Interface, Mobile-Text and Modalities of Mobile Phones

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Mobile phone has evolved from a voice-only medium into multimedia. Unfortunately, studies on mobile phones thus far have been unable to keep pace with developments in technology and service marketing. As a result, there are some biased tendencies in present day social and academic discourses on mobile phones. First, the marketing discourses are placing a strong emphasis on the technical developments of the mobile media. Second, there is a strong tendency in academic discourse to regard mobile phones as simply 'phones', namely a mono-medium. Thus, existing marketing and academic discourses have been incapable of providing a thorough understanding on the substance of the mobile phone. Only by understanding the media characteristics of the mobile phones can we understand its substance. In this context, I will attempt to approach this medium in three venues: *interface*, *mobile-text*, and *modalities*.

Key Words: mobile phone, interface, mobile-text, modalities

1. Introduction

The mobile phone has evolved from a voice-only medium into multimedia. Absorbing digital cameras, mp3 players, handheld video games, the Internet, and memo-pads among others, it holds a firm position as one of the most prominent 'convergence media'. Nowadays they are receiving

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more attention than any other medium because, besides their characteristics of mobility, they embody the latest multimedia development tendencies. Unfortunately, studies on mobile phones thus far have been unable to keep pace with developments in technology and service marketing. As a result, there are some biased tendencies in present day social and academic discourses on mobile phones.

First, the marketing discourses are placing a strong emphasis on the technological developments of the mobile media. The functional extensions of mobile phones such as 'digital camera phones' and 'mp3 player phones' exert strong pressure on consumers to change their equipment to new ones. However, these developments should not be considered merely in economical terms of marketing strategies. There needs to be a new kind of analysis in terms of 'remediation', since they implant the interfaces of other existing media into themselves. Based on these phenomena, this paper attempts to build a theoretical approach.

Second, there is a strong tendency in academic discourse to regard mobile phones as simply 'phones', namely as a mono-medium. Though mobile phones have moved beyond the stage of mere voice services to provide short Message Services (SMS) and Multimedia Message Services (MMS), the tendency to consider these as simple phones persists. One reason for this is that mobile phone studies have been following in the footsteps of studies on existing phones. A second reason is that the studies are utilizing a functionalistic approach which focuses on instrumental aspects of the mobile phones, and are failing to see the mobile phone as a 'medium in itself'. This paper attempts to overcome that functionalistic approach.

Thus, existing marketing and academic discourses have been incapable of providing a thorough understanding of the substance of the mobile phone. To achieve this, the focus should be on the mobile phone medium itself.

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2. The Interface of Mobile Phones

Just like general-purpose computers and other multimedia devices, mobile phones have their unique interfaces. The mobile phone is a combination of the implementation of existing media interfaces and newly developed features. Generally, when we speak of an interface, we are referring to the "hardware/software structures and design of mechanisms or tools, which define the interactivity between system and user". More technically, it is the embodiment of operations, the "complex of affordances" (Lee, 2003). All tools used by humans have their unique interfaces, and among those there has been a popular focus on the Human-Computer Interface (HCI). However, studies on the mobile media interfaces that have been recently widely distributed have been rare.

Terminal hardware

Mobile phones are bound to have a 'limited interface' in many aspects, due to the limitations of portability and mobility. As for the hardware, the size of the terminal has been getting smaller ever since it started to shift from being a 'car phone' until it landed in individual pockets. In the early stages they were bar-shaped similar to Walkie-Talkies. However, they evolved into other convenient forms such as the flip model as started by Motorola in 1992, the folder model after the popular introduction of CDMA

in the latter half of the 1990's, and other recent variations including the slide model and revolving folder among countless others. This trend can be summarized as 'smaller', 'ighter' and 'fashionable' to express oneself.

