ABSTRACT

In a series of now classic experiments, an output structure of the basal ganglia (BG) the substantia nigra pars reticulata (SNr) was shown to be involved in the generation of saccades made in particular behavioral contexts, such as when memory was required for guidance. Recent electrophysiological experiments however, call this original hypothesis into question. Here we test the hypothesis that the SNr is involved preferentially in non-visually guided saccades using electrical stimulation. Monkeys performed visually and memory-guided saccades to locations throughout the visual field. On 50% of the trials, electrical stimulation of the SNr occurred. Stimulation of the SNr altered the direction, amplitude, latency and probability of saccades. Visually-guided saccades tended to be rotated toward the field contralateral to the side of stimulation whereas memory-guided saccades tended to be rotated toward the hemifield ipsilateral to the site of stimulation. Overall, the changes in saccade vector direction were larger for memory-guided than visually-guided saccades. Both memory and visually-guided saccades were hypometric during stimulation trials, but the stimulation preferentially affected the length of memory-guided saccades. Electrical stimulation of the SNr produced *decreases* in visually-guided saccades bilaterally. In contrast, memory-guided saccades often had *increases* in saccade latency bilaterally. Finally, we found ~10% reduction in the probability of memory-guided saccades bilaterally. Visually-guided saccade probability was unaltered. Taken together the results are consistent with the hypothesis that SNr primarily