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The Case of the Disappearing Phone: Implications of Google Glass for the Embedding of Mobile Communication

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The aim of this chapter is two-fold. First, we will introduce a new theoretical framework for understanding the structural role of mobile communication in contemporary social life. Actually, the framework advanced here is not entirely new. As we explain, it is an expansion of Ling's (2012) recent theory building on the embedding of mobile communication, resulting in its "taken-for-grantedness." Starting from a macro-sociological standpoint, Ling's perspective offers a new way of understanding the consequences of mobile communication's embeddedness at the societal and collective levels. In this chapter, we attempt to expand this perspective to account for recent changes in human orientation toward mobile communication at the cognitive level. In that sense, we are essentially attempting to bridge the gap between sociology

and psychology, offering a synthesized model of how the embedding of mobile communication has not only altered the structure of society, but also worked its way into conscious and unconscious cognitive processes that underlie human behavior. With that framework in place, we will then segue into the second major goal of this chapter, which addresses the implications of wearable head-mounted display communication technologies for embeddedness at the social and psychological levels. We are particularly interested in highlighting the ways this new, or at least expanded, theoretical integration can provide guidance in identifying and developing areas of inquiry. Using Google Glass as a case study, we apply the new framework for theorizing how key affordances may have distinctive implications for the way people relate to the technology, each other, and society.

Embeddedness of Mobile Communication: from a Sociological Perspective

The process of embedding refers to the way that mobile communication as a distinctive form of social mediation has worked its way into and throughout daily life as it achieved critical mass (in the absolute sense). The social ecology has been fundamentally adjusted to accommodate the central role that mobile communication now plays in coordination, expression, and, increasingly, the exchange of information and digital content. As this process of embedding takes place, users become more attached to the technology, even bound to it (Vincent 2006). They also expect others to feel the same way, particularly with regard to heightened expectations of accessibility. Ling (2012) advances "The Katz Principle" to make this point. Here, he credits James Katz (2008) with observing that if someone is not available via mobile communication, it has now become *our* problem, whereas not long ago it was mainly just *their* problem. As these shared expectations become structurally embedded, mobile communication—as a social practice—is increasingly taken for granted (Ling 2012).

This conceptualization of embedding helps explain the evolution of mobile communication from something new to something nice to have, to a fundamental expectation. These "moments" of change resonate with the domestication framework, which identifies key

transitional periods of technology adoption and use for analytic traction in considering the meaning and consequences of new media in a given context, such as a household or network (Haddon 2003; Silverstone and Haddon 1996; Silverstone, Hirsch, and Morley 1992). Drawing from Max Weber, Emile Durkheim and others in the sociological tradition, Ling's perspective widens the lens to examine broader structural changes throughout society and social collectives. Families now rely on mobile communication as essential to the coordination of domestic affairs and tethering/untethering of children to/from parents (Ling 2004, 2005). In the context of business, mobile communication is now integral to both getting and performing jobs. Whereas this used to be primarily the case for high-level executive types, evidence from teens interviewed in focus groups indicates it has also seeped down to lower-level, part-time wage earners (Lenhart, Ling, Campbell, and Purcell 2010). Mobile communication is a primary player on the political stage as well, most obviously in the coordination of protests and revolution (e.g., Hussain and Howard 2012; Rheingold 2008). Perhaps not so obvious is the way mobile communication has also become central to political discourse and engagement in (relatively) stable democracies (e.g., Campbell and Kwak, 2010; 2012). The truth is, mobile communication has become a rather mundane part of these and other stages where social life is carried out. This is not to suggest that it is not important—quite the contrary, in fact. Rather, it has become so embedded into society that it is now taken for granted.

By way of analogy, Ling compares the embeddedness of mobile communication to that of mechanical timekeeping and automotive transportation, two other resources for social mediation that were once revolutionary, but are now difficult to live without. Imagine a person who does not recognize the social construct of time; the individual could hardly function as a member of society. Although less ubiquitous than mechanical timekeeping, automotive transportation (whether it be car, bus, train, or otherwise) is also a core necessity for many individuals throughout the world. Without access to these structural aspects of society, many individuals would completely fall through the cracks of shared social order. This would not only be their problem, but the problem of other individuals (and institutions) that wish to recognize them as part of the social

order. Here we see how the Katz Principle applies to other core resources for social mediation as well.

