

Supplementary Information for

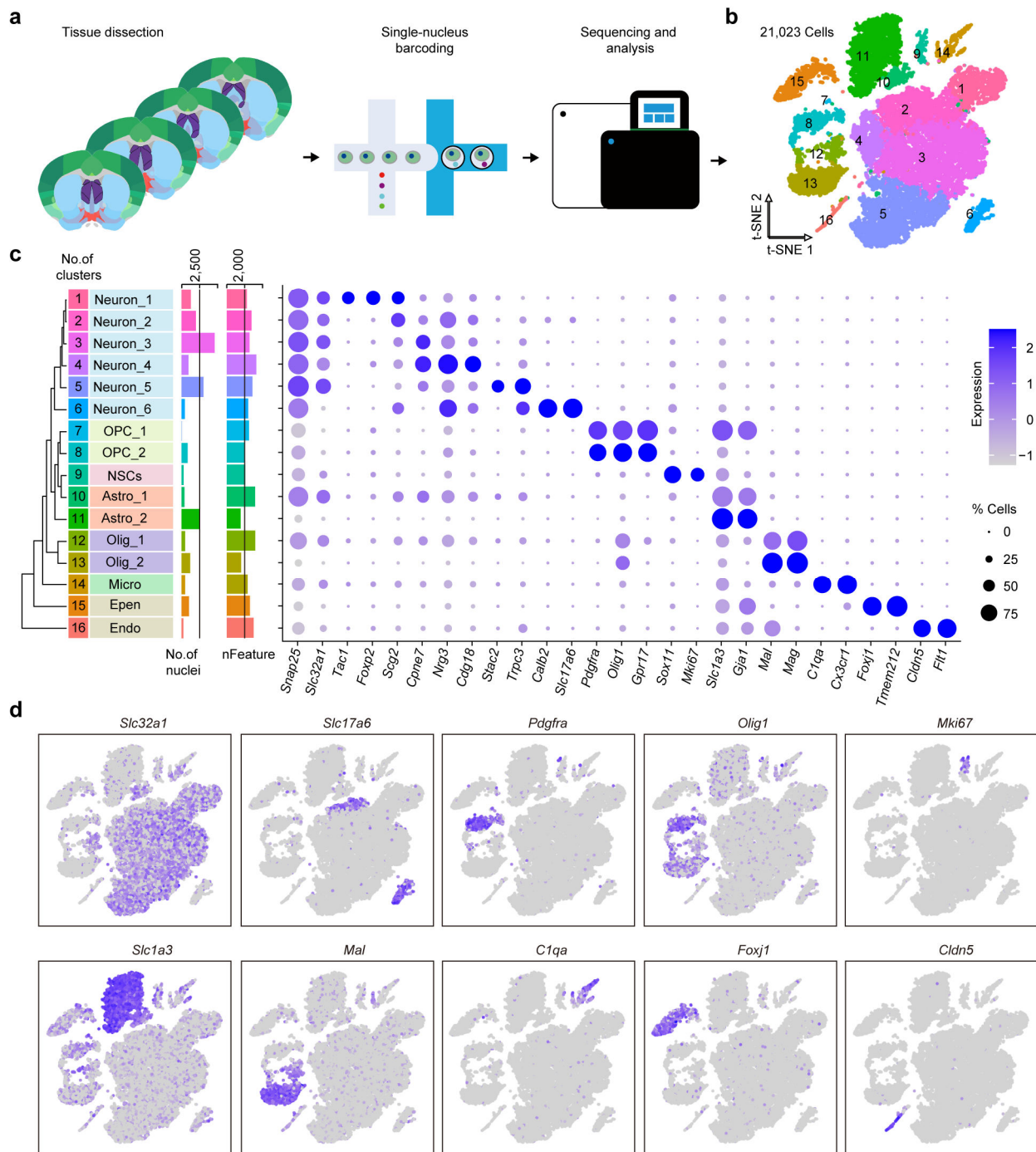
Bidirectional regulation of social memory by two distinct types of GABAergic neurons in the lateral septum

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Supplementary Fig. 1 to 25

Supplementary Tables 1-5



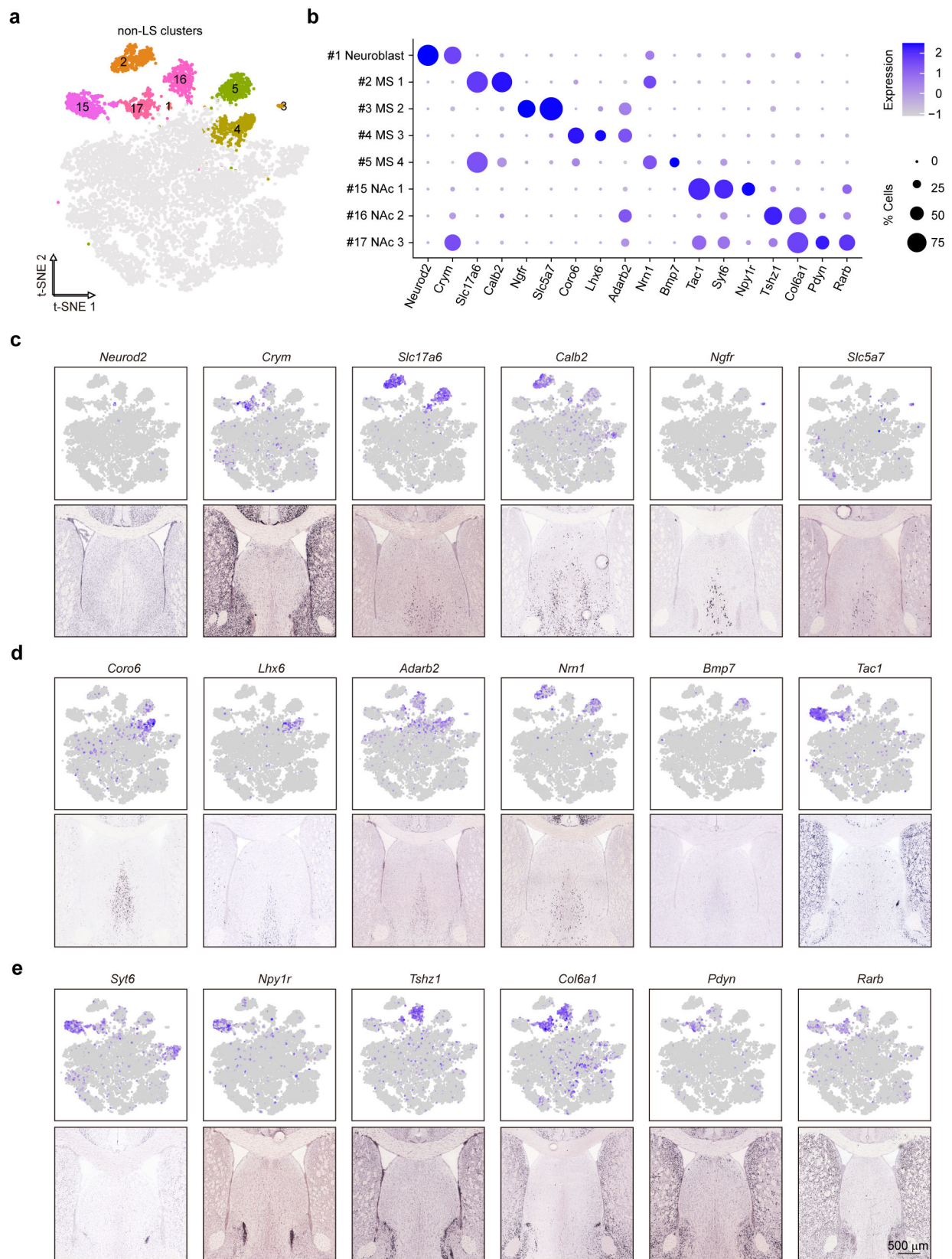
Supplementary Fig. 1 Single-nucleus RNA sequencing (snRNA-seq) in lateral septum (LS) (related to Fig. 1a-c).

(a) Flow chart of snRNA-seq pipeline. Left, LS tissue (highlighted in deep purple) was manually microdissected from 300- μ m thick coronal brain sections; middle, single nuclei were barcoded; right, RNA-seq analyses. Schematic brain sections were adapted from Allen Mouse Brain Atlas, atlas.brain-map.org.

(b) In total, 21 023 single nuclei were clustered into 16 clusters using t-SNE. Dots, individual cells.

(c) Single-cell molecular profiles in 16 defined cell clusters in LS. Left, hierarchical clustering analysis; Clusters 1–6, neurons; Clusters 7–8, oligodendrocyte precursor cells (OPCs); Cluster 9, neural stem cells (NSCs); Clusters 10–11, astrocytes (Astro); Clusters 12–13, oligodendrocytes (Olig); Cluster 14, microglia (Micro); Cluster 15, ependymal cells (Epen); Cluster 16, endothelial cells (Endo); middle, two histograms showing number of nuclei and average detected genes for every cluster, respectively; right, dot plot showing expression patterns of cluster-enriched markers (x-axis) for individual cell types (y-axis). Size of dot indicates percentage of cells expressing indicated gene. Color indicates average expression level.

(d) Expression patterns of 10 molecular markers used for clustering analysis. Dots, individual cells.

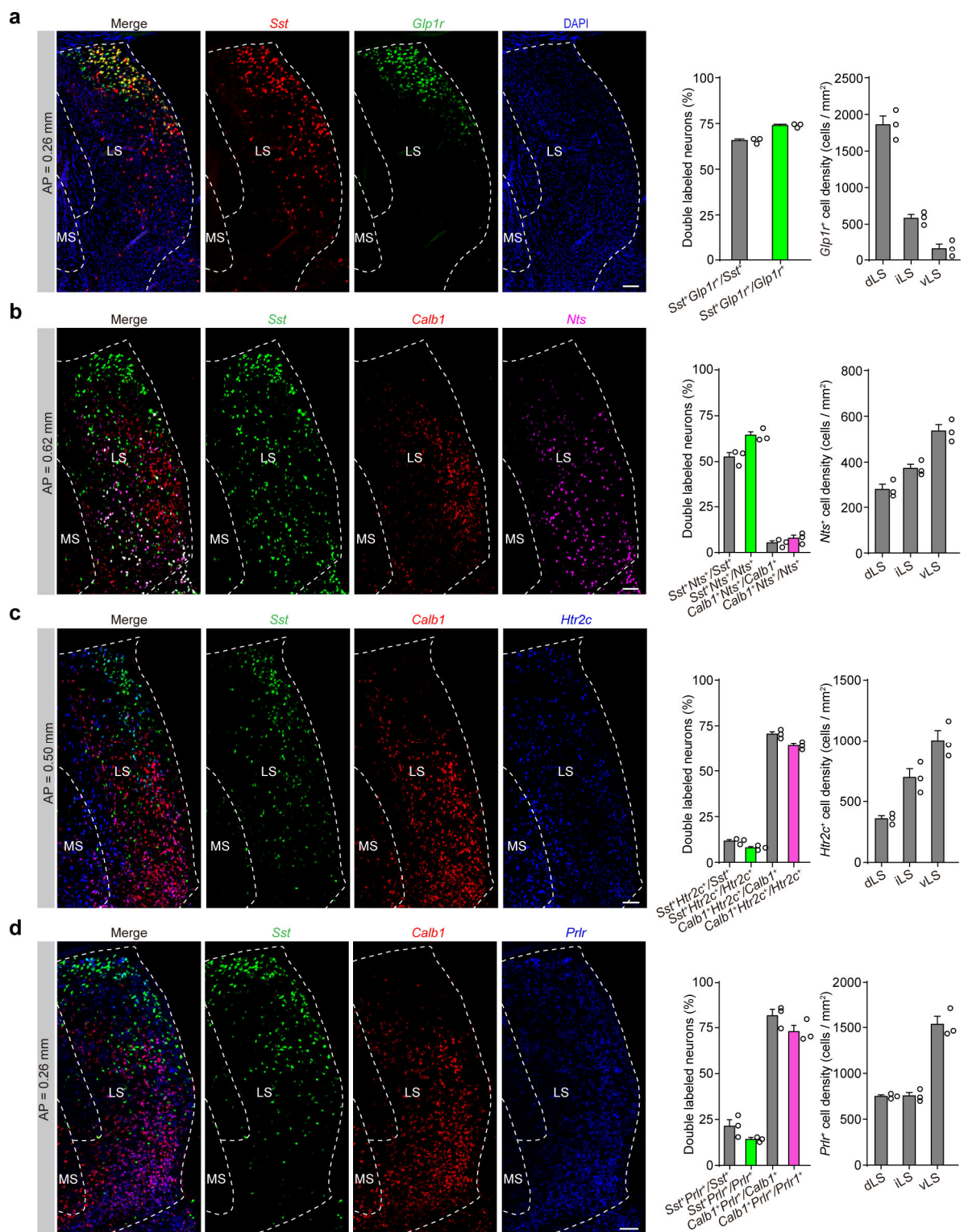


Supplementary Fig. 2 Non-LS neurons identified by unique molecular profiles (related to Fig. 1a-c).

(a) Visualization of eight major non-LS clusters using t-SNE. Colored dots, non-LS neurons; gray dots, major GABAergic neurons in LS analyzed in **Fig. 1a-c**.

(b) Dot plot showing expression patterns of cluster-enriched markers (x-axis) for eight non-LS clusters (y-axis). Cluster 1, neuroblast; Clusters 2–5, from the medial septal nucleus (MS); Clusters 15–17, from the nucleus accumbens (NAc).

(c-e) Expression pattern of cluster-enriched markers for non-LS clusters in septum and surrounding brain regions. Top, molecular markers in non-LS clusters. Dots, individual cells. Bottom, *in-situ* hybridization (ISH) images showing mRNA distribution of marker genes in distinct cell populations. ISH images are adapted from Allen Mouse Brain Atlas, mouse.brain-map.org, and details are provided in Supplementary Table 3.



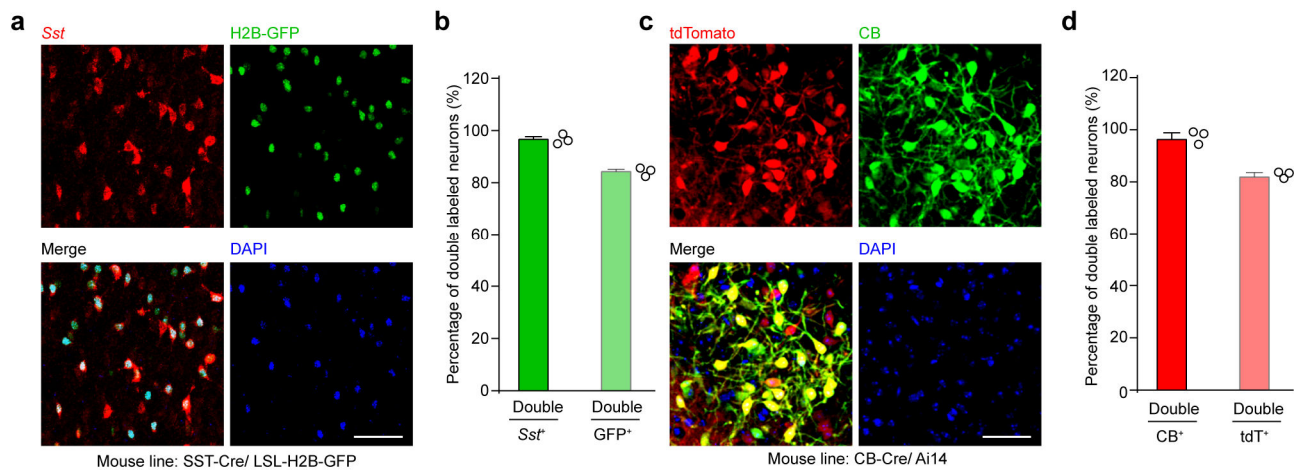
Supplementary Fig. 3 Distinct molecular profiles of SST⁺ and CB⁺ neurons in the LS (related to Fig. 1a-c).

(a) Left, representative coronal section showing high co-expression of *Sst* and *Glp1r* mRNA, predominantly localized in the dLS; Middle, quantification of percentage of double-labeled neurons among *Sst*⁺ or *Glp1r*⁺ neurons in the LS; Right, quantification of *Glp1r*⁺ neuron density across dLS, iLS, and vLS (n = 3).

(b) Left, representative coronal section showing robust co-expression of *Sst* and *Nts* mRNA; Middle, quantification of *Nts* co-expression across *Sst*⁺ or *Calb1*⁺ neurons in the LS; Right, quantification of *Nts*⁺ neurons density in the dLS, iLS, and vLS (n = 3).

(c) Left, representative coronal section showing high co-expression of *Calb1* and *Htr2c* mRNA; Middle, quantification of *Htr2c* co-expression across *Sst*⁺ or *Calb1*⁺ neurons in the LS; Right, quantification of *Htr2c*⁺ neurons density in the dLS, iLS, and vLS (n = 3).

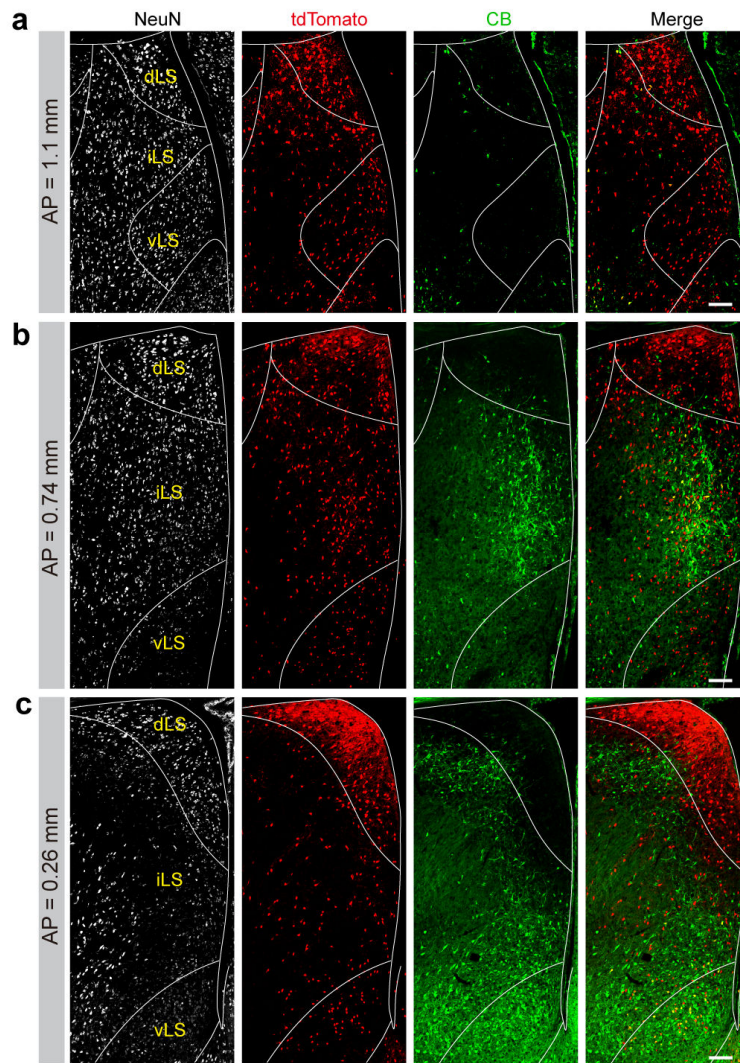
(d) Left, representative coronal section showing high co-expression of *Calb1* and *Prhr* mRNA; Middle, quantification of *Prhr* co-expression across *Sst*⁺ or *Calb1*⁺ neurons in the LS; Right, quantification of *Prhr*⁺ neuron density in the dLS, iLS, and vLS (n = 3). Scale bars: 100 μ m (**a, b, c, d**).



Supplementary Fig. 4 High specificity of SST-Cre and CB-Cre lines for targeting LS neurons (related to Fig. 1).

(a-b) smFISH validation of SST-Cre specificity. **(a)** smFISH labeling of *Sst* mRNA in SST-Cre/LSL-H2B-GFP mice. Representative magnified area of LS (red, *Sst*; green, H2B-GFP; blue, DAPI; scale bar, 50 μ m). **(b)** Quantification of percentage of double-labeled neurons ($n = 3$).

(c-d) IHC validation of CB-Cre specificity. **(c)** IHC staining for CB in CB-Cre/Ai14 mice. Representative magnified area of LS (red, tdTomato; green, CB, blue, DAPI; scale bar, 50 μ m). **(d)** Quantification of percentage of double-labeled neurons ($n = 3$).

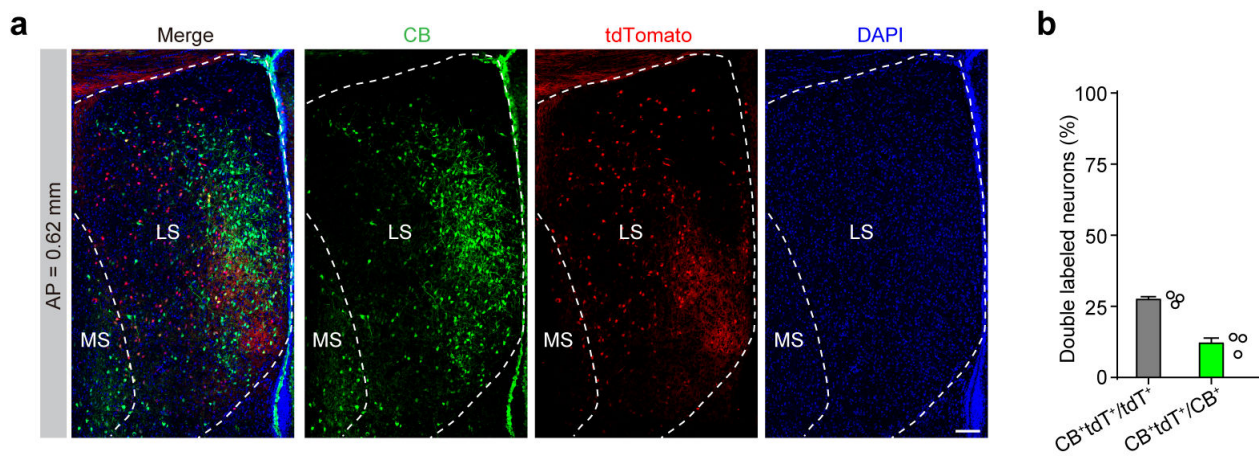


Supplementary Fig. 5 Distribution patterns of SST⁺ and CB⁺ neurons along the anterior to posterior LS axis (related to Fig. 1d-i).

(a) Confocal images of a 30-μm section at AP 1.1 mm, centered on LS from SST-Cre/Ai14 mouse (SST-Ai14). IHC staining was performed for CB and neuronal nuclei (NeuN). SST⁺ neurons were genetically labeled with tdTomato in SST-Ai14 mice. Outlines of dorsal, intermediate, and ventral LS (dLS, iLS, and vLS, respectively) were based on a standard atlas reference¹.

(b) Same as panel (a) but for AP 0.74 mm.

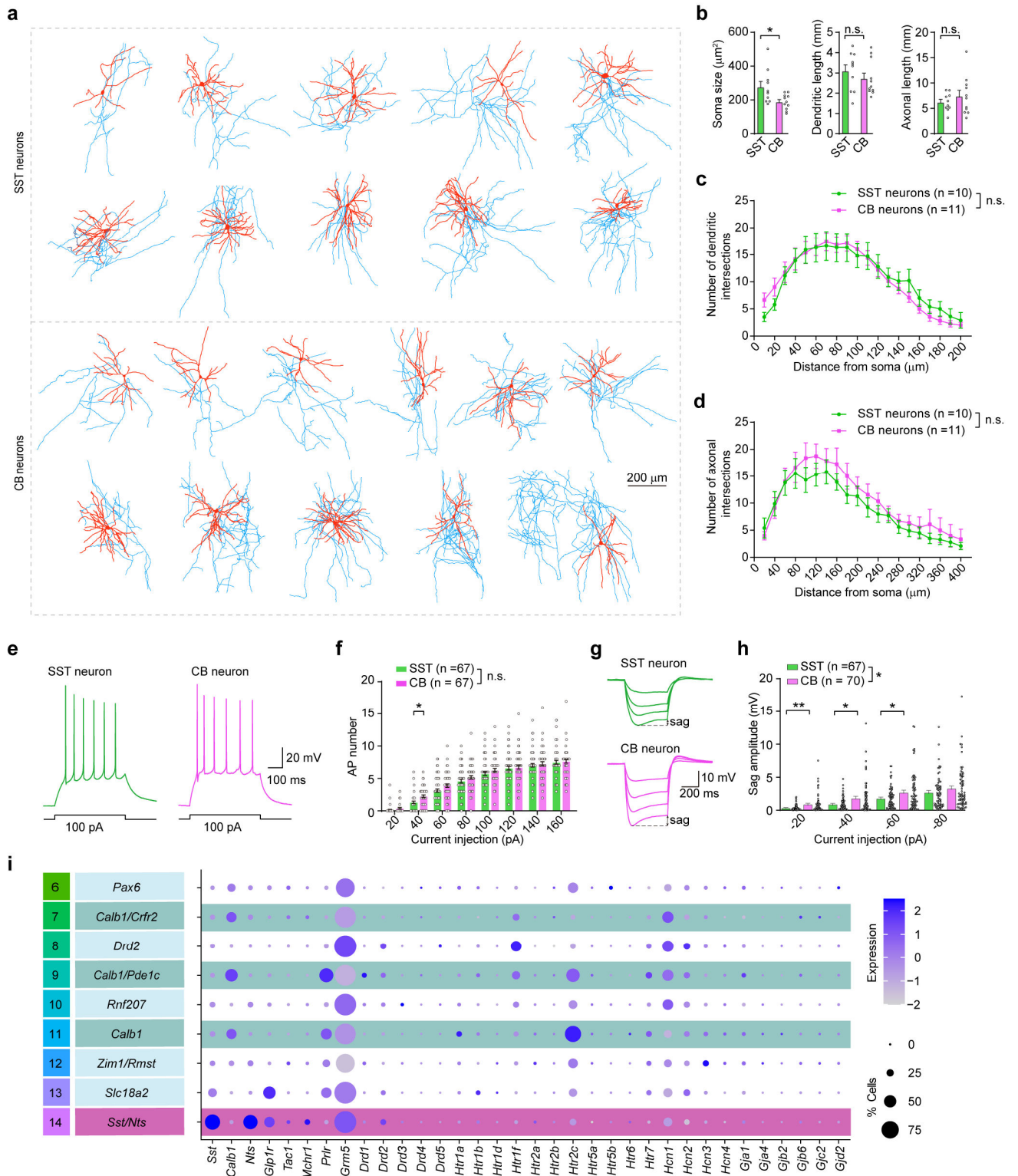
(c) Same as panel (a) but for AP 0.26 mm. Scale bars: 100 μm (a, b, c).



Supplementary Fig. 6 $Esr1^+$ and CB^+ neurons only partially overlap in the vLS (related to Fig. 1).

(a) Representative images of anti-CB protein staining of $Esr1$ -Cre/Ai14 mice in LS. Scale bar, 100 μ m.

(b) Quantification of the percentage of double labeled neurons ($n = 3$).



Supplementary Fig. 7 Morphological, Electrophysiological, and Molecular Distinctions of SST⁺ and CB⁺ neurons (related to Fig. 1).

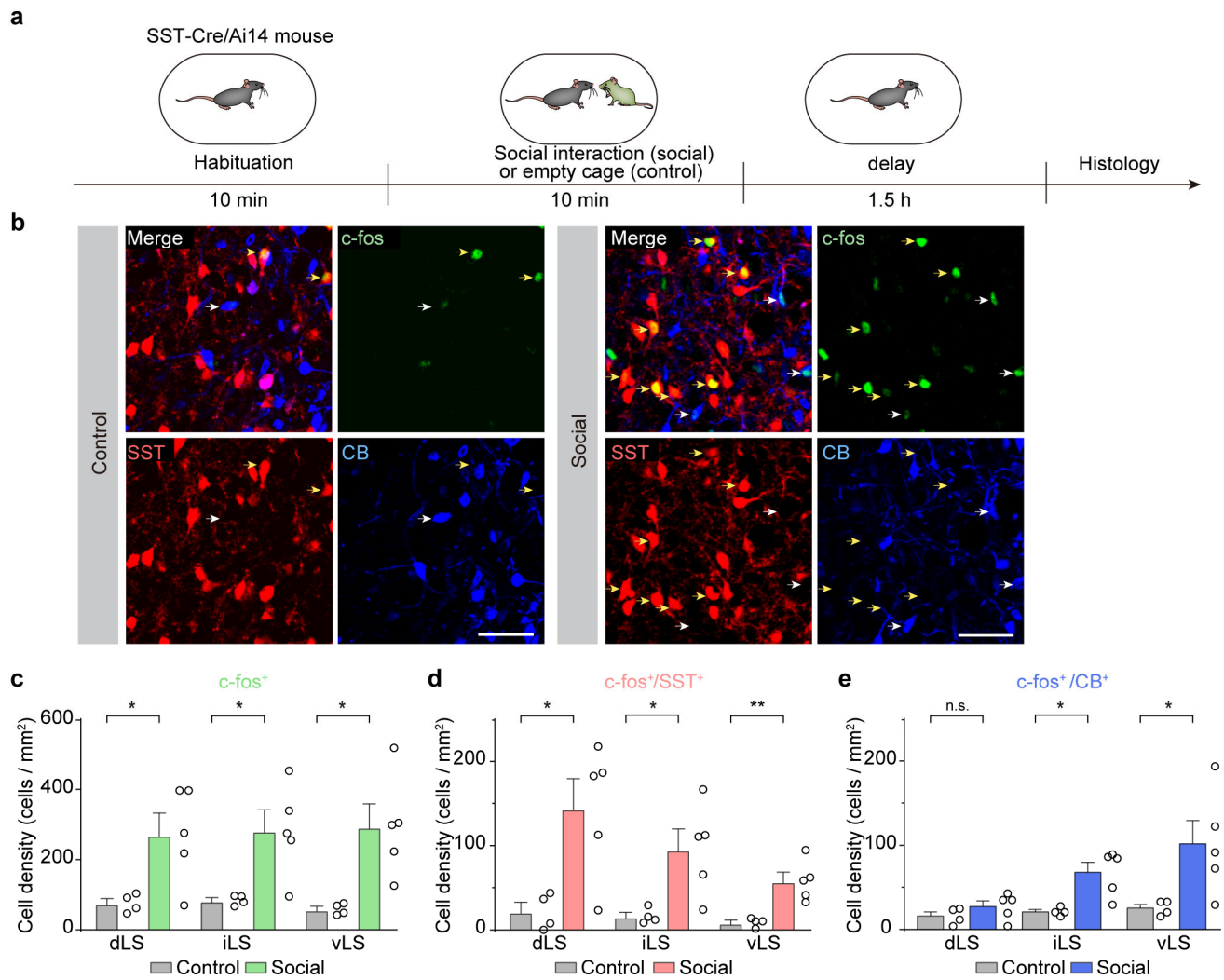
(a-d) Morphological reconstructions revealed that SST⁺ neurons had larger somata than CB⁺ neurons but similar dendritic and axonal complexity. **(a)** Individual SST⁺ and CB⁺ neurons (axons, blue; soma and dendrites, red). **(b)** SST⁺ neurons have larger soma (soma size: $p = 0.0270$; dendritic length: $p = 0.5116$; axonal length: $p = 0.3633$; 10 SST⁺ neurons, 3 mice; 11 CB⁺ neurons, 8 mice). **(c)** SST⁺ and CB⁺ neurons showed similar dendritic complexity (groups, $p = 0.8849$; distance, $p < 0.0001$; Holm–Sidak post-hoc: all $p > 0.05$; 10 SST⁺ neurons, 3 mice; 11 CB⁺ neurons, 8 mice). **(d)** Same as panel (c) but for axons (groups, $p = 0.4100$; distance, $p < 0.0001$; Holm–Sidak post-hoc: all $p > 0.05$; 10 SST⁺ neurons, 3 mice; 11 CB⁺ neurons, 8 mice).

