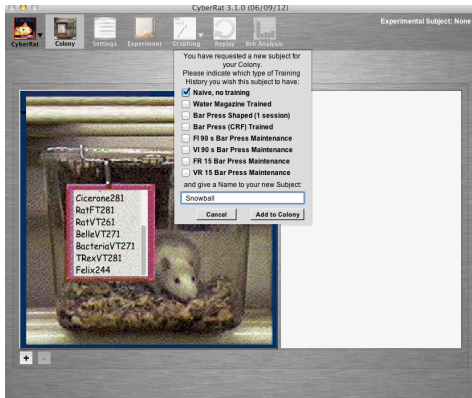


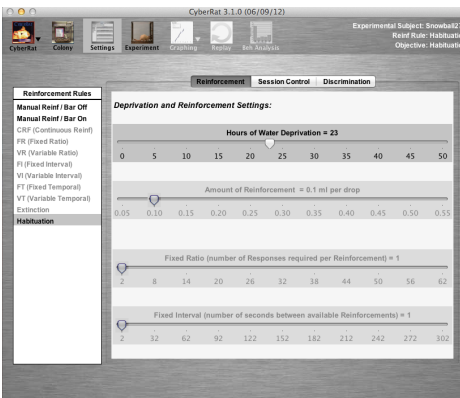
## CyberRat Lab #1 - Observation

First, select a new **naïve rat** in the CyberRat colony room.

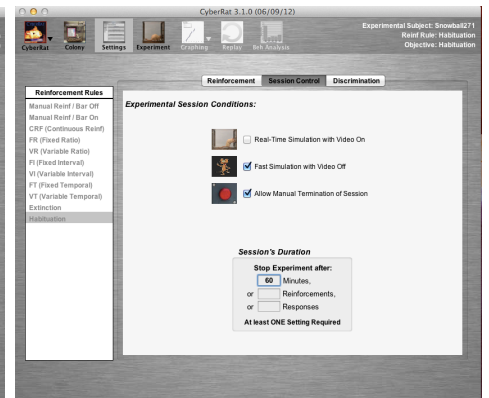
Then go to the **Settings** screen and select **Habituation** as the “schedule.” Set the Simulation options to “**Fast-run/No-Video**” and type in **60** for the minutes of the Session Duration. Click the “**Experiment**” button at the top to run your session.



*Colony Room*



*Settings - Reinforcement*

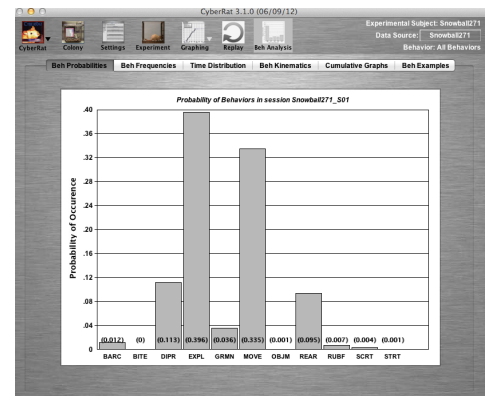


*Settings - Session Control*

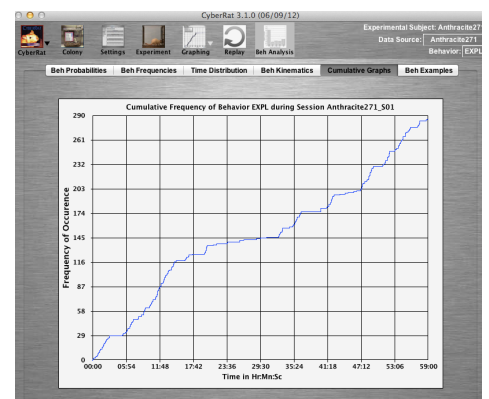
After the session is complete, select the **Beh Analysis** graphing icon. From the Behavior Analysis screen, select the “**Behavior Probabilities**” tab. You should now see a bar graph displaying the unconditional probabilities of all behaviors. Take a screen shot of this graph for your executive summary.

Next, click on the **Cumulative Graphs** tab. Under the Behavior menu, select a behavior to graph. In total you will need to **graph** three behaviors: **Grooming, Rearing, and Exploring**. Take a screen shot of each graph for your executive summary.

Replicate this project by selecting a new **naïve rat** and running the project again. Compare data from this rat to that of your previous rat.



