Chapter 4
Smartphone Usage Diversity among Older People

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4.1 Introduction

Intelligent systems allow smartphones to be adapted to user behaviour. However, older people are a minority in digital systems (e.g. Eurostat 2017; Pew Research Center 2017) and minorities are poorly represented in intelligent systems (Bonchi et al. 2017). To make the human computer interaction community aware of the importance of taking older people into account in the design of intelligent systems, there is a need to break down the stereotypes about older people and ICTs, particularly with regard to smartphones. Firstly, because older people are the fastest growing Internet group (Pew Research Center 2017) and although they use smartphones less intensively than other generations, this use is important to them (Rosales and Fernández-Ardèvol 2016b). Secondly, because older people are a diverse user group (Sawchuk and Crow 2011; Loos et al. 2012), although little is known about the diverse ways in which they perceive and use their smartphones.

To compensate for the lack of empirical evidence, in this chapter we have triangulated the data from three separate studies. The three studies focus on smartphone use and were conducted in Spain between 2014 and 2017. Firstly, we analysed the tracked activity. Smartphone logs were used to make a comparative analysis of the generational use of smartphones between 2014 and 2016 (tracked use study). This study allowed us to see how older people use smartphones differently from other generations and how this has increased over time. Secondly, we explored the reported use. Through a survey of a representative sample of the older online Spanish population we identified three different types of older smartphone users (reported use study). Finally,

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we looked at reflections on use. Using focus groups, we explored the perceptions, experience and skills of a group of older grandmothers regarding their smartphones, in order to understand why they use their devices (reflection on use study).

The tracked use study confirmed that older people use their smartphones less often and for less varied purposes than other generations. This difference increased between 2014 and 2016. Yet, comparatively older people might consider the camera, gallery and settings features (among others) more relevant than younger generations do. The survey allowed us to show the diversity of older smartphone users. We identified three clusters of smartphone users among older people who can be described as basic, proficient and advanced users. Basic users mainly use smartphones for making calls and taking pictures, while proficient users utilise most of the preinstalled functions on their devices, and advanced users download new apps. Finally, the reflection on use by means of focus groups showed that basic and advanced users could have positive and negative perceptions of smartphone use, and all of the participants were willing to learn more about the use of smartphones. However, basic users often have less experience with digital technologies and are less autonomous in their use of smartphones.

The paper is structured as follows: Related work, Methods, Results, Discussion and Conclusion.

4.2 Related Work

Algorithms, which use digital logs to learn from user behaviour and adapt services to their needs, are now pervasive (Schäfer and Van Es 2017). So-called intelligent systems rule our lives and it is assumed they will dominate them even more in the future. Smartphones also use logs as part of their intelligent systems, e.g., for fast app launching (Yan et al. 2012; Huangfu et al. 2015), to improve battery life (Ferreira et al. 2011), to suggest proactive tasks (Banovic et al. 2014) or to offer contextual information (Maggiore et al. 2014). Logs are also used to predict stress (Ferdous et al. 2015), bipolar disorder (Alvarez-Lozano et al. 2014), spending behaviour (Singh et al. 2013) and friendship (Ikebe et al. 2012), among others (De Montjoye et al. 2013).

However, while digital adoption is growing faster among individuals aged over 65 (Fundación Telefónica 2017; Pew Research Center 2017; Eurostat 2018). Such growth has not been enough to close the digital divide, especially for the oldest part of the population (Friemel 2016). Older people are therefore still a minority in digital systems and minorities are poorly represented in intelligent systems (Hajian et al. 2016). Specifically, most of the studies that make use of smartphone logs do not include older people and do not consider intergenerational differences in smartphone usage (Rosales and Fernández-Ardèvol 2016b). They do not therefore make decisions taking into account the habits of older people, which leads to structural ageism (Coupland and Coupland 1993).

The smartphone has opened the door to technology adoption for people with no prior Internet experience (Taipale 2016). New smartphone users today are mostly older people. Despite having access to the smartphones, most new users are part

of the second digital divide, the divide in skills and uses (Van Dijk 2006). Where available, data confirms that older individuals tend to rely more on mobile Internet access than a landline connection (e.g. Eurostat 2017; Pew Research Center 2017). However, when smartphones are the only device available to access the Internet, there is limited use of the web and/or less autonomy in its usage, which reinforces social exclusion (Pearce and Rice 2013; Park 2015; Mascheroni and Ólafsson 2016).

