

Touchscreen cognitive testing in rodents



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BACKGROUND:

Touchscreen-based systems are designed to reduce the 'translational gap' between preclinical research and clinical application because the tests for rodents and humans are designed to be as similar as possible. Sleep quality and quantity affect cognitive functions. To help progress our understanding of the connection between sleep and cognition, we are using a touchscreen-based testing system. Our study aims to test the effect of acute sleep deprivation on the performance of mice on the Trial-Unique Nonmatching-to-Location (TUNL) task.

METHODS

- 12 mice (6 male, 6 female) being trained on TUNL task in Touchscreen Cognition Testing Chambers.
- Sleep deprivation will be induced on the mice by gently poking with a paintbrush when sleep-like behaviors are observed.
- Performance on the TUNL task will be compared before and after 24 hours of sleep deprivation.

EXPECTED RESULTS

- We are expecting to see decreased performance following sleep deprivation.

DISCUSSION

- This study will help researchers understand how specific aspects of sleep affect cognitive performance. Future studies will assess the link between sleep disorders, Alzheimer's disease (AD), and cognitive functions in AD mouse models.

Touchscreen-based testing chambers to study the effects of sleep deprivation on pattern separation.

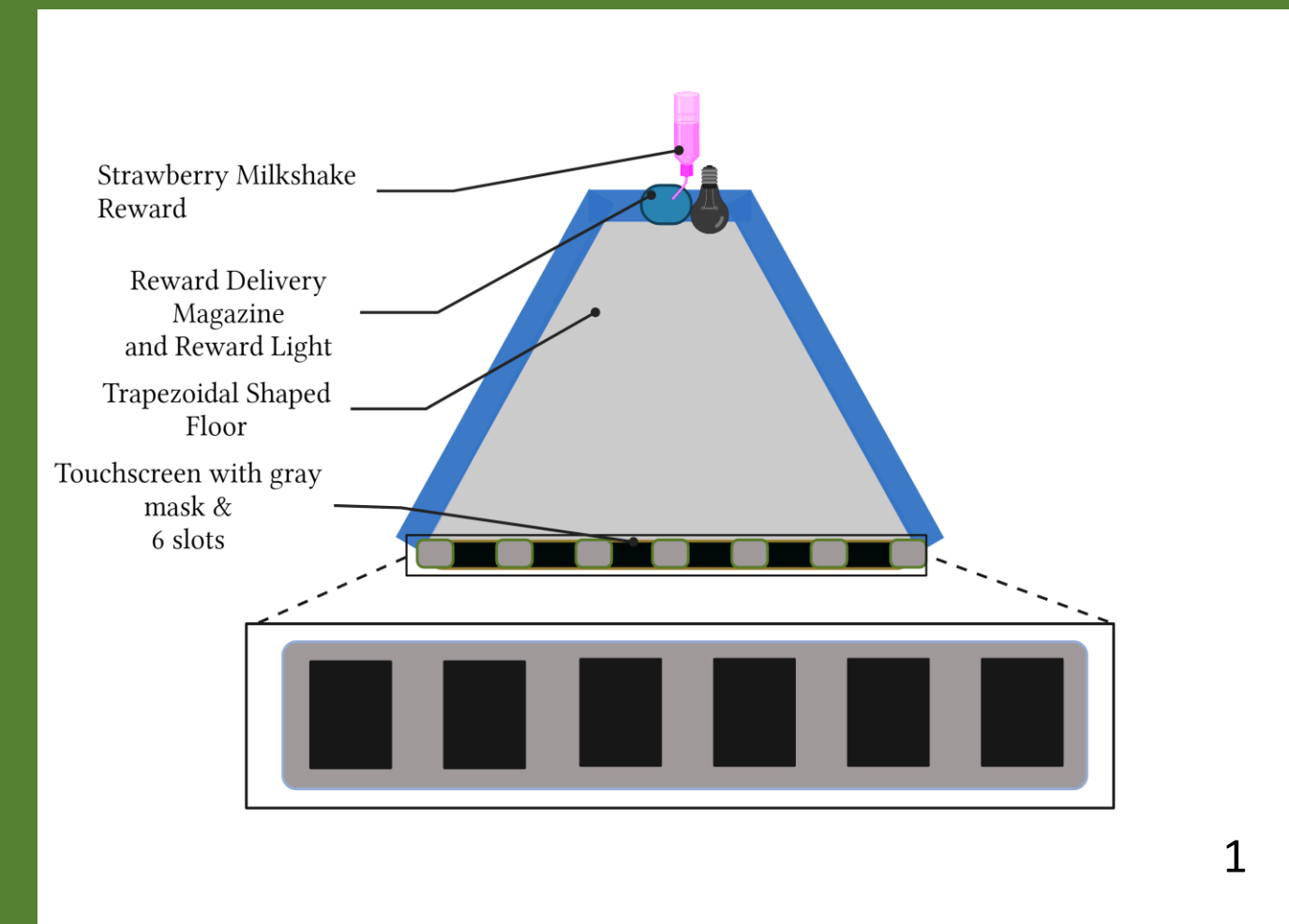


Fig. 1: Touchscreen chambers are trapezoidal-shaped chambers with a Touchscreen on the larger edge and a reward magazine and light on the smaller edge.

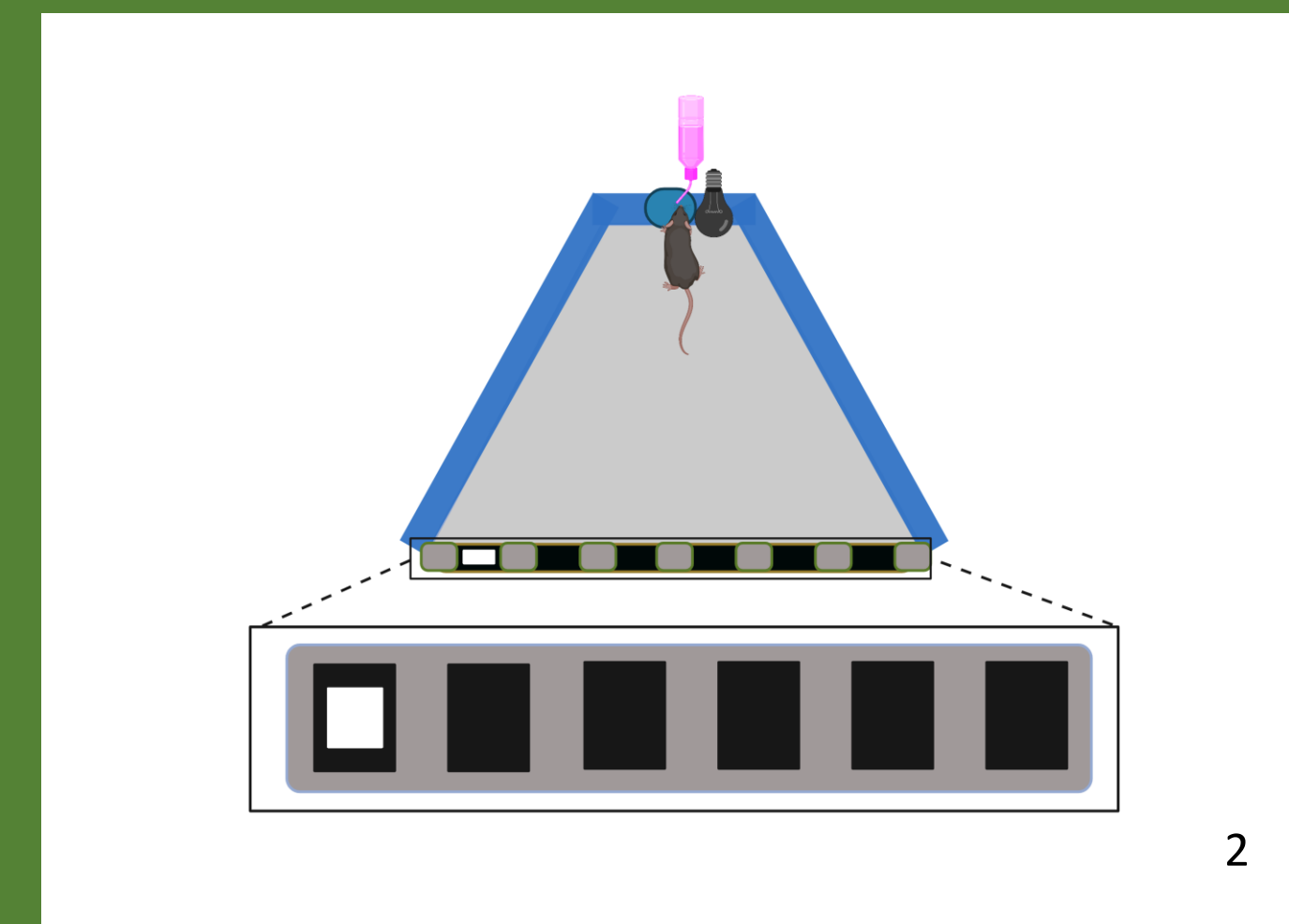


Fig. 2: Mouse needs to initiate trial by breaking Reward Magazine Infrared Beam.