*Unconditional Probabilities*



*Cumulative plots*

## **Analysis:**

I. **Define/Describe** - the behavioral operation (see Table 2-1) and the type of session (Habituation) for this lab.

II. **Methodology/Procedure** - Describe the parameters and sequence of this lab.

III. **Discussion** - Interpret the unconditional probabilities (bar graph). Also compare the cumulative plots for all three behaviors (grooming, rearing, or exploring)

What do these figures illustrate? For example, is grooming a high or low rate behavior (and to what benchmark are you comparing it)? Does it have the same rate of occurrence in each successive 10 minute interval across the hour, or does it tend to occur in specific periods? Which ones? Did you anticipate this from your readings about the principle of “Behavioral Hierarchies?”

## **IV. References**

- Catania, A. C. (2013). *Learning* (5th ed.). Cornwall-on-Hudson, NY: Sloan Publishing.
- Ray, R. D., & Miraglia, K. M. (2011). A sample of CyberRat assignments and their pedagogical functions as experimental activities in a learning course. *Journal of Behavioral and Neuroscience Research*, 9(2), 44-61.

## CyberRat Lab #2 - Stimulus Presentation

Using CyberRat, select the first subject you previously used for the Habituation/observation experimental session.

From the settings screen, select a **VT 90 sec schedule** (Variable Temporal).

Select **Fast Simulation**.

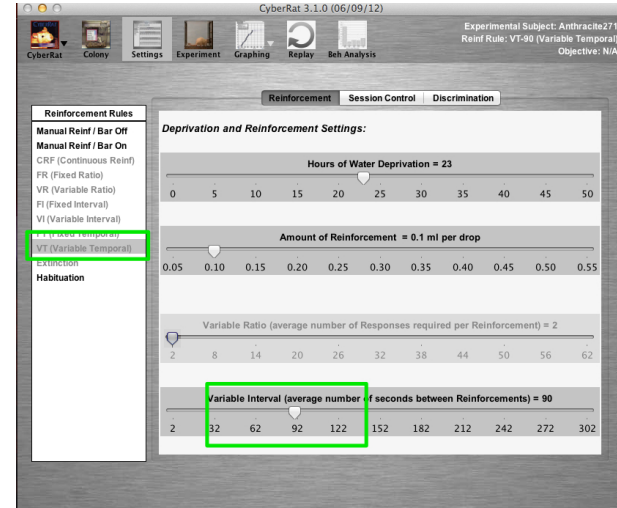
Set your session to **terminate after 11 reinforcements** (using the number of reinforcements criteria rather than duration of session).

Click the “Experiment” button at the top of the screen to **run the session**.

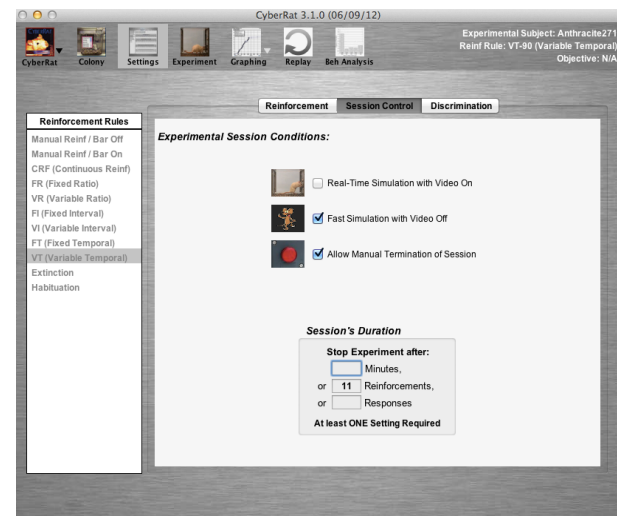
For your data collection in this exercise use the **video replay**.

**Determine the latencies** by calculating the time between each delivery of water and the subsequent drinking of that water. Drinking is operationally defined as the “eye of the animal disappearing from view as the nose enters the water reservoir.” Measure the first 10 presentation-to-drink latencies. If the animal fails to drink prior to the delivery of the next drop, use that delivery time as the “maximum” latency value for that trial.

**NOTE for ANALYSIS and DISCUSSION:** Long latencies indicate a relatively NEUTRAL stimulus vis a vis Elicitation of the “go-to-drink” behavior of the animal. Enter these latency values in an excel spreadsheet and graph (see example figure on the next page).



