Cross-task contributions of fronto-basal ganglia circuitry in response inhibition and conflict-induced slowing

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Supplementary

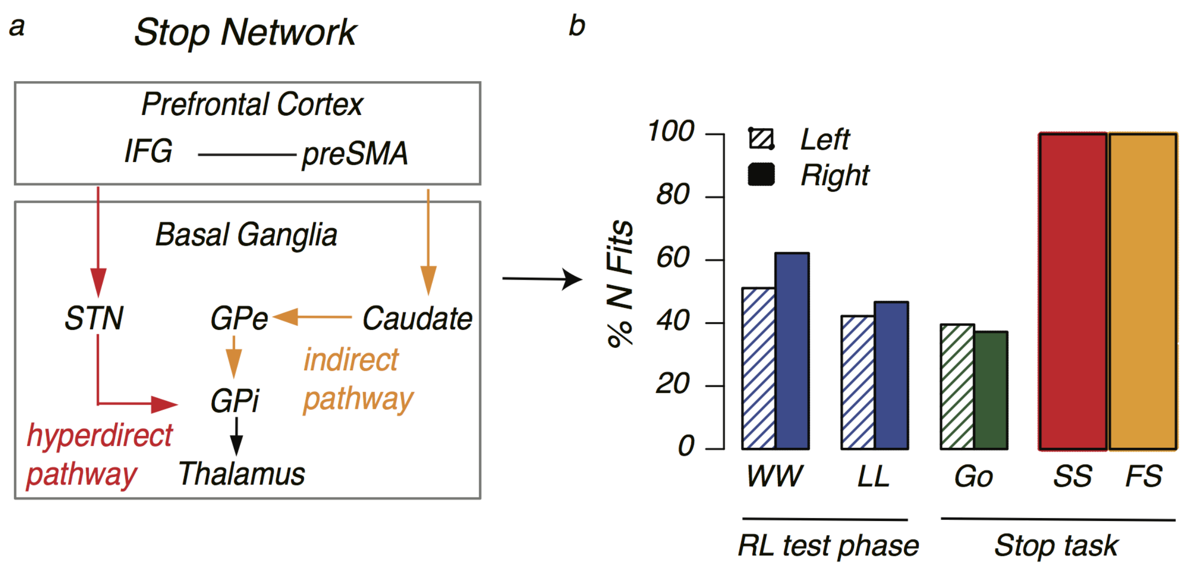

Figure 1: Right hemispheric Stop network and the percentage (%) of participants for whom the network fits the observed BOLD pattern during decision, or inhibition trials. A) Right hemispheric Stop network. Directed arrows represent effective connectivity, undirected arrows represent functional connectivity. On the left side of this model, the hyperdirect pathway is displayed including both the righ IFG, and preSMA, projecting into the right STN region. Right STN has effective connectivity with the right GPi, which in turn projects into the thalamus. On the right side, the model is complemented with the indirect pathway. Again, the IFG and preSMA project into the Caudate that is thought to activate a more selective stopping route, via projections to the GPe going into the GPi and finally into the Thalamus. Because IFG and preSMA each project into the STN and the Caudate, relationships among PFC nodes are defined as functional connectivity. B) When asked to inhibit a response this network fits the observed BOLD responses for all participants irrespective of whether the attempt succeeded (SS=successful stop attempt), or failed (FS= failed stop attempt). Critically, however, the proportion of participants for whom this model fits, is substantially reduced when an active choice is required based on: the discrimination of gender in faces (Go, Stop task), or the resolve of value-driven conflict (WW, positive value; LL, negative value). Left and right responses were evaluated separately for WW, LL and Go to improve fits (when collapsed over responses N_fit = 0 for all decision trials). We plot the % of participants for whom the Stop Network fits, or corresponds well to the observed pattern of BOLD responses across trials, because the number of subjects evaluated for the RL test-phase (N=45) differed from those evaluated in the Stop task (N=43). Fits are evaluated, per subject for each condition (e.g., WW, or SS), by using a modified version of the likelihood ratio (LR) test, which represents the relative difference in fit between the saturated model and the restricted Stop network (for more details please see Material and Methods).

