

Potentials and Challenges of Smartphones for Anthropological Research

Summary

This poster describes a framework of how smartphones can be used for anthropological research. A presented research approach includes the development of a smartphone application as a scientific research tool in order to document usage parameters, usage emotions and the personality of the user. This application shall firstly, provide a precise documentation of the usage parameters (e.g. registration of in- and outgoing phone calls and text messages, usage time etc.). Secondly, utilize the built-in-camera of the smartphone to record the face of the user in order to analyze these images via the software FaceReader that decodes the emotional reactions of the user. Thirdly, include questionnaires to document personality traits. A prototype is developed (Graphic B.) and a first pretest conducted, showing the feasibility of the application but no significant results due to a small and homogenous sample group ($N = 19$) resulting in $p = 0.6$.

The final development of the proposed application is expected during the second year of the doctoral thesis. More generally, this poster provides an overview of the relationship between smartphones and modern anthropology. The implementation of smartphones in anthropological research tangles sociology, psychology, philosophy and informatics and is often labeled as the newly emerging research field *Psychoinformatics*. The guiding question is: What are the potentials, impacts and challenges of smartphones on modern anthropological research?

“Tracking behavior on the smartphone is likely to lend the greatest insight into human behavior. It captures various aspects of life via a wide range of methods (...). It is loaded with sensors. It can communicate its data autonomously to a remote server. It serves as the central device to access the web, shop online, communicate with friends, and play games. And, importantly for research budgets, most people already own such a device.” (Montag, Duke & Markowetz, 2016, p. 3).

Introduction

Considering the release of the iPhone in 2007, smartphones are a relatively new technology. Yet, they seem to be profoundly implemented into social life. An average smartphone user reaches for his device every 18 minutes (Markowetz, 2015) and 36-40% of smartphone users use their device in the last five minutes before going to bed and in the first five minutes after waking up (Montag et al., 2015). It seems that smartphones do not only have an impact on social communication but furthermore on emotional properties. Smartphones raise a passionate discussion about their societal value. Observable positions range from evangelists, seeing the devices as a blessing for humanity with potentials in terms of democratisation, emancipation and political- and industrial system stability, to sceptics seeing the devices as a menace in terms of cultural diversity, personal freedoms and labor quality. Such positions tend to be made under the moral approach: Are smartphones good or bad? Instead of continuing this societal discourses, the following approach will concentrate on the role of smartphones as a scientific research tool. Smartphone usage becomes more and more integrated in daily social life. Meanwhile mounting studies treat the examination of intended and non-intended usage effects, especially regarding the influences for learning, social skills and cognitive abilities such as concentration. Smartphone usage often gets associated with non-intended usage effects such as Distraction, Stress, Social Anxiety or Attention Deficit Disorders. Nevertheless, causal interactions rest difficult to examine and existing studies show ambivalences regarding usage effects. While the same usage pattern may lead to symptoms of stress for one user, it may lead to symptoms of relaxation for another. According to that, it can be expected that usage effects underly a complex interaction of further influencing factors such as personal-, physical-, situational- and social ones. In order to expand the understanding of this relations, the proposed approach suggests to consider smartphones as an emotional and physical feedback system representing social communications. Mounting evidence shows the relevance of the body for mental processes (Niedenthal, 2007). Therefore, considering the smartphone as a physical feedback system shall be integrated in a mobile communication theory. Concluding, because of the usage coverage and the range of implemented sensors, smartphones contain a potential for anthropological research. Nevertheless, possible menaces are for example the violation of privacy and other ethical issues which need to be treated in order to utilize advantages of smartphones as a research tool.

