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Title of the doctoral thesis:

DECISION BIAS IN WORKING MEMORY RECOGNITION TASKS - A COGNITIVE NEUROSCIENCE PERSPECTIVE

ABSTRACT

Due to the continuous permeation of decision and memory processes in everyday cognitive functioning, the question about the mechanisms underlying their interaction seems to be of high importance - also from the perspective of research concerning other cognitive processes. This work discusses how response bias, liberal or conservative, impacts the ability to recognize stimuli when their representations are held in working memory. The thesis consists of two thematically consistent published research papers that deal with the issues from the fields of cognitive psychology and neuroscience, chronopsychology and psychophysiology. In both studies, modified versions of the Deese-Roediger-McDermott paradigm in a variant dedicated to study short-term memory distortions, were used. The criterion, a measurement established by the signal detection theory, was calculated to determine the response bias.

Data analysis from the first study was aimed at determining whether decision bias and effectiveness in differentiating the stimuli change with the time-of-day, and as a consequence affect the performance in working memory tasks. The results have shown that participants were more likely to demonstrate more liberal response strategy in the evening, rather than in the morning. This, together with the previous literature pointing to the involvement of the locus coeruleus in response bias, may indicate that the daily variations of the norepinephrine release impact, to some extent, the formation of recognition decisions.

The second experiment, conducted with the use of the eye tracking technique, allowed to determine the relationship between changes in pupil dilation, decision bias and type of reaction (old/new item). When participants' decision about the upcoming stimulus was not in line with their response bias, there was an increase in their pupil dilation, the pupil slope was gentler, and the response times were longer. As pupil dilation has been shown to be linked with the norepinephrine release, such findings indicate once more, that cognitive performance in working memory tasks may, at least partially, be linked with the locus coeruleus activity.

Taken together, the results obtained from both of those experiments suggest that the noradrenergic neuromodulatory system may be crucial for the shaping of the decision bias during the identification of stimuli. As the role of the norepinephrine in recognition memory remains underexplored, reported findings set a novel direction in research on the role of neuromodulation in cognitive functioning.

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