

Altering the gain of the infralimbic to accumbens shell circuit alters economically dissociable decision-making algorithms

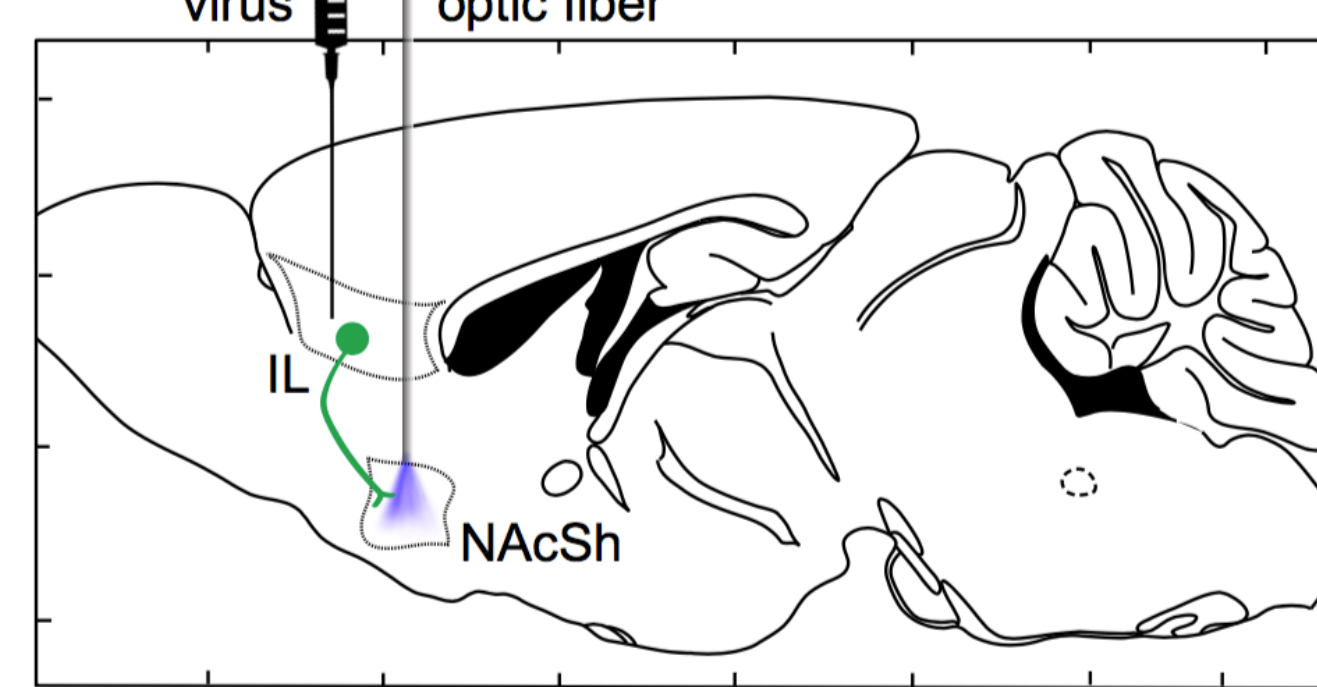
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Background

- Recent theories in neuroeconomics suggest that decisions made in different situations arise from distinct valuation functions residing in separable neural circuits.
- It can be difficult to behaviorally segregate these parallel information processing algorithms using simple behavioral paradigms.
- Furthermore, current circuit dissection experiments often disrupt endogenous neural signaling and provide little insight into the functional consequences of synaptic remodeling on information encoding – changes often observed in neuropsychiatric disorders.
- Here, we explore how the gain of a specific circuit impacts distinct aspects of decision-making information processing.

