Title: Motor control in the dorsal striatum

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The dorsal striatum (dS) has been involved in storing and retrieving procedural memories and linked to the control of movements kinematics. Delineating the dS function is challenging because movements are the readout of procedural memories. To disentangle this conundrum, we train rats in a set of original and complementary task. We found that dS lesions spared procedural memories but altered the kinematics of their expression in motor routines. Further behavioral analysis and theoretical simulations demonstrated that dS lesion did not affect animals' motivation, their ability to perform routines nor it modulated their running speed. Quite in contrast, dS lesion increased the animal sensitivity to energy expenditure. We propose that the dS computes an effort signal that influences the kinematics of purposive actions. By setting the sensitivity to effort, the dS contributes to the optimization of the energy invested into voluntary movements. Such an elementary function of the dS might explain its implication in both procedural decisions and the control of movement vigor.