Supplementary Materials

Table S1. Summary of the raw data for Experiment 1

Participant	no TMS				SI				IPL			
	Hits	FA	d'	C	Hits	FA	d'	C	Hits	FA	d'	C
1	24	1	2.7	0.5	12	4	0.9	0.7	12	0.5	1.9	1.2
2	29	9	2.4	-0.7	29	2	3.3	-0.2	28	1	3.3	0.2
3	23	1	2.6	0.6	10	0.5	1.7	1.3	23	1	2.6	0.6
4	29.5	4	3.2	-0.5	28	2	3.0	0.0	29.5	2	3.6	-0.3
5	26	8	1.7	-0.2	18	9	0.8	0.1	26	6	2.0	-0.1
6	13	1	1.7	1.0	12	1	1.6	1.0	6	1	1.0	1.3
7	29.5	1	4.0	-0.1	18	4	1.4	0.4	27	0.5	3.4	0.4
8	14	11	0.3	0.2	21	12	0.8	-0.1	21	14	0.6	-0.2
9	27	1	3.1	0.3	24	3	2.1	0.2	17	0.5	2.3	1.0
10	29.5	5	3.1	-0.6	26	9	1.6	-0.3	24	0.5	3.0	0.6
11	15	4	1.1	0.6	10	7	0.3	0.6	18	4	1.4	0.4
mean±SE	24±2	4±1	2.3±0.3	0.08±0.17	19±2	5±1	1.6±0.3	0.34±0.15	21±2	3±1	2.3±0.3	0.46±0.17

SE: standard error of the mean; C: criterion; FA: false alarm; d': d-prime

Table S2. Summary of the raw data for Experiments 2-7

Experiment	Task	Type	Targets		
			No TMS	SI	IPL
2	Detection	2-IFC	0.28±0.03(A.U.)	0.31±0.05(A.U.)	0.31±0.05(A.U.)
3	Detection	2-IFC	0.15±0.04(A.U.)	0.24±0.06(A.U.)	0.22±0.04(A.U.)
4	Discrimination	2-IFC	63.5±6.39Hz	82.0±6.73Hz	72.1±7.17Hz
5	Detection	2-IFC	0.13±0.02(A.U.)	0.41±0.09(A.U.)	0.25±0.05(A.U.)
6	Detection	2-IFC	0.11±0.03(A.U.)	0.46±0.10(A.U.)	0.25±0.06(A.U.)
7	Discrimination	2-IFC	26.7±5.25Hz	97.8±14.7Hz	66.8±13.4Hz

AU: absolute values thresholds

Table S3. Summary of the statistical comparisons for the different experiments

Experiment	Task	Measure	no TMS vs. SI/MN		no TMS vs. IPL/EDC		SI/MN vs. IPL/EDC	
			t	p	t	p	t	p
1	Detection	d-prime	2.45	0.02*	0.41	0.69	2.96	0.007*
		Criterion	-2.65	0.012*	-2.57	0.01*	-0.77	0.23
2	Detection	(A.U.)	-0.65	0.26	-0.92	0.18	-0.004	0.50
3	Detection	(A.U.)	-2.5	0.01*	-3.9	0.001*	0.84	0.21
4	Discrimination	Hz	-3.26	0.004*	-1.57	0.07	2.11	0.03*
5	Detection	(A.U.)	-3.38	0.003*	-3.24	0.004*	2.85	0.008*
6	Detection	(A.U.)	-3.46	0.002*	-2.67	0.01*	2.61	0.01*
7	Discrimination	Hz	-5.27	0.0001*	-3.46	0.002*	2.46	0.02*

AU: absolute values thresholds

Table S4. MNI coordinates of TMS target sites for the index and middle fingers

Target	Hem	MNI coordinates					
		Index Finger			Middle Finger		
		x	y	z	x	y	z
M1*	L	-50.67 (1.63)	-11.67 (8.33)	80.33 (7.09)	-44.00 -	-12.00 -	92.00 -
	R	53.60 (4.77)	-7.20 (8.32)	84.00 (7.21)	52.33 (4.27)	-8.33 (6.62)	83.00 (3.29)
S1	L	-45.00 (8.27)	-22.33 (6.12)	53.67 (8.52)	-47.33 (7.57)	-18.67 (2.31)	54.67 (4.62)
	R	50.80 (2.68)	-20.80 (2.28)	53.60 (4.56)	50.33 (6.12)	-16.00 (5.37)	50.00 (9.80)
IPL	L	-57.33 (5.32)	-52.67 (4.50)	32.33 (7.74)	-53.33 (6.11)	-49.33 (5.03)	44.00 (12.17)
	R	51.60 (6.10)	-55.20 (4.82)	40.40 (11.52)	52.67 (6.02)	-50.00 (8.10)	45.67 (5.85)

Values are means (SD in parentheses) Hem=hemisphere; N=number of participants; MNI=Montreal Neurological Institute coordinates (MNI 152 brain, 2mm resolution, viewed in FSLView; x,y,z=coordinates in MNI space; M1=primary motor cortex target; * Coil location, outside the brain; S1=primary somatosensory target; IPL=inferior parietal lobule target.

