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Implications of Software-Based Mobile Media for Social Research

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Abstract

Software-based mobile media devices such as smartphones and tablets pose both theoretical challenges and methodological opportunities for social research. The first part of this paper discusses how the complex, changing, and often idiosyncratic configuration of software-based mobile devices challenges the production of theoretical generalizations within and across populations. It is argued that overcoming this challenge involves attention to the mobile nature of these devices and focusing on clearly defined, widespread affordances. The second part of this paper discusses ethical, philosophical, and theoretical issues surrounding the methodological opportunity to collect large quantities of behavioral data using software-based mobile devices.

Keywords: mobile communication, smartphones, theory, methodology, ethics.

The increasing popularity of software-based mobile media devices such as smartphones and tablets poses both theoretical challenges and methodological opportunities for social research. One theoretical challenge is to produce generalizations that apply across multiple devices, despite their complex, changing, and often idiosyncratic configurations. However, an important methodological opportunity is the collection of abundant and highly accurate behavioral data. In this paper I will discuss two strategies for dealing with this theoretical challenge and several issues that need to be addressed to properly leverage this methodological opportunity.

Theoretical Generalization, Technological Complexity

The challenge inherent in making general claims about complex reality is not new to social scientists. This issue is particularly pertinent to those operating within a positivist tradition in which nomothetic statements are expected. Yet even those operating in different traditions often produce statements that reify human behavior and experience. This is not surprising given that unlike objects in the natural world, humans engage in behavior that is nuanced, unexpected, and sometimes difficult to describe. Moreover, how respondents understand and interpret their own social worlds is multifaceted, and varies by time, place, and individual. Consequently, general statements about how respondents interact and interpret their social actions typically leave something out.

Until recently researchers focusing on mobile phone use for the purposes of communication have been fortunate enough to have one aspect of their study remain fairly stable. Mobile phones have generally been limited to calling and text message functions. There has been some variation over time and geographic region in terms of hardware and network infrastructure - for example, limits to the length of text messages, keypad layout, and permissibility of SIM card swapping - that has somewhat limited generalization. But compared to the complexity of in-person interaction or even the multiple types of activities that occur through fixed internet terminals, the limited affordances of mobile devices has allowed researchers to focus more on the various routines, rituals, and interactions that surround these devices than the devices themselves. It has further provided researchers a common point from which to compare the results of multiple studies, thereby helping to simplify the task of explaining similarities and differences in mobile phone usage between populations.

Unlike hardware-based mobile phones, software-based mobile devices enable an extraordinary number of possible actions. This is partly because there are numerous software applications available to users, each of which has its own unique set of opportunities and constraints for mobile mediated behavior. It is also because these devices typically allow Internet access and web browsing, which further increases the scope of possible activities. Voice and text messaging functions may still be used, but they may not be the most important functions of these devices for all users, nor may they be the most salient functions for many topics of study.

The increasing number and complexity of activities that can be conducted through software-based mobile devices makes mobile communication research a rich and important topic of study. At the same time, it poses a serious challenge to higher-level generalizations about this technology and its social significance. This challenge exists in at least two aspects of research.

First, the complexity of software-based mobile devices makes it difficult for researchers to make generalizations about types of mobile activities performed by respondents. As mentioned, activities on these devices are numerous and complex. Moreover, even if a study involves focusing on a particular type of mobile communication activity, the variety of software programs used by respondents can mean that different respondents have different opportunities and constraints in carrying out that same activity. For example, consider a research project that focuses on the use of software-based mobile devices to carry out real-time sharing of life events using a social media service such as Facebook. Some respondents may use Facebook software applications that more easily allow for real-time sharing than applications used by other respondents. Moreover, some respondents may be using different versions of the same software application that favor certain types of real-time sharing, for example, sharing of pictures rather than sharing of status updates. It would be challenging to disentangle the extent to which certain types of real-time sharing can be attributed to social or psychological dispositions, rather than the particular software application that respondents are using. In short, the variability of mobile device configuration adds another layer of complexity that potentially hinders the production of theoretical generalizations.

