

HCI Usability Assignment

Mobile Observations

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Abstract

This reports tries to shed the light on the ongoing trends in mobile phones usage. We will try to summarize how people are using their phones, whether offline or online. What content do they access online and how do they access it. And if there is a relationship between mobile usage and demographic differences. Finally, we will see how businesses are responding to these trends by adapting their online presence.

1 Introduction

Despite the fact that mobile phones have surpassed landlines in call volumes¹. Their uses also vary from *education* [Facer et al., 2004, Kinshuk and Chen, 2005, Traxler, 2007] to *news reporting* [Väätäjä et al., 2011] to acting as alternative to banknote and credit cards [Karnouskos, 2004, Hughes and Lonie, 2007], and many other uses. Hence, we will begin by answering the following question: *What do people use their mobile phones for?*

With about 6 billion mobile subscriptions worldwide², mobile phone became one of the main means of accessing the internet, and tool for bridging the digital divide in areas with poor internet coverage [Brown et al., 2011]. So, our next two questions to answer will be: *What kind of Internet content is most often accessed using a mobile phone and who are the users?* and *What proportion of people access Internet or web content via dedicated apps, rather than through a browser?*

Later on, we will present our field study findings regarding the very same questions. Then, we will end the report with quick study of the top businesses in the United Kingdom and how they adapt their online presence to trends in the usage of mobile phones; mobiles from now on.

2 Related Work

2.1 Trends in Mobile Usage and Ownership

Before getting into a detailed analysis of the applications used by mobile users, it is good to understand how frequent people use their phones during the day, and if there are any temporal characteristics for the different groups of applications they use. [Falaki et al., 2010] developed custom logging tools to record the behaviour of Windows Mobile and Android users³. The users were found to interact with their phones from 10 to 200 times a day, and the duration of those sessions varies between 10 and 250 seconds. Even though they did not find relationship between the interaction patterns and users' demographics, the durations of the sessions were found to be dependant on the type of applications used. The average duration for interacting with some applications such as maps and games tended to be more than that of other applications such as system settings. Nevertheless, the number of applications used varied significantly - between 10 to 90 applications - among the different users.

Applications usage was also found to variate across the day. The messaging application on Windows Mobiles was reported to be used more during the day than at night. Although it

¹<http://www.mobilemastinfo.com/stats-and-facts/>

²<http://www.cellular-news.com/story/50929.php>

³222 Windows Mobile users were tracked between May-2008 and Jan-2009, and 33 Android HTC Dream users were monitored between May and October 2009.

is expected that the users' interaction with their phones decline during sleeping hours, it was noticed that there are still some few activities during that time. This was suggested to be due to irregular sleeping hours, or more interestingly, the fact that we tend to use our mobiles to check the time while in bed. [Rahmati and Zhong, 2012] tied the continuity of mobiles usage across the day to what they called *the discrete nature of mobile phones*, i.e. it can be used in locations or social contexts where the consumption of ICT devices used to be deemed inappropriate. They reached this conclusion after noticing that the 14 teens they surveyed by the end of 2007 tended to use their phones during school hours.

With the rise of mobile internet, the internet data usage is one more pattern that should be studied. [Falaki et al., 2010] discovered from their logs that the downloaded data volume varies between 1-to-1000 MB/day across the different users. They concluded that the data usage patterns for the mobile users in their survey was similar to that for computers few years earlier⁴. They also noticed that interactive applications⁵ generate slightly more than half of that traffic.

