

## Using gestures in L2 prosody acquisition training: The role of individual differences

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Previous studies have demonstrated the tight relationship between speech and co-speech gestures, as well as the beneficial role that gesture can play in L1 development [1]. However, the use of gestures in L2 acquisition is under-investigated. Findings on gestural training in L2 phonology learning specifically present contrasting results: Some studies find an effect of seeing or performing gestures during phonology training on L2 performance [2][3], yet others do not (e.g., [4]) or only in certain contexts, dependent on task and gesture complexity [5]. Moreover, prior work varies in the type of gesture that is used (e.g., beat, iconic, or metaphoric), the training modality (i.e., learners see or also produce gestures), the L2 (supra)segment that is being taught, and the dependent measures used to quantify acquisition. Hence, comparing previous work and determining why effects occur is challenging. Also, several studies suggest that individual differences might be relevant in this context (e.g., [6]), but to date, no study has disentangled the effect of different types of gestures and training, while also considering relevant individual factors, such as working memory (WM) capacity and musical aptitude.

In our study, sixty Dutch natives, without previous experience with Spanish, received training on the lexical stress rules of Spanish in between pretest and posttests. Dutch learners of Spanish generally struggle with Spanish lexical stress, especially in Dutch-Spanish cognates that are highly similar except for the position of the stressed syllable (e.g., ‘piramIdes’, ‘Horizon’, and ‘ventilAtor’ in Dutch, but ‘piRAmides’, ‘horizONte’, and ‘ventilDOR’ in Spanish). The training consisted of written instructions about the three lexical stress rules in Spanish and, per rule, a video of a native speaker presenting an example and two practice items with feedback to the participant. Participants were randomly assigned to one of five gesture conditions:

- 1) **AV**: The native speaker in the video did not produce gestures (control);
- 2) **AVB-Perc**: The participant saw the native speaker produce a beat gesture;
- 3) **AVB-Prod**: The participant saw and reproduced a beat gesture;
- 4) **AVM-Perc**: The participant saw the native speaker produce a metaphoric gesture;
- 5) **AVM-Prod**: The participant saw and reproduced a metaphoric gesture.

The metaphoric gesture was temporally aligned with the stressed syllable and produced by moving the hands apart horizontally to stress that duration is the primary cue of lexical stress in Spanish [7]. The stroke of the beat gesture was temporally aligned with the stressed syllable and produced by moving both hands together vertically. In a pretest and an immediate and delayed posttest, participants read aloud identical yet randomly ordered, short, easy to parse, Spanish phrases containing words that differ in lexical stress from their Dutch cognates (Figure 1). In between the two posttests, all participants performed a musical aptitude and WM task. In the acoustic analysis lexical stress was coded as on-target or not.

We found that, irrespective of gesture condition, participants significantly improved on their L2 lexical stress productions from pretest to first and second posttest (Figure 2). While differences between gesture conditions were non-significant, there were several significant three-way interactions between WM capacity or musical aptitude on the one hand and testing moment and gesture condition on the other hand. Hence, the effectiveness of gesture type and training modality in teaching L2 lexical stress was significantly influenced by WM capacity and musical aptitude. Therefore, present findings underline the importance of considering individual factors and methodological choices in determining the effect of gestures in L2 acquisition.



Figure 1. Screenshots of the native speaker of Spanish producing the metaphoric gesture (left) and the beat gesture (middle), and an example of a stimulus item (right).

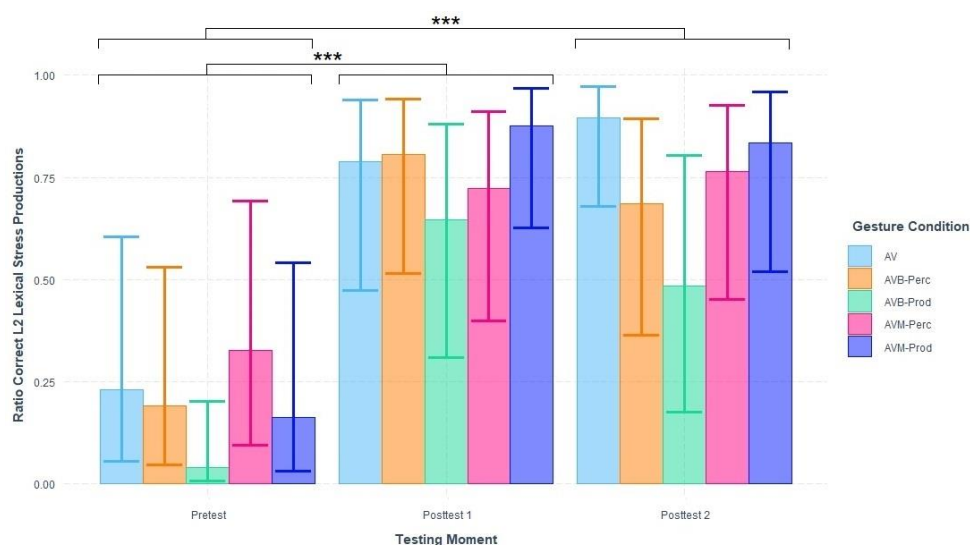


Figure 2. Ratio correct L2 lexical stress productions per gesture condition, separated by testing moment. Error bars represent 95% confidence intervals. \*\*\*:  $p < .001$

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