Second, the complexity of software-based mobile devices makes it difficult for researchers to compare results across studies. Even if studies being compared use similar populations at similar points in time, the software installed on mobile devices may vary considerably. Moreover, given that the hardware capabilities of software-based mobile devices are continually developing over time, comparing the results of studies conducted at different points in time may be challenging.

There are at least two ways of addressing the problem of producing generalizations that center on the use of software-based mobile devices. First, regardless of the software installed on the device or the capacities of the device itself, what is common to all mobile devices is the fact that they are mobile. Indeed, mobile communication research is a particularly fruitful area of study because mobility is a critical component of social interaction and everyday life. Although the Internet has enabled individuals to communicate with others across the world without leaving their homes, research has consistently shown that in-person communication is still the dominant form of interaction (see Hogan & Wellman, 2011). Mobile communication devices are often woven into in-person interaction, either because they are used while in-person interaction is occurring (DiDomenico & Boase, In Press), or because they are used to coordinate in person get-togethers (Ling & Yttri, 2002). Moreover, these devices provide a person-to-person portal for interaction that is less dependent on place than other communication media (Wellman, 2001). Attention to the mobile nature of these devices will help produce generalizations that are not limited by unique configurations of the devices themselves. Moreover, it will help researchers avoid the technologically deterministic approach of focusing too much on mobile devices, and will instead allow them to consider the larger context in which these devices are used.

A second way of increasing generalizability is by clearly defining and studying affordances that exist on multiple software platforms. The affordance approach has been used to produce theoretical generalizations that acknowledge the opportunities and constraints provided by technology without downplaying the importance of other factors such as human agency and social context (see Chapter 2 of Hutchby, 2001). For example, rather than broadly studying the use of a particular social media service on mobile devices, it would be better for mobile communication scholars to focus on a particular function of these services such as posting short status messages that can be asynchronously read by permitted network members. This type of function – broadly defined as “social awareness streams” (Naaman, Boase, & Lai, 2010) – exists on social media platforms other than Facebook, and is featured prominently by most mobile Facebook software applications. By defining and focusing on affordances that exist broadly, generalizations will be less hampered by the particularities of various software and hardware configurations.

Small Devices, Big Data

“Big Data” refers to the collection and analysis of large quantities of digital data, which is often the result of human action or other events occurring in the natural world. Until recently large stores of mobile phone log data were only available to researchers working in telecommunication companies. However, with the rise of software-based

mobile devices there are new opportunities for other researchers to independently collect large quantities of highly accurate mobile data. It is possible to develop mobile software applications that retrieve and copy data from voice and text logs and other sorts of mobile activity. Even if such software programs are only installed on a small number of mobile devices, the resulting data can be quite large. For example, using a mobile application that was installed on 542 mobile phones, Boase and Kobayashi (2012) collected dates, times, and anonymous identifier data for approximately 1.2 million voice, text message, and email events. Moreover, this software also allows for the use of onscreen survey questions that are directed to specific users. The data collected from these survey questions can then be merged with log data to give a more holistic understanding of mobile users and how they use their mobile devices.

The methodological opportunity of collecting big data in mobile communication research raises ethical, philosophical, and theoretical issues. It is beyond the scope of this paper to address many of these issues, however I would like to discuss a few.

Ethically, it is obvious that collecting big data from mobile devices has the potential to violate respondent privacy. Ways of dealing with this issue are less obvious and need to be carefully thought through. However, as with the difficulty in producing generalizations about complex social reality, ethical concerns regarding the use of private data are not new to social scientists. When conducting interviews, field research, surveys, and other forms of data collection, social scientists have been permitted access to information that is private and potentially compromising to their respondents. They have dealt with this issue in several ways. They avoid being exposed to information which is potentially compromising unless it is important to their research interests and they can ensure confidentiality. They protect the data that is collected, keeping in a safe place to which only they have access. When possible, they anonymize the data and remove identifying information. Their research methods are typically approved by ethical review boards in their institutions. Finally, when reporting the results of their research they avoid identifying individual respondents.

