

Dopaminergic and serotonergic modulation of working memory
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Previous studies have suggested that both the mammalian prefrontal cortex (PFC) and the avian neostriatum caudolaterale (NCL) subserve cue-related information maintenance and stabilization processes. In addition, they exhibit elevated firing frequency during the short-term memory component of a working memory task, and this has been recognized as a neuronal correlate of working memory activity. *In vivo* microdialysis in combination with high pressure liquid chromatography was used in a freely moving pigeon model to test the hypothesis that it is mainly the dopaminergic system in the NCL that is functionally involved in short-term memory component required by a working memory task. To test this hypothesis, an instrumental conditioning delayed matching to sample (DMTS) task with a short-term memory component and a matching to sample (MTS) task lacking this component were utilized. In these tasks, the pigeons were given a color-stimulus to maintain over a 4-second delay period. At the end of this delay period, they were presented with two colors, the one being the cue-color presented at the beginning of the delay component and the other an alternative color. The main result was the significant increase in dopamine (DA) release in the NCL during DMTS task. But no significant effect was observed in DA release in the NCL during MTS task. Instead, the data indicate only a less pronounced involvement of the DAergic system in the avian striatum during the DMTS task compared to the baseline level. Furthermore, for the first time the serotonergic system was also explored during a working memory task, and in contrast to the DA data, no special effect was found regarding the serotonergic system in the NCL. In spite of this fact, the results demonstrated a less pronounced involvement of the serotonergic system in the avian striatum again during the DMTS task compared to the baseline level.

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