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Can the Propensity to Attribute Incentive Salience to Food Stimuli Predict Cocaine-Induced Vocalizations in the Rat?

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Introduction

Environmental stimuli, when paired with rewards, can become strong motivators of behavior. Some individuals are more responsive to these stimuli, especially when paired with food and other rewards, such as cocaine. We wanted to determine whether this trait predicts the motivational effects of cocaine in rats, as measured by emission of 50-kHz ultrasonic vocalizations.

Methods

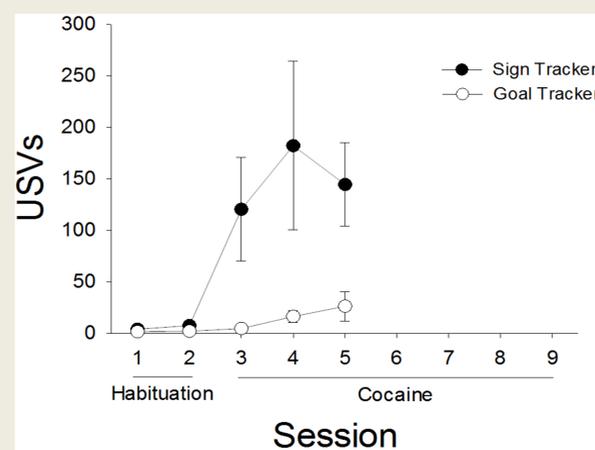
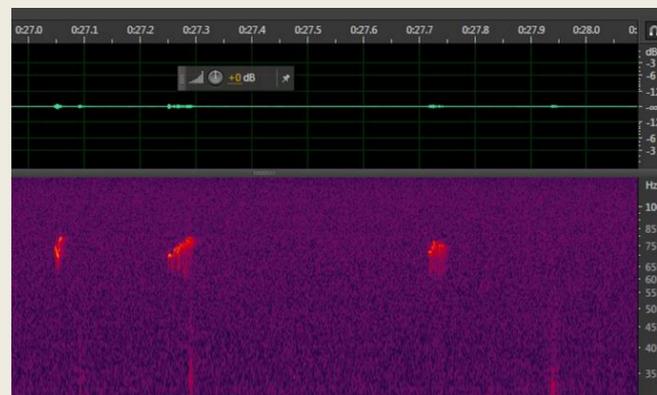
Subjects included 48 male Sprague Dawley rats.

In this experiment, rats learned to associate a lever presentation with the delivery of a banana-flavored food pellet during a Pavlovian Conditioned Approach (PCA) paradigm. Rats were categorized as sign trackers, or goal trackers based on whether they approached the lever (sign) or the food delivery location (goal), respectively.



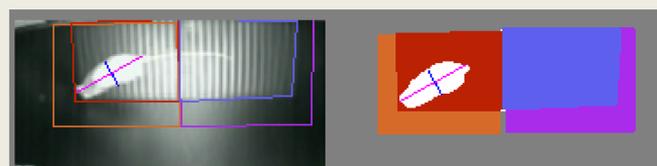
Afterwards, sign and goal trackers were then tested for 30 minutes in an open field locomotor chamber equipped with video cameras to track movement, and ultrasonic microphones to record ultrasonic vocalizations (USVs). Rats underwent a 2-day habituation period, in which all subjects received an injection of saline before being tested in the chambers. Following habituation, there were 7 sessions in which the subjects received 10mg/kg injections of cocaine before being tested in the chambers.

USV Results



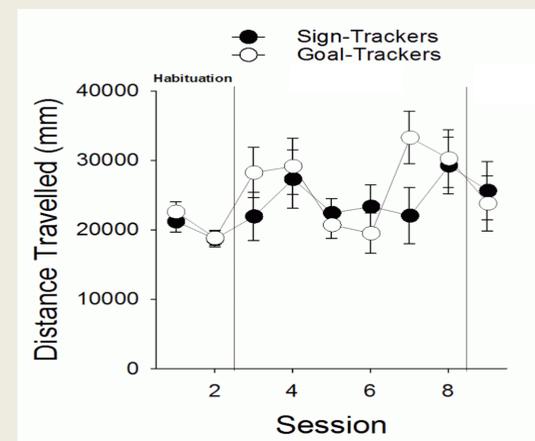
The above figure shows the USVs produced during habituation and cocaine sessions. There was an increase in USV production by sign trackers during all cocaine sessions, but not habituation. Goal trackers showed a significantly lower increase in USVs. USV analysis is ongoing.

Locomotor Results



Event					
Event					
Arena	ID	From	To	Length	
2	66	1'58"	2'00"	2.0	Mouse 1 m
2	67	2'01"	2'03"	2.2	Mouse 1 m
2	58	1'46"	2'08"	22.3	Ar
2	65	1'55"	2'09"	13.8	Mouse 1 mo

Locomotor Results



The above figure shows locomotor results during the course of the experiment. Sign and goal trackers did not differ in their overall locomotion throughout the experiment. This confirms that the USV production is likely not a by-product of locomotion.

Conclusions

From these preliminary studies, we conclude that exposure to cocaine does indeed lead to increased USV production by sign trackers, in comparison to goal trackers.

Future experiments will examine whether USV production in response to cocaine will predict performance in PCA.

Implications

Individuals that tend to approach reward cues show differences in drug addiction-related risk behaviors. USVs may serve as a potential biological marker for predisposition to addiction in an animal model, and will ultimately help in finding a similar one in humans.

Acknowledgements

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