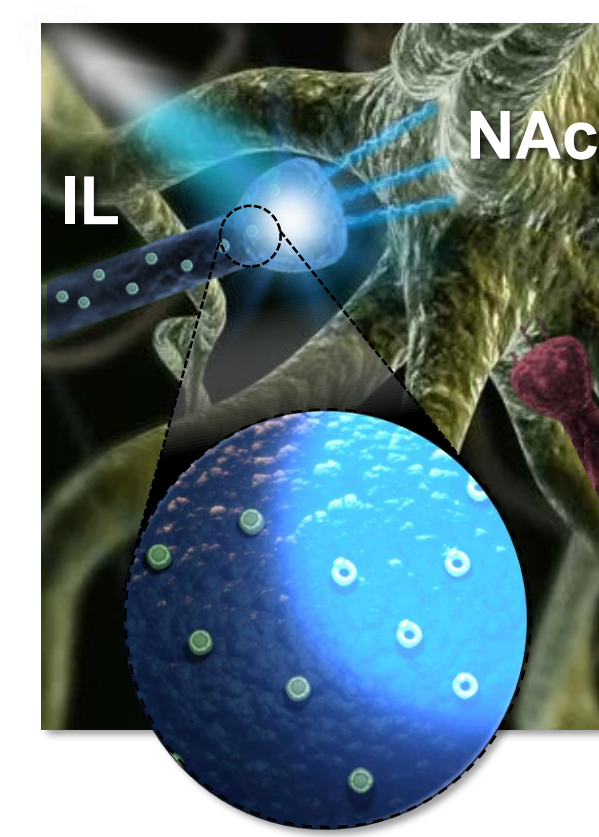
Methods

Optogenetics



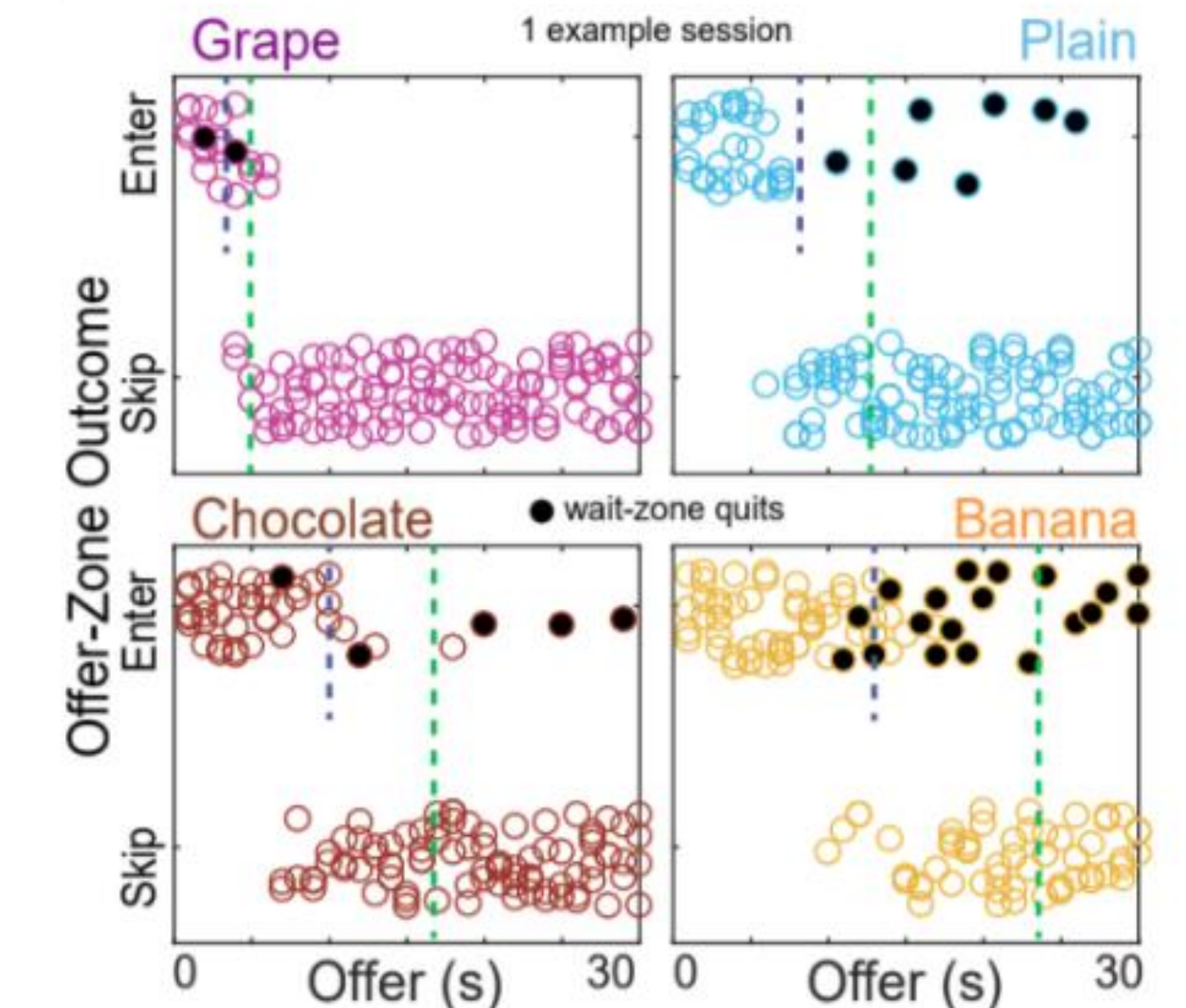
