Modulating attentional and pre-attentive visual processing through brief training on novel grammatical morphemes

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Can brief training on novel grammatical morphemes modulate visual processing of non-linguistic stimuli? If so, is this effect restricted to attentional visual processing, or can it also permeate pre-attentive visual processing? Here, an experimental group intentionally induced the function of two novel grammatical morphemes highlighting the familiar concept of (in)transitivity in sentential contexts; a control group performed the same intentional inductive task with the same sentences but with the novel labels used interchangeably. Subsequently, after overnight consolidation, both groups performed a grammaticality judgment test, in which only the experiment group showed an N400 to violations of the novel grammatical morphemes. Subsequently, both groups performed two visual oddball tasks with non-linguistic motion event stimuli that were disguised as a completely unrelated experiment being conducted for a colleague. In the first (attentional) oddball task, relative to the control group, the experimental group showed decreased attention to infrequent changes in the grammar-irrelevant dimension (shape) but not the grammar-relevant dimension (motion transitivity), as indexed by P300 amplitudes; in the second (pre-attentive) oddball task they showed enhanced pre-attentive responses to infrequent changes in motion transitivity but not shape, as indexed by N1/visual mismatch negativity amplitudes. Our findings show that up- or down-regulating attention to pre-existing concepts in sentence contexts through brief training on novel grammatical morphemes can modulate both attentional and pre-attentive visual processing. We argue that this effect of linguistic experience on non-verbal cognition is unconscious and automatic.