

Research of Psychology Computerization Experiment

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Abstract: Efficient and accurate computer has become an indispensable tool in experimental research and teaching, and the computerized experimental methods of psychology have gradually diversified and standardized. This paper first introduces the application of computer-based experiment generation tools in psychology, and then describes the characteristics of computer-based experiments in psychology, such as single machine experiments, online experiments with a variety of devices. Finally, the paper introduces the generation system of psychological computerized experiment based on windows, and looks forward to the future of psychological computerized experiment in form, technology and application.

1. Introduction

With the continuous development and improvement of computer technology, in today's psychological experimental research, efficient and accurate computer has become an indispensable tool in experimental research and teaching. Experiments controlled by computer programs have been widely used in various branches of psychological research and teaching. Most of the experimental contents in the traditional psychological experiment teaching can be realized by computer, and the experimental process can be strictly and effectively controlled to improve the accuracy and reliability of the experimental results. Computerized psychological experiments have been widely used in various fields of psychological research, and the methods of psychological computerized experiments are gradually diversified and standardized. Therefore, it is more and more important to explore the computer-based experiment of psychology and understand its generating system, which is of great practical significance to carry out scientific research, teaching and laboratory construction.

2. Application of computer-based experiment generating tools in psychology

When a psychological experiment needs to be controlled and collected by a computer, there are generally two choices for the generation of experiments: one is to use a professional computer language, and the other is to use a software tool specially designed for the generation of psychological computerized experiments. At present, there are many kinds of tools, but they have their own advantages, which need to be combined with their own characteristics and laboratory conditions. Common psychological experimental software based on Windows operating system includes E-Prime, DMDX, inquisition, presentation, superlab, stim, etc. As can be seen from Figure 1, prime and DMDX are far ahead in the use of professional tools.

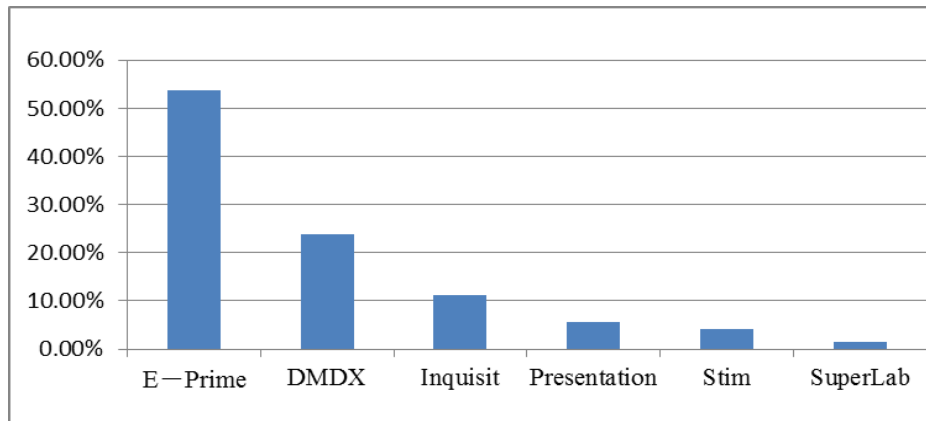


Figure1. Application proportion of each software

VB language and C language are preferred when using programming language to generate experiments. Figure 2 shows the usage proportion of programming language.

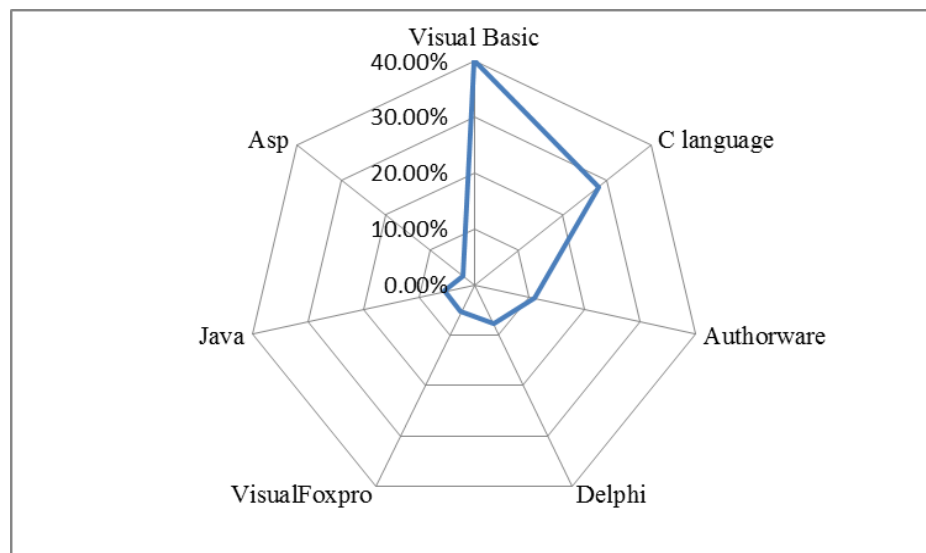


Figure2. Application proportion of each language

3. The form of psychological computerization experiment

Psychological computerization experiment refers to psychological experiment based on computer program control. Compared with the mechanized and intelligent psychological experimental methods, the computerized experimental method has the advantages of good control of additional related variables, accurate timing, and convenient recording and so on. With the development of computer technology and other scientific instrument technology, psychological computerization experiment has roughly formed a single experiment form which regards computer as an instrument, a variety of on-line experiment forms which place computer outside the instrument and equipment, and an on-line experiment form which uses internet technology to connect computers.

