How Young Algerians Interact With Their Smartphones

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Abstract—This study assesses the usage of smartphone in particular, from a Human-Computer Interaction perspective, among young Algerian smartphone users. Questionnaire was used to assess their smartphone usage details and multimodal interactions exploitation. The data were ana-lysed looking at key applications and reasons for the use or non-use of the different interaction modalities. It was found that for the participants, social networks (especially Face-book) are the most used applications, despite the lack of in-ternet connection. The participants interact mostly with the tactile modality. They do not use (and sometimes do not know) the other modalities because of several use problems and cultural particularities including the use of different languages, financial conditions, lack of use cases in their preferred applications and lack of conviction about the mul-timodality benefit.

Index Terms—Smartphone Usage; Human-Computer Interaction; Multimodal Interactions; Multimodal Mobile Appli-cation.

I. Introduction

In the last years, mobile phones and especially smartphones are being adopted at a phenomenal pace. In 2015, mobile phone penetration has reached 78% of population in Algeria. Smartphone penetration has reached 20% of mobile users which represent 15% of total popu-lation1. These numbers are expected to grow considera-bly over the coming years. However, we know little about how Algerian people use and interact with their mobile phones. Smartphones, in particular, include hun-dreds of applications and come with an important set of embedded sensors that enable new interaction modalities (interaction by inclining the phone, changing its orienta-tion, activating the text-to-speech synthesis, etc.).

Exploiting these interaction modalities enable users not only to benefit from the new mobile senses, but also to easily interact with applications even in difficult situations (taking a phone call while wearing gloves, reading a text in bright sun, etc.) [1]

In this preliminary study, our goal is to understand the use of smartphones among young Algerians who repre-sent the majority of the population (51% of people below 30 years old and 25% below 142). We focus on smartphone usage from a Human-Computer Interaction perspective: 1) What are the most used applications? 2) How does a user interact usually?

3) Does user know/use the different interaction modalities? 4) What are the factors that can prevent the use of applications and/ormodalities?

Answering these questions is not just a matter of academic interest; it is key to understanding which interaction type can improve user experience.

The rest of the paper is organized as follows. We discuss related work in section 2. We explain our study methodology and present their limitations in section 3. We pre-sent the findings of our study and analyse them in sec-tion 4. Finally, we discuss our work in section 5 and conclude it in section 6.

II. Related Works

Intensive research has been realised to study/understand the smartphones usability and users interaction in different countries [2]. In the USA for instance, several studies have been defined especially with young people. For example, the authors of [3] show that the smartphones usability among young users (14 novice teenage) is highly mobile, location-dependent, and serves multiple social purposes.

The authors of [4] find that there is an immense diversity among users (255 knowledge workers and high school stu-dents) while interacting with mobile phones. The average number of interactions per day varies from 10 to 200, and the average amount of data received per day varies from 1 to 1000 MB. The author of [5] presents a study on smartphone usage realised across five countries: Fin-land, Germany, France, the UK and the USA. It is a comparative analysis of mobile user behaviour that shows that users initial propensity to adopt advanced mobile handsets and their continued intensity of utilizing such appliances increase as user perceive the new data de-vices and services as more “useful” and “easier to use” [6].

In Africa, most studies in this area have been made in South Africa. For instance, authors in [7] present a study about the usage of smartphone applications and specifi-cally social networking applications. They found that users (60 university students) spend an average of five hours per day on their smartphones interacting with others via social networking applications and especially Facebook (updating their profiles, chatting with friends, and looking at their friends profiles and statuses). They also use sms and phonecalls to communicate with others, but only for close friends, loved ones and family; possibly due to the high cost of sms and phonecalls in South Africa compared to the low cost of social networking applications. In South Africa also, authors of [8] present a study about the smartphone adoption factors. They also profiled how con-sumers were using their mobile devices from a time and frequency perspective. So, they find that smartphone fea-tures such as battery life and the affordability of data were the most important to consumers in the decision of purchasing a smartphone. The study shows also that from the time and frequency perspective, Internet brows-ing is the activity that dominates for most users.