In Spain, the smartphone is the most popular digital device, used by 61% of the population aged 15 and over (ONTSI 2017), and is the most pervasive channel for online access (Fundación Telefónica 2017). However, older people use their smartphones less often than other age groups (Rosales and Fernández-Ardèvol 2016b). Teenagers and young people are the benchmark generations for ICT studies, as they can help to identify trends (Castells et al. 2006). More specifically, personal communication patterns and the use of media evolve as we grow older (Charness et al. 2001; Ling et al. 2012), mainly because our interests and life circumstances change, and older people are also affected by these dynamics (Gilleard et al. 2015; Fernández-Ardèvol et al. 2017; Naab and Schwarzenegger 2017).

There is therefore a need to consider heterogeneity in studies on later life, illustrating the diversity hidden under the label of 'older people' (Sawchuk and Crow 2011; Loos et al. 2012). Higgs and Gilleard (2015) argue for a distinction to be made between the third and fourth age in order to capture diversity in old age. Specifically, Leme et al. (2014) suggested three types of older mobile phone users: firstly, experienced users for whom the smartphone is essential; secondly, new users eager to learn; and thirdly, new users who have adopted the mobile phone because of social pressure and find it difficult to manage. However, this classification mixes skills and attitudes towards the smartphone. An earlier study classified older mobile phone users as assisted users, basic users, intermediate users and expert users (Fernández-Ardèvol and Arroyo 2012). Skill assessment, however, is not static and varies according to the technology and the context (Litt 2013). In this paper we therefore propose a particular classification of smartphone users.

This chapter focuses on the smartphone usage divide. We characterise different older smartphone users, according to the tools that they use and what they report using. Finally, we reflect on their reasons for remaining basic users.

4.3 Methods

We used three separate studies to analyse how older people use smartphones and the nuances of this usage. Each study involved different participants. In this section, we present the details of three studies on smartphone usage conducted in Spain between 2014 and 2017.

4.3.1 Tracked Use: Smartphone Logs

We collected data on the smartphone activities of a sample of adult individuals in two waves. The first wave collected data over one month in November 2014 (Rosales and Fernández-Ardèvol 2016a, b) and the second over one month in September 2016. Since most of the sample included Android smartphones, we focused on these devices for this study. The first wave involved 207 valid panellists and the second 321. In 2014, the panellists were 39.08 years old on average, with a standard deviation (SD) of 12.76. We classified both samples into six age groups: 20–24, 25–34, 35–44, 45–54, 55–64 and 65+. The participants were recruited and data collected through an online commercial panel. The tracking system counts each time a feature is displayed in the screen, while the screen is on, as a new access. Background activities are not therefore considered. It also registers how long each feature is displayed on the screen. Beyond demographic variables, the system thus provided us with the number and duration of every app used and each website visited. We analysed the number of smartphone activities by taking into account the features. Some specific features are provided by well-known commercial apps (e.g. WhatsApp); in such cases we analysed the commercial app as a unique feature. Other features, such as email or the gallery, are provided by similar apps from different developers; in such cases we analysed similar apps together under the name of the feature. We made no distinction between whether the same feature is used through apps or web access. E.g. Facebook is counted whether an app or the Internet browser is used for accessing it. For analytical purposes, we selected the most popular features, considering the number of users by age category and frequency of access. E.g. messaging represents only 0.2% of the app accesses, but is used by almost all participants.

Independence analysis between variables was supported by the appropriate statistical test. For the analysis of continuous variables we used the Pearson correlation. For comparisons of continuous variables among groups we used ANOVA (analysis of variance) tests, and a Chi-squared test for categorical variables. We also used the Bonferroni test when appropriate. We highlighted statistically significant differences (SSD) for probability levels below the usual 5%. Unfortunately, due to technical limitations it was not possible to analyse data from 2014 for the 65+ age group (the subsample was too small, $n < 30$). Informed consent was provided by panellists to the commercial panel that conducted the study as part of their relationship.