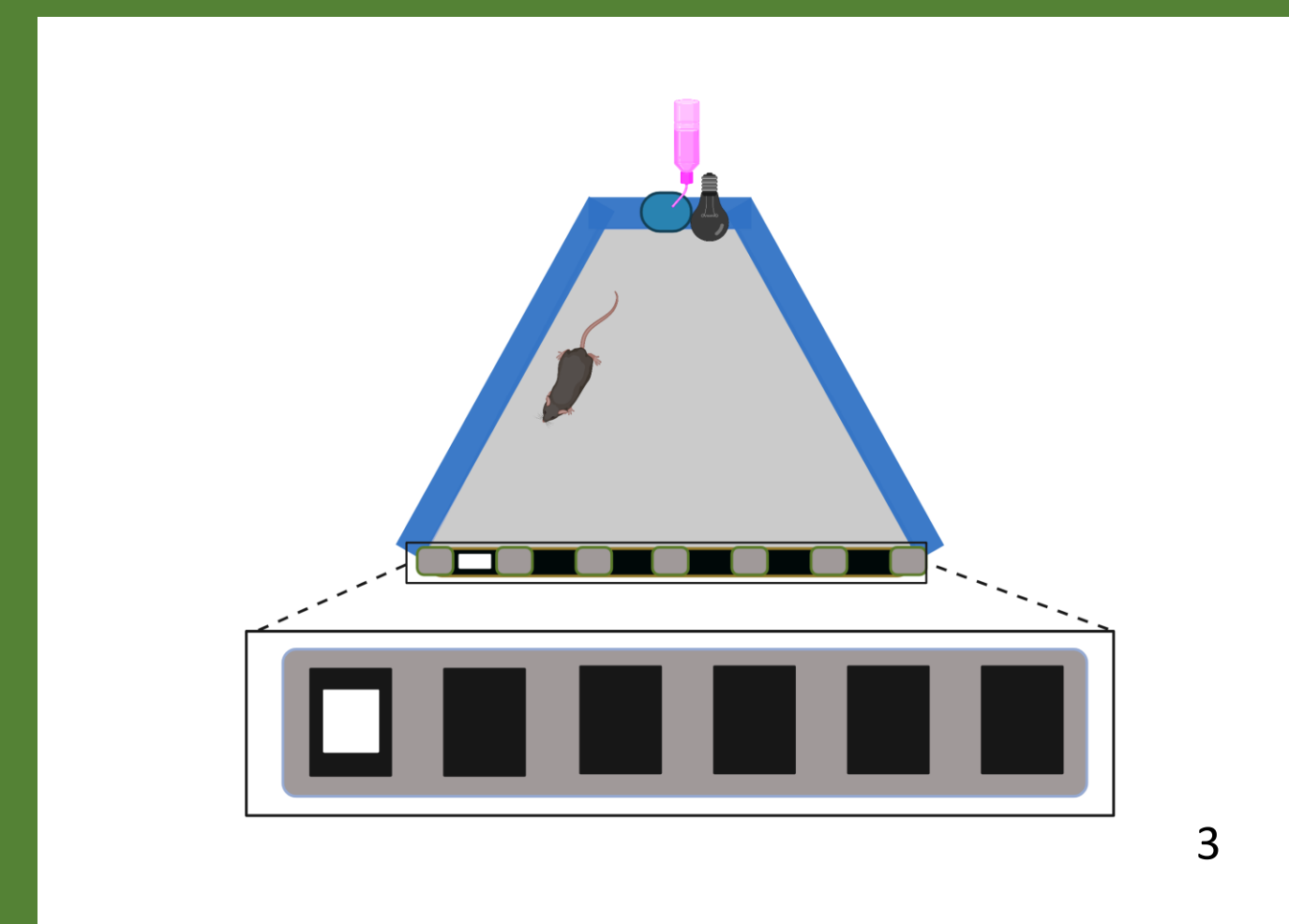


Fig. 3: After initiating the trial, sample image appears.