The screen, which is the most important visual display mechanism of multimedia, has seen constant developments and has grown larger as the mobile phones have evolved into displaying texts and graphics.[1] However, the maximum size of the screens does not yet exceed 2.5 inches, and currently a single SMS message is limited to 40 letters (80 bytes) in Korea. As such, the core dilemma of the terminal display is the conflict between the desire for a smaller terminal and the desire for a wide and transparent display. The development of these visual media may be said to be the realization of the human desire for a "wide and transparent window". It is exemplified by the fact that TV screens are getting larger, big cinema screens continue to thrive even in this age of personal devices (though there are other socio-cultural elements involved), and the widespread dissatisfaction with the small and low-resolution Internet clips. Compared to those, the display of current mobile media provides only a very limited window. It seems there is still a long way to go to achieve the status of a multimedia 'cultural interface'.[2]

Limited interface can also be seen in the control keys. Unlike the general-purpose PCs with over a hundred of keys on the keyboard and a mouse, the mobile phone has only about 25 keys in total, consisting of 12 numerical keys in the footsteps of traditional phones, 6 to 9 additional soft

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1) Historically, terminal LCD screens evolved from B/W LCDs and 4-gray LCDs to the popular STN LCDs with the introduction of color terminals in 2001. Then the high-definition competition started, giving rise to TFT, TFD and UFBs. For external LCD screens, organic EL models are being used.

2) Interfaces that carry multimedia cultural contents. For specifics, see Lee (2003). Various forms such as 1) printed forms, as represented by books 2) visual forms such as movies and TV 3) general-purpose HCI forms are being used inter-combined (Manovich, 2001, pp. 73-93).

buttons, and 3 to 4 other special buttons.[3] This is an inevitable result due to its portability, and is a common feature of most portable devices such as hand-held video games. However, there is a conflict between "the desire for a smaller terminal and the desire for various control methods", just as the case with display screens.

As a result, even though the advertisements emphasize new terminal models, new additional functions and convergence with other media, it could be that the current hardware interface will not significantly differ due to the fundamental emphasis on portability. Harper makes an extreme conclusion that there is little difference between the models in regard to the limitations of interface (Harper, 2002). Only external design, size, and additional buttons carry some differences while basically providing the same interface. He continues that although high-tech equipment such as PDAs and convergent terminals are being currently released, they are not significant in numbers. Harper calls this non-discriminability "sedimentation of the form factor" or "fixity in shape and function." Two reasons are given for this fixity. One is the economic factor, which means that the production cost of limited popular terminals is constantly dropping, while the cost would rise for the manufacturer if new models were to be developed. The other is the consumer factor, which means that the consumers are so accustomed to the existing terminals and their metaphors that they could reject new ones. Based on these economic and consumer factors, Harper asks whether new interaction forms, namely 'radical form factors' are really possible. As alternatives he suggests OS standardization such as *Symbian*, the shift to wearable forms and document token concepts such as Xerox's *Satchel*. However, none of these is about to become a

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3) On the other hand, information terminals such as PDAs and next-generation mobile media such as *NOKIA 9000* possess many more keys than phones, almost as many as PCs.

killer application yet.

User-interface and interface metaphors

The core problem is that such hardware limitations limit the applicable software as well, particularly the user interface configuration of the operating system (OS) and its usability.[4] The general-purpose HCI, which is one of the most common multimedia user interfaces (MUI) today, has been evolving from the character user interface (CUI), to the graphic user interface (GUI), to the virtual reality user interface (VRUI) as shown in <Table 1>.

Looking at the types and evolution of the general-purpose HCI, mobile

<Table 1> Types and evolution of general-purpose HCI

Gene-ration	Interface paradigm	Interface type	Interaction method
1	-	-	batch
2	CUI	line interface	query-answer dialog
			commandline dialog
3		full-screen interface	form input
			menu
4	GUI	direct manipulation interface	WIMP
5	VRUI	next generation interface	VR

*Source: Sjeord (1995) & Nielsen (1993).