In the Arab countries, there is a very few studies in this area (or in fields close to it). These studies have been made especially in the Persian Gulf countries like the study in [9] made in the United Arab Emirates. It presents a qualitative study on student adoption of mobile library technology. The find-ings not only support the applicability of a number of existing constructs from the technology acceptance litera-ture, such as

perceived ease of use, social influence and "trust"; but also suggests new adoption factors like the "perceived value", "facilitating conditions".

All these studies were conducted in different countries in order to define the different smartphone usage and interac-tion patterns. This helps developers to understand the users needs and improve their experience in the future. To the best of our knowledge, there are no studies to understand the smartphones usability and/or the user-mobile interactions in Algeria. Therefore, we direct our attention to this issue. In this paper, we present a study that aims to understand the use of smartphones among the Algerian people with a focus on Human-Computer Interaction and mainly on multimodal interactions (using sensor-based interactions in input and output).

III. Study Methodology

This preliminary study examines the usage of smartphones and multimodal interactions amongst stu-dents at an Algerian University.

Data collected (questionnaire). In order to better understand how students are using their smartphones and for what, a questionnaire was developed to assess their personal information, smartphone usage details and the multimodal interactions exploitation. Personal infor-mation, including information such as sex, age and partici-pant department. The smartphone usage details were col-lected through questions about the smartphone operat-ing systems, relative ranking of applications and factors that may prevent their usage. Lastly, regarding the multimodal interactions exploitation, questions were for-mulated to determine the intensity of using interaction mo-dalities other than the tactile, factors that may prevent their use as well as the degree of difficulty in using these interactions modalities.

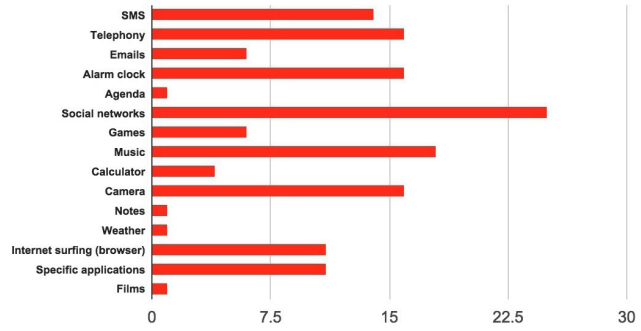

Fig.1. The applications usage

Participants. 26 participants (14 males, 12 females) took part in the study. The average age was 20 years. Partic-ipants were all students of the first year in the computer school ESI-SBA (Ecole Suprieure en Informatique, Sidi Bel Abbes). In this school, students come from different de-partments of Algeria. Thus, participants in our study cover 12 different departments, knowing that there are 48 departments in Algeria.

Duration. The data were collected over a period of seven weeks with the aim of collecting maximum responses. However, at the end of the collection period, a total of 26 responses were collected only.

Study limitations. The sample population for this study was specifically students on ESI. Only a small number of students answered the questionnaire (26 out of a possible 135), therefore the following limitations should be considered:

- The study participants are not in any case representative of the Algerian population.
- Participants were asked to provide a self-report on their usage of applications and interaction modali-ties. These may not be as accurate as using metric softwares for example.
- Non-parametric statistics will be used to analyse the results.

Despite these limitations, we believe that this study will provide a snapshot from Algerian smartphone users. Results will give us an idea about the use of smartphones among young Algerians, the use of interaction modalities and especially factors that can prevent their usage.

IV. Results and Analysys

Following is an overview of the results, ordered according to the questionnaire questions.

Smartphones. The predominant operating system is Android (76.9%). The next most popular system was iOS (11.5%) and then Windows Phone (3.8%). This is in line with a recent survey on the classification of OS present on smartphones sold in Algeria for 2014 (63.13% Android, 12.41% iOS, 9.17% Series 40, 3.72% Samsung bada, 2.14% Symbian OS, and Windows Phone of 1.87%)3.