Up to this point, we get a sense of what position mobile communication occupies in society and how it has developed from something new to something highly fundamental in many, if not most, contexts of daily life. Along with this transition come heightened expectations for accessibility, and mobile communication's emergence as a taken-for-granted means of social mediation. Ling argues that these developments represent new— or at least newly shifted—contours of social structure. To be sure, people have always had expectations for accessibility that have fueled the development and use of new systems of communication. So these expectations themselves are not new, but the degree to which they can be satisfied *in the moment* is new. Mobile phones make us individually addressable: whereas one used to call *somewhere* to reach *someone*, we now call (or text) people instead of places (Ling 2008; Ling and Donner 2009; Wellman et al. 2003). Unlike fixed and portable technologies, mobile devices support the flow of information and communication while physically moving about and/or engaging in the business of daily life activity. It is this potential for immediate, even ambient (Ito and Okabe 2005), access to others that makes mobile communication a distinctive form of social mediation with unique ramifications for shared expectations of accessibility (Campbell 2013).

Embeddedness of Mobile Communication: Toward a Psychological Perspective

Ling's argument about embeddedness draws heavily from sociology, and is therefore particularly useful for thinking about changes in the social structure of collectives and society. We consider this to be a promising framework for understanding implications of mobile communication not only at the collective level, but at the psychological level as well. The core argument we will attempt to develop here is that the embeddedness of mobile communication at the collective level is integrated with embeddedness at the psychological level, which has implications for how people orient to the technology and to each other.

We see both parallels and intersections between the sociological and psychological domains of embeddedness. Along with heightened expectations for accessibility comes a shift in orientation toward mobile communication. As it becomes embedded into our communication and information networks, so too does it become embedded in the self—indeed, as a part of the user (Campbell 2008). Our argument is that this movement toward embeddedness not only alters how we think about mobile communication as a form of social mediation, but also the extent to which we think about it at all.

As it moves into the realm of the mundane, mobile communication shifts from the front to the back of the mind; it becomes second nature, like checking one's watch. Although not always at the forefront, it is always there, like mechanical timekeeping (Farman 2012). It has become an important part of the self in the sense that it mediates an increasing amount of the social experiences through which the self is constructed. From a symbolic interactionist perspective, there is no self without others. In that sense, the self is a social construct. But it is also supported by cognitive processes associated with one's relationships, as suggested by psychological theory on the "relational self" (Chen et al. 2006). Because mobile communication has become so ingrained in how we are connected, it has also become entrenched into the cognitive processing that supports connectedness. In that sense, heightened expectations for accessibility at the collective level translate into the embedding of mobile communication into the cognitive processes underlying social behavior. This is evident in the focus groups for a Pew project (Lenhart et al. 2010), where participants discussed reflexively checking their device when it beckons, looking down at the screen throughout the day for the time, and routinely checking it immediately upon waking, to catch up on messages received overnight. Much of this is done without a lot (if any) thought. The technology can even trigger an automatic reaction without doing anything, evidenced by "phantom vibrations" where individuals are mistakenly cued to check their phone (Drouin et al. 2012). Such phenomena illustrate how an orientation toward embeddedness and heightened expectations for accessibility has burrowed its way into the subconscious domain of cognition.

Extending the perspective of embeddedness from the realm of sociology to that of psychology is an ambitious undertaking that will involve both small steps and big leaps. In order to take one step in that direction, we will offer an explanation for a puzzling behavior—texting while driving—that helps bridge the sociological principles of embeddedness into the psychological domain. In that sense, we are treating texting while driving as one "case" that illustrates how mobile communication has become an embedded social practice for the self as well as society.[1] Texting while driving is by no means the only meaningful outcome of embeddedness; however, the occurrence of mediated communication even in the midst of high-speed traffic highlights an example of extreme embeddedness—something that wearable technologies hope to achieve at all times.