Theory

Since the mid 20th century, the development of new information and communication technologies was accompanied with ideals of information democratisation, social emancipation and political and economic system stability. But announced potentials for productivity growth, could not be measured economically (known as the *Solow-paradox*). To explain this, Montag & Elish (2017, p. 364) suggest to regard the association between smartphone usage and productivity as an inverted U-funcion. An additional factor of influence to this may be the blurring differentiation between work life and leisure time. It seems, that smartphones are more important as a communication- rather than an information- technology to users since social networking and messenger applications are one of the mostly used smartphone functionalities. Therefore, smartphones can be regarded as a mobile, social communication technology. Social communications includes a relatively high emotional involvement. This aspect in combination with a high, daily usage coverage makes the smartphone a communication technology that could be considered as emotionally invasive. This dimension, in combination with the high degree of usage coverage, constitutes a potential for modern anthropological research. Neither psychology, sociology nor medicine had ever had a tool at hand to document human behavior in such a precise way and on such a big scale. Smartphones are in the reach of the user nearly 24 hours a day and they contain sensors such as: GPS, GIS, NFC, Bluetooth, Wi-Fi, cellular broadband, ambient light sensor, proximity sensors, magnetometers, 3-axis-accelerometers, 3-axis-gyroscopes and barometers. These sensors can be used to generate a wide range of anthropological insights. The proposed research approach considers smartphone usage as emotionally driven and aims to integrate the Embodiment approach into a mobile communication theory. Following Niedenthal (2007) psychological processes are influenced by the body and inversely. Therefore, smartphone usage is considered to contain a physical dimension. A physical interaction between the user and the device happens via the touch screen, the vibration settings and the global aspect to have the device closely in the pocket. Approaches of social constructivism state the relevance of social communication for the individual perception and construction of reality. Furthermore, they state that a human being not only has a body, but moreover is his body, what strengthens the physical dimension of smartphone usage. Following a constructivistic approach, the smartphone is relevant as a cultural good forming individual reality perception through social communication. Given the smartphone as a mobile, social communication technology, the device appears important for the social identification of a user. Social impression management, otherwise taking place face-to-face, happens nowadays more and more via the smartphone (e.g. chat-groups for teenagers). Combining these concepts, smartphones embody social communication. Social communication may unconsciously be projected on the physical interaction with the device. Relating to modern information and communication technologies, it is often stated as an advantage to disembodiment communication in order to connect people from all over the globe. The proposed research approach contrasts the notion of smartphones as disembodiment communication. Mounting evidence shows that smartphone usage appears partly unconsciously. Impulsive and repetitive usages can be observed that hint to a conditioned habitude to check for push-notifications even though the device did not give a sign for it. A possible explanation for this may be the concept of *Random Rewards* from B. F. Skinner. Thereby, the uncertainty of possible new social messages attracts the user more than a definite knowledge about new messages. This aspect may explain the addictive potential of smartphones. Existing studies link personality traits to smartphone usage (Montag et al., 2015). A personality with high scorings in extraversion is more likely to have an extensive smartphone usage in more direct communication functionalities as for example placing phone calls instead of texting. It seems as smartphones could be considered as a catalyst of personality traits. Nonetheless, it appears unlikely, that smartphone usage essentially changes communication behavior of a user, but rather it solidifies his communication tendencies and as an opportunity to anthropological research, it makes communication behavior precisely documentable. This is why the documentation of smartphone usage may picture more vivid emotion- and personality-profile than existing methods do.

Menaces

The proposed scientific research application raises ethical privacy issues. Basically, such a proposed application equals spying softwares mentioned in the NSA scandals 2013. Hence, a societal scepticism can be expected. The implementation in scientific studies presupposes the legal development of the participants agreement and only since the application is conceptualized as, not to be a commercial application but a scientific research tool used only with the agreement of the participant, a realisation seems imaginable. Another menace in the theoretical treatment of smartphones is a tendency to pathologize daily life. Some example of newly emerging possible pathologies touching this research field are titled as *Smartphone Addiction*, *Internet Addiction* or *Information Overload*. The basic ethical questions of the outlined research approach are: Is there any moral limit to the documentation of human behavior? Or: Is everything acceptable what a participant agrees on?

