





Analysis of English Listening Obstacles Based on Computer Assisted Instruction

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Abstract. Listening comprehension questions are an important part of the English test, but also the weakest link for many students. This article takes the computer-assisted language teaching research as the starting point, and combines psychology, linguistics and cultural influence to analyze the obstacles in listening and corresponding coping strategies. It is pointed out that through the joint efforts of students and teachers, various obstacles can be overcome and improved the overall listening level of the student. The system is developed based on the Rasch model, mainly because the Rasch model is a data fitting model in the measurement, which overcomes the sample dependence and item dependence in the general test, and converts the nonlinear data into the measured data through logarithmic transformation. In terms of characteristics, the Logit value is equidistant, so that the objectivity of the measurement can be realized. At the same time, the simplicity and ease of operation of the Rasch model is also a reason for choosing it. The Rasch model is used to evaluate the ability of students in the process of adaptive testing, and is used to measure the difficulty value of test questions in the process of constructing the question bank. At the same time, after the introduction of multimedia computer-assisted classroom teaching in the experimental class, the students' mathematics memory and imitation ability, and English listening ability were investigated, compared with the comparison class, and provided data for the actual effect of multimedia computer-assisted teaching.

Keywords: Computer adaptive testing; Rasch model; English hearing impairment; Computer-assisted teaching.

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1 INTRODUCTION

Computer-assisted teaching refers to the use of the advantages of computer information processing speed to help, simulate or substitute teachers to perform part of the teaching tasks, thereby improving the quality and efficiency of foreign language teaching. Computer-assisted language teaching is a perfect combination of the most advanced computer technology and English teaching to improve the effect of English teaching. Students use computer-assisted platforms to search various topics of interest as listening materials. You can get a lot of fun while improving your listening, and you can also increase your knowledge. Computer-assisted language teaching creates a synchronized, multi-user collaborative working environment. Practitioners can not only interact with online teaching resources, but also conduct online collaborative exercises with classmates through CMC tools such as video conferencing systems and remote expert conversations. In this interactive and collaborative language atmosphere, students can actively participate in it, and the effect of improving students' listening skills is very obvious. Therefore, it is of great significance to combine it with the analysis of college students' English hearing impairment. Computer Aided Instruction (CAI) refers to a teaching method that USES Computer to help or replace teachers to carry out part of teaching tasks, impart knowledge to students and provide skills training [1,2]. Computer-aided instruction (CAI) provides students with a good personalized learning environment. Greatly different from the traditional teaching methods, computer-aided teaching organically integrates computer technologies such as hypertext, multimedia, artificial intelligence and knowledge base, Xie makes the teaching content more comprehensive and the learning process more humanized [3]. As far as English teaching is concerned, the traditional teaching mode is "preview before class, study in class and practice after class". The seemingly reasonable teaching process actually has many drawbacks. First of all, the implementation of pre-class preview proposed by Litman is not good. In many years of teaching, I found that the proportion of students who can fully prepare what they have learned before class is actually very small [4]. In most cases, students' learning tasks are put in the limited time of classroom teaching. The particularity of language learning requires learners to invest a lot of time in repeatedly consolidating and strengthening language input so as to achieve a good learning effect. Short class time is far from enough. Traditional classroom teaching activities are usually based on teaching, and students' participation is insufficient. After the introduction of multimedia technology into teaching, multimedia courseware is more and more widely used. However, Root has proposed that there are more and more two extremes in the use of multimedia courseware [5, 6]. One is to design multimedia courseware into electronic lecture notes, which is boring and difficult to arouse students' interest in learning. Second, a large number of beautiful pictures, audio, video and animation are added into the multimedia courseware, which greatly attracts students' attention, but often leads to students' neglect of knowledge content. García points out that the teaching process should pay attention to the construction of students' knowledge structure and knowledge system, fully mobilize students' learning initiative, and attach importance to the guidance of students' learning process instead of one-sided emphasis on the final assessment scores [7, 8]. Teachers should play a guiding role in the teaching process and pay attention to the dynamic growth of students instead of only paying attention to the test scores of students. Liangxing pointed out that students should be cultivated to have a sense of autonomous learning. With the introduction of teaching requirements, colleges and universities across the country have started a vigorous reform of college English teaching, providing students with a good place for independent learning and high-quality supporting facilities. With the continuous advancement of teaching reform, face-to-face tutoring and independent learning have become the mainstream mode of English learning [9]. The influence of multimedia technology on mathematics education has been given full attention in the new curriculum standard, and it is emphasized that attention should be paid to vigorously develop learning resources and change learning methods by using modern information technology [10], so as to make it a powerful tool for exploratory mathematics activities. According to the cognitive theory of constructivism learning, the learning process of mathematics is a process in which students' original mathematical cognitive structure