Texting while driving has become a serious matter of public safety. Research indicates that chances of an accident can go up as much as 2,300% when the driver is texting (Angell and Flanigan 2011; Drews, Yazdani, Godfrey, Cooper, and Strayer 2009). Many studies in this area have focused on the *effects* of texting while driving, usually with an emphasis on the extent to which it impairs drivers and contributes to traffic accidents. Less research, however, has been done to *explain* this behavior. The handful of studies that do try to elucidate texting while driving primarily address it from a psychological perspective, with emphasis on mechanisms located in the conscious realm of cognitive processing, such as explicit attitudes, subjective norms, and perceived behavioral control (PBC) (Atchley, Atwood, and Boulton 2011; Nemme and White 2010; Walsh, White, Hyde, and Watson 2008; White, Hyde, Walsh, and Watson 2010; Zhou, Rau, Zhang, and Zhuang 2012; Zhou, Wu, Rau, and Zhang 2009).

Recent research has shifted attention toward mechanisms in the less conscious realm of cognitive processing, starting with Nemme and White's (2010) suggestion that texting while driving may be

1 Because definitions can vary, it is worth clarifying that our own conceptualization of "texting" encompasses the range of text-based engagements through mobile telephony, including text-based interaction with others (e.g., SMS and social media updates) and interfacing with the device to access and browse content.

related to habitual tendencies. They based this idea on the finding that high frequency of texting was a stronger predictor of this behavior than attitudes or norms. Mere frequency, however, does not differentiate between conscious and unconscious cognitive processing, which is vital in measuring habit (Gardner 2012; LaRose 2010; Verplanken 2006, 2010). To rectify this shortcoming, Bayer and Campbell (2012) conducted a follow-up study with measures that extricate *how* an individual texts (more or less automatic) from *how much* an individual texts (more or less common). As predicted, the "automaticity" (Bargh 1994) side of habit was a significant predictor of texting while driving even while controlling for overall frequency. The bottom line here is that to understand the state of mobile communication in everyday life, we must look beyond conscious considerations and intentions and also account for the less conscious processes that fuel this behavior.

This discovery that texting while driving is at least partially driven by automaticity resonates with our growing understanding of media habits (e.g., LaRose, 2010). According to LaRose (2010), much of our media consumption is habitual. Those kinds of media behaviors, such as channel surfing, start out as conscious attempts to achieve a short-term goal—in this example, to avoid commercial advertisements. Over time, these immediate outcome expectations feed into more latent, long-run outcome expectations. These long-run expectations translate into habit strength (or degree of automaticity), which then translates into media consumption behavior through contextual cues that trigger them. Put differently, media behavior lies on a continuum ranging from conscious to unconscious action. Over time, when immediate goals generate sustained expectations, people develop routinized patterns in their mobile communication that rest more on heuristics than conscious thought (Oulasvirta et al. 2012).

Cues are how habitual processes take off. And mobile devices, in particular, offer a wide range of opportunities to generate cues. Most obviously, there are cues within the technology itself when it beckons through ringing, chirping, vibrating, flashing, etc. Beyond that, there are also environmental and emotional cues associated with the technology. For example, during the Pew focus groups mentioned above, teens reported instances of reflexively taking a picture or texting a friend in response to something they

encountered in their physical environment or experienced as an emotional state. Because the technology can go to virtually any place and can be used at practically any time, it has become an important part of not only the user's identity, but also the social and environmental ecology. Consequently, there are many sources of cues that can trigger mobile-mediated habitual behavior (Bayer and Campbell 2012)—and these processes depend on the technological dimensions, or affordances, of communication devices.

We treat the research presented above as supporting evidence for the overarching theoretical proposition in this chapter: just as mobile communication has shifted from a foreground artifact of attention to an embedded part of social structure, so too has it shifted from the foreground toward the background of cognitive processing. While this demonstrates a pattern of *parallel* movement across sociological and psychological fronts, mobile communication also *intersects* these two fronts in a chicken-and-egg cycle of mutual influence between social behavior and cognitive processing. It is this intersection between these two that calls for an interdisciplinary framework that bridges both streams of theory.

