

## Effects of prosodic and gestural prominence on words recall in first and in second languages.

Olga Kushch<sup>1</sup>, Alfonso Igualada<sup>1</sup>, Pilar Prieto<sup>1,2</sup>

<sup>1</sup> Department of Translation and Language Sciences, Universitat Pompeu Fabra, Spain

<sup>2</sup> Institució Catalana de Recerca i Estudis Avançats (ICREA)

[olga.kushch@upf.edu](mailto:olga.kushch@upf.edu), [alfonso.igualada@upf.edu](mailto:alfonso.igualada@upf.edu), [pilar.proetp@upf.edu](mailto:pilar.proetp@upf.edu)

Research has shown that beat gestures are temporally integrated with speech (e.g., Krahmer & Swerts, 2007; Loehr, 2012) and facilitate information recall (e.g., So et al., 2012; Igualada et al., 2014). Yet, little is known about whether the beneficial effects of beat gestures are due to the effects of concomitant prosodic prominence (as beat gestures are typically associated with prominent prosodic positions), and whether these effects are also present in L2 language acquisition.

The present study consists of two experiments. Experiment 1 investigates the role of prosodic prominence (pitch accents) and gesture prominence (beat gestures) on the recall of contrastive information in natural discourse. Twenty Catalan-dominant native speakers were asked to watch 48 short videotaped discourses containing two contrast sets with two items (adapted from Fraundorf et al., 2014). The critical word in the continuation was presented under two experimental conditions: 1) accompanied by prosodic prominence (L+H\* pitch accent); and 2) accompanied by prosodic prominence and gestural prominence (L+H\* pitch accent and beat gesture) in the beginning or in the end of the discourse. After the training session there was a testing phase. In the testing phase participants were presented with a transcript of the stories that they heard with the target word replaced by underscores. Participants had to write down the missing word. The results of the recall task revealed a significant main effect of Prominence Condition ( $F(1,956) = 10.308$ ),  $p < .05$ , confirming that participants performed better in the recall task when the item was accompanied by prominence in speech and in gesture (i.e., beat gesture condition). Figure 1 shows the mean proportion of recalled words across the two Item positions (first and second target item position) separated by the two training conditions: 1) prominence in speech and in gesture and 2) prominence in speech.

Experiment 2 investigates the effects of prosodic prominence and visual prominence on L2 novel vocabulary acquisition. Ninety-six Catalan-dominant native speakers were asked to learn 16 Russian words that were presented within a sentence (e.g., *Bossa es diu "sumka" en rus* 'Bag is called "sumka" in Russian') under 4 experimental conditions: 1) prominence in neither speech nor gesture (baseline condition), 2) prominence in both speech and gesture, 3) prominence in speech but not in gesture, and 4) prominence in gesture but not in speech. To elaborate the stimuli a Catalan-Russian bilingual speaker was videotaped producing the 16 stimulus sentences in Condition 1 and Condition 2. In Condition 1 (no prominence in speech or gesture) the instructor produced the target word with a non-focal L\* pitch accent and kept her hands still. In Condition 2 (prominence in both speech and gesture) the instructor produced the target word with a focal L+H\* pitch accent and a beat gesture realized with her two hands held with the palms open. To generate conditions 3 and 4, the audio recording of the target word in Condition 1 (no prominence) was replaced by the one in Condition 2 (prominence in speech) and vice versa. The testing session consisted of recall and recognition tasks that were conducted after the training session. A GLMM analysis revealed a main effect of Prosodic Prominence ( $F(1,3064) = 30.487$ ,  $p < .001$ ), showing that items accompanied by prominence in speech were remembered better. There was

no main effect for Gestural Prominence, but a significant interaction was found between Prosodic and Gestural Prominence ( $F(1,3064) = 4.885$ ,  $p < .05$ ), indicating that only beat gestures produced with prosodic prominence had a significant positive effect on L2 word recall. Figure 2 shows mean proportion of memorized words across the four conditions in the two tasks (free recall and recognition tests).

The results of these two experiments show a positive effect of prosodic and gestural prominence on word recall both in first and second languages.

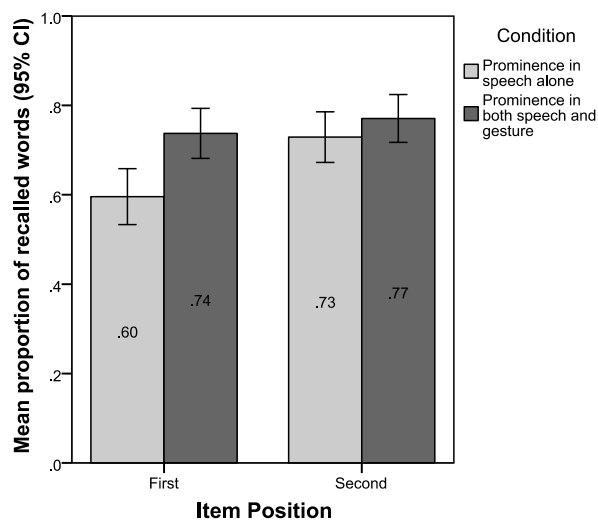


Figure 1: Mean proportion of recalled words across the two experimental conditions in the first and in the second target item positions.

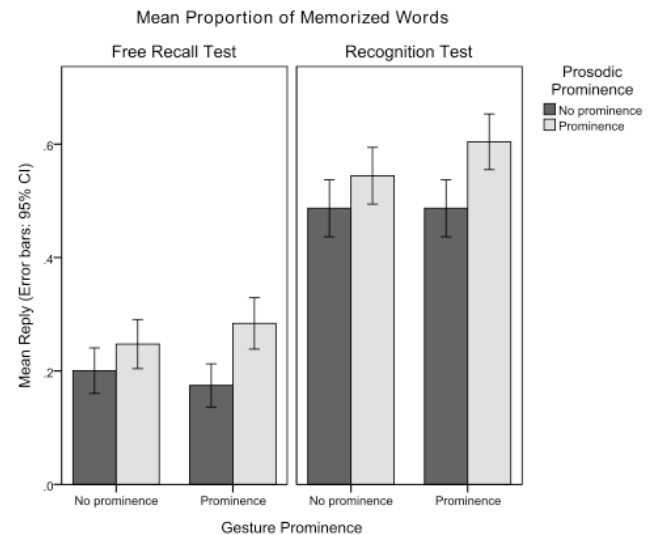


Figure 2: Mean proportion of memorized words across the four conditions in the two tasks (free recall and recognition tests).

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