3.1. Single machine experiment

Single machine experiment refers to the psychological experiment with independent computer as equipment. The computer is equivalent to a multi-functional psychological experiment instrument in a single machine experiment. The increase of human-computer interaction can minimize the influence of the main test on the subjects. Single machine experiment has relatively simple requirements for technology, and there are many kinds of experiments that can be carried out, but it is mainly used in the field of cognitive psychology with reaction time as the response variable. As we all know, reaction time experiment requires high accuracy of timing. However, there are some

problems in single machine experiment, such as the control of stimulus presentation time and the accurate measurement of response time.

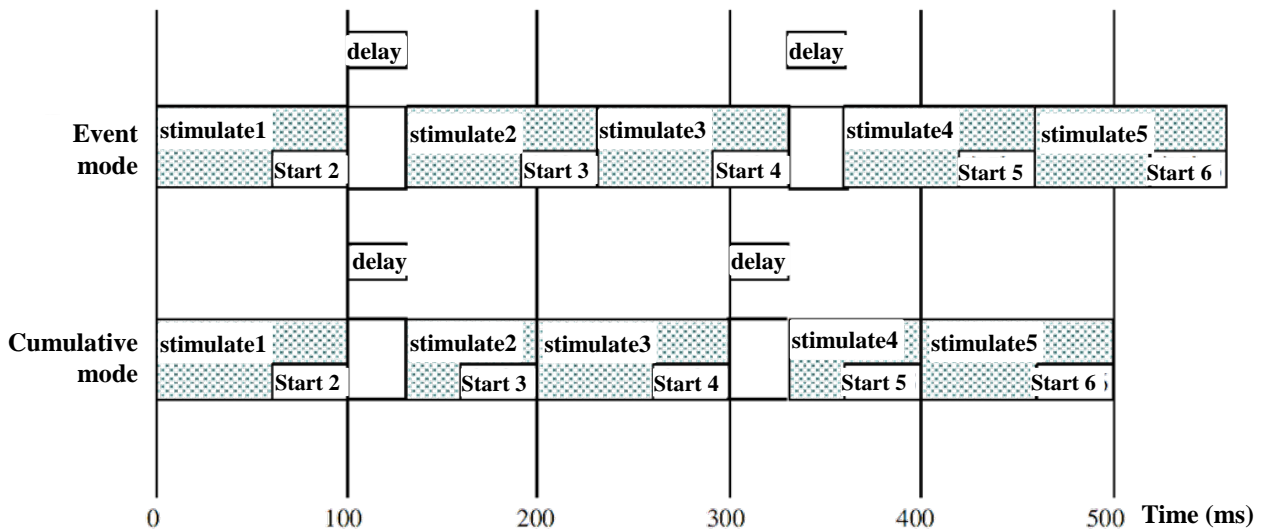


Figure 3. Event and cumulative timing mode in E-Prime

Figure 3 describes the first two processing methods provided by E-Prime when unexpected time delay occurs: event timing mode and cumulative timing mode. In event mode, the delay that occurs at the beginning of an event does not affect the scheduled duration of the event. Due to the error, the starting point of all events behind the sequence will be delayed, and a cumulative time delay will run through the whole process. In the cumulative mode, the delay at the beginning of an event will shorten the expected duration of the event and minimize the cumulative time error. Therefore, in the form of single machine experiment, we should pay special attention to check whether the function of the generating system meets the requirements of the experiment and reduce the influence of the error on the experimental results.

3.2. Multi device online experiment

Multi equipment on-line experiment is a psychological experiment which combines modern scientific experimental instruments with computers. It fully combines the technology of computers and scientific experimental instruments. The biggest characteristic of the on-line experiment of many kinds of equipment is to put the analysis and processing of the signal, the expression and output of the result of the experiment instrument on the computer to complete, which improves the test speed of the instrument, and obtains good measurement consistency and repeatability. The main problem of this kind of experiment form is that the interface equipment and technology between the computer and the instrument are very complex, the instrument connection needs to write complex programs to achieve the purpose, but at present, the data connection between the experiment generation system and the external equipment has not been completely solved. On line experiments with various devices have promoted the development of physiological psychology and cognitive neuroscience, and provided new and high-end methods and means for modern psychological experimental research.

4. The generating system of psychological computerized experiment

The generation system of psychological experiment can edit, make and present a wide range of stimulus materials. In addition, it can design the number of experiments, the presentation mode and the presentation time of the stimulation, and accurately record the response of the subjects and process the data. Compared with the computer experiment of computer language generation psychology, it has the advantages of simple and easy to use, fast generation of experimental program, high timing accuracy and few systematic errors.

The experimental generation system is not perfect for the computerized research of

psychological experiments. First of all, it cannot generate all the computer-based experiments, such as dynamic tracking experiment or need professional computer language. Secondly, although the calculation accuracy of these experimental generation systems can be accurate to milliseconds, in the windows operating system which supports multithreading technology, the timing cannot be completely accurate because of the impact of other background running programs during the experiment.

5. Conclusions

The computerization of psychological experiments has become the current trend. With the continuous upgrading and development of the generation system of psychological experiments, a more advanced standardized generation system for experiments in multiple fields has been developed. This is not only beneficial to expand the application field of computerized experiment, but also to promote the development of computerized experimental research in psychology towards standardization and scientization. Although the form of psychological computerized experiment will be more and more abundant, the online experiment of computer and other medical instruments may become the mainstream. The psychological experiment form of connecting high-tech medical equipment such as fMRI and computer can make full use of the resources and technologies of computer and scientific instruments. Therefore, in the future, the application proportion of computer as instrument and equipment in experimental teaching will be further improved.

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