A continuous fully automated progressive ratio task for the IntelliCage

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Progressive ratio tasks are well established to study the rewarding impact of drugs of abuse and food in rodents. However, their current implementation in operant chambers is complex and tedious. Animals are tested individually during many sessions and often need to be food deprived.
We have implemented a progressive ratio task for mice in the IntelliCage where animals are group-housed and can be tested 24/7 without deprivation and human interference. Each learning corner offers a choice between water and saccharin solution. Water access always requires a single nosepoke. The number of pokes needed to access the saccharin solution increases each time the mouse chooses saccharin but decreases after each choice of water.
C57BL/6 mice reached a stable equilibrium within few days, making on average 5-10 nosepokes to access saccharin. An equilibrium was also established rapidly in an aversively motivated version of the task, with mice making similar numbers of nosepokes to avoid drinking quinine. Modification of the available choices rapidly led to an adapted equilibrium reflecting the new value difference between stimuli.
This new IntelliCage task assesses the motivation of mice to work for reward or to avoid aversive stimuli. It is efficient, requires no handling, isolation or deprivation. Because an equilibrium is established, motivation can be monitored continuously over extended periods of time.