Trial by trial, motor evoked potentials (MEPs) are similar for TMS over SI and IPL

Typically, when TMS is applied over primary somatosensory cortex, it produces motor responses via stimulation of the adjacent motor cortex. In order to control for this, in the 2IFC design experiments with TMS on the scalp, we recorded MEP response amplitudes of the hand contralateral to the TMS. As depicted by Figure S1, in Experiment 2, analysis of motor responses recorded over the FDI muscle contralateral to the stimulated hemisphere revealed that the MEP responses (peak-to-peak amplitude within a window ~15-60ms after the TMS pulse) were significantly greater when TMS was applied over SI (M±SE=243±57μV) compared to when it was applied over IPL (M±SE=113±24μV; $t(9)=2.27$, $p=.05$). However, in Experiment 3 the FDI MEP amplitudes were not significantly different when TMS was applied over SI (M±SE=216±54μV) compared to over IPL (M±SE=179±40μV; $t(7)=1.66$, $p=.14$). The fact that a significant effect of TMS site was found in MEP response amplitudes in Experiment 2, but not in Experiment 3, and no significant effect of TMS site was seen on tactile detection thresholds in either experiment, suggests that coincidental motor responses dissociate from, and cannot therefore account for, participants' behavioural performance (e.g., Cohen et al., 1991; McKay et al., 2003). Similarly, in Experiment 4 analysis of the MEP responses did not reveal significant differences in MEP amplitudes when TMS was delivered over SI (M±SE=139±64μV) compared to over IPL (M±SE=123±21μV; $t(8)=0.79$, $p=.45$), again ruling out a motor explanation for the significant differences in the effect of TMS on tactile discrimination thresholds.

The mean levels of MEPs across all conditions (Figure S1) were 100-250μV – clearly above threshold, but on average not very large. There were no other significant differences in the mean amplitudes or in the number of MEPs (defined as >25μV peak-to-peak, or using 50 or 100μV criteria) evoked between conditions and experiments (14 comparisons, uncorrected $ps>.05$). Stimulation over the EDC induced very large muscle twitches in the index and other fingers, in many cases pulling the finger off the weighted stimulator. Despite this massive motor interference, thresholds were significantly smaller with stimulation over EDC than with stimulation over the median nerve, arguing against a motor explanation for decreased sensory sensitivity.

