

EVIDENCE FOR THE CAUDATE INFLUENCES ON MEMORY-GUIDED SACCADDES.

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Takikawa et al. (this issue) showed that the saccade-related activities in caudate (CD) projection neurons, together with saccade parameters, were modulated by reward expectation (motivation). The results suggest, but do not indicate, that the CD is a source of the changes in saccade parameters. The behavioral and neuronal modulations could independently reflect the difference between the rewarded and non-rewarded states. To investigate this issue, we analyzed the behavioral and neuronal data in a trial-by-trial basis. The analysis was based on CD neurons which were recorded using an ordinary memory-guided saccade task (ADR) and its asymmetrically rewarded version (1DR); they included neurons showing pre-cue, post-cue, and peri-saccadic responses. For each neuron, we calculated the correlation coefficients between saccade parameters (peak saccade velocity and latency) and the firing rate. This was done separately for each saccade direction (out of 4) and each reward condition (out of 5), thus excluding the possible differences in the rewarded/non-rewarded states and saccade directions. To evaluate the time course of the behavior/neuron relationship, we set a time window (200 ms) for calculation of the firing rate which was moved with a 100 ms step throughout a trial. We then calculated the grand average of the correlation coefficients for all neurons. The results showed that the saccade velocity was positively correlated with the firing rate, not only during or just before the saccade, but also during the delay period and pre-cue period. In contrast, there was a negative (but weak) correlation between the saccade latency and the firing rate. These results suggest that the CD activity, on the whole, starts to affect the characteristics of a memory-guided saccade much prior to its execution, especially under motivational control.

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