

during performance of visually-guided and memory-guided saccades (Bayer et al. 2002). One possibility for this difference, as suggested by the latter authors (Bayer et al. 2002) is that the rate of reward for visually-guided versus memory-guided eye movements differed between the two recording studies. It is unlikely that differences in the rate of reward can explain the differences we obtained with electrical stimulation since our monkeys were given rewards virtually regardless (the electronic windows were increased on stimulation trials) of their performance in order to encourage continued participation in the task. Rather, our results are consistent with the role of the BG in behavior more generally (Mishkin and Petri 1984). When salient sensory information is present, the BG are less critical for movement (Glickstein and Stein 1991; Morris et al. 1996). In contrast, when sensory information is absent or provides no new information, the BG are critical. For saccades, this may result simply because generating the burst in SC neurons (Moschovakis et al. 1988a, 1988b; Moschovakis et al. 1996; Özen et al. 2004) is more dependent upon decreases in SNr activity when no cortical (Helminski and Segraves 2003; Paré and Wurtz 1997; Paré and Wurtz 2001; Sommer and Wurtz 2000) or cerebellar (May et al. 1990) drive is present.

The idea that the burst in SC neurons is influenced differently by the loss of SNr inhibition when an excitatory drive is present is suggested by the subtle differences in saccade vector rotation in visually-guided versus memory-guided saccades (Figures 5,6 and 7). The difference in efficacy of stimulation with and without a visual drive (presumably excitatory) suggests an hypothesis for the type of inhibition arising from the SNr to the SC. We suggest that the inhibition arising