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博士論文

漢字の既習得者を対象とした漢字字形の再学習の  
支援手段に関する研究

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## Abstract

Character amnesia is a recent phenomenon in which native Chinese or Japanese speakers forget how to write Chinese characters (kanji in Japanese), although they maintain the ability to read them. Most research on Chinese character learning has stopped with the proposal of a Chinese character learning system for children or non-native speakers of Chinese. To the best of our knowledge, no studies exist on solving the problem of character amnesia among adults whose native language is Chinese or Japanese and who have already learned and mastered Chinese characters, except for the idea of picking up the pen again and practicing more. In this dissertation, I proposed an efficient and low-burden support method for correcting and reinforcing the shape memory of already-learned Chinese characters. To accomplish this, a negative support feature was introduced, which involves incorporating obstructive factors such as incorrect characters into daily reading and writing activities.

It is generally believed that the constant use of computers and mobile phones equipped with pronunciation-based Chinese character input systems is the cause of character amnesia. In Chapter 3, therefore, a new Chinese character input method called Gestalt Imprinting Method (G-IM) was developed to address the issue of character amnesia, based on the most popular pronunciation-based Chinese character input system. While the usual input methods of Chinese characters always output characters with correct shapes, G-IM sometimes outputs GIM characters whose shapes are slightly incorrect in one or two strokes. By being made to forcibly correct the errors, users must pay close attention to the character shapes, which leads to strengthening retention and recall. User studies have demonstrated that G-IM significantly strengthens the retention and recall of character shapes compared to conventional input methods and writing by hand. The findings indicate that G-IM can contribute to the relearning of Chinese characters through the "writing" process. However, it was found that using G-IM could place an excessive burden on users, so Chapters 4-6 examine low-load character relearning methods for those who have already learned and mastered Chinese characters.

In Chapter 4, I proposed a new transformation method of Chinese characters called SwaPS (Swapping Phonetic and Semantic), which creates new incorrect characters (PS characters) by swapping the positions of the semantic and phonetic components of Phonogram Characters, which make up 80% of all Chinese characters. We investigated whether embedding these PS characters as obstructive factors in the act of "reading" could contribute to Chinese character relearning. Specifically, we conducted a verification experiment using Chinese international students as participants, in which they read printed documents on a paper sheet that contained PS characters. The results showed that reading printed documents with PS characters significantly enhanced Chinese character shape memory compared to reading documents that only contained correct characters or documents that contained slightly incorrect characters (GIM characters) used in G-IM. Additionally, we confirmed that there was no significant increase in cognitive load when reading documents with PS characters compared to documents containing only correct characters.

In Chapters 5 and 6, the usefulness of the SwaPS method for multimedia (electronic media) and multilingual contexts was further evaluated, along with its effectiveness in enhancing long-term Chinese character shape memory. In Chapter 5, an experiment was conducted to insert PS characters into documents displayed on an e-book reader. The results showed that users could be encouraged to pay attention to the shape of Chinese characters by incorporating PS characters even into the documents on the e-book reader and that not only short-term but also long-term Chinese character shape memory could be significantly enhanced without increasing the cognitive load. In Chapter 6, an evaluation experiment was conducted on Japanese speakers who had already learned Kanji (Chinese characters in Japan) to verify the usefulness of the SwaPS method in a multilingual context. Similar to Chinese speakers, the results of the experiment confirmed that reading documents containing PS characters could significantly enhance Kanji shape memory without significantly increasing cognitive load, compared to reading documents containing only correctly written Kanji characters.

Finally, chapter 7 concluded this dissertation. I also discussed the contribution of my doctoral research to knowledge science and described future perspectives.

**Keywords:** Character Amnesia, Incorrect Character Shapes, Pronunciation-based Input Method, Phonogram Characters, (Re)building Retention and Recall of Character Shapes, Relearning Support