Korean youths. Through primary data collected in situ and analyzed within the scope of a Grounded Theory study, we discovered how the smartphone is appropriated through user practices that lacked pragmatic motives, and instead enabled moments and glimpses of private time, which we interpreted as fragments of personal time.

1.1 Time and ubiquitous computing

Studies on time in HCI usually focus on measures of increasing people's performance in regard to, scheduling [8], time-shifting [4], or interruptions [2]. These studies, however, neglect time practices of people that are neither meant to raise productivity nor to fulfill a conscious user goal. On the premise that increasingly embedded technologies in ubiquitous computing have temporal implications, because they are *always on* and available at *any time*, we argue that the pervasiveness of time changes how people relate to time, as they are enabled to shape it actively though ubiquitous computing technologies such as the smartphone.

Being most evident in people's everyday practices with their smartphone, the temporal ubiquity of an *always on* and *anytime* computing challenges the static convention of an absolute clock-time, and rather suggests a more

fluid and unformatted approach to time. We aim to understand what tactics and practices result from the time fluidity caused by the unique properties of ubiquitous computing. This understanding is critical, because it informs us about the hidden dimensions of time scarcity in today's fast pace of life that cannot be explained in terms of time-efficiency or productivity.

2. Research design

Our research goal was to develop a theory that addresses time practices with the smartphone to make early assumptions about the role of time within personal ubiquitous computing.

2.1 Research Question

While true for most time-saving technologies, we wondered if their maxim to be on time and more productive also applied to personal ubiquitous technologies such as the smartphone. Thus, our first interest was the effect of the smartphone on its user: (1) *what time practices do people apply in response to the smartphone's 'always-on' and 'anytime' properties?* Vice versa, we were also interested in the effect of the user on her smartphone: (2) *how is the smartphone re-interpreted and appropriated by Korean youths to support their time practices?*

2.1.1 Participants

Our research focused on real-life use situations of the smartphone among 20 to 25 year old Korean youths, who currently account for the highest rate of mobile internet usage [7]. We chose a narrow sample to focus on idio-syncrasies special to that age group. This approach helped to minimize a contamination of our data in three ways. Firstly, the approach allowed us to limit the number of participants in order to ease control and oversight. Secondly, the deep focus on a specific age group kept the data very consistent resulting in high data validity. Finally, the chosen age group showed a limited involvement and overlap of activities with other Korean social or demographic groups, meaning that the age group preferred to keep to themselves, within their social circles.

The recruitment process was enabled by announcements on public notice boards and online forums. Eventually, we recruited 13 participants with a mean age of M=23,5 (SD=1,5). Seven participants were female, 6 were male. Six participants owned an Andoid OS device, five an iPhone. In addition, one participant used a Blackberry and the remaining one a Nokia device (Symbian OS).

2.1.2 Data Collection

The collection of data followed the principles of Grounded Theory [1]. We began with an open qualitative data collection, to avoid constraining emergent patterns and frameworks.

We collected three data types. The primary source was photos taken by the participants in the process of making an informal photo diary. The participants were asked to record their smartphone use indirectly, by taking an *unaimed* and *effortless* snapshot immediately after each time they woke up their smartphone. Thus, the snapshots were not about picture-taking, but about marking the moments of smartphone use. Over a period of three weeks, the 13 participants took a total amount of 1033 pictures averaging to a mean of M=80 (SD=41,9). As the photos were taken with the smartphone, we had a secondary data source through automatic tags that provided the photograph with a time, date and GPS-location stamp. The third source for our analysis was gained in three weekly debriefing sessions in which the participants annotated their photographs in regard to the questions *Q1: What did you do on your*

smartphone?), Q2: *During what situation did you turn on your smartphone?*), Q3: *How long did you use your smartphone?*).

2.1.3 Data Analysis

We read and re-read data until major patterns emerged. Based on the most promising patterns we sketched first theories.

Open coding yielded a large number of different items regarding use patterns. Examples include smartphone use 'on the toilet', 'in the shower', 'while brushing teeth', 'while clipping toenails', 'alone in bed', 'in changing rooms of department stores', 'when wearing earphones', 'closing eyes', 'daydreaming', etc. Most of these examples are indirectly represented in the following concept of *idle time*. They all underscore the deep level of momentary privacy and glimpses of complete seclusion found throughout our study.

In the second step we reduced the numerous codes by looking for logic relationships and similarities of meaning. Thereby, we formulated nine generic concepts of smartphone use by young Koreans. These are: (1) *speed*, which subsumes instances of momentary smartphone activities, habitual micro-actions of very short durations, and fast thought-processes like chatting, (2) *face-to-face encounters*, considering smartphone uses when with or among people, (3) *media-multitasking*, including smartphone uses in situations like watching TV, surfing the web, reading a print magazine, etc., (4) *on-the-way*, subsuming use situations during transit, like riding the bus, walking, etc., (5) *in bed*, subsuming smartphone uses on the bed, (6) *idle time*, counting uses while waiting, (7) *during class*, which subsumes use cases while attending classes, (8) *study pal*, regarding cases during private, solitary study, and (9) *just checking*, including habitual and repetitive behavior patterns during smartphone use.