(e-f) SST⁺ and CB⁺ neurons showed comparable excitability. **(e)** Representative firing patterns. **(f)** Comparison of AP numbers across increasing current injections (groups, $p = 0.1359$; intensity, $p < 0.0001$; Holm–Sidak post-hoc: 40 pA, $p = 0.0107$; all others $p > 0.05$; 67 SST⁺ neurons, 5 mice; 67 CB⁺ neurons, 8 mice).

(g-h) CB⁺ neurons had larger HCN-mediated sag amplitudes. **(g)** Representative response to a series of current injections (–20, –40, –60, –80 pA). **(h)** Group data showed that CB⁺ neurons have larger sag amplitudes (groups, $p = 0.0249$; intensity, $p < 0.0001$; Holm–Sidak post-hoc: –20 pA, $p = 0.0073$; –40 pA, $p = 0.0100$; –60 pA, $p = 0.0455$; –80 pA, $p = 0.2076$; 67 SST⁺ neurons, 5 mice; 70 CB⁺ neurons, 8 mice).

(i) Distinct molecular expression patterns of SST⁺ and CB⁺ neurons. Both neurons express *Hcn1* and *Hcn2*.

Statistics: two-tailed unpaired Welch's *t*-test (**b**, left and right), two-tailed Mann-Whitney test (**b**, middle), and two-way RM ANOVA followed by Holm–Sidak post-hoc test (**c**, **d**, **f**, **h**). Data are presented as mean $\pm$ SEM.



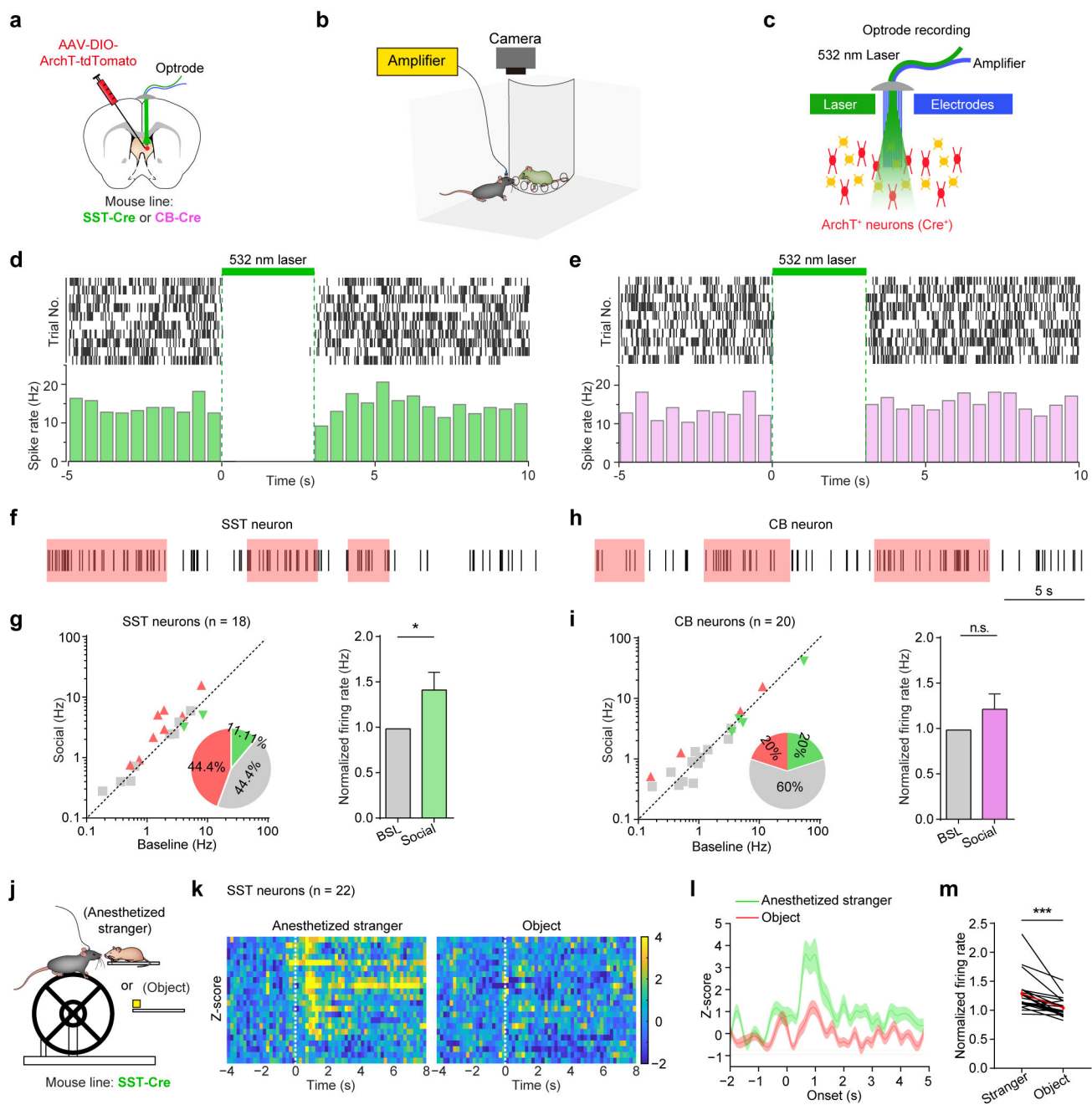
Supplementary Fig. 8 Both SST⁺ and CB⁺ neurons are recruited during social interaction (related to Fig. 2).

(a) Timeline of c-fos staining after social interaction.

(b) Representative coronal section of SST-Ai14 mouse, stained with anti-c-fos (green) and anti-CB (blue). Scale bar, 50 μ m. c-fos⁺/SST⁺ and c-fos⁺/CB⁺ neurons are denoted by yellow and white arrows, respectively.

(c-e) Quantification of c-fos⁺, c-fos⁺/SST⁺, and c-fos⁺/CB⁺ cell densities in the dLS, iLS and vLS, respectively. **(c)** Quantification of c-fos⁺ cell densities in the dLS, iLS and vLS, respectively (dLS: $p = 0.0315$; iLS: $p = 0.0265$; vLS: $p = 0.0216$; Control, $n = 4$; Social, $n = 5$). **(d)** Same as panel (c) but for c-fos⁺/SST⁺ cell densities (dLS: $p = 0.0195$; iLS: $p = 0.0284$; vLS: $p = 0.0086$; Control, $n = 4$; Social, $n = 5$). **(e)** Same as panel (c) but for c-fos⁺/CB⁺ cell densities (dLS: $p = 0.2536$; iLS: $p = 0.0161$; vLS: $p = 0.0486$; Control, $n = 4$; Social, $n = 5$).

Statistics: two-tailed unpaired Welch's t -test (**c-e**) and two-tailed unpaired Student's t -test for dLS (**d, e**). Data are presented as mean $\pm$ SEM.



Supplementary Fig. 9 Discharge profiles of SST⁺ and CB⁺ neurons during social interaction (related to Fig. 2 and 4).

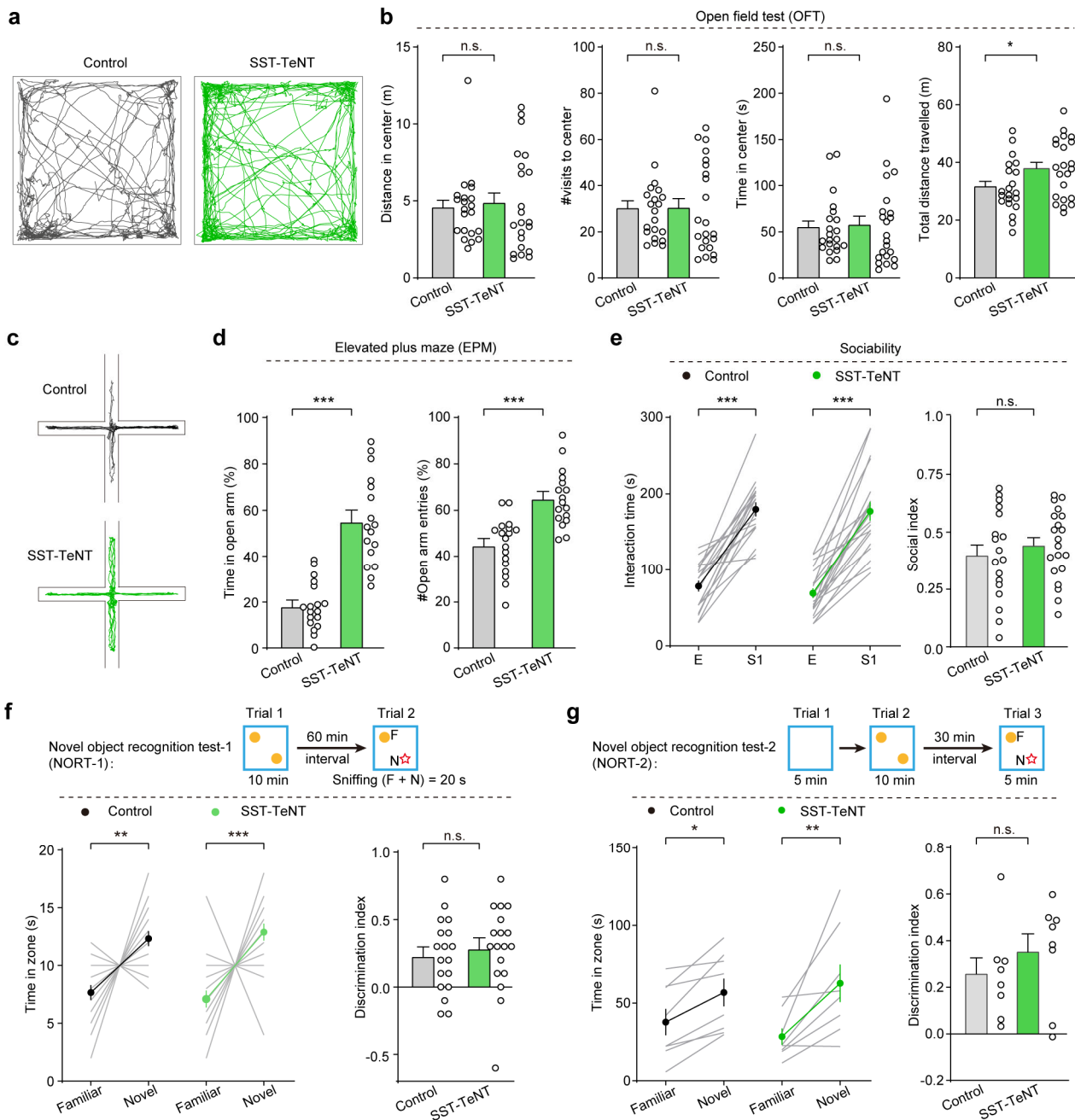
(a-e) ArchT-mediated optogenetic tagging identified SST⁺ and CB⁺ single units. **(a)** AAV-DIO-ArchT-tdTomato injection into LS of SST-Cre or CB-Cre mice followed by optrode implantation. **(b)** Setup for behavioral and optrode recordings. Experimental mouse freely interacted with a stranger mouse for 5 min. **(c)** Schematic of optrode recording. **(d)** Firing rate histogram of an SST⁺ single unit. Top, raster plot of single unit spikes. Bottom, firing rate histogram showing that spikes were suppressed by 532-nm laser (3 s, 10 mW). **(e)** Same as panel **(d)** but for CB⁺ single unit.

(f-g) SST⁺ neuron firing during social interaction. **(f)** Raster plots of representative SST⁺ neuron; red shading indicates social bouts. **(g)** Left, correlation of mean firing rates during baseline and social interactions for individual SST⁺ neurons. Red and green triangles represent individual neurons showing significantly higher and lower firing rates, respectively; gray squares represent neurons with no significant change. Inset, summary of proportions (increased: 44.4%, 8/18; decreased: 11.1%, 2/18). Right, normalized firing rates increased during social interaction ($p = 0.0159$; 18 SST⁺ neurons, 13 mice).

(h-i) CB⁺ neuron firing during social interaction. **(h)** Raster plots of representative CB⁺ neuron. **(i)** Same as panel **(g)** but for CB⁺ neurons, showing unchanged normalized firing rates (normalized firing rate: $p = 0.4980$; 20 CB⁺ neurons, 11 mice).

(j-m) SST⁺ neurons responded to social but not object stimuli. **(j)** Head-fixed setup presenting an anesthetized stranger or an object. **(k)** Z-score heatmap showed that SST⁺ single units were activated by an anesthetized stranger but not an object. **(l)** Averaged Z-score traces aligned to stimulus onset. **(m)** Normalized firing rates were higher in response to the anesthetized stranger compared to the object ($p < 0.0001$, 22 SST⁺ neurons, 9 mice).

Statistics: two-tailed paired Student's t -test for firing rate comparisons (**g, i**), one sample Wilcoxon signed rank test for normalized firing rate (**g, i**), and two-tailed Wilcoxon signed rank test (**m**). Data are presented as mean $\pm$ SEM.



Supplementary Fig. 10 TeNT silencing of SST⁺ neurons significantly reduces anxiety level (related to Fig. 2a-e).

(a-b) TeNT blockade of SST⁺ neurons slightly increased locomotion in open field test (OFT). **(a)** Representative track maps. **(b)** Quantification of distance in center ($p = 0.8429$), center visits ($p = 0.6781$), time in center ($p = 0.6346$), and total distance ($p = 0.0395$) (Control, $n = 21$; SST-TeNT, $n = 22$).

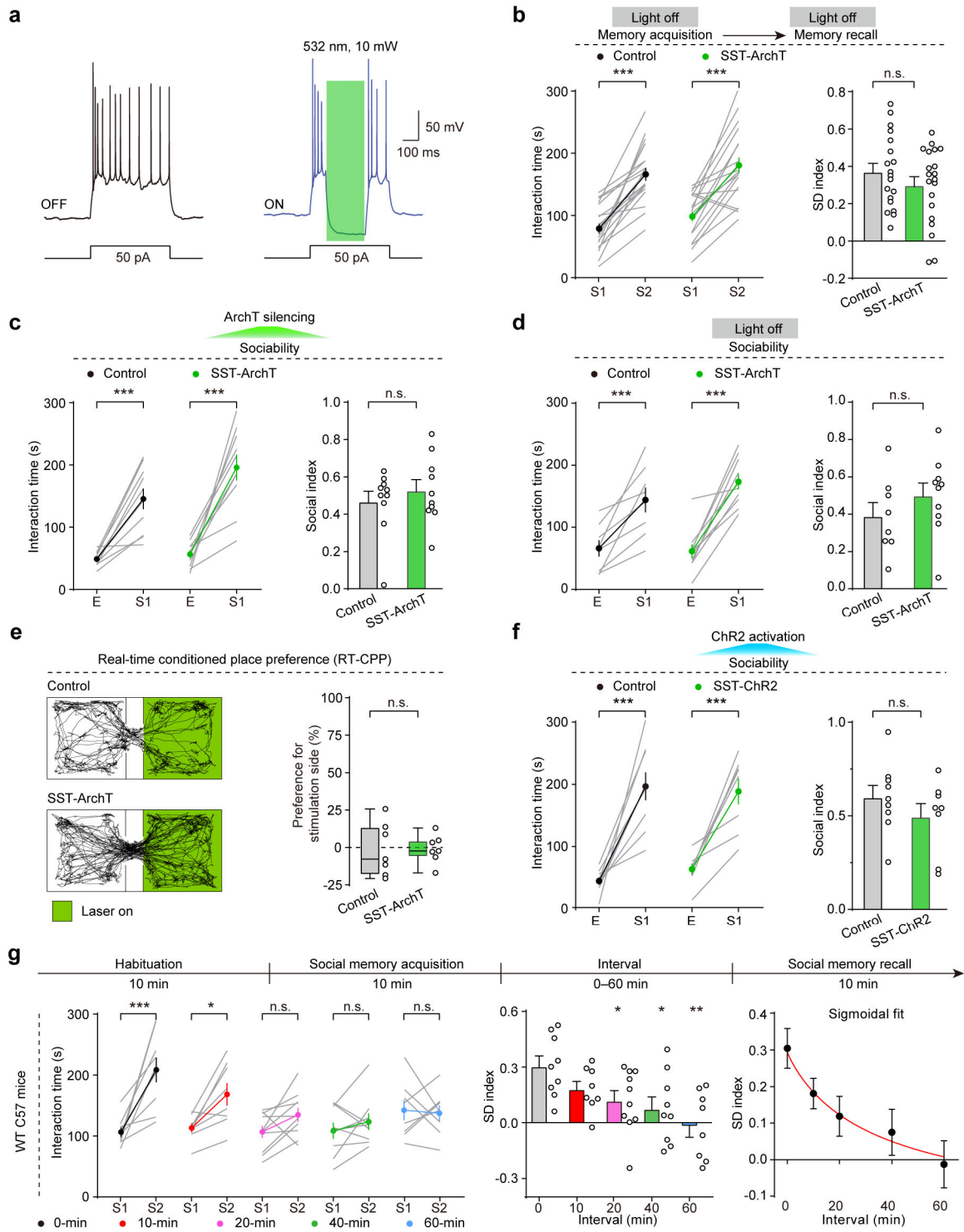
(c-d) TeNT blockade significantly reduced anxiety levels in elevated plus maze (EPM). **(c)** Representative track maps. **(d)** Increased open-arm exploration (time: $p < 0.0001$; entries: $p < 0.0001$; Control, $n = 18$; SST-TeNT, $n = 17$).

(e) Sociability was unaffected. Left: time spent investigating an empty cylinder vs. a cylinder containing a stranger mouse (S1) (interaction, $p = 0.6730$; Holm–Sidak post-hoc—Control: $p < 0.0001$, $n = 18$; SST-TeNT: $p < 0.0001$, $n = 20$; social index, $p = 0.4665$).

(f) Novel object recognition test-1 (NORT-1, first 20 s exploration) was unchanged (interaction, $p = 0.5808$; Holm–Sidak post-hoc—Control: $p = 0.0022$, $n = 18$; SST-TeNT: $p = 0.0005$, $n = 18$; discrimination index, $p = 0.5808$).

(g) Novel object recognition test-2 (NORT-2, full 5 min exploration) was also unchanged (interaction, $p = 0.1990$; Holm–Sidak post-hoc—Control: $p = 0.0344$, $n = 8$; SST-TeNT: $p = 0.0016$, $n = 8$; discrimination index, $p = 0.3837$).

Statistics: two-tailed Mann-Whitney test **(b)**, two tailed unpaired Welch's t -test **(d)**, two-way RM ANOVA followed by Holm–Sidak post-hoc test for time **(e, f, g)**, and two-tailed unpaired Student's t -test **(b, d, e, f, g)**. Data are presented as mean $\pm$ SEM.



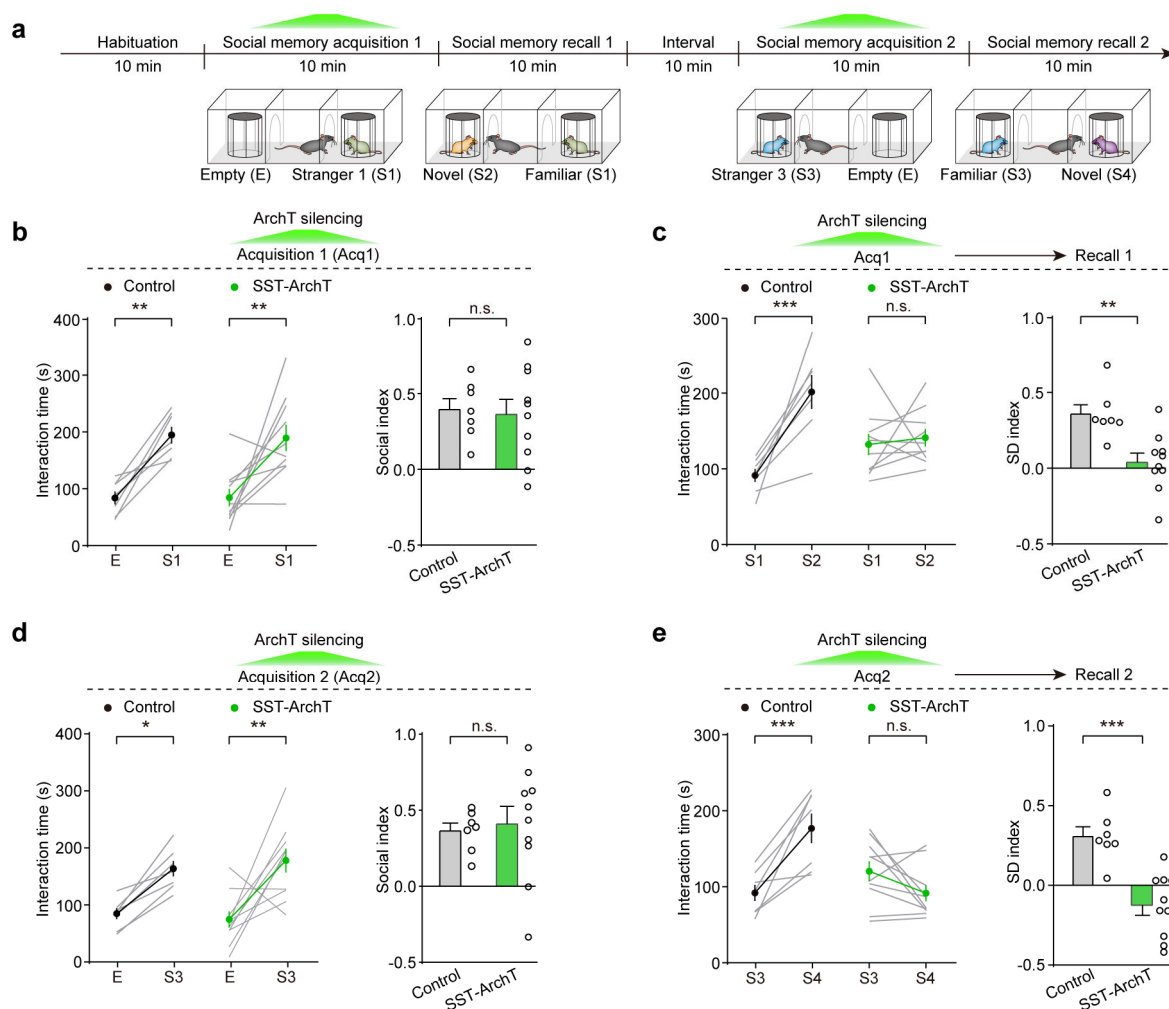
Supplementary Fig. 11 Optogenetic inhibition of SST⁺ neurons does not alter baseline sociability (related to Fig. 2g-l).

(a-e) ArchT silencing of SST⁺ neurons did not change sociability or real-time conditioned place preference (RT-CPP). **(a)** 532-nm laser blocked current-evoked action potentials. **(b)** Social memory was intact during light-off sessions (interaction, $p = 0.7739$; Holm–Sidak post-hoc—Control: $p < 0.0001$, $n = 19$; SST-ArchT: $p < 0.0001$, $n = 20$; SD index, $p = 0.2713$). **(c)** Silencing did not alter sociability (interaction, $p = 0.1342$; Holm–Sidak post-hoc—Control: $p = 0.0001$, $n = 10$; SST-ArchT: $p < 0.0001$, $n = 10$; social index, $p = 0.8099$). **(d)** Same without light (interaction, $p = 0.1653$; Holm–Sidak post-hoc—Control: $p = 0.0003$, $n = 8$; SST-ArchT: $p < 0.0001$, $n = 10$; social index, $p = 0.2758$). **(e)** Left, representative RT-CPP tracks; right, silencing did not change place preference ($p = 0.9575$; Control, $n = 7$; SST-ArchT, $n = 7$).

(f) ChR2 activation of SST⁺ neurons did not alter sociability (interaction, $p = 0.4271$; Holm–Sidak post-hoc—Control: $p < 0.0001$, $n = 9$; SST-ChR2: $p = 0.0001$, $n = 8$; social index, $p = 0.2944$).

(g) Social memory declined with longer recall delays. Top, experimental timeline for varying recall intervals (0–60 min). Left, interaction time (interaction, $p = 0.0008$; Holm–Sidak post-hoc—0-min: $p < 0.0001$, $n = 9$; 10 min: $p = 0.0139$, $n = 8$; 20 min: $p = 0.2471$, $n = 10$; 40 min: $p = 0.6281$, $n = 9$; 60 min: $p = 0.7638$, $n = 8$); middle, SD index ($p = 0.0056$; Holm–Sidak post-hoc—10 min vs 0 min: $p = 0.1382$; 20 min vs 0 min: $p = 0.0413$; 40 min vs 0 min: $p = 0.0183$; 60 min vs 0 min: $p = 0.0015$); right, sigmoidal fit of SD index.

Statistics: two-way RM ANOVA followed by Holm–Sidak post-hoc test (**b**, **c**, **d**, **f**, **g**), two-tailed unpaired Student's *t*-test for index (**b**, **d**, **e**, **f**), two-tailed Mann-Whitney test for index (**c**), and one-way RM ANOVA followed by Holm–Sidak post-hoc test (**g**). Data are presented as mean $\pm$ SEM.



Supplementary Fig. 12 Two rounds of acquisition and recall assay confirm that SST⁺ neurons are required for social memory acquisition (related to Fig. 2g-i).

(a) Experimental timeline showing optogenetic silencing during acquisition phase 1 (Acq1) and acquisition phase 2 (Acq2). The cylinder containing S1 or S3 was randomly placed in the left or right chamber at the start of each round.

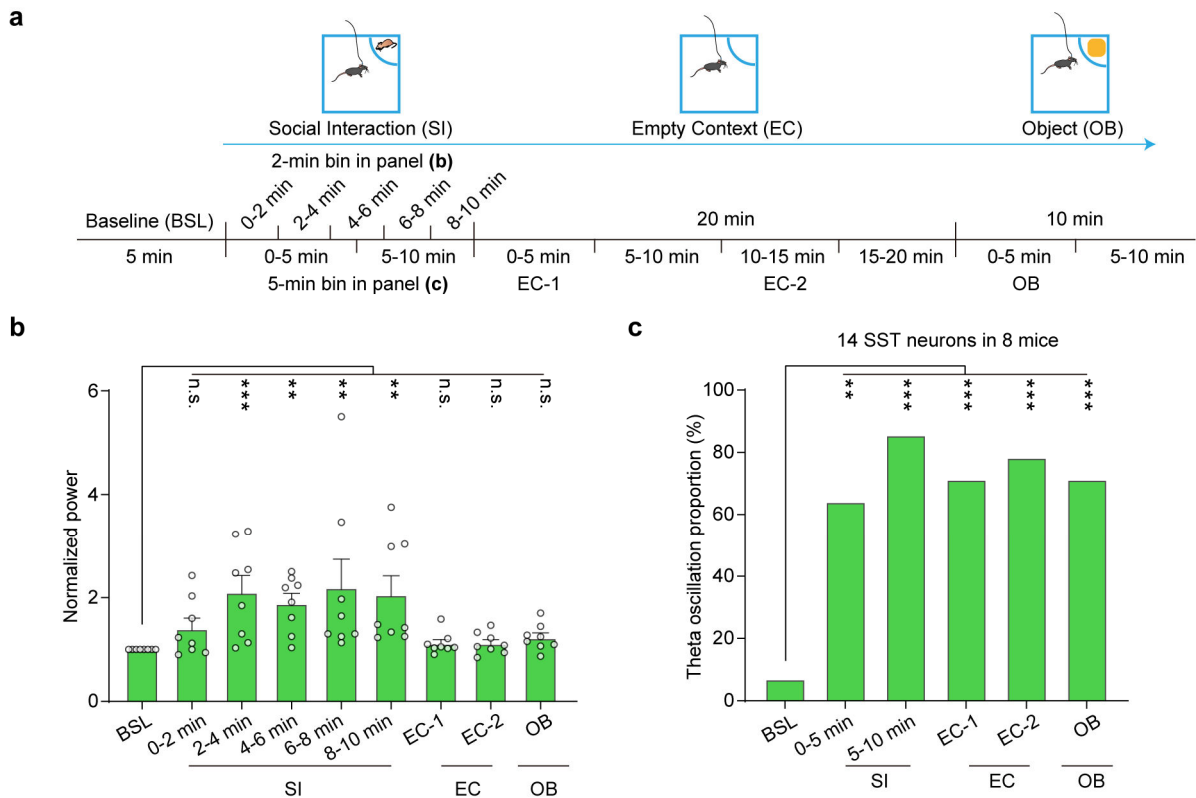
(b) Silencing SST⁺ neurons during Acq1 did not affect sociability (interaction, $p = 0.9137$; Holm–Sidak post-hoc—Control: $p = 0.0047$, $n = 7$; SST-ArchT: $p = 0.0036$, $n = 10$; social index, $p = 0.8079$).

(c) Silencing during Acq1 disrupted the preference for the novel mouse (interaction, $p = 0.0044$; Holm–Sidak post-hoc—Control: $p = 0.0005$, $n = 7$; SST-ArchT: $p = 0.6585$, $n = 10$; SD index, $p = 0.0030$).

(d) Silencing during Acq2 did not affect sociability (interaction, $p = 0.5276$; Holm–Sidak post-hoc—Control: $p = 0.0176$, $n = 7$; SST-ArchT: $p = 0.0016$, $n = 10$; social index, $p = 0.5241$).

(e) Silencing during Acq2 disrupted the preference for the novel mouse (interaction, $p = 0.0003$; Holm–Sidak post-hoc—Control: $p = 0.0007$, $n = 7$; SST-ArchT: $p = 0.0832$, $n = 10$; SD index, $p = 0.0003$).

Statistics: two-way RM ANOVA followed by Holm–Sidak post-hoc test for interaction time (**b-e**), two-tailed unpaired Student's t -test for index (**b, c, e**), and two-tailed unpaired Welch's t -test for index (**d**). Data are presented as mean $\pm$ SEM.



Supplementary Fig. 13. Social context–dependent enhancement of theta oscillations (related to Fig. 3a-i).