When it comes to the most frequently used applications, [Falaki et al., 2010] noticed that the communication (e.g. voice calls, SMS, email and IM) were the most used applications in their sample. Then came the internet browsing. They also highlighted that high-school students tended to play games and favour the communication applications slightly more than knowledge workers, who used productivity applications more. [Rahmati and Zhong, 2012] noticed that games and media players were the most used applications among their sample. It worth mentioning that [Rahmati and Zhong, 2012]'s sample did not have cellular data plans during the study, and this might explain the differences in internet and communication applications usage between their sample and that of [Falaki et al., 2010]. [Rahmati and Zhong, 2012] hypothesized that application whose content is always fresh and updated more frequently are more attractive to users. Communication applications, internet and what they called *recreational applications* (e.g. media player and phone-camera) all belong to this category. Those findings come in resonance with the recent report by Ofcom⁶ which shows that emails are frequently used by more than half of UK smart-phone owners followed by internet browsing, social networking, and then recreational applications.

Two notes worth mentioning here. In the studies of [Rahmati and Zhong, 2012] and [Falaki et al., 2010], as well as in Ofcom's report, the samples were only using smart-phones. Although smart-phones ownership is rising, it grew from 27% to 39% of U.K. adults in the last year⁶, patterns may still vary for feature-phones. The other factor is that the internet usage varies significantly from one smart-phone type to the other [Gerpott et al., 2012]. Apple iPhone users download more applications compared to other vendors [Murphy and Meeker, 2011]. Carolina Milanese⁷, smart-phones analyst at the research company Gartner, summarized this fact by saying that many smart-phones are in fact used as "glorified feature phones". They are used mostly for calls and texts. She added that Apple educates its customers more about the capabilities of their mobiles and applications compared to other vendors. Making the customers aware about the phone's capabilities is still one of the challenges facing human-computer interaction (HCI) designers as highlighted by [Dunlop and Brewster, 2002], since mobile users aren't normally trained on their phones. The significance of Ms. Milanese's note comes from that fact that half of the smart-phones sold in the U.K. are Android-based, while Apple's share is just 18.5%⁷.

The younger generation tend to favour smart-phones with 60-66% among those who are between 16 and 34 years old⁶. Whereas according to Nielsen report⁸ smart-phones owners tend to be more males worldwide, and the overall youth in the UK use mobile internet 20% more than other European countries. They also noticed that the females in UK text and use messaging services

⁴Numbers from 2003 and 2007

⁵Applications running in the foreground while the screen is on.

⁶<http://stakeholders.ofcom.org.uk/market-data-research/market-data/communications-market-reports/>

⁷<http://www.guardian.co.uk/technology/2011/oct/31/half-uk-population-owns-smartphone>

⁸<http://www.nielsen.com/us/en/insights/reports-downloads/2010/mobile-youth-around-the-world.html>

10% more than males. Such numbers can be complemented with [Kim and Lee, 2011]’s findings where cultural differences affect the trends in adopting the latest mobile phones. Similarly, [Väätäjä, 2010] noticed the effect of people’s profession on their mobile preferences.

2.2 Mobiles and Internet Content

2.2.1 Location and Device Type

In 2009, [Brown et al., 2011] compared the percentage of teens from USA households earning less than \$30,000/year who ever used their phones to access the internet to those from richer families. They then broke those numbers down based on the ownership of computer-based internet access in those households to elaborate that mobile phones are used to bridge the digital divide among teens by giving access to the internet to those with no other means of access. [Nylander et al., 2009] agreed that the lack of computers is a frequent reason for accessing the internet from a mobile phone; however in 51% of the cases in their survey, their sample⁹ accessed the internet from a mobile while they had access to a computer. The interviewed persons gave explanations like “The cell phone was more convenient since I was in the kitchen” and “Didn’t have the energy to go downstairs to the computer”. [Church and Oliver, 2011] confirmed the findings of [Nylander et al., 2009] two years later, stating that most of the time (more than 70%) the people they studied accessed the internet from their mobiles while at home. Similarly, [Song and Tjondronegoro, 2010] reported that the most common context for their sample to use mobile video was at home. This can also explain [Nylander et al., 2009]’s findings that 58% of the time mobile phone users access content not related to mobility or current situation; for example: reading the news, checking their email or just passing time.