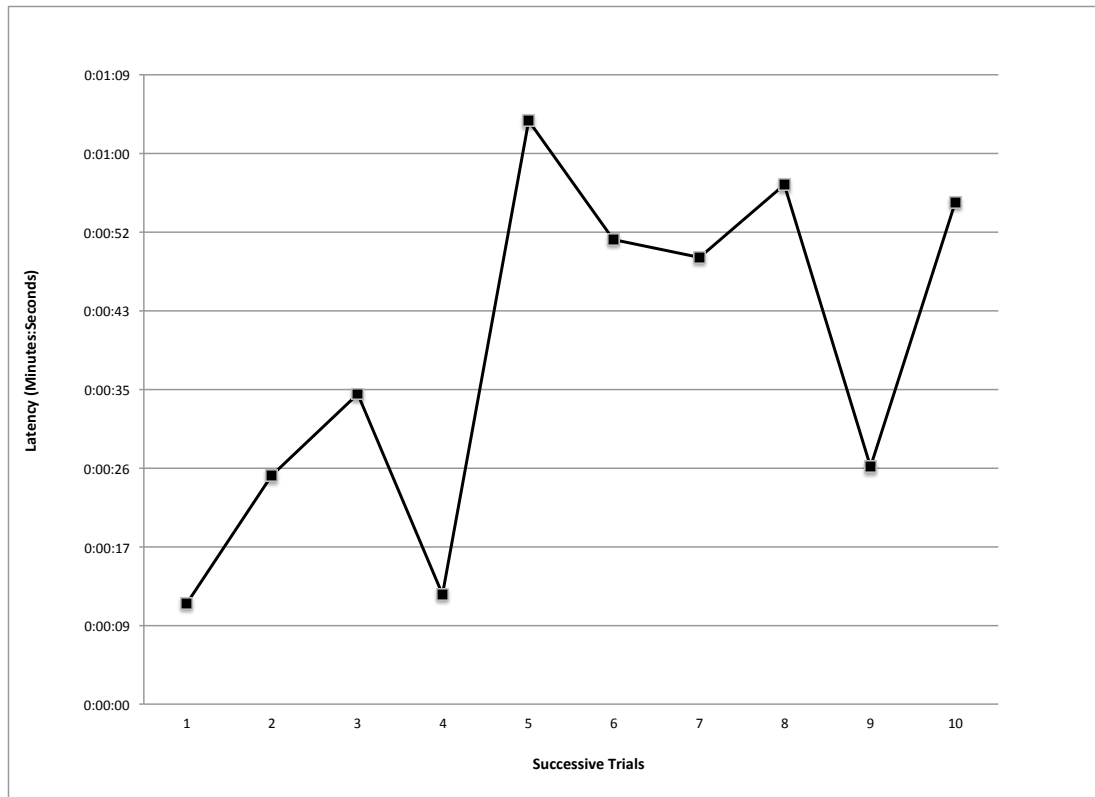
*Settings - Reinforcement*



*Settings - Session Control*



*Replay*



*Illustrative experimental data showing latencies (the time between the stimulus presentation & response) of “drink” behavior following delivery of sound+water across 10 successive presentations via use of VT 90 sec schedule in CyberRat*

## **Analysis - Executive Summary**

**I. Behavioral Procedures** - Identify the behavioral procedure/operation demonstrated in this exercise (include citations).

**II. Methodology/Procedure** - Describe the parameters and sequence of this lab.

**III. Discussion** - Interpret your results (latencies) in terms of the relative strength of the stimulus (include citations). Using Excel, create a line graph that displays these latencies (see example above).

## **IV. References**

Catania, A. C. (2013). *Learning* (5th ed.). Cornwall-on-Hudson, NY: Sloan Publishing.

Ray, R. D., & Miraglia, K. M. (2011). A sample of CyberRat assignments and their pedagogical functions as experimental activities in a learning course. *Journal of Behavioral and Neuroscience Research*, 9(2), 44-61.

## CyberRat Lab #3 - Signaling Stimulus Presentation

*Signaling Stimulus Presentation Operations using CyberRat: Exploring applications of classical conditioning for magazine training and conditioned elicitions*

### Assignment:

**STAGE 1 Procedure:** Using your previous experimental animal, under **Settings->Reinforcement** select manual reinforcement/Bar reinforcement off (**Manual Reinf/Bar Off**). When prompted, select “**Magazine Training Only**” as your objective. Under **Session Control** select **Real-Time Simulation with Video On**. Be sure to keep “**Allow Manual Termination of Session**” checked. Set the **Session’s Duration** to **60 minutes**.