interacts with the sensory information they receive from the environment, actively constructs the meaning of information, and forms a new mathematical cognitive structure. According to the change of Babarinde cognitive structure, the process of mathematics learning can be divided into four stages: input stage, interaction stage, operation stage and output stage [11]. Information transmission is a complex process. In the theory of communication, several modes of communication have been proposed, among which, Bello mode is suitable for the process of teaching communication. According to Bello's model, source, information, channel and disseminator are the four basic elements in information communication, among which channel includes various sensory organs, which reveals the important role of various sensory organs in information reception. The perception and reception of information are mainly accomplished by five sensory organs. Listening comprehension is the weakest and most feared item for many students. This requires teachers to focus more on the cultivation of college students' English listening comprehension ability and find out the obstacles of college students' English listening comprehension. Computer-assisted language teaching is a perfect combination of advanced computer technology and English language teaching. Therefore, based on the analysis of computer-assisted language teaching, we conducted a technical analysis of English hearing impairment from three aspects: psychology, linguistics and cultural influence. Use the Rasch model to test the test questions in the test question warehouse. Obtain abnormal test questions according to the Outfit and Infit values of the Rasch model's fitting index. On this basis, process or re-test the abnormal test questions to form a difficulty coefficient Reliable English listening test question bank. The English listening is subdivided into 12 obstacles. Each test question in the test question bank has a field to indicate which kind of hearing impairment the test question is used to diagnose the student. Therefore, students can choose a specific hearing-impaired module for listening test, and then learn their specific ability in different hearing modules. After the students have tested on any one or several sections, they can get the corresponding ability value, and then provide the students with targeted learning guidance relative to the ability value.

2 ANALYSIS OF ENGLISH HEARING IMPAIRMENT UNDER COMPUTER-ASSISTED TEACHING

2.1 Questionnaire Survey

Aiming at the English hearing impairment of non-English major college students, a questionnaire survey was conducted for freshman, sophomore, and junior non-English major students in a college. A total of 1,450 questionnaires were distributed, and 1,357 valid questionnaires were returned. The questionnaire has two dimensions: language and non-language factors, subjective and objective factors; 10 aspects: pronunciation, vocabulary, grammar, intonation, speed, psychology, listening skills, memory response, teaching methods, learning time, and culture Differences, mother tongue interference, detailed analysis of college students' English hearing impairment. The classification and topic distribution of hearing impairment in the questionnaire are shown in Table 1.

<i>classification</i>	<i>Langua ge</i>	<i>Vocab ulary</i>	<i>gram mar</i>	<i>Inton ation</i>	<i>Spee ch</i>	<i>Psycho logical</i>	<i>skills</i>	<i>Resp onse</i>	<i>meth od</i>	<i>Tim e</i>
<i>Phonetic and non-speech dimensions</i>	<i>Phonetic factors</i>					<i>Non-phonological factors</i>				
<i>Subjective and objective dimensions</i>	<i>Subjective factors</i>							<i>Objective factors</i>		

Table 1: Classification of hearing impairment in the questionnaire.

