

# PHONETIC, NOT SEMANTIC RADICALS, FACILITATE WRITTEN VERB PRODUCTION: EVIDENCE FROM CHINESE WITH THE PICTURE-WORD INTERFERENCE PARADIGM

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How is information transmitted across semantic and orthographic levels in written word production? There exists a consensus in the literature supporting a cascaded flow of information within the lexical system in alphabetic scripts. Given the characteristics of Indo-European languages where phonology and orthography are closely intertwined, Chinese, which adopts a distinct separability between the two, still demonstrates the generality of cascadedness. Yet, this understanding is largely based on studies in Chinese that manipulated the semantic radicals, referred to as "形旁". Taking into account that a vast majority of Chinese characters consist of both phonetic ("声旁") and semantic radicals, a sole focus on semantic radicals might not encapsulate the full complexity of the language. The semantic radical typically alludes to the character's meaning, while the phonetic radical provides pronunciation cues. This emphasis on semantic radicals in existing research raises the question of generalizability: Whether or not the semantic and phonetic radicals differently interact with the semantic system?

Furthermore, existing studies largely come from noun word production, relatively less work has explored verb production. Verbs, representing actions or states, are considered more abstract and are found to be more challenging to produce compared to nouns, which often denote tangible objects or entities. Given the inherent complexity of verbs, can finding of cascadeness based on nouns be generalized to verb production?

In our study, we probed the roles of both semantic and phonetic radicals in handwritten verb production using a picture-word interference paradigm. Chinese participants were instructed to write the names of target verb pictures while ignoring distractor words. To capture the pure orthographic effects, under all conditions, the distractors have no phonological relation to the target pictures. Each picture was paired with four types of distractor words: (1) a semantically related but orthographically dissimilar distractor (Sem); (2) a semantic related distractor, and with identical semantic radical (Sem\_semantic\_radical); (3) an orthographically related word with identical semantic radical, but semantically dissimilar (Orth\_semantic\_radical); (4) an orthographically related word with identical phonetic radical, but semantically dissimilar (Orth\_phonetic\_radical). Distractors within each condition were then recombined with the pictures to form four unrelated conditions. Compared with the unrelated condition, we found a significant semantic interference effect in Sem condition (1), and a significant orthographic facilitation in Orth\_phonetic\_radical condition (4). Moreover, we obtained an interaction between semantics and orthography under condition related to semantic radicals. Those findings indicate the distinct roles of semantic and phonetic radicals in written verb production. Our results bolster the non-discrete hypothesis in Chinese verb production, suggesting that activation operates in a cascaded manner within the written production system.

**Keywords:** word production; verb; picture-word interference paradigm; semantic radical; phonetic radical