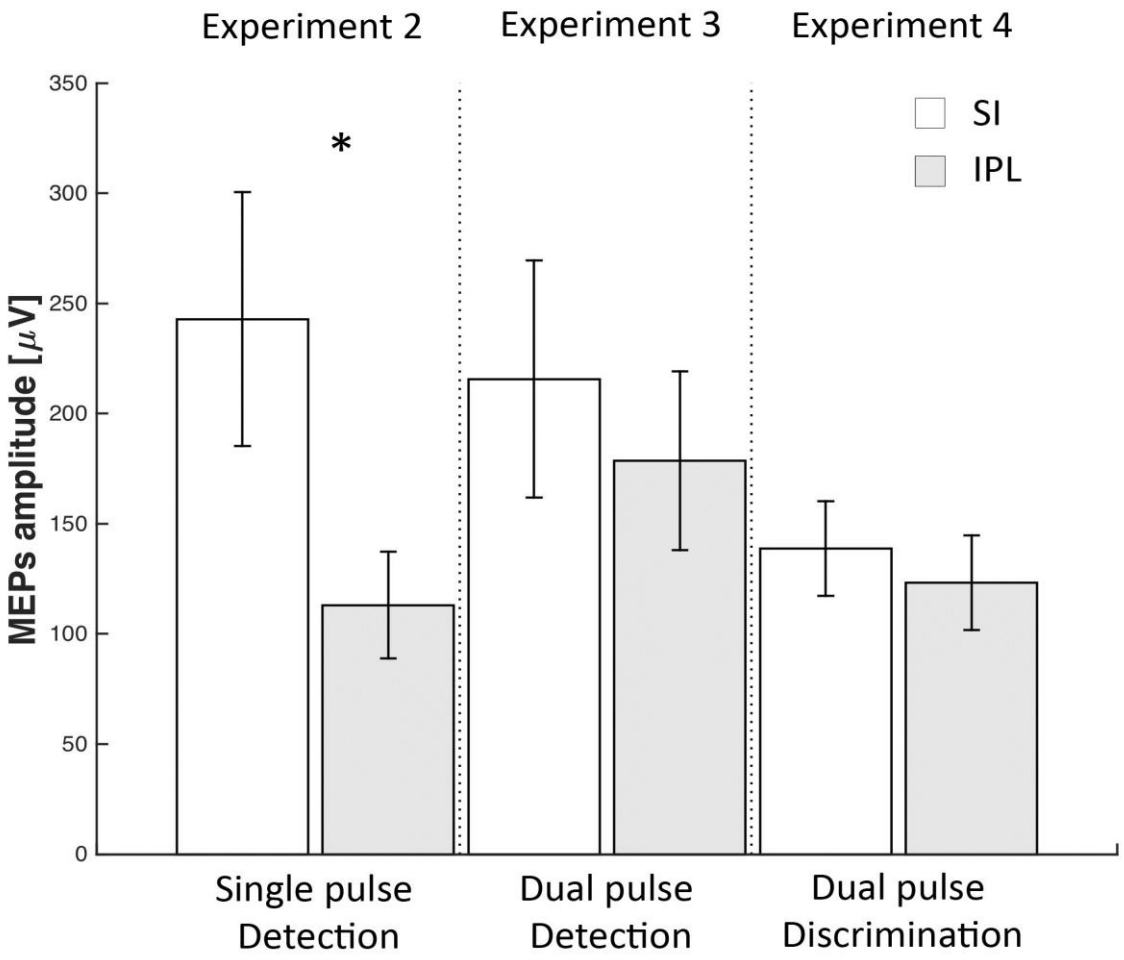

Figure S1. Mean (±SE) motor-evoked potential (MEP) amplitude over the first dorsal interosseus (FDI) muscle contralateral to the stimulated hemisphere, when TMS was applied over SI and IPL in Experiments 2, 3, and 4.

Averaged motor evoked potentials (MEPs) for TMS over SI and IPL

A complementary analysis of the EMG data used the grand averaged EMG traces over all trials for each condition and participant. While this approach minimises the contributions of random noise, it also smooths out any trial-by-trial differences in MEP latency or waveform. The peak-to-peak amplitude of the grand-averaged MEP for each participant and condition was then averaged across participants. Mean MEPs were larger in Experiment 2 for SI (190±56.9μV) than for IPL (31.7±7.79μV, $t(8)=3.02$, $p=.017$), comparable in Experiment 3 (SI, 141±66.1μV; IPL, 43.7±13.8μV,

t(7)=1.79, p=.116), and larger for SI (65.9±12.1μV) than IPL in Experiment 4 (18.0±2.42μV, t(8)=4.30, p=.002). Averaging across SI and IPL, mean MEPs were larger in Experiment 2 (111±29.0μV) than in Experiment 4 (41.9±6.18μV, t(8)=2.51, p=.024.

