

Supplementary Methods

Electrode implantation procedure

MR imaging (Siemens Magnetom Vision 1,5-T MRI scanner) was performed under stereotactic conditions under controlled anaesthesia to avoid the occurrence of any movement artefacts. The STN could be viewed directly on the T2-weighted Spin-Echo coronal images obtained perpendicular to the axial slices. The implantation was carried out under controlled anaesthesia using halogenated gas and Alfentanil. This type of anaesthesia is compatible with the intra-operative recording of STN and Substantia Nigra neuronal activity to assist targeting (Fluchère et al., 2014).

Postoperative CT-scan was obtained on day of surgery, fused with the stereotactic preoperative CT-scan with Leksell Surgiplan 10.1.1 (Elekta Instruments, Stockholm, Sweden), and incorporated into the surgical planning software for every patient. The location of all four contacts of the lead in relation to the subthalamic nucleus (intended target) could be obtained in all patients. The distance between the centre of the intended target within the nucleus and the final position of the lead was calculated (See supplementary Table 1).

Electrode selection

Note that all three bipolar contact pairs of each electrode were included in the cluster-based permutation analysis (Maris and Oostenveld, 2007), avoiding any bias introduced by contact selection. Nevertheless, we wanted to ascertain that the responses described here were recorded from the STN and not from any other structure in the vicinity. We therefore examined the response profile in contacts deemed to be within the STN due to the fact that they produced the best clinical effect and compared this approach to the cluster-based permutation method. We computed

the average response to the reward and effort cue by using these 2 different methods and compared the results obtained by means of RM ANOVA. In particular, for the reward cue response, we performed an RM ANOVA with the REWARD condition, the TREATMENT condition and the CONTACT PAIR SELECTION METHOD as independent variables. We confirmed the significant effect of the reward condition ($p=0.02$) whereas no other effect reached significance. In particular, none of the effects involving the contact pair selection method was significant (all $p>.3$). Similarly, we performed an RM ANOVA on the effort cue response with ACCEPTANCE, TREATMENT and CONTACT PAIR SELECTION METHOD as independent factors. We confirmed the significant effect of acceptance ($p=0.01$), while none of the effects involving the contact pair selection method reached significance (all $p>.15$).