It should be noted that 7.7% of respondents (2 people among the 26) say that they do not know the operating system of their smartphones.

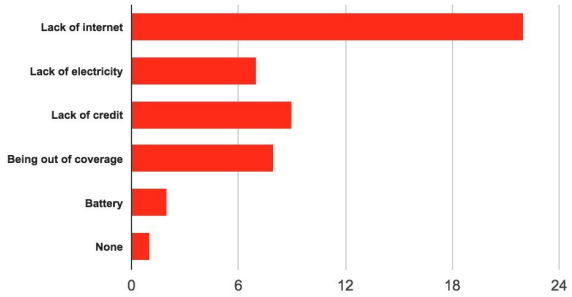

Fig.2. Factors preventing the smartphone applications usage

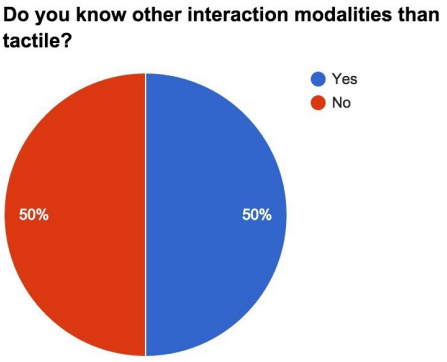

Fig.3. Knowledge of interactions modalities

Applications usage. The chart in figure 1 represents the students ranking of applications according to their frequency of usage.

The highest used application was Social net-works (Facebook, Twitter, Instagram, etc.), then Music, Alarm clock, Telephony and Camera. The next highest used are SMS, Internet surfing (browsers), Emails and Games. Finally, Calculator, Weather, Films, Notes and Agenda are the least used applications.

The highest used social networking site was Facebook.

Factors preventing the applications usage. The chart in figure 2 represents the factors preventing the smartphone applications usage. Students were asked to se-lect factors from a list and they had also the possibility to define new factors in "others" option. The most im-portant factor that prevents participants to use their fa-vorite applications is the lack of internet connection. This makes sense since most used / favorite application was Facebook (social networking). The second factor was the lack of credit, while the third was the fact of being out of coverage. Finally, the factors that prevent stu-dents less are the lack of electricity and battery problems. The latter factor was defined by the participants them-selves. It should also be noted that one participant selected the option "None", which means that there is no factor that prevents hem.

Interaction modalities. Figure 3 presents the chart about the extent of participants knowledge on interactions modalities other than tactile. For half of the participants, the tactile was the only known interaction modality. For the oth-er half, others modalities were declared.

The most well-known modality for the second half of participants is the voice (10/13 know it). Noting that there are participants who confuse between voice and Siri applica-tion for iOS. The second modality is the phone ori-entation (5/13 know it), while the third is the phone acceleration (2/13). Lastly, three participants declared respectively "touch ID" (physical button), "TalkBack" (text to speech) and "smart connect" (ubiquitous sys-tems) as known interactions modalities.

Frequency and intensity of modalities usage. We asked students about their frequency/intensity of the modalities usage (other than tactile). The Only occasion-ally and No, never were the options that had the most of selection, while the Yes, mostly and Yes, often had the least (as shown in figure 4).

Factors preventing the modalities usage. Students were asked to describe constraints that may prevent them from using the different interaction modalities (no listings was proposed). Most described constraints were about using the voice as interaction modality. This is logical since the voice is the most known modality after tactile. Its constraints are:

- The voice recognition system makes a lot of mistakes (it does not write correctly what we pronounce).
- Participants generally write (especially sms) in Arabic but with latin letters (in order to reduce the cost), this is just not possible using the voice modality.
- When they write SMS in French, they write abbreviated (instead of "parce que" -which means "because"- they write "pcq") to reduce the cost of sms. The voice modality does not help them do that.
- Voice requires internet connection.
- Even with the voice the tactile is needed.

