100 Days of iPhone Use: Mobile Recording in the Wild

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CHI 2014, Apr 26 - May 01 2014, Toronto, ON, Canada
ACM 978-1-4503-2474-8/14/04.
http://dx.doi.org/10.1145/2559206.2581296

Abstract
This report presents preliminary results from an unobtrusive video study of iPhone use – totalling over 100 days of everyday device usage. The data gives us a uniquely detailed view on how messages, social media and internet use are integrated and threaded into daily life, our interaction with others, and everyday events such as transport, communication and entertainment. These initial results seek to address the when, who and what of situated mobile phone use – beginning with understanding the impact of context. We then characterise three key modes of use found in the data: micro-breaks, digital knitting and reading. Finally we consider the multi-party and shared nature of phone use and who is involved. We reflect on analysis to date, designing from understanding use and future work – our data provides the resource and scope for further analysis of the moment-by-moment use of contemporary mobile phones.

Author Keywords
Video methods; ethnography; smartphone use; mobility

ACM Classification Keywords
H.5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

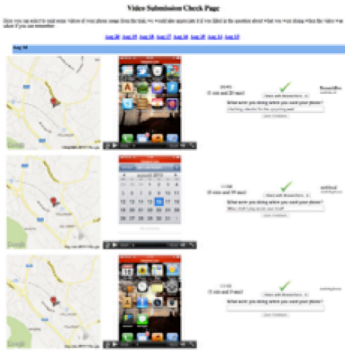


Figure 1 Participants' video review web page, where data could be approved before sharing with research team.

Introduction

The growth of the mobile device as the paramount platform for computing is increasingly difficult to dismiss, with growing sales and usage, as well a continuous innovation in hardware and applications. New technical opportunities such as near field communication, barcode scanning and Bluetooth LE (low energy) also offer increasing opportunities for integrating mobile devices into the environment. Yet the integration of mobile devices goes beyond the technical; they are an increasing part of our everyday activity and conversation, both interrupting and also augmenting our lives in new ways. Some claim that our human sociality is being damaged by the spread of internet connected devices [9, 14, 16], drawing us into shallow online interactions at the cost of more valuable face to face ones - however, there is little empirical data.

We present here the preliminary results from a study of iPhone use, using video recording to gain a more empirically informed understanding of mobile phone use in everyday life. We developed a software application (app) that ran on participants' own iPhone to record all screen interactions. The app also recorded ambient and device audio, GPS location and app launches. We used this to collect naturalistic data from 15 iPhone users in Sweden, the UK and the USA. The videos present a distinctive view – allowing us to study device use in situations as diverse as workplaces, bars, transport, outdoors, shopping malls, dinner parties, even toilets.

Study methodology

In August 2013 we conducted a 4 week study of everyday iPhone use. The method used developed that introduced by Brown et al. [4] where video data of phone use was collected during a 'day trip' in a city, using both wearable cameras and phone recording app.

Data collection - for current study, we wanted a system allowing collection of a broader range of data, less constrained by duration or nature of the 'day trip';

- Recording app downloaded and installed on participants' own phone
- Recording app running in background captures screen of the device, GPS location, apps used
- App also captures ambient and device audio
- Data videos and associated meta-data uploaded when the device simultaneously connected to power supply and wifi access
- Each participant given own review web page to approve their video data (figure 1)
- Participants asked to annotate diary entries for as many videos as possible (figure 1)
- Sessions planned to run for min 7 days

Privacy - during the use of applications (except full screen apps such as games) a bar appeared at the top of the screen, reminding users that recording was taking place. To maintain privacy the recording app could be simply turned off, plus options to delete the previous 30 mins of data and to pause the recording for 30 mins. Confidential recordings could be hidden from the researchers on the review page (figure 1).

Exit interviews - conducted at end of week either face to face or over Skype, to discuss interesting behaviour or ambiguities captured in the videos. The data extracts included in this report were all discussed in exit interviews. Alongside diary entries, interviews clarified areas of uncertainty in the recorded data.

Participants - in total, 15 regular mobile phone users took part; 10 recruited through adverts on social media and student websites, remaining participants recruited using Mechanical Turk (MT). All received gift tokens or MT payment. Age range 22-50 years. Eight were first language English speakers, and all interaction with and surrounding the phone was conducted in English, while seven used a mixture of Swedish and English. Occupations: opera producer, lecturer, actuary,

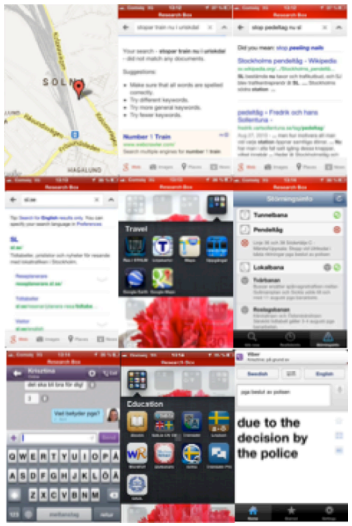


Figure 2 A storyboard of phone screens showing participant trying to find out why their train was stuck and when it would resume the journey home. Diary entry reads: "in the train going home - try to figure out why the train was stopped at the station." The train is a reason to search - it occasions use.

creative director, massage therapist, nanny, HR consultant, a student and 4 fulltime MT workers.

