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Computer-Aided Putonghua Test: Problems and Strategies

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Abstract. The implementation of mandarin test is one of the most important measures to popularize Putonghua in China. With the rapid development of modern information technology, especially the effective integration of computer, network and speech recognition technology, the model of computer-aided Putonghua proficiency test was born in a new form, which provides a good opportunity to promote the standardization and modernization of Putonghua proficiency test. Based on a brief introduction of the advantages of computer-aided Putonghua test, this paper mainly discusses the typical problems in the process of Putonghua test, and then puts forward the corresponding solutions in order to better promote the development of this test.

Key words. computer-aided Putonghua test, problems, strategies

1. Introduction

Since computers appeared, they have been contributed a lot to the whole world and have been applied to different research domains such as reading skill teaching [1], mechanic studies [2], climate changes [3], manual evaluation [4], implant surgery [5] and their combination with 3D etc. [6].

Besides, computer-aided technology has also been used in language teaching and learning as well as language test, so does in Computer-aided Putonghua Proficiency Test (CAPT). CAPT refers to the intelligent testing system of Putonghua proficiency in China, which aims to let the examinees take the Putonghua test on a computer by means of machine instead of human. This process mainly consists of three steps: digital information collection, computer aided network evaluation and evaluation process by network monitoring. In a certain period, the examinee must complete the voice intelligence test. Compared with the traditional scoring mode by human, CAPT technically solves the problem of low efficiency of manual test and embodies the scientific and fair evaluation of test results to a certain extent. Therefore, it gradually replaced the traditional universal testing mode, and has been welcomed and adopted by more and more universities and testing institutions.

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Table 1. Putonghua Test Proficiency

Level	Quantity of words	Listening	Reading	Writing
1	150	Yes	Yes	No
2	300	Yes	Yes	No
3	600	Yes	Yes	Yes
4	1200	Yes	Yes	Yes
5	2500	Yes	Yes	Yes
6	5000+	Yes	Yes	Yes

2. The benefits of CAPT

Compared with the previous manual test, CAPT has made a great breakthrough in terms of the number of examinees as well as its testing scale, efficiency, and cost. It has brought a revolution in the phonetic test of mandarin and has also become the inevitable trend of Putonghua proficiency test to be scientific and standardized. Xu Yanli [7] believes that CAPT has the following advantages[7]:

- It technically solves the problems of high cost and low efficiency of manual test;
- It eliminates the influence of human factors from the angle of the management;
- The evaluation is more objective and the test results are fair and reasonable;
- It realizes the purpose of informatization of CAPT by means of advanced modern technology.

As a matter of fact, CAPT also has another big advantage, that is, the fast information retrieval. As is known to all, the computer-aided system has a complete database system, which records much test-related information, such as the time and place of the test, the examinee's name, gender, identification number, photo, telephone number and so on. In previous Putonghua tests, the above information was recorded manually with the potential result that information retrieval was not only troublesome but also easy to lose.

The biggest concern is that once a candidate loses his or her certificate, it will be difficult to have another one. On the contrary, all the information of the examinee can be stored in a powerful data management system via CAPT; therefore, if it happens, candidates can easily find their testing scores at the testing agency and get a new certificate. In terms of the information management of candidates, the use of the database also makes it very simple. In the Internet era, the test candidates only need to fill in their own information (such as name, gender, ID number, etc.) through the Internet at a specified time, and the computer terminal will automatically collect such information. Compared with the traditional manual way of collecting examinee data, the use of computer database greatly simplifies this process and improves the work efficiency. Especially in the era of COVID-19, security has been greatly enhanced by such kind of telecommunication.

Table 2. Levels of Putonghua Test Proficiency

Levels	Name	Description
Level I	Beginner	Learners who have just started learning Chinese
Level II	Elementary	Learners who have a basic understanding of Chinese

Level III	Intermediate-Low	Learners with a good grasp of Chinese vocabulary and grammar
Level IV	Intermediate-High	Learners with solid understanding of Chinese grammar and vocabulary
Level V	Advanced-Low	Learners with a near native level understanding of Chinese vocabulary and grammar
Level VI	Advanced-High	Learners with native-level grasp of Chinese vocabulary and grammar

3. The Problems of CAPT

3.1. Poor Compatibility of Hardware

As far as the current CAPT is concerned, there is a common fault, that is, the standard of the testing software is too high for the hardware. To some extent, it has hindered the popularization of CAPT. As is known to all, the establishment of a standard machine-testing room requires high configuration of some computer equipment and related voice equipment, which needs a lot of money. However, the testing agencies or universities don't have enough money to buy such high-quality test hardware as computers, sound cards, headsets, etc. However, in the testing process, the test software is not compatible with the above speech sampling equipment, which causes abnormal speech recognition and background evaluation, and ultimately affects the test efficiency and test results.