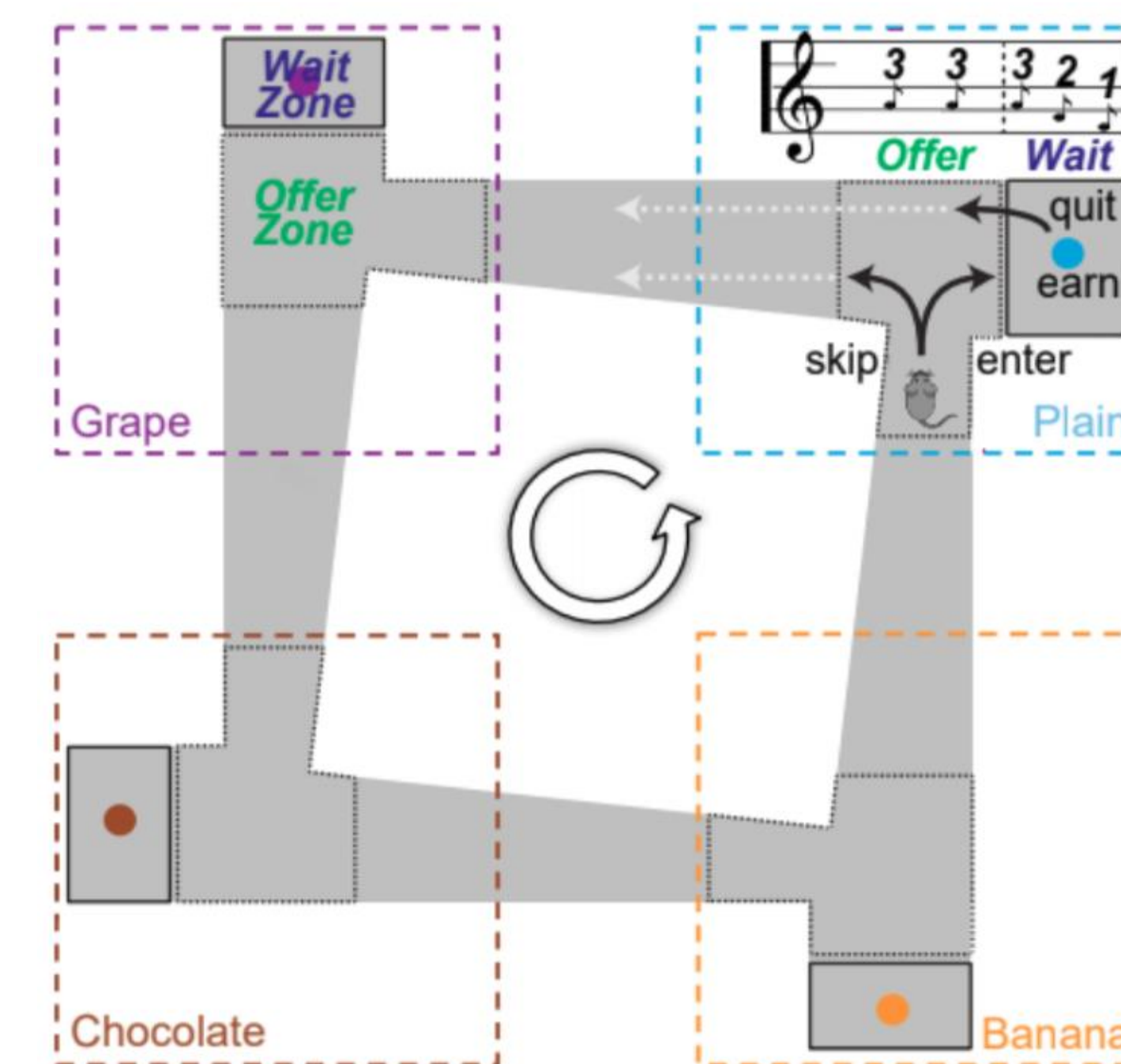
Plasticity-inducing stimulation (10Hz) was delivered “off-line” outside of behavioral testing

