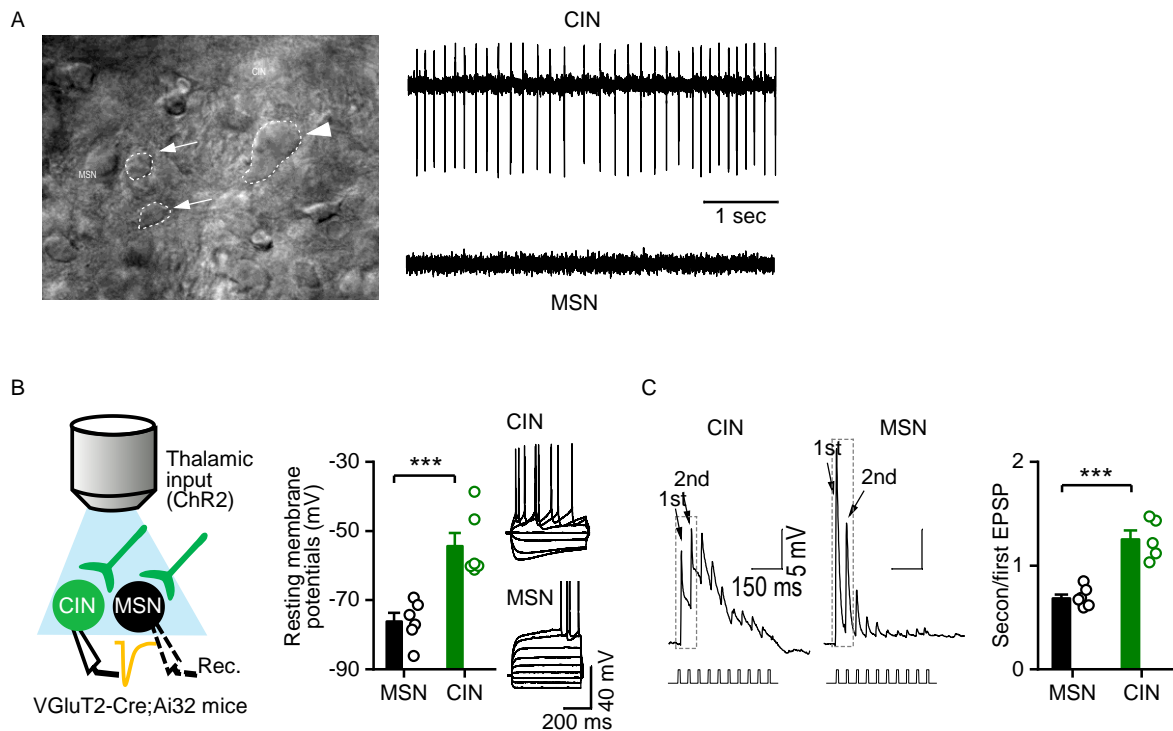
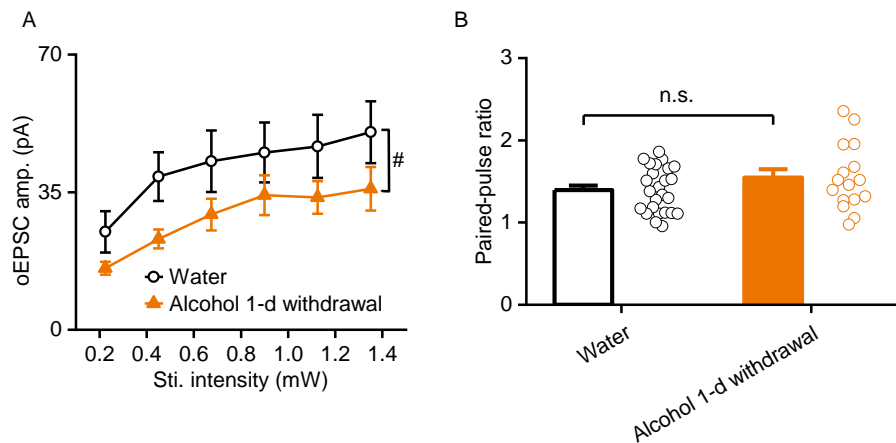


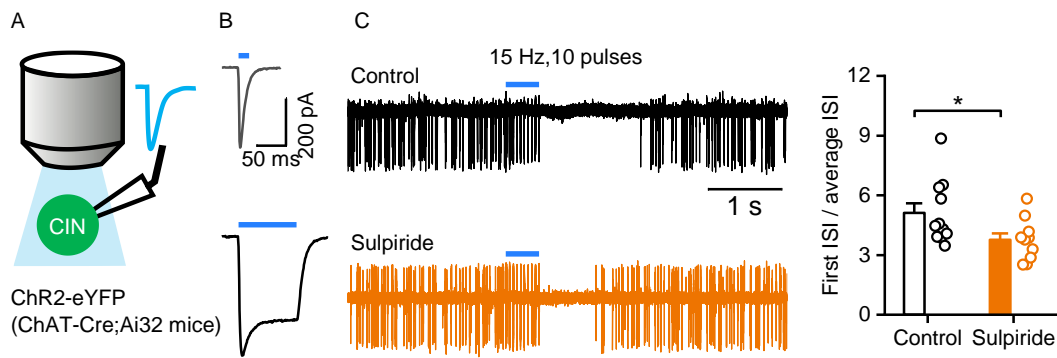
Supplementary Figure 1. Chronic alcohol-drinking rats shift their action strategy from goal-directed during initial A-O acquisition to habitual during reversed A-O learning. The difference between the 1st and 2nd devaluation index represents the degree of change in their action strategy. Black dots represent individual changes in the water group, and red dots represent individual changes in the alcohol group; ** $p < 0.01$ by unpaired t -test, $n = 13$ male rats (Water) and 11 male rats (Alcohol).