So far we have introduced our interdisciplinary framework regarding embeddedness and then applied it to help solve one of the puzzles that researchers and policymakers have been grappling with in recent years (i.e., explaining texting while driving). We believe our arguments about social and psychological embeddedness have utility not only for explaining past behavior, but for considering the social implications of what is on the horizon as well. In other words, we believe our propositions about the integration of embeddedness across social and psychological levels can help guide future research on emergent trends, in addition to helping explain existing ones. To develop this part of our argument, we shift our attention from the existing "case" of texting while driving to the emerging "case" of heads-up mounted displays—in particular, Google Glass. We see Google Glass not as the innovator of the new heads-up form factor (e.g., Epson's product), but rather as a specific case of something on the horizon that scholars and the popular press are beginning to grapple with.[2] Synthesizing the arguments

2 At the time of this writing, Google Glass was still on the horizon, with only a handful of individuals having sampled the product before its release in the marketplace.

above, we propose that a starting point for this task is to consider what new possibilities Google Glass has to offer for embeddedness, in both the socionormative and psychological domains.

When the Phone Disappears:
The Case of Google Glass

As noted above, it is difficult to say whether Google Glass will translate into a revolutionary change in mobile communication for the larger population of users. It may only take root among certain subgroups of users and/or serve as an added layer that is weaved into other mobile communication devices and practices. According to Ling (2012), in order for a technology to achieve "taken-for-grantedness," it must first reach a critical mass of users. Beyond that, adoption is legitimized through a system of shared beliefs, diffusion of the technology changes the social ecology, and reciprocal expectations are developed for its use. Thus, it is difficult to forecast Google Glass's potential to find its own unique place as a taken-for-granted means of social mediation. To us, though, that is not really the important question. From our perspective, Google Glass—as a form of mobile communication, more broadly—is already part of a larger communication system that has achieved this state. To us, the more interesting question is how Google Glass, and its distinctive affordances, present new dynamics to the embeddedness of mobile communication at the socionormative and psychological levels. As we will discuss, there are aspects of Google Glass that seem to resonate with the movement toward greater embedding, while also having the potential to alter the very nature of embeddedness.

From an affordances perspective (Norman 2002), Google Glass offers a distinctive set of characteristics that create new possibilities for embeddedness in social and psychological processes. Ling (2004) characterizes affordances as a theoretical perspective that lies somewhere between social and technological determinism. As a framework for understanding social implications, it places emphasis on the characteristics of a given medium without going so far as proposing those characteristics determine behavior. Rather than determining user conduct, characteristics of the medium (i.e., its affordances) create new possibilities for it. The possibilities

introduced by Google Glass are distinct from those associated with more traditional forms of mobile communication – from basic feature phones to smartphones. Just as the affordances of traditional mobile devices have helped shape embeddedness and expectations for accessibility (to others and now, increasingly, to content), it is likely that the distinctive affordances of Google Glass and the user interface may lead to new dimensions of embeddedness. Our interest here is with the key affordances that comprise the unique interface—involving visual, voice, and gesturing—and the ways they introduce new dynamics for embeddedness at the social and psychological domains.

One of the most notable affordances of Google Glass is the visual integration. Whereas the user's eyes track the screen of a smartphone, Google Glass tracks the scene in front of them, essentially serving as a third eye that captures the user's visual experience in order to share it with others or saves it to experience again later. Just as the technology keeps an eye on the physical environment, the user keeps an eye on the mediated environment with a small display that is implanted in his or her field of vision.

The visual interface of Google Glass represents a step toward greater integration of the mediated and physical stages of social interaction—what some might call the online and offline worlds. The smartphone's affordance of visual display on a small screen somewhat encourages removal of oneself from the world of others around them. We are not suggesting that those small screens cannot and do not connect users to their physical surroundings, only that there is also an element of removal—what Gergen (2002) terms "absent presence"—associated with focusing visual attention down at an artifact during use. Of course there are other existing affordances, such as voice recognition, that also lean toward a more integrated mobile experience, but none to the extent that Google Glass does with this distinctive form factor. Rather than requiring the user to maintain two scopes of visual engagement, the visual interface of Google Glass layers, even weaves, the mobile-mediated connection with the immediate physical surroundings, and those others who also occupy those surroundings.