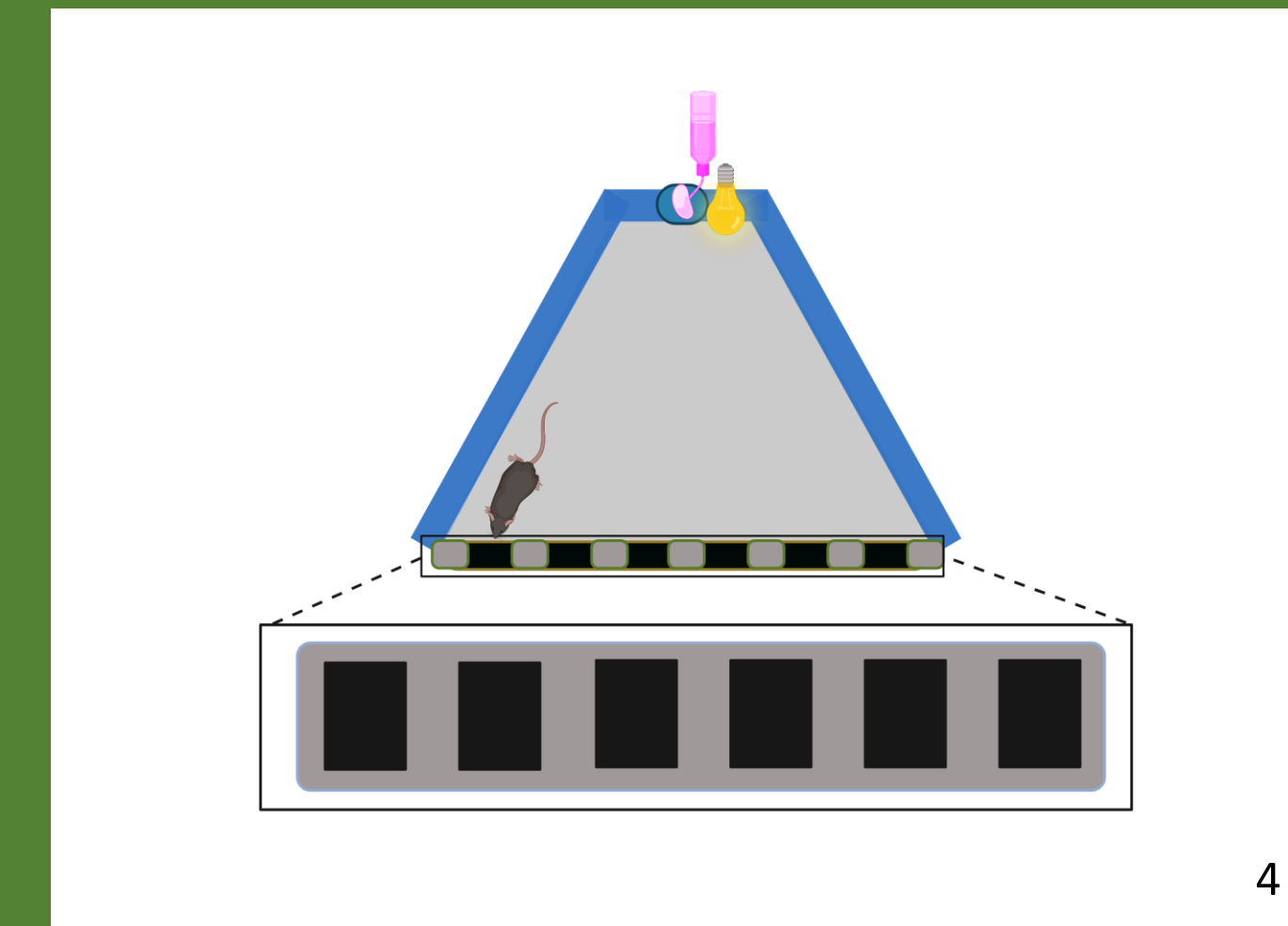


Fig. 4: Once mouse touches or nose-pokes the sample image, milkshake reward delivered on reward magazine accompanied by reward light.

