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Influence of Emotional Intelligence on Performance in an Emotionally Laden Cognitive Task: an ERP Study.

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Introduction

❖The ability to make decisions in contexts with emotional content is essential in our daily lives. Previous literature have provided evidence of a lower capacity for cognitive control in emotion-laden contexts in comparison with neutral contexts (Tottenham, Hare, & Casey, 2011).

❖EI is a construct that links emotion and cognition, and it is defined as the ability to perceive, use, understand, and manage emotions (Mayer, Caruso, & Salovey, 2016)

❖ The aim of the present research was to study changes in cognitive control performance at behavioral and brain level as a function of emotional intelligence (EI) level in contexts involving emotional information.

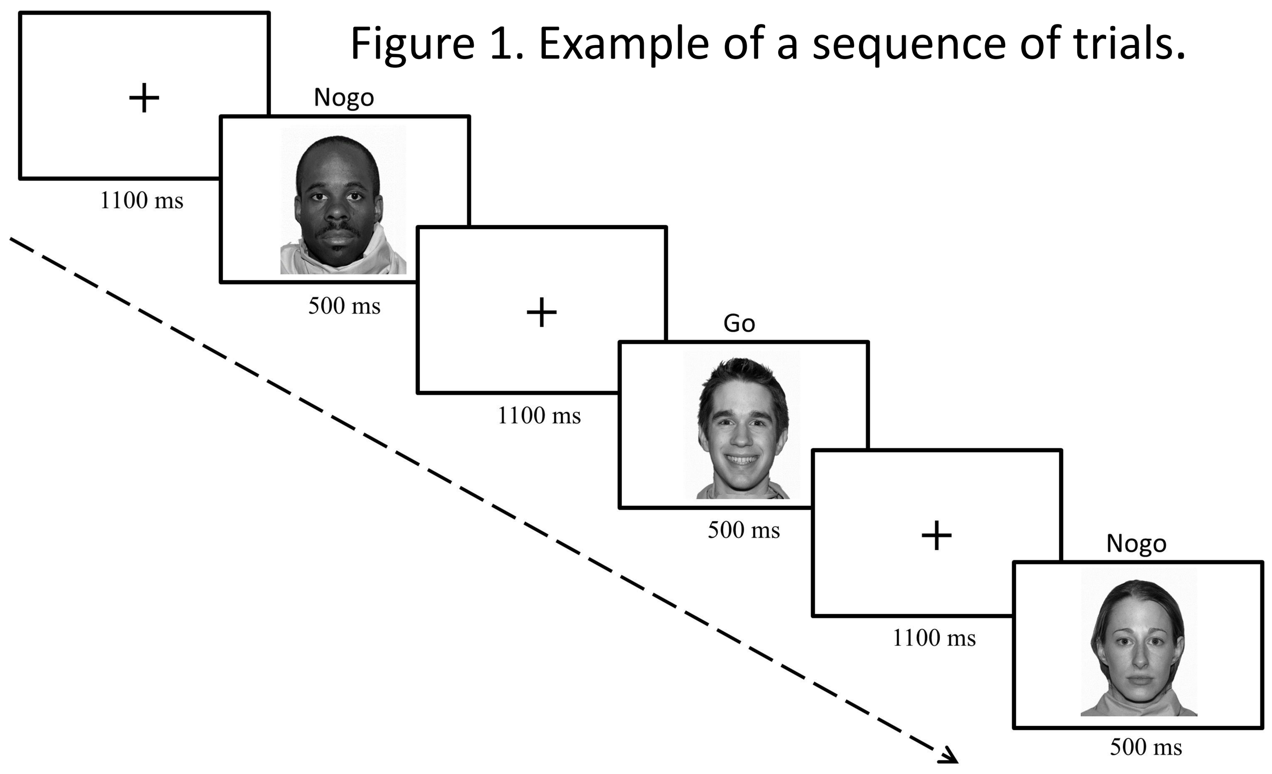
Method

❖The study sample was composed of 40 participants: 21 in the high EI group and 19 in the low EI group. EI was assessed by MSCEIT questionnaire (Spanish version; Extremera, Fernández-berrocal, & Salovey, 2006).

❖Participants carried out an well-established emotional go/no-go task (Tottenham et al, 2011). Brain activity was recorded by EEG during the task. N2 and P3 ERPs were used as indices of cognitive control processing. The N2 was defined as the most negative peak in the 150–350 ms time interval after face stimulus onset, and P3 as the most positive peak in the 300-500 ms time interval.