The other constraints affect the other modalities. Concern-ing the phone orientation, they declare that it does not work well with small screens. In addition, they are not accus-tomed to use it as well as the others new modalities. Partici-pants report that these modalities are not useful enough, ie, since they can do all interactions using the tactile, why they need to use other modalities?

Difficulty of using multimodal interactions. Finally, par-ticipants were asked about the difficulty of using multimodal interaction. 12 participants say that it is not difficult to use different interaction modalities while other 12 do not know if it's difficult or not. However, the two remaining stu-dents find it difficult.

V. Discussion

In this study, students use their smartphones mainly for social media. Thus, the problem/factor that haunts most students was the lack of internet connection. In Algeria, the 3G technology was only launched in Decem-ber 20134. Thereby, currently, it is still a new technology with a little high price and few users (3% of total popula-tion5).

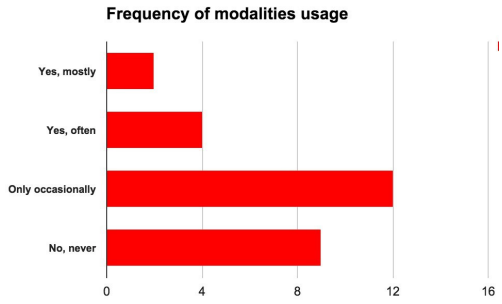

Fig.4. Frequency of the interaction modalities usage

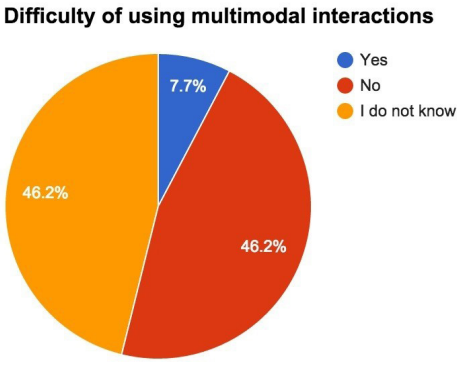

Fig.5. Difficulty of using multimodal inter-actions

Moreover, in Algeria and especially in departments other than the capital, there is no wifi available in public areas, universities, etc. (even if it is available, it is weak).

Regarding the multimodality, half of the participants do not know interaction modalities other than tactile (despite the two examples given with the question: voice and phone orientation). However, 4 among them re-port in the next question that they use some modalities occasionally (with this question modalities use-cases were given: voice for writing SMS and orientation to play games). These participants may not have realized the modalities that when we have given use-cases. This amounts to a major problem in mobile multimodality, which is how to inform the multimodal applications users about the different "no-tactile" interactions [10]. The use of tactile is obvious since users can view on the screen the different interaction points (button, list, etc.). However, for sensor-based interactions like shaking the phone or changing its orientation, no indication is dis-played on the screen. Therefore, the application develop-er has to identify a good way to inform users. In addi-tion, we note from this study that s/he has not only to give the modalities descriptions but also their use-cases in the ap-plication [10].

On the other side, participants who know the different

interaction modalities only use them occasionally. But, it is not the difficulty that prevents them since, for the most, the multimodality is not difficult. Which prevent them depend on some use problems and cultural particularities :

- The nearest being used modality is the voice because it is the best known after tactile (10/13 know it), but:
  - Participants felt that the voice can only be used via the Internet and since the lack of internet connection is the major factor that haunts them, they (most of them) didn't even try.
  - Their first language is Arabic, so they want to write in Arabic. But it costs more expensive than writing with Latin letters.
  - Due to the relatively high cost of sms in Alge- ria, students (those who use their second lan-guage: "French") write abbreviated SMS. This ex-plains the lack of using the voice modality while writing SMS.
- Modalities such as shaking the phone, orientation and proximity:
  - These modalities are unusual and students are not sure how to use them (so that some participants think that it is the screen size that makes these in-teractions work or not). One of the causes of this problem is that the most used applications do not offer these modalities such as social net-work applications [11]. Thus, there are no much use and participants are not accustomed. Another cause may be that developers implement these modalities in different ways. Shaking the phone, for example, is different from one application to another (shaking front-back, right-left, from all sides, etc.) which disturbs the users.
- Other modalities:
  - Participants declared some input interactions mod-alities like touch ID (interaction through the physical buttons) and smart connect. However, one participant has listed an output modality called "TalkBack" (a special use of the "text to speech" modality), while in the proposed questionnaire we talked about input ones only. This may empha-size the importance of output multimodality be-sides the input.