3.2. Insufficient Basic Conditions of CAPT

It is common knowledge that Putonghua test is a large-scale national test with many participants, which puts forward higher requirements for the basic conditions to testing institutions or colleges. These basic conditions include:

- Advanced computer-assisted testing software system;
- Sufficient hardware facilities and related auxiliary equipment required for the computer-assisted test as well as a fixed test site;
- Professional Putonghua testers and specialized personnel for computer operation management and equipment maintenance;
- Strict operation and management standards of computer-assisted test [8].

As far as the current situation is concerned, although CAPT has been carried out for many years, the testing system of many institutions is still far from the advanced standard. For instance, some universities even have no Putonghua testing institutions, so their students must go to provincial Putonghua testing centers to take the test, which actually brings a lot of trouble for them. Even in some universities that have obtained the qualification of computer testing, professional Mandarin testers, computer testing administrators and equipment maintenance personnel are also not enough to hold such a massive test. In addition, some colleges or universities have not established a special machine-aided testing room; therefore, it is likely that they will use a computer classroom as a testing room. At the same time, the hardware and software facilities of different

universities are not of the same standard while the size of the machine room and the configuration of the machine are also different, so many factors will have a great influence on the test effects and bring some uncertainty to the accuracy of the score.

3.3. Unsatisfied Phonetic Judgment

In the process of computer-aided test, it is found that the computer test score is not enough to show the intonation and co-articulation phenomenon [9]. As is known to all, Chinese tone values are relative, and Chinese intonation is not a simple stack of syllables and tones. When the examinee is reading the material or speaking according to a certain material, he or she should pay attention to not only the pitch but also the pause, the sound strength, and the length of the sound. In acoustics, intonation is closely related to pitch, length and strength, and its main factors are also different in various contexts. In actual communication, many intonations are used to distinguish the meaning of language and examinees' different pronunciation will cause a variety of intonations, which has nothing to do with the sound quality itself. And the machine-assisted test mode happens not to be able to recognize this phenomenon. In addition, phonemes in the speech environment are affected by the speech before and after them, which reflects the effects of co-articulation. Therefore, acoustic, and physiological parameters will change. Co-articulation is not only reflected between syllables and syllables as well as words and words, which is also unable to be achieved by computer-aided software.

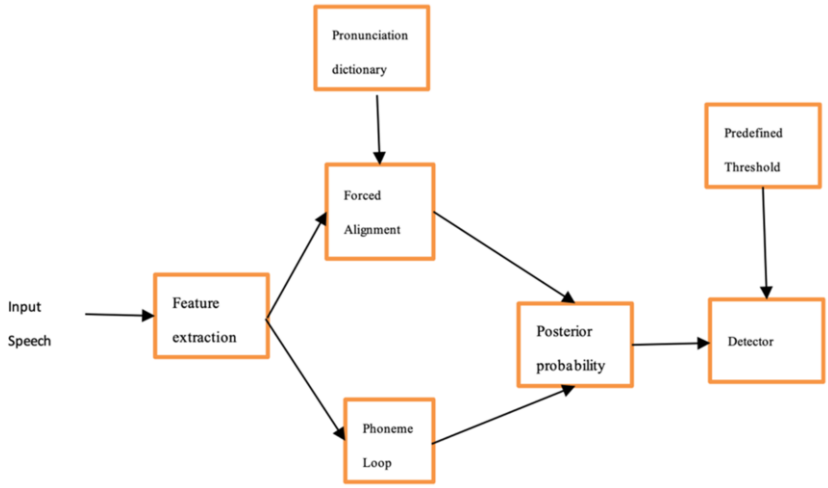

Fig 1. Pronunciation error detection

3.4. Difficult Test Supervision

The computer-assisted test of Putonghua not only gives students more freedom, but also greatly increases the difficulty of test supervision. Since there is no face-to-face tester supervision in the testing process, it is difficult for candidates to completely self-control their behavior in a relatively independent space. Some candidates will try every means to cheat, for instance, taking the test for others, taking some prepared materials into the testing room, reciting the brought materials and even repeating the given material at

times. At present, the typical cheating behavior is that some students will take out their mobile phones to read the content stored on the mobile phone when they complete the fourth task of speaking according to the given material. Once cheating occurs, if the test administrator stops it in public, it will certainly affect other candidates. Therefore, CAPT also brings some challenges to invigilator.

4. Strategies of CAPT improvement

4.1. Improving the Hardware of the Testing System

As can be seen from the above, the adaptability of the current testing software system to hardware must be strengthened, and the testing cost should be substantially reduced. Although the current computer-aided test system has gone through many modifications and improvements, and its stability has also been improved; there are many areas that need further improvement. One of the most important points is to change the software system's over-dependence on certain hardware. Generally speaking, based on building a standard computer-aided testing room, if other new and high-grade equipment are also installed, it will be a dream to have CAPT since it will cost a huge amount of money whether to colleges or testing agencies. Moreover, the maintenance of computer electronic equipment is very short, and the replacement is fast. Therefore, the testing institutions or colleges hope to make full use of some existing computer equipment to set up the computer room. However, the test software developed and used at present is not compatible with voice sampling equipment such as sound card and headset, which often leads to abnormal speech recognition and evaluation failure, thus affecting the normal testing. In addition, the manual review process of the system's interactive interface should be enhanced, and the reviewer's work intensity should also be reduced to greatly improve the work efficiency.