This handicap questionnaire consists of 24 questions, and each question has a grade score of 1 to 5. Therefore, in theory, the score of this questionnaire should be from 24 to 120. After the negative description problem is reverse-coded, if the score of a certain topic is higher, it means that the obstacles described in the topic have a greater impact on students. On the contrary, if the score of a certain topic is very low, it means the hearing impairment factors described in the title have little effect on students. According to the classification and statistics of the average value of hearing impairment, through the above-mentioned principle of great influence, we can know the proportion of each obstacle factor in the sample group, as shown in Figure 1.

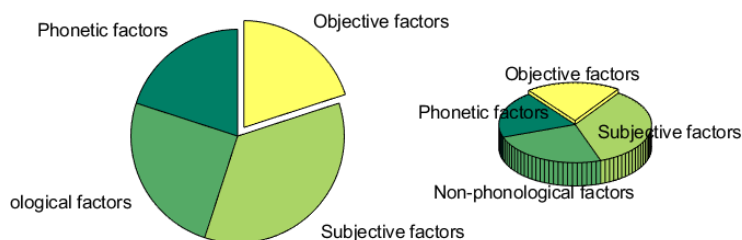


Figure 1: Influence ratio of hearing impairment factors.

It can be seen from the figure that: a. Intonation has the smallest effect on the listening status of the sample group; b. The influence of other factors except intonation is not much different; c. Phonetics, grammar, speaking speed, and cultural differences affect the sample. The hearing level of the group has a greater impact. Analyze the influence of speech and non-speech dimensions, subjective and objective dimensions on hearing impairment, and get the following two pie charts. It can be seen from Figure 2 that for the sample group, the effects of voice factors and non-voice factors, subjective factors and objective factors on their hearing are almost the same. We can know that the factors in various dimensions have a considerable impact on students' listening ability, and students need to improve the ability of different dimensions at the same time.

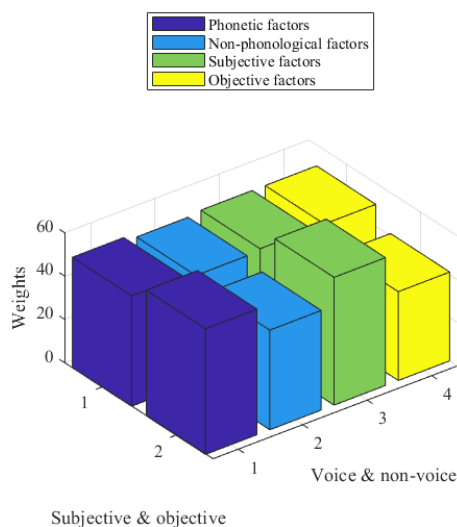


Figure 2: Proportion of voice and non-voice factors & the proportion of subjective and objective factors.

2.2 Technical Analysis of Hearing Impairment in English Test

The process of listening comprehension is a process of transmitting and receiving language information. Computer-assisted language teaching provides students with a real simulation environment, so that students can get a more real experience. Therefore, we can conclude that the students' English listening obstacles from the psychological point of view mainly include the following points: First, overcome tension and pressure and do a good job of psychological construction. Secondly, respond negatively. When doing listening questions, students may hear a variety of recordings with different accents, different speech speeds, or illegible words. If the students have a negative psychology at this time, they will use this as an excuse and think that they cannot be changed. If you don't face objective factors positively, this will greatly affect students' performance in the exam.

