**Supplemental Materials**

**Medial Orbitofrontal Cortex Modulates Associative Learning Between Environmental Cues and Reward Probability**

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Results:

**Group differences were not due to counterbalancing of houselight state**

It is possible that the state of the houselight signalling high vs low reward probability trials could have impacted accuracy by affecting the salience of the signal cues, and that this could have impacted acquisition across Saline and CNO groups. We therefore conducted a 2 (reward probability) x 3 (group; Sal, CNO+, CNO-) x 2 (houselight state) factor repeated measures ANOVA on proportion correct. This analysis showed a significant effect of reward probability (*F*(1,12)=12.06, p=0.005), with no significant effect of group (F(2,12)=2.087, p=0.167), no significant effect of houselight state (*F*(1,12)=1.130, p=0.309) and no significant interaction effects (Fs<1.5).

**Discrimination accuracy did not differ between groups**

To assess whether activating mOFC neurons impacted overall discrimination accuracy, we averaged accuracy across trial types for animals that did and did not meet acquisition criteria. The average proportion correct (standard error in parentheses) for rats that did (Saline/CNO+) and did not (CNO-) acquire was 0.75 (0.02) and 0.76 (0.04), respectively. An unpaired t-test on these data showed average accuracy was not significantly different (*t*(16) = 0.35, *p* = 0.73).

**Increasing mOFC neuronal activity did not impact perseveration**

To further assess the impact of increasing mOFC neuronal on SPSA performance, we calculated the proportion of perseverative responses (responses to a previously correct lever) and the proportion of perseverative errors (incorrect responses to a previously correct lever) for all rats. This analysis was conducted because disrupting OFC activity has previously been associated with increased perseverative responding on a previously rewarded response option (for review see Rudebeck & Murray, 2014). Figure S1 shows that there were no significant differences between perseverative responses (F(2,15) = 1.57, p = 0.24) or perseverative errors (F(2,15) = 0.63, p = 0.55) for Saline and CNO rats, respectively.

Table 1. Average choice response latency and # of trials omitted for all groups (standard error in parentheses).





*Figure S1.* A. Average proportion of perseverative responses. B. Average proportion of perseverative errors. Data are shown from all Saline and CNO rats.



*Figure S2*. Viral expression in CNO+ and CNO- groups. The figure shows the maximal (grey) and minimal (black) expression pattern. Numbers indicate distance relative to bregma.