While it is true that the widespread adoption of software-based mobile devices creates the possibility that researchers can now collect information that is potentially compromising, mobile data collection software applications can be designed to help social scientists safeguard respondent privacy using the same strategies of traditional data collection methods. When designed correctly, they can help researchers avoid compromising respondent privacy by: selecting and recording only that information which is necessary to the project, encrypting the recorded data so that it is only available to the researchers, saving the data on secure servers, and stripping the data of identifying information by using “hash” or other anonymous identifiers. Given that ethical review boards and respondents themselves may not understand the nuances of these software-based data collection tools, it is also important that researchers explain their functionality using clear and simple language. This allows respondents to give informed consent and provides ethical review boards with the knowledge necessary to judge whether the use of this type of tool is ethically sound. As in traditional research methods, using these strategies will not guarantee respondent privacy – there is always

a possibility that privacy will be broken one way or another – but they go a long way to protecting both respondents and researchers.

Philosophically, the role of big data in mobile communication research raises the question: To what extent is it possible to predict human behavior? On the one hand, it may be argued that the existence of free will and the complexity of human decision-making means that social scientists will never be able to accurately predict behavior. On the other hand, it could be argued that social scientists have been limited in their ability to make predictions because their data is based on inaccurate self-report measures or limited observations. There is already some evidence that bigger data may lead to better prediction in the realm of mobile communication research. Drawing on 330,000 hours of continuous temporal and spatial behavioral data logged by the mobile phones of 94 respondents, Eagle, Pentland, and Lazer (2009) were able to accurately infer 95% of friendships among respondents. Although more work needs to be done to confirm that big data will improve the accuracy of prediction for mobile communication researchers, the fact that early research in this area has used mobile devices to collect big data indicates that this is a fruitful area of future study.

Theoretically, it is important that insight from existing mobile research be incorporated into future mobile research using big data. As mentioned above, mobile scholars have shown that mobile phones are woven into our everyday lives. Only focusing on big data collected through mobile devices may lead some researchers to neglect this important aspect of reality and under theorize the role of behavior occurring while mobile devices are being used. Combining mobile digital data with in-person observation may help to avoid this issue. Mobile data collection software programs can also be designed to administer pop-up questionnaires asking users to report on activities at various points throughout the day. Spatial GPS data on where respondents are moving can also give researchers a better understanding of how their mobile devices are integrated into their daily lives. Finally, it may be possible to merge data from mobile devices with data collected through devices that leave traces of other daily activities.

Big data potentially allows researchers to provide better answers to existing research questions, and further allow them to ask new research questions that were not previously possible to address. In regard to improving answers to existing questions, big data collected from mobile devices is more accurate than self-report measures that depend on respondents recalling information about their mobile use (see Boase & Ling, Forthcoming, and Kobayashi & Boase, 2012). More accurate data will help researchers to better answer questions such as: Does frequent mobile use increase bonding among small numbers of friends and family, leading to more insular networks? To what extent does mobile phone use decrease political engagement? In regard to asking new questions, big data collected from mobile devices provides the richness and nuance necessary to identify fine grained interactional patterns over time in ways that are not possible with self-report or in-person observational methods. This rich data provides researchers with the opportunity to ask new questions, such as: What are the complex mobile communication routines that individuals employ to maintain and build their personal networks over time? How does complexity or sophistication of mobile phone

use relate to an individual's ability to leverage social support? Does even a small lowering of mobile communication over time have big consequences for social relationships? Although researchers relying solely on log data will be limited to questions that focus on mobile usage behavior, combining log data with survey, interview, or observational data will help to overcome this limitation.

To conclude, the rise of software-based mobile devices poses both challenges and opportunities for social research. Addressing these challenges and opportunities in a way that allows this field to mature requires both an openness to change and an understanding of the strategies and knowledge accumulated by mobile communication scholars.

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