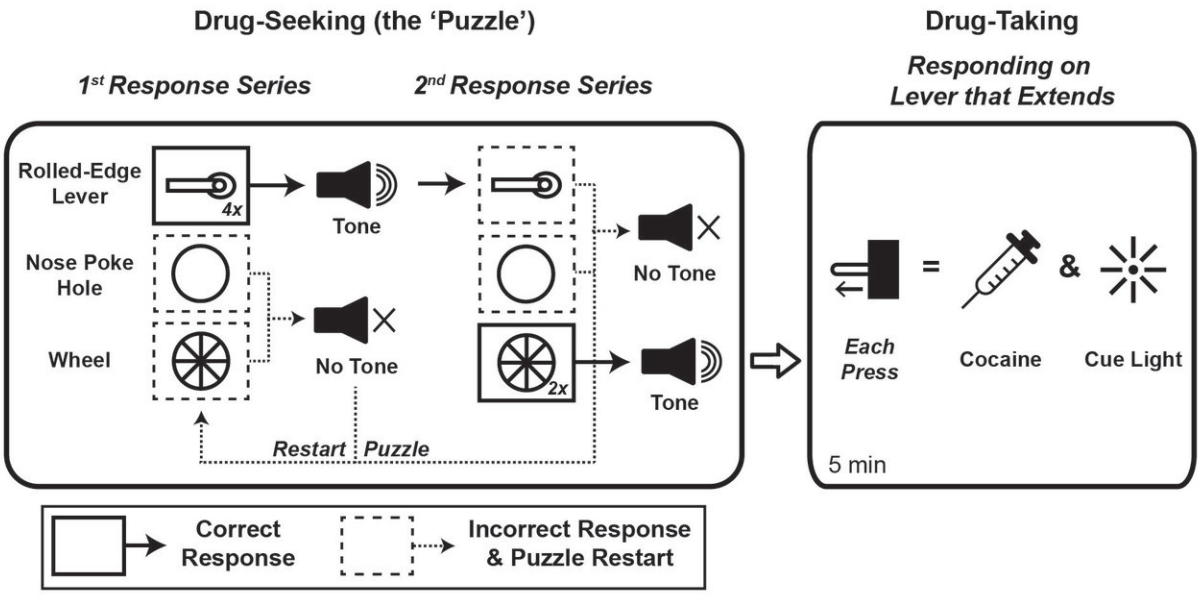
Realistic rodent model of drug addiction

November 20 2017



The drug-seeking phase requires the completion of 2 distinct response sequences. If either the 1st or 2nd response sequence during the drug-seeking period is performed incorrectly (indicated by dashed lines), no tone is presented, and the animal would have to restart the puzzle from the beginning. Credit: Singer et al., *JNeurosci* (2017)

Drug addiction may not require a habitual relationship with a substance, suggests findings from a new model of cocaine administration in rats that better captures the human experience of obtaining and using drugs. The research, published in *Journal of Neuroscience*, represents a step towards a translational animal model of addiction that challenges widely

held views about drug users.

Much of what we know about the neurobiology of addiction comes from studies that require animals to perform a repeated behavior, such as a lever-press or nose-poke, to gain access to a drug. These behaviors typically become habits controlled by the dorsal striatum, leaving open the question of whether more complex behaviors, like the flexible problem-solving that humans use to navigate drug dealing, can also lead to addiction.

Diverging from conventional animal models of addiction, Bryan Singer and colleagues instead required male rats to solve a new, increasingly difficult puzzle each day in order to receive a cocaine reward. This model still produced symptoms of substance use disorders in the rats. Drug-seeking behavior engaged the nucleus accumbens, a brain region involved in goal-directed behavior, throughout the experiment.

The authors did not observe a shift in dopamine signaling to the dorsal striatum, which is thought to underlie the transition from learned behavior to habit, suggesting that the rats continued to rely on ingenuity to sustain their addiction.

More information: *Journal of Neuroscience* (2017). DOI: 10.1523/JNEUROSCI.2458-17.2017

Provided by Society for Neuroscience