❖The go and no-go stimuli were 13 faces, each of them showing three emotional expressions: happy, fear and neutral (a total of 39 different faces). The task was composed of 6 blocks with the 6 possible combinations of go/no-go stimuli and facial expressions.

Figure 1. Example of a sequence of trials.



Results

❖ **Accuracy:** No-go trials showed a lower accuracy than go trials in general. Happy faces showed a higher accuracy than fear and neutral faces in go trials. Neutral faces showed a higher accuracy than fear and happy faces in no-go trials. (all p < .05).

Go/No-go ➔ F (1, 38) = 44.76, $p < .001$, $\eta^2_p = .54$
Go/No-go x Emo. ➔ F(2, 76) = 19.29, $p < .01$, $\eta^2_p = .34$

❖ **Reaction Times:** Participants responded faster to happy faces than to neutral and fear faces (all p < .05).

Emotion ➔ F (2, 76) = 13.74, $p < .001$, $\eta^2_p = .27$

❖ **N2:** No-go trials showed a larger N2 than go trials. High EI group showed a larger N2 than low EI group. Neutral faces showed a more negative N2 than fear and happy emotional faces (all p < .05). See Figure 2 and 3.

Go/No-go ➔ F (1, 38) = 4.57, $p = .03$, $\eta^2_p = .11$
EI group ➔ F (1, 38) = 4.19, $p = .04$, $\eta^2_p = .10$
Emotion ➔ F (2, 76) = 11.92, $p < .001$, $\eta^2_p = .24$

❖ **P3:** No-go trials showed a larger P3 than go trials. Neutral faces showed a less positive P3 than fear and happy faces (all p < .05).

Go/No-go ➔ F (1, 38) = 46.59, $p = < .01$, $\eta^2_p = .55$
Emotion ➔ F (2, 76) = 8.98, $p = .03$, $\eta^2_p = .19$

Figure 2. Grand average waveforms for Group and Go/No-go trial at FCz. Time-locked to the face stimulus onset.

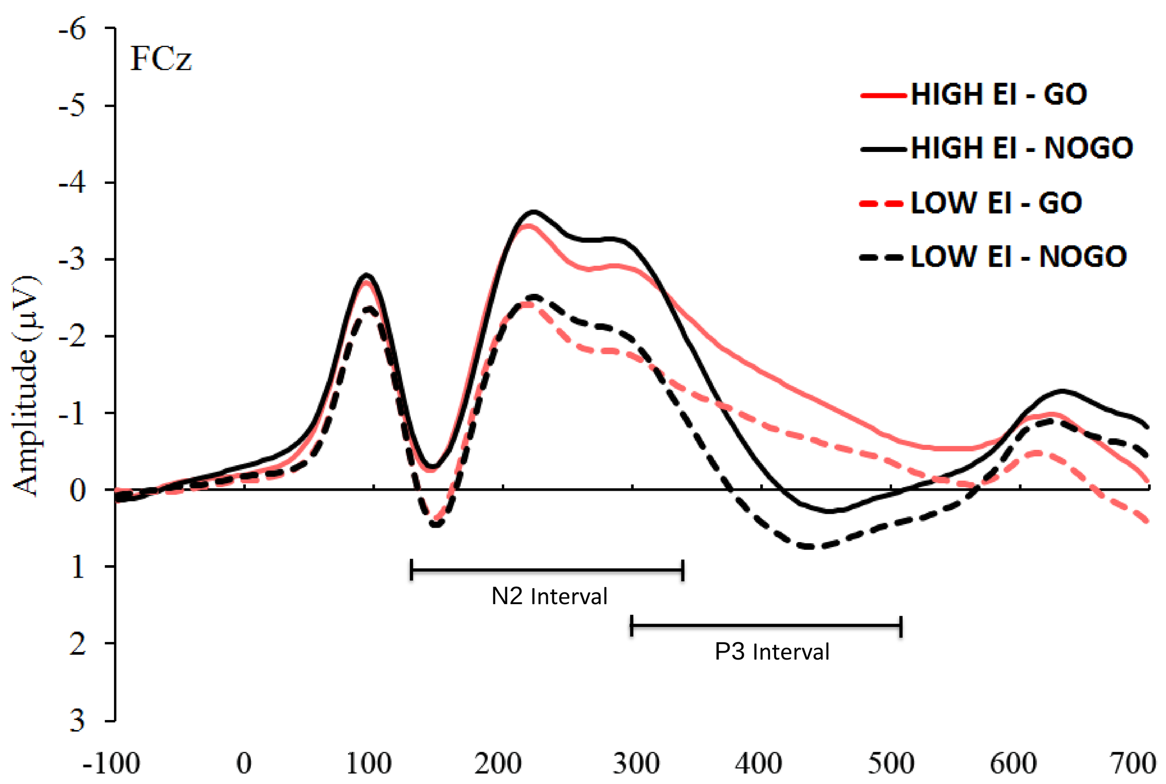


Figure 3. Average N2 amplitude at FCz for each level of Group, Go/No-go trial and Emotion.

