

CeLTA Fellowship Project Report
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Project Title

What We Look at When We Learn Vocabulary: Using Eye-tracking to Explore Learning Chinese Characters

Project Description

Chinese characters remain one of the greatest challenges for Chinese as a Foreign Language (CFL) learners in the U.S. (Ke et al., 2001). The difficulty lies in retaining three aspects of the characters: the graphic form, the pronunciation, and the meaning. This information must then be retrieved rapidly (Shen, 2004). Research has revealed that presentation formats can affect learning the three aspects of characters. In particular, displaying the character, the pinyin (sound script) and the English translation from top to bottom (vertical format) has been found to result in greater learning gains than using a left-to-right display (horizontal format) (Lee & Kalyuga, 2011). It is unknown whether the adjacent format (with the pinyin below and the English translation to the right of the character) will lead to even better learning outcomes than the other two formats.

My project aimed to examine the effects of presentation formats on Chinese character learning by analyzing eye-tracking data from the learning process. In the experiment, students learned 30 two-character words, which were divided into three ten-word groups with each group in the vertical, horizontal or adjacent format. Specifically, students had 30 seconds to learn each word and another 10 seconds for review. Their eye movements during the learning phase and the review phase were recorded. Three eye-tracking measures, i.e., fixation durations, numbers of fixations, and transitions of area of interest (AOI) were used in data analysis.

Project Outcome

Pilot data from three students were analyzed to prepare for the main study. Results from the pilot study showed a similar pattern of fixation durations across three presentation formats, i.e., horizontal, vertical, and adjacent: students spent more time in looking at the characters than the pinyin, with the least time for the translation. Differently, characters in the vertical format received less time of attention than the other two, while pinyin and translation in the vertical format received the most time of attention among three formats.

In terms of how many times students looked at each aspect of Chinese characters, while in the vertical and horizontal formats, pinyin were more often looked at than the other two aspects, in the adjacent format, characters were the most often looked at. However, it was shared among three formats that the translation received the least looks. Additionally, AOI transitions were calculated and transition metrics showed that students generally had different ways of assigning their attention to the three aspects of Chinese characters in different presentation formats.

These eye-tracking results and the experience of collecting data from students inspired me to consider further improvement of the research design, including the choice of Chinese words, the time allocated for the learning and the review phases, and the tests for measuring students' learning gains from the experiment. I am in the process of refining the research design and plan to conduct another pilot study with the improved experiment. Hopefully, after piloting the refined research design, I will be ready to start data collection for the main study.

Project Impact

This project is closely related to the teaching of Chinese characters and has nice potential for improving learning efficiency. If this study finds that one of the presentation formats generates better learning outcomes than the others, materials writers and teachers can make use of the research findings and adopt that presentation format in the teaching of Chinese characters, so that students can enjoy more efficient learning.

The findings of this project may benefit teachers and students not only in MSU but also from outside, when these findings are published in academic journals or presented in academic conferences. This project may also contribute to the lines of research on learning Chinese and on instructional design more generally.

I as a Ph.D. student have also benefited a lot from conducting this project, which not only allowed me to fulfil the requirement for the eye-tracking course, but also supported me to expand my course project to a full-fledge study. This project has given me insights into my teaching of Chinese as a teacher and into my understanding of Chinese acquisition as a researcher.