

NEUROPHYSIOLOGICAL EXAMINATION OF DECISION-MAKING IN THE AGING BRAIN: AN ERP STUDY FROM DIFFERENT CONTEXTS OF DECISION

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Background: According to the Affect–Integration–Motivation (AIM) framework, decisions are preceded by affective, integrative, and motivational processes. Affect potentiates gain/loss anticipation, being integrated with further evaluative considerations. Finally, motivation processes promote subsequent responses of approach/avoidance. Some of these processes are affected by aging, as older adults have preserved gain but reduced loss anticipation and value integration.

Aims: This study aimed to identify age differences in neural correlates of the AIM processes. To this purpose, younger and older adults performed the Monetary Incentive Delay (MID) task adapted to event-related potentials.

Method: During the MID task, a cue signals possible gains/losses and is followed by a target detection to win/avoid losses. Thus, the cue elicits anticipatory affective processes, which are integrated with further considerations to influence motivation processes that promote the target detection. Data was recorded from 77 participants (20–80 years old) to analyse the Cue-P3 (affective processes), Contingent Negative Variation (CNV; integration processes) and the Target-P3 (motivation processes). For younger adults (YA), we hypothesized larger amplitudes for gain/loss compared to neutral trials. For older adults (OA), we hypothesized larger amplitudes for gain than neutral trials, but similar amplitudes between loss and neutral trials.

Results: For YA, cues anticipating gain ($p = .004$) and loss trials ($p < .001$) elicited larger Cue-P3 than cues anticipating neutral trials. For OA, cues anticipating gains elicited larger Cue-P3 than cues anticipating neutral trials ($p = .012$), but cues anticipating loss and neutral trials elicited similar amplitudes ($p = .197$). Moreover, cues of gain ($p < .001$) and loss trials ($p = .019$) elicited larger CNV than cues anticipating neutral trials for YA. For OA, the three conditions elicited similar amplitudes (both $ps > 0.572$). Finally, targets of gain and loss trials elicited larger Target-P3 than neutral trials, both for YA (both $ps < .001$) and OA (both $ps = .006$).

Conclusions: The results support the AIM framework, suggesting that aging alters affective and integration processes. However, according to the results of the Target-P3, aging may preserve motivation processes, including the capacity to differentiate between gain/loss targets (that will result in a monetary gain/loss) from those that will result in neutral feedback.

Keywords: Aging, decision-making, Event-related potentials, Reward anticipation, Feedback processing

Publications:

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