4.3.2 Reported Use: Survey

We conducted an online survey targeted at Internet users aged 60 years and older living in Spain. The fieldwork was conducted in November 2016, with a final valid sample size of 2,232 responses from people aged 60 to 87,66.45 years old on average and an SD of 5.62. Representativeness was ensured through quota sampling, which followed the same age and sex distribution as the population under study (Jacobetty

and Fernández-Ardèvol 2017). The survey analysed the use of (non-) digital media and our interest focused on the functions respondents reported using on their mobile phones. As the data was categorical, we used a two-step cluster analysis to identify the types of users according to the functions they use on their smartphones. We then analysed whether there were differences between clusters in terms of socio-demographic characteristics by using the above-mentioned tests of independence. We conducted the online survey through a commercial panel, ethical consent was provided by panellist to the panel as part of their relationship.

4.3.3 Reflection on Use: Focus Groups

We conducted five focus groups with 25 participants in Barcelona (Catalonia), Spain, between April and May 2017. The participants were all grandmothers aged 65+ who had used some sort of digital communication technology in the past. The average age was 71.8, with a standard deviation of 6.03. We will refer to them by the number of the focus group, their age and a letter if there is more than one participant of the same age, e.g. FG2-65A, FG2-65B. Conversations revolved around the ecology of media used to communicate with family and friends. We conducted a thematic analysis of the features the participants used in order to classify them as basic or proficient smartphone users. We also analysed their perceptions, skills and digital experience. Ethical consent was provided by participants prior to the beginning of the focus groups.

4.4 Results

4.4.1 Tracked Use

For both years, it was noted that the younger the panellist, the more they used smartphones. In 2014, age and smartphone activities were negatively correlated ($r = -0.216$, $p < 0.05$). In 2016, there were statistically significant differences (SSD) in the number of logs by panellists according to their age group ($F(5, 315) = 30.089$, $p < 0.001$). All discussed SSD refer to a 5% level of error.

Three dimensions are relevant. Firstly, the number of smartphone activities by user increased significantly from 2014 to 2016 ($F(1, 526) = 45.492$, $p < 0.005$). However, this increase was recorded in younger age groups and is not significant for the 55–64 age group.[1] Secondly, the duration of logs increased significantly between 2014 and 2016 ($F(1, 523) = 17.570$, $p < 0.001$). Thirdly, the number of apps used increased significantly between 2014 and 2016 ($F(1, 525) = 13.973$, $p < 0.005$),

[1] 20–24 ($F(1, 64) = 19.827$, $p < 0.005$), 25–34 ($F(1, 104) = 49.332$, $p < 0.005$), 35–44 ($F(1, 127) = 23.261$, $p < 0.005$), 45–54($F(1, 114) = 5.964$, $p < 0.05$), 55–64 ($F(1, 72) = 3.299$, $p > 0.05$).

although the significant growth was only seen in the younger age groups (those up to 44).[2]

For data collected in 2016, we analysed the use of the most popular features. In accordance with previous results, there were SSD in the use of the most popular features by age, revealing that the younger generations use features including the clock, Facebook, Facebook Messenger, Google Maps, Instagram, Market, messaging, Twitter, WhatsApp and YouTube more often than older generations (see Table 4.1).[3] However, contrary to the general trend, the camera, contacts, email, gallery, Google, messaging, phone and settings are more relevant for older people than for younger age groups (see Table 4.1). Indeed, there were no SSD between age groups in the use of the camera, contacts, phone and settings. Older people therefore use such features proportionally more than other age groups. Specifically, there were SSD in the use of email, the gallery, Google and messaging, with younger generations using these less often than older generations (see Table 4.1).[4] Beyond WhatsApp, the weight of other apps in everyday use provide no significant differences by age group (see Fig. 4.1).[5]

4.4.2 Reported Use

As an exploratory analysis, we used an appropriate multivariate technique for reducing the dimensions in the case of nominal data and a large dataset. We used a two-step cluster analysis to analyse the data on the use of 19 mobile phone functions (see Table 4.2). The optimum number of clusters, log-likelihood distance measure and Schwarz's Bayesian criterion supported the decision. The silhouette measure of cohesion and separation equalled 0.2, which confirms a fair overall goodness of fit (Mooi and Sarstedt 2011). The three clusters obtained have a clear interpretation as they reflect different levels of use of the smartphone features: basic, proficient and advanced users. According to the results of the two-step cluster analysis, the most important predictors for cluster membership are downloading apps (1.0), visiting websites via browser (0.86), and using GPS and maps (0.82), as their use was quite different among the three clusters. In contrast, listening to the radio, gaming, MMS, ordinary voice calls, podcasts and SMS have no importance as input predictors (0), all of them were quite uncommon among panellists to influence the clusters.

