Will work for alcohol! Reward value of alcohol in rats.

Joanna B. Thompson and Mauricio R. Papini

Department of Psychology, Texas Christian University

Introduction
- Alcohol misuse is a prevalent problem in the United States.
- Over 16 million Americans per year are diagnosed with an alcohol use disorder (AUD) contributing to an economic burden exceeding $249 billion (NIAAA, 2017).
- Research with rodents has shown that alcohol possesses rewarding properties (Jupp et al., 2011).
- Rewarding properties contribute to the motivation to engage in alcohol consumption.

Method
- Phase 1: we used a mixed Pavlovian-Instrumental paradigm to train voluntary oral self-administration to Wistar rats.
- Male and Female Wistar rats (n=8) were given access to two bottles:
  - Empty bottle (S1)
  - Alcohol bottle (S2)
- Responding to (licking) the empty bottle (S1) gave access the alcohol bottle (S2).
- Phase 2: after three consecutive days of training under continuous reinforcement conditions, rats were switched to a progressive-ratio schedule of reinforcement.
- Rats were then required to make an increasing number of responses to the empty sipper to gain access to the alcohol solutions (0, 2, 10, 66%).

Voluntary, Oral Alcohol Self-Administration
- Presentation of each alcohol solution was counterbalanced daily for all animals.

PHASE 1: Self-Administration Training
- Three, 20-trial sessions; Mean ITI 90s
  - S1 (Empty) Max duration 15 s
  - S2 (Alcohol) Max duration 10 s after first response

PHASE 2: Progressive-Ratio Alcohol Self-Administration
- Nine sessions
  - S1 (Empty) Max duration 15 s on first trial only
  - S2 (Alcohol) Max duration 10 s after completing step requirement
  - After first trial, increasing step requirement: step=4
    - First trial, 1 response required; Second trial, 1+4 responses required...
  - When a rat failed to reach the next step requirement, or stopped responding to S1 for 10 consecutive minutes, the session terminated.
  - Breakpoint: the number of responses made on the last completed trial.

PHASE 3: Progressive-Ratio Water Self-Administration
- Three sessions
  - Same conditions as Phase 2. All animals received access to water for three consecutive sessions to assess for the reward value of water.

Results
- Breakpoints were similar across alcohol concentrations, though, rodents exhibited less response effort for 0% (water).
- Mean lick frequency to S2 was similar for 0, 2, and 10% alcohol, and lower for high concentration, 66% alcohol.

Conclusions
- Alcohol has rewarding value relative to water.
- Surprisingly, alcohol concentrations ranging between 2 and 66% have similar reward value.
- Studies have shown that a non-selective orexin-1 receptor antagonist, SB-334867, can decrease alcohol consumption (Anderson et al., 2014).
- Future research will explore doses of SB-334867 with the goal of decreasing alcohol self-administration under progressive ratio conditions.

References