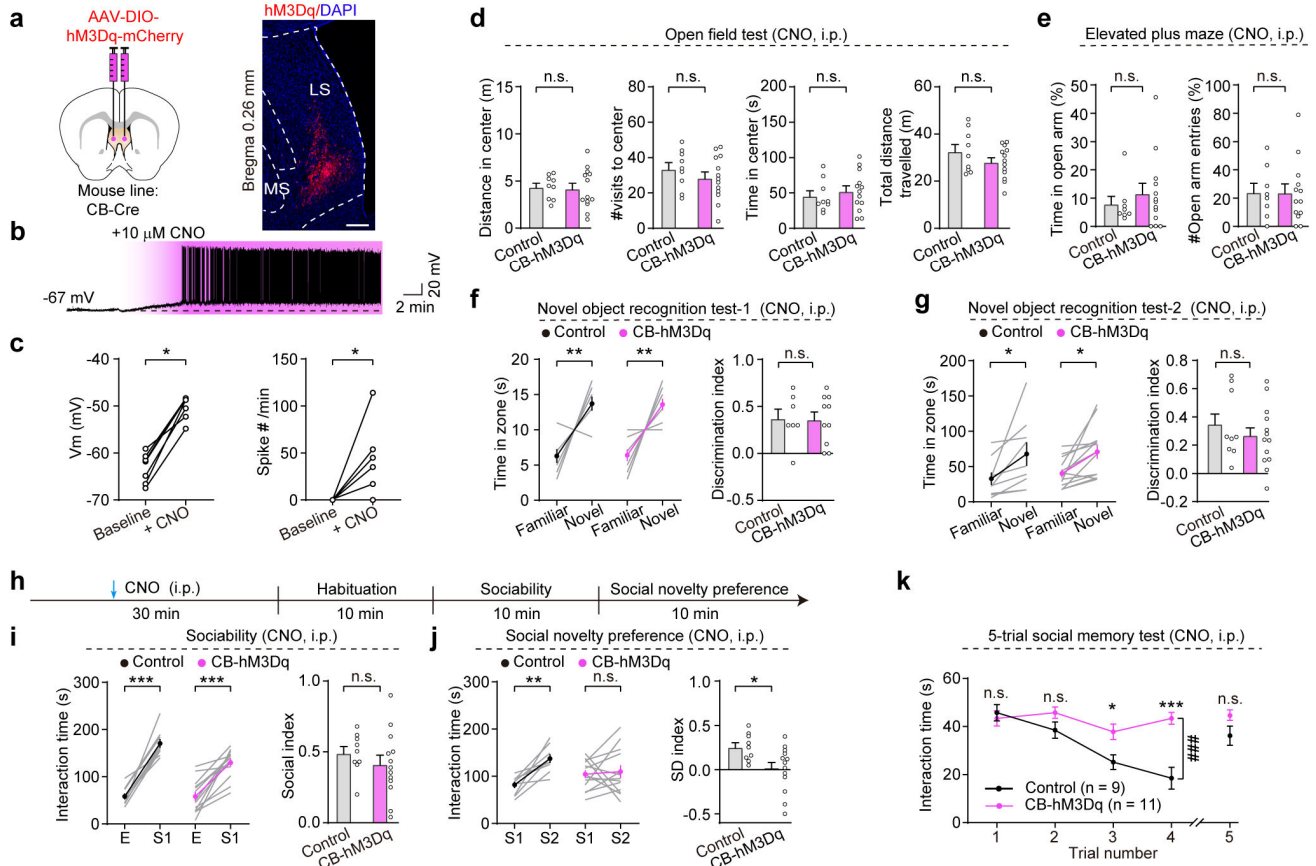
(a) Experimental timeline showing sequential LFP recording during social interaction (SI), empty context (EC), and object (OB) sessions.

(b) Normalized theta power relative to baseline (BSL) across conditions. SI session was divided into five 2-min bins. Theta power increased significantly during SI (2–10 min) but not during EC or OB sessions (Friedman test: $p < 0.0001$; Dunn's post-hoc—vs. baseline: 0-2 min, $p = 0.3569$; 2-4 min, $p = 0.0005$; 4-6 min, $p = 0.0030$; 6-8 min, $p = 0.0042$; 8-10 min, $p = 0.0015$; EC-1, $p > 0.9999$; EC-2, $p > 0.9999$; OB, $p = 0.2861$; $n = 8$ mice).

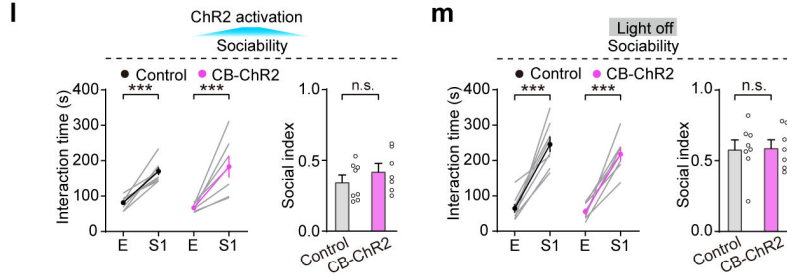
(c) Proportion of significantly phase-locked SST⁺ neurons during baseline, SI (0–5 min and 5–10 min), EC-1 (0-5 min), EC-2 (10-15 min), and OB sessions. The proportion remained elevated even after the theta power returned to baseline (vs. baseline: 0-5 min, $p = 0.0016$; 5-10 min, $p < 0.0001$; EC-1, $p = 0.0005$; EC-2, $p = 0.0001$; OB, $p = 0.0005$; 14 SST⁺ neurons, 8 mice).

Statistics: Friedman test followed by Dunn's post-hoc test **(b)**, and two-tailed Chi-squared test **(c)**. Data are presented as mean ± SEM.

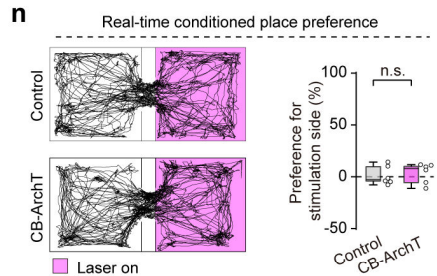
Impaired social memory in CB-hM3Dq mice injected with CNO



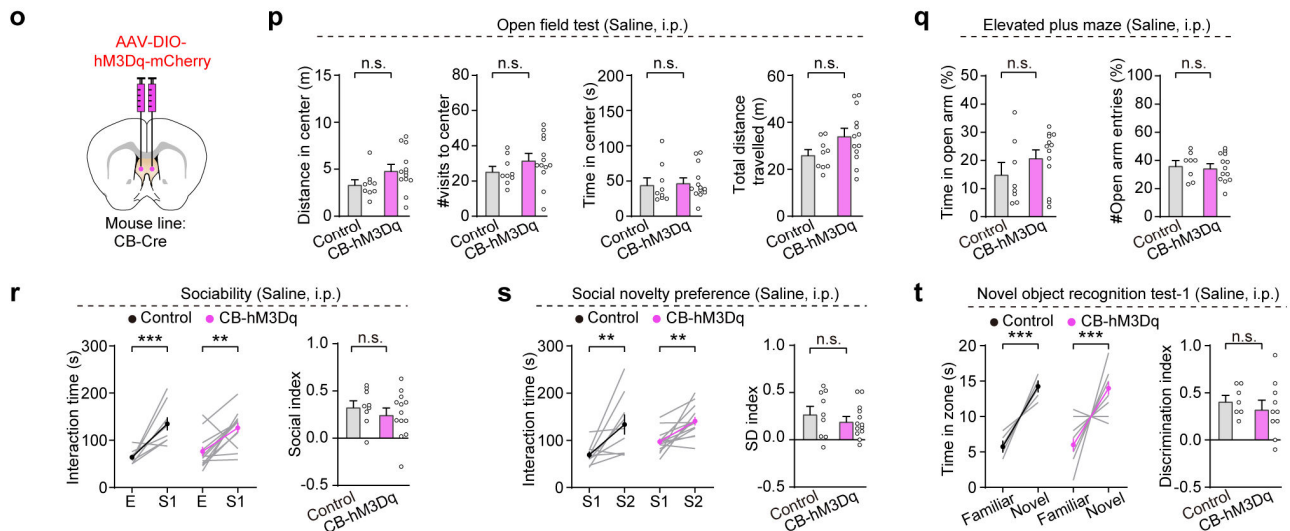
Optogenetic activation of CB⁺ neurons in the LS



Optogenetic inhibition of CB⁺ neurons



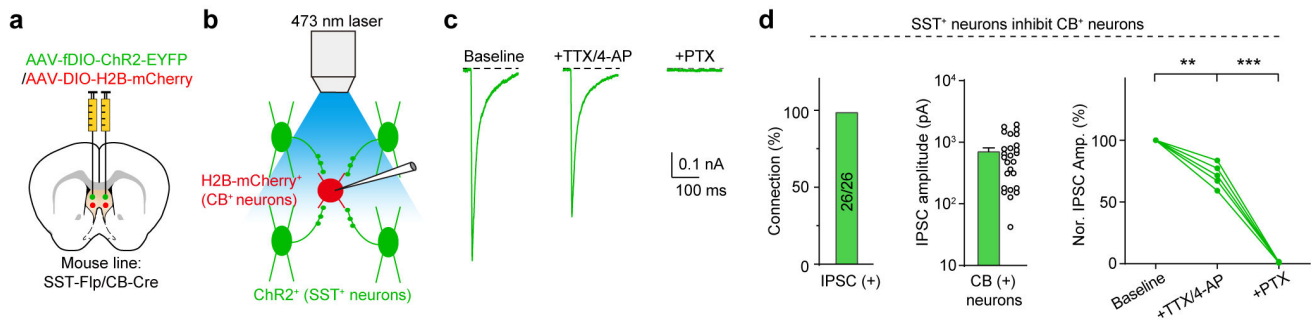
Unchanged behaviors in CB-hM3Dq mice injected with saline



Supplementary Fig. 14 Chemogenetic activation of CB⁺ neurons suppresses social memory (related to Fig. 4).

- (a-c)** CNO activated hM3Dq-expressing CB⁺ neurons. **(a)** Schematic and image (scale bar, 100 μ m). **(b)** Representative trace. **(c)** Summary (Vm: $p = 0.0156$; firing rate: $p = 0.0448$; 7 neurons, 3 mice). **(d-e)** Normal locomotion and anxiety in OFT ($p = 0.8363, 0.3404, 0.5594, 0.1986$; Control, $n = 9$; CB-Gq, $n = 13$) and EPM ($p = 0.5817, 0.9924$; Control, $n = 8$; CB-Gq, $n = 13$). **(f-g)** Novel object recognition remained intact. **(f)** NORT-1 (interaction, $p = 0.9303$; post-hoc—Control: $p = 0.0018, n = 7$; CB-Gq: $p = 0.0011, n = 10$; discrimination index, $p = 0.9303$). **(g)** NORT-2 (interaction, $p = 0.7885$; post-hoc—Control: $p = 0.0137, n = 9$; CB-Gq: $p = 0.0137, n = 13$; discrimination index, $p = 0.4262$). **(h-j)** CB⁺ activation disrupted social novelty preference. **(h)** Timeline. **(i)** Sociability (interaction, $p = 0.0263$; post-hoc—Control: $p < 0.0001, n = 9$; CB-Gq: $p < 0.0001, n = 13$; social index, $p = 0.3866$). **(j)** Social novelty preference (interaction, $p = 0.0274$; post-hoc—Control: $p = 0.0051, n = 9$; CB-Gq: $p = 0.6789, n = 13$; SD index, $p = 0.0196$). **(k)** Social memory was impaired (groups, $p < 0.0001$, denoted as ###; trials, $p < 0.0001$; post-hoc—trial 1-3: $p = 0.6136, 0.2209, 0.0227$; trial 4: $p < 0.0001$; Control, $n = 9$; CB-Gq, $n = 11$) without affecting novel interaction ($p = 0.0658$). **(l-m)** Optogenetic CB⁺ activation did not alter sociability. **(l)** Laser on (interaction, $p = 0.3683$; post-hoc—Control: $p = 0.0008, n = 8$; CB-ChR2: $p = 0.0003, n = 7$; social index, $p = 0.3242$). **(m)** Laser off (interaction, $p = 0.5959$; post-hoc—Control: $p < 0.0001, n = 8$; CB-ChR2: $p < 0.0001, n = 7$; social index, $p = 0.9132$). **(n)** ArchT silencing did not alter RT-CPP ($p = 0.6353$; Control, $n = 6$; CB-ArchT, $n = 6$). **(o-t)** Saline injection controls. **(p)** OFT ($p = 0.0961, 0.2257, 0.3575, 0.0703$; Control, $n = 9$; CB-Gq, $n = 13$). **(q)** EPM ($p = 0.3011, 0.7130$; Control, $n = 8$; CB-Gq, $n = 13$). **(r)** Sociability (interaction, $p = 0.3541$; post-hoc—Control: $p = 0.0007, n = 9$; CB-Gq: $p = 0.0015, n = 13$; social index, $p = 0.4070$). **(s)** Social novelty preference (interaction, $p = 0.3704$; post-hoc—Control: $p = 0.0025, n = 9$; CB-Gq: $p = 0.0059, n = 13$; SD index, $p = 0.4099$). **(t)** NORT-1 (interaction, $p = 0.4980$; post-hoc—Control: $p = 0.0009, n = 7$; CB-Gq: $p = 0.0009, n = 10$; discrimination index, $p = 0.4980$).

Statistics: two-way RM ANOVA followed by Holm–Sidak post-hoc test (**f, g, i, j, k, l, m, r, s, t**), two-tailed paired Student's *t*-test (**c**), two-tailed unpaired Student's *t*-test (**d-e, f-g, i-j, l-n, p-t; k**), two-tailed Mann-Whitney test (**e, p, q**). Data are presented as mean $\pm$ SEM.



Supplementary Fig. 15 SST⁺ neurons monosynaptically inhibit CB⁺ neurons in the LS (related to Fig. 4g-j).

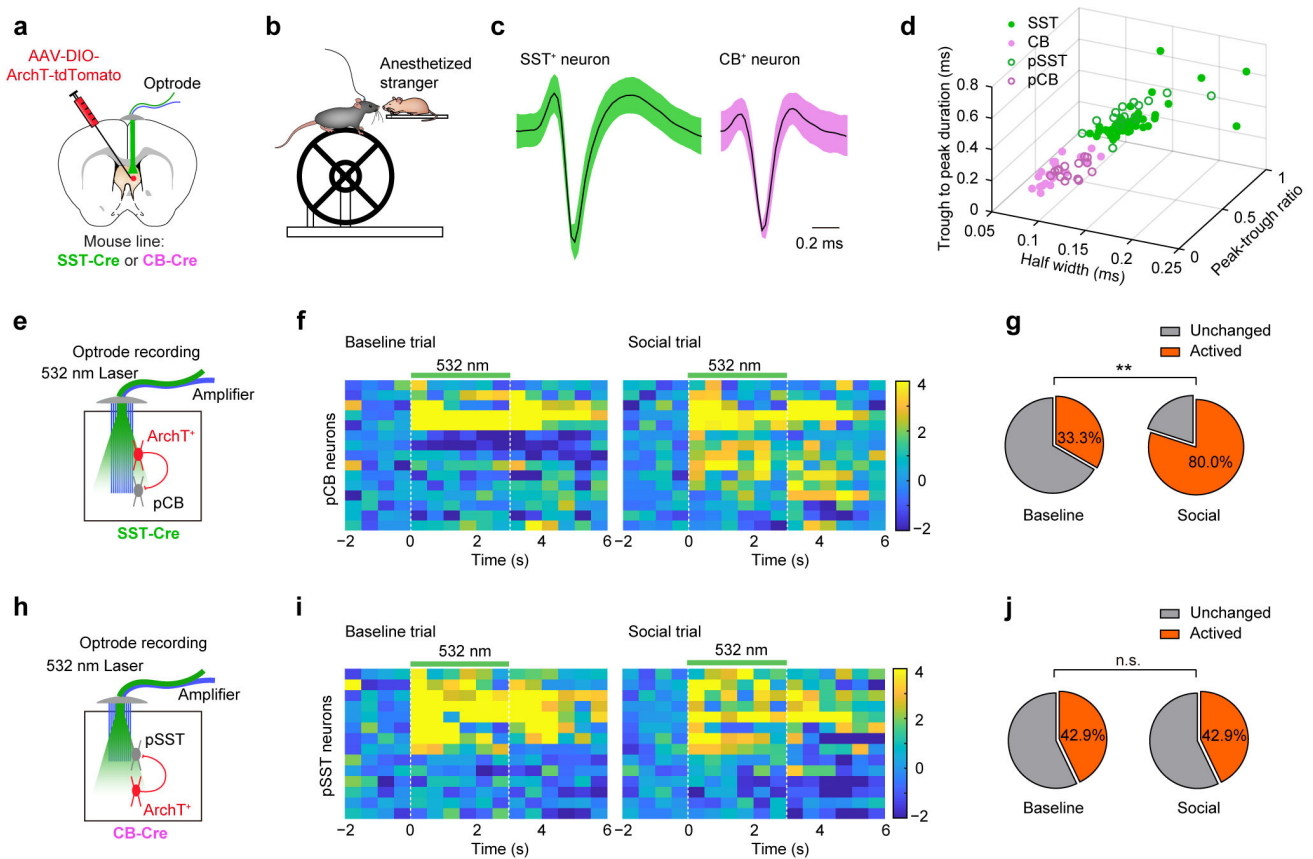
(a) Schematic showing AAV-fDIO-ChR2-EYFP and AAV-DIO-H2B-mCherry injection into LS of SST-Flp/CB-Cre mice.

(b) Schematic of slice physiology.

(c) Light-evoked IPSCs in CB⁺ neurons under baseline, TTX/4-AP, and PTX conditions.

(d) Quantification demonstrating monosynaptic inhibition of CB⁺ neurons by SST⁺ neurons. Connection probability and IPSC amplitudes (26 CB⁺ neurons, 3 mice); drug effects (Baseline vs. TTX/4-AP, $p = 0.0025$; TTX/4-AP vs. PTX, $p < 0.0001$, 5 CB⁺ neurons, 3 mice).

Statistics: two-tailed paired Student's t -test (**d**). Data are presented as mean $\pm$ SEM.



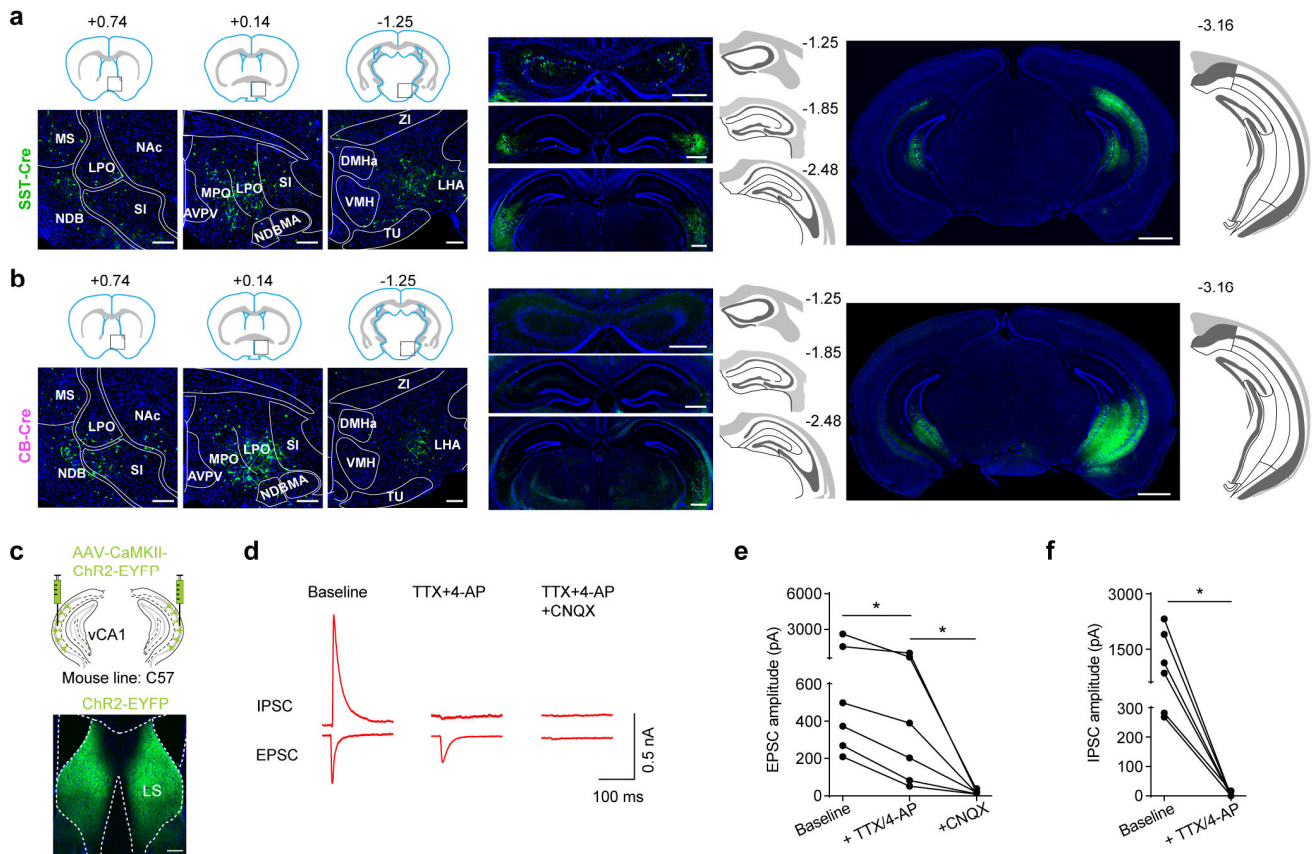
Supplementary Fig. 16 SST⁺ and CB⁺ neurons exhibit mutual inhibition during social interaction (related to Fig. 4).

(a-d) SST⁺ and CB⁺ single units display distinct spike waveforms. **(a)** Schematic of AAV-DIO-ArchT-tdTomato injection into LS of SST-Cre or CB-Cre mice and optrode implantation. **(b)** Head-fixed setup presenting an anesthetized stranger mouse. **(c)** Representative waveforms of opto-tagged SST⁺ and CB⁺ neurons. **(d)** Quantification of waveform properties from opto-tagged (solid dots: 54 SST⁺ neurons, 30 mice; 20 CB⁺ neurons, 11 mice) and putative SST⁺ (pSST⁺) and CB⁺ (pCB⁺) neurons (open dots: 14 pSST⁺ neurons, 9 mice; 15 pCB⁺ neurons, 8 mice).

(e-g) SST⁺ neurons exert stronger inhibitory control over pCB⁺ neurons during social interaction. **(e)** Schematic of optogenetic silencing of SST⁺ neurons (532-nm laser, 3 s, 10 mW) during pCB⁺ recordings. **(f)** Z-score heatmaps of pCB⁺ neuron firing under baseline and social stimulus. **(g)** Proportions of pCB⁺ neurons showing increased firing (Z-score > 2) or no change in (|Z-score| < 2) under baseline and social stimulus conditions. SST⁺ neurons suppressed pCB⁺ neuron activity more strongly during social interaction ($p = 0.0099$).

(h-j) CB⁺ neurons exert stable inhibition of pSST⁺ neurons regardless of context. **(h)** Optogenetic silencing of CB⁺ neurons during pSST⁺ recordings. **(i)** Z-score heatmaps of pSST⁺ neuron firing under baseline and social stimulus. **(j)** Proportions of pSST⁺ neurons showing increased firing (Z-score > 2) or no change in (|Z-score| < 2) under baseline and social stimulus conditions. CB⁺ neuron inhibition of pSST⁺ neurons remained stable ($p > 0.9999$).

Statistics: two-tailed Chi-squared test (**g, j**)



Supplementary Fig. 17 Mapping of the monosynaptic inputs of SST⁺ and CB⁺ neurons in the LS by pseudotyped rabies virus (related to Fig. 5a-d).

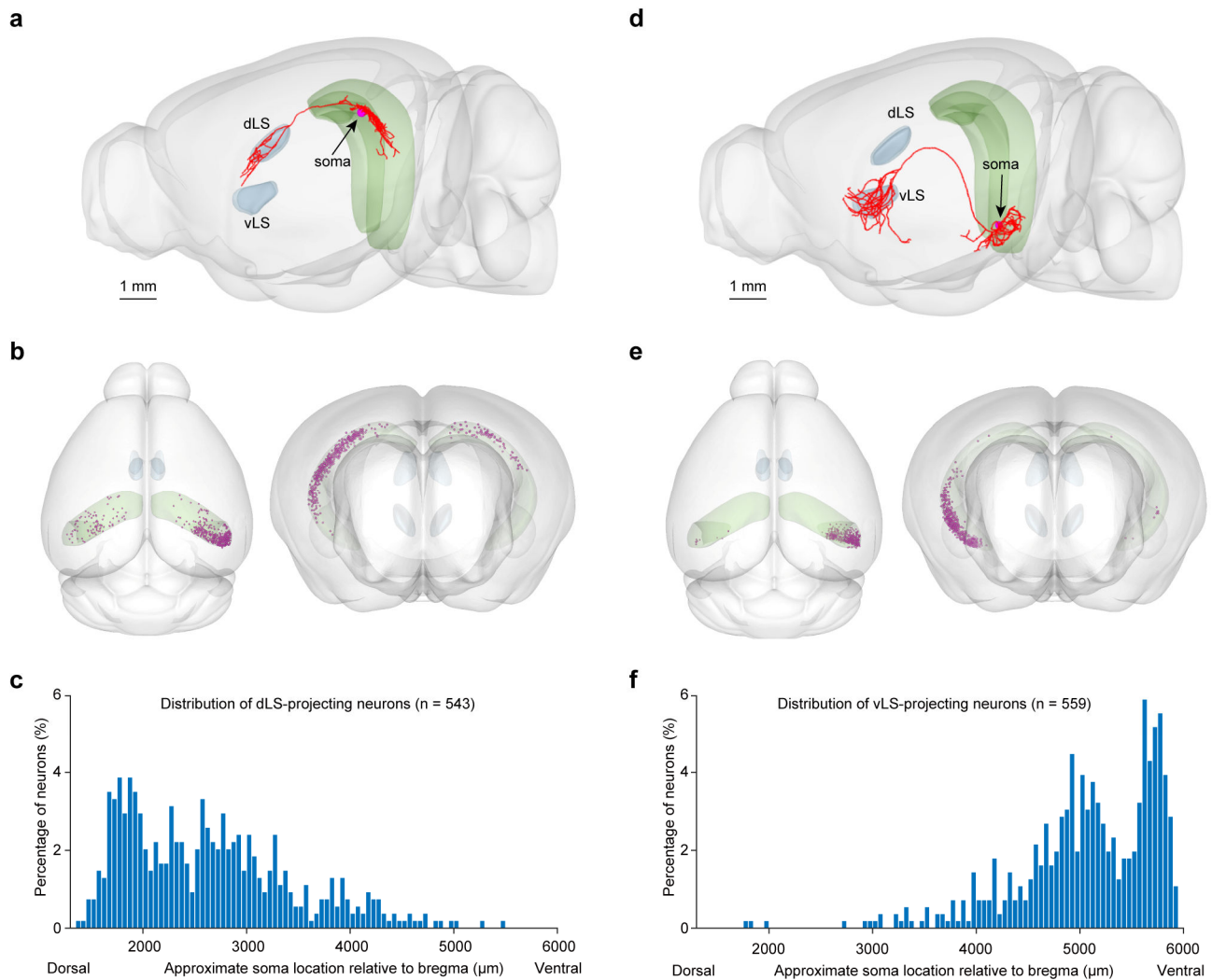
(a) Representative brain regions containing RV-labeled input neurons to SST⁺ neurons in the dLS of SST-Cre mice (injection site shown in **Fig. 5b**). Each fluorescent image is paired with a corresponding atlas reference¹. AP Positions are relative to bregma (mm). Scale bar: left, 200 μ m; middle, 500 μ m; right, 1 mm.

(b) Same as panel **(a)** but for CB⁺ neurons in the vLS of CB-Cre mice (injection site shown in **Fig. 5c**).

(c-f) Optogenetic stimulation of vCA1 inputs evokes monosynaptic glutamatergic EPSCs in LS neurons. **(c)** Bilateral AAV-CaMKII-ChR2-EYFP injection into vCA1 (top, schematic; bottom, representative coronal section showing ChR2-EYFP-labeled axon terminals, green; DAPI, blue; scale bar, 200 μ m). **(d)** Example traces showing effects of TTX/4-AP and CNQX on light-evoked EPSCs and IPSCs. **(e, f)** Summary of effects on EPSC (TTX/4-AP, $p = 0.0313$; CNQX, $p = 0.0313$; 6 neurons, 3 mice) and IPSC amplitude ($p = 0.0313$, 6 neurons, 3 mice).

Statistics: two-tailed Wilcoxon signed rank test (**e, f**).

Abbreviations: MS, medial septal nucleus; NAc, nucleus accumbens; LPO, lateral preoptic area; NDB, diagonal band nucleus; SI, substantia innominata; MPO, medial preoptic area; AVPV, anteroventral periventricular nucleus; MA, magnocellular nucleus; ZI, zona incerta; DMHa, dorsomedial nucleus of the hypothalamus, anterior part; VMH, ventromedial hypothalamic nucleus; TU, tuberal nucleus; LHA, lateral hypothalamic area.

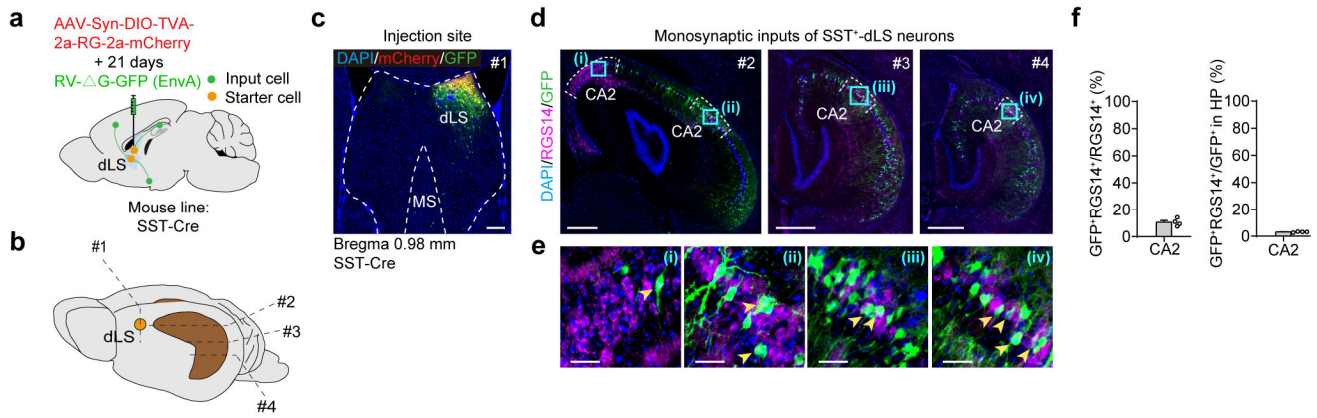


Supplementary Fig. 18 Single-neuron projectomes of the mouse hippocampus reveal topographic segregation of vCA1 pyramidal neurons projecting to dLS versus vLS (related to Fig. 5a-d).