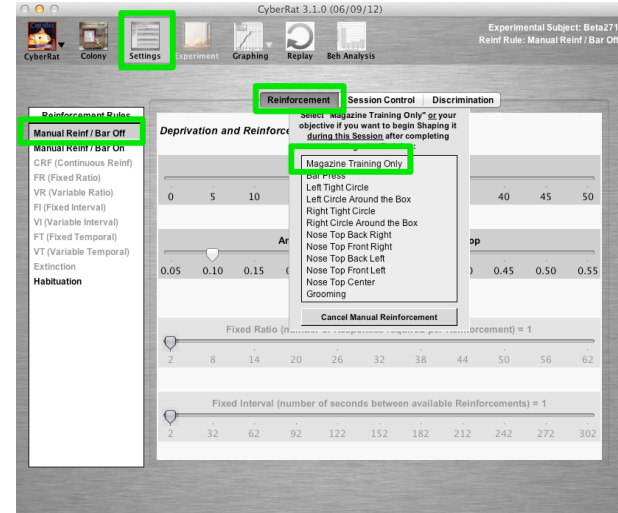
Run Experiment; and during the session, each time the animal is in FRONT of the Water Reservoir, approximately a head’s length away and looking in that direction, click the manual reinforcement button to deliver water. Do this **30** different times. After these 30 stimulus pairings (sound of delivery plus water), terminate your session using the **Manual Termination** button. We will next conduct a test for a change in your previously measured latency by repeating our previous Stimulus Presentation experiment. There are no graphs associated with Stage I in this assignment!

**STAGE 2 Procedure:** Using the same subject, once again set parameters to a VT 90 second schedule by clicking on the **Settings->Reinforcement** menu button and selecting **VT (Variable Temporal)** from the **Reinforcement Rules**. Adjust the **Variable Interval** slider to **90** under the **Deprivation and Reinforcement Settings**.

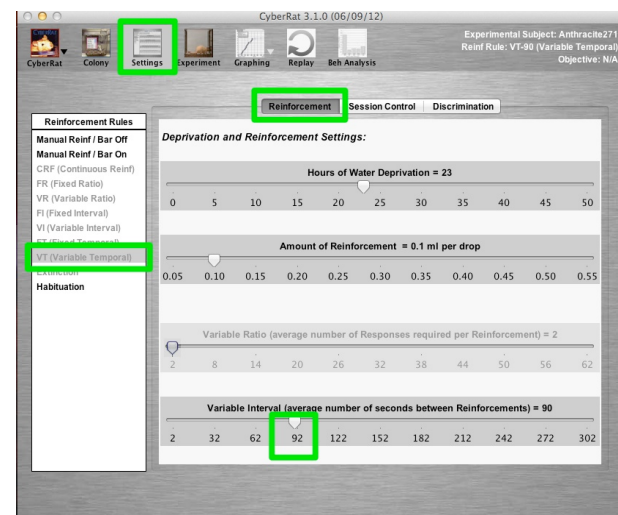
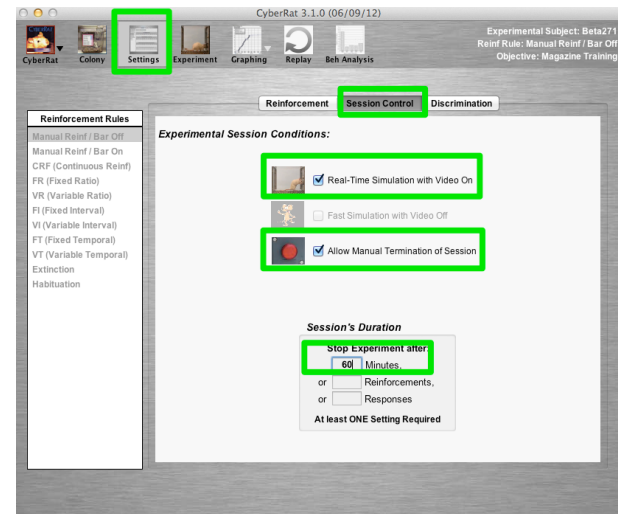
Under **Session Control**, select **Fast Simulation with Video Off**.

Set your **Session’s Duration** to **terminate after 11 reinforcements** (using the number of reinforcements criteria rather than duration of session).

