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ANOTHER SUB-LEXICAL UNIT OF REPRESENTATION IN READING CHINESE? THE LOGOGRAPHEME NUMBER EFFECT

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Studies of Chinese character recognition have demonstrated widely that complex characters are automatically decomposed into sub-lexical components referred to as radicals during reading and writing in Chinese. Yet, an issue raised by Yang et al., (2009) was that it is unclear how the orthographic sub-system in during character recognition is able to differentiate when the sub-lexical unit “口” in characters such as 𠔁 should be activated as a radical for the left side unit, but not for the right radical 𠔂 which also embeds a 口 within the radical. Studies of writing errors of Chinese children and aphasic patients argue that logographemes, a smaller sub-lexical unit than the radical, are one of the core units of representation within a character (e.g., Han & Bi, 2009; Law & Leung, 2000). Logographemes refer to a series of stroke patterns that are productive (i.e. exist in many characters) and appear to be smaller sub-lexical units than the radicals. For example, the character presented earlier consists of three logographemes of which two are 口 and one is 丁. However, the generalizability of such claims remains inconclusive given the small sample size and observations being limited to spelling tasks per se. Using a lexical decision task, we investigated to whether logographeme units influence character recognition with behavioural measures and event-related potentials (ERPs). Real characters varied in a factorial design by character frequency (high vs. low) and the number of logographemes within a character (3 vs. 6), whilst matching for stroke number, and controlling for phonogram regularity and semantic transparency. Stroke-matched pseudo characters served as filler trials, and were constructed by randomly rearranging the radicals of the real characters. Behavioural findings showed main effects of frequency and logographeme number, where high frequency characters or characters with three logographemes were faster to identify than ones of low frequency or with six logographemes. Electrophysiological results revealed that logographeme number modulations occurred at the P100 component, whereby characters with many logographemes evoked a larger P100 component. At the N170 component, the logographeme number effect was constrained to low frequency characters, where characters with few logographemes elicited a greater negativity. No effects were found at the frontal P200 or central parietal N400 components suggesting that the number of logographemes in a character does not facilitate phonological or lexical-semantic retrieval. Relative to radical activation, the findings suggest that logographemes differ to its time course of activation, such that they are accessed earlier than radicals and only during early visual-orthographic processing stages of Chinese character recognition. More importantly, the findings challenge Chinese character recognition models such as the Lexical Constituency model (Perfetti & Liu, 2006; Perfetti, Liu & Tan, 2005) and the Multilevel Interactive-Activation framework (Taft, 2006; Taft & Zhu, 1997; Taft, Zhu, & Peng, 1999), which do not assume a logographeme representational level.