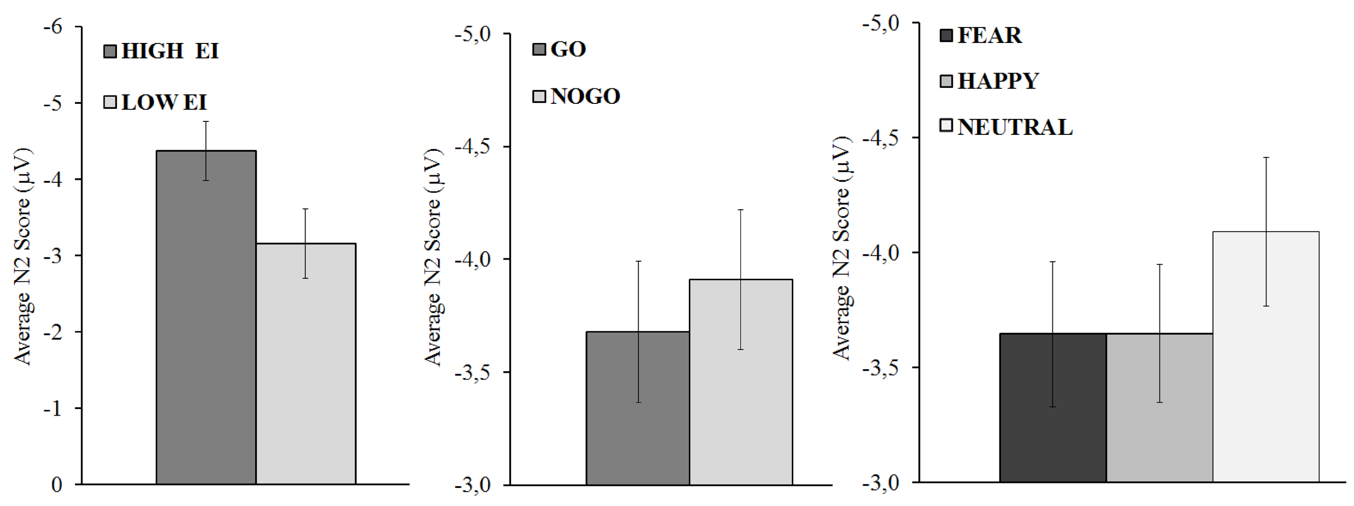


Figure 4. Grand average waveforms for Emotional face at FCz. Time-locked to the face stimulus onset.