[2] 20–24 ($F(1, 64) = 6.402$, $p < 0.05$), 25–34 ($F(1, 104) = 11.150$, $p < 0.005$), 35–44 ($F(1, 126) = 19.864$, $p < 0.005$), 45–54 ($F(1, 114) = .544$, $p > 0.05$), 55–64 ($F(1, 72) = .008$, $p > 0.05$).

[3] Clock ($F(5, 314) = 5.571$, $p < 0.005$), Facebook ($F(5, 308) = 13.341$, $p < 0.005$), Facebook Messenger ($F(5, 310) = 3.175$, $p > 0.05$), Google Maps ($F(5, 307) = 6.195$, $p > 0.005$), Instagram ($F(5, 308) = 25.031$, $p < 0.005$), Market ($F(5, 312) = 6.588$, $p < 0.005$), Twitter ($F(5, 307) = 7.735$, $p < 0.005$), WhatsApp ($F(5, 310) = 31.867$, $p < 0.005$), YouTube ($F(5, 307) = 14.972$, $p < 0.005$).

[4] Email ($F(5, 311) = 2.519$, $p < 0.05$), Gallery ($F(5, 310) = 2.447$, $p < 0$ .05), Google ($F(5, 308) = 3.845$, $p < 0.005$), Messaging ($F(5, 310) = 2.953$, $p < 0.05$).

[5] Camera ($F(5, 307) = 1.504$, $p > 0.05$), Contacts ($F(5, 314) = 2.139$, $p > 0.05$), Phone ($F(5, 309) = 1.199$, $p > 0.05$), Settings ($F(5, 309) = 1.492$, $p > 0.05$).

Table 4.1 Percentage of smartphone access to selected features from total smartphone access by age group. Black background shows features more relevant for 65+ than other age groups

	20–24	25–34	35–44	45–54	55–64	65+	Total
WhatsApp*	**20.2***	**16.9***	**16.6*[a]**	**16.1*[a]**	**18.9*[a]**	**19.3*[a]**	17.6
Facebook*	**6.1***	**6.3***	**5.0*[a]**	**5.2*[a]**	**3.8*[a]**	**3.2*[a]**	5.4
Google*	**4.0*[a]**	**4.9*[a]**	4.3	6.0	6.4	**6.0***	5.0
Email*	1.6	**2.6*[a]**	2.3	3.6	3.9	**4.5***	2.7
Instagram*	**3.4***	**2.1***	**0.8*[a]**	**0.5*[a]**	**0.3*[a]**	**0.1*[a]**	1.4
Twitter*	**2.2***	1.4	**0.8*[a]**	**0.8*[a]**	**1.0*[a]**	**0.4*[a]**	1.2
Gallery*	**0.9*[a]**	0.8	1.1	1.4	1.7	**1.7***	1.1
Contacts	0.3	0.3	0.9	1.1	1.4	2.2	0.8
Clock*	**0.7***	0.6	0.6	0.6	0.8	**0.4*[a]**	0.7
Market*	**0.5***	**0.5***	**0.7***	**0.7***	0.8	**0.6*[a]**	0.6
YouTube*	**0.8***	0.7	**0.7*[a]**	**0.4*[a]**	**0.4*[a]**	**0.2*[a]**	0.6
Settings	0.4	0.3	0.5	0.8	0.7	1.1	0.5
Camera	0.2	0.3	0.4	0.5	0.5	0.5	0.4
Phone	0.3	0.2	0.6	0.3	0.6	1.6	0.4
Facebook Messenger*	**0.3***	0.2	0.2	0.3	**0.2*[a]**	**0.1*[a]**	0.3
Google Maps*	**0.2***	**0.2***	0.2	0.2	0.2	**0.1*[a]**	0.2
Messaging*	0.1	0.2	0.2	**0.4***	0.5	**0.4*[a]**	0.2

*Shows SSD
*[a]Shows SSD among groups who use the feature less

Otherwise, instant messaging and photos were pretty common among the three groups, so they have no major influence in clusters. Indeed, the clusters showed statistically significant differences in all the considered functions except for two: taking photographs common among the three clusters, and listening to podcasts rather uncommon among all of them.

