

Abstract of thesis entitled:

The role of radical information in Chinese character recognition

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This research was designed to examine the processing of different kinds of radical frequency information, i.e. frequency as a position-free radical, frequency as a position-specific radical, and frequency as a stand alone character. Whether the task or the composition of materials could influence the processing of such information was also examined. The first two were behavioral experiments and results indicated that effect of the position-free radical frequency was stable across the lexical decision task (Experiment 1) and the position decision task (Experiment 2). Effect of the position-specific radical frequency emerged only when the lexical decision task was available (Experiment 1).

In Experiments 3 and 4, event-related potentials were recorded to verify the findings of the first two behavioral experiments. Similarly, Experiment 3 employed the lexical decision task and Experiment 4 used the position decision task. First, results revealed that a series of ERP components (P150, P200, and N400) were found to be related to the effect of position-specific radical frequency when the lexical decision task was used (Experiment 3). However, when replacing the lexical decision task with the position decision task but keeping illegal characters as fillers, the effect of position-specific radical frequency became quite weak, which was only associated with P200

(Experiment 4a). Moreover, when using the position decision task but replacing illegal characters with geometric figures as fillers, there were no effects of position-specific radical frequency any more (Experiment 4b). Second, the task was found to influence the time course for effects of position-free radical frequency, which was reflected by P200 in the lexical decision task (Experiment 3) and by N400 in the position decision task (Experiments 4a and 4b). Finally, simple character frequency could play a role in processing compound characters in which simple characters were used as radicals, but such effect was significant only in the position decision task and it was reflected by a change in N400 (Experiments 4a and 4b).

These findings indicate that position-specific radicals could play a role in character recognition, but this effect appears to be constrained by the task and/or the composition of materials. In contrast, effects of position-free radicals keep stable across different tasks and composition of materials. In addition, the findings also suggest that simple character information could exert influence on compound character processing, but only when characters are processed implicitly (e.g., in the position decision task). Implications of this research and future directions are discussed.

摘要

本研究旨在探讨各种不同类别的部件频率信息：不携带位置信息的部件频率 (frequency as a position-free radical)，携带位置信息的部件频率 (frequency as a position-specific radical) 以及部件作为单字的频率 (frequency as a stand alone character) 在汉字加工中的作用以及作用的时程。同时，本研究也探讨了任务范式和材料对不同类别的部件频率信息加工的作用。实验 1 和实验 2 的结果显示，无论采用真假字判断作业（实验 1）还是采用位置判断作业（实验 2），不携带位置信息的部件频率在汉字识别中产生了重要作用；而携带位置信息的部件频率只在真假字判断（实验 1）作业中才能发挥作用。

实验 3 和实验 4 采用脑电技术进一步探讨此问题。同理，实验 3 采用真假字判断作业，实验 4 采用位置判断作业。结果表明：首先，在真假字判断作业中，携带位置信息的部件频率引发了 P150, P200, N400 一系列脑电成份的变化（实验 3）；而当采用位置判断作业，但保留假字的存在时，携带位置信息的部件频率对汉字加工的作用强度明显变小，只表现在 P200 的变化上（实验 4a）；此外，当只保留位置判断作业而不采用假字为填充材料时，携带位置信息的部件频率不再对汉字加工产生作用（实验 4b）。其次，不同的作业会导致不携带位置信息的部件频率对汉字加工的作用在时程上产生变化，真假字判断任务似乎会使该作用提前，引发了 P200 的变化（实验 3）；而在位置判断(position decision)作业中，不携带位置信息的部件频率引发了 N400 的变化（实验 4a 和 4b）。最后，该结果还表明，部件作为单字的频率信息可以对汉字加工产生作用，但只表现在位置判断作业中，会引发 N400 的变化（实验 4a 和 4b）。

该研究结果表明携带位置信息的部件可以对汉字加工产生作用，但是该作用似乎受到任务和材料的限制；而不携带位置信息的部件对汉字加工的作用不受任务和材料的限制。此外，部件作为单字的信息可以对汉字加工产生作用，但是要在一定的条件下才能发生。基于本系列研究的结果，本论文探讨了其意义以及继续研究的方向。