(a-c) dLS-projecting pyramidal neurons are primarily localized in the dorsal portion of vCA1 (vCA1d). **(a)** Example reconstruction of a vCA1d neuron projecting to dLS (green, hippocampus; blue, dLS and vLS). **(b)** Soma distribution of dLS-projecting neurons in CA1 (one dot = one neuron). Left, horizontal view; right, coronal view. **(c)** Soma distribution of dLS-projecting neurons along the dorsal-ventral axis of vCA1 ($n = 543$).

(d-f) vLS-projecting pyramidal neurons are primarily localized in the ventral portion of vCA1 (vCA1v). **(d)** Example reconstruction of a vCA1v neuron projecting to vLS (green, hippocampus; blue, dLS and vLS). **(e)** Soma distribution of vLS-projecting neurons in the CA1 regions (one dot = one neuron). Left, horizontal view; right, coronal view. **(f)** Distribution of vLS-projecting neuron somata along the dorsal-ventral axis of vCA1 ($n = 559$).

Data source: Brain Science Data Center, Chinese Academy of Sciences (<https://braindatacenter.cn/>).



Supplementary Fig. 19 Mapping of the monosynaptic inputs from CA2 to SST⁺-dLS neurons using pseudotyped rabies virus (related to Fig. 5a-d).

(a) Schematic for rabies virus-based retrograde tracing strategy (as in **Fig. 5a**). Starter cells co-expressed mCherry and GFP, whereas input neurons expressed GFP alone.

(b) Diagram illustrating the locations of coronal LS section containing the injection site (position #1, shown in panel **c**) and horizontal hippocampal sections (positions #2–#4, shown in panel **d**).

(c) Representative coronal section showing that SST⁺ starter cells are unilaterally confined to the dLS. Scale bar, 200 μ m.

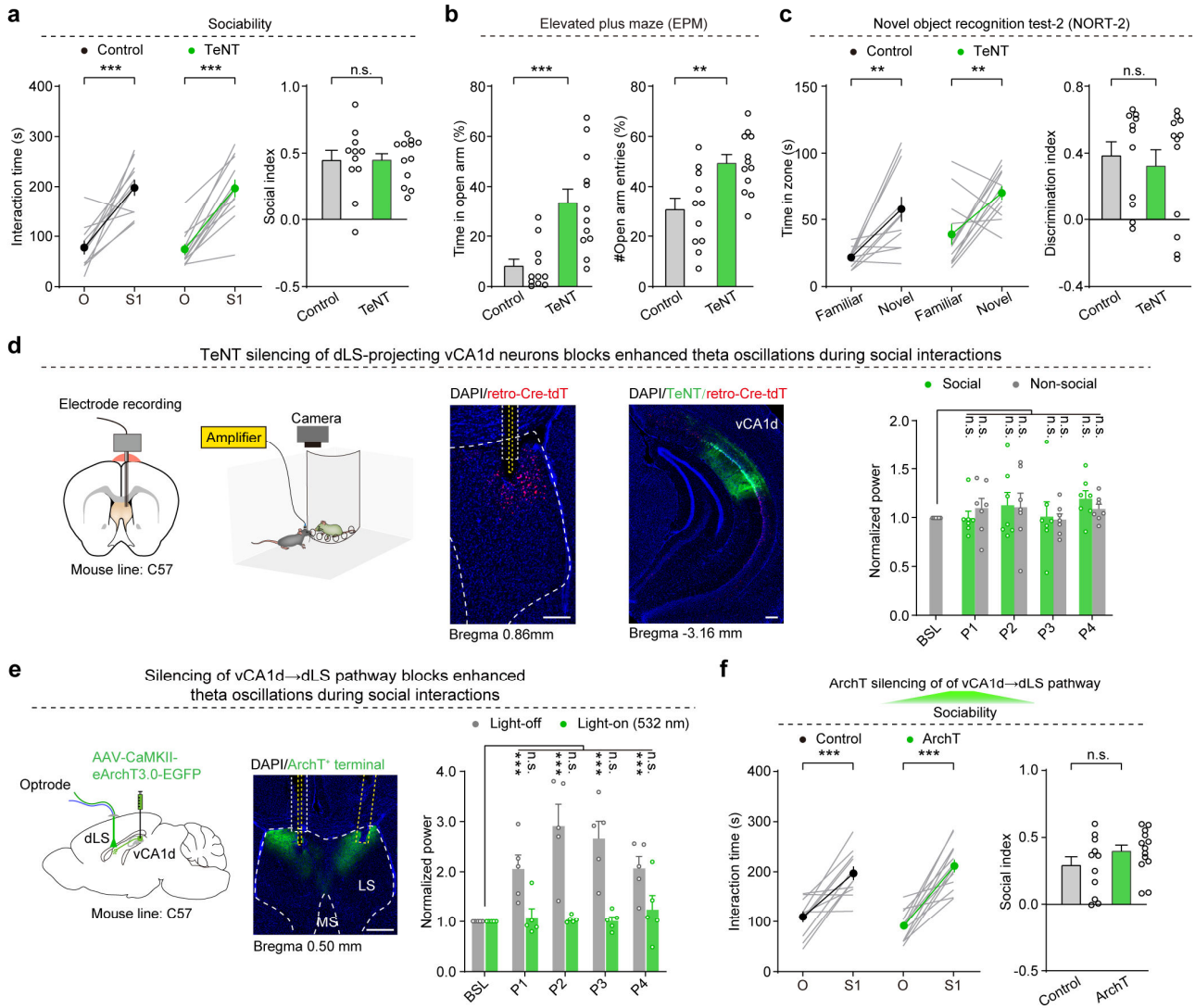
(d) Representative horizontal sections showing RV-labeled input neurons co-labeled with the CA2 marker RGS14. Scale bar, 500 μ m.

(e) Magnified areas of the CA2 from panel **(d)**. Yellow arrowheads indicate neurons co-expressing GFP and RGS14. Scale bar, 50 μ m.

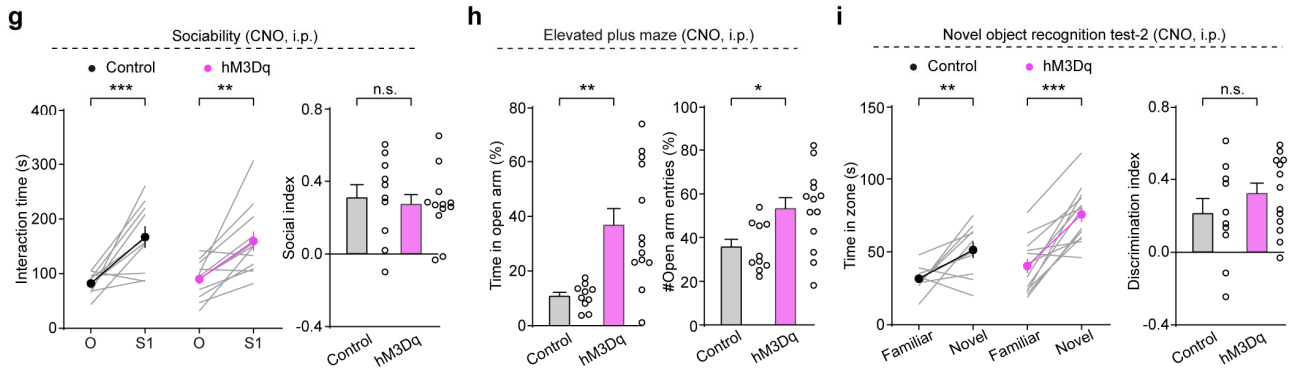
(f) Left, proportion of RGS14⁺ neurons that were GFP⁺ (double-labeled) within CA2. Right, proportion of GFP⁺ input neurons in the hippocampus that were RGS14⁺.

Data are presented as mean $\pm$ SEM.

TeNT silencing of dLS-projecting vCA1d neurons



Chemogenetic activation of vLS-projecting vCA1v neurons



Supplementary Fig. 20 The vCA1d→dLS and vCA1v→vLS pathways are anxiogenic and anxiolytic, respectively (related to Fig. 6).

(a) TeNT blockade of dLS-projecting vCA1d neurons did not change sociability (interaction, $p = 0.9369$; Holm–Sidak post-hoc—Control: $p < 0.0001$, $n = 11$; TeNT: $p < 0.0001$, $n = 12$; social index, $p = 0.9653$). Strategy for (a–d) shown in **Fig. 6a**.

(b) TeNT blockade reduced anxiety ($p = 0.0007$, 0.0038 ; Control, $n = 11$; TeNT, $n = 12$).

(c) Novel object recognition was unaffected in NORT-2 (interaction, $p = 0.7494$; Holm–Sidak post-hoc—Control: $p = 0.0048$, $n = 11$; TeNT: $p = 0.0050$, $n = 12$; discrimination index, $p = 0.4865$).

(d) TeNT blockade inhibited the enhancement of theta oscillations during sociability session. Left, schematic; middle, representative image; right, normalized theta power (time, $p = 0.2925$; status, $p = 0.8920$; Holm–Sidak post-hoc (vs. baseline): $p > 0.05$ for P1–P4; $n = 7$).

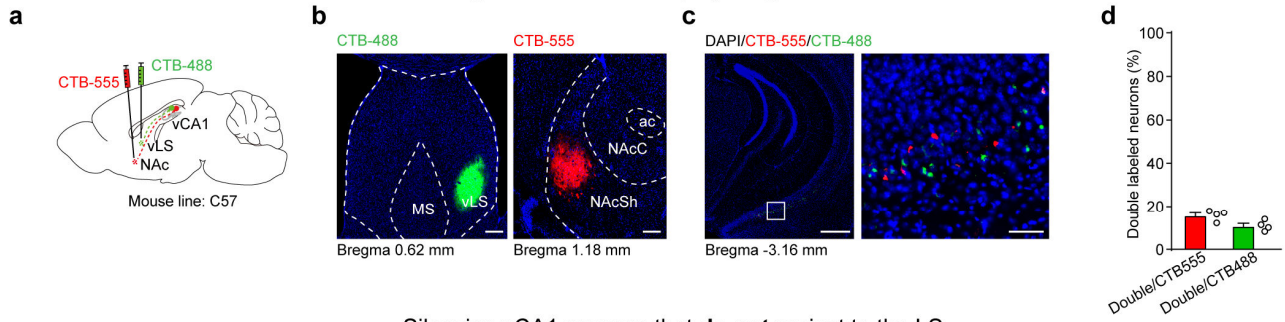
(e) Silencing of the vCA1d→dLS blocked social interaction-induced theta enhancement. Left, schematic of AAV-CaMKII-eArchT3.0-EGFP injection followed by optrode and optical fiber implantation in the dLS; middle, representative image; right, normalized theta power (time, $p = 0.0102$; light, $p = 0.0046$; Holm–Sidak post-hoc—light-off vs. baseline: $p < 0.001$ for P1–P4; light-on vs. baseline: $p > 0.05$ for P1–P4; $n = 5$).

(f) ArchT silencing of vCA1d terminals in dLS did not affect sociability (interaction, $p = 0.1811$; Holm–Sidak post-hoc—Control: $p < 0.0001$, $n = 11$; ArchT: $p < 0.0001$, $n = 13$; social index, $p = 0.1939$).

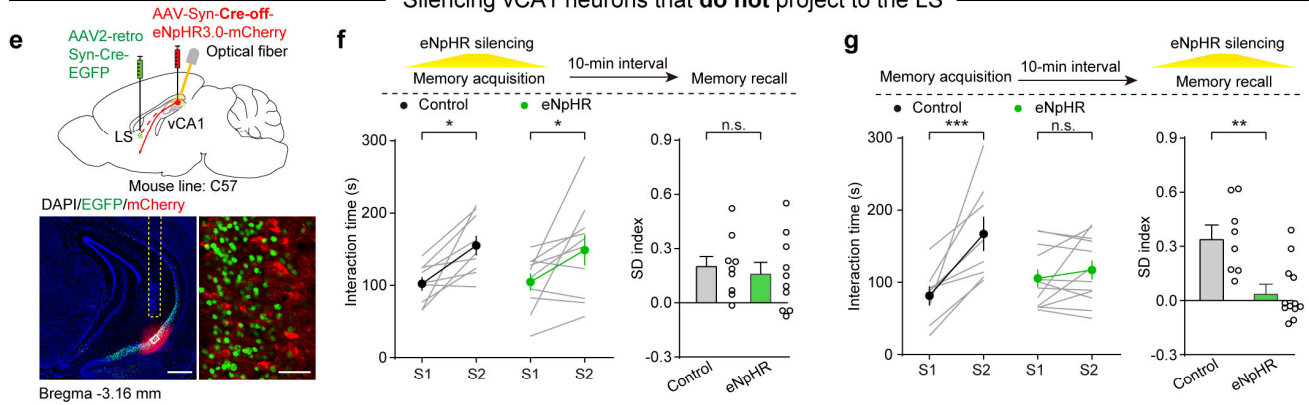
(g–i) vLS-projecting vCA1v neurons are anxiolytic (strategy shown in **Fig. 6g**). **(g)** Chemogenetic activation did not affect sociability (interaction, $p = 0.5609$; Holm–Sidak post-hoc—Control: $p = 0.0007$, $n = 10$; hM3Dq: $p = 0.0010$, $n = 12$; social index, $p = 0.6998$). **(h)** Activation reduced anxiety ($p = 0.0015$, 0.0156 ; Control, $n = 10$; hM3Dq, $n = 13$). **(i)** Activation did not alter novel object recognition in NORT-2 (interaction, $p = 0.0909$; Holm–Sidak post-hoc—Control: $p = 0.0075$, $n = 10$; hM3Dq: $p < 0.0001$, $n = 13$; discrimination index, $p = 0.2723$).

Statistics: two-way RM ANOVA followed by Holm–Sidak post-hoc test (**a**, **c**, **d**, **e**, **f**, **g**, **i**), two-tailed unpaired Student's *t*-test (**a**, **b**, **f**, **g**, **h**, **i**), two-tailed Mann-Whitney test (**b**, **c**). Data are presented as mean $\pm$ SEM. Scale bars: 200 μ m (**d**, **e**).

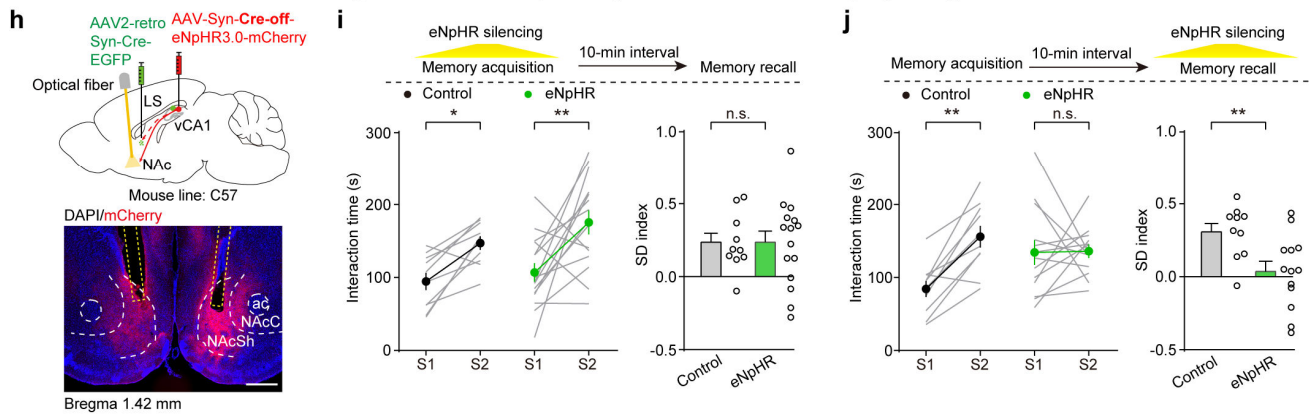
CTB-tracing the vCA1 neurons projecting to both vLS and NAc



Silencing vCA1 neurons that **do not** project to the LS



Silencing the vCA1→NAc pathway in vCA1 neurons **not** projecting to the LS



Supplementary Fig. 21 The vCA1→NAc pathway in non-LS projecting vCA1 neurons regulates social memory recall (related to Fig. 6).

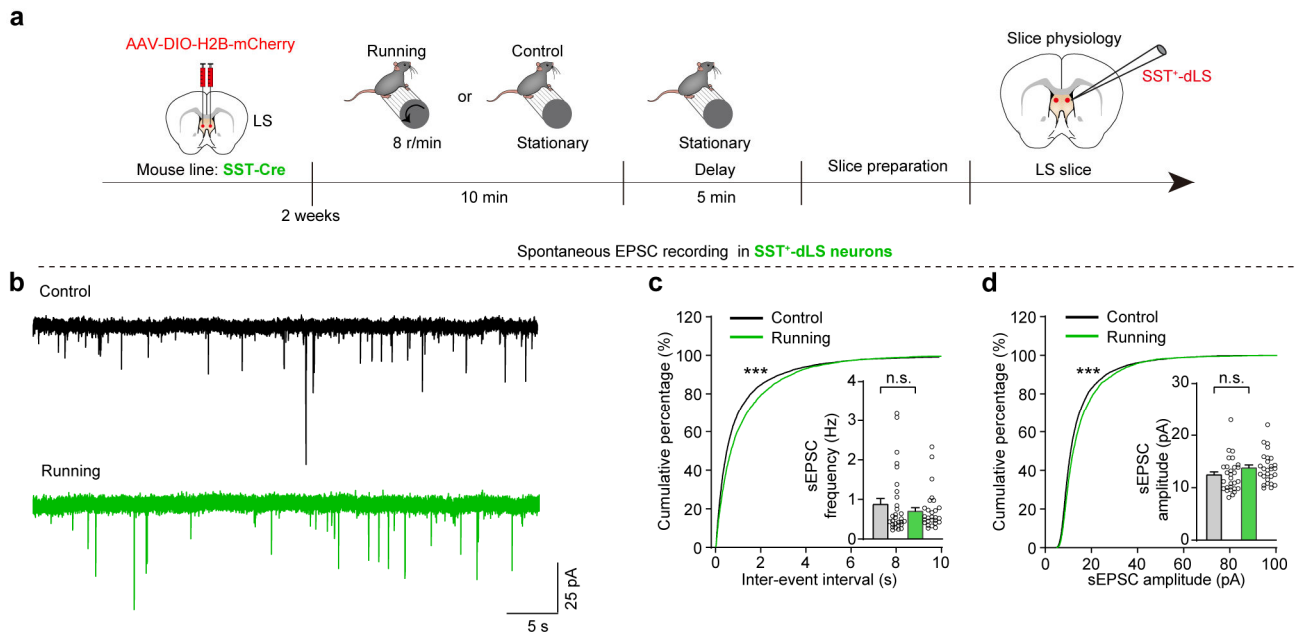
(a-d) CTB tracing revealed minimal overlap between vCA1 neurons projecting to the vLS and NAc.

(a) Schematic of unilateral CTB-488 and CTB-555 injections into the vLS and NAc, respectively. **(b)** Representative coronal section showing injection sites. Scale bar, 200 μm . **(c)** Retrogradely labeled vCA1 neurons (CTB-488, green; CTB-555, red); right, magnified boxed area. Scale bars: 500 μm (left) and 50 μm (right). **(d)** Quantification of double-labeled neurons among CTB-555⁺ and CTB-488⁺ vCA1 neurons.

(e-g) Optogenetic silencing of non-LS projecting vCA1 neurons impaired social memory recall after 10 min. **(e)** Top, schematic; bottom left, representative image showing optical fiber track above eNpHR-mCherry⁺ neurons in vCA1 (scale bar, 500 μm); bottom right, magnified view showing no overlap between EGFP⁺ and mCherry⁺ neurons (scale bar, 50 μm). **(f)** Silencing during memory acquisition did not alter social memory (interaction, $p = 0.7254$; Holm–Sidak post-hoc—Control: $p = 0.0172$, $n = 9$; eNpHR: $p = 0.0183$, $n = 10$; SD index, $p = 0.6268$). **(g)** Silencing during the memory recall disrupted social memory (interaction, $p = 0.0038$; Holm–Sidak post-hoc—Control: $p = 0.0002$, $n = 8$; eNpHR: $p = 0.4276$, $n = 12$; SD index, $p = 0.0022$).

(h-j) Optogenetic silencing of the vCA1→NAc pathway in non-LS projecting vCA1 neurons similarly impaired social memory recall at a 10-min interval. **(h)** Schematic showing AAV injection and optical fiber targeting non-LS projecting vCA1→NAc terminals; bottom, mCherry⁺ axons in the NAc (scale bar, 500 μm). **(i)** Silencing during social memory acquisition did not affect social memory (interaction, $p = 0.5930$; Holm–Sidak post-hoc—Control: $p = 0.0315$, $n = 10$; eNpHR: $p = 0.0026$, $n = 15$; SD index, $p = 0.9973$). **(j)** Silencing during social memory recall disrupted social memory (interaction, $p = 0.0149$; Holm–Sidak post-hoc—Control: $p = 0.0034$, $n = 10$; eNpHR: $p = 0.9375$, $n = 13$; SD index, $p = 0.0089$).

Statistics: two-way RM ANOVA followed by Holm–Sidak post-hoc test (**f, g, i, j**), two-tailed unpaired Student's t -test for index (**f, i, j**), and two-tailed Mann-Whitney test for index (**g**). Data are presented as mean $\pm$ SEM.

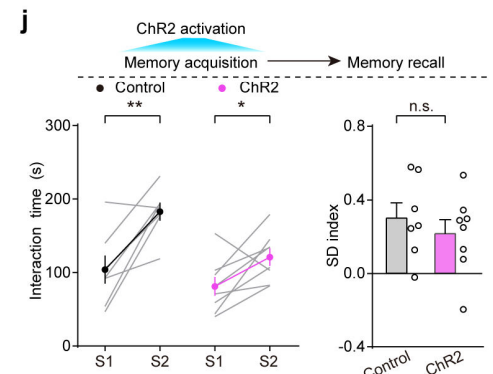
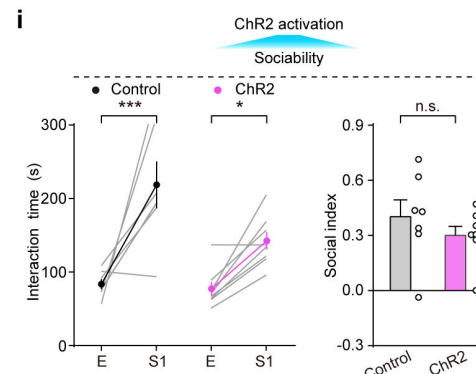
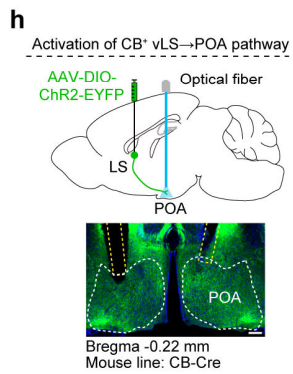
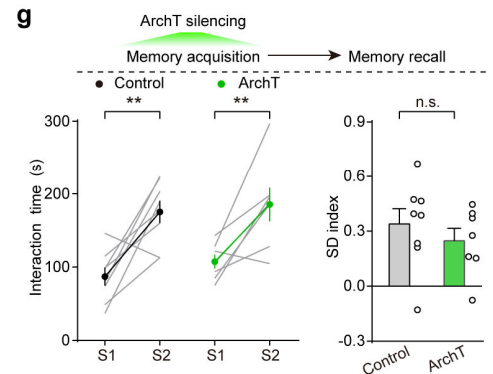
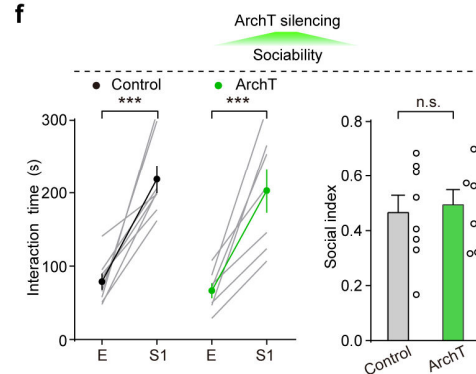
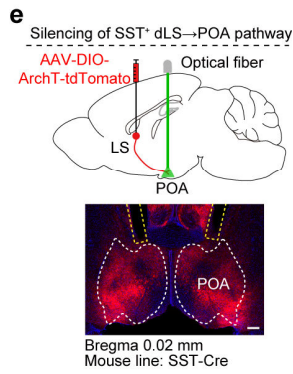
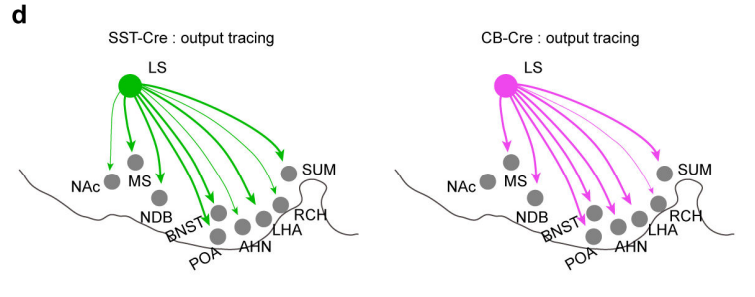
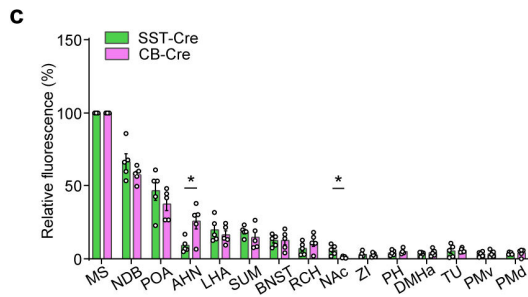
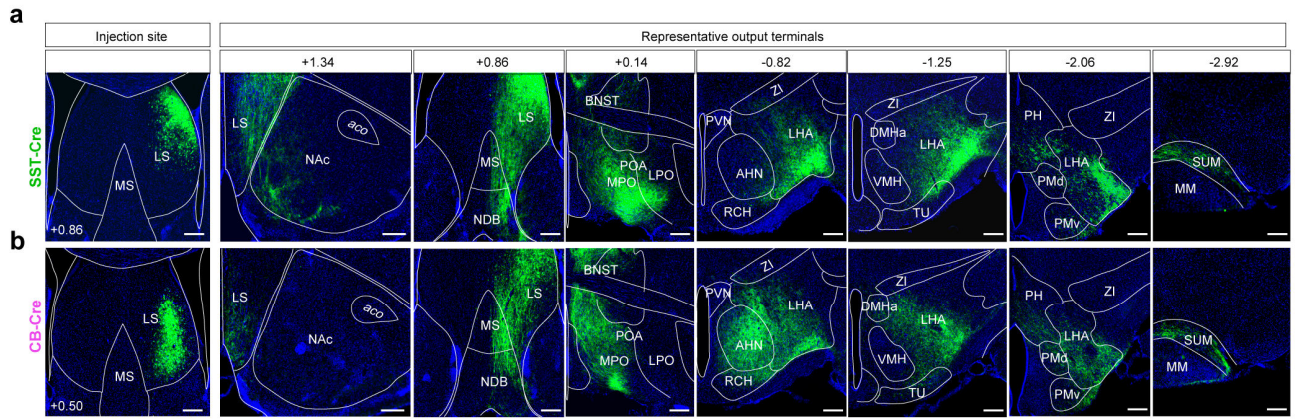


Supplementary Fig. 22 Excitatory inputs to SST⁺-dLS neurons are unaffected by rotarod running (related to Fig. 7).

(a) Experimental timeline. Mice performed rotarod running (8 rpm, 10 min) before slice physiology; controls remained on a stationary rod.

(b-d) Rotated running did not alter sEPSC frequency or amplitude in SST⁺-dLS neurons. **(b)** Representative sEPSC traces from control and running groups. **(c)** Cumulative distribution of inter-event interval and summary graphs of sEPSC frequency (inset) ($p = 0.7204$; Control, 29 neurons, 3 mice; Running, 27 neurons, 3 mice). **(d)** Cumulative distribution of sEPSC amplitude and summary of sEPSC amplitude (inset) ($p = 0.0660$; Control, 29 neurons, 3 mice; Running, 27 neurons, 3 mice).

Statistics: two-tailed Kolmogorov-Smirnov test for cumulative distributions (**c**, **d**), and two-tailed Mann-Whitney test for averaged frequency and amplitude (**c**, **d**). Data are presented as mean $\pm$ SEM.



Supplementary Fig. 23 SST⁺-dLS→POA and CB⁺-vLS→POA pathways do not regulate baseline sociability or social memory (related to Fig. 8).

(a-d) Anterograde tracing of SST⁺ and CB⁺ neurons in LS. **(a)** EGFP-labeled SST⁺ neurons in the dLS (left) and their axonal projections in ipsilateral output regions (right). **(b)** Same as panel **(a)** for EGFP-labeled CB⁺ neurons in the vLS. **(c)** Quantification of axonal fluorescence signals in ipsilateral targets normalized to MS (AHN: $p = 0.0190$; NAc: $p = 0.0341$; $p > 0.05$ for others; SST-Cre: $n = 5$; CB-Cre: $n = 5$). **(d)** Schematic summary of SST⁺ and CB⁺ LS neurons output patterns.

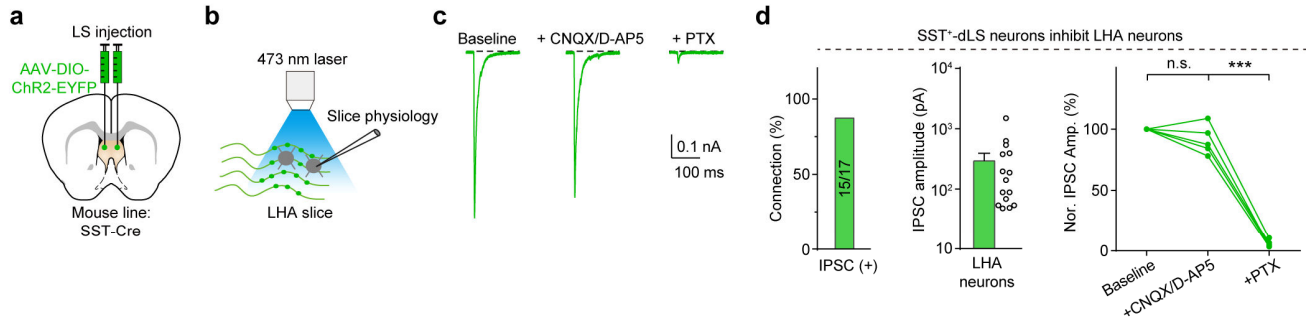
(e-g) Optogenetic silencing of SST⁺-dLS→POA did not alter sociability or social memory. **(e)** Schematic and representative image. **(f)** ArchT silencing did not alter sociability (interaction, $p = 0.9167$; Holm–Sidak post-hoc—Control: $p = 0.0002$, $n = 8$; ArchT: $p = 0.0002$, $n = 7$; social index, $p = 0.7441$). **(g)** Silencing during memory acquisition did not affect social memory (interaction, $p = 0.7542$; Holm–Sidak post-hoc—Control: $p = 0.0028$, $n = 8$; ArchT: $p = 0.0052$, $n = 7$; SD index, $p = 0.4216$).

