

Vs. on							
PT_{upper} (n = 6, 6)	0.2566	0.3122	0.0004	0.0080	0.0002	<0.0002	<0.0002
IT (layer 5) (n = 5, 7)	0.0720	0.1274	0.1346	0.4684	0.8952	0.6826	0.4858

*n = (mice tested in light off condition, mice tested in light on condition)

Cofilin vs unconjugated	Day 0	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
PT_{upper} (n = 7, 6)	0.4672	0.0022	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
IT (layer 5) (n = 5, 7)	0.7466	0.5442	0.1732	0.3516	0.9406	0.7716	0.5476

*n = (mice tested with Unconjugated-SN light on, mice tested with Cofilin-SN light on)

EDF1g-i: *p*-Values are based on Bootstrap comparison of the mean of CV or median of no response rate and # of trials (10000 iterations, two-sided test). $\alpha = 0.05$ was divided by the number of comparisons for *Bonferroni* correction to identify significant changes (highlighted in orange in the table).

EDF1g: CV	Day 0	Day 1	Day 2	Day 3
Control (n = 6, 7)	0.2720	0.9062	0.4350	0.8018
ALM (n = 6, 6)	0.1090	0.5972	0.1934	0.9450
PT (both types) (n = 5, 4)	0.0602	0.7384	0.5872	0.6238
PT_{upper} (n = 6, 10)	0.8830	0.8132	0.9468	0.5734
PT_{lower} (n = 6, 6)	0.8374	0.920	0.8216	0.8908
IT (layer 2/3) (n = 6, 6)	0.3402	0.3398	0.9950	0.8508
IT (layer 5) (n = 8, 10)	0.1508	0.8844	0.9240	0.2086

EDF1h: no response	Day 0	Day 1	Day 2	Day 3
Control (n = 6, 7)	0.4138	0.1396	0.9956	0.0004
ALM (n = 6, 6)	0.6572	0.0596	0.5542	0.0002 (control is higher)
PT (both types) (n = 5, 4)	0.6572	0.9202	0.8304	<0.0002 (control is higher)
PT_{upper} (n = 6, 10)	0.4466	0.4642	0.8148	0.0794
PT_{lower} (n = 6, 6)	0.8322	0.3590	0.1028	0.0004 (control is higher)

IT (layer 2/3) (n = 6, 6)	0.8360	0.8132	0.3160	0.4714
IT (layer 5) (n = 8, 10)	0.4186	0.7324	0.4206	0.3476

EDF1i: # of trials	Day 1	Day 2	Day 3
Control (n = 6, 7)	0.2910	0.0162	0.0044
ALM (n = 6, 6)	0.9234	0.2462	0.3582
PT (both types) (n = 5, 4)	0.6254	0.5158	0.1312
PT_{upper} (n = 6, 10)	0.6482	<0.0002 (control is lower)	0.0178
PT_{lower} (n = 6, 6)	0.2678	0.0028 (control is lower)	0.0428
IT (layer 2/3) (n = 6, 6)	0.0096	0.9254	0.6798
IT (layer 5) (n = 8, 10)	0.5308	0.0042	0.4760

EDF7a-d: *p*-Values are based on Bootstrap comparison of mean (first lick time, CV) or median no response and # of trials) (10000 iterations, two-sided test). $\alpha = 0.05$ was divided by the number of comparisons for *Bonferroni* correction to identify significant changes (highlighted in orange in the table).

EDF7a: first lick	Day 0	Day 1	Day 2	Day 3
Control vs. PT_{upper} (n= 10, 5)	0.8040	0.8172	0.0008	<0.0002
Control vs. PT_{lower} (n= 10, 7)	0.9294	0.0248	<0.0002	0.0002

EDF7b: no response	Day 0	Day 1	Day 2	Day 3
Control vs. PT_{upper} (n= 10, 5)	<0.0002 (control has higher no response rate)	0.6384	0.0026 (control has higher no response rate)	0.0040 (control has higher no response rate)
Control vs. PT_{lower} (n= 10, 7)	0.6762	0.7580	0.2340	0.0218

EDF7c: CV	Day 0	Day 1	Day 2	Day 3
Control vs. PT_{upper} (n= 10, 5)	0.5490	0.2708	0.4740	0.0496
Control vs. PT_{lower} (n= 10, 7)	0.0952	0.7372	0.1084	0.1750

EDF7d: # of trials	Day 0	Day 1	Day 2	Day 3
Control vs. PT_{upper} (n= 10, 5)	0.5128	0.1552	0.3432	0.1544
Control vs. PT_{lower} (n= 10, 7)	0.0260	0.5864	0.3518	0.8964

Fig.3 and 4 Number of recorded pyramidal neurons. Only preparatory cells were analyzed.

		Day 1	Day 2	Day 3	Expert	Sum
Control	# of all pyramidal cells	244	270	265	1064	1843
	# of preparatory cells	107	143	137	633	1020
PT _{upper} paAIP2 manipulation	# of all pyramidal cells	159	194	221	0	574
	# of preparatory cells	77	92	98	0	267
PT _{upper} paAIP2 manipulation	# of all pyramidal cells	285	226	275	0	786
	# of preparatory cells	139	122	115	0	376

of all cells (across experimental conditions): 3203

of task-modulated cells (across experimental conditions): 1613

Fig.4b: *p*-values comparing the increase in lick time (hierarchical bootstrap; separating two PT types in a different group, unlike in the main text). $\alpha = 0.05$ is divided by the number of comparisons (in this case, 8) for *Bonferroni* correction. Since their trends are consistent, we have pooled PT_{upper} and PT_{lower} cells for the analysis shown in the main figure.

	Day 1 (within session)	Day 2 (within session)	Day 3 (within session)	Across 3 sessions
Control vs. PT_{upper}	0.711	0.002	<0.001	<0.001
Control vs. PT_{lower}	0.294	0.013	0.014	0.003

Fig.4c: *p*-values comparing the increase in value within sessions (hierarchical bootstrap; separating two PT types in a different group, unlike in the main text):

	Day 1 (within session)	Day 2 (within session)	Day 3 (within session)	Across 3 sessions
Control vs. PT_{upper}	0.648	0.144	0.008	<0.001
Control vs. PT_{lower}	0.301	0.095	0.023	0.004

Fig.4d: *p*-values comparing the decrease in value within sessions (hierarchical bootstrap; separating two PT types in a different group, unlike in the main text).

	Day 1	Day 2	Day 3
Control vs. PT_{upper}	0.25	0.003	0.273

Control vs. PT_{lower}	0.349	0.021	0.512
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