

Review on the Revolution of Psychology Research in the Age of Big Data

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[Abstract] As a concept that came into being with the information age, big data has received common attention from all walks of life in recent years, including psychology. The text introduces the concept of big data and its technical tools from a technical point of view, summarizes the research logic and research methods of traditional psychology, and introduces the big data problems in psychology research and some related practical applications. It summarizes the impact of big data on the research logic and research methods of psychology. The emergence of big data is an inevitable outcome of technological development. Psychology, as a subject of external performance data, should seize this opportunity. For many aspects of current psychological research, big data technology can directly improve efficiency and enhance validity. At the same time, if researchers start from the goal of psychological research and make full use of modern information technology, combining big data with psychology and psychology research paradigms. It is expected to expand the field and ideas of psychological research and promote the further development of the psychological science system.

[Keywords] Big data; Psychological research; Revolution

1. Introduction

Scientific psychology uses experimental methods to make psychological research develop from empirical description to scientific and in-depth analysis of behavior, and then reveal the law of the occurrence and development of psychological phenomena. This inevitably requires scientific psychology research to be based on objective material that reflects the external performance of psychological activities, that is, based on objective data. However, due to limited conditions, psychological researchers have been unable to obtain objective data covering the entire research object for a long time, and thus have to develop a set of discipline operation specifications centered on laboratory experiments and sampling statistics. This specification provides great convenience for psychologist to conduct exploration in line with modern scientific standards. It enables the rapid accumulation of knowledge in psychology, but it also greatly limits the authenticity, usability and scalability of the research results.

The emergence of big data theory and technology, especially the rapid development of the current data acquisition technology and the wide expansion of the application range, makes it possible for us to carry out very large-scale user experiments, to track the full-time tracking, and achieve data granularity. The flexible changes make the data foundation of psychological research more comprehensive and solid. This paper

combines the computational network psychology research conducted by the Computational CyberPsychology Lab (CCPL) in recent years to analyze the new opportunities brought by big data from the perspective of psychological research.

2. Overview of Psychological Research

Psychological phenomenon, as a subjective spiritual phenomenon, cannot be invisible, has no volume, size and weight, and has no explicit characteristics. Therefore, it is necessary to rely on the explicit expression of psychological phenomena to speculate on the characteristics and laws of the psychological phenomena behind it.^[1] The basic task of psychology is to explore the law of the development and change of psychological phenomena. The ultimate goal is to achieve an effective interpretation of psychological phenomena, thereby predicting and intervening different psychological phenomena and improving people's quality of life.

2.1 Research Methods

Observation is a method of systematic observation of psychological phenomena. For variables that are not directly or difficult to intervene, observations are often used. Psychological variables themselves cannot be directly observed. Observations are used to observe behaviors that reflect psychological phenomena.

The survey method mainly includes questionnaires and interviews. Questionnaire method is one of the most widely used methods in psychology. Generally, the method of self-reporting is used to let the participants answer relevant questions. The interview method is a method of obtaining information about psychological phenomena through direct dialogue with the participants, and often exists as a supplementary work for the preliminary work of the questionnaire or the experimental method.

2.2 Research Tools

In psychology research, one of the most important tools is the Questionnaire and the Scale. Most of the questionnaires and scales are self-reported and require participants to answer questions according to their own situation. Tools for measuring certain psychological characteristics (such as personality), in addition to the self-reporting scale, there are projection and situational scales. The projection test will provide the participants with some stimulating situations (usually pictures, sentences), allowing the participants to express freely (such as reading a story, adding incomplete sentences), and analyzing their responses to infer their personality characteristics. The scenario test places the subject in a specific situation, observes the behavioral response and infers his personality traits. Today, questionnaires and metrics tools are used in a variety of research methods, including surveys, tests, and experiments.

In addition, there are a large number of experimental tools designed specifically for a

certain problem in the study of psychology, such as the Skinner box for studying operational behavior, the cliff for studying depth perception, and the touching point for studying cognitive maps and so on. With the rise of cognitive neuroscience in the past 20 years, neurophysiological recording techniques and equipment such as EEG, ERPs, and fMRI have also been widely used in psychological research.

3. Big Data in Psychological Research

At present, research using big data has spread across disciplines, and psychology is no exception. In 2014, there was a controversy over the study of emotional contagion, which make some changes on the dynamic information of nearly 700,000 Facebook users, so that the information received by a group of users was based on positive emotions, another group users are mainly negative emotions.^[2] The results show that the user's emotions are affected by the emotions contained in these dynamic information. The user who receives positive emotional information is more active, while the user who receives negative emotional information will become negative. In traditional psychological research, it is difficult to imagine how much manpower and time cost it takes to collect nearly 700,000 samples and big data technology has easily solved this problem. The rise of big data has brought great opportunities for psychological research. The author describes the promotion of big data on psychology research from three aspects: research logic, methods and tools.