Computer-assisted language teaching is an important trend in the development of modern multimedia teaching. It can provide a more realistic voice carrier for students' listening practice, which is conducive to students' listening comprehension. To this end, we summarized the language factors that affect students' listening: first is speech. There is a big difference between listening comprehension and written reading comprehension. In written reading, the eyes are the medium of input to the brain, while listening comprehension requires the ears to act as this medium. Then the influencing factors of voice have become the primary problem, because only a good grasp of voice can be free from it. Students could pronounce themselves correctly, they will not be able to recognize sounds correctly which will cause errors in listening comprehension. Listening comprehension is a complex process. It not only involves the two major elements of language and psychology, but is also affected by other factors such as cultural background and social knowledge. Language reflects the characteristics of a nation. It not only contains the history and cultural background of that nation, but also contains the nation's views on life, lifestyle and way of thinking. It can be said that language is the carrier of culture, and language is restricted by culture. Because culture is deeply rooted in language, people must be restricted and influenced by their national culture when they use language. The two influence each other and are interdependent. "Lack of language and cultural background is often an important factor hindering students' comprehension of listening content. The flow chart of the analysis of English hearing impairment is as shown in Figure 3:

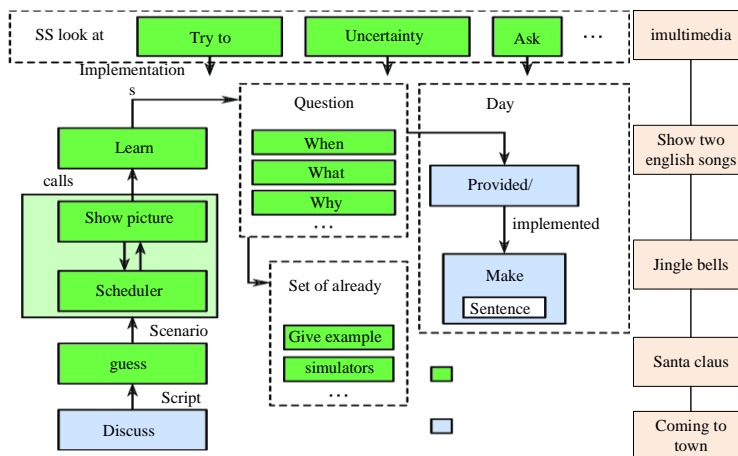


Figure 3: Technical analysis of English hearing impairment.

The language knowledge that affects listening includes many aspects, the first is speech. Students can pronounce themselves accurately in order to recognize the sound better. Therefore, in the daily learning process, pay more attention to whether your pronunciation is standard and whether the

pronunciation memory of vocabulary is accurate. The inaccurate pronunciation must be corrected as soon as possible. At the same time, we should pay attention to some continuous reading, weak reading, blasting and lost blasting in English pronunciation. When using the divination time, you should listen to more standard pronunciation materials and perform follow-up exercises. While correcting your own pronunciation, you can also cultivate your sense of language, listen more, read more and practice, and pay attention to accumulation. Secondly, students should pay attention to the accumulation of vocabulary when studying, especially some words, phrases and idioms that often appear in the listening comprehension part, to continuously expand their vocabulary. In addition, students also need to master basic grammatical knowledge and common sentence structures, which are the prerequisites for understanding paragraphs. For students with poor mastery, in addition to keeping up with the teacher's teaching progress in class, it is necessary to increase grammar knowledge in class.

2.3 Research on Key Technologies of English Hearing Impairment based on Rasch Model

When building the question bank, we need to consider the quantity and quality of the test questions in the question bank. In terms of quantity, each type of question and the number of questions of different difficulty must be satisfied. Therefore, we need to mark the difficulty level for each test question to facilitate the management of the question bank. Before building a question bank with a degree of difficulty, the thesis recommends collecting a sufficient number of typical sample groups, predicting the test questions in the initial question bank, and estimating the difficulty of the test questions and the ability of the students. The framework of the website is shown in Figure 4. The entire business application of the system is divided into the bottom layer (data access layer), the middle layer (business logic layer), and the top layer (user layer). The hierarchical framework design separates the system's database, function, interface, verification and other tasks, which conforms to the idea of high cohesion, low damage and common sentence structures, which are the prerequisites for understanding paragraphs. For students with poor mastery, in addition to keeping up with the teacher's teaching progress in class, it is necessary to increase grammar knowledge in class.

