A Study on Chinese Cognition of Bilinguals Based on Eye Movement Technique

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Abstract. This paper summarizes the eye movement research of Chinese language in two aspects. The paper sums up the results of eye movement research of bilinguals who are foreign students and minority students reading Chinese. Finally get the conclusion that word segmentation, text style, mother tongue background and the familiarity with second language can affect the language cognition approach to bilinguals.

Introduction

It was recognized a long time ago by observing a person's eyes to understand his or her mental activity, but it was not easy to do that. Since the 19th century, psychologists have been constantly studying eye movement recording device, and by analyzing the recorded eye movement data to explore the relationship between eye movement and mental activity.

Eye movement technology, also known as eye movement recording technology or eye tracking technology, refers to the use of eye movement recorder to record the visual information in dealing with eye trajectory characteristics, commonly used for attention, visual perception, reading and other areas of research. A bilingual person refers to a person who is proficient in applying two languages. In his daily life, he can use a foreign language and native language to be used for listening, speaking, reading and writing. Of course, their mother tongue language Knowledge and ability are generally greater than the second language. With the expansion of social interaction and language communication, bilingual people become common. The study of bilingual people not only can promote the construction of language cognitive processing model, but also can provide some theoretical basis for the teaching of second language in realistic situation, so the study of bilingual people has good social value.

The use of eye movement technology to solve the bilingual language awareness has a unique advantage, you can examine the reader in the reading of the eye movement mode and reading characteristics. For example, the study of eye movement characteristics of Chinese reading, is conducive to improving the mother tongue is not Chinese people's Chinese reading level, and can also provide some reference for the preparation and typesetting of Chinese teaching materials. At present, the domestic eye movement research of bilinguals reading Chinese mainly focused on foreign students and minority students reading Chinese two aspects. At eye movement technology research these two aspects, can be very intuitive to show the reader's eye movement mode, but also to promote language teaching and artificial intelligence development.

The Application of Eye Movement Technique in Language Cognition

The study of eye movement in the world began in the late 1970s. From 1879, the French scholar Javal's discovery of the eye jumped to the world's eye-catching research boom, eye-catching reading study has continued more than a hundred year. Since then, the French scholars Lamare, Jaral and Heuy have tried to understand the perceptual process behind reading by studying the order of eye-catching points and eyebrows. According to the need of reading eye movement, a series of eye movement parameters are used to reflect the process of cognitive processing. In the 1970s, it entered
the development period of reading eye movement research, and the improvement of eye movement recording system was the main feature. On the one hand, the characteristics of various trajectory system are studied in detail, and on the other hand, the method of eye movement data is improved greatly. In particular, the eye movement trajectory system combined with the laboratory computer can collect and analyze a large amount of data, so that eye movement recording can better predict the information processing process.

**Eye Movement Model**

Researchers have put forward their own views on the eye movement model, the "strategy-tactical model" proposed by Op Regan, the "EZ reader model" by Reichle et al., "Visual buffer processing model" by Bouma and De Voogd, Carpenter's "Immediate Processing Model" and "Eye-Brain Processing Model", Morrison's "Eye Movement Control Model", Henderson and Ferreira's "Sequential Stent-Parallel Program Model" and so on. The introduction of these models for us to further understand the eye movement in the reading process characteristics, to explore the eye movement and the relationship between human cognitive and psychological activities have great reference value. With the development of information technology and the rapid development of computer technology, eye movement recording system continues to upgrade, people for eye movement research and more in-depth and meticulous.

**A Study on Chinese Eye Movement Cognition**

In China, professor Shen Youqian first studied the Chinese reading with eye movement instrument in 1925. To the 20th century, 80 years later, the Chinese eye movement research developed rapidly. In the field of word research, Shi Dongfang and others examined the role of verbs in the early processing of Chinese sentences. By studying the "object selective restriction information" of the verb, they get the conclusion that after the verbs are identified, the verb lexical information is immediately activated and applied to the early processing of the sentence, and the early processing of the sentence is not a simple syntactic analysis, it also includes semantic processing. In the context of sentence comprehension, Ren Guiqin et al. studied the ambiguity digestion in sentence context, and concluded that in the context of neutral sentences, the meaning of ambiguous words is carried out according to the relative frequency of words, and the sentence context acts on the late meaning of ambiguous words and inhibits the inappropriate meaning of ambiguous words. In the study of chapter reading, Yan Guoli and others studied the eye movement characteristics of students in different grades when they read the technical description, and obtained the similarities and differences between the students in different grades.

From the earliest paper on the eye movement, Jing Qicheng's "research on the application of eye movement in foreign countries", to the famous psychologist Mr. Shen Deli edited the "a study on the eye movement of students in Chinese reading" on the basis of eye movement research, to now Bai Xuejun, Yan Guoli edited the "eye movement research in China" and Yan Guoli's "application of eye movement analysis in psychology" have laid a theoretical foundation for the study of eye movement in the later reading process. Studying the characteristics of eye movement of foreign students and ethnic minority students has a great value to improve their level of Chinese reading comprehension. The relationship between language and thought is one of the most complex problems, and the discussion of this question can reflect the essence of human consciousness. The eye as the window of the soul, the way of movement changes can reflect the manner of thinking. Therefore, the study of their eye movement characteristics of reading can reveal their cognitive methods and can make a scientific assessment of their reading level, so as to promote the renewal of language teaching theory.

