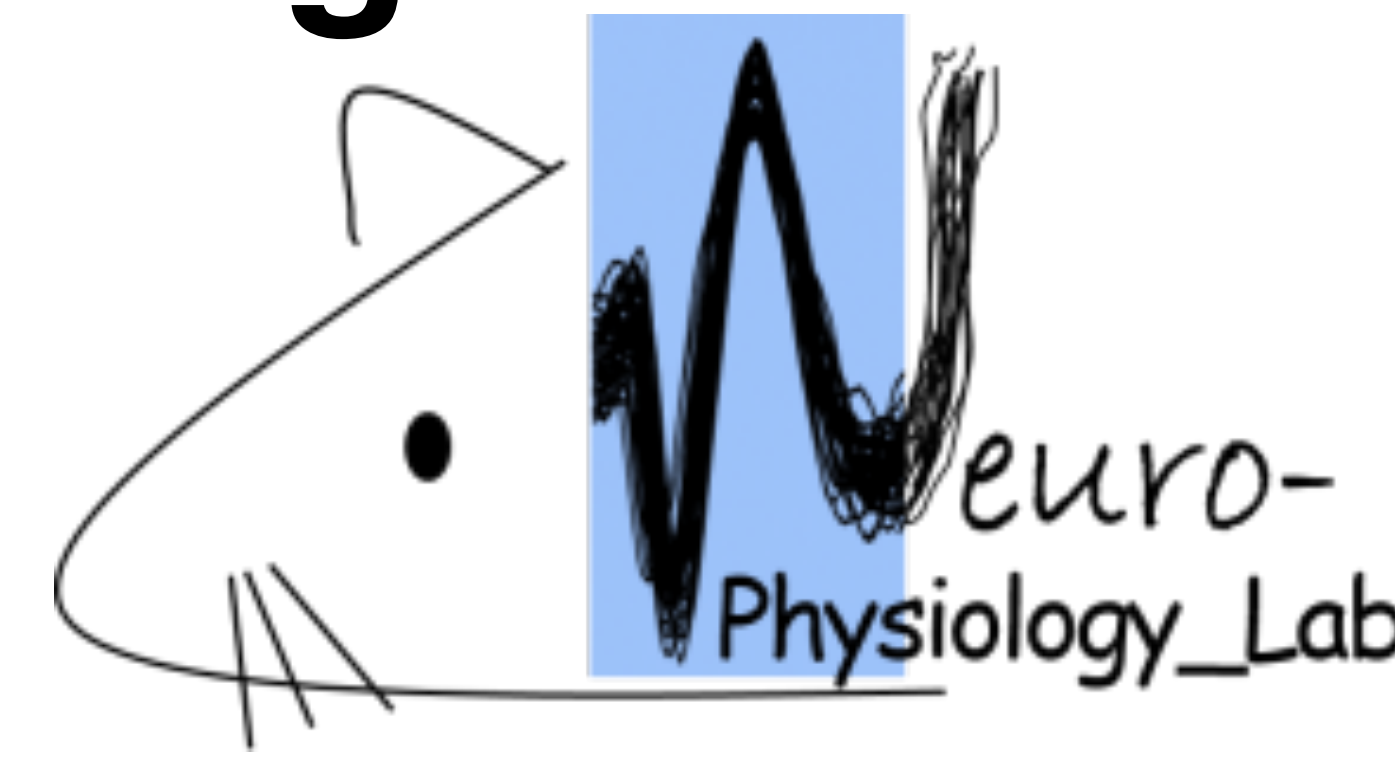




Effects of intermittent episodes of social stress on reward-seeking and avoidance behaviors

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INTRODUCTION

Repeated social stress changes brain function and behavior, which may lead to the development of substance abuse disorders. Previous studies focused on the reward system and suggested that social stress alters motivation and reward-seeking behavior. However, little is known about whether social stress alters the processing of aversive events that drives avoidance behavior. This study aims to investigate whether repeated social stress changes reward-seeking and avoidance behavior.

