Frustrative nonreward: Role of opioid receptors in reward downshift

Emily Rice, Morgen Crosby, Jessica Suarez, Christopher Hagen, and Mauricio R. Papini
Department of Psychology, Texas Christian University

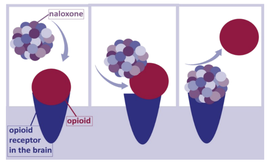
Introduction

- The COVID-19 pandemic revealed widespread changes in human behavior resulting from the **loss** of sources of reward that had been taken for granted.
- The study of **frustration** in animals predicted most of these changes.

- **Frustration:** Emotional reaction induced by an unexpected loss in the quantity or quality of a reward (Amsel, 1992).
- **cSNC:** Consummatory successive negative contrast, unexpected reduction in sucrose from 32% or 16% to 4%.
- **Effects:**
  - Rejection of the downshifted solution, stress response (Flaherty, 1996).
  - Less extreme reward disparity produce no behavioral evidence of enhanced suppression (Arjol et al., under review).
- **Interpretation:** Behavioral suppression reflects frustration (Amsel, 1992).
- **Approach:** Block opioid receptors in animals exposed to a mild reward disparity to determine whether cSNC can be dissociated from frustration.
- **Naloxone:** Opioid blockage augments frustration during reward downshift, inhibiting the dopaminergic reward system in the brain (Pellegrini et al., 2005).

Method

- **Subjects:** 47 female Wistar rats around 90 days old at the beginning of the experiments were used.
- **cSNC:** Ten 5-minute sessions of access to 32% or 16% sucrose followed by 4 downshift sessions of access to 4% sucrose. Control groups were always exposed to 4%.



- **Injections:** 2 ml/kg of either naloxone or saline solution was administered 15 min before each of the four downshift sessions.
- **Instrument:** Subjects received training in consummatory behavior boxes, each enclosed in a sound-attenuating cubicle. A circuit connecting the metal bars on the floor of the box with the zipper tube allowed licks to be counted.

Results

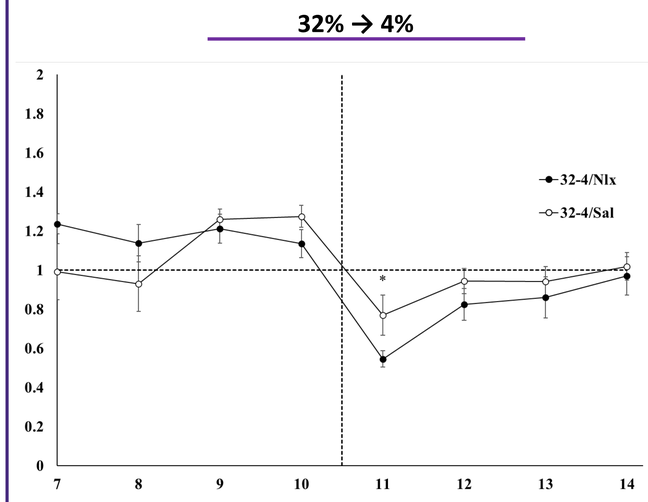


Figure 1: Licking ratio of the groups 32% with naloxone and saline compared to their respective control group 4%.* significant differences, *p*s<0.05.

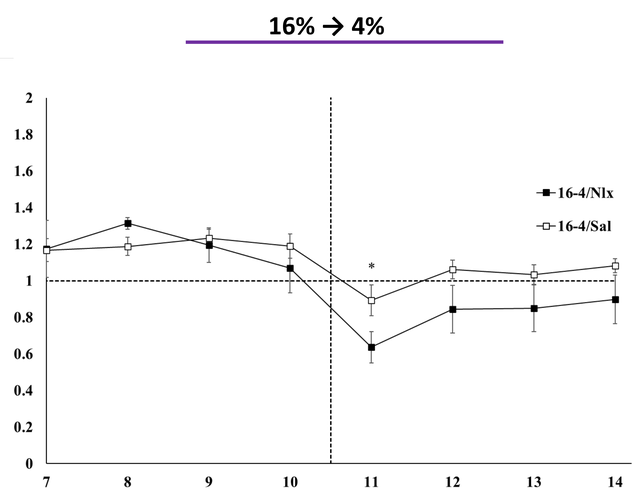


Figure 2: Licking ratio of the groups 16% with naloxone and saline compared to their respective control group 4%.* significant differences, *p*s<0.05.

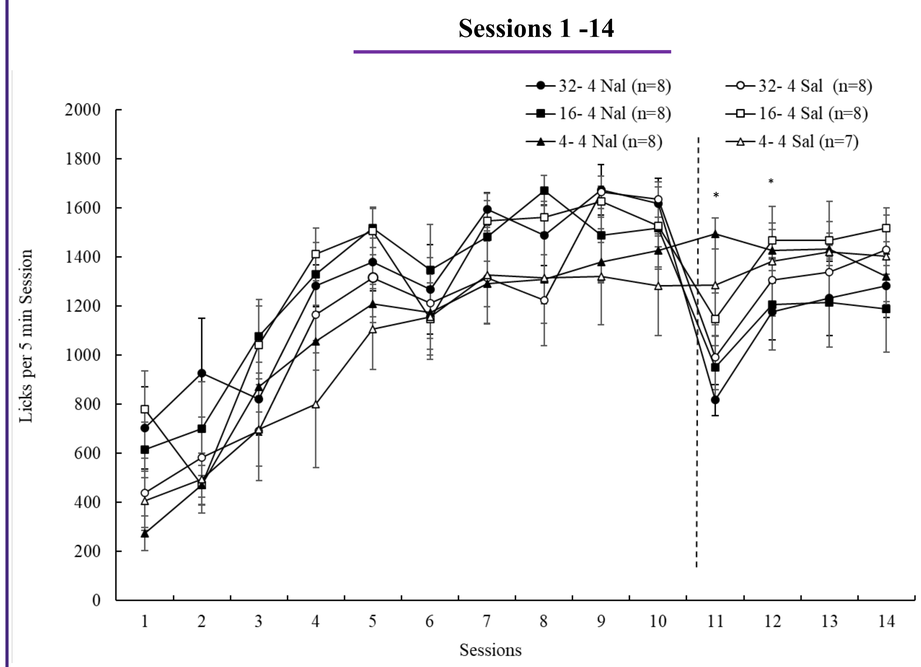


Figure 3: Means (± SEM) of licking frequency during the downshift after exposure to naloxone or saline 15 minutes before the test. * represents significant differences compared to control groups, *p*s<0.05.

Discussion

- **Consummatory suppression:** Enhanced behavioral suppression after the exposition of naloxone.
- **Small reward loss:** Blocking opioid receptors showed significant differences in the less extreme downshift condition.
- **Recovery:** There could be a trend towards greater resistance in behavioral recovery.
- **Conclusion:** Behavioral change does not allow detect emotional activation in less extreme reward changes.
- **Future studies:** Differences in recovery and suppression between extreme and non-extreme downshift.

References

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