Android phones form half of the smart phones being sold in UK, while the share of Blackberry and Apple’s iPhone are 22.5% 18.5% respectively, as reported by The Guardian⁷. Nevertheless, when it comes to the browsers seen online, Apple Safari comes first with 42.4% followed by Blackberry and Android with 29.7% and 20.7% respectively, as stated by Ofcom report⁶. This gives us idea how some smart-phones are used more than others to access the internet. This, by the way, confirms the previously mentioned findings of [Murphy and Meeker, 2011, Gerpott et al., 2012].

2.2.2 Trends in Web Content

In their study on 109 participants from Austria in 2009, [Schmiedl et al., 2009] found that 70% of the accessed websites are either those providing content related to current situation, such as weather forecast or news, or those providing general information, such as Wikipedia and search engines. The next two categories are Entertainment and Social Networking Sites (SNS) with 17% and 13% respectively. Such findings varied in [Church and Oliver, 2011]’s study, two years later, where 30% of the web activities of their 18 participants was to SNS. Applications such as news, music, and videos came next with 24%. The findings of [Church and Oliver, 2011] are aligned more with Ofcom recent report⁶ where about 40% of the smart-phone owners surf the web and access SNS frequently. The findings of [Church and Oliver, 2011] are also justified by the rise of smart-phone users as well as the findings of [Nylander et al., 2009], mentioned earlier, where mobile phones are being used more to access the internet in non-mobile context.

Mobile search has been studied in more details. [Church and Oliver, 2011]’s findings in this area were more consistent with [Schmiedl et al., 2009]’s general internet usage findings. By studying 17 out of their 18 participants who performed web searches on their phone, they found that current content (e.g. weather, bus times and addresses of local businesses) has the lion’s share in searches. They also noticed large volume in general information and fact-checking related searches. Search patters also varies between the different mobile phones. [Kamvar et al., 2009]

⁹They interviewed 19 persons after asking them to keep a diary of their mobile internet activity

noticed that the average number of words (and characters) for iPhone users were more close to those entered by computer users than they are to other conventional-phone¹⁰ users. Similarly, the diversity in the search queries entered by computer and iPhone users was bigger than that of conventional-phones' queries. The superiority of touch-phones (iPhone in this case) in searches can be explained by [Oulasvirta and Bergstrom-Lehtovirta, 2011]'s findings: Although typing on phone with physical Qwerty keyboards is quicker than touch-phones, it was found that touch-phones excel when the users are typing while doing other simultaneous tasks, which is what mobile users often do. [Kamvar et al., 2009] concluded: “[A]s text entry gets more difficult, users may be willing to spend more time browsing the list of search results rather than refining their query in order to find the desired information”.

Google was the most used search engine in [Church and Oliver, 2011]'s study with a ratio of 81:3 occurrences compared to Yahoo. It was also noticed that the temporal patterns for mobile searches were steady across the day, which they interpreted by the influence of the random information needs users face during the day.

2.2.3 Browsers vs Native Applications

Most of the 18 users studied by [Church and Oliver, 2011] preferred accessing content via an application, unless they can't find an application for the content they want. They also found that for 75% of the cases, web access was initiated from a native mobile application such as email, SNS and news applications. The users commented that it makes reaching the desired content quicker and in “one simply tap”. [Kamvar et al., 2009] found that the iPhone users tend to search for local content from richer applications rather than doing normal web searches. They added that mobile users in general have more web-based local searches compared to computer users.

[Charland and Leroux, 2011] agreed with [Church and Oliver, 2011] regarding the effect of the user experience factor on favouring native applications. They listed different aspects that make the application experience more attractive to the user: The user gets a consistent look and feel for the content they visit, whereas the differences between browsers and the set of HTML/CSS standards they support make web-pages get rendered differently (or badly) on different phones. Also, the fact that browsers are not tightly coupled with the system's operating system makes the execution of some pages slow and prevents websites from pushing notifications to the users or accessing the low-level APIs such as those for geolocation.