METHODS

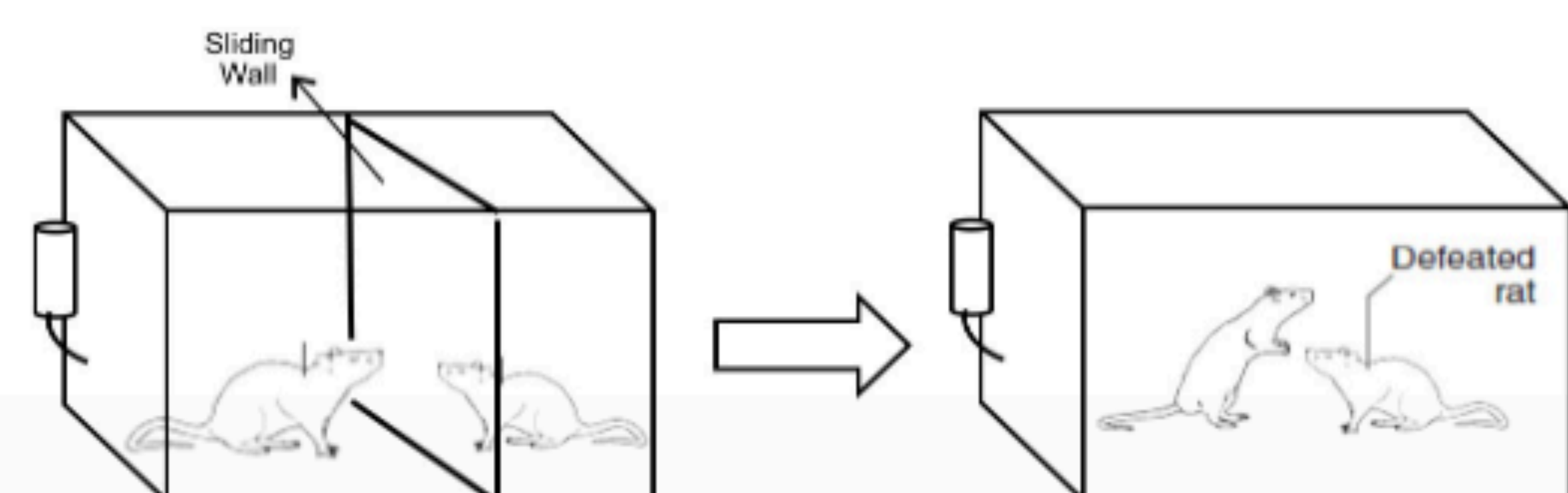
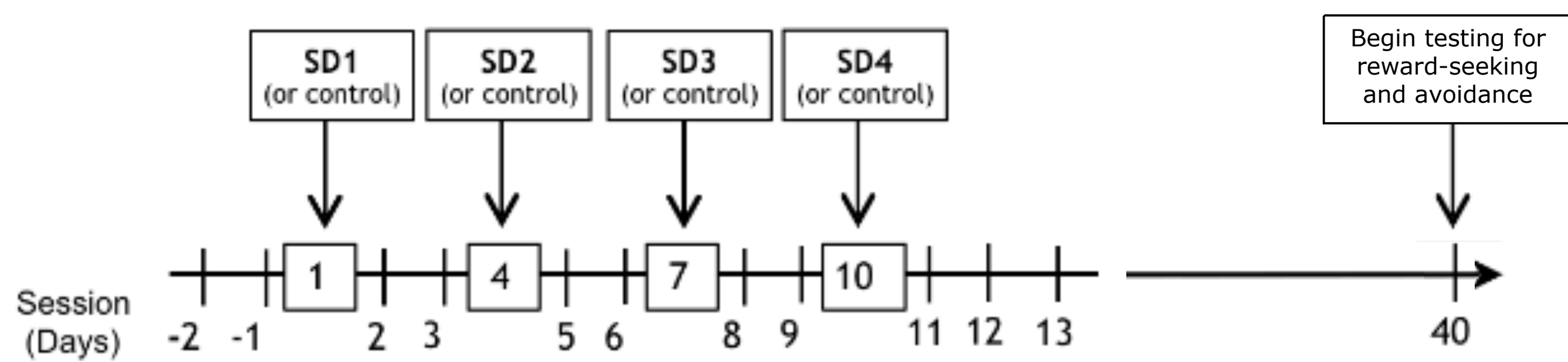
Experimental Procedure: Fifteen male Long-Evans rats were food-restricted and separated into two groups, Stress (n=7) and Control (n=8), and were exposed to intermittent social defeat stress or handling (see below).