**A Study on the Eye Movement Cognition of Foreign Students Reading Chinese**

Fu Yuping who studied in Capital Normal University did a research to the advanced Chinese reading patterns of foreign students by eye tracker in 2008. And she finds that word frequency, the number of Chinese characters will affect the reading gaze and senior students have a certain sense of syntax, but still have defect. Chi Dongxian who is a student of Nanjing Normal University did an eye-tracking
research for effect of mark on English and Chinese spoken students to comprehend Chinese sentences. The results show that the degree of marking of the sentence has an effect on the eye movement mode of sentence processing. Students who are native speakers of English are less likely to be influenced by the grammar rules of the mother tongue when they read the different phrases of different markings; it is relatively easy to read the sentence without marking, and rather it is relatively difficult. Zhang Lanlan who is in Tianjin Normal University made a study of the influence of different grammar knowledge levels on Chinese word segmentation in 2009. And she finds that the degree of mastery of different grammatical knowledge has obvious influence on the Chinese word segmentation. With the improvement of grammar knowledge, the degree of cognition of words is further deepened, and the correct rate of word segmentation will be improved accordingly. Tianjin Normal University’s student who named Tian Jin had done a research about the influence of Chinese word segmentation on Chinese reading of Korean and Thai students. The results show that the reading time of students in Korea and Thailand is significantly shorter than that under other conditions, on the contrary, it is longer than the reading time under other conditions. Compared with foreign students with low level of Chinese, the students with high level of Chinese have shorter reading time and less attention. Bai Xuejun, Guo Zhiying and others did a study on the eye movement of the influence of Chinese word segmentation on Japanese - Chinese bilinguals in 2011. And the study reveal that word segmentation has a positive effect on recognizing Chinese vocabulary for Japanese-Chinese bilinguals. Wang Di in Tianjin Normal University made a study which is "the influence of word segmentation on Chinese reading of Russian students" in 2011. The results show that Russian students have the shortest reading time under the conditions of word space and shadow word segmentation. On the contrary, the reading time is the longest in non-word space and non-word conditions. Russian students with high Chinese language proficiency are shorter than those with Chinese language at medium and low levels in reading time. Xinjiang Normal University’s student who named Wang Di did an eye movement research on Chinese character recognition in the foreign student of the central Asia. She finds that the mother tongue background and the level of Chinese language learning will affect the recognition of Chinese of Central Asia students.

In summary, the research in this field is mainly aimed at mark transfer, Chinese mastery, word segmentation and mother tongue background. We can see that foreign students' proficiency in Chinese language and the degree of mastery of grammar knowledge and their mother tongue background will have an effect on Chinese reading. The word segmentation of Chinese will promote the reading of foreign students and shorten the time of attention.

A Study on the Cognition of Minority Students Reading Chinese

Xinjiang Normal University’s student Wang Zhen did a study of Chinese word segmentation on Uighur students’ and Han students’ eye movement in 2011. She finds that the Uighur students in the high level of Chinese and low level of Chinese in the case of gray mark way under the Chinese word segmentation of eye movement trajectory are different and the average eyeball jumps will increase as the number of space increases. And the spaces between words and the way of adding gray mark will promote their reading. Chen Guiping, Hu Axu and Yu Hongzhi made a research which is the eye movement of Mongolian college students when reading Chinese texts of different styles in 2012. The results of the study show that the reader's background knowledge is richer and their understanding of the article is better. Yao Jingyuan who studied in Xinjiang Normal University made a study of eye movement and the perceptual span in Chinese reading of Uighur college students in 2012. She finds that with the improvement of Chinese proficiency, their indicators show a continuous trend of optimization. Zhang Yaqin, a student of Northwest University for Nationalities, she did an Eye Movement Study on Uighur college students' different style of Chinese text reading in 2014. She gets a conclusion that regardless of the level of Chinese language, Uighur students in the reading process is from the beginning of the word and they are constantly looking to understand the Chinese article. And the order in which they read the different styles is the argumentative writing, the exposition, the news, the narrative. In 2015, Northwest University for Nationalities’ student Zhao Xiaoxue made an
eye movement characteristics in sentence reading of Tibetan and Han college students. She finds that
Tibetan college students in the reading of Chinese sentences, the verb of the phrase's point of view
and sustained attention time are higher than the nominal phrase, which is similar to the Han college
students, but the point of view and watching the duration are higher than the Han college students.

The above research is mainly aimed at word segmentation, Chinese reading perception breadth,
different style of reading, and sentence reading four aspects. It is concluded that the level of Chinese
of minority students has some differences in the eye movement of Chinese word segmentation and
word segmentation has a positive effect on Chinese reading. In the reading of the chapter, the
background knowledge of the reader and the level of Chinese language are different from the reading
comprehension of the Chinese text. Among them, the narrative is the simplest for the majority of the
minority students, and the argumentative writing is the most difficult. In the reading of the sentence,
minority students pay more attention to the verb phrase than the nominal phrase, which is similar to
the Han students, but the time is generally higher than the Han students.

Conclusion

Different text systems have different ways of cognition, and different grammatical categories have
different ways of processing. To sum up two aspects of the study, we have concluded that the
language of familiarity, mother tongue background, article style and word segmentation on the
Chinese reading have an impact. At present, there are many studies on the eye movement of the
bilingual language in the academic circles, but the research objects of the bilinguals are relatively
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circles, but the research objects of the bilinguals are relatively few. We select the scope of the
researchers can be appropriately widened, in addition to the mother tongue from the perspective, but
also from the geographical point of view can be compared to the study of eye movement. These
results will be more comprehensive. The study of bilingual Chinese reading is conducive to the
development of Chinese teaching, which can improve their reading ability and language learning
ability, so that Chinese can better go to the world. But also to enrich the cognitive linguistics research,
to promote the development of cognitive linguistics better.

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