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Smartphones: A Game Changer for Psychological Research

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Abstract

As technology continues to advance and smartphones continue to grow in popularity, we argue that smartphones have rapidly evolved as a suitable tool for psychological research. In this editorial, we will first briefly introduce the technological and social features possessed by smartphones that are ideal for psychology research. Then we distinguish two approaches to use smartphones for research, highlighting the external and internal validity of each approach. We further discuss computer skills and analysis methods needed for research with smartphones.

Keywords: Mobile computation; Smartphones; Big data; Research methods

Introduction

Smartphones: A Game Changer for Psychological Research

In the Smartphone Psychology Manifesto, [1] posed a profound question: What if psychology had no history, as if it were invented today and had no methodological inertia, what research methods would we use for data collection? Highly likely, the answer would be smartphones. As technology continues to advance and smartphones continue to grow in popularity, we argue that smartphones have rapidly evolved as a suitable tool for psychological research. In this editorial, we will first briefly introduce the technological and social features possessed by smartphones that are ideal for psychology research. Then we distinguish two approaches to use smartphones for research, highlighting the external and internal validity of each approach. We further discuss computer skills and analysis methods needed for research with smartphones.

The Technological and Social Features of Smartphones

Although smartphones are primarily designed for daily life activities (e.g., communication, navigation, personal computing, etc.), its technological and social features make it surprisingly suitable for conducting psychological research. First of all, smartphones carry many sensors, such as proximity, gyroscope, accelerometer, orientation sensors, etc., which allow for automatically recording users' various personal and social behaviors. In addition, its programmable functionality allows for adding external sensors and program applications (i.e., "Apps") customized for particular research projects, which is important for data collection in psychological research. These features can record a large variety of behavioral data with real-time and precise-location information at a high sampling frequency.

More importantly, more and more people carry smartphones every day and increasingly rely on them for daily activities. According to comScore, as many as 184 million (i.e., 75.8%) people in the U.S. owned a smartphone as of January 2015 [2]. More than 5 billion people worldwide are expected to use smartphones in about ten years [1] Such popularity of smartphones enables researchers to collect psychological data from extremely large populations, directly addressing the small-sample methodological problems that psychologists had faced decades before.

Two Approaches of Using Smartphones in Research

For the purpose of organization and the convenience of examining its validity, we distinguish two important approaches of collecting data using smartphones: naturalistic observation and experimental design.

Naturalistic observation: The daily use of smartphones generates unobtrusive and big data, most which reflect essential social and psychological behaviors. By analyzing these naturalistically observed behaviors, we gain meaningful insight into the psychological state of users. For example, the automatic logs of phone communications (e.g., who, when, how long of calls and text messages) shed important information about the users [3]. Despite the privacy concern of smartphone data, many users still entirely or partially share their information through social media applications like Twitter, Facebook, LinkedIn, etc; Users voluntarily log into such Apps and share their thoughts, feelings, and daily activities. Data generated by this approach is not only naturalistic and unobtrusive, but also big: large in volume, fast in velocity, complex in variety, and low in cost. This approach yields high external validity, especially ecological validity.

Rigorous experimental design: The naturalistic approach may not necessarily meet research needs; psychologists can also use smartphones to collect data through rigorous experiment design. In such cases, smartphones are a versatile data collection tool that can be used for field or laboratory studies. Participants may be recruited online and are requested to install specific Apps and even attach external sensors such as EEG [4] for collecting various types of behavioral data. Experience Sampling Method [5,6] can also be incorporated in this approach. This approach may not necessarily be able to access a population as large as the naturalistic observation approach, but because of its rigorous research design, it is expected to yield high internal validity while still maintain decent external validity as it does not impose virtual settings as typical laboratory settings do.

Computer Skills and Analysis Methods

Using smartphones for psychological research does have limitations. The smartphone-based research requires a set of computer skills and analysis methods to deal with the data collection and analysis. For the data collection, basic computer programming is required to develop smartphone Apps. In addition, more advanced analysis methods are needed to analyze such data, including text analysis [7], social network analysis [8], time series analysis [9], geodata analysis, and so on [10-12].

Conclusions

The history of psychology has witnessed the power of innovation of data collection methods in advancing the research and improving our knowledge. With the rapidly ubiquitous use of smartphones, we believe smartphones are revolutionizing psychological research through their powerful way of data collection, which in turn fosters new paradigms in psychology research. It is our hope that this editorial will bring more attention to this innovative method of data collection and eventually lead to more cutting-edge findings.

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