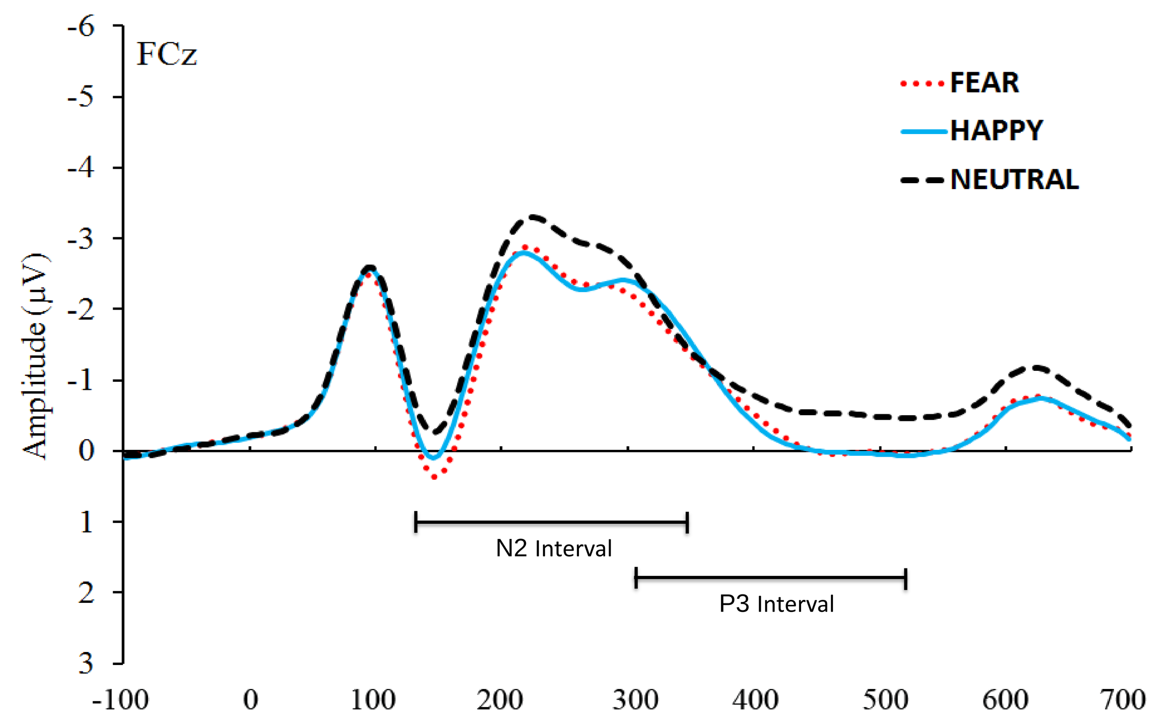
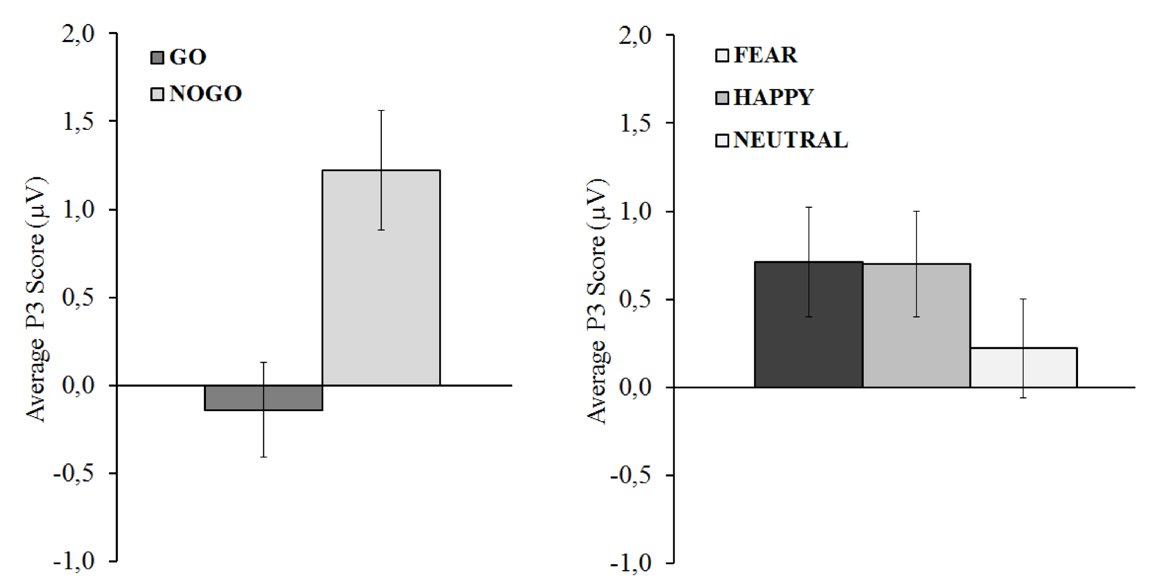


Figure 5. Average P3 amplitude at FCz for each level of Group, Go/No-Go trial and Emotion.



Discussion

❖The present study supports that the capacity for cognitive control is impaired when emotional information is involved in cognitive tasks, reducing the ability to regulate behavior.

❖As main objective, it was found that electrophysiological mechanisms underlying the execution of emotional tasks that involve cognitive control depended on individual emotional abilities. Participants with higher EI presented a greater capacity for cognitive control, reflected by a larger N2 component on no-go trials. Moreover, between-group differences in N2 on go trials could be associated with performance changes in the detection and evaluation of the target stimuli (Cid-fernández, Lindín, & Diaz, 2016).

❖These findings constitute further evidence of the strong integration of emotion and cognition, and the potentially important role played by EI in linking both constructs. From an applied point of view, our results suggest that training in EI abilities may be beneficial for adequate performance in tasks involving emotional content.

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