(h-j) Optogenetic activation of CB⁺-vLS→POA did not affect sociability or social memory. **(h)** Schematic and representative image. **(i)** Activation did not alter sociability (interaction, $p = 0.0848$; Holm–Sidak post-hoc—Control: $p = 0.0005$, $n = 7$; ChR2: $p = 0.0235$, $n = 8$; social index, $p = 0.3304$). **(j)** Activation during memory acquisition did not affect social memory (interaction, $p = 0.1505$; Holm–Sidak post-hoc—Control: $p = 0.0020$, $n = 7$; ChR2: $p = 0.0397$, $n = 8$; SD index, $p = 0.4627$).

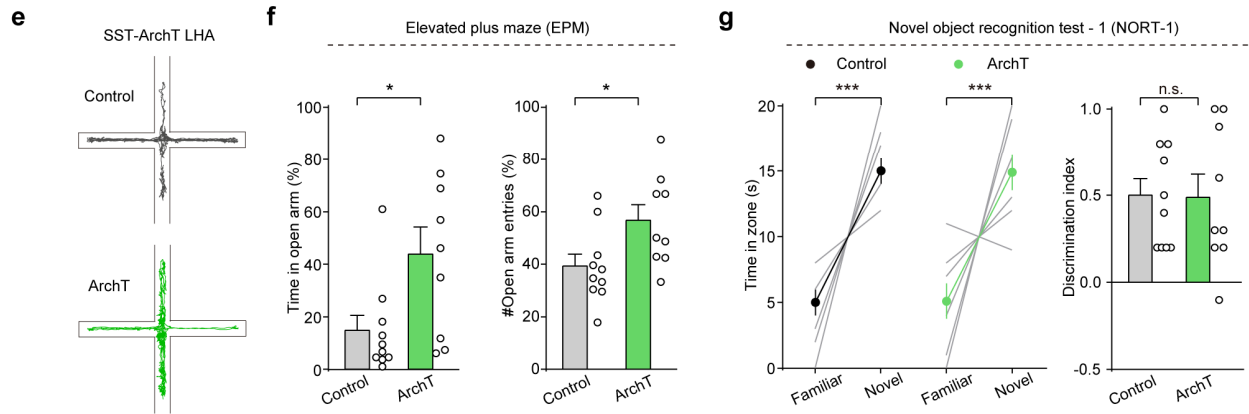
Statistics: two-way ANOVA RM followed by Holm–Sidak post-hoc test (**f, g, i, j**), two-tailed unpaired Student's t -test (**c, f, g, i, j**), two-tailed unpaired Welch's t -test (**c**). Data are presented as mean $\pm$ SEM. Scale bars: 200 μ m (**a, b, e, h**).

Abbreviations: MS, medial septal nucleus; NDB, diagonal band nucleus; POA, preoptic area; AHN, anterior hypothalamic nucleus; LHA, lateral hypothalamic area; SUM, supramammillary nucleus; BNST, bed nucleus of the stria terminalis; NAc, nucleus accumbens; PH, posterior hypothalamic nucleus; ZI, zona incerta; RCH, retrochiasmatic area; DMHa: dorsomedial hypothalamic nucleus, anterior part; TU: tuberal nucleus; PMv: ventral premammillary nucleus; PMd: dorsal premammillary nucleus.

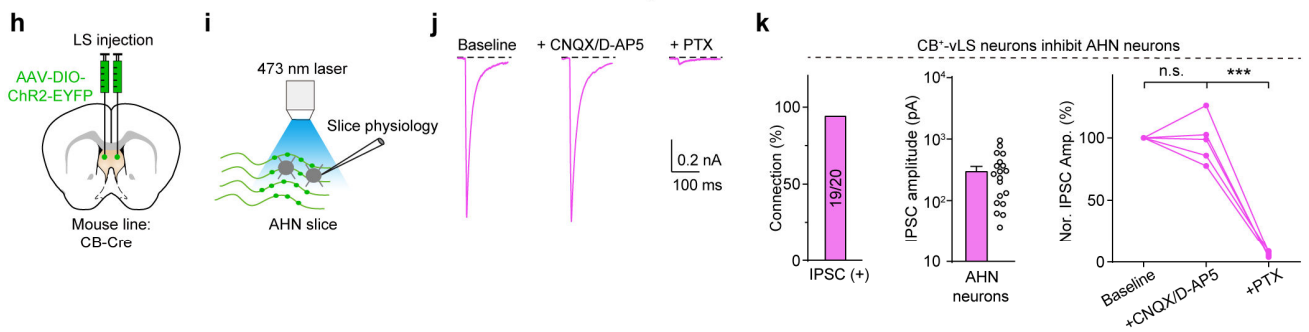
SST⁺-dLS neurons form GABAergic connections to LHA neurons



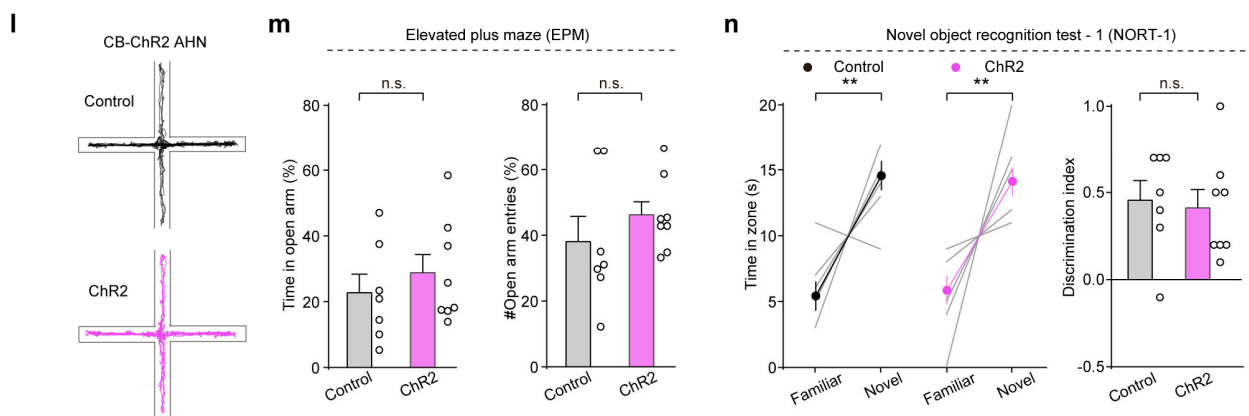
ArchT Silencing of SST⁺ dLS→LHA pathway



CB⁺-vLS neurons form GABAergic connections to AHN neurons



ChR2 activation of CB⁺ vLS→AHN pathway



Supplementary Fig. 24 Silencing of SST⁺-dLS→LHA pathway reduces the anxiety level in the EPM (related to Fig. 8).

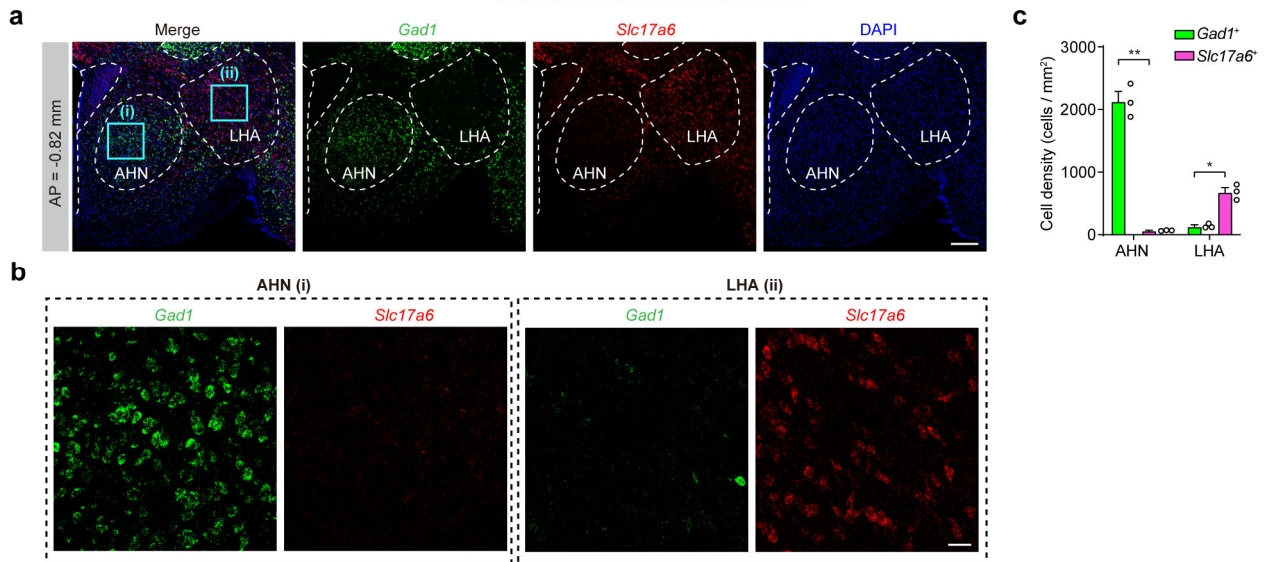
(a-d) SST⁺-dLS neurons formed functional GABAergic synapses with LHA neurons. **(a)** Schematic of AAV-DIO-ChR2-EYFP injection into dLS of SST-Cre mice. **(b)** Recording configuration for LHA neurons in acute slices. **(c)** Example traces showing the effects of CNQX/D-AP5 and PTX on light-evoked IPSCs recorded from LHA neurons. **(d)** Summary of connection probability (17 LHA neurons, 3 mice), IPSC amplitudes (15 neurons, 3 mice), and drug effects (CNQX/D-AP5, $p = 0.1714$; PTX, $p < 0.0001$; 5 neurons, 3 mice).

(e-g) Optogenetic inhibition of SST⁺-dLS→LHA pathway reduced anxiety level without affecting novelty preference. **(e)** Representative EPM track map. **(f)** Increased open-arm exploration ($p = 0.0279$, 0.0288 ; Control, $n = 10$; ArchT, $n = 9$). **(g)** NORT-1 was unaffected (interaction, $p = 0.9463$; Holm–Sidak post-hoc—Control: $p = 0.0007$, $n = 10$; ArchT: $p = 0.0007$, $n = 9$; discrimination index, $p = 0.9463$).

(h-k) CB⁺-vLS neurons formed functional GABAergic synapses with AHN neurons. **(h)** Schematic of AAV-DIO-ChR2-EYFP injection into vLS of CB-Cre mice. **(i)** Recording configuration for AHN neurons. **(j)** Example traces of light-evoked IPSCs in AHN neurons. **(k)** Summary of connection probability (20 neurons, 3 mice), IPSC amplitude (19 neurons, 3 mice), and drug effects (CNQX/D-AP5: $p = 0.8313$; PTX: $p = 0.0004$; 5 neurons, 3 mice).

(l-n) Optogenetic activation of CB⁺-vLS→AHN pathway did not alter anxiety or novelty preference. **(l)** Representative EPM track map. **(m)** Anxiety measures were unchanged ($p = 0.4537$, 0.3494 ; Control, $n = 7$; ChR2, $n = 8$). **(n)** NORT-1 was unaffected (interaction, $p = 0.7760$; Holm–Sidak post-hoc—Control: $p = 0.0026$, $n = 7$; ChR2: $p = 0.0026$, $n = 8$; discrimination index, $p = 0.7760$).

Statistics: two-tailed one sample t -test (**d**, **k**), two-tailed paired Student's t -test (**d**, **k**), two-way RM ANOVA followed by Holm–Sidak post-hoc test (**g**, **n**), two-tailed unpaired Student's t -test (**f**, **g**, **m**, **n**), and two-tailed Mann-Whitney test (**f**). Data are presented as mean $\pm$ SEM.



Supplementary Fig. 25 Distinct distribution of GABAergic and glutamatergic neurons in the AHN and LHA (related to Fig. 8).

(a-c) smFISH labeling of *Gad1* (GABAergic marker) and *Slc17a6* (glutamatergic marker) mRNAs in C57 mice. **(a)** Representative coronal section showing *Gad1*⁺ and *Slc17a6*⁺ neurons in the AHN and LHA (scale bar, 200 μ m). **(b)** Magnified views of AHN and LHA from **(a)**. Scale bar, 25 μ m. **(c)** Quantification showed higher *Gad1*⁺ density in the AHN ($p = 0.0058$) and higher *Slc17a6*⁺ density in the LHA ($p = 0.0257$, $n = 3$ mice).

Statistics: two-tailed paired Student's t -test (c). Data are presented as mean $\pm$ SEM.

References

- 1 George Paxinos, K. F. *Paxinos and Franklin's the Mouse Brain in Stereotaxic Coordinates*. (Academic, 2019).

Supplementary Table 1 | Key resources table

REAGENT or RESOURCE	SOURCE	IDENTIFIER
Antibodies		
Rabbit polyclonal anti-Calbindin 1	Proteintech	Cat# 14479-1-AP; RRID:AB_2228318
Mouse monoclonal anti-NeuN	Millipore	Cat# MAB377; RRID:AB_2298772
Guinea pig polyclonal anti-c-fos	Synaptic systems	Cat# 226004; RRID:AB_2619946
Rabbit polyclonal anti-RGS14	Proteintech	Cat# 16258-1-AP; RRID:AB_2179918
Rat monoclonal anti-mCherry	Thermo Fisher Scientific	Cat# M11217; N/A
Rabbit polyclonal anti-GFP	Thermo Fisher Scientific	Cat# A-11122; RRID:AB_221569
Goat anti-mouse Alexa Fluor 647	Thermo Fisher Scientific	Cat# A-21236; RRID:AB_2535805
Goat anti-guinea pig Alexa Fluor 633	Thermo Fisher Scientific	Cat# A-21105; RRID:AB_150061
Goat anti-rabbit Alexa Fluor 488	Thermo Fisher Scientific	Cat# A-11034; RRID:AB_2576217
Goat anti-rat Alexa Fluor 546	Thermo Fisher Scientific	Cat# A-11081; RRID:AB_2534125
Alexa Fluor 488-conjugated streptavidin	Thermo Fisher Scientific	Cat# S11223; N/A
Bacterial and Viral Strains		
AAV2/9-Syn-DIO-EGFP-2A-TeNT	Taitool	N/A
AAV2/9-Syn-DIO-EGFP	Taitool	N/A
AAV2/9-Syn-DIO-hM3Dq-mCherry	Taitool	N/A
AAV2/9-CAG-DIO-ArchT-tdTomato	Taitool	N/A
AAV2/9-EF1 α -DIO-ChR2(H134R)-EYFP	Taitool	N/A
AAV2/9-EF1 α -fDIO-ChR2(H134R)-EYFP	Taitool	N/A
AAV2-retro-Syn-Cre-tdTomato	Taitool	N/A
AAV2-retro-Syn-Cre-EGFP	Taitool	N/A
AAV2/9-CaMKII-ChR2(H134R)-EYFP	Taitool	N/A
AAV2/9-Syn-DIO-mCherry	Taitool	N/A
AAV2/9-Syn-DIO- H2B-mCherry	Taitool	N/A
AAV2/9-Syn-fDIO-H2B-GFP	Taitool	N/A
rAAV-EF1 α -fDIO-H2B-mCherry	Brain Case	N/A
AAV2/9-Syn-DIO-H2B-EGFP	Taitool	N/A
AAV2/9-Syn-Cre-off-eNpHR3.0-mCherry	Taitool	N/A
AAV2/9-EF1 α -DIO-tdTomato	Brain Case	N/A
AAV2/9-CaMKII-eArchT3.0-EGFP	Taitool	N/A
AAV2/9-Syn-DIO-TVA-2a-RG-2a-mCherry	Brain Case	N/A
SAD Δ G-GFP rabies virus	Brain Case	N/A
Chemicals, Peptides, and Recombinant Proteins		
Clozapine-N-oxide (CNO)	Tocris Bioscience	Cat# 4936; CAS: 34233-69-7
4-aminopyridine (4-AP)	Tocris Bioscience	Cat# 0940; CAS: 504-24-5
Tetrodotoxin (TTX)	Tocris Bioscience	Cat# 1078; CAS: 4368-28-9
D-(-)-2-amino-5-phosphonopentanoic acid (D-AP5)	Tocris Bioscience	Cat# 0106; CAS: 79055-68-8

6-cyano-7-nitroquinoxaline-2,3-dione disodium (CNQX)	Tocris Bioscience	Cat# 1045; CAS: 479347-85-8
Picrotoxin (PTX)	Tocris Bioscience	Cat# 1128; CAS: 124-87-8
Critical Commercial Assays		
Mini protease inhibitor cocktail	Roche	Cat# 11836153001;
DNBelab C4 Single-Cell Library Prep Set	MGI	Cat# 1000021082;
Qubit™ ssDNA Assay Kit	Thermo Fisher Scientific	Cat# Q10212;
RNAscope™ Multiplex Fluorescent Regent Kit V2 Assay	Advanced Cell Diagnostics	Cat# 323100;
Experimental Models: Organisms/Strains		
Mouse: SST-IRES-Cre	Jackson Laboratory	JAX: #013044 RRID:IMSR JAX:013044
Mouse: CB-IRES-Cre	Jackson Laboratory	JAX: #028532 RRID:IMSR JAX:028532
Mouse: SST-IRES-Flp	Jackson Laboratory	JAX: #031629 RRID:IMSR JAX:031629
Mouse: Esr1-2A-Cre	Jackson Laboratoryc	JAX: #0017913 RRID:IMSR JAX:0017913
Mouse: Rosa26-LSL-tdTomato (Ai14)	Jackson Laboratory	JAX: #007914 RRID:IMSR JAX:007914
Mouse: Rosa26-LSL-H2B-GFP (LSL-H2B-GFP)	Jackson Laboratory	JAX: #036761 RRID:IMSR JAX:036761
Oligonucleotides		
RNAscope™ Probe- Mm- <i>Sst</i> -C1	Advanced Cell Diagnostics	Cat. #404631-C1
RNAscope™ Probe- Mm- <i>Calb1</i> -C2	Advanced Cell Diagnostics	Cat. #428431-C2
RNAscope™ Probe- Mm- <i>Nts</i> -C3	Advanced Cell Diagnostics	Cat. #420441-C3
RNAscope™ Probe- Mm- <i>Prlr</i> -C3	Advanced Cell Diagnostics	Cat. #430791-C3
RNAscope™ Probe- Mm- <i>Htr2c</i> -C3	Advanced Cell Diagnostics	Cat. #401001-C3
RNAscope™ Probe- Mm- <i>Glp1r</i> -C2	Advanced Cell Diagnostics	Cat. #418851-C2
#1 HCR probe targeting <i>Sst</i> mRNA: CACATTTACAGACCTCAATA ACGATGCAGAGCGCAGCCAG	This paper	N/A
#2 HCR probe targeting <i>Sst</i> mRNA: TGACACCGCCCAAAGCCAG GAACCTACCTCCAACCTCTCAC	This paper	N/A
#3 HCR probe targeting <i>Sst</i> mRNA: CACATTTACAGACCTCAATA GGCAGCCGCCAGAGACTTCT	This paper	N/A
#4 HCR probe targeting <i>Sst</i> mRNA: GCCAGTTCCTGTTTCCCGGT AACCTACCTCCAACCTCTCAC	This paper	N/A
#5 HCR probe targeting <i>Sst</i> mRNA: CACATTTACAGACCTCAATA GCAGCTCTGCCAAGAAGTAC	This paper	N/A
#6 HCR probe targeting <i>Sst</i> mRNA: TGTCTGGTTGGGCTCGGACA AACCTACCTCCAACCTCTCAC	This paper	N/A
#7 HCR probe targeting <i>Sst</i> mRNA: CACATTTACAGACCTCAATA	This paper	N/A

GGTGCCATTGCTGGGTTCGA		
#8 HCR probe targeting <i>Sst</i> mRNA: AGCCAGCTTTGCGTTCCCGG AACCTACCTCCAACCTCTCAC	This paper	N/A
#1 HCR probe targeting <i>Gad1</i> mRNA: CACTTCATATCACTCACTTA TTTCTGGTGCATCCATGGGC	This paper	N/A
#2 HCR probe targeting <i>Gad1</i> mRNA: CACAGATCTTCAGGCCAGT AACCCAATCTCTATCTACCC	This paper	N/A
#3 HCR probe targeting <i>Gad1</i> mRNA: CACTTCATATCACTCACTTA AAGACGACTCTTCTCTTCCA	This paper	N/A
#4 HCR probe targeting <i>Gad1</i> mRNA: CTCTCCCTGAAGGCGCTCAC AACCCAATCTCTATCTACCC	This paper	N/A
#5 HCR probe targeting <i>Gad1</i> mRNA: CACTTCATATCACTCACTTA TCACAGGAAAGCAGGTTCTT	This paper	N/A
#6 HCR probe targeting <i>Gad1</i> mRNA: GGGCACCCTGGTCACTGTTT AACCCAATCTCTATCTACCC	This paper	N/A
#7 HCR probe targeting <i>Gad1</i> mRNA: CACTTCATATCACTCACTTA TTAAAGCCTTCCATGCCTTC	This paper	N/A
#8 HCR probe targeting <i>Gad1</i> mRNA: GGTGGTCAGACAGCTCCAAA AACCCAATCTCTATCTACCC	This paper	N/A
#9 HCR probe targeting <i>Gad1</i> mRNA: CACTTCATATCACTCACTTA CCAATGATATCCAAACCAGT	This paper	N/A
#10 HCR probe targeting <i>Gad1</i> mRNA: TCAGCCATTCACCAGCTAAA AACCCAATCTCTATCTACCC	This paper	N/A
#11 HCR probe targeting <i>Gad1</i> mRNA: CACTTCATATCACTCACTTA ACCATCCAACGATCTCTCTC	This paper	N/A
#12 HCR probe targeting <i>Gad1</i> mRNA: CCCATCACCATCTTTATTTG AACCCAATCTCTATCTACCC	This paper	N/A
#13 HCR probe targeting <i>Gad1</i> mRNA: CACTTCATATCACTCACTTA CGGCTTTCTTTATGGAATAG	This paper	N/A
#14 HCR probe targeting <i>Gad1</i> mRNA: TCCAAAGCCAAGCGCAGCCC AACCCAATCTCTATCTACCC	This paper	N/A
#15 HCR probe targeting <i>Gad1</i> mRNA: CACTTCATATCACTCACTTA CCCTTTCATTGCACTTTATC	This paper	N/A
#16 HCR probe targeting <i>Gad1</i> mRNA: ATCAGCCGGAATTATCTTCC AACCCAATCTCTATCTACCC	This paper	N/A
#17 HCR probe targeting <i>Gad1</i> mRNA: CACTTCATATCACTCACTTA TATGCCGCTGAGTTTGTGGC	This paper	N/A
#18 HCR probe targeting <i>Gad1</i> mRNA:	This paper	N/A

GTGACTGAATTGGCCCTTTC AACCCAATCTCTATCTACCC		
#19 HCR probe targeting <i>Gad1</i> mRNA: CACTTCATATCACTCACTTA TCCTTGACCAGAATGGCAGA	This paper	N/A
#20 HCR probe targeting <i>Gad1</i> mRNA: ATCCTTGGAGTATACCCTTT AACCCAATCTCTATCTACCC	This paper	N/A
#21 HCR probe targeting <i>Gad1</i> mRNA: CACTTCATATCACTCACTTA ACCATCTCAAACCTCTTCTCT	This paper	N/A
#22 HCR probe targeting <i>Gad1</i> mRNA: GCTCAGGCTCACCATCGAAA AACCCAATCTCTATCTACCC	This paper	N/A
#23 HCR probe targeting <i>Gad1</i> mRNA: CACTTCATATCACTCACTTA CCTCGAAGGCTTTGTGGAAT	This paper	N/A
#24 HCR probe targeting <i>Gad1</i> mRNA: GCTCAGGGCTATCTGGAACC AACCCAATCTCTATCTACCC	This paper	N/A
#25 HCR probe targeting <i>Gad1</i> mRNA: CACTTCATATCACTCACTTA TGGTTGTTCTGACTCCATC	This paper	N/A
#26 HCR probe targeting <i>Gad1</i> mRNA: TTGAGGCTGGTAGCCACCA AACCCAATCTCTATCTACCC	This paper	N/A
#1 HCR probe targeting <i>Slc17a6</i> mRNA: AGCGGATGCCGAAGGATATG AACCTACCTCCAACCTCTCAC	This paper	N/A
#2 HCR probe targeting <i>Slc17a6</i> mRNA: CACATTTACAGACCTCAATA GCGGTGGATAGTGCTGTTGT	This paper	N/A
#3 HCR probe targeting <i>Slc17a6</i> mRNA: TCCTTGATAACTTTGCCTCC AACCTACCTCCAACCTCTCAC	This paper	N/A
#4 HCR probe targeting <i>Slc17a6</i> mRNA: CACATTTACAGACCTCAATA CAAAGACCCGGTTAGCAGCC	This paper	N/A
#5 HCR probe targeting <i>Slc17a6</i> mRNA: GGTGAGCAGTATCGCAGCCC AACCTACCTCCAACCTCTCAC	This paper	N/A
#6 HCR probe targeting <i>Slc17a6</i> mRNA: CACATTTACAGACCTCAATA ACACCCTCCACAAGTCCTTG	This paper	N/A
#7 HCR probe targeting <i>Slc17a6</i> mRNA: CATGACAGGCTGGGTAGGTG AACCTACCTCCAACCTCTCAC	This paper	N/A
#8 HCR probe targeting <i>Slc17a6</i> mRNA: CACATTTACAGACCTCAATA TACTCCTCTCCAAGGGAGGG	This paper	N/A
#9 HCR probe targeting <i>Slc17a6</i> mRNA: AAAGGAGGTTGTAGCCAACC AACCTACCTCCAACCTCTCAC	This paper	N/A
#10 HCR probe targeting <i>Slc17a6</i> mRNA: CACATTTACAGACCTCAATA TGTA CTGCACAAGGATACCA	This paper	N/A

#11 HCR probe targeting <i>Slc17a6</i> mRNA: AAATACTGACGACCATCCAG AACCTACCTCCAACCTCTCAC	This paper	N/A
#12 HCR probe targeting <i>Slc17a6</i> mRNA: CACATTTACAGACCTCAATA ACCAGACCATGCCAAAGCTT	This paper	N/A
#13 HCR probe targeting <i>Slc17a6</i> mRNA: CACCAGAAGCCAGAACATGT AACCTACCTCCAACCTCTCAC	This paper	N/A
#14 HCR probe targeting <i>Slc17a6</i> mRNA: CACATTTACAGACCTCAATA AATTATCGCGTAGACGGGCA	This paper	N/A
#15 HCR probe targeting <i>Slc17a6</i> mRNA: CTCCTGCAGAAGTTGGCAAC AACCTACCTCCAACCTCTCAC	This paper	N/A
#16 HCR probe targeting <i>Slc17a6</i> mRNA: CACATTTACAGACCTCAATA AGGAAATCTGCAATTGCCC	This paper	N/A
#17 HCR probe targeting <i>Slc17a6</i> mRNA: AGAGAATTTGCTTGCTCCTT AACCTACCTCCAACCTCTCAC	This paper	N/A
#18 HCR probe targeting <i>Slc17a6</i> mRNA: CACATTTACAGACCTCAATA CTGAATCCTACTGCAAGCAC	This paper	N/A
#19 HCR probe targeting <i>Slc17a6</i> mRNA: AACCAGAGATAGCAAATCCA AACCTACCTCCAACCTCTCAC	This paper	N/A
#20 HCR probe targeting <i>Slc17a6</i> mRNA: CACATTTACAGACCTCAATA TCTTGGAGCAATATCCAAGT	This paper	N/A
#21 HCR probe targeting <i>Slc17a6</i> mRNA: CCCATTAAGATACTGGCATA AACCTACCTCCAACCTCTCAC	This paper	N/A
#22 HCR probe targeting <i>Slc17a6</i> mRNA: CACATTTACAGACCTCAATA CGGGACTTATTCTTTGTCAT	This paper	N/A
#23 HCR probe targeting <i>Slc17a6</i> mRNA: AGACATACTGCCATTCTTCA AACCTACCTCCAACCTCTCAC	This paper	N/A
#24 HCR probe targeting <i>Slc17a6</i> mRNA: CACATTTACAGACCTCAATA TTTCTTCGCTTGTTTCTCA	This paper	N/A
#25 HCR probe targeting <i>Slc17a6</i> mRNA: TTCGTGAATGAAGCCACATT AACCTACCTCCAACCTCTCAC	This paper	N/A
#26 HCR probe targeting <i>Slc17a6</i> mRNA: CACATTTACAGACCTCAATA GGTGGTACCGTAATTTATGT	This paper	N/A
#27 HCR probe targeting <i>Slc17a6</i> mRNA: GAGGTAGCACCGTAAGATTT AACCTACCTCCAACCTCTCAC	This paper	N/A
#28 HCR probe targeting <i>Slc17a6</i> mRNA: CACATTTACAGACCTCAATA CTTCTTGACAAATTCTTCC	This paper	N/A
#29 HCR probe targeting <i>Slc17a6</i> mRNA: GGTGTACGCGTCTTGCGCAC	This paper	N/A

AACCTACCTCCAACCTCTCAC		
#30 HCR probe targeting <i>Slc17a6</i> mRNA: CACATTTACAGACCTCAATA CAGAAGCCGAGGCCGCTCAT	This paper	N/A

Supplementary Table 2 | Summary of all experimental designs

Figures	Aims	Mouse lines	AAV injection, optical fiber & electrode implantation	Type of data
Fig. 1a-c; Supplementary Fig. 1, 2, 7i	To reveal the cellular composition of the LS	WT C57	No AAV injection. No optical fiber implantation.	snRNA-seq
Fig. 1d-i; Supplementary Fig. 5	To capture the finer spatial distribution patterns of SST ⁺ and CB ⁺ neurons in the LS	SST-Cre/Ai14	No AAV injection. No optical fiber implantation.	Histology
Supplementary Fig. 3	To reveal the distinct molecular profiles of the SST ⁺ and Calb1 ⁺ neurons	WT C57	No AAV injection. No optical fiber implantation.	RNA-scope
Supplementary Fig. 4	To confirm the specificity of SST-Cre and CB-Cre mice	SST-Cre/LSL-H2B-GFP; CB-Cre/Ai14	No AAV injection. No optical fiber implantation	Histology
Supplementary Fig. 6	To demonstrate the Characterization of Esr1 ⁺ and CB ⁺ neurons in the LS	Esr1-Cre/Ai14	No AAV injection. No optical fiber implantation	Histology
Supplementary Fig. 7a-d	To examine the morphological properties of SST and CB neurons	SST-Cre/Ai14 CB-Cre/Ai14	No AAV injection. No optical fiber implantation	Morphology
Supplementary Fig. 7e-h	To examine the electrophysiological properties of SST ⁺ and CB ⁺ neurons	SST-Cre/Ai14 CB-Cre/Ai14	No AAV injection. No optical fiber implantation	Slice physiology
Supplementary Fig. 8	To examine whether SST ⁺ and CB ⁺ engage in social interactions	SST-Cre/Ai14	No AAV injection. No optical fiber implantation	Histology
Supplementary Fig. 9; Supplementary Fig. 16	To clarify the firing properties of SST ⁺ and CB ⁺ neurons during social interactions	SST-Cre; CB-Cre	Bilateral injection of AAV-DIO-ArchT-tdTomato into the LS. Implantation of an optrode into the LS	<i>In-vivo</i> electrophysiology
Fig. 2a-e; Supplementary Fig. 10	To examine the behavior evoked by TeNT silencing of SST ⁺ neurons	SST-Cre	Bilateral injection of AAV-DIO-EGFP-2A-TeNT into the LS. No optical fiber implantation	Behavior Histology
Fig. 2f-i; Supplementary Fig. 11a-e Supplementary Fig. 12	To examine the behavior evoked by optogenetic inhibition of SST ⁺ neurons	SST-Cre	Bilateral injection of AAV-DIO-ArchT-tdTomato into the LS. Bilateral implantation of an optical fiber above LS	Behavior Histology Slice physiology
Supplementary Fig. 11g	To test the social memory performance after 0–60 min interval	WT C57	No AAV injection. No optical fiber implantation	Behavior
Fig. 2j-l; Supplementary Fig. 11f	To examine the behaviors evoked by optogenetic activation of SST ⁺ neurons	SST-Cre	Bilateral injection of AAV-DIO-ChR2-EYFP into the LS. Bilateral implantation of an optical fiber above LS	Behavior Histology Slice physiology
Fig. 3a-e	To record local field potential during social interaction	WT C57	No AAV injection. Implantation of an electrode in LS	<i>In-vivo</i> electrophysiology
Fig. 3f-i Supplementary Fig. 13	To record SST ⁺ single units and local field potential during social interactions	SST-Cre	Bilateral injection of AAV-DIO-ArchT-tdTomato into the LS. Implantation of an optrode into LS	<i>In-vivo</i> electrophysiology

