

# An Examination of the Relative Salience of Internal and External Instrumental Occasion Setters

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## Introduction

- Occasion setter (OS): a stimulus that signals the relationship between a response and an outcome - can be external or internal (Arnold, 1991).
- External OS: Prior study showed rats could learn that reward was given for choosing one arm of a T-maze at one time of day and the other arm at a different time of day (Means, 2000).
- Internal OS: Prior study showed that a morphine drug state could signal the relationship between a flavored drink & gastrointestinal upset in rats (Skinner, 2000).
- Such results suggest that both internal & external cues can “set the occasion” for the nature of the relationship between a response and outcome. **The current study sought to determine the relative effectiveness of internal & external cues in an appetitive maze task.**

## Apparatus

Round 4' children's swimming pool filled with 3" corn cob bedding. FruitLoops® (FL) were used as the reward. Crushed FL were interspersed in the bedding to mask odor cues. The maze was divided into four equal quadrants by “drawing” lines in the bedding by indenting the surface. **A small rotating disco ball served as the external OS, while 5mg/kg morphine injected subcutaneously 30 min prior to training served as the internal OS.** Posters on the walls provided spatial cues for animals to navigate the maze (Figure 1).

Figure 1. Experimental Room setup



## Subjects

- Twenty-eight Long Evans female rats weighing 155-273g at start of experiment
- Kept in individual cages in colony room on a 12/12 light/dark cycle with water available ad libitum.
- Fed daily to maintain 85% of free feeding weight.

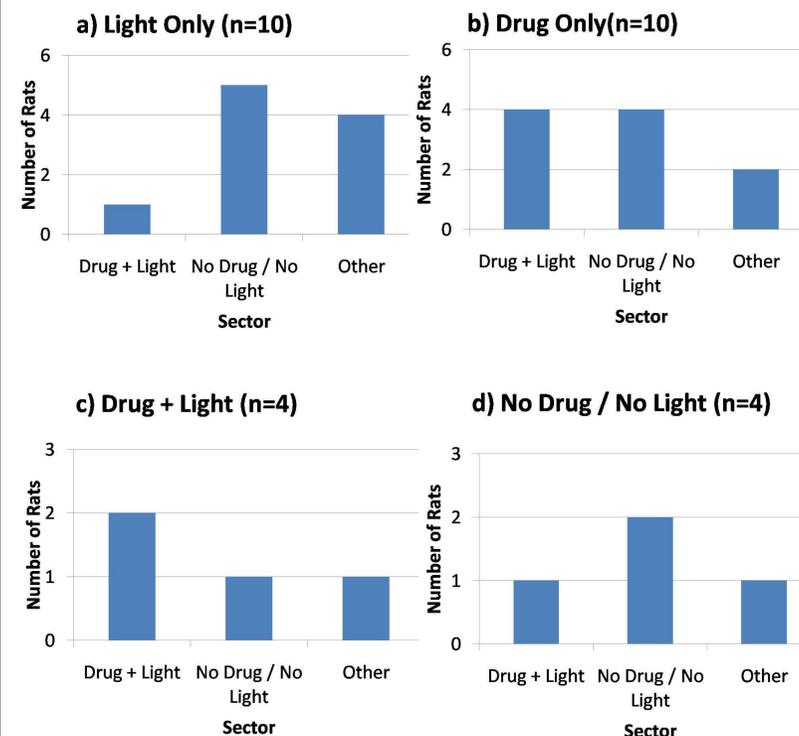
## Training

- Rats were trained to dig in the bedding for FL. Training involved 16 training sessions with 3 trials per session. Trials lasted 3 min or until half the reward was found & consumed. On initial trials FL were visible, but were buried progressively deeper until completely covered after 6 sessions.
- Training involved 8 sessions in the presence of both OSs and 8 in the presence of neither OS. Location of the FL depended on the presence or absence of OSs.
- Trials were randomly intermixed.

## Testing

- At test, rats were divided into the following groups based upon the presence or absence of the OSs during testing:
- Group Light only (n=10): Tested in presence of light only
  - Group Drug only (n=10): Tested in presence of drug only
  - Group Drug + Light (n=4): Tested in presence of Drug & Light
  - Group NoDrug/NoLight (n=4): Tested in presence of neither OS.
  - The Dependent Variable was the quadrant visited first during test.

Figure 2. First quadrant visited in the four testing groups.



## Results

Chi Square Goodness of Fit Tests were performed for all groups for the quadrant first visited data:

- Light Only:  $\chi^2(3, n=10) = 4.4, p > 0.05$  (Fig. 2a)
  - Drug Only:  $\chi^2(3, n=10) = 6.8, p < 0.1$  (Fig. 2b)
  - Drug + Light:  $\chi^2(3, n=4) = 2, p > 0.05$  (Fig. 2c)
  - No Drug / No Light:  $\chi^2(3, n=4) = 2, p > 0.05$  (Fig. 2d)
- Results were not significant at 0.05 level.

## Discussion

- Results showed no significant differences between groups.
- In the Light Only group there was a trend toward selecting the sector associated with the drug state at test that was significant at 0.1 level, which suggests that internal cues might overshadow external cues using a more liberal rejection criterion.
- Further research is needed, including larger sample sizes
- Modifications will be made to the sand maze task including:
  - (1) Corn cob bedding will be replaced with play sand, as bedding is more porous and might allow animals to use olfactory cues to navigate the maze
  - (2) The starting point in the maze will be varied during training trials to ensure that rats use extra-maze cues to navigate the task rather than directional cues.
  - (3) More training trials to ensure that the task has been adequately learned.

## References

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