What does the Eriksen Flanker task measure? An ERP investigation

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Background
1. The fronto-central N2 (200-300ms post-stimulus at Fz) observed in the Go-Nogo paradigm typically interpreted as an index of response inhibition [1].
2. By analogy, a negativity reported for incongruent trials in the flanker task also interpreted as an index of response inhibition [2,3].
3. Striking diversity in characteristics of the reported N2 component across different ERP studies using the flanker paradigm (different from the Go-Nogo N2):
   - varying topography (e.g. posterior)[3],
   - divergent time windows [8,9],
   - nonstandard measures (non-nasion reference [3], using peak amplitudes [2]),
   - the effect often confused with the P300 for congruent trials [1,4,6].

Task structure
Respond to the direction of the central arrow
Ignore the distractors (flanking arrows)
2 blocks,
72 trials in each,
50% congruent trials
50% trials under fixation point

Results

Behavioral results:
repeated measures ANOVA
3 (Test wave) x 2 (Congruity)

ERP results:
repeated measures ANOVA
3 (Test wave) x 3 (Electrode Cluster) x 2 (Congruity)
in the 490-630 ms time window
* <.05 ** .<001

Conclusions
1. Despite the general consensus on the N2 in the Eriksen Flanker Task, we did not obtain the N2 effect, instead we report P2 + P300 components.
2. Based on literature review, the fronto-central N2 occurs only in modified versions of the Eriksen Flanker Task, e.g. when the proportion of trials is manipulated (the higher the proportion of congruent trials, the larger N2 for incongruent vs. congruent trials) [4].
3. Basing on the P2 finding, possible strategy of resolving conflict in the canonical Flanker task: focusing on central arrow helps avoid interference in incongruent trials.
4. The N2 is elicited in the Flanker task, when the dominant reaction related to congruent stimuli need to be inhibited (the N2 as an index of response inhibition). Whereas, in the canonical Flanker task, there is no need to inhibit a response, but there is need to resolve the interference between the target and flankers (the P2 as an index of selective attention).

References

The research was supported by Foundation for Polish Science subsidy. National Science Centre grant awarded to Zofia Wodniecka and Ministry of Science and higher education grant awarded to Patrycja Kałamała, we are grateful to the participants, who volunteered to take part in our study.