In the end, [Charland and Leroux, 2011] expected that such a gap between native applications and web browsers is on its way to get bridged. They added: “Most mobile browsers support geolocation today, for example, and iOS recently added Accelerometer and a slew of other HTML5 APIs”. While [Lee and Yu,], on the other hand, stated in their study of twitter third-party applications that developers should try to stick to the conventions set by the website or official application for easier experience to new users.

3 Field Study

3.1 Study Sample and Methodology

The sample consisted of 26 persons (17 Females and 9 Males), The majority of them were UEA (University of East Anglia) students and their ages varied between 18 and 44. The average age and standard deviation of the sample were 24.5 and 6.7 respectively. We also took note of whether they use a smart-phone or a feature phone.

They were asked the following 3 questions:

¹⁰The phones' input devices or OS's were not specified in the study

1. What do you do the most with your phone? (They were encouraged to give 3 answers)
2. What are the top internet content you visit from your phone? (They were encouraged to give 3 answers)
3. If some content is available via Native Application, do you prefer using the Native Application or the Web Browser?

3.2 Limitations

People normally say what applications they think they use the most, not usually what they really use the most. Previous studies where logging tools were installed on the sample's phones or even those who conducted diary studies sure have better insights.

We have seen earlier that not all smart-phones are used in the same way. So, it would be better if such survey can be repeated while taking note of the actual phone type instead of just smart-phone versus feature-phone. Also it might be useful in future surveys to compare phone usage to other variables such as income and field of work/education, or compare users from different cultural backgrounds.

The sample's limited age range and diversity is not representable to the whole population, and the size of the sample makes our findings more subject to type I and II statistical errors.

3.3 Results

Smart phones were dominant among the sample we studied: 15 out of 19 females and 7 out of 9 males have smart-phones. 59% of those who had smart-phones preferred using Native Applications. That slight difference came in agreement with [Church and Oliver, 2011] who reported a preference for native applications among their sample. Nevertheless, we could not find a statistical significance between the users' age and the use of native application versus web browser. The same was noticed for the use of smart-phones versus feature-phones. Although Blackberry is considered a smart-phone and users can download applications on it, one of the users complained that his phone is a blackberry and that's why he preferred access the online content via the web browser. This gives us an idea how not all smart-phones are equal from a usability point of view. In the same fashion, the users awareness of their phones' capabilities and the richness of their applications ecosystem play a role here.

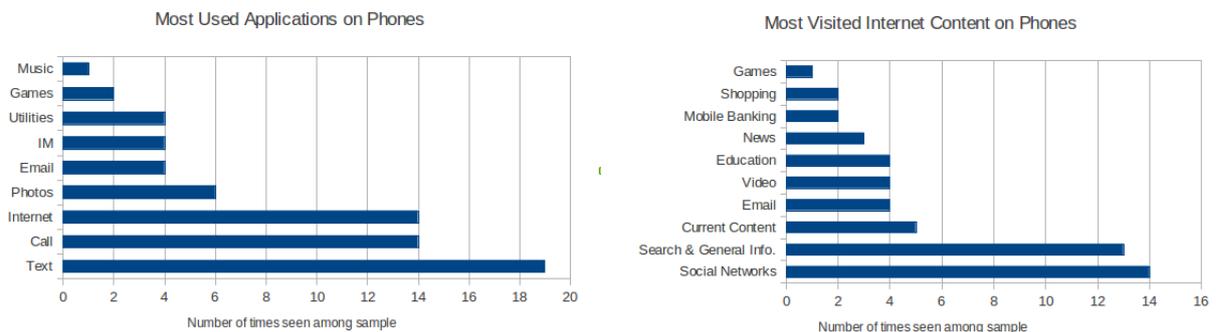


Figure1: Field Study Findings

As seen in figure 1: Sending text messages was the most widely reported usage of mobile phones among our sample. Accessing the internet was reported as much times as making phone calls. The aggregate of calls, text messages and instant messaging (communication) formed the top use of mobile phones. The same was true for [Falaki et al., 2010]'s sample. Unlike

[Rahmati and Zhong, 2012], games and media applications were not seen much in our sample. Our results were more aligned to the more recent studies. The absence of video applications is explained by [Song and Tjondronegoro, 2010] who asserted that the reason keeping people from adopting mobile video and TV is that they still “haven’t gained a viewing experience on a small screen as good as on a big one”.