Table 1. Agreement Matrix.

		Speed	Face-to-face	Multi-tasking	On the way	In Bed	Idle time	During class	Study pal	Just Checking	Marginal total
						Coder 2					
	Speed	.09 (.017)	.01	.02	.01	-	-	-	-	.01	.14
	Face-to-face	-	.03 (.002)	-	-	-	-	.01	-	-	.04
	Multitasking	.02	-	.04 (.004)	.01	-	-	-	-	-	.07
	On the way	.01	-	-	.09 (.011)	-	-	-	-	-	.10
	In Bed	-	-	-	-	.15 (.026)	-	-	-	-	.15
Coder 1	Idle time	-	-	-	-	.02	.13 (.034)	.03	.01	-	.19
	During class	-	.02	-	-	-	-	.05 (.008)	.01	-	.08
	Study pal	-	-	-	-	-	-	.01	.08 (.009)	-	.09
	Just Checking	-	-	-	-	-	.05	-	-	.09 (.014)	.14
	Marginal Total	.12	.06	.06	.11	.17	.18	.10	.10	.10	1.00

To ensure reliability of these concepts we went into another coding cycle with two individual coders, and subsequently adopted Cohen's Kappa as an interrater reliability measure:

$$K = (P_a - P_c) / (1 - P_c)$$

where P_a represents the percentage of cases on which the coders agree and P_c represents the percentage of agreed cases when the data is coded by chance. From Table 1 the sum of the diagonal values result in $P_a = 0.75$ and $P_c = 0.125$ leading to the result of:

$$K = (0.75 - 0.125) / (1 - 0.125) = \mathbf{0,71}$$

The highest agreement on a concept was found with time spent '*in bed*', as those situations occurred regularly and were easy to identify. The marginal totals show the most frequently coded concepts, which are '*idle time*', time spent '*in bed*' and the concept of '*speed*'.

2.1.4 Formation of a theory

For our theory we focused on user practices aimed at creating fluid time margins with the smartphone. In the process of research we identified these time margins as a personal refuge, and interpreted that users aimed at collecting numerous moments of personal activities, creating glimpses of private time in a public context. Building our theory around this thought, we arrived at more general issues of time and society in view of an ever accelerating pace of life, where technology is not only the cause of speeding up but can also be the means to solve it. We realized that although, a personal ubiquitous computing technology such as the mobile phone might have affected people negatively, as it heightened their busyness, aggravated the effects of interruption and fragmentation on their lived experience, and generally deprived them of the control over their time, we also found a positive aspect that revealed smartphone use as an enabler of reclaiming control over one's time. Paradoxically, we discovered that reclaiming control was not enabled by a more efficient time management, but by loose and flexible stretches of unproductive time, which were fitted opportunistically into everyday life.

3. Findings

On the basis of our qualitative analysis, the preliminary theory explains that Korean youths apply practices of fragmenting the time experience to create fluid time margins for private moments.

3.1 The practice of fragmenting personal time

This practice is about exploiting the non-linearity of the time experience and represents two phenomena. Firstly, it describes the smartphone's characteristic to enable a more fluid approach to temporality, in which time is separated from the question of purpose and use. Secondly, it argues that the *always-on* and *anytime* property of the smartphone allows the participants to create private time margins for fluid and opportunistic moments. Participants pointed out that in all the complexity and noise of their everyday lived experience they have moments that could best be describe as "me-time". In some instances we found that those moments of involuntary introspection happen throughout the day preferably at quiet places and during time of waiting or when in 'idle mode'. Participants reported that during these times it is a habitual act to reach out for the smartphone and do any kind of thing by opportunity, even if it is just checking the time. One male participant even showed a frequency of checking the time nearly every ten minutes without actually being under time pressure, yet feeling some kind of emptiness or wanting to react to a sudden or rather unfamiliar tranquility or stillness, for which the smartphone seemed to offer some kind of relief. This was especially interesting, as we observed during the debriefings that this situation in fact happened implicitly without the participants' realization. In their explanations they only expressed that they felt how they emotionally bonded with their devices, as those were instantly available in the unforeseen occurrences when they 'slipped' into a moment of private time. In this way the smartphone helped to experience *fragments of personal time* by helping to create the necessary time margins. Figure 1 shows private moments of solitude and calmness

Figure 1. Personal 'smartphone time' while removing make-up.

4. Discussion

From our research findings, the practice of *fragmenting personal time* reflected a relevant issue in Korea, so that we had a reason for elaborating it further into a temporal quality factor of personal ubiquitous technologies.

