

## **Supplementary Figure Legends.**

**Supplementary Figure S1. Whisker stimulation evokes action potentials in S1 of both hemispheres.** **A.** Example of a whole-cell recording from a layer V pyramidal neuron in S1. The dashed lines represent contra-, ipsi-, and bilateral whisker deflections (in blue, green, and red, respectively) **B.** PSTH showing the mean frequency of action potentials for contra-, ipsi-, and bilateral whisker stimulation in the neuron recorded in example A, following ~40 repetitions. The dashed line indicates the whisker deflection. Bin size = 25 ms, window = 500 ms. **C.** Average latency to the peak discharge response (N = 9). **D.** Average discharge response frequency, normalized to the baseline frequency (yellow dashed line, N = 9). Asterisks \*, \*\* represent p values smaller than 0.05, 0.01, respectively.

**Supplementary Figure S2. Application of TTX in ipsilateral S1.** Application of TTX in ipsilateral S1 blocked cortical (LFP1/2-S1) and striatal responses to contralateral whisker stimulation, and attenuated spontaneous activity in the injected ipsilateral S1 (LFP1, upper traces). In contrast, spontaneous slow wave activity in contralateral S1 (LFP2) and striatum was not affected, indicating that other corticostriatal and cortico-cortical pathways remained intact following TTX application.