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4) On assessing methods and results of the usability of mobile phones and design considerations based upon them, refer to Berg, Taylor & Harper (2003), Helyar (2002), Johnson(1998), Pering (2002) and Väänänen-Vainio- Mattila & Ruuska (1998).

phone terminals have been incapable of implementing the fourth generation interface, which is direct manipulation via WIMP (windows, icons, mouse, pointer), staying at the third generation CUIs consisting of a line or full-screen interface. As a result, interaction with the terminal is limited to choice by menu, dialog box, or form input. Based on the menu method, one menu choice leads to another sub-menu, giving out a specific input space to enter characters or numbers. If commands such as delete or input are selected, a dialog box pops up and asks the user to choose between yes and no. The current mobile phone terminal interfaces do not provide an 'embodied interaction' via direct manipulation such as clicking on an icon with a mouse pointer, but only an abstract interaction via symbols such as input of characters and numbers on the menu.[5]

Such limitations of the interface directly limit the usability, raising confusion and dissatisfaction among users. Generally, HCIs utilize 'interface metaphors' to promote understanding and usability. One example is the 'desktop metaphor', which was first developed in the 1970s by Xerox Palo Alto Research Center (PARC), implemented on the PC in 1984 by Apple's Macintosh, and now widespread by MS-Windows. It made us realize that the familiar environment of a desk is realized in the computer system, thus heightening the understanding of the system and lowering the entry barrier for beginners (Lee, 2003).

In this, two aspects are to be considered. First, interface metaphors cannot be well utilized with mobile phones, because of the limitations of the interface itself. An example of interface metaphors for the mobile phone is the 'room metaphor', which is a spatial metaphor. Like Internet relay chatting (IRC), it attempts to understand chatting channels as a room. Another example is the 'letter metaphor' used for SMS and email services,

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5) Due to the fact that a mouse is a form of embodied interaction by directly mapping bodily movements into the system, it is regarded as the start of VRUI.

and the 'map metaphor' used for location-based services (LBS) such as positioning and navigators.[6] Despite such examples, the utilization of metaphors is quite confined.

Second, for the users already accustomed to the general-purpose HCI, confusion and conflicts can arise due to the discrepancy between the HCI metaphors and mobile interface metaphors (Helyar, 2002). As mentioned before, general purpose PC interfaces are GUI and mobile phones are still CUI, making conflict inevitable. Though there are also mobile phone users not accustomed to PCs, when users accustomed to the GUI of the PC use mobile phones they get confused with the terms and manipulation methods as they receive the 'plain old telephone' metaphor or the limited metaphors mentioned above (Herstad, Van Thanh, & von Niman, 1999).

3. Remediation and Media Convergence of Mobile Phones

No new technology emerges completely irrelevant from existing ones. It is also the case with media. All new media including mobile phones borrow the technology, expression forms and social practices of the existing media and modify and implement them for their own sake. Such media logic was called "remediation" by Bolter & Grusin (1999).[7] They define remediation as "the formal logic of the new media to improve and remedy existing ones". Analyzing this process is overcoming the insular biases of existing studies which have dealt with each media separate from one

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6) Due to the portability, mobile media such as the mobile phone generally tends to emphasize the coexistence and combination of the real and the virtual. It can be inferred that spatial metaphors will be used more frequently (Rodden, Chervest & Davies, 1998).

7) The term remediation comes from both *remedy* and *mediate*, so it can be understood as both remedying something or literally re-mediation.

another, and an attempt to construct a media genealogy as an alternative to the previously 'a-historic' media studies.

By extracting the remediation practices of mobile phones, a genealogical approach is possible. Indeed, there many cases which exemplify them. One is the fact that mobile phones are borrowing the hardware combination of existing fixed telephone almost entirely in its original form, the receiver, the transmitter and the numerical buttons. Also, the first bar shaped mobile phones looked like Walkie-Talkies. Remediation of fixed phones can also be seen in the software, including the dial tone and the busy signal. The answering machine, an auxiliary device of the fixed phone, developed into the voice message of mobile phones. More importantly, the key-based number and character input system itself was borrowed from fixed phones. Characters on the numerical buttons had been originally invented to convert numbers into words thus make it easier to memorize.[8] This combination of numbers and characters was applied directly to the character input system, making it possible to use them just like typewriters or computer keyboards.

Mobile phones also remediate the computer. CUI such as the menu, query-answer dialog, and form input methods are borrowed from computer OS, and gradually there are some cases of WIMP-based GUI as well. The more important remediation example is that the wireless Internet borrows the information structure and approaches of the wired Internet. The term 'wireless Internet' already carries that connotation, and other concepts such as browser, protocol, markup language and architecture. In fact, the two forms of Internet differ significantly in their interface, content forms, access, application, data storage ability and use patterns. Calling wireless

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8) In American telephone directories, character-based phone numbers can be easily found that remind us of Internet domain name systems. On the numerical buttons are letters such as ABC on the '2' key, which means that the letters A, B, C refer to the number 2. In this way, a rent-a-car company number that reads 800-CAR-RENT can be dialed with the number 800-227-7368.

