

## Supplementary methods

### Controlling for valid trial data

Statistical analysis was performed on correct, artefact-free and non-outlier trials. Trials were excluded based on the following criteria: (i) Missed or incomplete tracking performance. This was rarely the case:  $99.7\% \pm 0.7$  of trials for PSZ,  $99.9\% \pm 0.3$  for HC and  $99.9\% \pm 0.2$  for SIB were retained for further analysis. (ii) Trials in which subjects gave an incorrect sum of memorized numbers at the end of a Dual-ADD block. Overall, for force tracking analysis, in Dual-DIST and Dual-ADD conditions, an average of  $29.7 \pm 5.2$  trials were included for PSZ,  $32.4 \pm 2.7$  for HC and  $32.5 \pm 3.6$  for SIB. (iii) Trials including eye blinks or missing/artefactual eye tracking data in Dual-DIST and Dual-ADD conditions. An average of  $25 \pm 8.6$  trials were retained in PSZ,  $25.5 \pm 7.7$  in HC and  $28.9 \pm 6.0$  in SIB for each of the Dual-DIST and Dual-ADD conditions for eye tracking analysis. (iv) Trials with TMS-related EMG artefacts. An average of  $10.7 \pm 1.8$  MEPs (in Dual-DIST and Dual-ADD conditions) were retained in PSZ,  $10.8 \pm 1.3$  in HC and  $10.9 \pm 1.4$  in SIB. (v) Outlier data from experimental variables (visuomotor, gaze and TMS measures) according to Hoaglin's method (Hoaglin et al., 1986). Two subjects were classified as outliers and excluded from the tracking analysis (1 PSZ, 1 HC).

None of these (marginal) group differences in number of trials explained group differences in force tracking, gaze or neurophysiological results.

### References

Hoaglin DC, Iglewicz B, Tukey JW. Performance of Some Resistant Rules for Outlier Labeling. *J. Am. Stat. Assoc.* 1986; 81: 991–999.

## Supplementary results

### Behavioral results – mean force applied during force-tracking

To control for correct task comprehension and achievement between groups, mean applied force was extracted in the HOLD phase and normalized to 1 Newton target force.

The mean applied force did not differ between patients (mean force $\pm$ SD; Single: 1N $\pm$ 0.05; Dual-DIST: 1.01N $\pm$ 0.04; Dual-ADD: 1N $\pm$ 0.04), controls (Single: 1.01N $\pm$ 0.03; Dual-DIST: 1N $\pm$ 0.03; Dual-ADD: 1N $\pm$ 0.03) and siblings (Single: 1.01N $\pm$ 0.03; Dual-DIST: 1N $\pm$ 0.02; Dual-ADD: 1.01N $\pm$ 0.04) across conditions (ANOVA mean force, GROUP:  $F(2,62)=0.25$ ,  $p=0.78$ ). The ANOVA showed no effect of CONDITION ( $F(2,62)=0.04$ ,  $p=0.96$ ) nor interaction effect GROUP\*CONDITION ( $F(4,124)=1.14$ ,  $p=0.34$ ).

### Neurophysiological results – controlling for smoking status

Nicotine consumption has been shown to increase cortical excitability. Our following three step analysis showed no influence of smoking status on results and statistics of group differences:

(i) The percentage of smokers did not significantly differ between groups (PSZ: 36%; HC: 28%; SIB: 41%):

- PSZ vs. HC: Mann-Whitney  $U=287.5$ ,  $n_1=n_2=25$ ,  $p=0.63$  two-tailed

- PSZ vs. SIB: Mann-Whitney  $U=201.5$ ,  $n_1=25$ ,  $n_2=17$ ,  $p=0.78$  two-tailed

- HC vs. SIB: Mann-Whitney  $U=184.5$ ,  $n_1=25$ ,  $n_2=17$ ,  $p=0.48$  two-tailed

(ii) Across all groups, task-related cortical excitability of smokers (mean MEP amplitude: 1.68 $\pm$ 0.60) and non-smokers (mean MEP amplitude: 1.56 $\pm$ 0.44) did not significantly differ (smokers vs. non-smokers:  $t(65)=-0.81$ ,  $p=0.42$ , two-tailed).

(iii) When included as a covariate in the ANOVA of cortical excitability, smoking status did not explain the interaction between GROUP and CONDITION factors (ANCOVA: GROUP\*CONDITION:  $F(4,124)=5.88$ ,  $p<0.001$ ) nor group differences between patients with schizophrenia and healthy controls in the Single-task condition (PSZ vs. HC: post-hoc,  $p=0.02$ ).

### Clinical results – controlling for outliers in SAS score

No difference of force tracking error has been found in the one patient that was identified as an outlier on extra-pyramidal score. We identified this patient as an outlier using the

Hoaglin's method. This patient had a SAS score of 13. However, this patient's NSS total score of 21 and sensory-integration sub-score of 4 were not classified as outliers (again using Hoaglin's method). This patient also had mid-range (near group's average) clinical symptoms (PANSS/BPRS) and CPZ equivalent. His performance in the grip force-tracking task was in the average of his group: Single-task: 0.11N (PSZ Group mean±sd: 0.12±0.05); Dual-DIST: 0.15N (PSZ Group mean±SD: 0.15±0.07); Dual-ADD: 0.18 (PSZ Group mean±SD: 0.17±0.09).

Coherent with the above findings, at the group level, there was no significant Spearman correlation between SAS scores and force tracking error in the patient group ( $r=0.21$ ,  $p=0.33$ ).