

Introduction

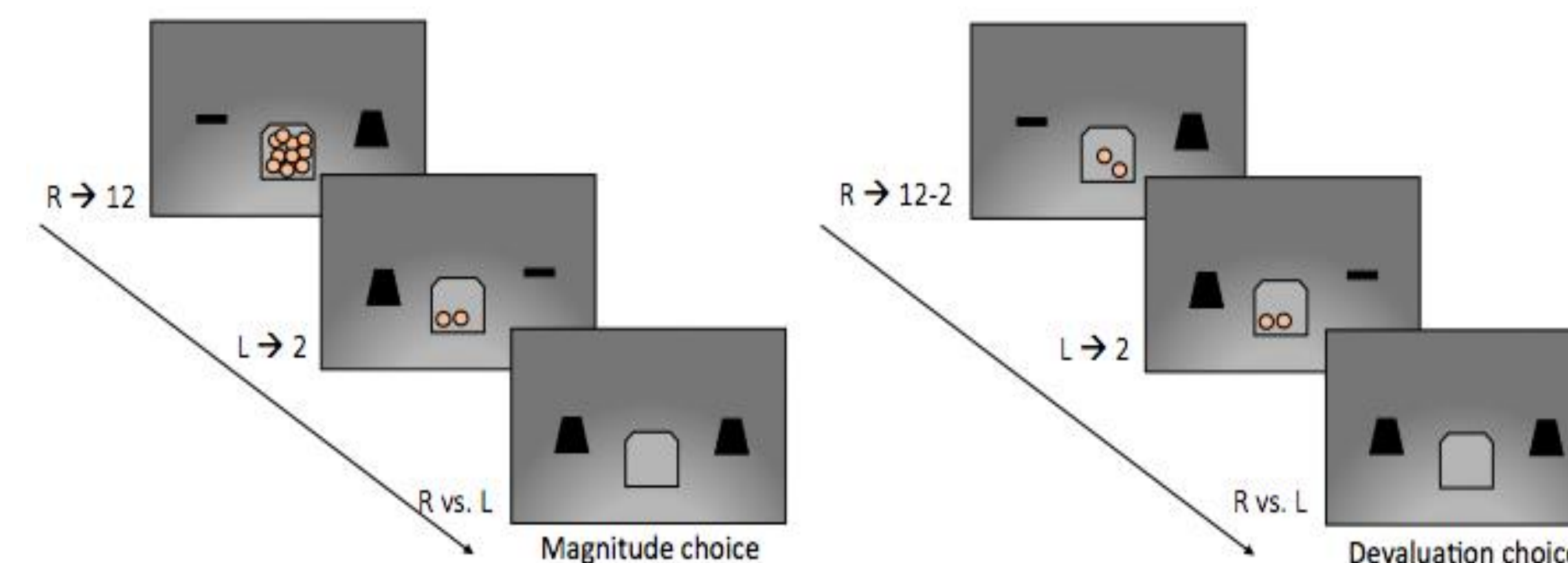
- **Medical Marijuana:** The endocannabinoid brain system has become a pressing social and political issue as 23 states have legalized the use of medical marijuana ("23 Legal" 2015).
- **Emotion:** High expression of the cannabinoid CB1 receptors in brain regions significant for emotion may suppress stress (Ganon-Elazor & Akirav 2009).
- **Research Question:** Will administration of a drug affecting CB1/CB2 receptors affect coping with frustration induced by reward loss?
- **Reward Loss:** It causes anxiety and psychological pain in rats, comparable to the consequences of an unexpected loss in humans (Papini et al. 2015).