4.1 Personal and social time in Korea

People's fragmented private time is particularly prevalent in East Asia. Hofstede, Hall and Nisbett [3,5,9] clarify why Koreans are prone to have private moments rather scattered over time. Hofstede claims that social life in Korea is strongly influenced by hierarchy, so that Korean culture shows a high „power distance". Secondly, Koreans are very collectivistic, as they emphasize the importance of loyalty and unity for the group. Thirdly, Hall points out Korea's high context culture, in which each expression has to be related to the situation. Finally, Nisbett indicates that East Asians have a richer understanding of the situations and relations between people than westerners, but a lower ability to verbalize this knowledge. Thus, in a country focused on (1) hierarchy, (2) collectivism, (3) contextuality, and (4) empathy, society literally 'owns' the time of its individuals. For example, in a debriefing session with our participants we learned that if one wanted to spend some time by herself while her peer-group prefers to have a get-together, than the collective pressure generally prevailed without even a slightest chance of an open discussion. Hence, peer opinions and the threat of being socially excluded cause individuals to fragment and fit in their personal time to the dictate of 'social time'. Moreover, this causes a fragmented distribution of personal time. In this context, we found that the smartphone as a personal ubiquitous technology offered the potential to alleviate this personal and cultural issue by presenting a way to enable moments of privacy at any time. This very intimate relationship between the participants and their smartphone, in which they revealed, taking it to various places secluded form the public, made us understand the underlying motives for the deep integration of the phone into people's everyday practices. Grounded in our field study, we identified a key practice that describes how time margins are used to interweave fragments of private time with the activities of everyday life.

4.2 Implications for ubiquitous computing

An early theory from our data is based on the discovery that, when mediated by the smartphone, participants exploited ubiquitous computing features to create several fluid time margins in the course of a day. In regard to the lessons learned from smartphone use, we identified a preliminary temporal quality factor to be considered for developments of future personal ubiquitous technologies, which we termed *Intrinsic Technology Integration* and

which responds to the non-linearity of the time experience. It describes how a technology enables the creation of frequent and unplanned time margins, in which moments of private activities, free of purpose and time structure, are fitted-in opportunistically. Thereby, the value of such an unproductive approach to time is found in the way of overcoming scheduled time constraints in favor of spontaneous possibilities to adapt to unforeseeable situations. The result is a deep and intrinsic integration of the technology, while it becomes a habitual and thus natural extension to its user.

5. Conclusion and Future Work

In this study we have taken the approach of opening a different perspective on productivity, by arguing that the distinction between time-saving and time-wasting technologies becomes obsolete within personal ubiquitous computing. Ubiquitous computing's unique characteristic of pervasive time results in new time practices regarding the appropriation and reinterpretation of personal ubiquitous technologies, such as the smartphone. In view of our two initial research questions, first, we discussed one such practice in our preliminary theory of people's *fragments of private time* and the smartphone's involvement as the enabling technology, and second, we proposed the temporal quality factor of *intrinsic technology integration* to test an initial way how to adopt and appropriate personal ubiquitous technologies meaningfully. This is our first step in an ongoing research that explores the role of time-flexibility within the research of personal ubiquitous computing. We attempt to discover new thought and design spaces for this emerging domain and underscore the value of qualitative studies for learning from those spaces.

Our future research on smartphone use, time and productivity will continue with defining further temporal quality factors through the discovery of more time practices that draw out the value of unproductive time.

6. References

1. Corbin, J. and Strauss, A. *Basics of Qualitative Research: Techniques and Procedures for Developing Grounded Theory*. Sage Publications, 2008.
2. Czerwinski, M., Cutrell, E., and Horvitz, E. Instant messaging and interruption: Influence of task type on performance. *Proceedings of OZCHI*, (2000), 356–361.
3. Hall, E.T. *The silent language.* Anchor, 1973.
4. Harboe, G., Massey, N., Metcalf, C., Wheatley, D., and Romano, G. The uses of social television. *Comput. Entertain. 6*, 1 (2008), 8:1–8:15.
5. Hofstede, G.H., Hofstede, G.J., and Minkov, M. *Cultures and organizations: software of the mind: intercultural cooperation and its importance for survival*. McGraw-Hill Professional, 2010.
6. Karlson, A., Meyers, B., Jacobs, A., Johns, P., and Kane, S. Working overtime: Patterns of smartphone and PC usage in the day of an information worker. *Pervasive Computing*, (2009), 398–405.
7. KCC. Korea Communications Commission. *Survey Report on smartphone usage in the second half of 2011 (in Korean)*, 2011. http://www.kcc.go.kr/download.do?fileSeq=33279.
8. Neustaedter, C. and Bernheim Brush, A.J. "LINC-ing" the family: the participatory design of an inkable family calendar. *Proceedings of the SIGCHI conference on Human Factors in computing systems*, ACM (2006), 141–150.
9. Nisbett, R.E. *The geography of thought: how Asians and Westerners think differently–and why*. Free Pr, 2004.
10. Oulasvirta, A., Rattenbury, T., Ma, L., and Raita, E. Habits make smartphone use more pervasive. *Personal and Ubiquitous Computing*, (2011), 1–10.