3.1 Research Logic

The research logic of psychological hypothesis testing is a priori and is an inference made before the results are obtained. Unlike the research logic of psychology, big data is based on data analysis and its research logic is posterior. Psychology uses a priori logic, which is a realistic compromise of classical research methods that can only obtain partial and limited data. The emergence of big data provides a posterior possibility for psychology, which in turn improves the scientific nature of psychology research, and is also more in line with the philosophy from practice to theory to practice.

3.2 Research Methods

In the traditional research methods of psychology, the sample size is very limited. The research mostly uses sampling to extract samples from the population, and then generalizes the results of the sample research to the whole. This makes the validity of the research conclusion inevitably affected by the representativeness of the sample. Traditional research methods do not have the ability to directly study the population, so they use the “detour” method to study the samples; now big data technology make it possible to directly study the psychology, fundamentally eliminate the problem of sample representation.

For large-scale questionnaires and test research, the traditional method on the one hand is slow in data collection process, and often needs to wait for the feedback to feed enough information. On the other hand, it requires a lot of manual calculation in the data processing stage, and the efficiency is greatly limited. Big data technology has the ability to efficiently access massive amounts of data, and can analyze the existing and original data records to extract effective features, making psychological research a qualitative leap in the scale of data foundation and effectively reduce research costs and improve research efficiency.

3.3 Research Tools

A wearable device generally refers to an electronic device that is embedded in a garment or that exists in the form of an accessory or a carry-on article. They use sensors as the source device for collecting data, not only to collect user's behavior, physiological and biochemical indicators (such as gait, heart rate, blood oxygen saturation, etc.), but also have comprehensive environmental awareness (via GPS, camera, microphone, etc.). Due to its small size and real-time contact with the user's body, it is able to record the external performance of the individual more completely, providing rich and comprehensive data for conducting psychological research.

4. Big Data Helps Modern Psychology Research Innovation

Big data not only provides sufficient research materials for psychological research, but also has triggered some new areas of psychological research.^[3] Now combined with the recent progress of related research, the author proposes a possible psychological research innovation direction, for reference only.

4.1 Psychological Processes and Mechanisms in the Big Data Network

Environment

The virtual world can be called a virtual society because in the virtual network environment, the individual's performance and the relationship between people are the mapping of human reality society. The behavior of individuals in real society and virtual society presents complex interactions. The consistency and relevance of individuals in real society and virtual society constitutes the premise of our current understanding of virtual society.^[4] However, people's behavior in virtual society may be influenced by their own conscious and unconscious manipulation. Therefore, the study of the consistency between virtual society and real society is carried out, and the mechanism of interaction between the two is explored. It is of great significance to fully understand the virtual world, expand relevant psychological theories, and guard against related risks.

4.2 Construction of Psychological Knowledge System in Virtual Society

The current psychological knowledge system is constructed through the analysis of individual psychological phenomena in the real society. With the gradual popularization of the network, the virtual society of the network interacts with the real society, but there are still obvious differences between them. For example, some researchers have found that there is a difference between the network personality and the real personality. The emergence of big data provides technical support for us to analyze individual behavior in virtual society, making it possible to comprehensively analyze behaviors in virtual society. Therefore, through the big data research method, it is a feasible and meaningful research direction to discover and construct a psychological knowledge system that is truly suitable for virtual society. If we regard real society and virtual society as two different environmental systems, then construct a psychological knowledge system under different environmental systems. It will help us to understand, predict and control individual and group behavior in different environmental systems.

4.3 Psychology Application Innovation in the Era of Big Data

With the generalization and integration of individual behavior data records, through the analysis of big data, it is possible to monitor the influencing factors such as reflecting public attitudes and emotions, predict social trends such as trends in group events, thereby achieving early warning of mass incidents.

Online psychological intervention refers to the method of placing traditional psychological intervention methods and processes on the network, and users are psychologically intervened according to the guidance on the network.^[5] The effectiveness of this has been supported by many empirical studies. The traditional intervention method is limited by the number of employees, and the use of big data technology to online the psychological intervention information acquisition, intervention implementation, feedback collection and other processes can greatly improve the efficiency and coverage of psychological intervention services.

5. Conclusion

The emergence of big data is an inevitable outcome of technological development. Psychology, as a subject of external performance data, should seize this opportunity. For many aspects of current psychological research, big data technology can directly improve efficiency and enhance validity; at the same time, if we start from the goal of psychological research and make full use of modern information technology, combine big data with psychological issues and psychology research paradigms, it is expected to open up the fields and ideas of psychological research and promote the further development of the psychological science system.

As an old and young discipline, psychology has deep accumulation and conforms to the development needs of the times. Therefore, it is necessary to learn from the development of contemporary science and technology and continue to innovate. The ultimate goal of all technological development is to serve humanity. Therefore, as a “people-oriented” psychology, it should be a leading role in the rapid development of science and technology. Psychology is currently facing a period of leaps and bounds. With the help of modern science and technology, it is imperative to develop “major psychology”. In this respect, we need to pay attention to the current scientific and technological progress and actively carry out interdisciplinary research. On the other hand, in the field of psychological education, we will carry out universal education on related disciplines, broaden our horizons for psychology professionals, and lay the foundation for interdisciplinary research.

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