Data and analysis

Analysis is ongoing, so this works-in-progress report presents preliminary results only; the analysis grows out of ethnomethodology and conversation analysis. Corpus consists 2,684 video clips of use, with additional 162 hidden by participants, totalling 176 video hours of iPhone use. Median clip - 44 seconds. 10% of clips over 4 minutes 50 seconds. Longest clip over 2 hours. Participants each contributed from 22 to 445 video clips of use - median of 144 clips submitted per user. 40% of clips have diary entries submitted by participants. While this data is revealing, it presents some challenges for analysis. Some of the clips only have the video of the device available – there is no talk, ambient noise, or user's diary entry to help identify surrounding activity. Some aspects of the audio and location data allow reconstruction of the situation of use.

For analysis, all the video clips were logged and watched after being uploaded by one of the authors. Data was categorised broadly by the activity, apps used and by number of users present. We did not count numbers of clips in each category but rather moved analytically between the rough categories and videos, refining the categories as we investigated further video clips. 55 'interesting clips' were identified as either typical or unusual, or where interaction around the phone revealed aspects of use difficult to access otherwise. Over two days all three authors watched these clips and selected twenty for transcription and further, more in-depth analysis. Transcripts use simplified notation to show [overlaps], ↑raising, ↓falling tone, pauses (length in brackets).

Results

1. When?

Looking simply at use by clock time, the lowest usage is at 4am, use peaks between 3-4pm. Social media use seems fairly constant until the evening, whereas messaging peaks around 12 noon and 5pm, perhaps correlating with lunch and office hours. Participants used their phones for a median of 37 minutes per day, with a max of 14 hours and a minimum of 3 seconds. However, our data allows us to dig deeper than these descriptive statistics. What actually made a participant use a phone at a particular time?

Occasioning use

By the device - we often see use initiated when a notification (such as a message) arrives. This is an example of the device 'occasioning' use – the arriving message creates a slot where a user can naturally attend to their device, perhaps by replying to the message. Of course, this is not to say that the device *compels* a user to initiate use – messages go ignored.

By context - there are many alternate cases where usage is 'occasioned' by the context. An example of this is when there is a need for some sort of information that can be found with the phone. A common example of this was searching for directions on the map. Many of these sorts of location and information searches happen at transitions – such as when leaving home or work, or about to arrive at public transport.

Circumstances outside a participant's control can also occasion the use of the device. In figure 2, a delayed train leads to a search for information. The participant's train is stuck at a station. Not understanding the announcement made in Swedish, she searches on the Internet, eventually turning to a popular Stockholm transport information app (Res i STHLM, "Travel in Stockholm"). The in-app information page provides an explanation, but uses the abbreviation "pga". The participant messages a Swedish speaking friend to ask what "pga" means, and also uses the google translate app – with a reply to her message and the translation arriving at the same time.

A: Playing solitaire? [*]
B: Su:re
A: I'm gonna be rea-
lly surprised if this
girl comes back in
like em not kidding
B: Really
A: yeah like cos she
has been on the shit
list and I'm trying
to remember I've got
a feeling she's
no-showed on you

before, lemme look, I swear she has
(8s)
A: it doesn't say-euw
B: she's never actually success-
fully been in
A: nope
B: she was physically here this
morning, s that gives me hope that
maybe she'll be here, [maybe]
A: [wouldn't count on it]
B: you wouldn't count on it ↑
A: not gonna count on it
B: dang
((fanfare music signals start of the
joint game of solitaire))
A: oh my gawsh that was like in
stereo I heard it from over there and
here
B: shoot player gawn, okay [*]
((A and B play a 5 min game
of 'Multiplayer Solitaire'.
Each of them play on their
own, and are able to see
the other's score at the
bottom of the screen while
time counts down top)) (16s)

((game makes carhorn noise))
A: beep
A: bee:p (8s)
A: figure I'll watch emperor's new
groove tonight
B: aw maan
A: I'm like in that mood heh heh

Figure 3 Attention moves dynamically between the game of Solitaire on the two mobiles and conversation between two

The delayed train sets off a search for information on her phone – clearly the phone is not disconnected from the situation in which it is being used – it is actively drawn on here to explain what is going on, the iPhone is in the world.