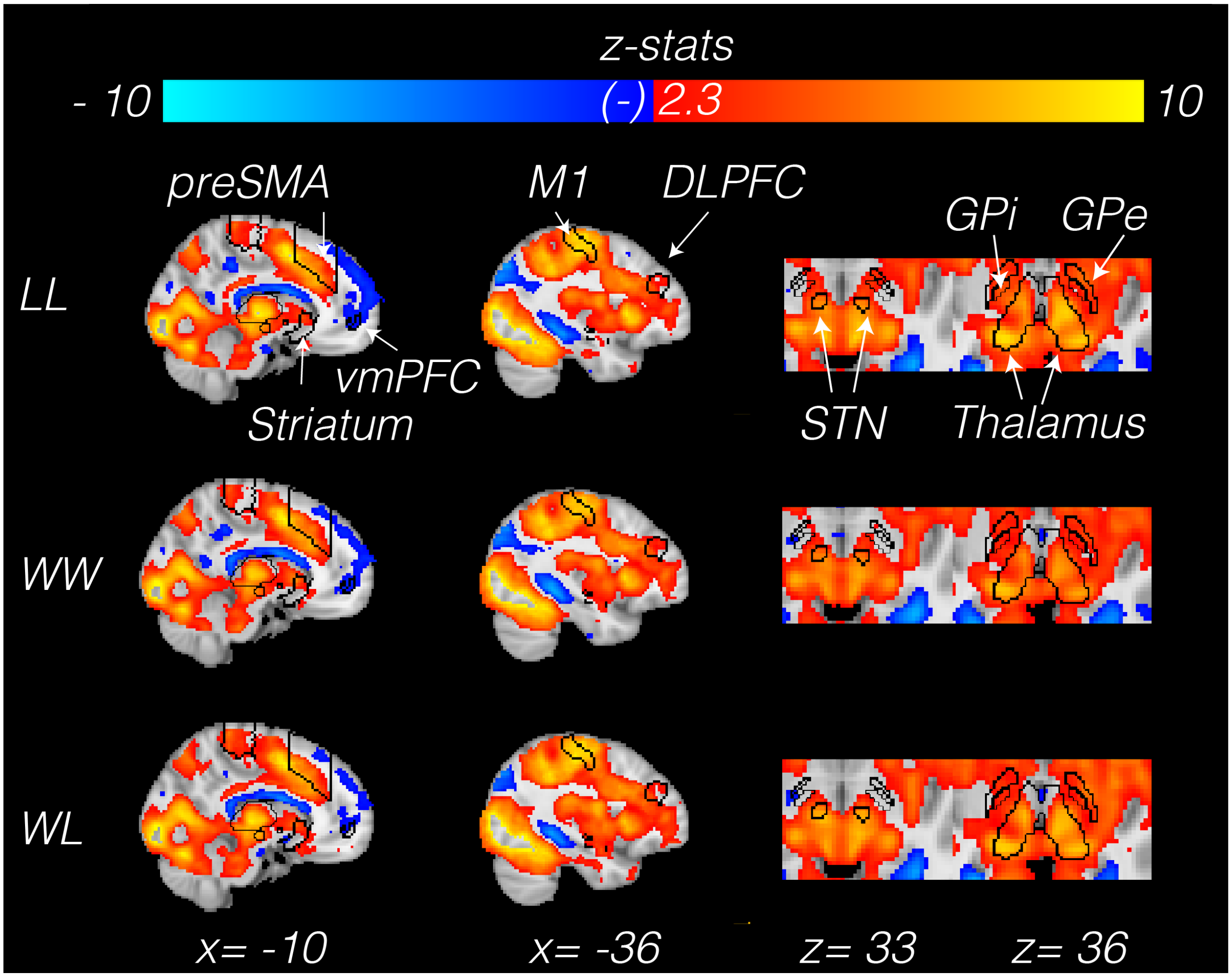

Figure 2: Whole brain activity patterns observed during LL, WW, and WL trials during the RL-task test phase. The connectivity masks used for the network in Figure 6 are overlaid for each behavior (for more details on the masks please see Material and Methods). Note that all masks were bilateral for the analysis shown in Figure 6, but are illustrated here only for one hemisphere on the cortex. Colourbar shows the cluster corrected z-scores with p<0.01. Red-orange reflects activation, whereas blue shows deactivation. These maps display the average over trials in each condition, whereas our connectivity analysis uses the variation across trials.

