SUPPLEMENTARY INFORMATION

Supplementary Videos

Supplementary Video 1. Three-dimensional whole-brain reconstructions of axonal projections from ChAT+ (magenta) and ChAT- (green) GP-FC cells. rAAVs DIO-EGFP (Cre-On) and FAS-tdTomato (Cre-Off) were injected into the GP and adjacent dorsal NB in a *ChAT* $^{i\text{-}Cre/+}$ mouse. The max projection video begins with a lateral to medial view of the injection site and Rt. A posterior to anterior fly through of cortex shows axons in frontal cortex and the lateral amygdala, followed by a medial to lateral view that exhibits subcortical projections to the Str, STN, SNr/c, PF and LH. A small amount of FAS-tdTomato expression in striatum contributes to the Cre-Off projection in SNr. Rt, thalamic reticular nucleus; Str, striatum; SNr/c, substantia nigra reticulata/compacta; PF, thalamic parafascicular nucleus; LH, lateral habenula.

Supplementary Video 2. Three-dimensional whole-brain reconstructions of axonal projections from iSPNs (green) and dSPNs (magenta) from dorsal striatum into GP/dorsal NB. rAAVs DIO-EGFP (Cre-On) and FAS-tdTomato (Cre-Off) were injected into the dorsal striatum of *D2r*-Cre mouse, to differentially label Cre^{+} iSPNs and Cre^{-} non-iSPNs. Since SPNs provide the only output of striatum, this strategy selectively labels iSPN and dSPN projections. Following a rotated lateral view of the whole brain, the video proceeds anterior to posterior, following single coronal slices through the injection site and back and forth through the GP before continuing to the SNr. Visualizing iSPNs and dSPNs individually illustrates that dSPN axons arborize widely in the ventral and posterior regions of GP/NB containing GP-FC cells.