Differential effects of ethanol devaluation on instrumental behaviors

Regina A. Mangieri*, Roberto U. Cofresí, and Rueben A. Gonzales

College of Pharmacy, Division of Pharmacology and Toxicology, The University of Texas at Austin, Austin, Texas 78712 USA; *reginamangieri@mail.utexas.edu

Supported by: NIAAA awards R01AA011852 (RAG), T32AA007471, F32AA018252 (RAM)

608.01
VV39

BACKGROUND

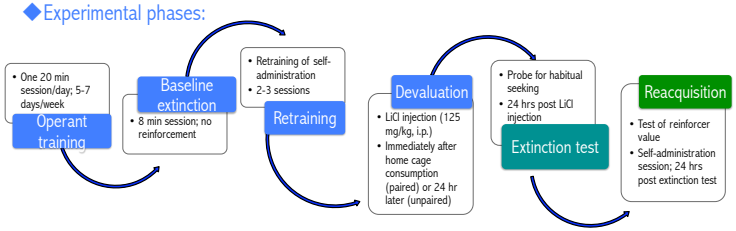
- Instrumental behaviors can be goal-directed actions governed by information about action-outcome (A-O) associations, or habitual responses driven by learned stimulus-response (S-R) associations.
- The performance of habits, therefore, is not affected by changes in the value of the reinforcer; they have been operationally defined using the criterion of "insensitivity to outcome devaluation".
- Studies of instrumental behavior in rats self-administering food or sucrose reinforcers have found these behaviors to be predominantly under the control of S-R associations (i.e., insensitive to outcome devaluation) after training under conditions of reduced action-outcome contingency. Such conditions include overtraining or training with interval (rather than ratio) schedules of reinforcement.
- Continued drug/alcohol seeking despite diminished value of the outcome is a hallmark of addictive behavior in humans, but few studies have used animal models to formally evaluate the conditions under which ethanol-seeking is insensitive to reinforcer devaluation.

SPECIFIC AIM AND HYPOTHESIS

- To experimentally determine if seeking behavior by rats trained for operant self-administration of pharmacologically-relevant doses of ethanol can be insensitive to reinforcer devaluation.
- Outcome devaluation will decrease ethanol-seeking in rats trained under a variable ratio, but not a variable interval schedule of reinforcement, and that this differential effect of devaluation will diminish with extended training.

METHODS

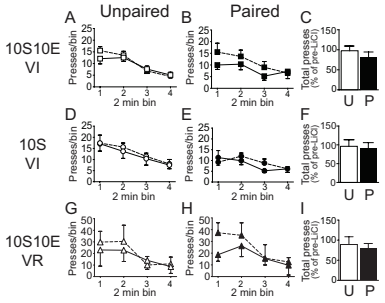
- Subjects: male Long Evans rats, 225-250 g upon arrival from Charles River
- Behavioral apparatus: Operant chambers from MedAssociates, equipped with lever and retractable bottle assembly
- Behavioral training: Lever press for 10 sec access to sipper tube of 10% sucrose; 10% ethanol added to solution after 2-3 days of training for 10S10E groups
- Experimental phases:



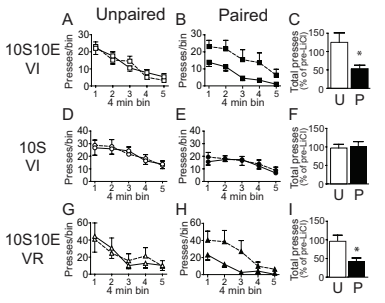
RESULTS

EXTENDED TRAINING

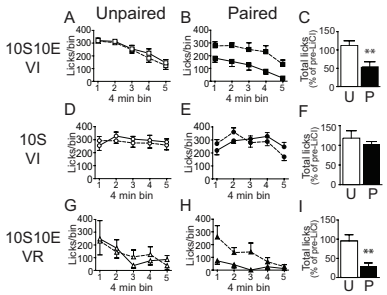
EXTINCTION SEEKING



REACQUISITION SEEKING

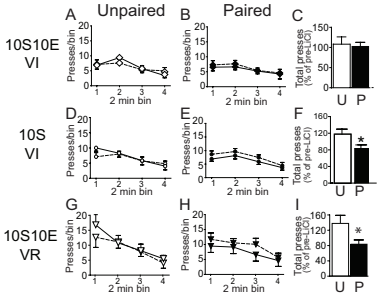


REACQUISITION CONSUMPTION

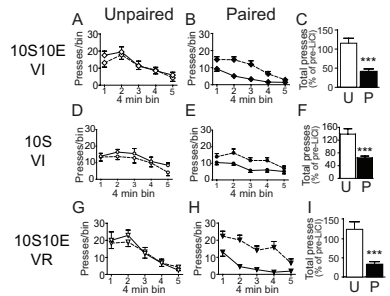


LIMITED TRAINING

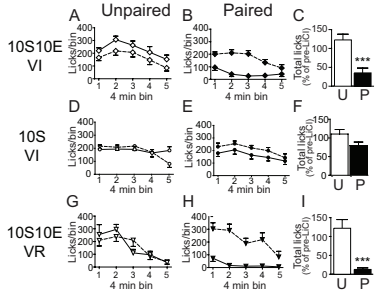
EXTINCTION SEEKING



REACQUISITION SEEKING



REACQUISITION CONSUMPTION



SUMMARY

- Extended training:
  - LiCl treatment had no effect on extinction responses in any group, and paired treatment decreased responding in the reacquisition session by the groups self-administering 10S10E, but not 10S. Thus, both 10S10E groups exhibited seeking behavior that was insensitive to outcome devaluation. The devaluation procedure (LiCl injection after 20 min home cage drinking) appeared to be ineffective to devalue 10S, and the timing of the injection was changed to 10 min in the limited training experiments.
- Limited training:
  - Paired LiCl treatment reduced both extinction and reacquisition responses by the 10S and the 10S10E VR groups, suggesting that seeking by these groups was sensitive to outcome devaluation. The 10S10E VI group exhibited significantly reduced responding in the reacquisition session, but appeared unaffected by LiCl devaluation when tested under extinction conditions.