This visual integration between the virtual and the physical can be considered as movement toward greater embedding of these two social environments. Momentum in this direction can

already be seen in the ways that young people use text messaging, picture sharing, and even video sharing (e.g., Snapchat) as methods of incorporating distant others into the mix of co-present social interaction. However, by visually disengaging with the group to look down and focus on the screen, the lines demarcating the mediated and unmediated realms are more defined with small screens. By consolidating the user's visual focus, they have a more integrated, or embedded, social experience. The embedding of the mediated and unmediated social environments points to some potential shifts at the socionormative level of mobile communication. One of the notable trends coming out of the teen focus groups for the Pew project (Lenhart et al. 2010) was that young people have become accustomed to divided attention. They acknowledge that attending to their phone can be disengaging when they are with co-present others, but it does not bother them. They give each other "a pass" for popping in and out of absent presence. This is a normative arrangement they have worked out socially—and, as they noted in the focus groups, one that is not always shared by their parents, teachers, and other older adults. The point here is that by consolidating visual focus, the normative landscape for what is acceptable and expected is altered. The context that gives meaning to the very concepts of absent and present is notably different with Google Glass. The differences between these concepts become less pronounced, making it more possible for users to have one foot in both worlds at the same time (for better or worse). Thus, Google Glass offers the potential to mitigate absent presence by consolidating visual attention, increasing the user's capacity to integrate their mediated and unmediated experiences. Whether this is actually the case, or if it might just mitigate the *appearance* of absent presence, is an interesting question for future research.

In addition to those socio-normative implications, the embeddedness of Google Glass may also present changes for the user's psychological orientation toward the technology. Even at this early stage, it is not difficult to make connections between the embedding of Google Glass and the discussion above about the habitual aspect of mobile communication. As the technology becomes more entrenched in the self, it moves further into second nature. Such developments in mobile communication resonate with the classic ideas of ubiquitous computing (Weiser 1991;

see Ling 2013), as well as more recent theory on embodiment in mobile media (Farman 2012). Indeed, at least some level of conscious work is reduced in that the user does not have to visually navigate two separate social environments, but rather one that is layered. On the other hand, the possibility of increasingly layered communication may result in more complex practices. Enacting a single conversation may be simpler with wearable technology, but the management of more lines of communication with more interlocutors may be harder in aggregate.

The layered interaction of wearable communication technologies also points to the potential for habitual cues to become more proximal and plentiful. As the number of cognitive steps between them and the behavioral response is reduced, the act of communicating is streamlined. In fact, this appears to be one of the primary objectives of wearable technologies. One of the Project Glass developers emphasized that one goal is to "[bring] technology closer to your senses" (Joshua Topolsky, "I Used Google Glass: The Future, but with Monthly Updates," *The Verge,* February 22, 2013). With Google Glass, habitualized use can be triggered and then acted on without doing much more than saying a word, taking a glance, or waving a hand. With usage over time, these conditions may support habit acquisition to an even greater extent than handheld devices. Beyond exaggerating the development of less conscious processes, the affordances of this type of wearable computing would likely increase the sheer number of cues. Due to the scene-tracking technology of Google Glass, visual cues may now operate on two levels: the human and the technological. A user may prompt communication through mental cues, or the device itself may encourage it through readings of their gaze or reminders of interpersonal goals. Thus, affordances of Google Glass may interact with automatic and taken-for-granted processes—and, in doing so, introduce novel elicitors of interpersonal communication. In total, as the technology moves to more of an embedded or background experience, the balance between manifest and latent cognitive thought is tipped toward the latter. Google Glass, then, may accelerate the automaticity of mobile communication.

In line with the potential for new unconscious rhythms, there is also an opportunity to consider how Google Glass is objectively and subjectively embedded as a part of the self. The affordance

of head-mounted scene tracking means the user is not so much looking *at* the mobile device, but rather *through* it. From the user's perspective, the artifact—as an object—disappears into the body. It is now something other people look at, whereas the user looks through it.

