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Posterior Parietal Cortex Dependent Contextual Renewal of Conditioned Positive and Negative Associations

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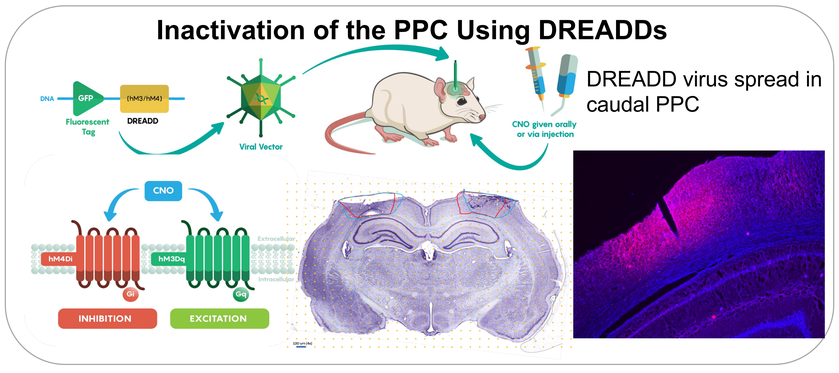
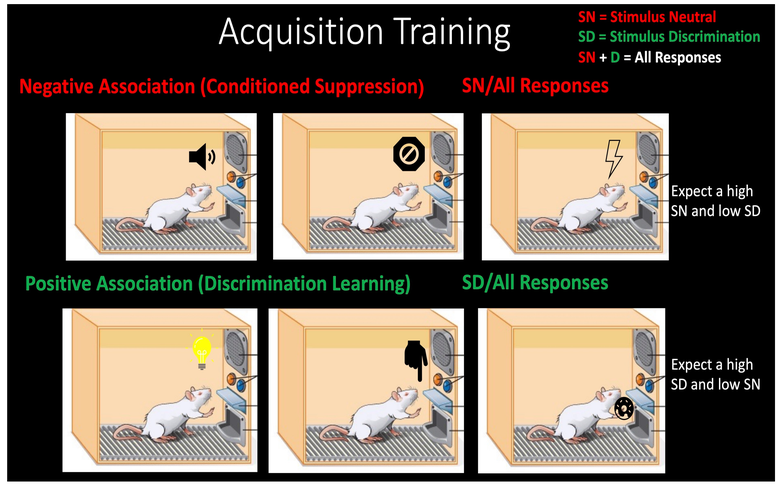
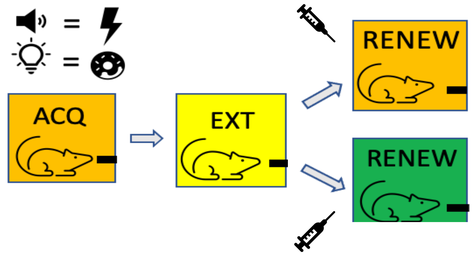
The Posterior Parietal Cortex (PPC) aids in decision making by integrating multisensory information. Recent evidence suggests the PPC is required for renewal of an extinguished conditioned fear response in a novel but not familiar context (Joo et.al, 2020). It is unknown if this PPC context-dependent renewal is limited to fear-based memories or whether renewal would also occur with positive conditioned stimuli. **To examine the hypothesis that the PPC serves a more general role in context-dependent renewal, the PPC will be temporally inactivated while rats are tested for renewal after associating both positive and negative (fear) stimuli.** First, we tested sham operated controls on the ABA/ABC paradigm with both positive and negative associations to determine expected results and establish a double control with CNO and saline injections.