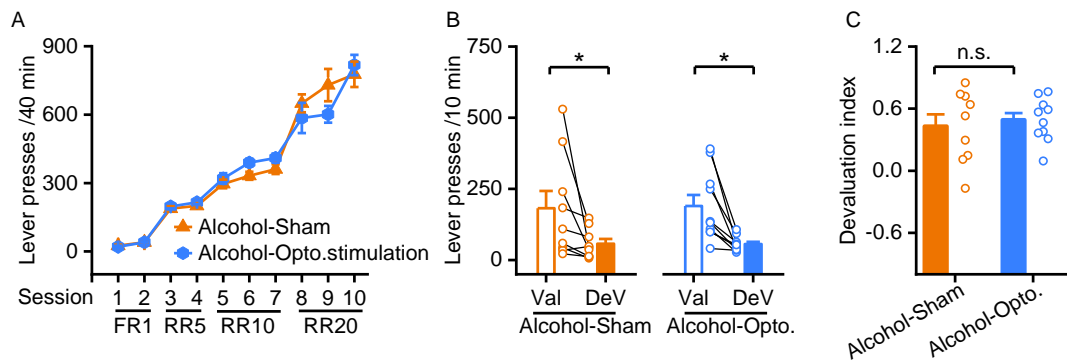
Supplementary Figure 2. The distinct features of CINs and MSNs in the DMS. **(A)** DIC image showing a CIN (arrowhead) and MSNs (arrows), and sample traces of spontaneous firing in CINs (top), but not in MSNs (bottom) using cell-attached recording. **(B)** Schematic diagram showing light stimulation of ChR2-expressing thalamic inputs and whole-cell recording of CINs or MSNs in DMS slices prepared from VGLUT2-Cre;Ai32 or VGLUT2-Cre;Ai32;ChAT-eGFP mice. Characterization of CINs and MSNs using their distinct resting membrane potentials and responses to current injection. Left, CINs had higher resting membrane potentials than did MSNs; $***p < 0.001$ by unpaired t test, $n = 6$ neurons from 3 male mice per group. Right, less current was needed to generate action potentials in CINs than in MSNs using 500-ms step-current injections, starting at -120 pA with 30-pA increments. **(C)** Left and middle, sample traces showing that a train of light stimulation (2 ms, 10 pulses, 15 Hz) of thalamic inputs elicited facilitation of the second EPSP in CINs, but the depression of the second EPSP in MSNs. Right, the ratio of the second: first EPSP was significantly higher in CINs than in MSNs; $***p < 0.001$ by unpaired t test, $n = 5$ neurons from 4 male mice (CINs) and 7 neurons from 4 male mice (MSNs).



Supplementary Figure 3. Chronic alcohol intake reduces thalamic excitatory inputs onto DMS CINs of mice injected with AAV-Chrimson-tdT. **(A)** Input-output curves of oEPSC amplitudes in CINs from mice injected with AAV-Chrimson-tdT and exposed to alcohol or water; $^{\#}p < 0.05$ by two-way RM ANOVA; $n = 12$ neurons from 2 male mice (Water) and 12 neurons from 2 male mice (Alcohol). **(B)** Paired-pulse ratios in mice injected with AAV-Chrimson-tdT and exposed to alcohol or water; $p > 0.05$ by unpaired t test, $n = 27$ neurons from 5 male mice (Water) and 16 neurons from 2 male mice (Alcohol).



Supplementary Figure 4. Direct optical stimulation of CINs generates a pause mimicking the thalamostrially-evoked burst-pause response. **(A)** Diagram showing light stimulation of, and whole-cell recording in, ChR2-expressing DMS CINs from ChAT-Cre;Ai32 mice. **(B)** Short (2 ms) or prolonged (100 ms) light stimulation of DMS CINs elicited a short-lived (top) or sustained (bottom) depolarization. **(C)** Inhibition of D2Rs reduced the pause response of DMS CINs to direct light excitation. Left, superimposed sample traces show that light-mediated CIN stimulation induced a “burst-pause” response in the absence (top) and presence (bottom) of the D2R antagonist, sulpiride (20 μ M). Right, the ratio of the first inter-spike interval (ISI) after light stimulation was divided by the average ISI measured before stimulation (500 ms). This ratio was lower in the sulpiride group than in the control group; $*p < 0.05$ by unpaired t test, $n = 11$ neurons from 4 male mice (Control) and 10 neurons from 4 male mice (Sulpiride).



Supplementary Figure 5. Group performance for the initial learning before light stimulation.

(A) Two groups showed no significant difference in total lever presses during the acquisition of the initial contingencies, moving from a fixed ratio 1 (FR1) schedule to random ratio 5 (RR5), RR10, and RR20 schedules as indicated; two-way RM ANOVA. **(B)** Outcome-specific devaluation testing showed that both sham and light stimulation groups pressed the DeV lever significantly fewer times than the Val lever; $*p < 0.05$ by paired t test. **(C)** The devaluation index, defined as $(Val - DeV)/(Val + DeV)$, did not differ significantly between the two groups; n.s., not significant by unpaired t test. $n = 6$ male and 3 female rats (Alcohol-Sham) and 8 male + 2 female rats (Alcohol-Opto) for A, B, C.