Internet as 'Internet' is more than the application of existing Internet technologies to the new network. It reveals the desire to transfer the familiarity of the wired Internet to the mobile information access forms.[9]

Also, mobile phones borrow SMS forms from paper letters and Internet emails, hands-free interaction from Walkman earphones, cross formed soft buttons from handheld video games, speakers from cassette players, and photo sound effects from existing cameras. Mobile media remediate almost all other media to absorb existing technology as their own, and also attempt to overcome their limited interface.

Besides remediating other media, mobile phones combine other media into themselves directly. This is generally called media fusion or convergence. Media convergence is a general feature of modern media, and mobile phones are the most typical case of convergence. Recent mobile phone terminals combine phones with PDAs, digital cameras, camcorders, navigators, mp3 players, handheld video games and even credit cards. The so-called 'Dica' phones, mp3 phones and PDA phones are such examples, and carry several significant meanings.

The first is that all existing combinable portable devices are being converged, raising the question of for how long the existing categorizations of media will make sense. Second, the meaning of mobile phones to the individual will differ according to the different ways of personalization such as cognition and reception. For some, mobile phones will still be only phones no matter how many functions are merged into them, but for others, such as teenagers, it can be a chatting and gaming tool to maintain social networks. Third, users are not mere consumers of contents, but consumers

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9) Mobile phone browsing differs from PC browsing since they have more desire for immediate information results than the joy of browsing itself. Though the 'I-Mode' of Japan's NTT DoCoMo takes the packet switching method just like wired Internet, they do not emphasize the term Internet. It is due to the consideration for the potential I-mode users who are non-Internet users (Helyar, 2002).

and producers at the same time. Mobile media including the mobile phones will be an important contents production base in our time, and it has already begun in the form of 'mobile casting'. Fourth, as can be seen in cases such as the market shrinking of digital cameras and mp3 players, or the conflict between copyright holders and service providers regarding music downloads for mp3 phones, it is of utmost importance for future industrial interests to decide who will become the center of the media convergence.

4. Mobile Phones and Mobile-Text

We can define multimedia as "the digital media which constructs unique modalities by smoothly integrating various media components such as data, text, image and sound into a single digital information environment" (Lee, 2004, p. 6). The first emphasis is the smooth integration of various media components and second they construct unique modalities according to their composition. I will refer to the smoothly integrated digital components broadly as 'mobile-text'. Looking into it, I will discuss about what changes they could bring about to the human modalities.

Though there has been some discussions on the mobile-text, a more fundamental thinking is needed on the contents that are mediated to the users via the mobile media interface. I implemented the term mobile-text in this paper based on the digitextuality concepts by Everett & Caldwell (2003), to explain the 'mobility of material and symbols' as a sub-concept of mobility as mentioned above.[10] Just like general digitextuality,

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10) According to Everett (2003), 'digitextuality' includes both the term digital which is the characteristic of the technological process and products of the computer media, and the term 'intertextuality' which was implemented by the film theorist Kristeva

mobile-textuality requires a deep analysis of the broad aspects surrounding the mobile media such as their aesthetic characteristics, relationships with existing media, and their reception. Since I already discussed about the interface and their aesthetical aspects above, the following will focus on the textuality of the digital contents that are provided via the interface, especially the textuality of SMS.

Existing discussions on mobile-texts can be summarized into two categories. First is that mobile-texts started off as a so-called 'mono' medium and evolved into the current multimedia. Mobile services have been developing from 1) voice services into 2) SMS, 3) picture messaging (PM) with text and images, 4) have currently reached the stage of MMS where text, graphic and voice are seamlessly integrated, and 5) will further evolve into next generation mobile multimedia services where new forms of contents can be communicated via new methods.

