Progress of Eye Movement Research in Bilingual Reading of Ethnic Minorities

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Abstract: At present, there are few eye movement studies on Bilingual Reading of ethnic minorities. This paper combs the eye movement studies of Tibetan, Mongolian, and Uygur reading mother tongue and Chinese, and puts forward the future research ideas: To investigate the reverse reading of Chinese texts by Uygur native speakers, and the reading perceptual span of Mongolian reading of Mongolian primary school students.

Keywords: minority; reading; eye movement

1. Introduction

Minority languages and scripts are an important part of the history of Chinese writing and have provided important support for the development of ethnic cultures [1]. Most of the minority scripts are phonetic scripts, but they differ in their writing forms and the use of punctuation marks. For example, Uyghur is written from right to left. Mongolian is written from top to bottom, and the line order is from left to right. Mongolian uses one dot for a comma, two dots for a period, and four dots at the end of a paragraph; while in Tibetan, there is a separator between words and a clause line between sentences.

Ethnic minorities in China need to learn Chinese while learning their languages. Ethnic minorities in China have a long history of learning Chinese, especially after the founding of the People's Republic of China, the state has paid great attention to ethnic language teaching and Chinese language teaching in ethnic minority areas [2]. In this paper, we will introduce in detail the eye-movement studies of Tibetan, Mongolian, and Uyghur reading native languages and Chinese, and propose future research ideas based on them.

2. Tibetan

2.1. Eye movement research results of native Tibetan speakers reading their native language

Using a moving window paradigm, Gao Xiaolei examined the right-hand side range of reading perceptual breadth, developmental characteristics, and its influencing factors in Tibet using native Tibetan speakers as subjects. The results showed that the reading perceptual breadth of Tibetan was 4-8 characters to the right of the gaze point. The development trend of Tibetan reading perceptual breadth showed a "U" shape with age, with the breadth of Tibetan reading perceptual breadth for third-grade elementary school students ranging from 4 to 8 characters to the right of the gaze point, and for fifth-grade elementary school students ranging from 4 to 6 characters to the right of the gaze point, and for first-grade middle school students ranging from 4 to 8 characters to the right of the gaze point. The reading perceptual breadth of the Tibetan language is 4-6 characters to the right of the point of view. The perceptual breadth of reading in Tibetan is not affected by the difficulty of the material, the subject's reading ability, or his or her working memory capacity [3].

Gao Xiaolei et al. examined the word frequency effect during Tibetan reading and the effect of word frequency on the previsualization effect. The results found that there was a word frequency effect as well as a word frequency delay effect in Tibetan reading, indicating that the word frequency effect is consistent across languages. It was also found that there was a paracentral concave prehension effect in Tibetan reading, and readers could extract phonological and graphemic information through the paracentral concave. In Tibetan reading, the word frequency of words in the central recess affects the magnitude of the paracentral concave prehension effect, i.e., the prehension effect is greater for high-frequency words in the word-form similar prehension condition. The above results support the idea of paracentral concave

sequence processing in the E-Z reader model [4].

2.2. Eye movement research results of native Tibetan speakers reading Chinese

Using a moving window paradigm, Gao Xiaolei et al. investigated the perceptual breadth and the type of paracentral concave prehension in reading Chinese for Tibetan-Chinese readers with high and low Chinese proficiency levels. The results showed that the perceptual breadth of Tibetan-Chinese readers at high Chinese proficiency level was two characters to the right of the gaze point, while the perceptual breadth of Tibetan-Chinese readers at low Chinese proficiency level was one to two characters to the right of the gaze point. Both high and low-level Tibetan-Chinese readers can obtain word shape and phonological information from the central recess [5].

Using Tibetan college students as subjects, Gao Xiaolei et al. examined the respective roles of grapheme and phonological information in lexical recognition and word frequency effects when native Tibetan speakers read Chinese sentences in different contexts. The results found that word form and phonology played a joint role in high-restrictive sentence contexts; phonology played a significant role in low-restrictive sentence contexts; and the word frequency effect appeared in the late stage of high-restrictive contexts, as well as in the middle and late stage of low-restrictive contexts. This suggests that sentence context influences the role of word form and phonology and the time course of the effect during lexical recognition in the reading of Chinese by native Tibetan speakers. This result also suggests that Chinese lexical recognition by native Tibetan speakers is consistent with the dual-channel theory [6].

3. Uyghur

3.1. Eye movement research results of Uyghur native speakers reading their native language

Using a moving window paradigm, Zhang Yujing et al. explored the magnitude and symmetry of Uyghur reading perceptual breadth among fifth-grade Uyghur elementary school students with high and low reading levels. The results showed that the reading perceptual breadth of high reading level elementary school students ranged from 8-11 characters on the left side of the gaze point to 2-3 characters on the right side, while the reading perceptual breadth of low reading level elementary school students ranged from 8-11 characters on the left side of the gaze point to 2 characters on the right side. This indicates that the Uyghur reading perceptual breadth of fifth grade Uyghur elementary school students at different reading levels are asymmetrical, with the left side of the reading perceptual breadth being larger than the right side; the reading perceptual breadth of high reading level elementary school students is slightly larger than that of low reading level elementary school students and this feature is mainly reflected in the right side of the perceptual breadth [7].