The basic cluster included 524 panellists, accounting for 26% of the sample. It represents those who use smartphones mainly for taking pictures, making voice calls and instant messaging. Some of them also use the SMS, alarm, clock and reminder features, but barely use other functions (Fig. 4.2, Table 4.2).

The proficient cluster included 962 panellists, accounting for 47.7% of the sample. It represents those who are very proficient in the use of smartphones. Most of them use all the functions mentioned in the basic cluster, and most of the functions that often come preinstalled on their smartphones, although not all of them (Fig. 4.2, Table 4.2).

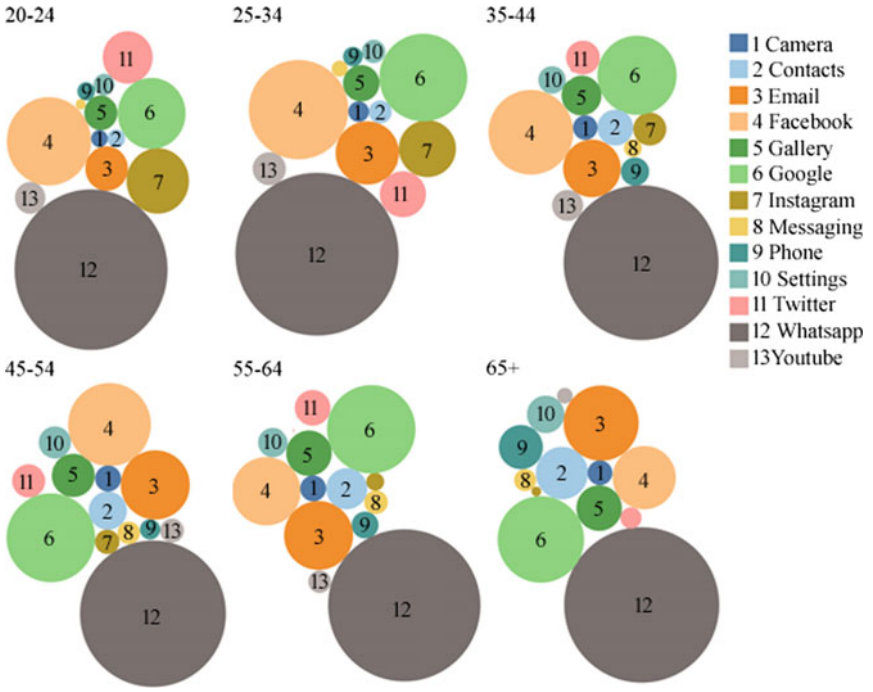

Fig. 4.1 Percentage of selected features from all smartphone activities by age group