Repeated Intermittent Social Defeat Stress (Figure 1): The Resident-Intruder paradigm consists of housing a larger male rat (resident) with a female rat in a big cage (45 x 61 x 61 cm) for two weeks before stress begins. Then, every stress episode goes as follows: first, the female rat is removed from the resident cage; second, the "intruder" is placed into the resident's cage with a clear dividing wall that allows them to see each other without physical interaction for 10 minutes; third, the wall is removed allowing the rats to interact physically. The interaction ends immediately after a bite, the intruder spends more than 5 seconds in a supine (on their back) position, more than 6 attacks are observed, or 5 minutes had passed. Control rats are taken to a separate room for the same amount of time and handled by researchers for 5 minutes. Fourth, the dividing wall is set again to separate both rats for 10 more minutes. Finally, intruders are returned to their home cages.

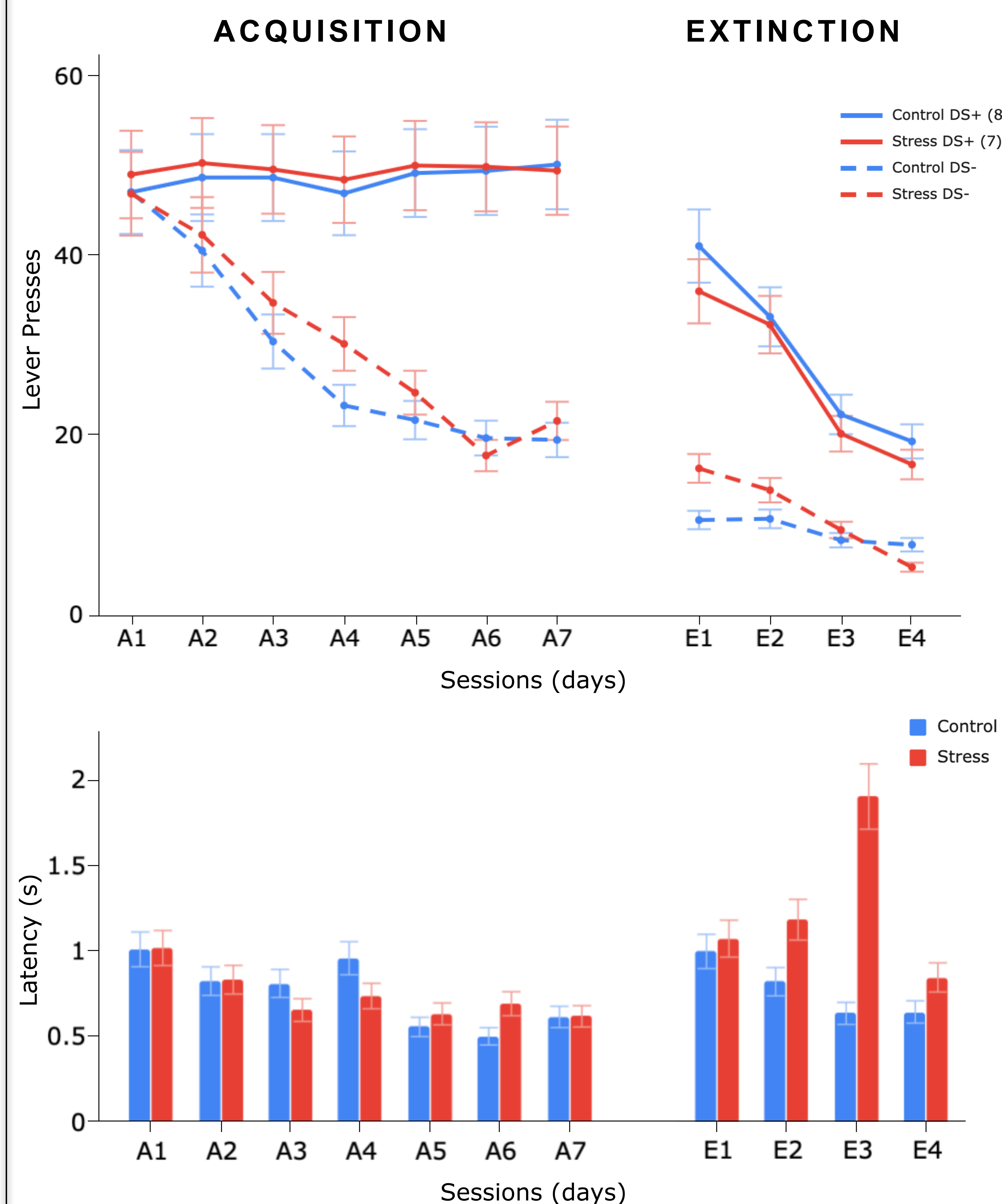
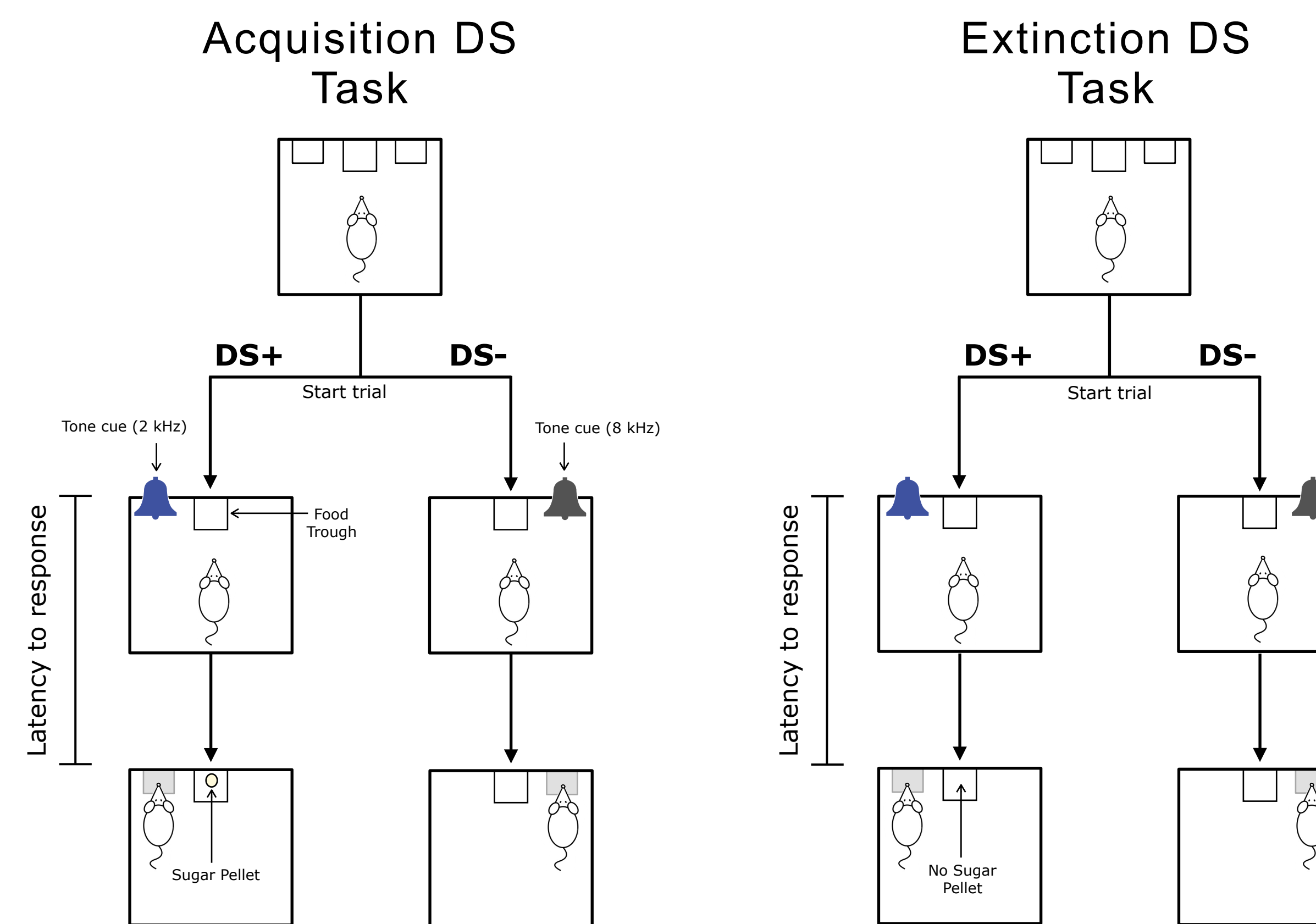
Reward-seeking behavior: Discriminative-Stimulus Task: One month after the last stress episode (SD4), the rats were trained and tested in a discriminative-stimulus (DS) reward-seeking task (Figure 2). The DS task required the rats to engage in or withhold responding on a trial-by-trial basis, depending on a specific stimulus. Rats were trained to discriminate between a reward and non-reward stimulus based on a cue (tone) as well as a specific lever (i.e., right or left) to earn a sugar pellet. After stable performance, the rats were trained in the extinction protocol in which responses to both the reward and non-reward lever did not produce an effect. Every session consisted on 50 trials with 30 s inter-trial interval.