Fig. 3j-m	To record local field potential during optogenetic manipulations of SST ⁺ neurons	SST-Cre	Bilateral injection of AAV-DIO-ArchT-tdTomato into the LS. Implantation of an optrode into LS Bilateral injection of AAV-DIO-ChR2-EYFP into the LS. Implantation of an optrode into LS	<i>In-vivo</i> electrophysiology
Fig. 3n-q	To record the monosynaptic IPSCs from SST ⁺ to SST ⁻ neurons	SST-Cre/Ai14	Bilateral injection of AAV-DIO-ChR2-EYFP into the LS. No optical fiber implantation	Slice physiology
Supplementary Fig. 14a-k, o-t	To examine the behavior evoked by chemogenetic activation of CB ⁺ neurons	CB-Cre	Bilateral injection of AAV-DIO-hM3Dq-mCherry into the LS. Intraperitoneal injection of CNO (5 mg/kg)	Behavior Slice physiology
Fig. 4a-c; Supplementary Fig. 14l, m	To examine the behavior evoked by optogenetic activation of CB ⁺ neurons	CB-Cre	Bilateral injection of AAV-DIO-ChR2-EYFP into the LS. Bilateral implantation of an optical fiber above LS	Behavior Histology
Fig. 4d-f; Supplementary Fig. 14n	To examine the behavior evoked by optogenetic inhibition of CB ⁺ neurons	CB-Cre	Bilateral injection of AAV-DIO-ArchT-tdTomato into the LS. Bilateral implantation of an optical fiber above LS	Behavior Histology
Fig. 4g-j	To record the monosynaptic IPSCs from CB ⁺ to SST ⁺ neurons	CB-Cre/SST-Flp	Bilateral injection of AAV-DIO-ChR2-EYFP and AAV-fDIO-H2B-mCherry into the LS. No optical fiber implantation	Slice physiology
Supplementary Fig. 15	To record the monosynaptic IPSCs from SST ⁺ to CB ⁺ neurons	CB-Cre/SST-Flp	Bilateral injection of AAV-fDIO-ChR2-EYFP and AAV-DIO-H2B-mCherry into the LS. No optical fiber implantation	Slice physiology
Fig. 5a-d; Supplementary Fig. 17a-b; Supplementary Fig. 19a-f	To obtain cell type-specific maps of monosynaptic inputs for SST ⁺ -dLS and CB ⁺ -vLS neurons	SST-Cre CB-Cre	Unilateral injection of AAV-DIO-TVA-2A-RG-2A-mCherry into the LS, followed by injection of RV-ΔG-GFP into the same location. No optical fiber implantation	Histology
Supplementary Fig. 17c-f	To confirm monosynaptic glutamatergic connections between vCA1 and LS neurons	WT C57	Bilateral injection of AAV-CaMKII-ChR2-EYFP into the vCA1. No optical fiber implantation	Slice physiology
Fig. 5e-g	To compare the synaptic strength of excitatory vCA1d inputs to SST ⁺ -dLS and CB ⁺ -vLS neurons	CB-Cre/SST-Flp	Bilateral injection of AAV-CaMKII-ChR2-EYFP into the vCA1d; Bilateral injection of AAV-fDIO-H2B-mCherry into the dLS; Bilateral injection of AAV-DIO-H2B-EGFP into the vLS. No optical fiber implantation	Slice physiology
Fig. 5e, f, h	To compare the synaptic strength of excitatory vCA1v inputs to SST ⁺ -dLS and CB ⁺ -vLS neurons	CB-Cre/SST-Flp	Bilateral injection of AAV-CaMKII-ChR2-EYFP into the vCA1v; Bilateral injection of AAV-fDIO-H2B-GFP into the dLS; Bilateral injection of AAV-DIO-H2B-mCherry into the vLS. No optical fiber implantation	Slice physiology
Fig. 6a-c; Supplementary Fig. 20a-c	To examine the behavior evoked by TeNT silencing	WT C57	Bilateral injection of AAV2-retro-Syn-Cre-tdTomato into the dLS;	Behavior Histology

	of dLS-projecting vCA1d neurons		Bilateral injection of AAV-DIO-EGFP-2A-TeNT into the vCA1d. No optical fiber implantation	
Supplementary Fig. 20d	To record local field potential after TeNT silencing of dLS-projecting vCA1d neurons	WT C57	Bilateral injection of AAV2-retro-Syn-Cre-tdTomato into the dLS; Bilateral injection of AAV-DIO-EGFP-2A-TeNT into the vCA1d. Implantation of an optrode into the dLS	<i>In-vivo</i> electrophysiology
Supplementary Fig. 20e	To record local field potential after ArchT silencing of vCA1d→dLS pathway	WT C57	Bilateral injection of AAV-CaMKII-eArchT3.0-EGFP into the dLS; Implantation of an optrode into the dLS	<i>In-vivo</i> electrophysiology
Fig. 6d-f; Supplementary Fig. 20f	To examine the behavior evoked by optogenetically silencing axonal terminals of vCA1d neurons in the dLS	WT C57	Bilateral injection of AAV2-retro-Syn-Cre-EGFP into the dLS; Bilateral injection of AAV-DIO-ArchT-tdTomato into the vCA1d. Bilateral implantation of an optical fiber above the dLS	Behavior Histology
Fig. 6g-i; Supplementary Fig. 20g-i	To examine the behavior evoked by hM3Dq activation of vLS-projecting vCA1v neurons	WT C57	Bilateral injection of AAV2-retro-Syn-Cre-EGFP into the vLS; Bilateral injection of AAV-DIO-hM3Dq-mCherry into the vCA1v. No optical fiber implantation	Behavior Histology
Fig. 6j-l	To examine the behavior evoked by optogenetically activating axonal terminals of vCA1v neurons in the vLS	WT C57	Bilateral injection of AAV2-retro-Syn-Cre-tdTomato into the vLS; Bilateral injection of AAV-DIO-ChR2-EYFP into the vCA1v. Bilateral implantation of an optical fiber above the vLS	Behavior Histology
Supplementary Fig. 21a-d	To examine retrograde tracing vCA1 neurons to both vLS and NAc	WT C57	Unilateral injection of CTB-555 and CTB-488 into NAc and vLS respectively	Histology
Supplementary Fig. 21e-g	To examine the behavior evoked by optogenetically silencing of vCA1 neurons not projecting to the LS	WT C57	Bilateral injection of AAV2-retro-Syn-Cre-EGFP into the LS; Bilateral injection of AAV-Syn-Cre-off-eNpHR3.0-mCherry into the vCA1. Bilateral implantation of an optical fiber above the vCA1	Behavior Histology
Supplementary Fig. 21h-j	To examine the behavior evoked by optogenetically silencing vCA1→NAc pathway in vCA1 neurons not projecting to the LS	WT C57	Bilateral injection of AAV2-retro-Syn-Cre-EGFP into the LS; Bilateral injection of AAV-Syn-Cre-off-eNpHR3.0-mCherry into the vCA1. Bilateral implantation of an optical fiber above the NAc	Behavior Histology
Fig. 7a-g; Supplementary Fig. 22	To examine whether the excitatory inputs into SST ⁺ -dLS neurons and CB ⁺ -vLS neurons were potentiated after social exploration	SST-Cre CB-Cre	Bilateral injection of AAV-DIO-H2B-mCherry into the LS. No optical fiber implantation	Slice physiology
Fig. 7h, i	To record the paired-pulse ratio (PPR) of vCA1d EPSCs to SST ⁺ -dLS neurons	SST-Cre	Bilateral injection of AAV-DIO-H2B-mCherry into the dLS; Bilateral injection of AAV-CaMKII-ChR2-EYFP into the vCA1d. No optical fiber implantation	Slice physiology

Fig. 7h, j	To record the paired-pulse ratio (PPR) of vCA1v EPSCs to CB ⁺ -vLS neurons	CB-Cre	Bilateral injection of AAV-DIO-H2B-mCherry into the vLS; Bilateral injection of AAV-CaMKII-ChR2-EYFP into the vCA1v. No optical fiber implantation	Slice physiology
Supplementary Fig. 23a-d	To anterogradely trace the outputs of SST ⁺ -dLS and CB ⁺ -vLS neurons	SST-Cre CB-Cre	Unilateral injection of AAV-DIO-EGFP into the dLS or vLS. No optical fiber implantation	Histology
Fig. 8a-f; Supplementary Fig. 23e-g and 24e-g	To examine the behavior evoked by optogenetically silencing axonal terminals from SST ⁺ -dLS neurons	SST-Cre	Bilateral injection of AAV-DIO-ArchT-tdTomato into the dLS. Bilateral implantation of optical fibers above AHN, LHA and POA, respectively	Behavior Histology
Supplementary Fig. 24a-d	To functionally validate the SST ⁺ -dLS→LHA pathway	SST-Cre	Bilateral injection of AAV-DIO-ChR2-EYFP into the dLS. No optical fiber implantation	Slice physiology
Fig. 8g-l; Supplementary Fig. 23h-j and Fig. 24l-n	To examine the behavior evoked by optogenetically activation of axonal terminals from CB ⁺ -vLS neurons	CB-Cre	Bilateral injection of AAV-DIO-ChR2-EYFP into the vLS. Bilateral implantation of optical fibers above AHN, LHA and POA, respectively	Behavior Histology
Supplementary Fig. 24h-k	To functionally validate the CB ⁺ -vLS→AHN pathway	CB-Cre	Bilateral injection of AAV-DIO-ChR2-EYFP into the vLS. No optical fiber implantation	Slice physiology
Supplementary Fig. 25a-c	To capture the spatial distribution patterns of <i>Gad1</i> ⁺ and <i>Slc17a6</i> ⁺ neurons in the AHN and LHA	WT C57	No AAV injection. No optical fiber implantation.	Histology

Supplementary Table 3 | The sources of ISH images

Gene name	Atlas	URL link
<i>Neurod2</i>	Allen Mouse Brain Atlas	https://mouse.brain-map.org/experiment/show/75651126
<i>Crym</i>		https://mouse.brain-map.org/experiment/show/73592526
<i>Slc17a6</i>		https://mouse.brain-map.org/experiment/show/73818754
<i>Calb2</i>		https://mouse.brain-map.org/experiment/show/79556662
<i>Ngfr</i>		https://mouse.brain-map.org/experiment/show/79591691
<i>Slc5a7</i>		https://mouse.brain-map.org/experiment/show/73929608
<i>Coro6</i>		https://mouse.brain-map.org/experiment/show/77280432
<i>Lhx6</i>		https://mouse.brain-map.org/experiment/show/635
<i>Adarb2</i>		https://mouse.brain-map.org/experiment/show/73925721
<i>Nrn1</i>		https://mouse.brain-map.org/experiment/show/75147760
<i>Bmp7</i>		https://mouse.brain-map.org/experiment/show/2065
<i>Tac1</i>		https://mouse.brain-map.org/experiment/show/1038
<i>Syt6</i>		https://mouse.brain-map.org/experiment/show/1032
<i>Npy1r</i>		https://mouse.brain-map.org/experiment/show/72103807
<i>Tshz1</i>		https://mouse.brain-map.org/experiment/show/72129289
<i>Col6a1</i>		https://mouse.brain-map.org/experiment/show/77869097
<i>Pdyn</i>		https://mouse.brain-map.org/experiment/show/71717084
<i>Rarb</i>		https://mouse.brain-map.org/experiment/show/75038442

Supplementary Table 4 | The number of exclusions

Figure	Exclusion	Figure	Exclusion	Figure	Exclusion
Fig. 2c	8	Fig. 2e	3	Fig. 2h	4
Fig. 2i	3	Fig. 2l	4	Fig. 4b	5
Fig. 4c	4	Fig. 4e-f	6	Fig. 6b	5
Fig. 6c	5	Fig. 6e	8	Fig. 6f	7
Fig. 6h	5	Fig. 6i	5	Fig. 6k	6
Fig. 6l	6	Fig. 8b-c	4	Fig. 8e-f	5
Fig. 8h-i	4	Fig. 8k-l	3	Supplementary Fig. 12b-e	3
Supplementary Fig. 14i-j	6	Supplementary Fig. 14k	4	Supplementary Fig. 21f	5
Supplementary Fig. 21g	7	Supplementary Fig. 21i	8	Supplementary Fig. 21j	7
Supplementary Fig. 23f-g	3	Supplementary Fig. 23i-j	4		

Supplementary Table 5 | Summary of statistical analyses

Figure Panel	n/group	Primary statistic	Post-hoc test	Comparison	P values	Statistic
Fig. 1g	dLS (n =4)	Two-way ANOVA	RM	Groups	$p < 0.0001$ ***	$F_{1, 36} = 1.253$
				AP	$p = 0.0546$ n.s.	$F_{5, 36} = 2.418$
			Holm–Sidak post-hoc test	SST vs. CB (AP = 1.18)	$p < 0.0001$ ***	$t_{36} = 14.24$
				SST vs. CB (AP = 0.98)	$p < 0.0001$ ***	$t_{36} = 15.00$
				SST vs. CB (AP = 0.74)	$p < 0.0001$ ***	$t_{36} = 13.94$
				SST vs. CB (AP = 0.50)	$p < 0.0001$ ***	$t_{36} = 14.29$
				SST vs. CB (AP = 0.26)	$p < 0.0001$ ***	$t_{36} = 16.27$
				SST vs. CB (AP = 0.02)	$p < 0.0001$ ***	$t_{36} = 12.98$
Fig. 1h	iLS (n =4)	Two-way ANOVA	RM	Groups	$p = 0.0460$ *	$F_{1, 36} = 4.271$
				AP	$p < 0.0001$ ***	$F_{5, 36} = 9.444$
			Holm–Sidak post-hoc test	SST vs. CB (AP = 1.18)	$p = 0.0014$ **	$t_{36} = 3.862$
				SST vs. CB (AP = 0.98)	$p = 0.0002$ ***	$t_{36} = 4.650$
				SST vs. CB (AP = 0.74)	$p = 0.1853$ n.s.	$t_{36} = 1.702$
				SST vs. CB (AP = 0.50)	$p = 0.3907$ n.s.	$t_{36} = 0.8688$
				SST vs. CB (AP = 0.26)	$p < 0.0001$ ***	$t_{36} = 5.011$
				SST vs. CB (AP = 0.02)	$p < 0.0001$ ***	$t_{36} = 9.396$
Fig. 1i	vLS (n =4)	Two-way ANOVA	RM	Groups	$p = 0.0022$ **	$F_{1, 36} = 10.87$
				AP	$p < 0.0001$ ***	$F_{5, 36} = 15.63$
			Holm–Sidak post-hoc test	SST vs. CB (AP = 1.18)	$p < 0.0001$ ***	$t_{36} = 8.551$
				SST vs. CB (AP = 0.98)	$p < 0.0001$ ***	$t_{36} = 7.724$
				SST vs. CB (AP = 0.74)	$p = 0.0044$ **	$t_{36} = 3.038$
				SST vs. CB (AP = 0.50)	$p = 0.0001$ ***	$t_{36} = 4.901$
				SST vs. CB (AP = 0.26)	$p < 0.0001$ ***	$t_{36} = 10.36$
				SST vs. CB (AP = 0.02)	$p < 0.0001$ ***	$t_{36} = 12.13$
Supplementary Fig. 7b	SST (n = 10) CB (n = 11)	Two-tailed unpaired Welch's <i>t</i> -test		Soma size: SST vs. CB	$p = 0.0270$ *	$t_{12,11} = 2.516$
		Two-tailed Mann-Whitney test		Dendritic length: SST vs. CB	$p = 0.5116$ n.s.	Mann-Whitney U = 45

		Two-tailed unpaired Welch's <i>t</i> -test		Axonal length: SST vs. CB	$p = 0.3633$ n.s.	$t_{14.43} = 0.9388$
Supplementary Fig. 7c	SST (n = 10) CB (n = 11)	Two-way RM ANOVA		Groups	$p = 0.8849$ n.s.	$F_{1, 19} = 0.0215$
				Dendrite: distance from soma:	$p < 0.0001$ ***	$F_{2.033, 38.63} = 28.54$
			Holm–Sidak post-hoc test	SST vs. CB (10 μ m)	$p = 0.6961$ n.s.	$t_{16.98} = 2.035$
				SST vs. CB (20 μ m)	$p = 0.9151$ n.s.	$t_{16.68} = 1.630$
				SST vs. CB (30 μ m)	$p > 0.9999$ n.s.	$t_{18.75} = 0.2494$
				SST vs. CB (40 μ m)	$p > 0.9999$ n.s.	$t_{18.61} = 0.0943$
				SST vs. CB (50 μ m)	$p > 0.9999$ n.s.	$t_{17.72} = 0.1652$
				SST vs. CB (60 μ m)	$p > 0.9999$ n.s.	$t_{15.18} = 0.0489$
				SST vs. CB (70 μ m)	$p > 0.9999$ n.s.	$t_{15.26} = 0.2408$
				SST vs. CB (80 μ m)	$p > 0.9999$ n.s.	$t_{14.21} = 0.1714$
				SST vs. CB (90 μ m)	$p > 0.9999$ n.s.	$t_{14.30} = 0.2640$
				SST vs. CB (100 μ m)	$p > 0.9999$ n.s.	$t_{15.74} = 0.4578$
				SST vs. CB (110 μ m)	$p > 0.9999$ n.s.	$t_{14.01} = 0.1202$
				SST vs. CB (120 μ m)	$p > 0.9999$ n.s.	$t_{14.61} = 0.2446$
				SST vs. CB (130 μ m)	$p > 0.9999$ n.s.	$t_{15.23} = 0.3508$
				SST vs. CB (140 μ m)	$p = 0.9998$ n.s.	$t_{14.47} = 0.7078$
				SST vs. CB (150 μ m)	$p = 0.9743$ n.s.	$t_{12.06} = 1.376$
				SST vs. CB (160 μ m)	$p = 0.9895$ n.s.	$t_{13.74} = 1.169$
				SST vs. CB (170 μ m)	$p = 0.9870$ n.s.	$t_{15.70} = 1.227$
				SST vs. CB (180 μ m)	$p = 0.9638$ n.s.	$t_{13.53} = 1.455$
				SST vs. CB (190 μ m)	$p = 0.9993$ n.s.	$t_{12.25} = 0.8663$
				SST vs. CB (200 μ m)	$p > 0.9999$ n.s.	$t_{11.50} = 0.5849$
Supplementary Fig. 7d	SST (n = 10) CB (n = 11)	Two-way RM ANOVA		Groups	$p = 0.4100$ n.s.	$F_{1, 19} = 0.7098$
				Axon: distance from soma:	$p < 0.0001$ ***	$F_{2.851, 54.18} = 24.56$
			Holm–Sidak post-hoc test	SST vs. CB (20 μ m)	$p = 0.9997$ n.s.	$t_{12.00} = 0.6993$

				SST vs. CB (40 μ m)	$p = 0.9997$ n.s.	$t_{18.22} = 0.2764$
				SST vs. CB (60 μ m)	$p = 0.9997$ n.s.	$t_{18.98} = 0.0579$
				SST vs. CB (80 μ m)	$p = 0.9997$ n.s.	$t_{18.97} = 0.2847$
				SST vs. CB (100 μ m)	$p = 0.9979$ n.s.	$t_{18.60} = 1.109$
				SST vs. CB (120 μ m)	$p = 0.9979$ n.s.	$t_{19.00} = 1.103$
				SST vs. CB (140 μ m)	$p = 0.9997$ n.s.	$t_{18.99} = 0.6209$
				SST vs. CB (160 μ m)	$p = 0.9983$ n.s.	$t_{14.82} = 1.010$
				SST vs. CB (180 μ m)	$p = 0.9964$ n.s.	$t_{16.96} = 1.204$
				SST vs. CB (200 μ m)	$p = 0.9997$ n.s.	$t_{19.00} = 0.6156$
				SST vs. CB (220 μ m)	$p = 0.9993$ n.s.	$t_{18.95} = 0.8909$
				SST vs. CB (240 μ m)	$p = 0.9979$ n.s.	$t_{18.80} = 1.121$
				SST vs. CB (260 μ m)	$p = 0.9997$ n.s.	$t_{19.00} = 0.2128$
				SST vs. CB (280 μ m)	$p = 0.9997$ n.s.	$t_{19.00} = 0.6649$
				SST vs. CB (300 μ m)	$p = 0.9993$ n.s.	$t_{18.59} = 0.8486$
				SST vs. CB (320 μ m)	$p = 0.9997$ n.s.	$t_{15.77} = 0.4739$
				SST vs. CB (340 μ m)	$p = 0.9993$ n.s.	$t_{12.37} = 0.8893$
				SST vs. CB (360 μ m)	$p = 0.9997$ n.s.	$t_{13.08} = 0.6863$
				SST vs. CB (380 μ m)	$p = 0.9997$ n.s.	$t_{13.14} = 0.5348$
				SST vs. CB (400 μ m)	$p = 0.9997$ n.s.	$t_{12.48} = 0.6451$
Supplementary Fig. 7f	SST (n = 67) CB (n = 67)	Two-way ANOVA	RM	Groups	$p = 0.1359$ n.s.	$F_{1, 132} = 2.252$
				Intensity	$p < 0.0001$ ***	$F_{2.296, 301.1} = 736.8$
			Holm–Sidak post-hoc test	SST vs. CB (20 pA)	$p = 0.2408$ n.s.	$t_{117.5} = 2.027$
				SST vs. CB (40 pA)	$p = 0.0107$ *	$t_{130.2} = 3.278$
				SST vs. CB (60 pA)	$p = 0.2221$ n.s.	$t_{131.9} = 2.128$
				SST vs. CB (80 pA)	$p = 0.5042$ n.s.	$t_{132.0} = 1.520$
				SST vs. CB (100 pA)	$p = 0.5042$ n.s.	$t_{131.7} = 1.439$
				SST vs. CB (120 pA)	$p = 0.9175$ n.s.	$t_{131.9} = 0.3040$
				SST vs. CB (140 pA)	$p = 0.8953$ n.s.	$t_{131.7} = 0.6316$

				SST vs. CB (160 pA)	$p = 0.9175$ n.s.	$t_{131.7} = 0.3689$
Supplementary Fig. 7h	SST (n = 67) CB (n = 70)	Two-way RM ANOVA		Groups	$p = 0.0249$ *	$F_{1, 135} = 5.143$
				Intensity	$p < 0.0001$ ***	$F_{1, 310, 176.8} = 143.3$
		Holm–Sidak post-hoc test		SST vs. CB (-20 pA)	$p = 0.0073$ **	$t_{83.85} = 3.220$
				SST vs. CB (-40 pA)	$p = 0.0100$ *	$t_{92.73} = 3.012$
				SST vs. CB (-60 pA)	$p = 0.0455$ *	$t_{111.3} = 2.305$
				SST vs. CB (-80 pA)	$p = 0.2076$ n.s.	$t_{129.7} = 1.266$
Supplementary Fig. 8c	Control (n=4) Social (n = 5)	Two-tailed unpaired Welch's t -test		dLS c-fos ⁺ : Control vs. Social	$p = 0.0315$ *	$t_{4.37} = 3.119$
	Control (n=4) Social (n = 5)	Two-tailed unpaired Welch's t -test		iLS c-fos ⁺ : Control vs. Social	$p = 0.0265$ *	$t_{4.113} = 3.383$
	Control (n=4) Social (n = 5)	Two-tailed unpaired Welch's t -test		vLS c-fos ⁺ : Control vs. Social	$p = 0.0216$ *	$t_{4.12} = 3.604$
Supplementary Fig. 8d	Control (n=4) Social (n = 5)	Two-tailed unpaired Student's t -test		dLS c-fos ⁺ /SST ⁺ : Control vs. Social	$p = 0.0195$ *	$t_7 = 3.015$
	Control (n=4) Social (n = 5)	Two-tailed unpaired Welch's t -test		iLS c-fos ⁺ /SST ⁺ : Control vs. Social	$p = 0.0284$ *	$t_{4.284} = 3.248$
	Control (n=4) Social (n = 5)	Two-tailed unpaired Welch's t -test		vLS c-fos ⁺ /SST ⁺ : Control vs. Social	$p = 0.0086$ **	$t_{4.463} = 4.466$
Supplementary Fig. 8e	Control (n=4) Social (n = 5)	Two-tailed unpaired Student's t -test		dLS c-fos ⁺ /CB ⁺ : Control vs. Social	$p = 0.2536$ n.s.	$t_7 = 1.244$
	Control (n=4) Social (n = 5)	Two-tailed unpaired Welch's t -test		iLS c-fos ⁺ /CB ⁺ : Control vs. Social	$p = 0.0161$ *	$t_{4.34} = 3.822$
	Control (n=4) Social (n = 5)	Two-tailed unpaired Welch's t -test		vLS c-fos ⁺ /CB ⁺ : Control vs. Social	$p = 0.0486$ *	$t_{4.202} = 2.751$
Supplementary Fig. 9g	SST neurons (n = 18)	One sample Wilcoxon signed rank test		P1 vs. Baseline	$p = 0.0159$ *	N/A
Supplementary Fig. 9i	CB neurons (n = 20)	One sample Wilcoxon signed rank test		P1 vs. Baseline	$p = 0.4980$ n.s.	N/A
Supplementary Fig. 9m	SST neurons (n = 22)	two-tailed Wilcoxon signed rank test		Normalized firing rate:	$p < 0.0001$ ***	N/A

				Stranger vs. Object		
Fig. 2c	Control (n = 18) SST-TeNT (n = 20)	Two-way RM ANOVA		Interaction	$p = 0.0002$ ***	$F_{1, 36} = 17.32$
			Holm–Sidak post-hoc test	Control: S1 vs. S2	$p < 0.0001$ ***	$t_{36} = 6.001$
				SST-TeNT: S1 vs. S2	$p = 0.7827$ n.s.	$t_{36} = 0.2779$
	Control (n = 18) SST-TeNT (n = 20)	Two-tailed unpaired Student's <i>t</i> -test		SD index: Control vs. SST-TeNT	$p = 0.0004$ ***	$t_{36} = 3.885$
Fig. 2e	Control (n = 9) SST-TeNT (n = 7)	Two-way RM ANOVA		Groups	$p = 0.0064$ ##	$F_{1, 56} = 8.036$
				Trials	$p = 0.0026$ **	$F_{3, 56} = 5.368$
			Holm–Sidak post-hoc test	Control vs. SST-TeNT (trial 1)	$p = 0.6264$ n.s.	$t_{56} = 0.8686$
				Control vs. SST-TeNT (trial 2)	$p = 0.6264$ n.s.	$t_{56} = 0.7665$
				Control vs. SST-TeNT (trial 3)	$p = 0.0183$ *	$t_{56} = 2.952$
				Control vs. SST-TeNT (trial 4)	$p = 0.0197$ *	$t_{56} = 2.820$
		Two-tailed unpaired Student's <i>t</i> -test		Control vs. SST-TeNT (trial 5)	$p = 0.1577$ n.s.	$t_{14} = 1.493$
Fig. 2h	Control (n = 10) SST-ArchT (n = 10)	Two-way RM ANOVA		Interaction	$p = 0.0093$ **	$F_{1, 18} = 8.489$
			Holm–Sidak post-hoc test	Control: S1 vs. S2	$p = 0.0001$ ***	$t_{18} = 5.242$
				SST-ArchT: S1 vs. S2	$p = 0.2769$ n.s.	$t_{18} = 1.121$
	Control (n = 10) SST-ArchT (n = 10)	Two-tailed Mann-Whitney test		SD index: Control vs. SST-ArchT	$p = 0.0005$ ***	Mann-Whitney $U = 7$
Fig. 2i	Control (n = 8) SST-ArchT (n = 10)	Two-way RM ANOVA		Interaction	$p = 0.4487$ n.s.	$F_{1, 16} = 0.6030$
			Holm–Sidak post-hoc test	Control: S1 vs. S2	$p = 0.0226$ *	$t_{16} = 2.523$
				SST-ArchT: S1 vs. S2	$p = 0.0021$ **	$t_{16} = 3.986$
	Control (n = 8) SST-ArchT (n = 10)	Two-tailed Mann-Whitney test		SD index: Control vs. SST-ArchT	$p = 0.5726$ n.s.	Mann-Whitney $U = 33$
Fig. 2l	Control (n = 9) SST-ChR2 (n = 8)	Two-way RM ANOVA		Interaction	$p = 0.0329$ *	$F_{1, 15} = 5.523$
			Holm–Sidak post-hoc test	Control: S1 vs. S2	$p = 0.5394$ n.s.	$t_{15} = 0.6282$
				SST-ChR2: S1 vs. S2	$p = 0.0033$ **	$t_{15} = 3.822$