2. What?

We have begun to investigate *what* mobiles are used for by initially characterising three types of emergent usage; micro breaks, digital knitting and reading.

Micro-breaks

Mobile device use was often short (median clip 44 seconds), and use distributed throughout the day in short bursts. We found much of this short usage was checking the mobile for updates, at times triggered by a notification or incoming message, but at other times this is simply a check of social media. This echoes Oulasvirta et al's [11] discussion of 'checking behaviours'. We call these short sessions 'micro-breaks'. One participant, while working all day at computer, adopted a pattern of intermittent small 'snacks' of checking their phone, navigating between Facebook, messaging, work and personal email. These clips would often be less than a minute, and self-initiated. The applications accessed during these micro-breaks were also fairly habitual – a favourite website, a news application or social media, messaging. Another participant mentioned this in their exit interview:

"In a meeting or something like that, I would check either what I need to do or just drop a few seconds out of a meeting when I need to kind of think about something else. When there's a question going on I tend to random browse either my phone or the news to disconnect a little bit and then be able to come back and have a solution."

The ergonomic literature has long advocated taking productivity value of micro-breaks, they occurred commonly in our data. Related literature concerns 'self interruptions' [9]. These micro-breaks can be seen as a form of self-interruption, and potentially helpful.

Digital Knitting

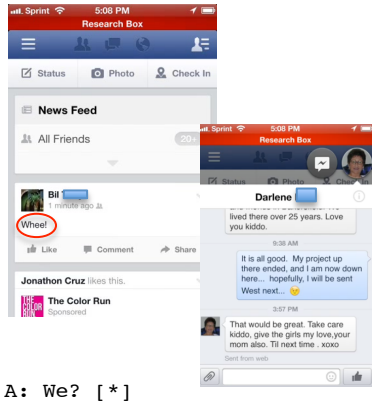
We observed longer episodes of use during which content was both created and consumed; games played while the user was involved in some other activity. We called this 'digital knitting' - attention moves between the mobile and the other activity dynamically, and the device itself is at times connected to that activity. In figure 3, a massage therapist finds herself with a spare time slot allowing her to start a Solitaire game with a fellow therapist. We draw an analogy with conversations in knitting circles, where conversation can continue alongside and around the knitting. The sporadic nature of talk in the clip is notable for its long pauses - typical of conversation with another involvement, like knitting or driving [12].

Participants at knitting groups are participating in handwork – their hands are busy but their minds can easily stray to other matters. In this way knitting is conducive to chatting, and chatting is justified because participants are still being productive. For this reason, knitting groups are increasingly termed "Stitch & Bitch' since participants can use the gathering to share not only skills but everyday life information [12]

Other creative examples of 'digital knitting' worth noting include elaborate photo editing for social media. The phone here supports enjoyable or creative activities; when asked why they spent so long creating new content for Instagram, one participant suggested, *"It all started with my hobby for friendship bracelets when I was about ten years old."*

Reading

The data is full of text of different sorts: news, messages, emails, websites, games, reviews, maps, notes and so on. Book reading is one of the most demanding reading commitments – only one participant



A: We? [*]
B: What's that↑
((Participant B responds from the other side of the room, where they can be heard typing on a keyboard))
A: we:e:e↑
B: we what?
A: you said WE
B: oh (.) wee↑eee
A: oh my gawd
((muffled groans as A gets the joke. A then opens a Facebook message)) [*]
A: (.12) Aunt Darleen wants us to move to Bakersfield
((A closes Facebook, opens Mail and begins to clear inbox emails))
A: you're too far awa:ay
((adopts an 'Auntie' accent while continuing to discuss Facebook message))
A: (.) to which I would have to say, something to the effect of, we:e:ell you havenät seen me in forte, no, thurty eight years

Figure 4 Reading social media status updates and messages provide resource for conversation with co-present other.

reads a book, reading on Kindle application for around 20 mins during commute. Future analysis could characterise types of mobile reading more fully. Media consumption on mobile devices has been the subject of some attention – Dimmick et al. [5]. Drawing on Licoppe [8], we would argue the importance of the temporal organisation of activity in determining the reading activity to be undertaken. Reading needs to fit with the free time available.

3. Who?

Finally, the richness of our data in terms of multiparty situations was a considerable surprise. In particular, the ways in which devices came to be used and brought into conversational settings. Approximately 25% of our videos had more than one voice speaking while the device was being used, indicating some interaction taking place. In figure 4, for example, social media consumption leads to a short conversation between the participant and their partner. We are reminded here of Sacks' [13, vol ii, p92] comments on the ways in which 'local resources' (he meant physical objects in the environment) provide topical resources for conversation. We see social media offering an array of topic resources regularly in the data.