This movement from objective to subjective embeddedness is also supported by other aspects of Google Glass's dissimilar interface. Instead of typing, users rely on oral commands and head gestures to complement the visual component. This mix of affordances has the obvious benefit of freeing up the hands to do other things. With Google Glass, mobile communication is more seamlessly woven into daily life; for these users, mobile communication may become even more a part of who they are because it requires less attending to. Instead of looking down at a small screen while holding the device and typing on it, users speak, gesture, and gaze with the technology. In other words, the way people interface with mobile communication becomes more like the way people interact with each other: we look at, talk to, and gesture with our friends—normally, we do not type on them.

To further illustrate this point about the subjective embedding of Google Glass, we can think about how the oral command interface "subjectifies" the mobile experience. As noted, voice recognition platforms are already out there. Currently, two of the popular ones are Siri and talk-to-text, so the voice recognition aspect of Google Glass is not new. However, its usage in supporting the overall mobile experience is what makes it novel. In fact, voice (along with gaze and gestures) *mediates* the user's total mobile experience. The difference between this and using it only for a particular application is like the difference between an operating system and a particular software package. Voice commands mediate throughout the entire experience; there is a lot of talking involved in the interaction with the technology. Beyond that, the technology gets a name. Users ask or tell "Glass" to do something. ("Okay, Glass, take a picture.") This particular aspect of the interface adds a distinctive nuance to the embedding of the technology in the subjective realm of experiencing it, while diminishing its position in the objective realm. Traditionally, mobile communication has been discussed, in the subjective realm, as a part of who the user is—in other words, as a part of their identity (e.g., Campbell 2008; Walsh et al. 2011).

By naming the technology, it becomes more deeply embedded as subject rather than object, but in a unique way from other forms of mobile communication. Through the regular use of the name "Glass," the technology has a structural component that facilitates recognition of its own subjectivity, signifying a change in how one is psychologically oriented to mobile communication.

It is in that sense wearable communication technologies may come to occupy the territories of self, other, and object concurrently—raising questions about what happens when the user takes them off. Already we know that many users feel a great sense of discomfort without their handheld device. Some even panic (Vincent 2006). Without over-speculating, one can imagine a sense of nakedness when the glasses are removed (at least among those who wear and use them regularly throughout daily life). Moving forward, an avenue for future research is to examine how attachment differs across technologies that are carried, as opposed to those that are worn. Regardless, we imagine that Google Glass and other more integrated form factors will fuel the trend toward heightened expectations for accessibility, while also introducing new dynamics to the relationships between self, other, technology, and society.

To be sure, there are a myriad of ways in which one might consider affordances, embeddedness, and social/psychological shifts associated with Google Glass. Rather than providing a comprehensive analysis, our aim here was to raise a few that are particularly useful in illustrating how select principles of taken-for-grantedness can be utilized to frame the way Google Glass is considered and approached as an area for future research. Drawing from Ling's sociological perspective and extending it to the psychological tradition opens up avenues that will be fruitful for scholars to examine. As they do, researchers should attempt to identify other ways in which Google Glass may become embedded as a part of the social ecology and as part of the self. Without digging too far into promises and perils, we point to areas in which Google Glass and its distinctive interface may alter orientations to mobile communication and to each other. Whether/how this is helpful/harmful (socially and psychologically speaking) also warrants examination. On the one hand, it is important and helpful for social and personal artifacts to become taken for granted: as the use

of daily things becomes more heuristic in nature, our thoughts and attention are freed up for other matters. This means that we come to rely on our daily things to function in ways that are expected. While this may help smooth the flow of daily life activity, there is also the argument popularized by Sherry Turkle (2011) that we have come to rely on our daily digital artifacts a bit too much. In particular, Turkle contends we now are too dependent on our communication technology and not enough on each other. If indeed we are drifting in this direction, then Google Glass and the embeddedness it offers would seem more likely to flow with that drift rather than against it. This calls for future inquiry into both the opportunities and challenges the technology brings about as it transitions from something new to something nice to have, to something expected—if not for society at large, then at least for those who do incorporate Google Glass into the mix of mobile communication.

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