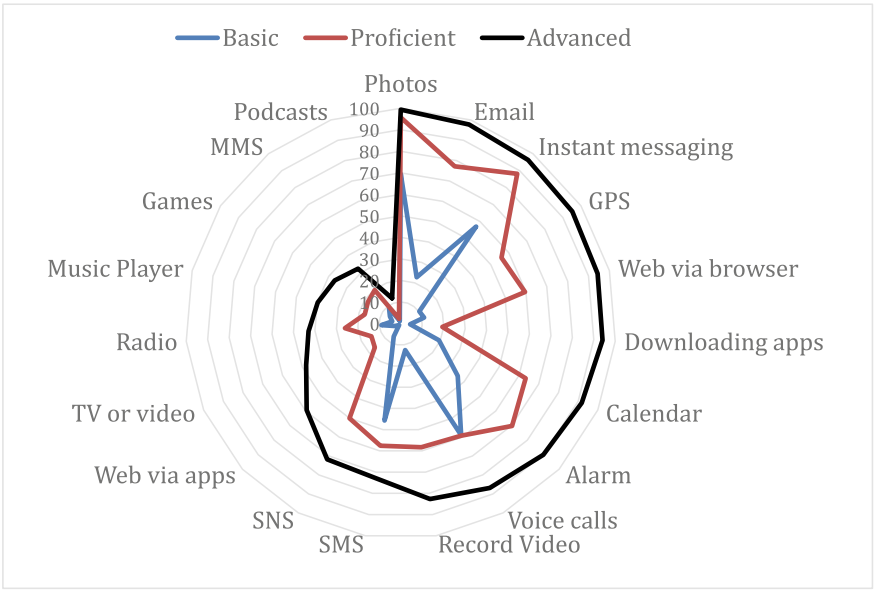

Fig. 4.2 Percentage of panelists by cluster who use each function

Table 4.2 Percentage of panelists in each cluster who use the functions

	Basic (%)	Proficient (%)	Advanced (%)	Total (%)
Taking photographs	*58.2	*97.7	*99.4	87.9
Instant messaging	47.1	*87.8	*98.5	80.1
Ordinary voice calls	*66.4	*56.2	*89.6	67.7
Email	20.2	*71.1	*98.1	65.0
Alarm clock and reminders	32.3	*67.9	*91.0	64.7
SMS	41	*58.6	*74.4	58.2
Calendar	17.7	*58.1	*94.4	57.2
Viewing websites via browser	5.5	*57.2	*95.5	53.8
GPS and maps	8	*52.6	*96.2	52.5
Recording video	3.4	*55.5	*86.8	50.2
Social network sites	5.5	42.7	*76.8	42.0
Downloading apps	1.9	26.5	*91.9	37.3
Listening to the radio	8.8	20.1	*51.8	25.5
Viewing websites via apps	1.0	14.7	*65.3	24.4
Watching TV or video	1.3	13.4	*54.2	21.0
MMS Multimedia Message Service	2.1	20.6	36.2	19.9
Using the phone as a music player	1.7	14.0	48.0	19.7
Games	4.4	15.9	41.8	19.7
Listening to podcasts	0.6	2.3	14.7	5.1

*Shows the functions used by most panelists in each cluster

The advanced cluster included 531 panellists, accounting for 26.3% of the sample. Most of them use all the functions used by the proficient cluster, and all the functions mentioned in the survey, except for four (Table 4.2). What most sets this group apart is that most of them download new apps, whereas this is not common in the other two clusters (Fig. 4.2, Table 4.2).

Gender is independent of the level of use ($\chi^2(2) = 2.720$, $p > 0.05$). Age, in contrast, is associated with the level of use.[6] Individuals aged 75 and over tended to be concentrated in the basic cluster, with most of those 80 and over being part of this cluster. In contrast, the advanced cluster included a significantly higher proportion of the younger old (those between 60 and 64 years old). Education and income level were also associated with levels of use. In particular, those with a primary school education or less were more concentrated in the basic cluster, whereas those

[6] $\chi^2(8) = 113.9$, $p = .000$. As an ANOVA was not technically possible, we conducted a crosstab with age grouped into 5-year segments.

who completed tertiary education tended to be concentrated in the advanced cluster ($\chi^2(6) = 82.9$, $p = 0.000$). Those with declared income above the average also had a relatively higher presence in the advanced cluster ($\chi^2(6) = 65.4$, $p = 0.000$).

4.4.3 Reflections on Use

According to our analysis of the focus groups, several factors influence the diversity of smartphone use between basic, proficient and advanced users. While all users tend to question digital technologies, basic users often have limited digital trajectories. Values, style and habits influence their decision to limit smartphone use.

4.4.3.1 Basic Users

Basic users are often new users with little experience of digital technologies. Sometimes the smartphone is the only device they have with which to access the Internet. Furthermore, basic users are often not autonomous in their smartphone use and feel limited in their abilities.

FG2-65B uses a smartphone but she is used to communicating by other means. She thus puts limits on her smartphone in accordance with her customs and values.