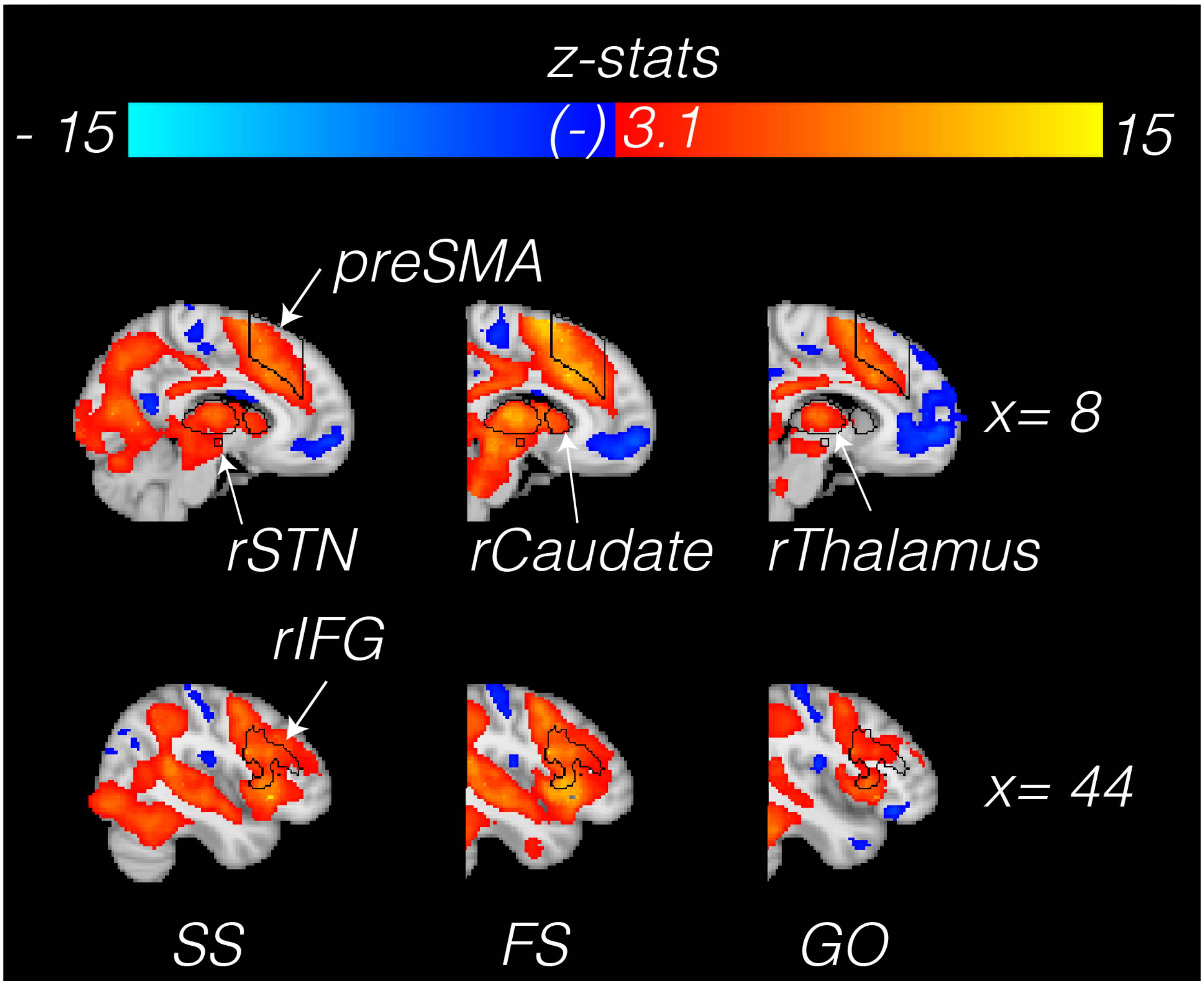

Figure 3: Whole brain activity patterns observed during successful stop (SS), failed stop (FS), and go (GO) trials of the Stop-task. The connectivity masks used in supplementary figure 1 are overlaid for each behavior. Colourbar shows the cluster corrected z-scores with $p<0.01$. Red-orange reflects activation, whereas blue shows deactivation. These maps display the average over trials in each condition, whereas our connectivity analysis uses the variation across trials.