Submitter Name: Jie Ni
Submitter email: jni4@uthsc.edu
PI Name: Hao Chen
PI email: hchen@uthsc.edu

PeerPub: a novel device for concurrent oral operant conditioning by two rats

Jie Ni, Paige Lemen, Hakan Gunturkun, and Hao Chen

Department of Pharmacology, Addiction Science and Toxicology, University of Tennessee Health Science center

The social environment has long been recognized to play important roles in drug abuse. Operant conditioning is the most widely used rodent model of drug abuse. However, most operant chambers do not accommodate more than one rat at a time. Here, we introduce PeerPub – a novel social operant chamber. PeerPub uses a RaspberryPi computer and touch sensors to count the number of licks on drinking spouts. It then delivers 60 µl solution when the number of licks meets the requirement of a reinforcement schedule. A radio-frequency identification (RFID) chip implanted on the top of a rat's skull allows identity tracking when rats poke their heads into the spout holder. We tested PeerPub using male Wistar Kyoto rats in daily one hour sessions, using supersac (a combination of glucose and saccharin) as the reward. Rats consumed similar amounts of supersac regardless of their social group. However, switching from a social to an isolated setting resulted in a long-lasting increase in supersac intake. In contrast, switching from an isolated to a social setting resulted in a long-lasting decrease in supersac intake. These proof-of-concept data indicate the utility of PeerPub in modeling the interaction between motivated behavior and social context. Our ongoing experiment is investigating the role of adolescent social isolation on the motivation to obtain opioids. Future experiments will explore the interaction between social and genetic factors on models of oral drug intake. The design of PeerPub is available at http://github.com/nijie321/PeerPub