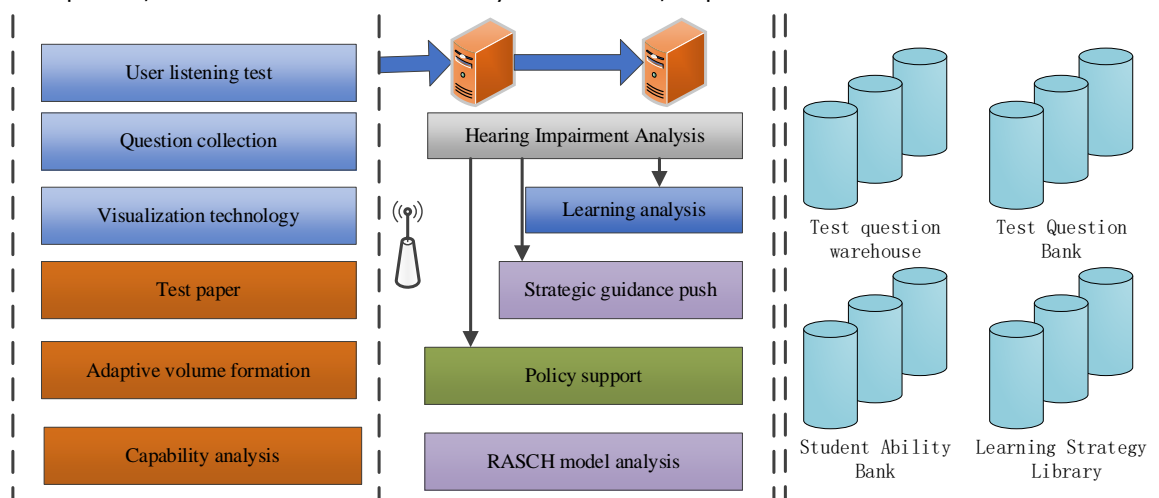


Figure 4: Analysis framework of English hearing impairment based on Rasch model.

In the research of this section, a set of listening test questions was compiled to assess students' listening vocabulary. Use the Rasch model to analyze the students' ability and difficulty of the questions in this test. Through the simulation operation of the Rasch model, the use of the Rasch model and the joint maximum likelihood estimation method (Joint Maximum Likelihood Estimation,

JMLE) are used to continuously generate new data through iterative operations and to continuously accurately adjust the measurement values of ability and difficulty. Finally, the output data is obtained. There are 13 students and 10 test questions. Among the students who participated in this test, all right, all wrong, and students who withdrew from the test were eliminated, leaving 9 students. They were 0 in this test 1. The binary scoring matrix is shown in Table 2. This is the usual observation.

Person	1	2	3	4	5	6	7	8	9
1	0	0	1	1	1	1	0	1	0
2	0	1	1	0	1	1	1	1	1
3	0	0	0	1	1	0	0	0	0
4	1	1	0	1	0	1	1	1	1
5	0	0	1	0	1	0	1	0	0
6	1	0	1	0	0	0	0	0	1
7	0	1	0	0	0	0	0	1	0
8	0	1	1	0	1	1	1	0	1
9	0	0	0	0	0	1	1	1	0

Table 2: Test original score matrix.

When using the Rasch model to estimate the difficulty of the question and the ability of the student, it is necessary to calculate the average probability of each student making a correct response on all the questions, the average probability of making a mistake, and the Logit value of the student's ability according to the observation values in the above table. , The Logit value of the difficulty of the question, the adjusted value of the difficulty of the question, the expected value, the variance of the expected value, the residual value, and then use the iterative method according to these values to continuously calculate the Logit value of the student's ability and the Logit value of the difficulty of the question until the residual The sum of the squares of the difference is approximately. , Means that the ability value and difficulty value have been measured, and the calculation ends. Since the Rasch model uses a score of 0, 1, it conforms to the binomial distribution. The calculation results of the expected value variance are shown in Table 3.