Avoidance behavior: Escape-Avoidance task: After extinction of the DS task, the rats were trained in the Escape-Avoidance task, using a 95 dB white noise as the aversive stimulus (Figure 3). The avoidance training consisted of having the opportunity to avoid or escape the aversive stimulus predicted by a cue (tone) and a specific lever (i.e. right or left). After the cue the rats had 10 s to avoid the aversive stimulus by pressing the lever (avoidance response). The lack of avoidance response triggered the aversive stimulus for 15 s. However, the rats could stop it by pressing the lever (escape response). Every session consisted on 50 trials with 30 s inter-trial interval.

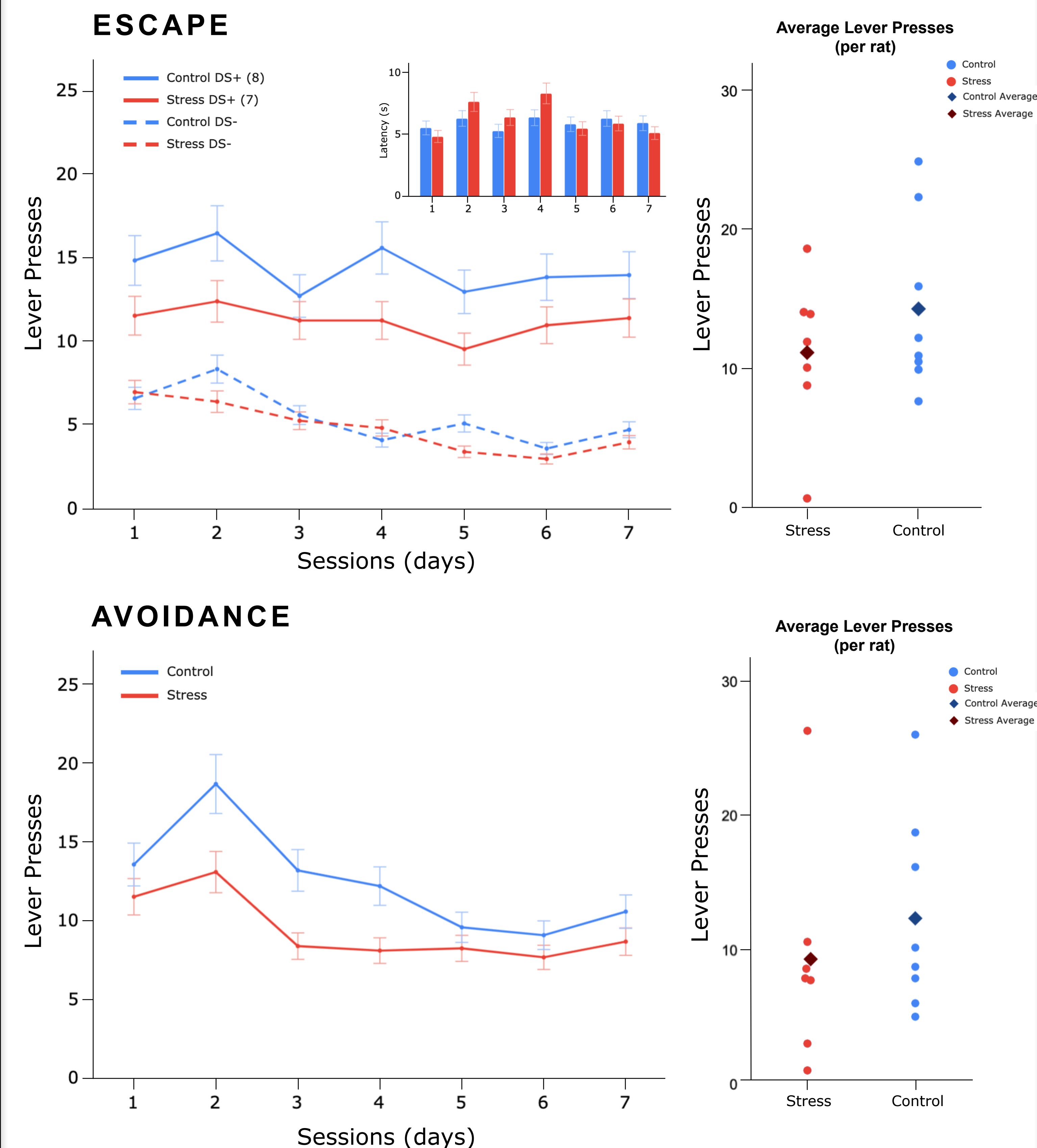
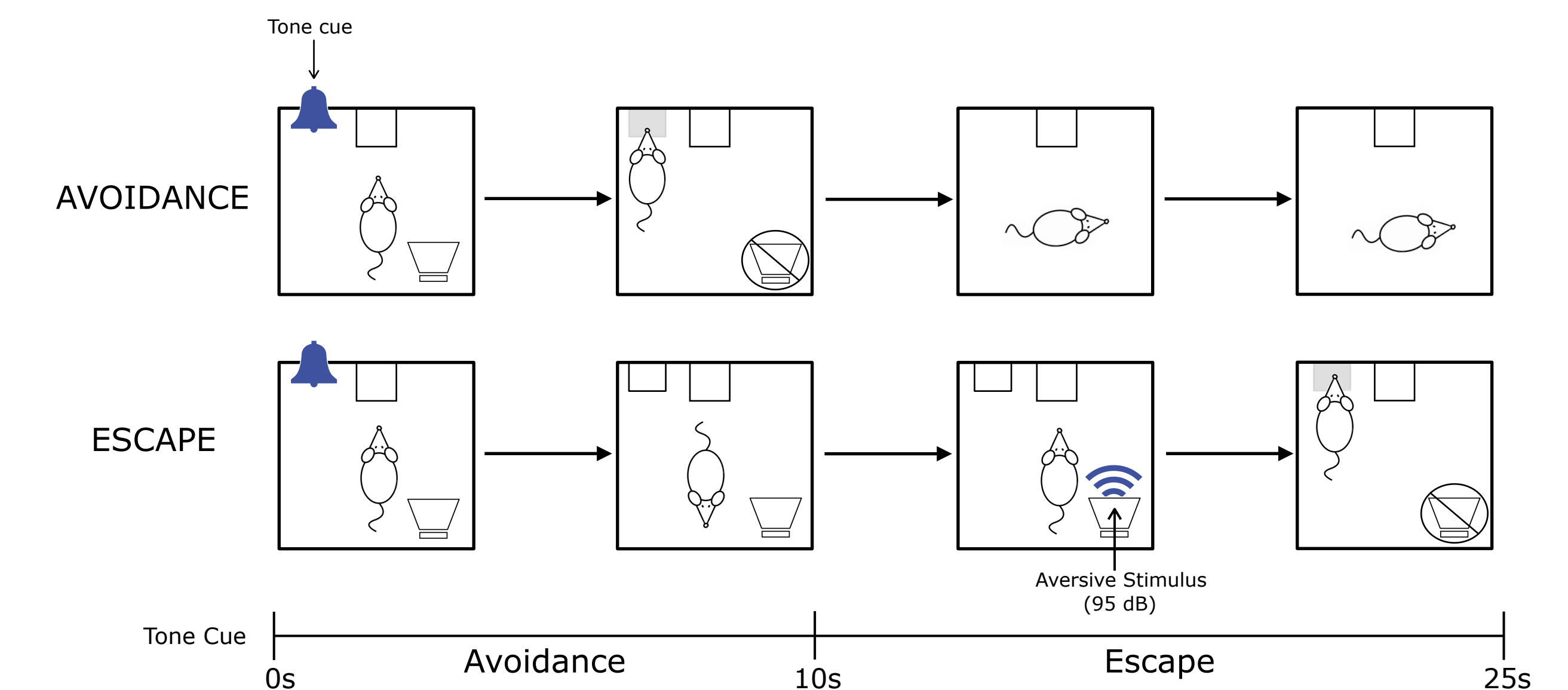
1. Intermittent social defeat stress protocol



2. Social stress does not change the acquisition and extinction in the Reward-Seeking Task.



3. Social stress does change avoidance behavior in the Escape-Avoidance Task.



CONCLUSION

- Intermittent episodes of social stress did not change the acquisition or extinction in a reward-seeking task.
- In contrast, stressed animals tended to show less avoidance and escape responses compared to control animals. These preliminary results suggest that episodes of social stress produces long-term effects on the brain processing of aversive stimuli.