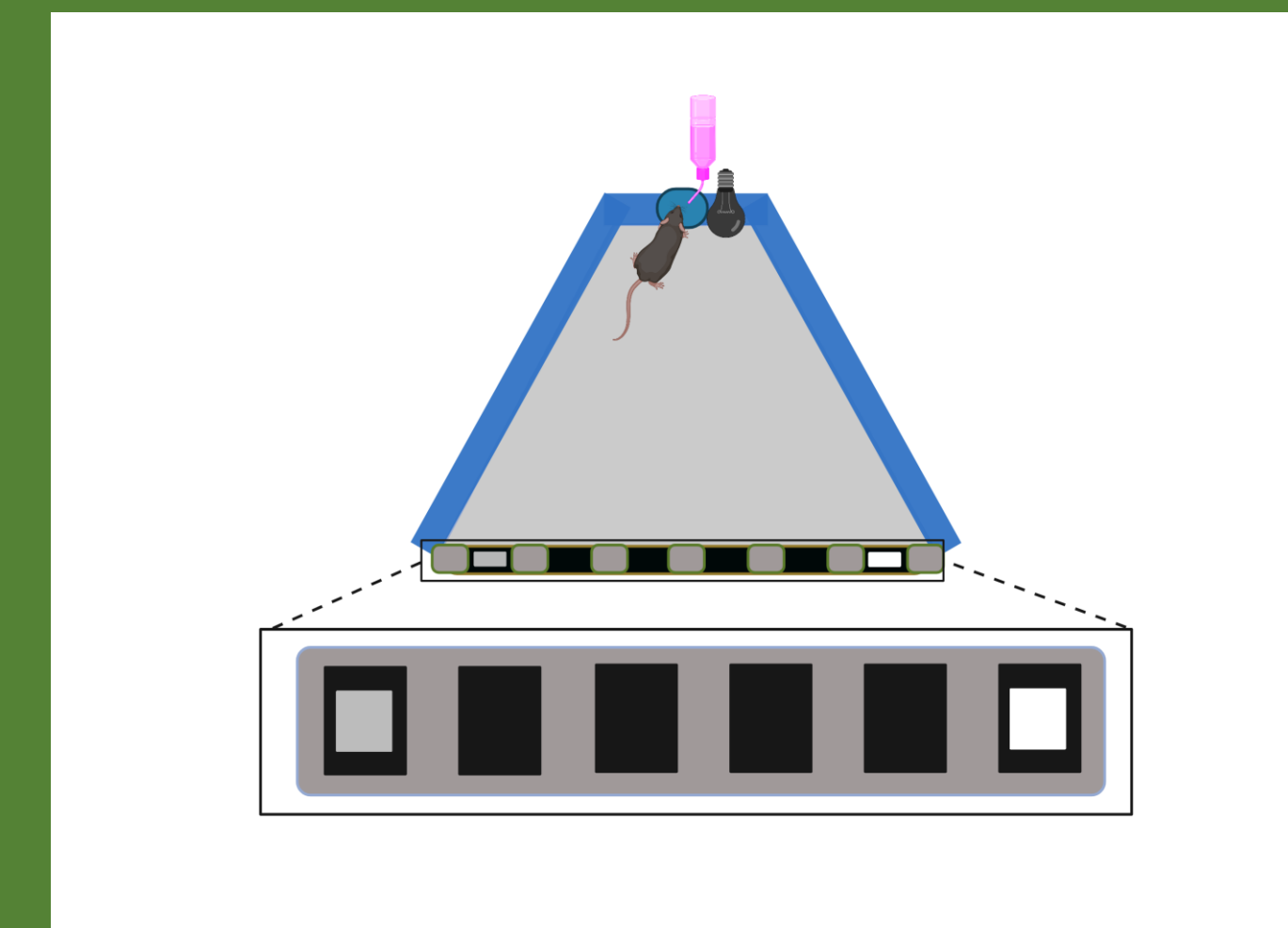


Fig. 5: After the mouse gets the sample reward, both sample and trial images appear. In cued TUNL, trial images have more brightness compared to sample images.