Second, these multimedia service developments can be regarded as the growth of benefits by enlarged versatility in the eyes of the users (Nokia, 2001). Versatility refers to the information exchange capabilities between the same or other platforms such as mobile devices and the Internet of other mobile devices. This view is generally presented by the communication industry, contents providers (CP), or the terminal manufacturers. However, these discussions are based on technology optimism based on technology determinism. They may be meaningful in prospective future technological developments of the mobile service, but are less so in understanding mobile-text.

Unlike those technological discussions there has been a novel approach to mobile-text, which dealt with the textuality of SMS (Small, 2003). Though the mobile services of the mobile phone has reached a stage of MMS, still

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to explain the relationship between the texts.

SMS is the core aspect of mobile services and works as the principal point that shifted the voice-centered mono medium into true multimedia. According to Small, SMS is defined as "brief written texts that are sent via mobile phones or Internet and are received via mobile handsets." They are characterized by 1) portability, 2) unintrusiveness, 3) utilization of 'dead time', 4) diminished language redundancy, and thus were successful as a service. Moreover, they have brought about changes in the production and utilization of the written language practices along with Internet email.

According to Ong, the primary era of orality was replaced by literacy after the advent of letters and the invention of print (Walter Ong, 1982). In the 20th century, when radio, telephone and TV were invented, people who were accustomed to the written language shifted to the spoken language and thus the secondary orality gained rule once again. But Small argues that with the recent developments of email and SMS, people are getting accustomed to expressing themselves in the written form. Implementing Ong's terms, he calls it the "secondary literacy". The characteristics of SMS as a secondary literacy can be summarized as follows.

First, it differs from primary literacy in the sense that people have acquired the ability to express their thoughts shortly. Though it is getting more generous with MMS, current SMS systems allow only 160 characters (40 in Korean) per message. In spite of such limits, they have a great effect on interpersonal relationships and other social-political dimensions.

Second, email and SMS are similar to existing phones in that they are interpersonal media, but are different because they are based on literacy rather than orality. Yet another interesting point that Small did not mention is the fact that mobile phones combine both the orality of the phone and the literacy of SMS. As can be seen in the colloquial expressions in SMS messages, SMS is paradoxically a delicate hybrid of orality and literacy, or a realization of oral literacy.

Third, in spite of the technical limits and the inconvenience of use, SMS provides additional values to the message sender and receiver — 'fun'. The fun of SMS is in proportion to the time invested in the message production to overcome the limits. SMS combines the manual dexterity of the advanced user and language creativity to overcome the inconvenience, namely a new form of a 'language game'.[11]

5. Mobile Phones and Modalities

According to McLuhan (1964), all media is the extension of the bodily function. As can be seen in the relationship between print and vision, when a medium that refers to a specific sense takes control, that sensory organ takes advantage over the others and causes an unbalance of senses or even a closure of other specific sensory organs.

> Depending on which sense or faculty is extended technologically, or "autoamputated," the "closure" or equilibrium-seeking among the other senses is fairly predictable .... But the ratio among the components in the sensation or the color can differ infinitely. Yet if sound, for example, is intensified, touch and taste and sight are affected at once. The effect of radio on literate or visual man was to reawaken his tribal memories, and the effect of sound added to motion pictures was to diminish the role of mime,

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11) Additionally, Small (2003) mentions some more points on SMS. Taking those into account, SMS can be regarded as a new communication form or interaction pattern as argued by Harper (2002). First, SMS shows a reterritorialization of space. Unlike voice phones, SMS allows hidden private communication in public spaces. The message tones work as a symbol of constructing the space of 'family and community', a private space, into the unfamiliar space. Next, SMS works as a sort of remedial media. According to Levinson (1999), remedial media functions as rewarding for or avoiding failures with existing communications. Through SMS, people can avoid the awkwardness or uncomfort of face-to-face conversation, phone dialogues and voicemail messages, as well as the burden of real-time response.

> tactility, and kinesthesis .... Any invention or technology is an extension or self-amputation of our physical bodies, and such extension also demands new ratios or new equilibriums among the other organs and extensions of the body. (McLuhan, 1964, pp. 44~45)

Just like other media and technologies, mobile phones have built unique combinations of senses, namely modalities. Especially since multimedia target multiple senses including sight, sound and touch, it can be said that they have invented new forms of modalities. It is also the case with mobile phones since they have shown the 'transition from sound to sight and sound'.

