

Typing Before Handwriting: Cognitive Pathways Linking Pinyin Input and Character Production in L2 Chinese

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This study examines how Pinyin-based character typing relates to character handwriting in L2 Chinese learners, with a focus on the cognitive mechanisms underlying this relationship. As typing becomes increasingly dominant in Chinese language use, an important question is whether it supports or hinders the development of handwriting skills. Prior research has produced mixed findings, with some studies suggesting negative effects of typing on orthographic processing and others reporting facilitative effects [1,2]. The present study proposes a mechanism-based account linking typing and handwriting through intermediate cognitive processes.

Sixty-two intermediate-level learners completed tasks measuring character typing, handwriting, orthographic–phonological conversion ability, phonological awareness, orthographic awareness, and overall Chinese proficiency. Mediation analyses revealed that character typing positively predicts handwriting performance both directly and indirectly ($p < .05$). Critically, orthographic–phonological conversion ability emerged as the only significant mediator, indicating that typing facilitates handwriting by strengthening mappings between phonological representations and orthographic forms [3]. In contrast, phonological awareness and orthographic awareness did not mediate this relationship ($p > .05$).

Moderation analyses showed that Chinese proficiency significantly influenced the direct relationship between typing and handwriting ($p < .05$) (Figure 1). The facilitative effect of typing was strongest among lower-proficiency learners and decreased as proficiency increased, suggesting that typing serves as a compensatory mechanism at earlier stages of learning (Figure 2). However, the indirect effect via orthographic–phonological conversion remained stable across proficiency levels, pointing to a consistent underlying mechanism.

These findings suggest that typing and handwriting are not competing modalities but are linked through shared cognitive processes. Pinyin-based typing supports handwriting development by reinforcing form–sound mappings, particularly in the early stages of acquisition. This study provides empirical support for integrating typing into Chinese language instruction as a scaffold for developing orthographic knowledge and written production skills.

References

- [1] Chen et al. (2016). Chinese character practice: Comparison between children using handwriting and Pinyin keyboarding]. *Acta Psychologica Sinica*, 48(10), 1258-1269.
- [2] Siok & Liu (2018). Differential impacts of different keyboard inputting methods on reading and writing skills. *Scientific Reports*, 8(1), 17183.
- [3] Guan et al. (2011). Writing strengthens orthography and alphabetic-coding strengthens phonology in learning to read Chinese. *Journal of Educational Psychology*, 103(3), 509-522.

Figures

Figure 1: Moderated mediation model illustrating the effects of character typing ability on character handwriting ability ($p < .01^{**}$).

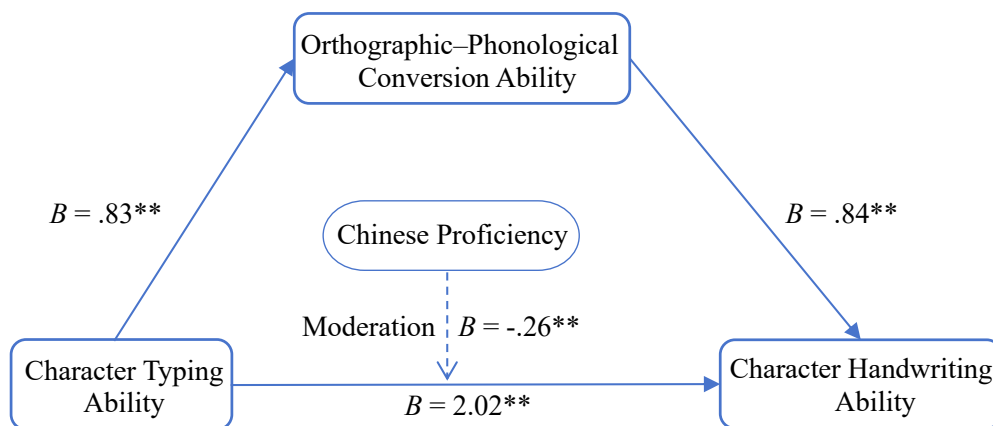


Figure 2. Direct and indirect effects of character typing ability on character handwriting ability across proficiency levels. Chinese proficiency significantly moderated the direct effect, whereas variation in the indirect effect across proficiency levels was descriptive only and did not reach statistical significance.