Methodology

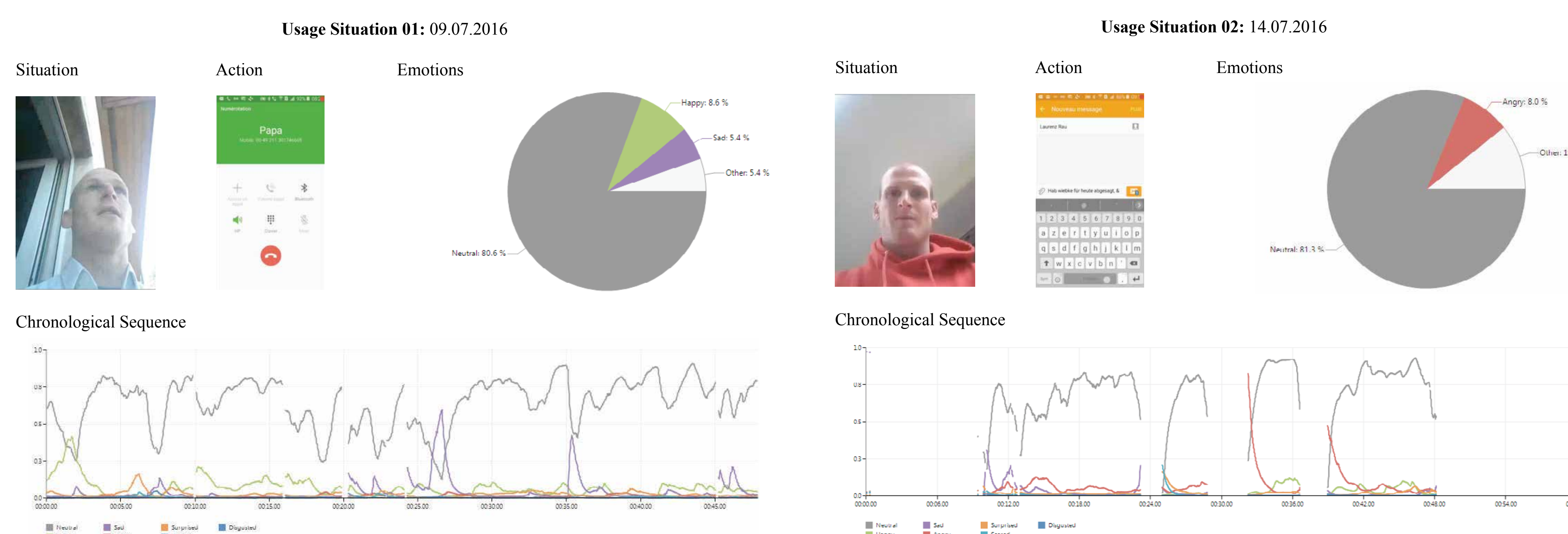
In order to research usage behavior studies still partly rely on questionnaires containing items such as: How often did you place a phone call? Or: How long did you use your smartphone? Obviously these data contain different biases and differ from the actual usage. A device-based documentation method could gain more objective data. The *Menthal* application is an example for such a research application that documents the most basic usage parameters. As noted, smartphones can be considered as an emotionally invasive communication technology. To research this perspective, in addition to the documentation of the usage parameters it would be necessary to gain access to a documentation of usage emotions. Therefore, the application could implement different emotion recognition softwares as for example Facial Recognition-, Text-to-Emotion- or Speech-to-Emotion softwares. To use Facial Recognition Softwares, the built-in-camera of the smartphone can be employed to document the face of the user. Graphic A. shows an example of an analysis of smartphone usage situations analyzed via the software FaceReader. FaceReader is an emotion recognition software based on the *Facial Action Coding System* from Ekman & Friesen (1976) that detects emotional changes with an accuracy of 90%. As noted, usage effects seem to be influenced by a complex structure of influencing factors. One of the factor sets is the personality of the user (Montag et al., 2015). So in order to understand individual usage motivation and evolving usage effects it would be necessary to identify individual personality traits of a user. Therefore, it is assumed to implement questionnaires appearing as push-notifications.

