RAPC Chamber

Paradigm Example

Revision 2.10

9/15/2004

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RAPC Paradigm Example Summary

The RAPC system is a positive reinforcement-based operant paradigm that has alternating Performance and Learning components during each experiment session, with different auditory stimuli signaling which component is currently in effect. During the Performance component, the sequence of door openings remain constant leading to the reward, while during the Learning component, subjects are required to learn a new sequence of door openings leading to the reward for each new experiment session. This unique system allows the experimenter to evaluate learning versus rote performance on a within-subject and within-behavioral test session basis (Brooks et al. 2000).

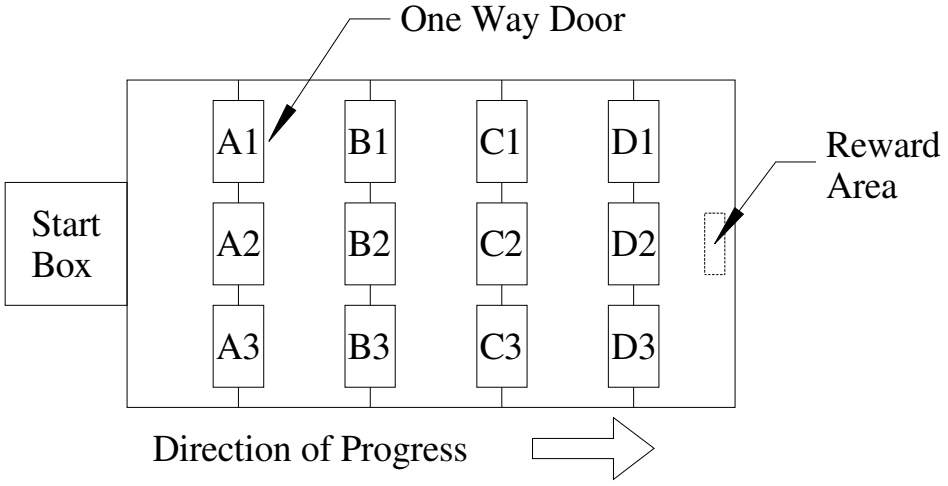
Pre-Experiment Protocol

Saccharin Habituation: (Two Days)

- Prior to introducing mice to the RAPC for the first time, deprive mice of water and habituate to 0.2% saccharin solution for 30 minutes, twice a day for 2 days, after which provide regular drinking *ad libitum.*

Habituation: (Four Days)

- Give mice four apparatus habituation sessions (one session per day), each lasting 20 minutes and all followed by a 12 to 16 hour water deprivation.
- During each of the four habituation sessions, allow mice to freely explore the chamber in which they can consume saccharin drops that are placed as follows in the chamber:
    - Day 1: in front and in back of all doors with all doors latched open
    - Day 2: in front and in back of all doors with all doors unlatched
    - Day 3: only in back of C & D doors with all doors unlatched
    - Day 4: only in back of D doors with all doors unlatched



RAPC Edit Program

- This program is used to prepare the experiment specifications, such as experiment name, desired sequences of performance and learning, white noise volume, door lock patterns, and inactivity time-outs.
- The experiment specifications are stored in RAPC Experiment Specification files with the extension .RAP.
- The specification files are used by the RAPC Experiment program to control the different experiments.
- See RAPC Users Guide for detailed instructions on use of RAPC Edit.

RAPC Experiment Program

- This program is used to control the experiment based on the specifications stored in the Experiment Specification files created using the RAPC Edit Program.
- Start the RAPC Experiment Program by double clicking the icon on the desktop.
- The single chamber version automatically assumes that Chamber 1 is used for the experiment.
- Open the desired configuration file by selecting the OPEN option under the File pull down menu.
- Fill in the remaining information to be stored with the experiment results.
- Perform the RAPC experiment.
- See RAPC Users Guide for detailed instructions on use of RAPC Experiment.

RAPC Experiment Overview

Each experiment session consists of 3 Performance components that alternate with 3 Learning components:

Performance Component

During the Performance component, the door sequence leading to saccharin remains constant during all three experiment sessions. White noise audio signal is played for the duration of the Performance component as a discrimination stimulus.

Learning Component

During the Learning component, subjects are required to learn a new sequence of door openings leading to the reward for each of the three experiment sessions. No audio is played during the Learning component.

- Precede all experiment sessions with a 12 to 16 hour water deprivation period.
- Perform the three experiment sessions on alternating days, with *ad libitum* water allowed on the non-test days (i.e. test M, W, F; non-test T and R).
- Each experiment session consists of three alternating sets of the Performance component and the Learning component.
- Separate each trial with 45 to 60 second intervals, cleaning chamber with Roccal-D between each trial.
- The RAPC Experiment program instructs the operator and collects all the timing data during the individual trials. At the end of the trials, additional information about the experiment may be added and saved with the experiment results.
- See RAPC Users Guide for detailed instructions on use of RAPC Experiment.

RAPC Experiment Protocol

- Start the RAPC Experiment Program.
- Load the desired experiment specification file created with RAPC Edit Program.
- Fill in additional experiment specific data into the program.
- Manually set the chamber door locks according to pattern displayed on computer screen and controller's LCD for the first trial.
- Place reward in 5th compartment after cleaning chamber with Roccal-D.
- Allow subject to acclimate in the Start Box prior to the beginning of the experiment for 5 to 10 minutes.
- Begin experiment by manually opening the Start Box door while simultaneously pressing the Start button on the Controller.
- RAPC system will automatically record all events (time and location) of all door openings and door opening 'errors' made by the subject during the trial.
- Press the Controller's Stop button when the animal enters the 5th chamber.
- Trial will stop automatically if the Controller's Stop button is not pressed prior to the Interval Time Out specified in the RAPC Edit Program.
- Move the animal back to the Start House, reset the door locks, replenish the reward, and spot clean the chamber (if necessary).
- Follow the instructions on the computer screen or on the Controller's LCD for the next trial.
- Upon completion of the final trial, record any additional information regarding the experiment to be stored with the experiment's data.