AAV2-CaMKIIa-Chronos-EYFP was injected into the IL of 30 C57BL6J mice



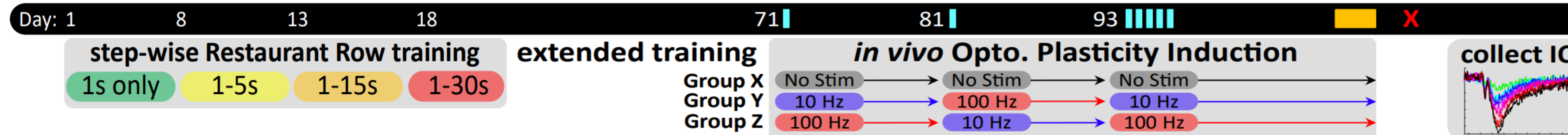
Restaurant Row

Behavioral task that distinguishes deliberative and foraging decision-making processes.



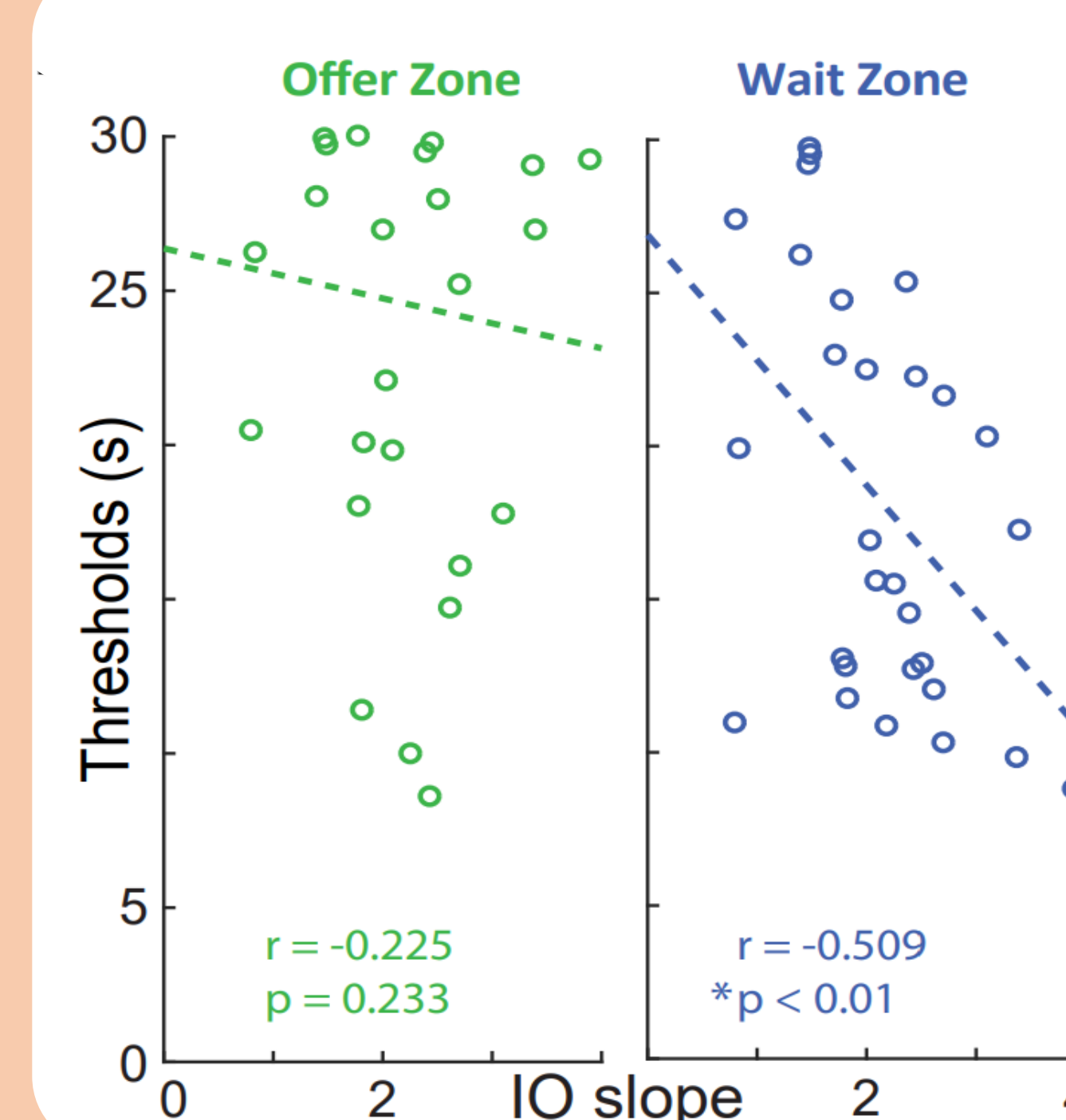
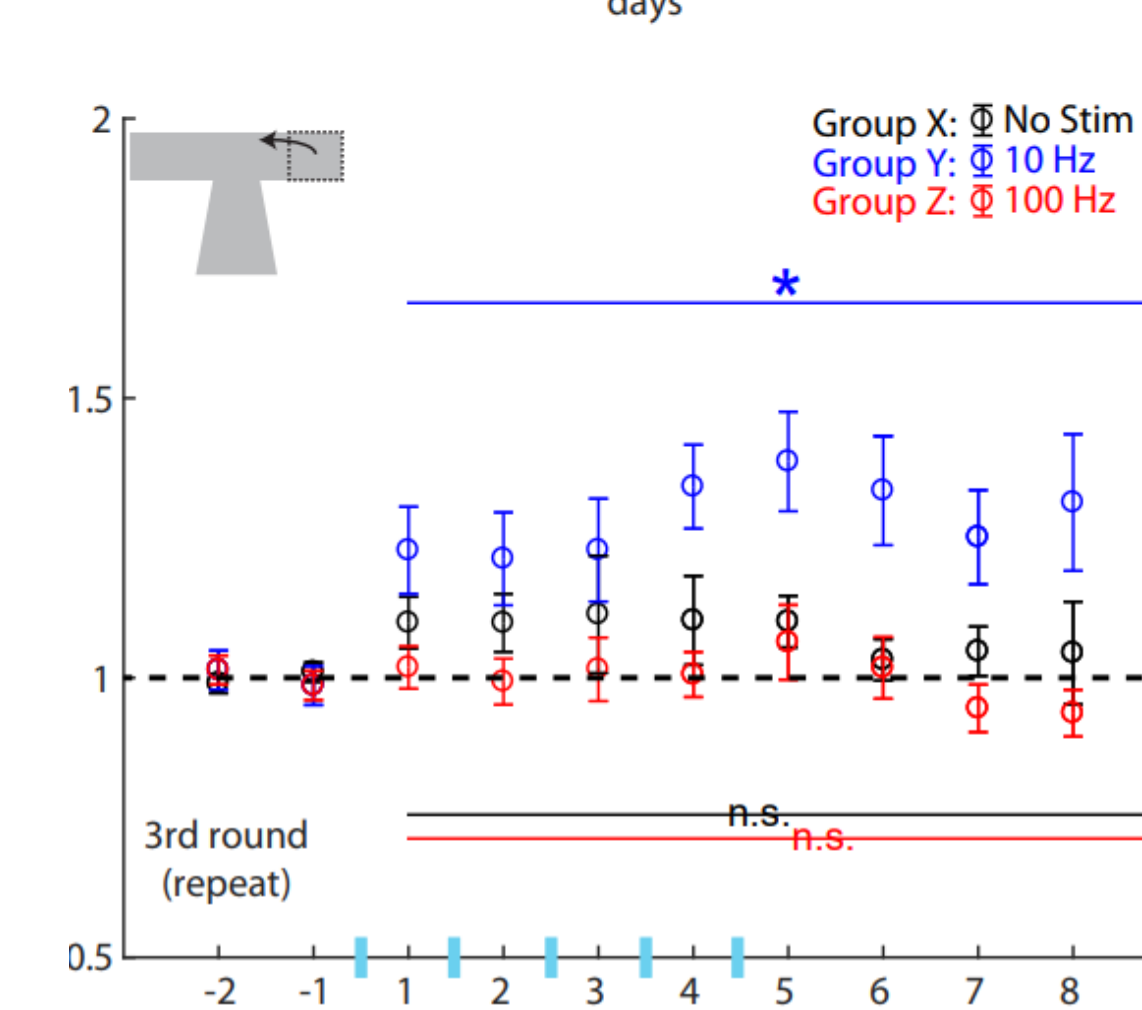
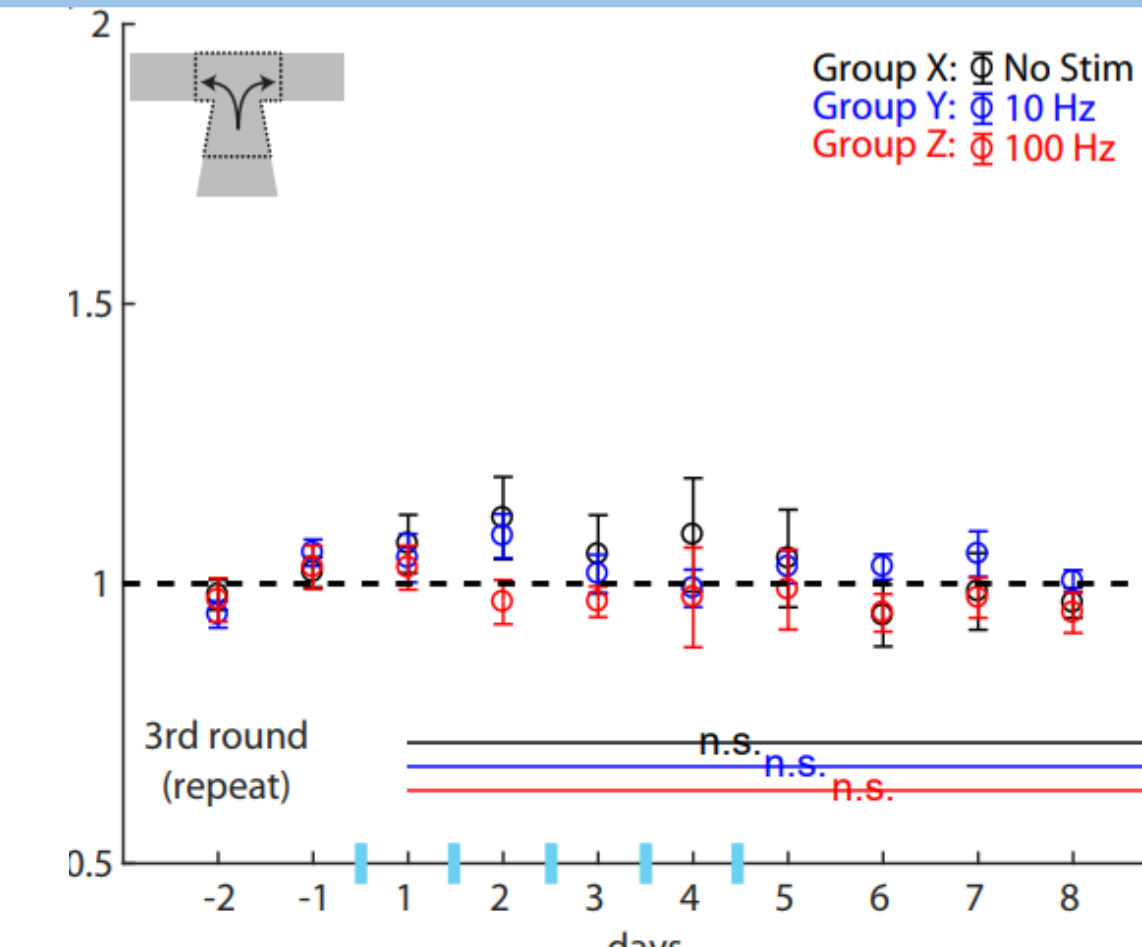
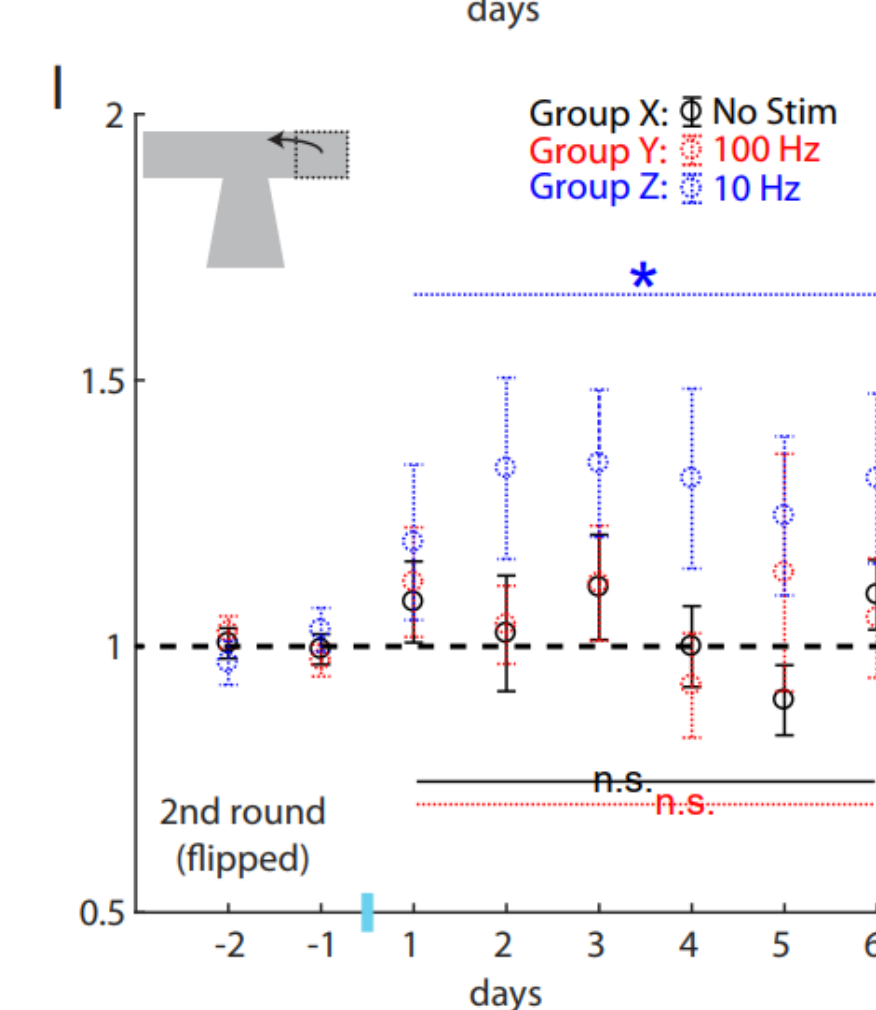
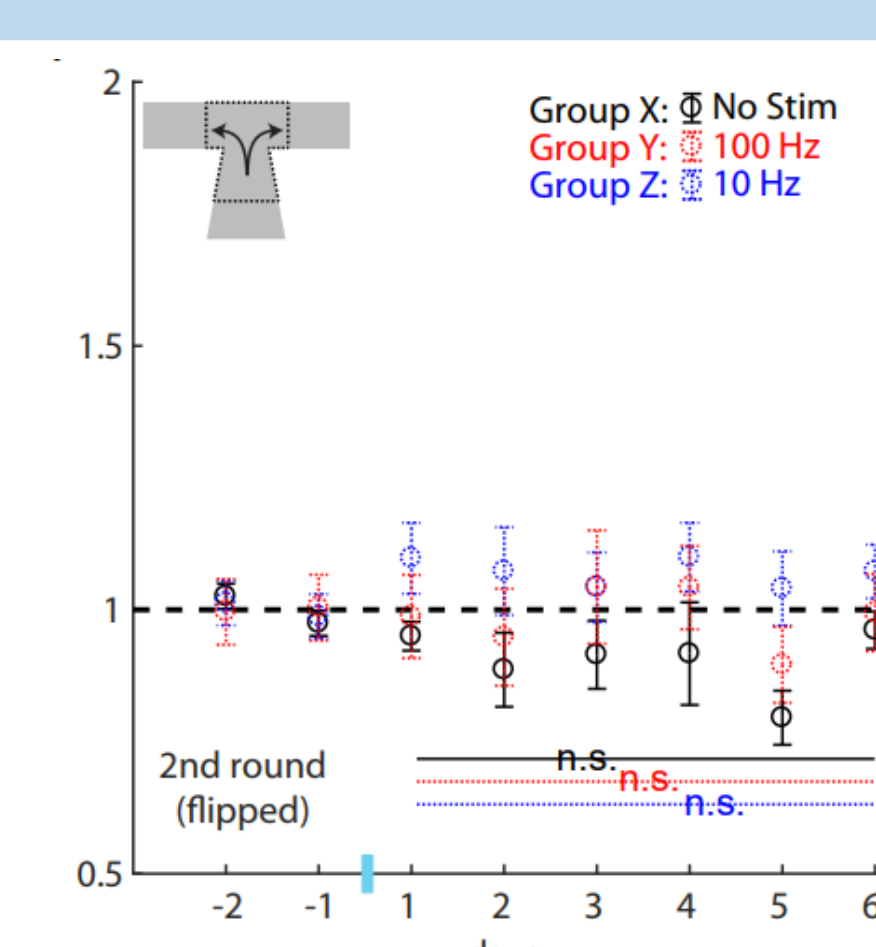