4.2. Strengthening Organization and Further Optimizing Software

Excellent software performance is an important guarantee for the smooth running of CAPT. Computer aided testing system is widely applicable, but its technical development is difficult. Therefore, for the government, it is far from enough to entrust one or two information technology companies to research, develop and upgrade this project, because most of the developers of computer-aided testing system are not front-line testers of Putonghua proficiency test or experts in language teaching and theoretical research. They have very different needs for Putonghua proficiency test users, so the software that has been developed will naturally be unreasonable in practice [10]. For such an important scientific and technological research project, it should be led by the national authority to organize the top experts and research institutions in speech-processing technology nationwide in collaboration with linguistic experts, including the backbone professionals who have been engaged in the teaching and testing of Putonghua for a long time. It is necessary to employ some interdisciplinary talents who are familiar with both computer technology and Putonghua theory and testing, so as to further optimize the adaptability of the system to hardware and the accuracy of software system testing, and to modernize Putonghua testing from management, testing, training to research [11].

4.3. Enhancing the Phonetic Evaluation

The evaluation model of pronunciation in computer-aided test should be enhanced and the objectivity of the analysis report should be strengthened. At present, there is a unified reference standard for Putonghua proficiency test all around China, that is, *Putonghua Proficiency Test Outline* [9], which develops a complete set of scoring criteria in detail. Both the examinee and the academic research institution can check the examinee's completion of each test according to the scoring rules and summarize the pronunciation problems, to understand the details of the tester's scoring. At present, the testing software delivered to all regions is designed according to the requirements of the *outline* in theory, but the actual scoring process is not implemented according to the scoring rules. Therefore, in the actual testing process, the testing agencies should gradually improve the scoring criteria of computer evaluation, including such aspects as the addition and omission of Chinese characters, reading passage with wrong pronunciation, the process of natural fluency, intonation, pause and rhythm etc., so that the computer test can gradually replace manual test in a humanized and scientific way.

4.4. Establishing the Scientific Examination Management System

It is particularly important to establish and perfect the relevant rules and regulations of CAPT to strengthen the administration of Putonghua test. In view of the situation that some students take advantage of the machine-assisted test in a cheating way, a perfect supervision system should be established as soon as possible, so that the examination management can follow the rules. Specifically, it is mainly reflected in the following aspects:

- Before the test, students' registration and information entry check should be well prepared in a systematic and scientific way. On the one hand, students need to be familiar with the examination process and objects in advance; On the other hand, supervisors need to be familiar with the handling of emergencies and accidents.
- In the test, the management of the test process should be standardized, for example, standardizing the job responsibilities of supervisors, standardizing the examinee test process, and standardizing the test environment etc.
- After the test, the test agency should standardize the result evaluation, the certificate management, and the test file management etc. At the same time, the testing institutions should reflect on the various problems in the test, analyze the causes of them and find solutions to avoid similar accidents next time. Meanwhile, the testing agency should further clarify the work responsibilities of supervisors in each step so that the examination work can be standardized and institutionalized.

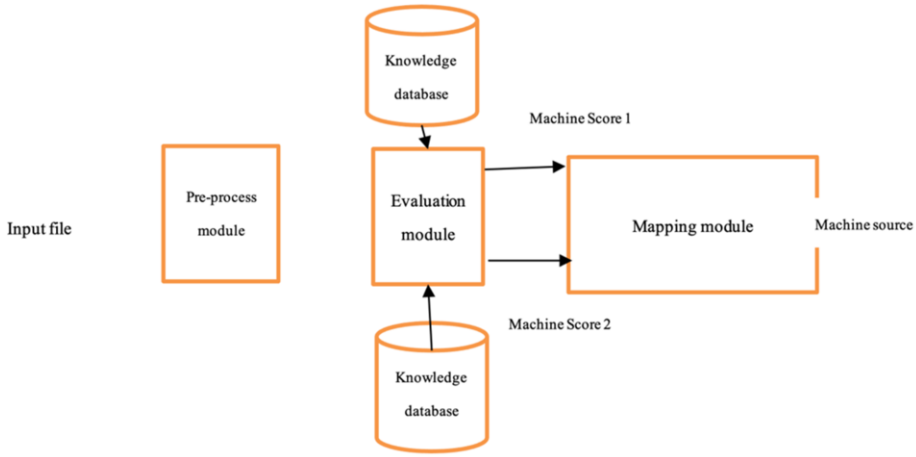

Fig 2. CAPT Structure

5. Conclusion

Although the implementation and application of CAPT is not too long, it is a change and challenge of Putonghua proficiency test, the result of the rapid development of computer and network technology and is also the need of long-distance communication in the new era. In the application process, the computer-aided Putonghua proficiency testing system presents various problems and deficiencies, but its advantages and benefits are also obvious. It is believed that this epoch-making testing method will be improved in the process of implementation and will have better application and broad prospects.

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