The popularity of SMS, which brought about the second literacy and the use of graphic images is a clear example of the shift "from the ears to the eyes" (Nokia, 2001). Graphic messages have replaced existing picture postcards and have made it possible to send text and images free from the limits of space, time and contents. Instant photography via digital camera phones has freed the users from the limits of the analogue development, printing and manual transmission, making it possible to realize immediacy in both recording and transmitting to achieve an 'instant sharing of experience'. Mobile phones are not a simple 'speaking-and- listening medium' any more, but a 'writing-and-reading medium'.

Furthermore, mobile phones have been evolving into a 'hitting medium', a medium of touch. The expansion of SMS means a shift not only to the eyes, but also to the hand. SMS users, named by Rheingold as "thumb tribes" (Umjijok in Korean) or "GenTxt", are symbolic figures of the new ratio of the senses and extension of organs (Rheingold, 2003). The thumb tribes can input text messages in a quick manner without seeing the screen, or even while doing some other work. They do not write, but 'hit' (Chida in Korean). They express their activities as 'hitting', 'striking' (Ddaerida)

and 'flying' (Nalida) their messages. Such touch-based sense is not limited to SMS practices. As can be seen in the vibration mode, incoming calls are not sensed by only hearing the dial tones but they are also sensed by the touch of the vibrating terminal. Moreover, teenagers are treating their mobile phones like "beloved pets" as McLuhan put it (McLuhan, 1964, p. 266). The mobile phone has practically become an "utterance of the body" in Maurice Merleau-Ponty's terms.

Everett argues that this touch-based button manipulation is a general tendency in the current digital media, which has built a 'click culture' (Everett, 2003). Besides mobile phones and PDAs, new media tools providing such 'click pleasures' include the computer mouse, joysticks, handheld video games, pocket computers, and remote controls among others. According to her click theory, these click devices have the "seduction of sensory plenitude" of being able to manipulate objects ubiquitously. Since mobile phones can manipulate the 'world' with touch, it can be said to be at the core of this click culture.

McLuhan has long ago pointed out the fundamental essence of the telephone as follows.

> Many people feel a strong urge to "doodle" while telephoning. This fact is very much related to the characteristic of this medium, namely that it demands participation of our senses and faculties. Unlike radio, it cannot be used as background. Since the telephone offers a very poor auditory image, we strengthen and complete it by the use of all the other senses. (McLuhan, 1964, pp. 267~268)

Maybe the recent tendency that mobile phones become multimedia in the text composition and multi-sensory with sight and touch is nothing but the emergence of the fundamental characteristics of the telephone.

6. Conclusion

This study was an attempt to look into the interface, text practices and modalities of mobile phones to overcome functionalist approaches and take steps into theorizing the interface culture. Mobile phones provide a limited interface in hardware and software due to their unique characteristics of portability and mobility. Whereas the conflict between the desire for a smaller terminal and the desire for a wide and transparent window is a limitation on the hardware side, the primitivity of the user interface and insufficient interface metaphors are limitations on the software side. To overcome such limitations, mobile phones have remediated various existing media and have also absorbed their functions to become convergent media.

Based on such an interface, mobile phones have developed the unique style of mobile-text. The new mobile-text practices that have arisen from manual dexterity based language games realize a delicate hybrid of orality and literacy. It can be called an 'oral literacy', as seen in the case of SMS. With this, mobile phones have shown the transition of modalities from sound to sight and touch. They have taken their place as a multi modalities media.

For future research on mobile media including the mobile phone, I would like to suggest the following. First, mobile phone studies should step out of their 'media isolationism' and consider their inter-relationships with other media. As briefly mentioned in this paper, it would be a systematical genealogical study on remediation practices. Second, media studies should be based on the three-party relationship between humans, media as technology, and the world including others and objects. In this aspect, mobile phone studies could strive in the direction of mobile interaction research in the views of technological phenomenology as Fällman (2003)

and Lee (2005) suggest. When relational and genealogical research findings in this regards accumulate, the construction of general media theories will also be possible.

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