VI. Conclusion

Our study of the usage of smartphones among young Algerians shows that for our participants, social networks (especially Facebook) are the major used applications. It shows also that the most important factor that prevents them to use these applications is the lack of internet connection. A factor that, in our opinion, may disappear by developing the com-munication field in Algeria.

Participants interact mostly with the tactile modality. They do not use (and sometimes do not know) the other modalities because of several use problems and cultural particularities including the use of different languages (Latin letters Vs Arab letters), financial conditions (communication credit Vs cost of sms), lack of knowledge (lack of conviction about the multimodality benefit) and habituation (lack of use cases in their preferred applications), etc.

We recognize that our study results do come with their limitations. Our work should certainly be complemented by additional studies including more participants in order to properly represent the young population in Algeria. Metric applications may also be used in future studies so that we will have more details regarding the use of the different interaction modalities on participants smartphones.

Finally, we will continue to explore how Algerian people use and interact with their smartphones where we plan to perform a field study that will provide us quantitative and qualitative data about usage and usage evolution of interaction modali-ties provided to participants through some applications. We aim to understand how our participants will use these modali-ties and how they can be accustomed on them.

References

[1] Elouali, N., Le Pallec, X., Rouillard, J., Tarby, J.C., MIMIC: Leverag-ing Sensor-based Interactions in Multimodal Mobile Applications, In: Proceedings of CHI '14 Extended Abstracts on Human Factors in Computing Systems, pp 2323–2328 (2014)

[2] Kjeldskov, J., Graham, C., A Review of Mobile HCI Research Meth-ods, In: Proceedings of 5th International Symposium, Mobile HCI, pp 317-335 (2003)

[3] Rahmati,A.,Zhong,L.,Studyingsmartphoneusage:lessonsfromafour-month field study, in IEEE Transactions on Mobile Computing (2013).

[4] Falaki, H., Mahajan, R., Kandula, S., Lymberopoulos, D., Govindan, R., Estrin, D., Diversity in Smartphone Usage, In: Proceeding of the 8th International Conference on Mobile Systems, Applications, and Services MobiSys '10, pp 179–194 (2010)

[5] Verkasalo, H., An international study of smartphone usage, in IJEB, pp 158-181 (2011)

[6] Gerpott, T., J., Thomas, S., Weichert, M., Characteristics and mobile Internet use intensity of consumers with different types of advanced handsets: An exploratory empirical study of iPhone, Android and other web-enabled mobile users in Germany, in Telecommunications Policy journal, pp 357 - 371 (2013)

[7] Uys, W., Mia, A., Jeffrey, G., Van, H., Schyff, D., Andre M., Khusu, M., Gierdien, M., Andrea, N., Faltein, S., Gihwala, T., Smartphone Application Usage Amongst Students at a South African University, In: Proceedings of IST-Africa 2012 Conference (2012)

[8] Nainkin, S., A national study of smartphone adoption factors in south africa. PhD thesis, Stellenbosch University (2014)

[9] Alfaresi, S.H., Hone, K., The Intention to Use Mobile Digital Library Technology: A Focus Group Study in the United Arab Emirates, In-ternational Journal of Mobile Human Computer Interaction, pp 23–42 (2015)

[10] Elouali, N., Approche base de modles pour la construction dap-plications mobiles multimodales. PhD thesis, Lille 1 University (2014)

[11] Piumi Ishanka, U. A., Marasinghe, A., Supporting user interaction of social network mobile application with multimodal interaction, In: Proceedings of 10th Asia-Pacific Symposium on Information and Telecommunication Technologies (APSITT), pp 1-3 (2015)