Conclusion

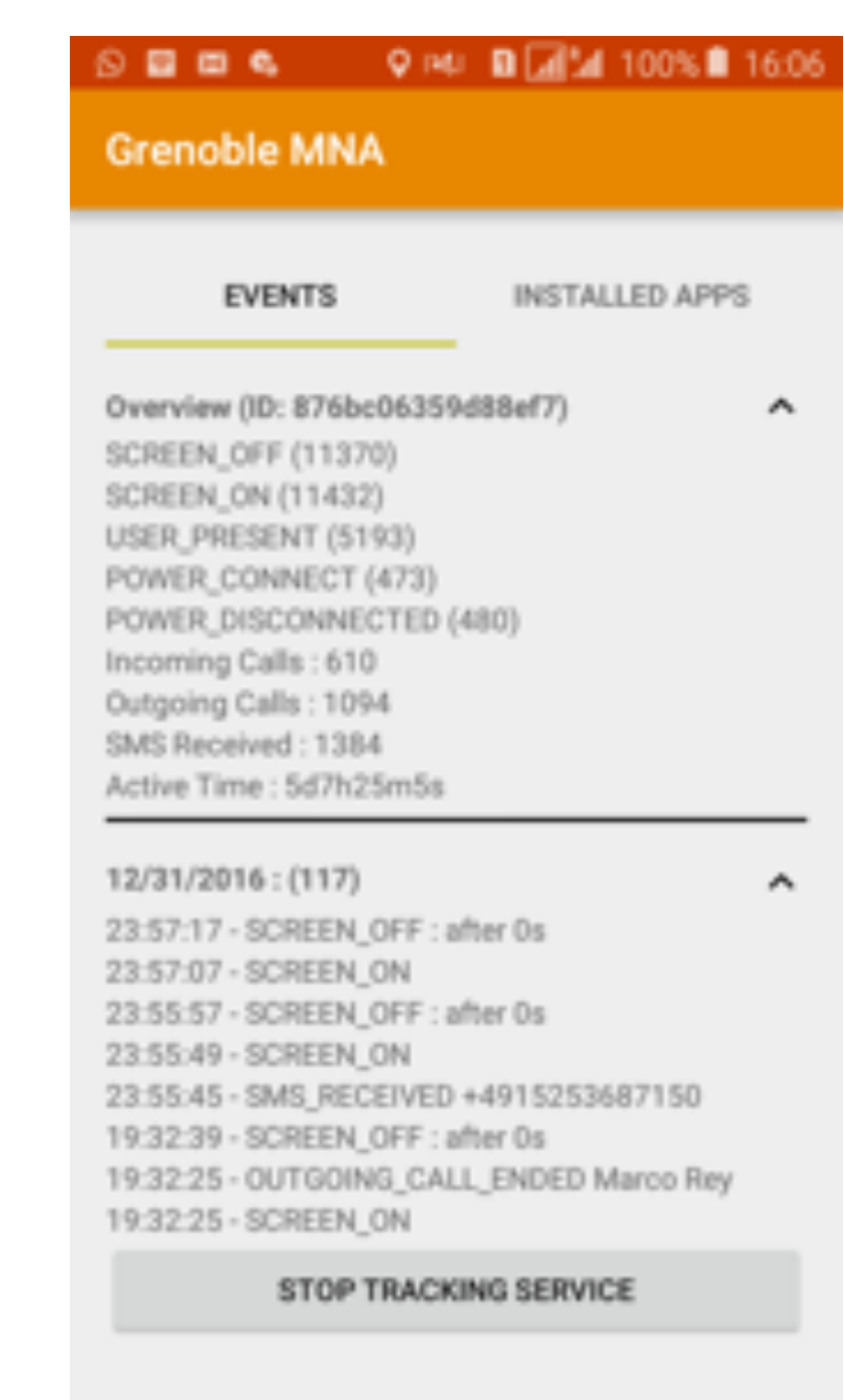
Aside from the potentials of smartphones for anthropological research, smartphone usage rests an important topic for society since daily life seems invasively patterned by smartphone usage. The societal meaning of technologies evolves by the kind of their usage. Therefore, smartphone usage can be considered as a relevant topic for the *JLIC*, since it will be an evolving topic for this researcher generation to discuss usage norms. Furthermore, the appearance of new technologies makes the parallel development of new anthropological theories and methods necessary (as it happened for example due to the industrial revolution). Consequences of smartphone usage are not profoundly examined yet. Further studies are necessary to do so. The proposed research approach shall contribute to this process.

Biography

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Graphic A. FaceReader Analysis of smartphone usage situations.



Graphic B. Prototype of the proposed application