Discussion and designing from understanding use

We address two emergent issues: First, questions of distraction around mobile phones, and the popular discussion that mobile phones are distracting us or interfering with ordinary life. The results here show how usage has been shaped to fit with, and become part of our everyday interactions and life – fueling some scepticism towards the notion of disruption. Second, role of design is discussed, arguing the unique suitability of video as a technique in study of distributed mobile device use. Although the study has focused so far on analysing use rather than design implications for mobile devices and services, there are already notes worth sharing here:

1. Temporality of usage and modes of use
Predicting when and where a device will come to be used could have implications for battery life and the frequency of network updates. Using time statistics and clusters of app usage, a system could potentially identify the 'situation of use' – to predict which particular form of usage might dominate, for example, waiting situations, or matching modes of transport with usage patterns.
2. Identify when others are co-present
Detect co-presence by measuring talk around the device – and potentially activate aspects of the system to fit better with the device being 'presented' to others.
3. Value of video data
Logging could be usefully augmented by video data - potentially helping us move from understanding that a particular design is more popular to understanding why.

Conclusion and future work

We have described the collection and analysis of a large, new corpus of video data featuring naturalistic mobile phone use, and begun analysis of this data by asking three core questions: When are mobiles used? What are they used for, and who is present when they are used? So far, we highlight the 'occasioned' nature of mobile use – how context impacts the timing and duration of use. We identify three usage patterns – micro-breaks, digital knitting and different types of mobile reading. Finally, we begin investigation of clips where conversation occurs indicating interaction with co-present others. The study seeks to contribute to the growing interest in understanding mobile end-user behavior. Existing analysis techniques miss much of the complexity of how mobile phones are actually adopted and used - the data presented here provides a new perspective on this most important form of contemporary technology use.

References

[1] Ariga, A. and Lleras, A. Brief and rare mental "breaks" keep you focused: Deactivation and reactivation of task goals preempt vigilance decrements. *Cognition*, 118, 3 (2011), 439-443.

[2] Barkhuus, L. and Polichar, V. E. Empowerment through seamfulness: smart phones in everyday life. *Personal and Ubiquitous Computing*, 15, 6 (2011), 629-639.

[3] Böhmer, M., Hecht, B., et al. Falling asleep with angry birds, facebook and kindle: a large scale study on mobile application usage. In Proceedings of MobileHCI 2011 (2011),47-56 ACM.

[4] Brown, B., McGregor, M., et al. iPhone in vivo: video analysis of mobile device use. In*Proceedings of CHI '13, Paris, France.,* ACM Press (2013).

[5] Dimmick, J., Feaster, J. C., et al. News in the interstices: The niches of mobile media in space and time. *New Media & Society*, 13, 1 (2011), 23-39.

[6] Girardello, A. and Michahelles, F. AppAware: which mobile applications are hot? In Proceedings of the 12th international conference on Human computer interaction with mobile devices and services (2010),431-434 ACM.

[7] Jin, J. and Dabbish, L. A. Self-interruption on the computer: a typology of discretionary task interleaving. In Proceedings of the 27th international conference on Human factors in computing systems (2009),1799-1808 ACM.

[8] Licoppe, C. and Figeac, J. *Patterns of Gaze Switching in the "Naturally-Occurring" Uses of Smartphones in Urban Mobile Settings*. Department of Economics and Social Sciences TELECOM ParisTech, 2013.

[9] Nir, S. M. Kiss Baby, Smile, Check Phone (Over and Over), Mayoral Candidates Wedded to Smartphones While Campaigning, New York Times, September 6th 2013. City, 2013.

[10] O'Hara, K., Perry, M., et al. Exploring the relationship between mobile phone and document use during business travel. In *Wireless world,* Springer (2000).

[11] Oulasvirta, A., Rattenbury, T., et al. Habits make smartphone use more pervasive.*Personal and Ubiquitous Computing*, 16, 1 (2012), 105-114.

[12] Prigoda, E. and McKenzie, P. J. Purls of wisdom: A collectivist study of human information behaviour in a public library knitting group. *Journal of Documentation*, 63, 1 (2007), 90-114.

[13] Sacks, H. *Lectures on conversation: vol 1 & 2*. Basil Blackwell, Oxford, 1995.

[14] Slade, G. The Big Disconnect: The Story of Technology and Loneliness. Prometheus Books, 2012.

[15] Trougakos, J. P. and Hideg, I. Momentary work recovery: The role of within-day work breaks. *Research in occupational stress and well-being*, 7(2009), 37-84.

[16] Turkle, S. Alone together: Why we expect more from technology and less from each other. Basic Books, 2012.