Person	1	2	3	4	5	6	7	8	9
1	0.23	0.09	0.18	0.08	0.3	0.4	0.23	0.22	0.18
2	0.13	0.24	0.04	0.24	0.04	0.03	0.13	0.05	0.06
3	0.06	0.03	0.18	0.03	0.2	0.24	0.06	0.13	0.18
4	0.21	0.22	0.08	0.22	0.17	0.05	0.22	0.12	0.03
5	0.25	0.08	0.12	0.08	0.3	0.6	0.25	0.24	0.18
6	0.26	0.07	0.13	0.08	0.23	0.23	0.22	0.25	0.18
7	0.23	0.04	0.24	0.05	0.18	0.17	0.21	0.26	0.21
8	0.22	0.08	0.16	0.08	0.23	0.23	0.23	0.24	0.18
9	0.26	0.13	0.14	0.34	0.06	0.04	0.24	0.21	0.14

Table 3: Expected value variance of iteration 1.

The selected test questions are stored in the test question warehouse. The test questions in the test question warehouse are classified and stored according to the hearing impairment, so the storage of the test questions in the test question warehouse is one-dimensional. The test question warehouse is to prepare for the establishment of the test question bank. According to the content

of Chapter 2, we divide the hearing impairment into 12 categories. If a test question appears in the vocabulary impairment category, it is best not to reappear in the speech impairment category, that is, it is not allowed to put two barrier labels on a test question at the same time, in order to avoid the same test question in the test of different hearing impairment categories repeatedly. For example, although it is impossible for a listening test question to simply require the student's vocabulary ability and not his speech ability, we still only set a unique vocabulary classification label for this listening question.

3 ANALYSIS OF RESULTS

In the study of listening comprehension of English barriers, a total of 55 questionnaires were sent out through questionnaires, and 49 valid questionnaires were recovered. 94% of them are interested in this kind of classroom learning mode. The supporting exercises in the online courseware have various levels of prompts. Students can click on the prompts as needed. 100% of the students like this kind of selective practice according to their own level, and 93% of the students think this teaching mode is helpful to improve their confidence in learning English. From classroom video analysis and teaching diary, students' participation in the classroom is greatly improved, and sleeping and talking are basically eliminated. Students basically accept this kind of classroom teaching mode, and can adapt quickly. Each stage is tested separately to analyze the student's learning effect. Figure 5 is the four analysis scores of English listening in the pre-test for action research and the three research stages.

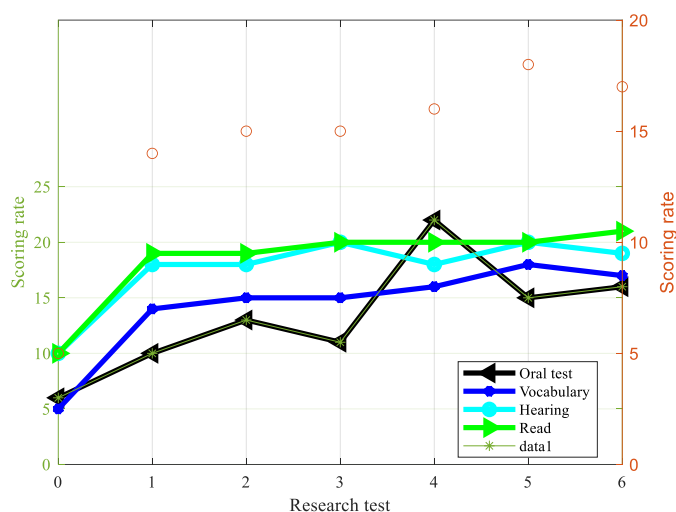


Figure 5: Comparison of student test score rate.

The difficulty of the question and the value of human ability are located in a graph with 8 intervals of Logit values. Therefore, it can be seen that the difficulty of the question and the ability of the student in general are consistent, that is, the measurement function of the student's ability in the sample of the test question is obtained Better play, comparable on the same scale. It is not intuitive enough to look at the uniform distribution of the questions only from the numerical point of view. Figure 6 is a scatter plot of the difficulty measurement of the questions.