We have found differences between the uses of feature-phones compared to smart-phones with significance level of 0.05. Calls and text messages were the top uses when it comes to feature phone users, with equal numbers for both. When it comes to smart phones users, they tended to text more, and they browse the internet as frequent as they call.

Among the interesting top uses mentioned by two persons in our sample are: “Dictionary” and “Nike Sports”

As in [Church and Oliver, 2011] and Ofcom report⁶, figure 1 shows that SNS was a dominant destination for our sample. Followed by Search, which accounted for 10% of [Church and Oliver, 2011]’s diary entries. Current content came next followed by Email, Video and Education. It worth mentioning that all those who referred to education were referring to UEA¹¹ website and students’ portal.

4 Businesses response to the above trends

We checked the top 25 websites access from within the UK according to Alexa¹². The results are shown in the table 1. Please notice that Google was combined with Google UK, same for Amazon and Amazon UK as well as Twitter and t.co. As for Blogspot, the website itself does not have a mobile version, however the blogs hosted there can be configured to have one. Also notice that since this is an HCI study, unless a mobile version was easily found, we considered it not to be there.

Rank	Website	Mobile Site?	Comments	Rank	Website	Mobile Site?	Comments
01	Google	Y	A/D	02	Facebook	Y	A/D
03	YouTube	Y	A/D	04	BBC	Y	A/D
05	eBay	Y	A/D	06	Yahoo	Y	A/D
07	Amazon	Y	A/D	08	Windows Live	Y	A/D
09	Wikipedia	Y	A/D	10	Twitter	Y	A/D
11	LinkedIn	Y	A/D App	12	Blogspot	Y/N	A/D
13	The Daily Mail	N	N/A	14	Paypal	Y	M App
15	The Guardian	Y	A/D	16	Wordpress	Y	A/D
17	MSN	Y	A/D	18	The Telegraph	Y	A/D
19	Apple	N	N/A	20	Tumblr	Y	A/D
21	Rightmove	Y	A/D App	22	HSBC	Y	A/D App

Table 1: A/D = Auto-detected my Android phone and switched to mobile site. App = Offered me to download Application. M = Did not detect my phone and I had to find link to their mobile site or tried any of m.domain.tld or mobile.domain.tld

We checked the top 30 British firms by market capitalisation¹³. They all have web presence, but only 10 have mobile sites, and 16 have mobile applications. All the 5 banking firms¹⁴ have web applications, and 3 of them have mobile sites. As expected, the two telecommunication firms have mobile access, yet BT was only available via an application. Other than Shell, none of the

¹¹<http://www.uea.ac.uk/>

¹²<http://www.alexa.com/topsites/countries/GB>

¹³<http://www.economicshelp.org/finance/top-10-companies.html>

¹⁴Lloyds TSB acquired HBOS in 2009, so they were counted only once

Mining, Petroleum or Pharmaceutical firms have mobile access. There is only one Retail firm in the list (Tesco), and it has both mobile site and application. “British Gas” and “Scottish & Southern Energy” have mobile applications, yet none of the Gas and Facilities firms has a mobile site. Almost none of the 8 Industrial Firms has mobile access (except BAE Systems), and few of their subsidiary brands have mobile sites or (mainly marketing) applications; such as Knorr and Durex. Both Aviva and Prudential have very limited applications, mainly marketing one too, and only Aviva out of the two has a mobile site.

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