

Classifier congruency effects in Spanish–Chinese noun phrase production: behavioral and electrophysiological evidence

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Mandarin Chinese employs a classifier system where specific morphemes, known as ‘classifiers’, are obligatorily positioned between a demonstrative, a numeral, or a quantifier and the noun in noun phrases (NPs; e.g., 一张桌子, /yi1zhang1zhuo1zi3/ [*one classifier-zhang1 table*], ‘one table’) [1]. While previous studies have explored classifier congruency effects in monolingual Mandarin Chinese speakers, it remains unclear whether this effect extends to early Spanish-Chinese bilinguals. In other words, the mechanisms underlying classifier-NP production in bilingual speakers remain less well understood. To address this gap, this study investigated the classifier congruency effect in noun phrase production by 29 early Spanish-Chinese bilinguals and 30 Mandarin Chinese speakers (control group) using behavioral and electrophysiological (EEG) measures. Participants completed a picture-word interference (PWI) task in which two factors were manipulated: classifier congruency (congruent vs. incongruent) and semantic relatedness (related vs. unrelated) between the target pictures and distractor words. This resulted in four conditions: congruent/related, congruent/unrelated, incongruent/related, incongruent/unrelated. Participants named the target pictures quickly and accurately with Mandarin Chinese NPs while ignoring distractor words. Vocal responses (RTs) and EEG data (using a standard 32-electrode 10/20 montage) were recorded and analyzed using a generalized linear mixed model (GLMM) and a single-trial linear mixed model (LMM), respectively. Behavioral results showed significantly longer naming latencies in classifier-incongruent and semantically related conditions in both groups compared to classifier-congruent and semantically unrelated conditions. Electrophysiological data revealed sensitivity to classifier incongruency (N400 effect) in both groups and semantic interference, with an N400 effect in bilinguals and a P600 effect in Mandarin Chinese speakers. These findings provide the first combined behavioral and electrophysiological evidence that early Spanish–Chinese bilinguals exhibit robust classifier congruency effects in Chinese NP production. It suggests that classifiers are competitively selected during noun phrase production, and the classifier congruency effect is robust in early Spanish-Chinese bilinguals, mirroring monolingual Chinese speakers’ processing patterns.

References

- [1] Li, C. N., & Thompson, S. A. (1981). *Mandarin Chinese: A Functional Reference Grammar*. University of California Press.

Tables:

Table 1. A sample set of target pictures paired with distractors for the picture naming task.

	Condition			
	C+S+	C+S−	C−S+	C−S−
Target picture BED [床 /chuang2/]				
Target classifier 张 /zhang1/				
Distractors	table /zhuo1zi0/	photo /zhao4pian4/	chair /yi3zi0/	bicycle /zi4xing2che1/
Classifier of distractors	张 /zhang1/	张 /zhang1/	把 /ba3/	辆 /liang4/

Table 2. Mean picture naming latencies by conditions in Mandarin Chinese and early Spanish–Chinese bilingual groups.

Conditions	Naming latencies (ms)			
	Mandarin Chinese group		Spanish–Chinese group	
	Mean	SD	Mean	SD
Classifier-congruent/Semantically Related (C+S+)	911	264	978	262
Classifier-congruent/Semantically Unrelated (C+S−)	888	223	945	212
Classifier-incongruent/Semantically Related (C−S+)	925	246	992	247
Classifier-incongruent/Semantically Unrelated (C−S−)	899	252	980	235