Click the “**Experiment**” menu button at the top of the



*STAGE 1: Settings - Reinforcement- Bar Reinf OFF Select Magazine Training Only*

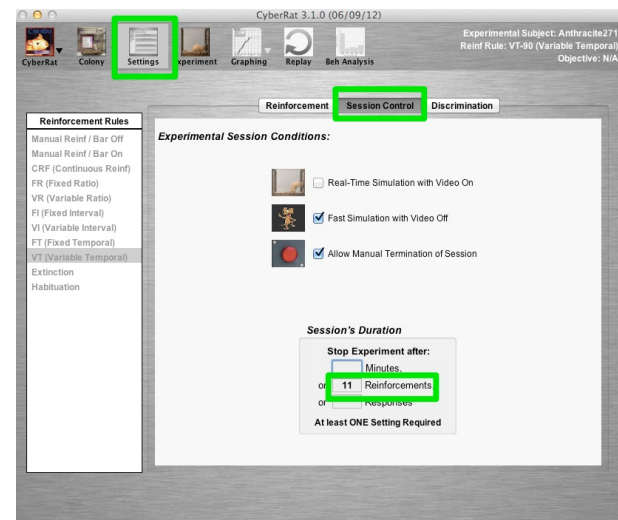


*STAGE 2: Settings - Reinforcement*

screen to run the session.

After the session is complete and the program transitions to the graphing screen, click ok to dismiss the pop-up message.

For your data collection in this exercise use the **Replay** screen. Utilize the controls at the bottom of the screen to play/pause the video playback. For best results avoid using the playhead scrubber.



**Determine the latencies** by calculating the time between each delivery of water and the subsequent drinking of that water.

Drinking is operationally defined as the “eye of the animal disappearing from view as the nose enters the water reservoir.” Measure the first 10 presentation-to-drink latencies. If the animal fails to drink prior to the delivery of the next drop, use that delivery time as the “maximum” latency value for that trial. Plot your new values along with your original stimulus presentation values in your excel spreadsheet and re-graph.

STAGE 2: Settings- Session Control

**Reminder:** Relatively long latencies can indicate a relatively NEUTRAL stimulus vis-a-vis Elicitation of the “go-to-drink” behavior of the animal. What has happened to your previously long latencies after your administration of 30 trials of Classical Conditioning?

### Analysis - Executive Summary

I. **Behavioral Procedures:** Introduce the behavioral operation (signaling stimulus presentation; see Catania, 2013, Table 2-1) and define Magazine Training.

II. **Method/ Procedure:** Describe the settings and sequence for both phases.

III. **Discussion:** Interpret your results. Include a line graph that depicts both your first subject’s baseline phase (previous data) and experimental phase latencies (this assignment).

Consider the following:

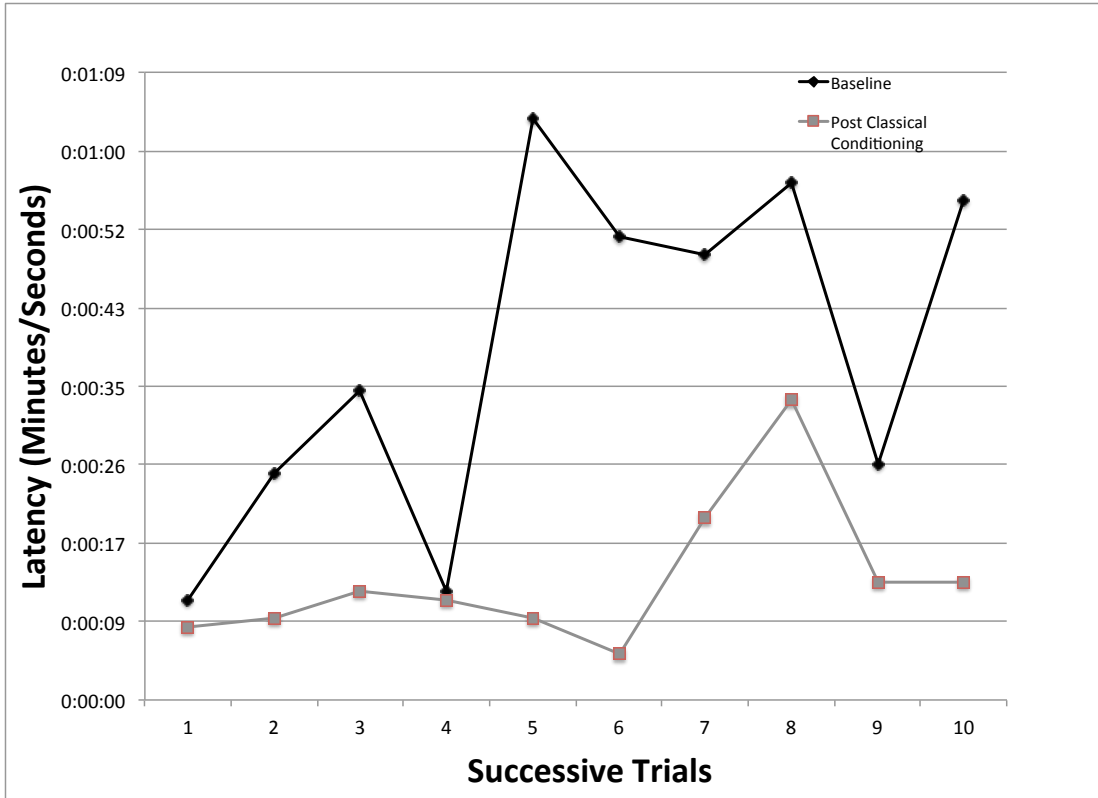
How do your data confirm (or not) the effects of classical conditioning (see example figure on the following page)? Finally, consider why even these shorter latencies in CyberRat are typically longer than those observed with your live animals (hint: video clip lengths). Note that this is one of CyberRat’s more significant shortcomings as a simulator.