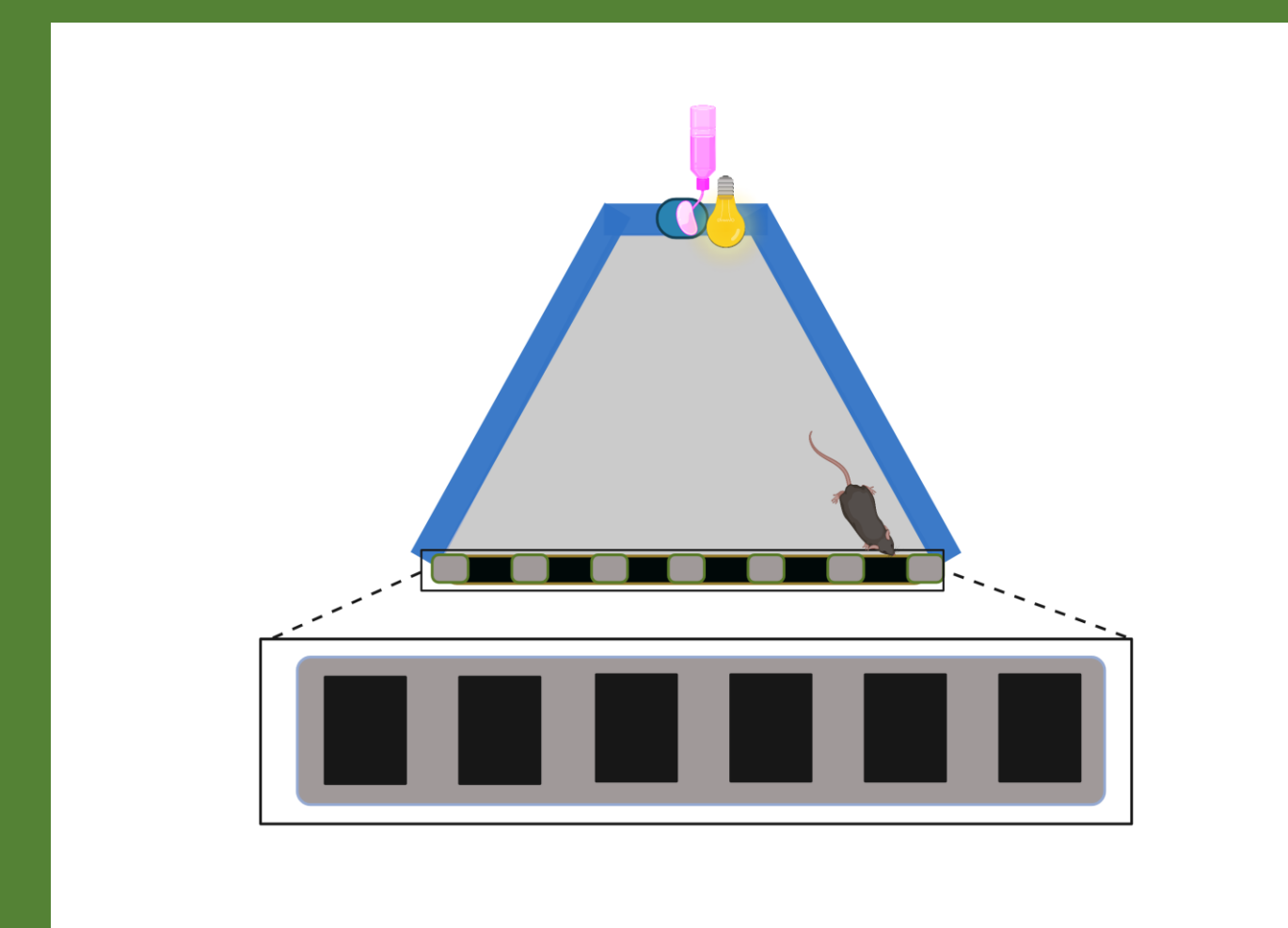


Fig. 6: If mouse touches/nose-pokes the correct image, which is the novel image, trial ends. Otherwise, a correction trial begins where the mouse needs to wait for a while before the same images appear.

TUNL Task and Pattern Separation:
TUNL task is used mainly to test 'pattern separation'. Pattern separation is a process that is important for discriminating between similar memories

Advantages of Touchscreen Platforms:

- ❖ Less stressful for animals
- ❖ Automated and expedited testing
- ❖ Increased standardization and precision
- ❖ Allow for a blend for different methodologies
- ❖ Minimize contact between animals and researcher.
- ❖ Positive rewarding
- ❖ Flexibility and manipulation ability
- ❖ High translational potential

References:

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