Method

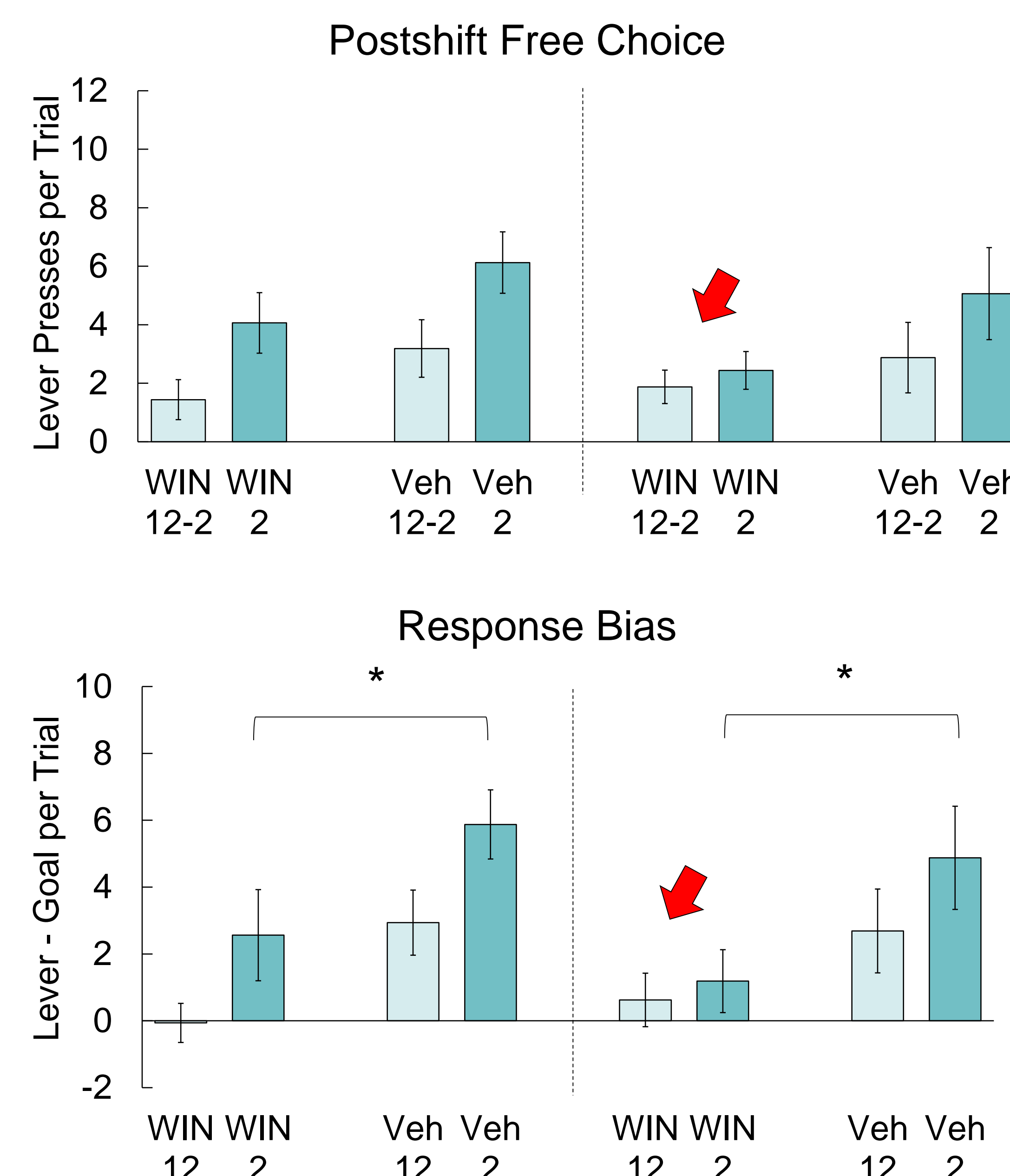
- **Procedure:** Pavlovian autoshaping procedure where the presence of a lever predicts the delivery of food pellets, regardless of whether or not the animal presses the lever
- **Training:** Rats received acquisition training with two levers that signaled either 12 or 2 pellets for 7 daily sessions.
- **Testing:** Rats experienced a downshift in which the 12 pellet lever was only followed by the delivery of 2 pellets.
- **Choice:** The downshifted session ended with a "free choice" trial where both levers were extended
- **Cycles:** The 7-day preshift/postshift phase was repeated 4 times.
- **WIN:** Rats were intraperitoneally injected with either WIN 55,212-2 (WIN; 1 mg/kg), a CB1/CB2 receptor agonist, or Vehicle (70% DMSO, 30% saline) prior to each of the 4 key downshift test sessions.
- **Dependent variables:**
 - **Sign tracking:** lever presses to each lever
 - **Goal tracking:** head entries into the goal area during lever presentation

Procedure

N = 16	Acquisition (7 sessions)	Preshift 1 (6 sessions)	Postshift 1 (1 session)	Preshift 2 (6 sessions)	Postshift 2 (1 session)	Preshift 3 (6 sessions)	Postshift 3 (1 session)	Preshift 4 (6 sessions)	Postshift 4 (1 session)
WIN n = 8	R12, L2	R12, L2	R2, L2 Free choice: R vs. L	R12, L2	R2, L2 Free choice: R vs. L	R12, L2	R2, L2 Free choice: R vs. L	R12, L2	R2, L2 Free choice: R vs. L
Veh n = 8	R12, L2	R12, L2	R2, L2 Free choice: R vs. L	R12, L2	R2, L2 Free choice: R vs. L	R12, L2	R2, L2 Free choice: R vs. L	R12, L2	R2, L2 Free choice: R vs. L



Results



Results

- Data from Postshifts 1-2 were averaged, and compared to Postshifts 3 and 4.
- There was a tendency for WIN to eliminate the preference for the unshifted lever after 3-4 downshifts (arrows in figures).
- WIN also shifted the balance from sign tracking (pressing the lever) to goal tracking (seeking reward) during the downshift episodes (asterisks in figure).

Conclusions

- Since increased sign-tracking has been linked with addictive behavior (Morrison, Bamkole, & Nicola, 2015), the trend toward increased goal tracking for WIN animals relative to Vehicle controls suggests CB receptor activation may make animals behave less impulsively
- A larger sample size may be needed to find significant results where our data currently shows trends

References

- Ganon-Elazar, E., & Akirav, I. (2009). Cannabinoid receptor activation in the basolateral amygdala blocks the effects of stress on the conditioning and extinction of inhibitory avoidance. *Journal of Neuroscience*, 29, 11078-11088.
- Morrison, S. E., Bamkole, M. A., & Nicola, S. M. (2015). Sign tracking, but not goal tracking, is resistant to outcomes devaluation. *Frontiers in Neuroscience*, 9, 1-12.
- Papini, M. R., Fuchs, P. N., & Torres, C. (2015). Behavioral neuroscience of psychological pain. *Neuroscience & Biobehavioral Reviews*, 48, 53-69.
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