	Control (n = 9) SST-ChR2 (n = 8)	Two-tailed unpaired Student's <i>t</i> -test		SD index: Control vs. SST-ChR2	$p = 0.0193$ *	$t_{15} = 2.620$
Supplementary Fig. 10b	Control (n = 21) SST-TeNT (n = 22)	Two-tailed Mann- Whitney test		Distance in center: Control vs. SST-TeNT	$p = 0.8429$ n.s.	Mann-Whitney U = 222.5
	Control (n = 21) SST-TeNT (n = 22)			Number of visits to center: Control vs. SST-TeNT	$p = 0.6781$ n.s.	Mann-Whitney U = 213.5
	Control (n = 21) SST-TeNT (n = 22)			Time in center: Control vs. SST-TeNT	$p = 0.6346$ n.s.	Mann-Whitney U = 211
	Control (n = 21) SST-TeNT (n = 22)	Two-tailed unpaired Student's <i>t</i> -test		Total distance travelled: Control vs. SST-TeNT	$p = 0.0395$ *	$t_{41} = 2.127$
Supplementary Fig. 10d	Control (n = 18) SST-TeNT (n = 17)	Two-tailed unpaired Welch's <i>t</i> -test		Percentage of time in open arm: Control vs. SST-TeNT	$p < 0.0001$ ***	$t_{24,34} = 6.937$
	Control (n = 18) SST-TeNT (n = 17)	Two-tailed unpaired Student's <i>t</i> -test		Percentage of entries into open arm: Control vs. SST-TeNT	$p < 0.0001$ ***	$t_{33} = 4.904$
Supplementary Fig. 10e	Control (n = 18) SST-TeNT (n = 20)	Two-way RM ANOVA		Interaction	$p = 0.6730$ n.s.	$F_{1,36} = 0.1811$
			Holm-Sidak post-hoc test	Control: Empty vs. S1	$p < 0.0001$ ***	$t_{36} = 8.879$
				SST-TeNT: Empty vs. S1	$p < 0.0001$ ***	$t_{36} = 9.977$
	Control (n = 18) SST-TeNT (n = 20)	Two-tailed unpaired Student's <i>t</i> -test		Social index: Control vs. SST-TeNT	$p = 0.4665$ n.s.	$t_{36} = 0.7360$
Supplementary Fig. 10f	Control (n = 18) SST-TeNT (n = 18)	Two-way RM ANOVA		Interaction	$p = 0.5808$ n.s.	$F_{1,34} = 0.3109$
			Holm-Sidak post-hoc test	Control: Familiar vs. Novel	$p = 0.0022$ **	$t_{34} = 3.312$
				SST-TeNT: Familiar vs. Novel	$p = 0.0005$ ***	$t_{34} = 4.100$
	Control (n = 18) SST-TeNT (n = 18)	Two-tailed unpaired Student's <i>t</i> -test		Discrimination index: Control vs. SST-TeNT	$p = 0.5808$ n.s.	$t_{34} = 0.5576$
Supplementary Fig. 10g	Control (n = 8) SST-TeNT (n = 8)	Two-way RM ANOVA		Interaction	$p = 0.1990$ n.s.	$F_{1,14} = 1.818$
			Holm-Sidak post-hoc test	Control: Familiar vs. Novel	$p = 0.0344$ *	$t_{14} = 2.343$
				SST-TeNT:	$p = 0.0016$ **	$t_{14} = 4.250$

				Familiar vs. Novel		
	Control (n = 8) SST-TeNT (n = 8)	Two-tailed unpaired Student's <i>t</i> -test		Discrimination index: Control vs. SST-TeNT	$p = 0.3837$ n.s.	$t_{14} = 0.8993$
Supplementary Fig. 11b	Control (n = 19) SST-ArchT (n = 20)	Two-way RM ANOVA		Interaction	$p = 0.7739$ n.s.	$F_{1, 37} = 0.0838$
			Holm-Sidak post-hoc test	Control: S1 vs. S2	$p < 0.0001$ ***	$t_{37} = 7.034$
				SST-ArchT: S1 vs. S2	$p < 0.0001$ ***	$t_{37} = 6.802$
	Control (n = 19) SST-ArchT (n = 20)	Two-tailed unpaired Student's <i>t</i> -test		SD index: Control vs. SST-ArchT	$p = 0.2713$ n.s.	$t_{37} = 1.117$
Supplementary Fig. 11c	Control (n = 10) SST-ArchT (n = 10)	Two-way RM ANOVA		Interaction	$p = 0.1342$ n.s.	$F_{1, 18} = 2.459$
			Holm-Sidak post-hoc test	Control: Empty vs. S1	$p = 0.0001$ ***	$t_{18} = 4.938$
				SST-ArchT: Empty vs. S1	$p < 0.0001$ ***	$t_{18} = 7.155$
	Control (n = 10) SST-ArchT (n = 10)	Two-tailed Mann-Whitney test		Social index: Control vs. SST-ArchT	$p = 0.8099$ n.s.	Mann-Whitney U = 46.5
Supplementary Fig. 11d	Control (n = 8) SST-ArchT (n = 10)	Two-way RM ANOVA		Interaction	$p = 0.1653$ n.s.	$F_{1, 16} = 2.114$
			Holm-Sidak post-hoc test	Control: Empty vs. S1	$p = 0.0003$ ***	$t_{16} = 4.523$
				SST-ArchT: Empty vs. S1	$p < 0.0001$ ***	$t_{16} = 7.237$
	Control (n = 8) SST-ArchT (n = 10)	Two-tailed unpaired Student's <i>t</i> -test		Social index: Control vs. SST-ArchT	$p = 0.2758$ n.s.	$t_{16} = 1.128$
Supplementary Fig. 11e	Control (n = 7) SST-ArchT (n = 7)	Two-tailed unpaired Student's <i>t</i> -test		Preference for stimulation side: Control vs. SST-ArchT	$p = 0.9575$	$t_{12} = 0.0544$
Supplementary Fig. 11f	Control (n = 9) SST-ChR2 (n = 8)	Two-way RM ANOVA		Interaction	$p = 0.4271$ n.s.	$F_{1, 15} = 0.6664$
			Holm-Sidak post-hoc test	Control: Empty vs. S1	$p < 0.0001$ ***	$t_{15} = 6.699$
				SST-ChR2: Empty vs. S1	$p = 0.0001$ ***	$t_{15} = 5.194$
	Control (n = 9) SST-ChR2 (n = 8)	Two-tailed unpaired Student's <i>t</i> -test		Social index: Control vs. SST-ChR2	$p = 0.2944$ n.s.	$t_{15} = 1.086$
Supplementary Fig. 11g	For the left panel: 0-min (n = 9) 10 min (n = 8) 20 min (n = 10) 40 min (n = 9) 60 min (n = 8)	two-way RM ANOVA		Interaction	$p = 0.0008$ ***	$F_{4, 39} = 5.967$
			Holm-Sidak post-hoc test	0 min interval: S1 vs. S2	$p < 0.0001$ ***	$t_{39} = 6.090$
				10 min interval: S1 vs. S2	$p = 0.0139$ *	$t_{39} = 3.110$
				20 min interval: S1 vs. S2	$p = 0.2471$ n.s.	$t_{39} = 1.737$
				40 min interval: S1 vs. S2	$p = 0.6281$ n.s.	$t_{39} = 0.8691$
				60 min interval:	$p = 0.7638$	$t_{39} = 0.3026$

	For the middle panel: 0-min (n = 9) 10 min (n = 8) 20 min (n = 10) 40 min (n = 9) 60 min (n = 8)	One-way RM ANOVA		S1 vs. S2	n.s.	
					$p = 0.0056$ **	$F_{4, 39} = 4.305$
			Holm–Sidak post-hoc test	SD index: 0 min vs. 10 min	$p = 0.1382$ n.s.	$t_{39} = 1.514$
				SD index: 0 min vs. 20 min	$p = 0.0413$ *	$t_{39} = 2.408$
				SD index: 0 min vs. 40 min	$p = 0.0183$ *	$t_{39} = 2.898$
				SD index: 0 min vs. 60 min	$p = 0.0015$ **	$t_{39} = 3.891$
Supplementary Fig. 12b	Control (n = 7) SST-ArchT (n = 10)	Two-way RM ANOVA		Interaction	$p = 0.9137$ n.s.	$F_{1, 15} = 0.0122$
			Holm–Sidak post-hoc test	Control: Empty vs. S1	$p = 0.0047$ **	$t_{15} = 3.313$
				SST-ArchT: Empty vs. S1	$p = 0.0036$ **	$t_{15} = 3.788$
	Control (n = 7) SST-ArchT (n = 10)	Two-tailed unpaired Student's <i>t</i> -test		Social index: Control vs. SST-ArchT	$p = 0.8079$ n.s.	$t_{15} = 0.2475$
Supplementary Fig. 12c	Control (n = 7) SST-ArchT (n = 10)	Two-way RM ANOVA		Interaction	$p = 0.0044$ **	$F_{1, 15} = 11.23$
			Holm–Sidak post-hoc test	Control: S1 vs. S2	$p = 0.0005$ ***	$t_{15} = 4.746$
				SST-ArchT: S1 vs. S2	$p = 0.6585$ n.s.	$t_{15} = 0.4509$
	Control (n = 7) SST-ArchT (n = 10)	Two-tailed unpaired Student's <i>t</i> -test		SD index: Control vs. SST-ArchT	$p = 0.0030$ **	$t_{15} = 3.531$
Supplementary Fig. 12d	Control (n = 7) SST-ArchT (n = 10)	Two-way RM ANOVA		Interaction	$p = 0.5276$ n.s.	$F_{1, 15} = 0.4181$
			Holm–Sidak post-hoc test	Control: Empty vs. S3	$p = 0.0176$ *	$t_{15} = 2.665$
				SST-ArchT: Empty vs. S3	$p = 0.0016$ **	$t_{15} = 4.193$
	Control (n = 7) SST-ArchT (n = 10)	Two-tailed unpaired Welch's <i>t</i> -test		Social index: Control vs. SST-ArchT	$p = 0.5241$ n.s.	$t_{11.62} = 0.6568$
Supplementary Fig. 12e	Control (n = 7) SST-ArchT (n = 10)	Two-way RM ANOVA		Interaction	$p = 0.0003$ ***	$F_{1, 15} = 22.09$
			Holm–Sidak post-hoc test	Control: S3 vs. S4	$p = 0.0007$ ***	$t_{15} = 4.575$
				SST-ArchT: S3 vs. S4	$p = 0.0832$ n.s.	$t_{15} = 1.856$
	Control (n = 7) SST-ArchT (n = 10)	Two-tailed unpaired Student's <i>t</i> -test		SD index: Control vs. SST-ArchT	$p = 0.0003$ ***	$t_{15} = 4.718$
Figure 3e	1–3 Hz (n = 8)	Two-way RM ANOVA		Time	$p = 0.0969$ n.s.	$F_{2, 685, 37.59} = 2.321$
				Status	$p = 0.2999$ n.s.	$F_{1, 14} = 1.159$
			Holm–Sidak post-hoc test	P1 (Social) vs. Baseline	$p = 0.8891$ n.s.	$t_7 = 0.4160$
				P1 (Non-social) vs. Baseline	$p = 0.2591$ n.s.	$t_7 = 1.668$

				P2 (Social) vs. Baseline	$p = 0.8891$ n.s.	$t_7 = 0.4490$
				P2 (Non-social) vs. Baseline	$p = 0.2591$ n.s.	$t_7 = 1.563$
				P3 (Social) vs. Baseline	$p = 0.8532$ n.s.	$t_7 = 0.8973$
				P3 (Non-social) vs. Baseline	$p = 0.2540$ n.s.	$t_7 = 2.097$
				P4 (Social) vs. Baseline	$p = 0.8532$ n.s.	$t_7 = 0.9347$
				P4 (Non-social) vs. Baseline	$p = 0.2540$ n.s.	$t_7 = 2.130$
	4–12 Hz (n = 8)	Two-way ANOVA RM		Time	$p < 0.0001$ ***	$F_{2,375, 33.25} = 15.78$
				Status	$p = 0.9641$ n.s.	$F_{1, 14} = 0.0021$
			Holm–Sidak post-hoc test	P1 (Social) vs. Baseline	$p = 0.0128$ *	$t_7 = 3.837$
				P1 (Non-social) vs. Baseline	$p = 0.0265$ *	$t_7 = 2.801$
				P2 (Social) vs. Baseline	$p = 0.0017$ **	$t_7 = 6.221$
				P2 (Non-social) vs. Baseline	$p = 0.0060$ **	$t_7 = 5.032$
				P3 (Social) vs. Baseline	$p = 0.0104$ *	$t_7 = 4.319$
				P3 (Non-social) vs. Baseline	$p = 0.0149$ *	$t_7 = 4.033$
				P4 (Social) vs. Baseline	$p = 0.0196$ *	$t_7 = 3.012$
				P4 (Non-social) vs. Baseline	$p = 0.0149$ *	$t_7 = 3.809$
	13–30 Hz (n = 8)	Two-way ANOVA RM		Time	$p = 0.1329$ n.s.	$F_{1,897, 26.55} = 2.199$
				Status	$p = 0.9713$ n.s.	$F_{1, 14} = 0.0013$
			Holm–Sidak post-hoc test	P1 (Social) vs. Baseline	$p = 0.8564$ n.s.	$t_7 = 0.6342$
				P1 (Non-social) vs. Baseline	$p = 0.2762$ n.s.	$t_7 = 1.484$
				P2 (Social) vs. Baseline	$p = 0.5770$ n.s.	$t_7 = 1.438$
				P2 (Non-social) vs. Baseline	$p = 0.2762$ n.s.	$t_7 = 1.696$
				P3 (Social) vs. Baseline	$p = 0.8564$ n.s.	$t_7 = 0.7423$
				P3 (Non-social) vs. Baseline	$p = 0.2762$ n.s.	$t_7 = 1.880$
				P4 (Social) vs. Baseline	$p = 0.8564$ n.s.	$t_7 = 0.7524$
				P4 (Non-social) vs. Baseline	$p = 0.2743$ n.s.	$t_7 = 2.072$
	31–80 Hz (n = 8)	Two-way ANOVA RM		Time	$p = 0.5177$ n.s.	$F_{1,839, 25.74} = 0.6506$
				Status	$p = 0.7839$ n.s.	$F_{1, 14} = 0.0782$

			Holm–Sidak post-hoc test	P1 (Social) vs. Baseline	$p = 0.7752$ n.s.	$t_7 = 1.091$
				P1 (Non-social) vs. Baseline	$p = 0.4110$ n.s.	$t_7 = 1.673$
				P2 (Social) vs. Baseline	$p = 0.8580$ n.s.	$t_7 = 0.7489$
				P2 (Non-social) vs. Baseline	$p = 0.4612$ n.s.	$t_7 = 1.166$
				P3 (Social) vs. Baseline	$p = 0.8580$ n.s.	$t_7 = 0.5805$
				P3 (Non-social) vs. Baseline	$p = 0.4612$ n.s.	$t_7 = 1.209$
				P4 (Social) vs. Baseline	$p = 0.9979$ n.s.	$t_7 = 0.0027$
				P4 (Non-social) vs. Baseline	$p = 0.4110$ n.s.	$t_7 = 1.748$
Figure 3h	SST neurons (n = 18)	Two-tailed Chi-squared test		P1 vs. Baseline	$p = 0.0160$ *	$X^2 = 5.806$
				P2 vs. Baseline	$p < 0.0001$ ***	$X^2 = 22.91$
				P3 vs. Baseline	$p < 0.0001$ ***	$X^2 = 15.84$
				P4 vs. Baseline	$p < 0.0001$ ***	$X^2 = 15.84$
Figure 3i	SST neuron populations (n = 18)	Rayleigh test			$p < 0.0001$ ***	N/A
Figure 3k	4–12 Hz (n = 5)	Two-way RM ANOVA		Time	$p = 0.8474$ n.s.	$F_{2,395, 19.16} = 0.2113$
				Status	$p = 0.4131$ n.s.	$F_{1, 8} = 0.7455$
			Holm–Sidak post-hoc test	P1 (Social) vs. Baseline	$p = 0.8579$ n.s.	$t_4 = 0.5173$
				P1 (Non-social) vs. Baseline	$p = 0.8726$ n.s.	$t_4 = 0.9354$
				P2 (Social) vs. Baseline	$p = 0.8579$ n.s.	$t_4 = 0.5524$
				P2 (Non-social) vs. Baseline	$p = 0.9856$ n.s.	$t_4 = 0.0292$
				P3 (Social) vs. Baseline	$p = 0.8579$ n.s.	$t_4 = 0.7815$
				P3 (Non-social) vs. Baseline	$p = 0.9856$ n.s.	$t_4 = 0.2411$
				P4 (Social) vs. Baseline	$p = 0.1325$ n.s.	$t_4 = 3.138$
				P4 (Non-social) vs. Baseline	$p = 0.9856$ n.s.	$t_4 = 0.3316$
Figure 3m	4–12 Hz (n = 5)	One-way RM ANOVA			$p < 0.0001$ ***	$F_{3, 16} = 31.14$
			Holm–Sidak post-hoc test	5 Hz vs. Baseline	$p = 0.6108$ n.s.	$t_{16} = 0.5191$
				10 Hz vs. Baseline	$p < 0.0001$ ***	$t_{16} = 7.016$
				20 Hz vs. Baseline	$p = 0.2006$ n.s.	$t_{16} = 1.714$

Figure 3q	IPSC amplitude (n = 5)	One sample Wilcoxon signed rank test		IPSC amplitude: Baseline vs. CNQX/D-AP5	$p = 0.0625$ n.s.	N/A
		two-tailed paired Student's t -test		IPSC amplitude: CNQX/D-AP5 vs. PTX	$p < 0.0001$ ***	$t_4 = 29.87$
Supplementary Fig. 13b	SST-ArchT (n = 8)	Friedman test	Dunn's post- hoc test		$p < 0.0001$ ***	N/A
				Baseline vs. 0-2 min	$p = 0.3569$ n.s.	N/A
				Baseline vs. 2-4 min	$p = 0.0005$ ***	N/A
				Baseline vs. 4-6 min	$p = 0.0030$ **	N/A
				Baseline vs. 6-8 min	$p = 0.0042$ **	N/A
				Baseline vs. 8- 10 min	$p = 0.0015$ **	N/A
				Baseline vs. EC- 1	$p > 0.9999$ n.s.	N/A
				Baseline vs. EC- 2	$p > 0.9999$ n.s.	N/A
				Baseline vs. OB	$p = 0.2861$ n.s.	N/A
Supplementary Fig. 13c	SST neurons (n = 14)	Two-tailed Chi-squared test		SI (0-5 min) vs. Baseline	$p = 0.0016$ **	$X^2 = 9.956$
				SI (5-10 min) vs. Baseline	$p < 0.0001$ ***	$X^2 = 18.29$
				EC-1 vs. Baseline	$p = 0.0005$ ***	$X^2 = 12.13$
				EC-2 vs. Baseline	$p = 0.0001$ ***	$X^2 = 14.58$
				OB vs. Baseline	$p = 0.0005$ ***	$X^2 = 12.13$
Figure 4b	Control (n = 8) CB-ChR2 (n = 7)	Two-way RM ANOVA	Holm-Sidak post-hoc test	Interaction	$p = 0.0008$ ***	$F_{1, 13} = 19.08$
				Control: S1 vs. S2	$p < 0.0001$ ***	$t_{13} = 6.233$
			CB-ChR2: S1 vs. S2	$p = 0.8828$ n.s.	$t_{13} = 0.1504$	
	Control (n = 8) CB-ChR2 (n = 7)	Two-tailed unpaired Student's t -test		SD index: Control vs. CB- ChR2	$p = 0.0015$ **	$t_{13} = 3.991$
Figure 4c	Control (n = 8) CB-ChR2 (n = 7)	Two-way RM ANOVA	Holm-Sidak post-hoc test	Interaction	$p = 0.4711$ n.s.	$F_{1, 13} = 0.5510$
				Control: S1 vs. S2	$p = 0.0003$ ***	$t_{13} = 5.191$
				CB-ChR2: S1 vs. S2	$p = 0.0020$ **	$t_{13} = 3.839$
		Control (n = 8) CB-ChR2 (n = 7)	Two-tailed unpaired Student's t -test		SD index: Control vs. CB- ChR2	$p = 0.8543$ n.s.
Figure 4e	Control (n = 7) CB-ArchT (n = 9)	Two-way RM ANOVA	Holm-Sidak post-hoc test	Interaction	$p = 0.1702$ n.s.	$F_{1, 14} = 2.091$
				Control: S1 vs. S2	$p = 0.0010$ **	$t_{14} = 4.166$

				CB-ArchT S1 vs. S2	$p < 0.0001$ ***	$t_{14} = 6.910$
	Control (n = 7) CB-ArchT (n = 9)	Two-tailed Mann-Whitney test		Social index: Control vs. CB-ArchT	$p = 0.8371$ n.s.	Mann-Whitney U = 29
Figure 4f	Control (n = 7) CB-ArchT (n = 9)	Two-way ANOVA RM		Interaction	$p = 0.0400$ *	$F_{1, 14} = 5.122$
			Holm–Sidak post-hoc test	Control: S1 vs. S2	$p = 0.3571$ n.s.	$t_{14} = 0.9523$
				CB-ChR2: S1 vs. S2	$p = 0.0010$ **	$t_{14} = 4.502$
	Control (n = 7) CB-ArchT (n = 9)	Two-tailed unpaired Welch's <i>t</i> -test		SD index: Control vs. CB-ArchT	$p = 0.0292$ *	$t_{8.686} = 2.608$
Figure 4j	IPSC amplitude (n = 5)	Two-tailed one sample <i>t</i> -test		IPSC amplitude: Baseline vs. TTX/4-AP	$p = 0.0215$ *	$t_4 = 3.663$
		two-tailed paired Student's <i>t</i> -test		IPSC amplitude: TTX/4-AP vs. PTX	$p = 0.0217$ *	$t_4 = 3.651$
Supplementary Fig. 14c	CB neurons (n = 7)	Two-tailed Wilcoxon signed rank test		Vm: Baseline vs. CNO	$p = 0.0156$ *	N/A
		Two-tailed one sample <i>t</i> -test		Spike#/min: Baseline vs. CNO	$p = 0.0448$ *	N/A
Supplementary Fig. 14d	Control (n = 9) CB-hM3Dq (n = 13)	Two-tailed unpaired Student's <i>t</i> -test		Distance in center: Control vs. CB-hM3Dq	$p = 0.8363$ n.s.	$t_{20} = 0.2094$
				Number of visits to center: Control vs. CB-hM3Dq	$p = 0.3404$ n.s.	$t_{20} = 0.9767$
				Time in center: Control vs. CB-hM3Dq	$p = 0.5594$ n.s.	$t_{20} = 0.5936$
				Total distance travelled: Control vs. CB-hM3Dq	$p = 0.1986$ n.s.	$t_{20} = 1.330$
Supplementary Fig. 14e	Control (n = 8) CB-hM3Dq (n = 13)	Two-tailed Mann-Whitney test		Percentage of time in open arm: Control vs. CB-hM3Dq	$p = 0.5817$ n.s.	Mann-Whitney U = 44
		Two-tailed unpaired Student's <i>t</i> -test		Percentage of entries into open arm: Control vs. CB-hM3Dq	$p = 0.9924$ n.s.	$t_{19} = 0.0096$
Supplementary Fig. 14f	Control (n = 7) CB-hM3Dq (n = 10)	Two-way ANOVA RM		Interaction	$p = 0.9303$ n.s.	$F_{1, 15} = 0.0079$
			Holm–Sidak post-hoc test	Control: Familiar vs. Novel	$p = 0.0018$ **	$t_{15} = 3.772$
				CB-hM3Dq:	$p = 0.0011$ **	$t_{15} = 4.369$

				Familiar vs. Novel		
	Control (n = 7) CB-hM3Dq (n = 10)	Two-tailed unpaired Student's <i>t</i> -test		Discrimination index: Control vs. CB-hM3Dq	$p = 0.9303$ n.s.	$t_{15} = 0.089$
Supplementary Fig. 14g	Control (n = 9) CB-hM3Dq (n = 13)	Two-way RM ANOVA		Interaction	$p = 0.7885$ n.s.	$F_{1, 20} = 0.0739$
			Holm–Sidak post-hoc test	Control: Familiar vs. Novel	$p = 0.0137$ *	$t_{20} = 2.860$
				CB-hM3Dq: Familiar vs. Novel	$p = 0.0137$ *	$t_{20} = 3.013$
	Control (n = 9) CB-hM3Dq (n = 13)	Two-tailed unpaired Student's <i>t</i> -test		Discrimination index: Control vs. CB-hM3Dq	$p = 0.4262$ n.s.	$t_{20} = 0.8123$
Supplementary Fig. 14i	Control (n = 9) CB-hM3Dq (n = 13)	Two-way RM ANOVA		Interaction	$p = 0.0263$ *	$F_{1, 20} = 5.751$
			Holm–Sidak post-hoc test	Control: Empty vs. S1	$p < 0.0001$ ***	$t_{20} = 8.636$
				CB-hM3Dq: Empty vs. S1	$p < 0.0001$ ***	$t_{20} = 6.629$
	Control (n = 9) CB-hM3Dq (n = 13)	Two-tailed unpaired Student's <i>t</i> -test		Social index: Control vs. CB-hM3Dq	$p = 0.3866$ n.s.	$t_{20} = 0.8851$
Supplementary Fig. 14j	Control (n = 9) CB-hM3Dq (n = 13))	Two-way RM ANOVA		Interaction	$p = 0.0274$ *	$F_{1, 20} = 5.661$
			Holm–Sidak post-hoc test	Control: S1 vs. S2	$p = 0.0051$ **	$t_{20} = 3.445$
				CB-hM3Dq: S1 vs. S2	$p = 0.6789$ n.s.	$t_{20} = 0.4201$
	Control (n = 9) CB-hM3Dq (n = 13)	Two-tailed unpaired Student's <i>t</i> -test		SD index: Control vs. CB-hM3Dq	$p = 0.0196$ *	$t_{20} = 2.536$
Supplementary Fig. 14k	Control (n = 9) CB-hM3Dq (n = 11)	Two-way RM ANOVA		Groups	$p < 0.0001$ ###	$F_{1, 72} = 21.40$
				Trials	$p < 0.0001$ ***	$F_{3, 72} = 9.560$
			Holm – Sidak post-hoc test	Control vs. CB-hM3D (trial 1)	$p = 0.6136$ n.s.	$t_{72} = 0.5072$
				Control vs. CB-hM3D (trial 2)	$p = 0.2209$ n.s.	$t_{72} = 1.585$
				Control vs. CB-hM3D (trial 3)	$p = 0.0227$ *	$t_{72} = 2.745$
				Control vs. CB-hM3D (trial 4)	$p < 0.0001$ ***	$t_{72} = 5.429$
		Two-tailed unpaired Student's <i>t</i> -test		Control vs. CB-hM3D (trial 5)	$p = 0.0658$ n.s.	$t_{18} = 1.959$
Supplementary Fig. 14l	Control (n = 8) CB-ChR2 (n = 7)	Two-way RM ANOVA		Interaction	$p = 0.3683$ n.s.	$F_{1, 13} = 0.8686$
			Holm–Sidak post-hoc test	Control: Empty vs. S1	$p = 0.0008$ ***	$t_{13} = 4.349$
				CB-ChR2: Empty vs. S1	$p = 0.0003$ ***	$t_{13} = 5.344$

	Control (n = 8) CB-ChR2 (n = 7)	Two-tailed unpaired Student's <i>t</i> -test		Social index: Control vs. CB- ChR2	$p = 0.3242$ n.s.	$t_{13} = 1.025$
Supplementary Fig. 14m	Control (n = 8) CB-ChR2 (n = 7)	Two-way RM ANOVA		Interaction	$p = 0.5959$ n.s.	$F_{1, 13} = 0.2955$
			Holm–Sidak post-hoc test	Control: Empty vs. S1	$p < 0.0001$ ***	$t_{13} = 7.704$
				CB-ChR2: Empty vs. S1	$p < 0.0001$ ***	$t_{13} = 6.462$
	Control (n = 8) CB-ChR2 (n = 7)	Two-tailed unpaired Student's <i>t</i> -test		Social index: Control vs. CB- ChR2	$p = 0.9132$ n.s.	$t_{13} = 0.1111$
Supplementary Fig. 14n	Control (n = 6) CB-ArchT (n = 6)	Two-tailed unpaired Student's <i>t</i> -test		Preference for stimulation side: Control vs. CB- ArchT	$p = 0.6353$ n.s.	$t_{10} = 0.4891$
Supplementary Fig. 14p	Control (n = 9) CB-hM3Dq (n = 13)	Two-tailed unpaired Student's <i>t</i> -test		Distance in center: Control vs. CB- hM3Dq	$p = 0.0961$ n.s.	$t_{20} = 1.746$
		Two-tailed unpaired Student's <i>t</i> -test		Number of visits to center: Control vs. CB- hM3Dq	$p = 0.2257$ n.s.	$t_{20} = 1.25$
		Two-tailed Mann- Whitney test		Time in center: Control vs. CB- hM3Dq	$p = 0.3575$ n.s.	Mann-Whitney U = 44
		Two-tailed unpaired Student's <i>t</i> -test		Total distance travelled: Control vs. CB- hM3Dq	$p = 0.0703$ n.s.	$t_{20} = 1.912$
Supplementary Fig. 14q	Control (n = 8) CB-hM3Dq (n = 13)	Two-tailed Mann- Whitney test		Percentage of time in open arm: Control vs. CB- hM3Dq	$p = 0.3011$ n.s.	Mann-Whitney U = 37
		Two-tailed unpaired Student's <i>t</i> -test		Percentage of entries into open arm: Control vs. CB- hM3Dq	$p = 0.7130$ n.s.	$t_{19} = 0.3733$
Supplementary Fig. 14r	Control (n = 9) CB-hM3Dq (n = 13)	Two-way RM ANOVA		Interaction	$p = 0.3541$ n.s.	$F_{1, 20} = 0.8998$
			Holm–Sidak post-hoc test	Control: Empty vs. S1	$p = 0.0007$ ***	$t_{20} = 4.301$
				CB-hM3Dq: Empty vs. S1	$p = 0.0015$ **	$t_{20} = 3.686$
	Control (n = 9) CB-hM3Dq (n = 13)	Two-tailed unpaired Student's <i>t</i> -test		Social index: Control vs. CB- hM3Dq	$p = 0.4070$ n.s.	$t_{20} = 0.8471$
Supplementary Fig. 14s	Control (n = 9) CB-hM3Dq (n = 13)	Two-way RM ANOVA		Interaction	$p = 0.3704$ n.s.	$F_{1, 20} = 0.8396$
			Holm–Sidak post-hoc test	Control: S1 vs. S2	$p = 0.0025$ **	$t_{20} = 3.757$
				CB-hM3Dq: S1 vs. S2	$p = 0.0059$ **	$t_{20} = 3.083$

