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Citation	The 15th International Conference on the Processing of East Asian Languages (ICPEAL 2014), Korea University, Seoul, Korea, 24-26 October 2014. In Conference Proceedings, 2014, p. 95-96
Issued Date	2014
URL	http://hdl.handle.net/10722/210464
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Processing sublexical phonology in L2 Chinese character reading: An ERP study

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Compared to alphabetic scripts, the distinct forms of Chinese characters as orthographic units and the fundamental difference in the mappings between orthographic, phonological, and semantic units lead to specific demands in L2 Chinese processing. The current study examined the sensitivity to and time course of two measures of orthography-phonology mapping-- phonological regularity and consistency-- for relatively proficient L2 readers of Chinese. Most Chinese characters are phonograms, which have a phonetic radical that carries phonological information. Regularity in these phonograms is defined by the congruence between the pronunciation of a phonogram and that of its phonetic radical. Consistency is the extent to which the pronunciation of the phonogram is shared by other phonograms with the same phonetic radical. A recent study has shown that in native Chinese readers, regularity and consistency produced divergent effects in behavioral measures as well as event-related potentials (ERPs) (Yum, Law, Su, Lau, & Mo, 2014). Native readers showed regularity effects at the N170, P200, and N400 components, and consistency effects at the P200 component. These effects were observed in delayed naming (DN) and not present in lexical decision (LD). In this study, the participants were native readers of alphabetic systems who acquired written Chinese after age 5 with a reading level at or above Grade 4 in Hong Kong. Similar to native Chinese readers of Grade 4 reading level, L2 participants were faster to respond to and more accurately named regular than irregular phonograms, but did not show behavioral consistency effects. Real characters elicited a larger N170 than pseudo-characters. In the P200 window, irregular phonograms generated a greater positivity over the right hemisphere compared to regular phonograms in LD, while consistency showed no effect. Both irregular phonograms and inconsistent phonograms elicited enhanced N400 compared to regular and consistent phonograms, respectively, in LD. Regularity had no effect at the late-positive component (LPC), but inconsistent phonograms elicited attenuated LPC relative to consistent phonograms. The regularity effects in P200 were consistent with previous reports, so L2 readers accessed the pronunciation of the phonetic radical, which created interference with the pronunciation of the whole character. L2 readers also showed consistency effects in later time windows, suggesting that activation of neighbourhood information occurred after extraction of the phonological form of the phonetic radical itself. The different time courses and topographic distributions of the effects supported that regularity and consistency were distinct mechanisms of orthography-phonology mapping, even in late-acquired L2 Chinese readers. We propose a two-stage account of orthographic analysis in L2 Chinese reading where characters were processed holistically in the initial stage (N170) and decomposed into

radicals in subsequent analysis. This lower efficiency in character processing was reflected by the delay in appearance of regularity and consistency effects relative to native readers and the lack of significant effects in DN. Furthermore, unlike native readers L2 learners showed phonological effects in LD, indicating that less skilled readers may access phonological representations of characters to support lexicality judgment.