"*For 45 or 50 years I have lived without a mobile. (…) Fortunately, I have my family here and I prefer to see them. However, in an emergency I usually use WhatsApp. But always very short messages (…). This happened to me with the landline [telephone]. (…) I have never had long conversations on the landline, just the minimum I needed*."

FG3-77 describes herself as old-fashioned. Although she has access to the technology and the skills to use it, she prefers to use analogue systems.

"*I'm a bit old-fashioned and I use the landline to talk about important things. (…) I'm in favour of science and information. For example, a person without information is a person without an opinion. You go to the computer and you immediately know what is happening, in just a moment. It's immediacy. I'm very much in favour of all of this. But I prefer my style, to read the newspaper at my own pace*."

FG2-65A used to be an indirect user, as she delegated the use of the smartphone to her late husband. Now she is a delighted new smartphone user, although she sees it as being in competition with face-to-face interaction.

"*All this about technologies is very interesting, but I think contact is better than the mobile. (…) In the morning there are twelve of us and we all go to have breakfast together; we leave the grandchildren at school and go to a bar in a side street. That's the best therapy. We have breakfast there and when it's 11.00am we say "time's up, time to go". But that's the best therapy for me. Not WhatsApp, none of that*."

4.4.3.2 Proficient and Advanced Users

Proficient users often have extensive experience with digital technologies and have adopted smartphones as part of their digital development, although they often question technology.

FG2-78B adopted the smartphone in response to social pressure. Although she is confident about using technologies, she does not like the smartphone and prefers face-to-face interaction.

"*I didn't want one of these telephones [smartphones], but in the end, I gave in because everyone in the group had one and I wanted to stay in my group, so I bought one. But I'm not addicted to it at all. (…) Now I will say one thing: I don't envy today's youth compared to my childhood in the village. The WhatsApp we used to have consisted of things like "you know that so-and-so is getting married to so-and-so" or "we're meeting up on Sunday, spread the word.""*

FG1-72B has extensive experience with digital technologies and adopted smartphones as part of her continuing use of these technologies.

"*My daughter brought home an out-of-date computer from work and said "Mum, do you want it?" and I began to use it a bit. (The smartphone) is practically the same, with little differences. I began with one of those mobile phones – the tiny ones – and then my son gave me this one*."

FG3-68B reports on her addiction to the Internet; she has been using it for more than ten years and uses a variety of devices. Nevertheless, she is willing to learn more.

"*I'm an addict. I found my philosopher's stone with the Internet, with all these devices (…), I hardly use the landline. And yet I use the smartphone, the tablet when I want to share things with my family; we share them on the computer. I use everything depending on the speed I need or the type of communication. I'm just not good at it (…) I can use these things, but I'm limited by certain technicalities that they are better at than me. Look, the latest book that everybody is talking about. It's called "Patria" ["Homeland"], a huge book, they (her sons) downloaded it for me, and I read it in one go*."

FG2-69 and FG2-65A are both advanced users and are willing to explore new apps.

FG2-69 "*The other day at a funeral home they were playing some lovely music; there was a girl, (doing something with her smartphone) but we didn't know what she was doing. So, I asked my friends, and we downloaded the app*."

FG2-65A "*I don't have that one. What app is it?*"

FG2-69 "*When you hear some music, it identifies the group or singer*."

4.5 Discussion

Our study focuses on understanding the uses of a digital technology that is already in the market and widely used in Spain: smartphones. It also focuses on their use by older people, in order to characterise their diverse uses and understand how to

make current technologies more inclusive. With some exceptions, this approach is not common in HCI research with older people. Most research in HCI with older people refers to the design, development and evaluation of prototypes with or for older people (Durick et al. 2013). And most research on the use of products does not include older people, or does not carry out intergenerational analysis to identify how usage changes throughout a lifetime.

Although there is some concern regarding the bias of intelligent systems in terms of race, gender or religion (Hajian et al. 2011), less attention has been paid to age discrimination, or ageism. Older people are a minority in digital media, in terms of both access and use. Minorities are poorly represented in intelligent systems (Hajian et al. 2016), because these systems are often built on predictions and correlations (Bonchi et al. 2017) that are acceptable if they suit 80% of the population. Data granularity (Kitchin 2014) must be considered in order to take into account the different ways in which older people, as a minority in the digital world, use digital media, and therefore better incorporate their uses into intelligent systems.