	Control (n = 9) CB-hM3Dq (n = 13)	Two-tailed unpaired Student's <i>t</i> -test		SD index: Control vs. CB- hM3Dq	$p = 0.4099$ n.s.	$t_{20} = 0.8418$
Supplementary Fig. 14t	Control (n = 7) CB-hM3Dq (n = 10)	Two-way RM ANOVA		Interaction	$p = 0.4980$ n.s.	$F_{1, 15} = 0.4824$
			Holm–Sidak post-hoc test	Control: Familiar vs. Novel	$p = 0.0009$ ***	$t_{15} = 4.451$
				CB-hM3Dq: Familiar vs. Novel	$p = 0.0009$ ***	$t_{15} = 4.238$
	Control (n = 7) CB-hM3Dq (n = 10)	Two-tailed unpaired Student's <i>t</i> -test		Discrimination index: Control vs. CB- hM3Dq	$p = 0.4980$ n.s.	$t_{15} = 0.6946$
Supplementary Fig. 15d	IPSC amplitude (n = 5)	Two-tailed one sample <i>t</i> -test		IPSC amplitude: Baseline vs. TTX/4-AP	$p = 0.0025$ **	$t_4 = 6.750$
		two-tailed paired Student's <i>t</i> -test		IPSC amplitude: TTX/4-AP vs. PTX	$p < 0.0001$ ***	$t_4 = 16.77$
Supplementary Fig. 16g	pCB neurons (n = 15)	Two-tailed Chi-squared test		Baseline vs. Social	$p = 0.0099$ **	$X^2 = 6.652$
Supplementary Fig. 16i	pSST neurons (n = 14)	Two-tailed Chi-squared test		Baseline vs. Social	$p > 0.9999$ n.s.	$X^2 = 0$
Figure 5g	SST ⁺ neurons (n = 12)	Two-tailed Wilcoxon signed rank test		EPSC amplitude: SST ⁺ neurons vs. CB ⁺ neurons	$p = 0.0005$ ***	N/A
	CB ⁺ neurons (n = 12)					
Figure 5h	SST ⁺ neurons (n = 10)	Two-tailed Wilcoxon signed rank test		EPSC amplitude: SST ⁺ neurons vs. CB ⁺ neurons	$p = 0.0020$ **	N/A
	CB ⁺ neurons (n = 10)					
Figure 6b	Control (n = 11) TeNT (n = 12)	Two-way RM ANOVA		Interaction	$p = 0.0230$ *	$F_{1, 21} = 6.020$
			Holm–Sidak post-hoc test	Control: S1 vs. S2	$p = 0.0154$ *	$t_{21} = 2.944$
				TeNT: S1 vs. S2	$p = 0.6410$ n.s.	$t_{21} = 0.4731$
	Control (n = 11) TeNT (n = 12)	Two-tailed unpaired Student's <i>t</i> -test		SD index: Control vs. TeNT	$p = 0.0069$ **	$t_{21} = 2.993$
Figure 6c	Control (n = 11) TeNT (n = 12)	Two-way RM ANOVA		Groups	$p = 0.0247$ #	$F_{1, 84} = 5.230$
				Trials	$p = 0.0026$ **	$F_{3, 84} = 5.144$
		Holm–Sidak post-hoc test		Control vs. TeNT (trial 1)	$p = 0.9444$ n.s.	$t_{84} = 0.2613$
				Control vs. TeNT (trial 2)	$p = 0.9444$ n.s.	$t_{84} = 0.3011$
				Control vs. TeNT (trial 3)	$p = 0.4110$ n.s.	$t_{84} = 1.412$
				Control vs. TeNT (trial 4)	$p = 0.0434$ *	$t_{84} = 2.600$

		Two-tailed unpaired Student's <i>t</i> -test		Control vs. TeNT (trial 5)	$p = 0.0345$ *	$t_{21} = 2.261$
Figure 6e	Control (n = 11) ArchT (n = 13)	Two-way RM ANOVA	Holm–Sidak post-hoc test	Interaction	$p = 0.0042$ **	$F_{1, 22} = 10.20$
				Control: S1 vs. S2	$p = 0.0139$ *	$t_{22} = 2.976$
				ArchT: S1 vs. S2	$p = 0.1522$ n.s.	$t_{22} = 1.483$
	Control (n = 11) ArchT (n = 13)	Two-tailed Mann-Whitney test		SD index: Control vs. ArchT	$p = 0.0009$ ***	Mann-Whitney U = 17
Figure 6f	Control (n = 12) ArchT (n = 15)	Two-way RM ANOVA	Holm–Sidak post-hoc test	Interaction	$p = 0.5767$ n.s.	$F_{1, 25} = 0.3199$
				Control: S1 vs. S2	$p = 0.0101$ *	$t_{25} = 2.782$
				SST-ArchT: S1 vs. S2	$p = 0.0011$ **	$t_{25} = 3.959$
	Control (n = 12) ArchT (n = 15)	Two-tailed unpaired Student's <i>t</i> -test		SD index: Control vs. ArchT	$p = 0.9364$ n.s.	$t_{25} = 0.0805$
Figure 6h	Control (n = 10) hM3Dq (n = 12)	Two-way RM ANOVA	Holm–Sidak post-hoc test	Interaction	$p = 0.0026$ **	$F_{1, 20} = 11.86$
				Control: S1 vs. S2	$p = 0.0009$ ***	$t_{20} = 4.186$
				hM3Dq: S1 vs. S2	$p = 0.6073$ n.s.	$t_{20} = 0.5222$
	Control (n = 10) hM3Dq (n = 12)	Two-tailed unpaired Student's <i>t</i> -test		SD index: Control vs. hM3Dq	$p = 0.0002$ ***	$t_{20} = 4.470$
Figure 6i	Control (n = 9) hM3Dq (n = 13)	Two-way ANOVA		Groups	$p = 0.0010$ ##	$F_{1, 80} = 11.68$
				Trials	$p = 0.0003$ ***	$F_{3, 80} = 7.056$
				Control vs. hM3Dq (trial 1)	$p = 0.4798$ n.s.	$t_{80} = 0.7099$
				Control vs. hM3Dq (trial 2)	$p = 0.0981$ n.s.	$t_{80} = 2.159$
				Control vs. hM3Dq (trial 3)	$p = 0.3491$ n.s.	$t_{80} = 1.312$
				Control vs. hM3Dq (trial 4)	$p = 0.0377$ *	$t_{80} = 2.655$
		Two-tailed unpaired Student's <i>t</i> -test		Control vs. hM3Dq (trial 5)	$p = 0.3222$ n.s.	$t_{20} = 1.015$
Figure 6k	Control (n = 11) Chr2 (n = 13)	Two-way RM ANOVA	Holm–Sidak post-hoc test	Interaction	$p = 0.0047$ **	$F_{1, 22} = 9.897$
				Control: S1 vs. S2	$p = 0.0015$ **	$t_{22} = 3.919$
				Chr2: S1 vs. S2	$p = 0.7026$ n.s.	$t_{22} = 0.3868$
	Control (n = 11) Chr2 (n = 13)	Two-tailed unpaired Student's <i>t</i> -test		SD index: Control vs. Chr2	$p = 0.0033$ **	$t_{22} = 3.297$
Figure 6l	Control (n = 11) Chr2 (n = 10)	Two-way RM ANOVA		Interaction	$p = 0.3433$ n.s.	$F_{1, 19} = 0.9446$
			Holm–Sidak post-hoc test	Control: S1 vs. S2	$p = 0.0018$ **	$t_{19} = 3.938$

				ChR2: S1 vs. S2	$p = 0.0261$ *	$t_{19} = 2.412$
	Control (n = 11) ChR2 (n = 10)	Two-tailed unpaired Student's <i>t</i> -test		SD index: Control vs. ChR2	$p = 0.9393$ n.s.	$t_{19} = 0.0772$
Supplementary Fig. 17e	EPSC amplitude (n = 6)	Two-tailed Wilcoxon signed rank test		EPSC amplitude: Baseline vs. TTX/4-AP	$p = 0.0313$ *	N/A
				IPSC amplitude: TTX/4-AP vs. CNQX	$p = 0.0313$ *	N/A
Supplementary Fig. 17f	IPSC amplitude (n = 6)	Two-tailed Wilcoxon signed rank test		IPSC amplitude: Baseline vs. TTX/4-AP	$p = 0.0313$ *	N/A
Supplementary Fig. 20a	Control (n = 11) TeNT (n = 12)	Two-way RM ANOVA		Interaction	$p = 0.9369$ n.s.	$F_{1, 21} = 0.0064$
			Holm–Sidak post-hoc test	Control: Object vs. S1	$p < 0.0001$ ***	$t_{21} = 6.042$
				TeNT: Object vs. S1	$p < 0.0001$ ***	$t_{21} = 6.427$
	Control (n = 11) TeNT (n = 12)	Two-tailed unpaired Student's <i>t</i> -test		Social index: Control vs. TeNT	$p = 0.9653$ n.s.	$t_{21} = 0.0440$
Supplementary Fig. 20b	Control (n = 11) TeNT (n = 12)	Two-tailed Mann- Whitney test		Percentage of time in open arm: Control vs. TeNT	$p = 0.0007$ ***	Mann-Whitney U = 14
	Control (n = 11) TeNT (n = 12)	Two-tailed unpaired Student's <i>t</i> -test		Percentage of entries into open arm: Control vs. TeNT	$p = 0.0038$ **	$t_{21} = 3.251$
Supplementary Fig. 20c	Control (n = 11) TeNT (n = 12)	Two-way RM ANOVA		Interaction	$p = 0.7494$ n.s.	$F_{1, 21} = 0.1047$
			Holm–Sidak post-hoc test	Control: Familiar vs. Novel	$p = 0.0048$ **	$t_{21} = 3.453$
				TeNT: Familiar vs. Novel	$p = 0.0050$ **	$t_{21} = 3.139$
	Control (n = 11) TeNT (n = 12)	Two-tailed Mann- Whitney test		Discrimination index: Control vs. TeNT	$p = 0.4865$ n.s.	Mann-Whitney U = 54
Supplementary Fig. 20d	4–12 Hz (n = 7)	Two-way RM ANOVA		Time	$p = 0.2925$ n.s.	$F_{2, 203, 26.44} = 1.296$
				Social status	$p = 0.8920$ n.s.	$F_{1, 12} = 0.0192$
			Holm–Sidak post-hoc test	P1 (Social) vs. Baseline	$p = 0.9970$ n.s.	$t_6 = 0.0545$
				P1 (Non-social) vs. Baseline	$p = 0.7423$ n.s.	$t_6 = 0.9828$
				P2 (Social) vs. Baseline	$p = 0.7589$ n.s.	$t_6 = 0.9525$

				P2 (Non-social) vs. Baseline	$p = 0.7423$ n.s.	$t_6 = 0.7415$
				P3 (Social) vs. Baseline	$p = 0.9970$ n.s.	$t_6 = 0.0713$
				P3 (Non-social) vs. Baseline	$p = 0.7423$ n.s.	$t_6 = 0.3634$
				P4 (Social) vs. Baseline	$p = 0.2022$ n.s.	$t_6 = 2.378$
				P4 (Non-social) vs. Baseline	$p = 0.4007$ n.s.	$t_6 = 1.811$
Supplementary Fig. 20e	4–12 Hz (n = 5)	Two-way ANOVA RM		Time	$p = 0.0102$ *	$F_{4, 16} = 4.754$
				Light	$p = 0.0046$ **	$F_{1, 4} = 32.74$
			Holm–Sidak post-hoc test	light-off: P1 vs. Baseline	$p = 0.0009$ ***	$t_{16} = 4.334$
				light-off: P2 vs. Baseline	$p < 0.0001$ ***	$t_{16} = 7.851$
				light-off: P3 vs. Baseline	$p < 0.0001$ ***	$t_{16} = 6.824$
				light-off: P4 vs. Baseline	$p = 0.0009$ ***	$t_{16} = 4.392$
				light-on: P1 vs. Baseline	$p = 0.9812$ n.s.	$t_{16} = 0.3457$
				light-on: P2 vs. Baseline	$p = 0.9812$ n.s.	$t_{16} = 0.1801$
				light-on: P3 vs. Baseline	$p = 0.9812$ n.s.	$t_{16} = 0.0536$
				light-on: P4 vs. Baseline	$p = 0.7950$ n.s.	$t_{16} = 1.011$
Supplementary Fig. 20f	Control (n = 11) ArchT (n = 13)	Two-way ANOVA RM		Interaction	$p = 0.1811$ n.s.	$F_{1, 22} = 1.907$
			Holm–Sidak post-hoc test	Control: Object vs. S1	$p < 0.0001$ ***	$t_{22} = 5.035$
				ArchT: Object vs. S1	$p < 0.0001$ ***	$t_{22} = 7.514$
	Control (n = 11) ArchT (n = 13)	Two-tailed unpaired Student's <i>t</i> -test		Social index: Control vs. ArchT	$p = 0.1939$ n.s.	$t_{22} = 1.340$
Supplementary Fig. 20g	Control (n = 10) hM3Dq (n = 12)	Two-way ANOVA RM		Interaction	$p = 0.5609$ n.s.	$F_{1, 20} = 0.3497$
			Holm–Sidak post-hoc test	Control: Object vs. S1	$p = 0.0007$ ***	$t_{20} = 4.321$
				hM3Dq: Object vs. S1	$p = 0.0010$ **	$t_{20} = 3.857$
	Control (n = 10) hM3Dq (n = 12)	Two-tailed unpaired Student's <i>t</i> -test		Social index: Control vs. hM3Dq	$p = 0.6998$ n.s.	$t_{20} = 0.3912$
Supplementary Fig. 20h	Control (n = 10) hM3Dq (n = 13)	Two-tailed unpaired Student's <i>t</i> -test		Percentage of time in open arm: Control vs. hM3Dq	$p = 0.0015$ **	$t_{21} = 3.641$
	Control (n = 10) hM3Dq (n = 13)	Two-tailed unpaired Student's <i>t</i> -test		Percentage of entries into open arm:	$p = 0.0156$ *	$t_{21} = 2.63$

				Control hM3Dq	vs.		
Supplementary Fig. 20i	Control (n = 10) hM3Dq (n = 13)	Two-way RM ANOVA		Interaction		$p = 0.0909$ n.s.	$F_{1, 21} = 3.141$
			Holm–Sidak post-hoc test	Control: Familiar vs. Novel		$p = 0.0075$ **	$t_{21} = 2.961$
				hM3Dq: Familiar vs. Novel		$p < 0.0001$ ***	$t_{21} = 6.063$
	Control (n = 10) hM3Dq (n = 13)	Two-tailed unpaired Student's <i>t</i> -test		Discrimination index: Control vs. hM3Dq		$p = 0.2723$ n.s.	$t_{21} = 1.127$
Supplementary Fig. 21f	Control (n = 9) eNpHR (n = 10)	Two-way RM ANOVA		Interaction		$p = 0.7254$ n.s.	$F_{1, 17} = 0.1276$
			Holm–Sidak post-hoc test	Control: S1 vs. S2		$p = 0.0172$ *	$t_{17} = 2.967$
				eNpHR: S1 vs. S2		$p = 0.0183$ *	$t_{17} = 2.609$
	Control (n = 9) eNpHR (n = 10)	Two-tailed unpaired Student's <i>t</i> -test		SD index: Control vs. eNpHR		$p = 0.6368$ n.s.	$t_{17} = 0.4808$
Supplementary Fig. 21g	Control (n = 8) eNpHR (n = 12)	Two-way RM ANOVA		Interaction		$p = 0.0038$ **	$F_{1, 18} = 11.06$
			Holm–Sidak post-hoc test	Control: S1 vs. S2		$p = 0.0002$ ***	$t_{18} = 4.956$
				eNpHR: S1 vs. S2		$p = 0.4276$ n.s.	$t_{18} = 0.8117$
	Control (n = 8)) eNpHR (n = 12)	Two-tailed Mann- Whitney test		SD index: Control vs. eNpHR		$p = 0.0022$ **	Mann-Whitney U = 10
Supplementary Fig. 21i	Control (n = 10) eNpHR (n = 15)	Two-way RM ANOVA		Interaction		$p = 0.5930$ n.s.	$F_{1, 23} = 0.2939$
			Holm–Sidak post-hoc test	Control: S1 vs. S2		$p = 0.0315$ *	$t_{23} = 2.291$
				eNpHR: S1 vs. S2		$p = 0.0026$ **	$t_{23} = 3.663$
	Control (n = 10) eNpHR (n = 15)	Two-tailed unpaired Student's <i>t</i> -test		SD index: Control vs. eNpHR		$p = 0.9973$ n.s.	$t_{23} = 0.0034$
Supplementary Fig. 21j	Control (n = 10) eNpHR (n = 13)	Two-way RM ANOVA		Interaction		$p = 0.0149$ *	$F_{1, 21} = 7.034$
			Holm–Sidak post-hoc test	Control: S1 vs. S2		$p = 0.0034$ **	$t_{21} = 3.597$
				eNpHR: S1 vs. S2		$p = 0.9375$ n.s.	$t_{21} = 0.0793$
	Control (n = 10) eNpHR (n = 13)	Two-tailed unpaired Student's <i>t</i> -test		SD index: Control vs. eNpHR		$p = 0.0089$ **	$t_{21} = 2.885$
Figure 7c	Control (n = 31) Social (n = 31)	Two-tailed Kolmogorov- Smirnov test		Cumulative percentage of inter-event interval: Control vs. Social		$p < 0.0001$ ***	N/A
	Control (n = 31) Social (n = 31)	Two-tailed Mann- Whitney test		sEPSC frequency:		$p = 0.0161$ *	Mann-Whitney U = 310.5

				Control vs. Social		
Figure 7d	Control (n = 31) Social (n = 31)	Two-tailed Kolmogorov-Smirnov test		Cumulative percentage of sEPSC amplitude: Control vs. Social	$p = 0.0003$ ***	N/A
	Control (n = 31) Social (n = 31)	Two-tailed unpaired Welch's t -test		sEPSC amplitude: Control vs. Social	$p = 0.4391$ n.s.	$t_{51.02} = 0.7799$
Figure 7f	Control (n = 27) Social (n = 26)	Two-tailed Kolmogorov-Smirnov test		Cumulative percentage of inter-event interval: Control vs. Social	$p = 0.7514$ n.s.	N/A
	Control (n = 27) Social (n = 26)	Two-tailed Mann-Whitney test		sEPSC frequency: Control vs. Social	$p = 0.9473$ n.s.	Mann-Whitney U = 347
Figure 7g	Control (n = 27) Social (n = 26)	Two-tailed Kolmogorov-Smirnov test		Cumulative percentage of sEPSC amplitude: Control vs. Social	$p < 0.0001$ ***	N/A
	Control (n = 27) Social (n = 26)	Two-tailed unpaired Student's t -test		sEPSC amplitude: Control vs. Social	$p = 0.4345$ n.s.	$t_{51} = 0.7878$
Supplementary Fig. 22c	Control (n = 29) Running (n = 27)	Two-tailed Kolmogorov-Smirnov test		Cumulative percentage of inter-event interval: Control vs. Running	$p < 0.0001$ ***	N/A
	Control (n = 29) Running (n = 27)	Two-tailed Mann-Whitney test		sEPSC frequency: Control vs. Running	$p = 0.7204$ n.s.	Mann-Whitney U = 369
Supplementary Fig. 22d	Control (n = 29) Running (n = 27)	Two-tailed Kolmogorov-Smirnov test		Cumulative percentage of sEPSC amplitude: Control vs. Running	$p < 0.0001$ ***	N/A
	Control (n = 29) Running (n = 27)	Two-tailed Mann-Whitney test		sEPSC amplitude: Control vs. Running	$p = 0.0660$ n.s.	Mann-Whitney U = 279
Figure 7i	Control (n = 26) Social (n = 25)	Two-tailed unpaired Student's t -test		Paired pulse ratio: Control vs. Social	$p = 0.0020$ **	$t_{49} = 3.266$
Figure 7j	Control (n = 25) Social (n = 23)	Two-tailed unpaired Welch's t -test		Paired pulse ratio: Control vs. Social	$p = 0.8418$ n.s.	$t_{31.40} = 0.2013$

Figure 8b	Control (n = 8) ArchT (n = 9)	Two-way RM ANOVA		Interaction	$p = 0.2216$ n.s.	$F_{1, 15} = 1.627$
			Holm–Sidak post-hoc test	Control: Empty vs. S1	$p = 0.0149$ *	$t_{15} = 2.751$
				ArchT: Empty vs. S1	$p = 0.0005$ ***	$t_{15} = 4.777$
	Control (n = 8) ArchT (n = 9)	Two-tailed unpaired Student's t -test		Social index: Control vs. ArchT	$p = 0.2899$ n.s.	$t_{15} = 1.097$
Figure 8c	Control (n = 8) ArchT (n = 9)	Two-way RM ANOVA		Interaction	$p = 0.6939$ n.s.	$F_{1, 15} = 0.1610$
			Holm–Sidak post-hoc test	Control: S1 vs. S2	$p = 0.0053$ **	$t_{15} = 3.597$
				ArchT: S1 vs. S2	$p = 0.0056$ **	$t_{15} = 3.230$
	Control (n = 8) ArchT (n = 9)	Two-tailed unpaired Student's t -test		SD index: Control vs. ArchT	$p = 0.8459$ n.s.	$t_{15} = 0.1978$
Figure 8e	Control (n = 7) ArchT (n = 10)	Two-way RM ANOVA		Interaction	$p = 0.0691$ n.s.	$F_{1, 15} = 3.835$
			Holm–Sidak post-hoc test	Control: Empty vs. S1	$p = 0.0037$ **	$t_{15} = 3.428$
				ArchT: Empty vs. S1	$p < 0.0001$ ***	$t_{15} = 7.149$
	Control (n = 7) ArchT (n = 10)	Two-tailed unpaired Student's t -test		Social index: Control vs. ArchT	$p = 0.0538$ n.s.	$t_{15} = 2.092$
Figure 8f	Control (n = 7) ArchT (n = 10)	Two-way RM ANOVA		Interaction	$p = 0.0630$ n.s.	$F_{1, 15} = 4.033$
			Holm–Sidak post-hoc test	Control: S1 vs. S2	$p = 0.0287$ *	$t_{15} = 2.764$
				ArchT: S1 vs. S2	$p = 0.8637$ n.s.	$t_{15} = 0.1746$
	Control (n = 7) ArchT (n = 10)	Two-tailed unpaired Welch's t -test		SD index: Control vs. ArchT	$p = 0.0285$ *	$t_{12.36} = 2.480$
Figure 8h	Control (n = 8) ChR2 (n = 9)	Two-way RM ANOVA		Interaction	$p = 0.7284$ n.s.	$F_{1, 15} = 0.1252$
			Holm–Sidak post-hoc test	Control: Empty vs. S1	$p = 0.0017$ **	$t_{15} = 4.143$
				ChR2: Empty vs. S1	$p = 0.0017$ **	$t_{15} = 3.878$
	Control (n = 8) ChR2 (n = 9)	Two-tailed unpaired Student's t -test		Social index: Control vs. ChR2	$p = 0.9269$ n.s.	$t_{15} = 0.0933$
Figure 8i	Control (n = 8) ChR2 (n = 9)	Two-way RM ANOVA		Interaction	$p = 0.0025$ **	$F_{1, 15} = 13.07$
			Holm–Sidak post-hoc test	Control: S1 vs. S2	$p = 0.0025$ **	$t_{15} = 3.964$
				ChR2: S1 vs. S2	$p = 0.3035$ n.s.	$t_{15} = 1.066$
	Control (n = 8) ChR2 (n = 9)	Two-tailed unpaired Student's t -test		SD index: Control vs. ChR2	$p = 0.0012$ **	$t_{15} = 3.977$
Figure 8k	Control (n = 7) ChR2 (n = 8)	Two-way RM ANOVA		Interaction	$p = 0.8638$ n.s.	$F_{1, 13} = 0.0306$

			Holm–Sidak post-hoc test	Control: Empty vs. S1	$p = 0.0014$ **	$t_{13} = 4.032$
				ChR2: Empty vs. S1	$p = 0.0011$ **	$t_{13} = 4.567$
	Control (n = 7) ChR2 (n = 8)	Two-tailed unpaired Student’s t -test		Social index: Control vs. ChR2	$p = 0.7174$ n.s.	$t_{13} = 0.3699$
Figure 8l	Control (n = 7) ChR2 (n = 8)	Two-way RM ANOVA		Interaction	$p = 0.0713$ n.s.	$F_{1, 13} = 3.856$
			Holm–Sidak post-hoc test	Control: S1 vs. S2	$p = 0.0006$ ***	$t_{13} = 4.894$
				ChR2: S1 vs. S2	$p = 0.0347$ *	$t_{13} = 2.358$
	Control (n = 7) ChR2 (n = 8)	Two-tailed unpaired Student’s t -test		SD index: Control vs. ChR2	$p = 0.2951$ n.s.	$t_{13} = 1.091$
Supplementary Fig. 23c	Ipsilateral: SST mice (n = 5) CB mice (n = 5)	Two-tailed unpaired Student’s t -test		NDB: SST vs. CB	$p = 0.1738$ n.s.	$t_8 = 1.493$
				POA: SST vs. CB	$p = 0.2912$ n.s.	$t_8 = 1.130$
				AHN: SST vs. CB	$p = 0.0190$ *	$t_8 = 2.931$
				LHA: SST vs. CB	$p = 0.4978$ n.s.	$t_8 = 0.7101$
				SUM: SST vs. CB	$p = 0.3576$ n.s.	$t_8 = 0.9761$
				BNST: SST vs. CB	$p = 0.9920$ n.s.	$t_8 = 0.0104$
				NAc: SST vs. CB	$p = 0.0341$ *	$t_{4,247} = 3.080$
				PH: SST vs. CB	$p = 0.4325$ n.s.	$t_8 = 0.8264$
				ZI: SST vs. CB	$p = 0.7046$ n.s.	$t_8 = 0.3930$
		Two-tailed unpaired Welch’s t -test		RCH: SST vs. CB	$p = 0.2391$ n.s.	$t_8 = 1.272$
				DMHa: SST vs. CB	$p = 0.5368$ n.s.	$t_8 = 0.6453$
				TU: SST vs. CB	$p = 0.8619$ n.s.	$t_8 = 0.1797$
				PMv: SST vs. CB	$p = 0.8648$ n.s.	$t_8 = 0.1759$
				PMd: SST vs. CB	$p = 0.7499$ n.s.	$t_{4,748} = 0.3379$
Supplementary Fig. 23f	Control (n = 8) ArchT (n = 7)	Two-way RM ANOVA		Interaction	$p = 0.9167$ n.s.	$F_{1, 13} = 0.0114$
			Holm–Sidak post-hoc test	Control: Empty vs. S1	$p = 0.0002$ ***	$t_{13} = 5.663$
				ArchT: Empty vs. S1	$p = 0.0002$ ***	$t_{13} = 5.152$
	Control (n = 8) ArchT (n = 7)	Two-tailed unpaired Student’s t -test		Social index: Control vs. ArchT	$p = 0.7441$ n.s.	$t_{13} = 0.3335$
Supplementary Fig. 23g	Control (n = 8) ArchT (n = 7)	Two-way RM ANOVA		Interaction	$p = 0.7542$ n.s.	$F_{1, 13} = 0.1023$

	Control (n = 8) ArchT (n = 7)	Two-tailed unpaired Student's <i>t</i> -test	Holm–Sidak post-hoc test	Control: S1 vs. S2	$p = 0.0028$ **	$t_{13} = 4.049$
				ArchT: S1 vs. S2	$p = 0.0052$ **	$t_{13} = 3.349$
				SD index: Control vs. ArchT	$p = 0.4216$ n.s.	$t_{13} = 0.8299$
Supplementary Fig. 23i	Control (n = 7) ChR2 (n = 8)	Two-way RM ANOVA		Interaction	$p = 0.0848$ n.s.	$F_{1, 13} = 3.480$
			Holm–Sidak post-hoc test	Control: Empty vs. S1	$p = 0.0005$ ***	$t_{13} = 4.954$
				ChR2: Empty vs. S1	$p = 0.0235$ *	$t_{13} = 2.565$
	Control (n = 7) ChR2 (n = 8)	Two-tailed unpaired Student's <i>t</i> -test		Social index: Control vs. ChR2	$p = 0.3304$ n.s.	$t_{13} = 1.011$
Supplementary Fig. 23j	Control (n = 7) ChR2 (n = 10)	Two-way RM ANOVA		Interaction	$p = 0.1505$ n.s.	$F_{1, 13} = 2.334$
			Holm–Sidak post-hoc test	Control: S1 vs. S2	$p = 0.0020$ **	$t_{13} = 4.230$
				ChR2: S1 vs. S2	$p = 0.0397$ *	$t_{13} = 2.285$
	Control (n = 7) ChR2 (n = 8)	Two-tailed unpaired Student's <i>t</i> -test		SD index: Control vs. ChR2	$p = 0.4627$ n.s.	$t_{13} = 0.7567$
Supplementary Fig. 24d	IPSC amplitude (n = 5)	Two-tailed one sample <i>t</i> -test		IPSC amplitude: Baseline vs. CNQX/D-AP5	$p = 0.1714$ n.s	$t_4 = 1.664$
		two-tailed paired Student's <i>t</i> -test		PSC amplitude: CNQX/D-AP5 vs. PTX	$p < 0.0001$ ***	$t_4 = 19.50$
Supplementary Fig. 24f	Control (n = 10) ArchT (n = 9)	Two-tailed Mann- Whitney test		Percentage of time in open arm: Control vs. ArchT	$p = 0.0279$ *	Mann-Whitney U = 18
	Control (n = 10) ArchT (n = 9)	Two-tailed unpaired Student's <i>t</i> -test		Percentage of entries into open arm: Control vs. ArchT	$p = 0.0288$ *	$t_{17} = 2.388$
Supplementary Fig. 24g	Control (n = 10) ArchT (n = 9)	Two-way RM ANOVA		Interaction	$p = 0.9463$ n.s.	$F_{1, 17} = 0.0047$
			Holm–Sidak post-hoc test	Control: Familiar vs. Novel	$p = 0.0007$ ***	$t_{17} = 4.468$
				ArchT: Familiar vs. Novel	$p = 0.0007$ ***	$t_{17} = 4.145$
	Control (n = 10) ArchT (n = 9)	Two-tailed unpaired Student's <i>t</i> -test		Discrimination index: Control vs. ArchT	$p = 0.9463$ n.s.	$t_{17} = 0.0683$
Supplementary Fig. 24k	IPSC amplitude (n = 5)	Two-tailed one sample <i>t</i> -test		IPSC amplitude: Baseline vs. CNQX/D-AP5	$p = 0.8313$ n.s	$t_4 = 0.2273$

		two-tailed paired Student's <i>t</i> -test		PSC amplitude: CNQX/D-AP5 vs. PTX	$p = 0.0004$ ***	$t_4 = 11.05$
Supplementary Fig. 24m	Control (n = 7) ChR2 (n = 8)	Two-tailed unpaired Student's <i>t</i> -test		Percentage of time in open arm: Control vs. ChR2	$p = 0.4537$ n.s.	$t_{13} = 0.7724$
	Control (n = 7) ChR2 (n = 8)			Percentage of entries into open arm: Control vs. ChR2	$p = 0.3494$ n.s.	$t_{13} = 0.9707$
Supplementary Fig. 24n	Control (n = 7) ChR2 (n = 8)	Two-way RM ANOVA	Holm–Sidak post-hoc test	Interaction	$p = 0.7760$ n.s.	$F_{1, 13} = 0.0844$
				Control: Familiar vs. Novel	$p = 0.0026$ **	$t_{13} = 4.074$
				ChR2: Familiar vs. Novel	$p = 0.0026$ **	$t_{13} = 3.930$
	Control (n = 7) ChR2 (n = 8)	Two-tailed unpaired Student's <i>t</i> -test		Discrimination index: Control vs. ChR2	$p = 0.7760$ n.s.	$t_{13} = 0.2905$
Supplementary Fig. 25c	AHN (n = 3)	Two-tailed paired Student's <i>t</i> -test		<i>Gad1</i> ⁺ vs. <i>Slc17a6</i> ⁺	$p = 0.0058$ **	$t_2 = 13.09$
	LHA (n = 3)			<i>Gad1</i> ⁺ vs. <i>Slc17a6</i> ⁺	$p = 0.0257$ *	$t_2 = 6.122$