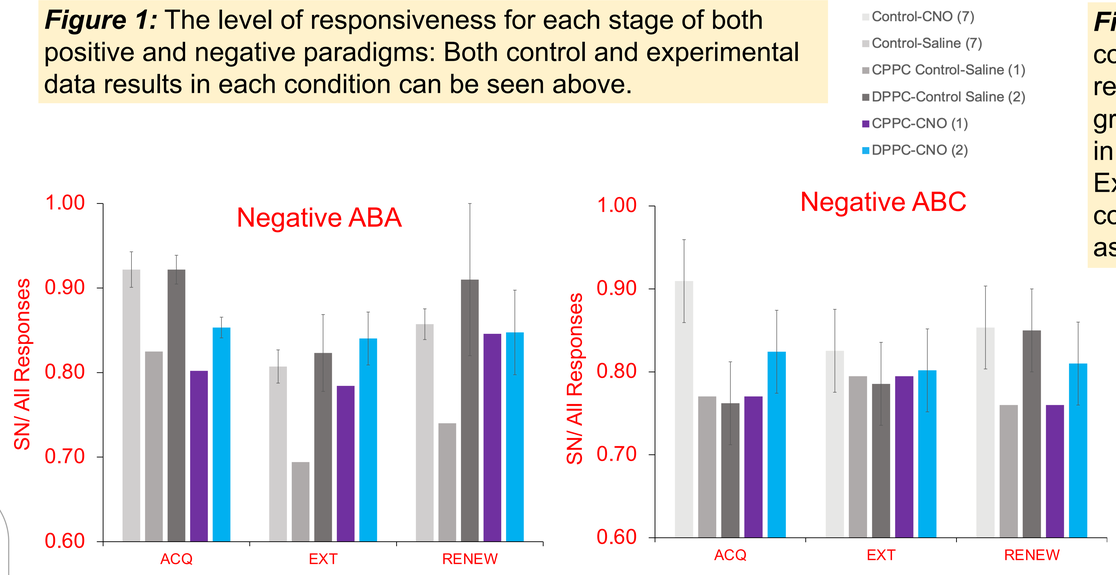




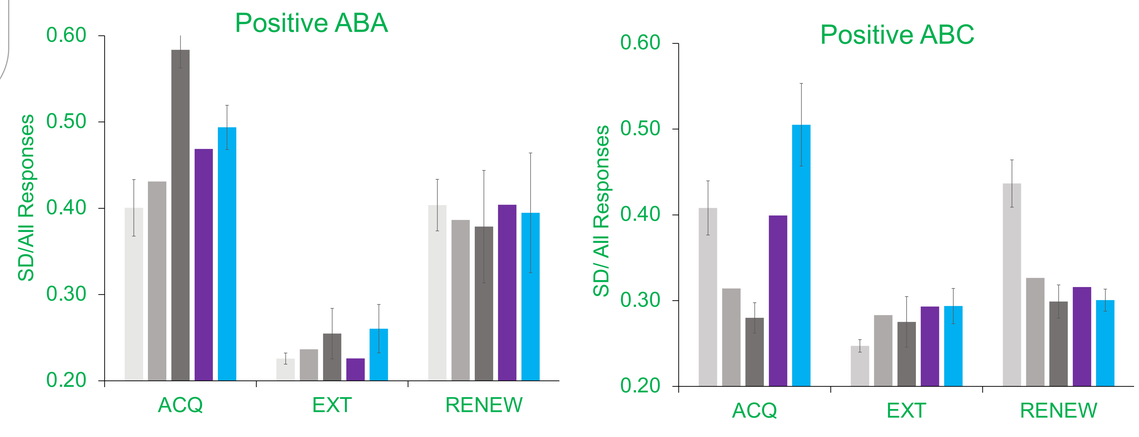


Conditioned suppression: conditioned response to a positive stimulus (lever pressing for food) is reduced by another stimulus (tone) that is associated with an aversive stimulus (shock).

Figure 1: The level of responsiveness for each stage of both positive and negative paradigms: Both control and experimental data results in each condition can be seen above.

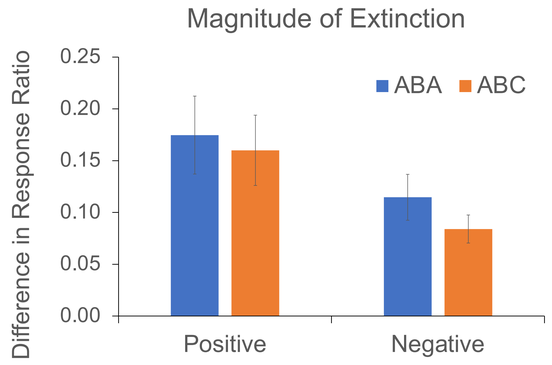


Negative. 3x2 RMANOVA controls. Context: $F_{1,9}$=1.04, p=.335, Phase: $F_{2,18}$=13.7, **p<.001**, Context x Phase: $F_{2,18}$=2.51, p=.109

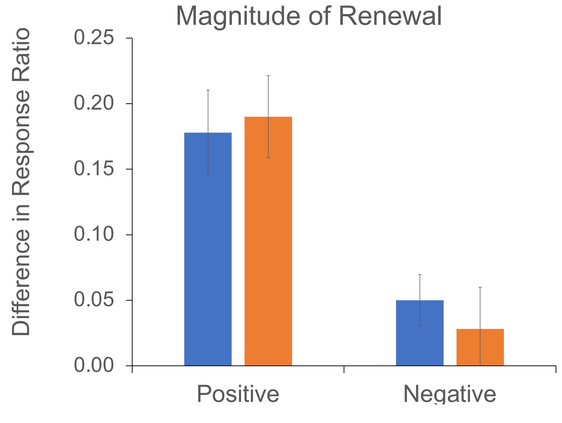


Positive. 3x2 RMANOVA controls. Context: $F_{1,9}$=.081, p=.782, Phase: $F_{2,18}$=30.04, **p<.001**, Context x Phase: $F_{2,18}$=1.86, p=.184

Figure 2: The level of extinction and renewal compared between the two paradigms. These results are derived from control rats. An overall greater level of both extinction and renewal is seen in the positive paradigm compared to negative. Extinction was also higher in the familiar (A) context compared to novel (C) in with the negative association.



2x2 RMANOVA controls. Context: $F_{1,9}$=3.9, **p=.079**, Valence: $F_{1,9}$=98.6, **p<.001**, Context x Valence: : $F_{1,9}$=73.9, **p<.001**



2x2 RMANOVA controls. Context: $F_{1,9}$=.209, p=.658, Valence: $F_{1,9}$=10.01, **p=.011**, Context x Valence: : $F_{1,9}$=.551, p=.477

Conclusions and Future Directions

After IP injection (saline or CNO; which should have no behavioral effect), control rats demonstrated renewal in both familiar and novel contexts for both positive and negative associations. Results from PPC DREADDS injected rats are inconclusive (N=3 subjects). With future cohorts of DREADDS animals, we predict subjects with inactivated PPCs will not renew positive or negative associations in novel contexts but renewal in familiar contexts will be spared.

References: Joo, B., Koo, J. W., & Lee, S. (2020). Posterior parietal cortex mediates fear renewal in a novel context. *Molecular Brain*, 13(16).

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