this end, event-related potentials and behavioral responses were recorded from 9 children diagnosed with ADHD and 8 control children, matched in age (mean age: 10.5 and 10.3, respectively) and IQ (102 and 119, respectively), while they performed a selective attention task involving emotional stimuli (positive, negative and neutral). No behavioral differences between both groups were found. However, differences between groups in P2 amplitudes were observed. The amplitude of P2 to pleasant images was significantly lower in ADHD children than in controls (no differences between both groups were observed in response to neutral or negative stimuli). Indeed, positive stimuli elicited the maximum P2 amplitude in the control group, and the lowest in the ADHD group. These results suggest that the emotional charge of visual stimuli significantly modulates attentional processes in ADHD children, a reduction in attention-related electrophysiological activity in response to positive stimuli being observed.

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Affective go–nogo: Comparing the effect of emotional targets and emotional contexts

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The emotional modulation of response inhibition-related processes has scarcely been explored up to the moment. In the present study we explored whether this modulation, in case it is produced, is different when the emotional information is provided by the target than when it is conveyed by the context in which the target appears. In the first experiment, event-related potentials (ERPs) were measured from 32 subjects while they performed a go/nogo task in response to neutral stimuli presented within three different emotional contexts (201 s each) generated by pictorial backgrounds: unpleasant, neutral and pleasant. Temporal and spatial principal component analyses (tPCA and sPCA, respectively) were employed to define and quantify the main components of the ERP go/nogo response, and a source localization algorithm (sLoreta) provided information on their neural origin. We found that, as usual, N2 and P3 amplitudes were larger in nogo than in go trials, but only the second component was sensitive to the interaction between the emotional charge of contexts and the type of trial ($F[2,62]=3.175$, HF corrected $p<0.05$): whereas P3 amplitude differed as a function of the emotional charge of the context in nogo trials (response inhibition), no differences were observed in go trials (response execution). Specifically, we observed that participants showed higher P3 amplitudes when they inhibited their response during the pleasant context than during the unpleasant context. Source location analyses revealed the supplementary motor area (BA 6) as the origin of the P3 and, consequently, of the experimental effects. In the second experiment, ERPs were measured from 31 subjects while they performed a go/nogo task in which go and nogo targets were unpleasant, neutral and pleasant pictures presented during 300 ms. Half of subjects were instructed to press a button if a person appeared in the image and to avoid their response if they didn't see a person, and the other half did the opposite task. Analyses also revealed higher N2 and P3 amplitudes in nogo than in go trials, although neither of both components showed an interaction between the emotional content of targets and the type of trial. We employed identical nogo percentage (30%) and intertrial interval (1500 ms) in both experiments. Our results suggest that response inhibition is modulated to a greater extent by the affective charge of the context than by the affective content of the target.

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Advantage of the emotional charge of encoded items over the emotional charge of context to modulating implicit memory

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Emotion has been reported to have either a facilitating or a disruptive effect on implicit memory. Some studies have focused on the emotional content of the stimuli on the one hand, and other on the emotional content of the context on which the stimuli were encoded on the other, and their results are still not clear or conclusive. In the present study we take into account both, the emotional content of the stimuli and of the context. In a first experiment we presented emotional pictures to subjects, and subsequently recorded event related brain potentials (ERPs) during a second presentation of these emotional pictures, along with other new emotional pictures. No explicit instructions or clues related to memory were given to participants, neither on the study nor the test phase, so both encoding and retrieval were implicit. Our results showed that old stimuli elicited an enhanced late positive component 450 ms after stimulus onset (repetition effect), and that this effect was modulated by the stimuli's emotional valence, being the positively valenced stimuli the ones that showed a smaller repetition effect. The effect was located at ventromedial prefrontal cortex. In order to test whether or not implicit memory may also be modulated by the emotional charge of the context in which items to be encoded appear, in a second experiment we presented neutral visual stimuli in different emotional contexts. In the study phase, contexts were generated through written and audio-recorded emotional sentences, which appeared along a neutral picture. An indirect task ensured attention both to the neutral picture (subjects had to report if the image depicted people or not) and to the context (they had to indicate whether written and audio sentences were equal or not). Subsequently (test phase) the same neutral pictures were presented to subjects along with other new neutral pictures, while ERPs were recorded in the same way we did in the first experiment. Differently from the effect of the emotional stimuli, results showed no effect of the emotional context on implicit memory. These results suggest that, at least in electrophysiological terms and with the present experimental procedure, the emotional valence of items themselves modulates to a greater extent their implicit encoding and/or retrieval than the emotional valence of the context in which they appear during encoding.

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Length of beta bursts and their frequency of occurrence — A neuronal correlates of visual attention mechanism — Change with age

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The results of our animal studies have suggested that short bursts of beta oscillatory activity (12–29 Hz) might be used as a carrier for attentional activation within the visual system (Wróbel, 2000). Here we have made an effort to find a similar activity in the human EEG data, and to relate it with age dependent deficits of visual attention. Young and old subjects were involved in visual and auditory spatial differentiation paradigms. The beta bursts activity was identified in all subjects but the number and duration of these bursts increased with age and behavioral performance. It is suggested that attentional mechanism is more activated in elderly human subjects, yet its efficiency is not as good as in younger people.

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