Differential effects of working memory load on visual priming and recognition

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Little is known about the impact of working memory load on implicit, as opposed to explicit, visual memory. The aim of the study was to determine whether there are differential effects of working memory load on a visual priming and recognition. Participants were presented with real-object pictures and asked to classify them semantically. At retrieval, a visual priming task followed by a visual recognition task was performed. Participants concurrently performed an articulatory suppression task, a backward counting task, or a tapping task. Results suggest that visual priming is not affected by a concurrent load while visual recognition can be, especially when the working memory task is executively demanding.

METHODS

Participants:

72 participants with normal vision. Randomly assigned to a working memory load condition (3 groups of 24 participants each)

Materials:

80 coloured real photographs: 20 vegetables, 20 animals, 20 clothing items and 20 objects. 4 lists of images were created to ensure material rotation

Design and Procedure:

Encoding:
40 images
(250 ms each)

Semantic categorization

10 min

Concurrent task:
- Repetition of digits
- Counting backwards in 2's
- Corsi Blocks

(same digits for each condition across trials)

Visual priming:
80 images: 40 old
Partially Masked
(100 ms each)

Identification response

Visual recognition:
After each masked item response

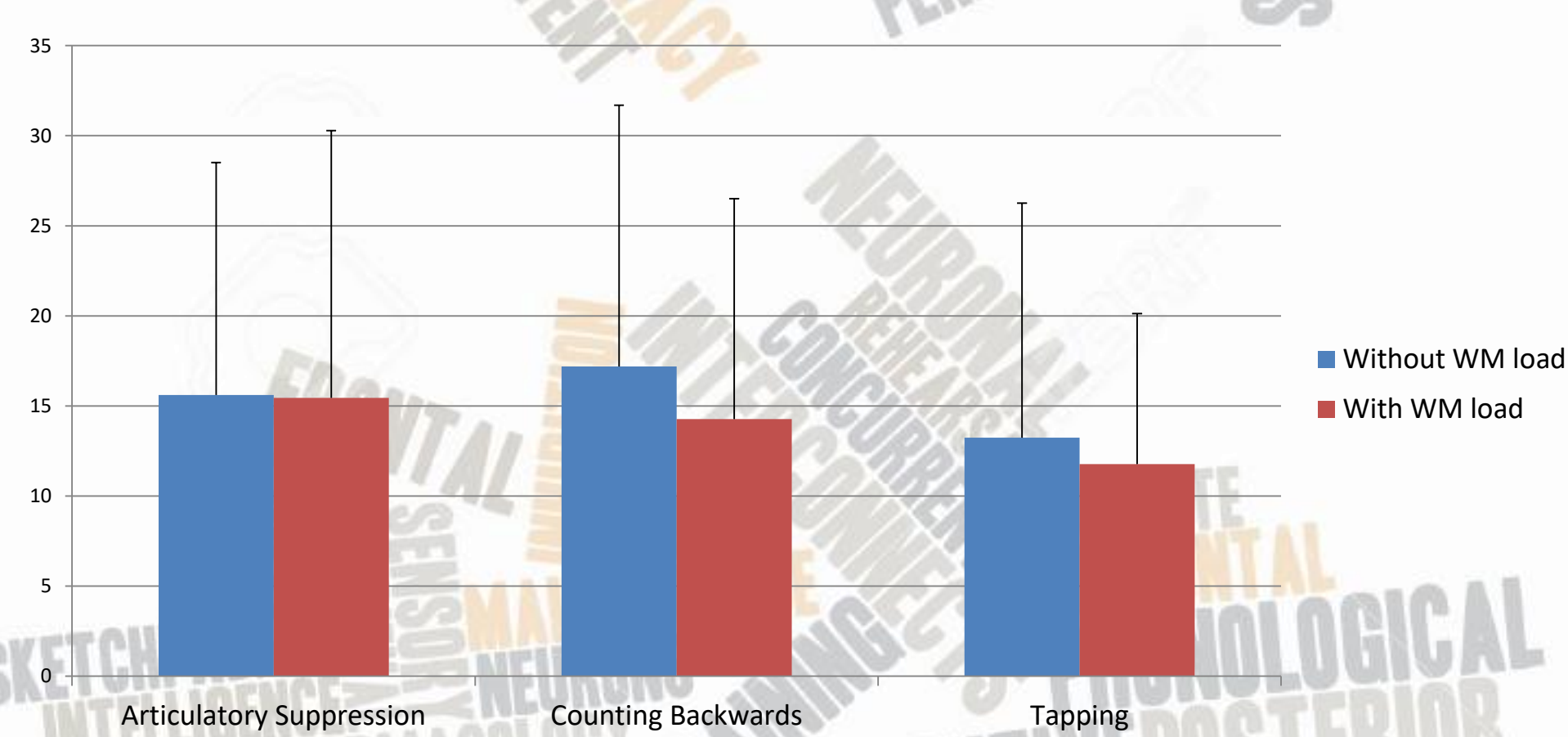Yes/No response

RESULTS AND DISCUSSION

Table 1. Mean percentage of priming in visual identification as a function of group and memory load condition
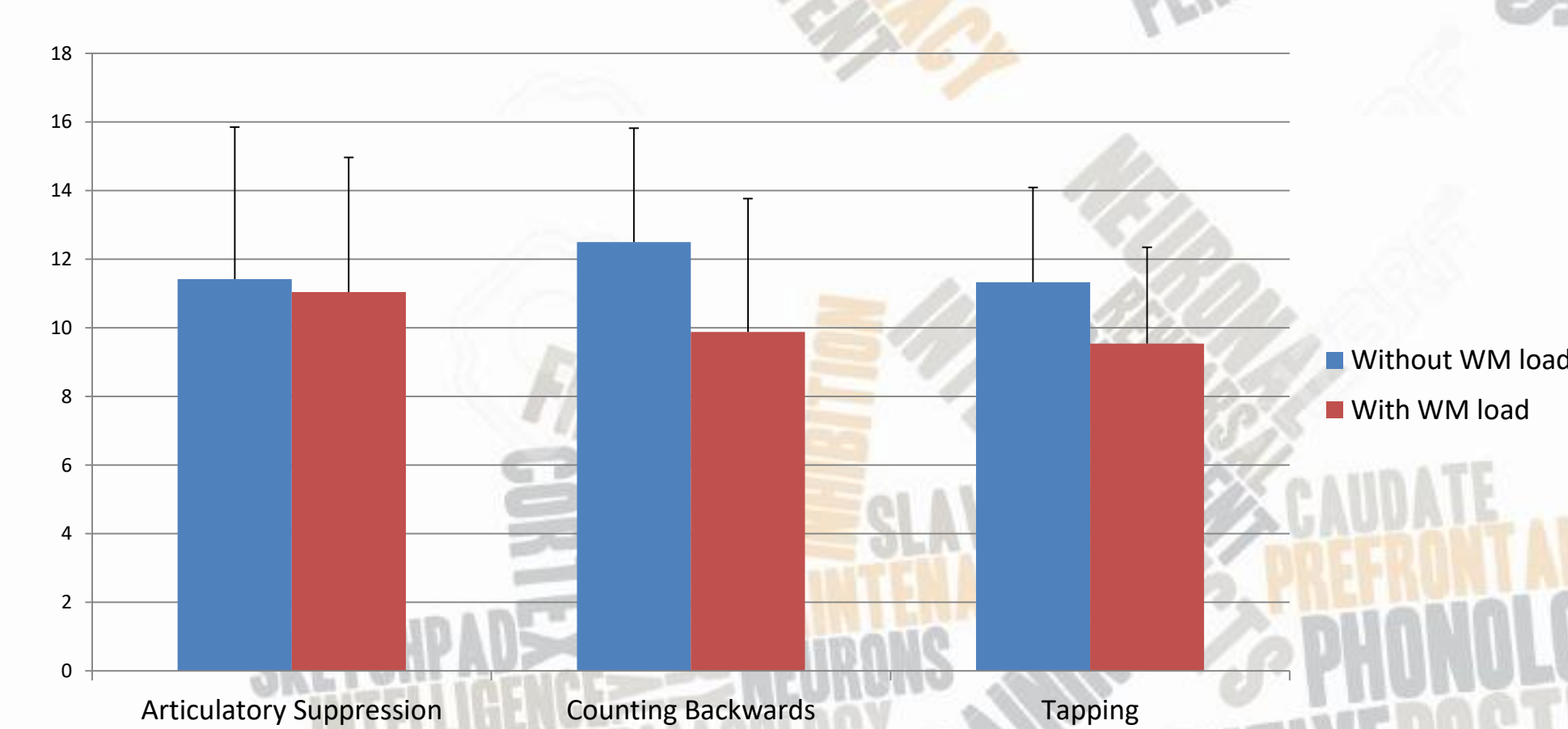

Table 2. Mean number of correct visual recognition as a function of group and memory load condition.

Priming task: Old images were significantly better identified than new images, showing a general effect of visual priming ($p<.001$). No main effect of WM load or group, and no interaction → Visual priming was not affected by any of the working memory manipulations of the experiment.

Recognition task: Significant interaction between memory load and group ($p=.04$). The articulatory suppression group was the only one in which no differences were observed between the two conditions (with / without load).

Conclusions: Articulatory suppression failed to diminish performance on both tasks. Backward counting and tapping influenced recognition, but not priming. Recognition seems to be affected, especially when the WM task is executively demanding, while priming is insensitive to WM manipulations at encoding, possible due to automaticity. Results are in line with studies on priming and divided attention, which show that implicit memory does not require attentional resources during encoding.