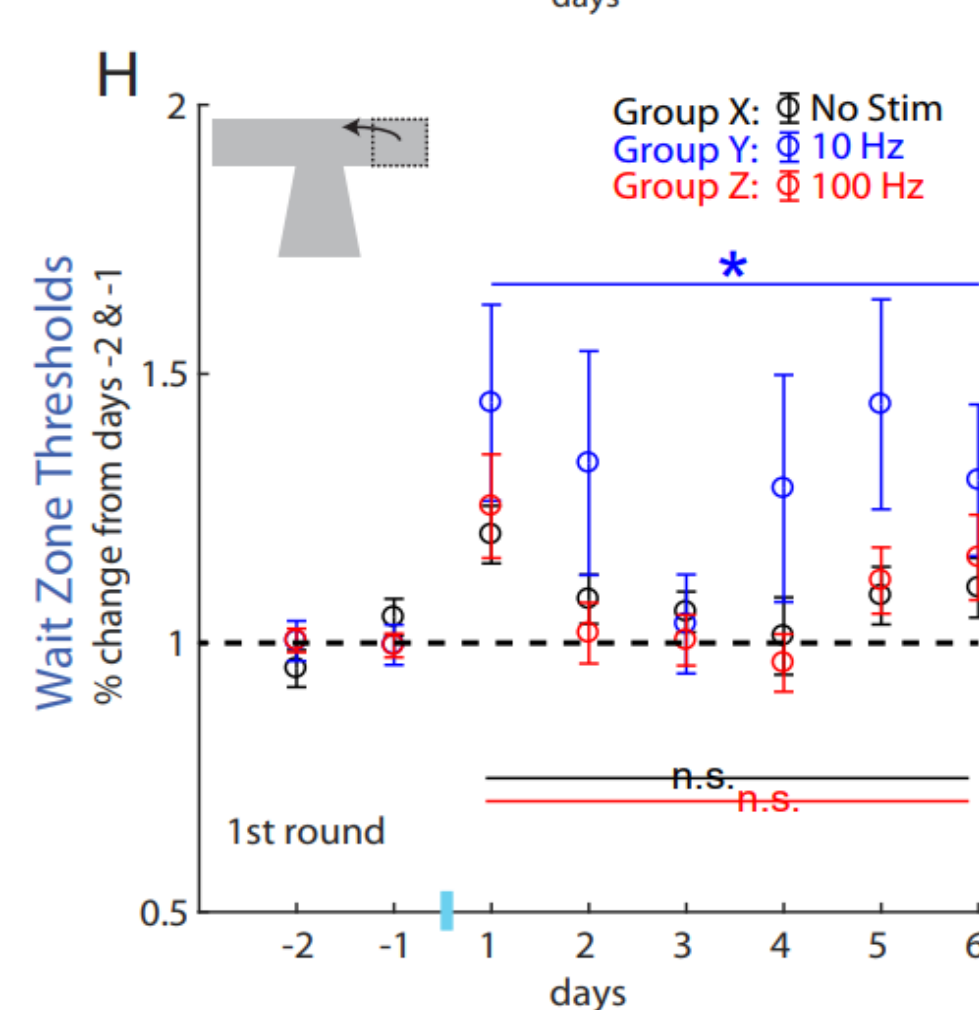
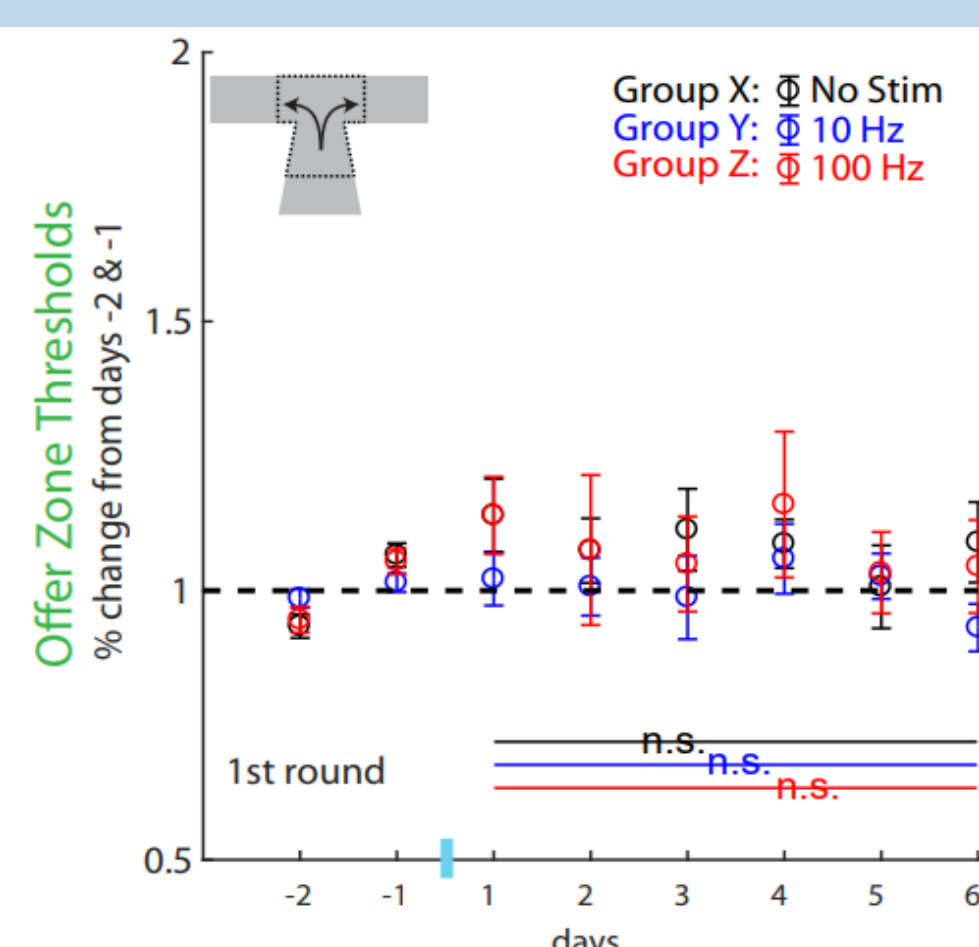
Value for each reward is quantified in two distinct stages of decision-making

Results



10hz stimulation significantly raised thresholds in the wait zone, but had no effect on offer zone thresholds.

Importantly, manipulations were made “off-line” outside of behavioral testing and had lasting effects



Strength of IL-NAcSh circuit explains individual differences in foraging but not deliberative valuations

Similar synaptic remodeling of the IL-NAcSh circuit is observed in mouse models of relapse

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