

Experiment	Figures	Number of mice	Mouse line	Number of recordings	Baseline window duration	Evoked response window duration	Evoked response window onset (relative to stimulus onset)	Post-peak window duration	Post-peak window onset (relative to stimulus onset)	Stimulus	DP (mean ± SEM)	SP (mean ± SEM)
Psychometric curve (1 vs 3 whiskers)	Fig. 1d	3	C57BL/6NHsd	n/a	n/a	n/a	n/a	n/a	n/a	40 Hz (300-1200 deg/s)	n/a	n/a
Psychometric curve (multi-whisker data point)	Fig. 1d	2	C57BL/6NHsd	n/a	n/a	n/a	n/a	n/a	n/a	40 Hz, 1.5 s (~2200 deg/s)	n/a	n/a
2-photon calcium imaging of S1 somata	Fig. 1e-g, Fig. 7d, Supp. Fig. 1b,c, Supp. Fig. 8	6	C57BL/6NHsd	6 (1746 neurons)	267 ms (4 frames)	200 ms (3 frames)	~100 ms	n/a	n/a	20 Hz (500-900 deg/s)	0.51 ± 0.002 (responsive: 0.56 ± 0.003)	0.52 ± 0.002 (responsive: 0.57 ± 0.003)
TG	Fig. 2, Supp. Fig. 1b,c, Supp. Fig. 10	6	C57BL/6NHsd	17	200 ms	27 ms	2 ms	n/a	n/a	40 Hz (700-900 deg/s)	0.52 ± 0.02	0.94 ± 0.02
VPM	Fig. 3, Supp. Fig. 1b,c, Supp. Fig. 3, Supp. Fig. 6, Supp. Fig. 10	4	C57BL/6NHsd	17	200 ms	10 ms	5 ms	100 ms	15 ms	40 Hz (700-900 deg/s)	0.60 ± 0.03	0.85 ± 0.03
VPM microstimulation & VPM recording	Fig. 4a-f	3	Scnn1a-Tg3-Cre;Ai32	12	200 ms	10 ms	5 ms	100 ms	15 ms	40 Hz (700-900 deg/s)	n/a	n/a
VPM microstimulation & S1 recording	Fig. 4g-m	3	Scnn1a-Tg3-Cre;Ai32	15	200 ms	30ms	5 ms	100 ms	35 ms	40 Hz (700-900 deg/s)	n/a	n/a
S1 whole cell	Fig. 5, Fig. 7a-c, Supp. Fig. 1b,c, Supp. Fig. 5, Supp. Fig. 6, Supp. Fig. 7, Supp. Fig. 8, Supp. Fig. 9, Supp. Fig. 10	17 (14 used for AP analysis)	C57BL/6NHsd	22 (19 for APs)	200 ms (200 ms for APs)	100 ms (100 ms for APs)	5 ms Vm (7 ms for APs)	n/a	n/a	40 Hz (700-900 deg/s)	0.58 ± 0.03 Vm (0.54 ± 0.02 AP)	0.83 ± 0.03 Vm (0.62 ± 0.04 AP)
2-photon calcium imaging of S2-to-S1 axons	Fig. 6, Supp. Fig. 1b,c	4	C57BL/6NHsd	4 (167 axons)	267 ms (8 frames)	167 ms (5 frames)	~117 ms	n/a	n/a	20 Hz (500-900 deg/s)	0.53 ± 0.005	0.54 ± 0.005
TG stimulus-response	Supp. Fig. 1a	2	C57BL/6NHsd	9	200 ms	27 ms	2 ms	n/a	n/a	40 Hz (300-1200 deg/s)	n/a	n/a
VPM stimulus-response	Supp. Fig. 1a	2	C57BL/6NHsd	15	200 ms	10 ms	5 ms	n/a	n/a	40 Hz (300-1200 deg/s)	n/a	n/a
S1 stimulus-response	Supp. Fig. 1a	2	C57BL/6NHsd	16	200 ms	100 ms	7 ms	n/a	n/a	40 Hz (300-1200 deg/s)	n/a	n/a
Performance with extended training	Supp. Fig. 1d	2	C57BL/6NHsd, TH-Cre;Ai32	n/a	n/a	n/a	n/a	n/a	n/a	40 Hz (700-900 deg/s)	n/a	n/a
S1 optogenetic silencing	Supp. Fig. 2a-j	2	PV-IRES-Cre;Ai32	23	n/a	500ms	5 ms	n/a	n/a	40 Hz (700-900 deg/s)	n/a	n/a
S1 muscimol silencing	Supp. Fig. 2k,l	2	C57BL/6NHsd	n/a	n/a	n/a	n/a	n/a	n/a	40 Hz (700-900 deg/s)	n/a	n/a
VPM microstimulation & S1 recording (awake, non-behaving)	Supp. Fig. 4	2	Scnn1a-Tg3-Cre;Ai32	21	200 ms	30ms	5 ms	100 ms	35 ms	40 Hz (700-900 deg/s)	n/a	n/a

Supplementary Table 1. Summary of experimental conditions.