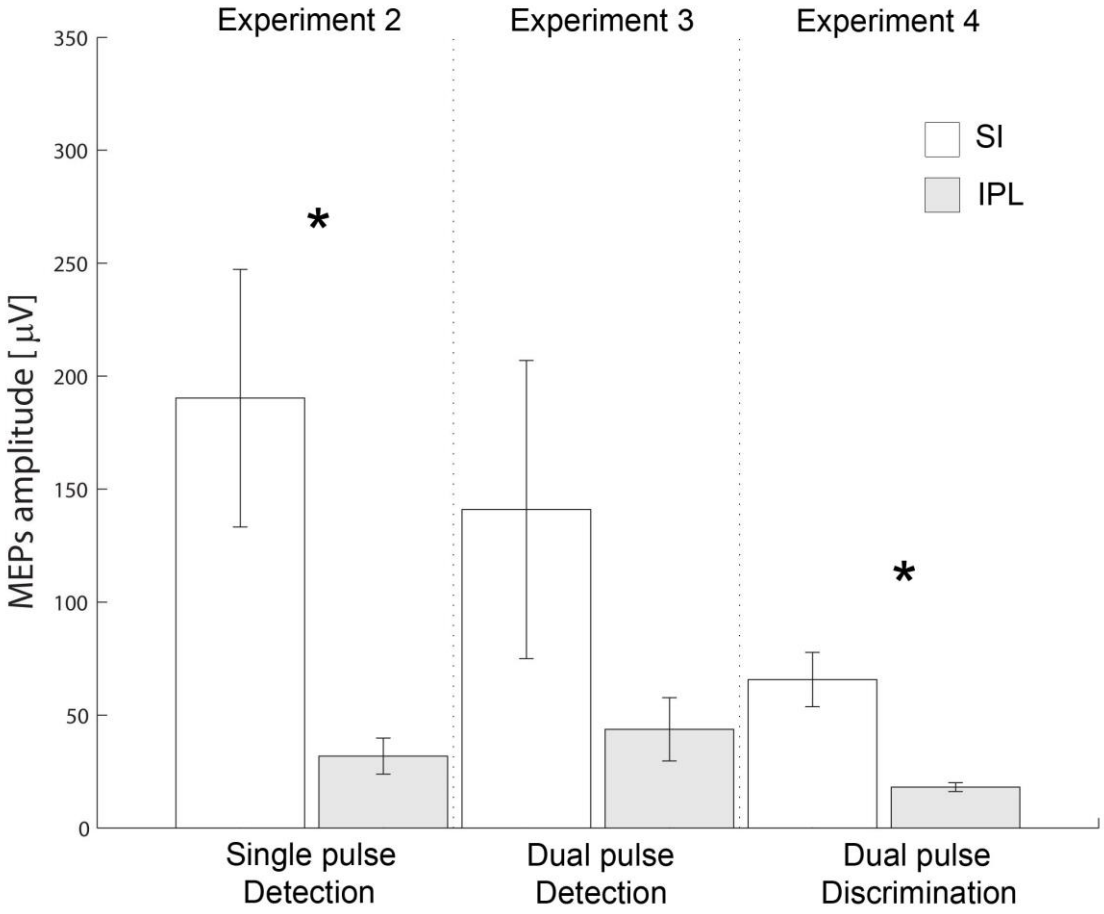

Figure S2. Mean (±SE) motor-evoked potential (MEP) amplitude over the first dorsal interosseus (FDI) muscle contralateral to the stimulated hemisphere, when TMS was applied over SI and IPL in Experiments 2, 3, and 4.

Modelling the within-subjects effects for Experiment 1 and Experiment 3

The same 11 participants performed Experiments 1 after Experiment 3. To model the within-participants variability, a between-experiment ANOVA was run, with variables task and TMS site. Because they were collected in different measurement units, each dataset was first scaled to between 0 and 1 by subtracting the lowest score across participants and conditions, and dividing by the range of scores across participants and conditions. The best performance was 1, and the worst was 0 (Figure S3). There was no significant main effect of task ($F(1,10)=0.387$, $p=.548$) or of TMS ($F(1,10)=4.22$, $p=.067$), but there was a significant interaction between these two variables, ($F(1,10)=9.35$, $p=.012$). The significant interaction shows that TMS over SI only affected performance during the 1-IFC task.

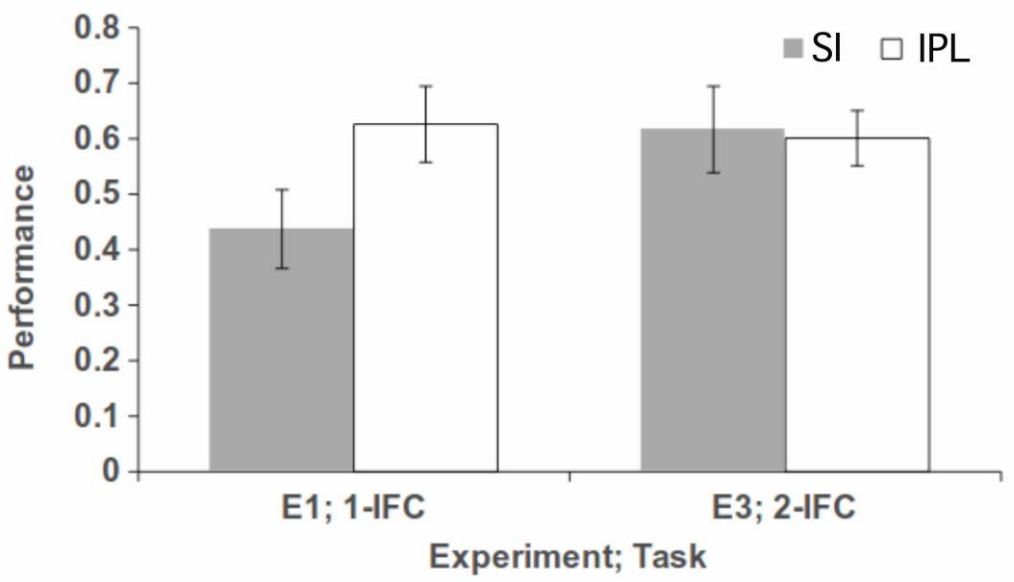

Figure S3. Mean (±SE) of the participants' performance in Experiment 1 (1-IFC) and Experiment 3 (2-IFC), when TMS was applied over SI and IPL.