3.2. Eye movement research results of Uyghur native speakers reading Chinese

Wang Zhen et al. examined whether word cutting can facilitate Chinese reading for Uyghur college students, and the results showed that for Uyghur college students, inter-word addition of gray has a facilitating effect on Chinese reading in the process of Chinese reading [8]. Han Yang used the repetitive learning new word paradigm to examine the acquisition of new Chinese words by Uyghur college students. The results found that Uyghur college students' new word acquisition in natural reading conformed to the connectionist model. Compared with Han college students, Uyghur college students processed new words less efficiently than Chinese readers in Chinese reading, as evidenced by longer gaze times and gaze positions closer to the beginning of words [9].

4. Mongolian

4.1. Eye movement research results of Mongolian native speakers reading their native language

Duan Liling examined the reading perceptual breadth of Mongolian college students when they read Mongolian and found that the range of reading perceptual breadth in Mongolian was about 8-12 character spaces [10]. Sujuan et al. explored the effect of deleting spaces in Mongolian texts on reading Mongolian, while the researchers set high and low-frequency words as target words in the sentences to examine the effect of different space presentation conditions on lexical processing. The results showed that the gaze time of the target words was significantly longer after the removal of spaces than in the condition with

spaces, and the gaze time of the low-frequency words was significantly longer than that of the high-frequency words, but the researchers did not find any interaction between word frequency and the presentation of spaces, which indicated that spaces affected the visual processing of Mongolian text rather than the lexical processing; the removal of spaces did not affect the selection of eye-hopping targets, and the biased gaze position was still close to the center of the word. The above results are different from those using English or Spanish as experimental materials. The reason may be that Mongolian has rich word boundary information in addition to the word boundary information of inter-word spaces [11].

4.2. Eye movement research results of Mongolian native speakers reading Chinese

Xu Na et al. examined Mongolian college students' reading of Chinese texts with and without word boundaries. The results found that adding inter-word spaces to Chinese texts did not promote Mongolian college students' Chinese reading [12]. This result is similar to Bai et al.'s findings that there was no significant difference in sentence reading time between normal and inter-word cut conditions [13].

5. Prospect

5.1. Examining Uyghur native speakers' reading of Chinese texts in reverse order

In studies examining whether word cuts can facilitate reading in Chinese, it has been found that there is a trade-off between the reader's familiarity with the text presentation and the interference and facilitation effects produced by the presence or absence of word boundary information, resulting in no difference in total reading time between these two conditions [13]. In recent years, to control for the effect of text presentation familiarity on Chinese reading, some researchers have used reverse-order reading to explore whether inter-word spaces can facilitate reading while controlling for text presentation familiarity, and found that inter-word spaces facilitated reading by native Chinese speakers in the reverse-order Chinese reading condition [14]. This study used subjects who were native Chinese speakers, and in future experiments, we may try to use Uyghur college students as subjects, and the facilitation effect of interword spaces may be greater when they read unfamiliar Chinese texts. In addition, Uyghur college students' native language is presented from right to left, and according to cross-linguistic transfer theory, the learning ability acquired by individuals in learning the first language in the process of second language learning will have an impact on second language learning [15], Uyghur college students' right-to-left reading habit when reading their native language may help them to read reverse-order Chinese texts, which leads to Uyghur college students' Chinese The facilitation effect of inter-word spaces in reverse-order reading may be smaller than that of Chinese college students reading Chinese texts in reverse-order.

5.2. Examining the Reading Perceptual Breadth of Mongolian Primary School Students' Reading in Mongolian

Rayner's experimental results showed that the perceptual breadth of reading was slightly smaller in beginning readers than in skilled readers [16]. H äiki öet al. also found an age effect in a study of perceptual breadth of reading in Finnish [17]. In Chinese reading, a study by Xiong et al. showed that there is a tendency for perceptual breadth to become larger with age [18]. Yan Guoli et al. found that the reading perceptual breadth of elementary school students was smaller than that of college students [19]. Subsequently, a study by Yan Guoli et al. further found that the size of reading perceptual breadth was directly proportional to grade level [20]. It was hypothesized that Mongolian elementary school students' reading perceptual breadth when reading Mongolian should be smaller than that of adults. Therefore, future studies can continue to examine the reading perceptual breadth of Mongolian elementary school students when they read Mongolian.

6. Conclusion

In summary, there are few studies on the eye-movement of bilingual reading for ethnic minorities. This paper goes through the eye-movement studies of Tibetan, Mongolian, and Uyghur reading native languages and Chinese, and proposes future research ideas: examining Uyghur native speakers' reading of Chinese texts in reverse order and examining Mongolian elementary school students' reading perceptual breadth in Mongolian.

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