

Identifying Visual-Orthographic Unit and Motor Mechanism in Chinese L2 Character Writing

Learning to write Chinese characters presents significant challenges to second language (L2) learners due to their complex spatial layout and strict stroke sequence rules. Character writing involves activating visual orthographic representation and integrating visual-motor systems (Kandel, 2023). According to the *sequential organization hypothesis* (Giovanni, 1994), stroke sequence information within orthographic representation is stored in memory as a motor schema, which serves as a cue for word retrieval. While empirical studies on Chinese L2 learners have supported motor sequential organization, the nature of L2 visual orthographic representation and the mechanism underlying motor orthographic organization remain unclear. Our study aims to advance theoretical understanding of L2 orthographic representation and inform pedagogical practices in Chinese L2 instruction by examining: 1) What is the basic unit of L2 orthographic representation in writing—the analytic stroke (丿 in 猫, meaning *cat*), the intermediate component (犹, 艹, or 田 in 猫), or the holistic character (猫)? 2) How is orthographic information sequentially organized? Two experiments were conducted with about 40 Chinese L2 beginners from U.S. colleges.

In Experiment 1, 180 unfamiliar characters with a left-right structure, varying across three stroke-defined complexity levels, were presented under three conditions: stroke-based, component-based, and character-based. In Experiment 2, another 120 unfamiliar characters with a left-right structure were manipulated in terms of the sequence (intact vs. scrambled) both across components and within a component. Participants completed a delayed copy task using a digitizer tablet. Outcomes, including character accuracy, writing latency, and writing duration, were measured, and the effects of orthographic unit and sequential organization were analyzed using repeated-measures ANOVA. Pilot results from eight participants in Experiment 1 showed that all three writing measures were consistently and significantly superior in the component-based condition. We hypothesize a stronger sequence effect across components than within a component in Experiment 2. We plan to complete data collection by February 2026.

Visual orthographic representation among Chinese L2 beginners may be neither whole character-based nor stroke-based, but instead component-based, regardless of whether the component is a radical or a non-radical pattern. Accordingly, Chinese L2 character instruction may benefit from emphasizing components and their sequential organization within each character, especially for relatively complex characters among beginning learners.