Mobile communication patterns are different depending on age, just as personal communication patterns and the use of media change throughout life (Charness et al. 2001; Ling et al. 2012). The tracking study shows how older generations use smartphones less often than others, but also that some features are more commonly used by older people compared to younger generations.

Mobile communication patterns also change over time. Our panellists used their smartphones more often and accessed more apps in 2016 than in 2014 However, differences are only statistically significant among younger cohorts. This could be influenced by the fact that digital adoption is growing faster among individuals aged over 65 (Pew Research Center 2017; Eurostat 2018). It is therefore to be expected that there will be inequalities in terms of skills and usage (Van Dijk 2006) among new adopters, who are today late adopters of smartphones and probably have fewer digital skills than early adopters.

Despite being a minority in the digital world, among older smartphone users almost 70% are proficient or advanced users for whom the smartphone plays a key role, and they use it in a way that is different to other generations.

Finally, the focus groups help us to understand the reasons why some older individuals use smartphones more than others. Previous studies found that the most common explanations for non-use of the Internet include motivational reasons (lack of interest), material reasons (lack of material access) and skills (lack of skills) (Van Dijk and Hacker 2000). Motivational reasons increased in importance over time (Helsper and Reisdorf 2016). Given that all the focus group participants were smartphone users, the most common explanation for not using smartphones more often was based on motivational reasons. They argue that values, style, habits and long-term perspective influence their decision on whether or not to use smartphones more frequently. Moreover, there are positive and negative perceptions of smartphones among basic and proficient or advanced users. All of them, to a greater or lesser extent, question the use of smartphones. While it is often presumed that non-users are missing out on the benefits of ICT (e.g. Rogers 2003; Morris et al. 2007; Peacock and Künemund 2007) the focus group participants made a conscious decision to limit the

use of their smartphones, and to meet their information and communication needs by other means better suited to their context, interests or habits. Otherwise, probably influenced by the fact that all the participants are women, most of them mentioned their limited skills, especially compared with younger generations. Moreover, limited digital trajectories associated with limited skills are more common among basic users, who achieve their communication or socialisation goals by other means.

The analysis we carried out in this paper allowed us to combine reported use and tracked use. Specifically, surveys and focus groups provide an account of reported use, while tracking systems record tracked use. Beyond actual use, reported use analyses what people say they do in their everyday life, which could be different to what they actually do. In contrast, tracked use is often described as an expression of human behaviour e.g. (Böhmer et al. 2011; Ferreira et al. 2014), although it is often a mixture of human actions and automated or programmed activities. In the case of smartphones, logs can report how long the screen has displayed the content of an app, although this does not necessarily mean that the user was using the device. The timeout feature can keep the screen on after the user has finished their activities. The duration of logs is thus influenced by the screen timeout selected by the user. The number of logs could also be influenced by other features, including ambient display, interactive notifications, priority notifications and unlocking systems. For example, ambient display turns the screen on, opening an app whenever there is an incoming notification. This is counted as a new log in tracking systems and therefore as a new user activity, even when this is not the case. Thus, similarly to reported use, tracked use is related with usage, but is not describing actual use, is just analysing the activities of smartphones. Thus, each research method, despite its own biases, contributes to understand smartphone usage.

To counterbalance this effect, in this chapter we triangulated the results of different methods and, beyond the raw data, presented a comparative analysis of how different groups use smartphones differently.

4.6 Conclusion

We studied the diversity of smartphone use among older people in Spain through the triangulation of tracked use, reported use and reflections on use. We showed how older people are a minority and a heterogeneous group regarding smartphone use in Spanish society. The tracked use study showed how the divide in smartphone use has increased between 2014 and 2016 among younger and older people. According to the reported use, older Internet users (60+) in Spain constitute a diverse user group, among which proficient and advanced users represent more than 70%. Finally, the focus groups showed that basic smartphone users meet their information and communication needs by other means better suited to their habits and values. To avoid structural ageism, there is therefore a need to take into account that older people are a minority, as well as a heterogeneous user group, in the design of intelligent systems based on smartphone logs.

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