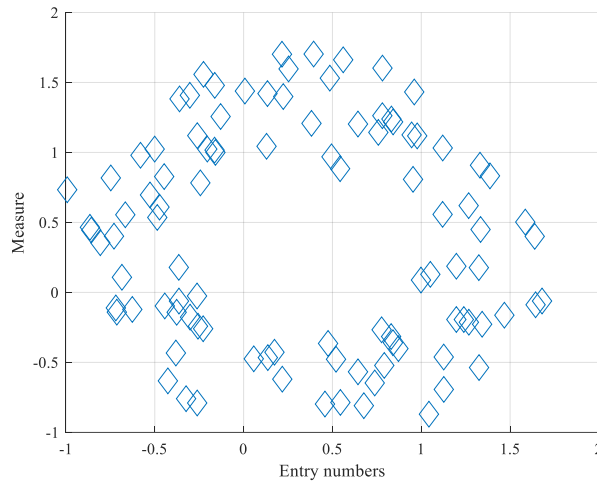


Figure 6: Scatter plot of test questions measurement.

The same generated human measurement scatter plot, as shown in Figure 7, can also be intuitively seen that the abilities of most subjects are basically normal distribution.

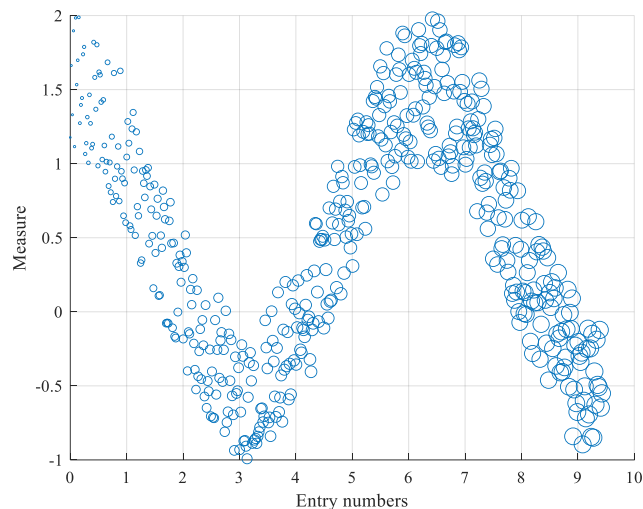


Figure 7: Scatter plot of human measurement.

The above describes the Rasch model method used in the paper, and at the same time verifies that the algorithm is correct and feasible, that is, the algorithm of the Rasch model used in the paper can measure the student's ability and the difficulty of the topic on the same scale. The final output data includes ability value, difficulty value, standard error of the person, standard error of the question, Outfit and Infit of the person, Outfit and Infit of the question.

4 CONCLUSION

To sum up, listening comprehension is an important part of CET-4, and students need to overcome various obstacles in psychological, linguistic and cultural aspects if they want to achieve excellent results. Based on this, this paper, starting from the research on COMPUTER-aided language teaching (CAI) and combining the technical analysis of psychology, linguistics and cultural development, explores the problems and strategies of CET-4 hearing impairment. The system is developed based on Rasch model. One of the biggest characteristics of the model itself is to measure the objectivity. Improve the efficiency of the hearing test, usually in listening tests for college students, the time is 30 minutes or more, the university English four, six levels, for example, students asked to finish all the test subject, can obtain the more accurate measurement but this system can according to the students' ability, timely and dynamically rendered the next set of questions and ability, so students get information, need to reduce the number of test, the test time is shortened; Improve the listening comprehension test, diagnose and guide the pertinence, at present a lot of literature study of hearing tests, the study of adaptive test paper is very much also, the use of adaptive test in English examples also have, but the hearing system will be English, in two dimensions, 12 categories has carried on the classification, so as to make the students in the listening ability of diagnosis and analysis can make a comprehensive ability, can also be targeted for capacity analysis of a plate.

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