### IV. References:

Catania, A. C. (2013). *Learning* (5th ed.). Cornwall-on-Hudson, NY: Sloan Publishing.

Ray, R. D., & Miraglia, K. M. (2011). A sample of CyberRat assignments and their pedagogical functions as experimental activities in a learning course. *Journal of Behavioral and Neuroscience Research*, 9(2), 44-61.

Ray, R. D., Belden, N. R., & Eckerman, D. A. (2005). *Learning and conditioning tutorials*. Winter Park, FL: (AI)2, Inc.



*Example Figure: Illustrative experimental data showing latencies of “drink” behavior following delivery of sound+water across 10 successive presentations via use of a VT 90 sec schedule in CyberRat before (Baseline) and after 30 trials of “magazine training” (Post Classical Conditioning).*

## CyberRat Lab #4 - Shaping

*Details of Consequential Operations and the impact of Establishing Operations on these Consequential Operations using CyberRat: Shaping a new operant response, the rate of that response under a Continuous Reinforcement (CRF) schedule, and the impact of alternative durations of pre-experimental deprivation on within-session satiation to water as a reinforcer*

### Lab Assignment:

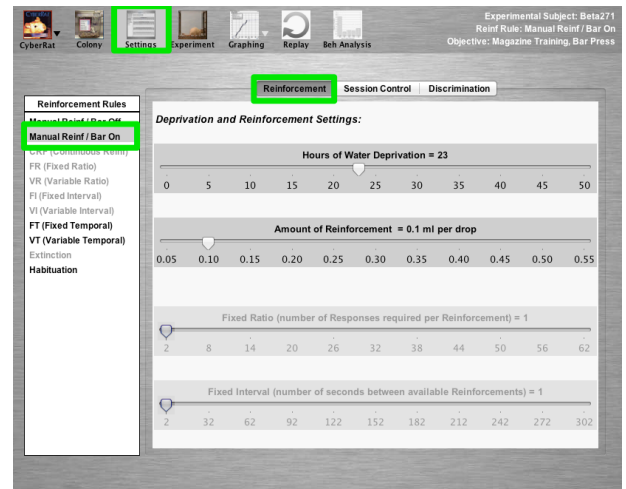
**STAGE 1.** Read the Learning & Conditioning Tutorials Appendix Topics, which is downloadable as a pdf at the bottom of the following webpage: [http://www.ai2inc.com/AIDownloads/AIDownloads/chpt\\_downloads.html](http://www.ai2inc.com/AIDownloads/AIDownloads/chpt_downloads.html)

**STAGE 2 - Shaping Procedure:** From the colony, select the same first animal that you have already run through Habituation, Elicitation Testing, and Magazine Training. Under **Settings->Reinforcement->Reinforcement Rules** Select “**Manual Reinforcement with Bar Reinforcement on**” (**Manual Reinf/Bar On**). Under the **Session Control** tab select “**Real-Time Simulation with Video On**” and confirm that “**Allow Manual Termination of Session**” is also checked. Set the **Session’s Duration** to **30 Minutes**.

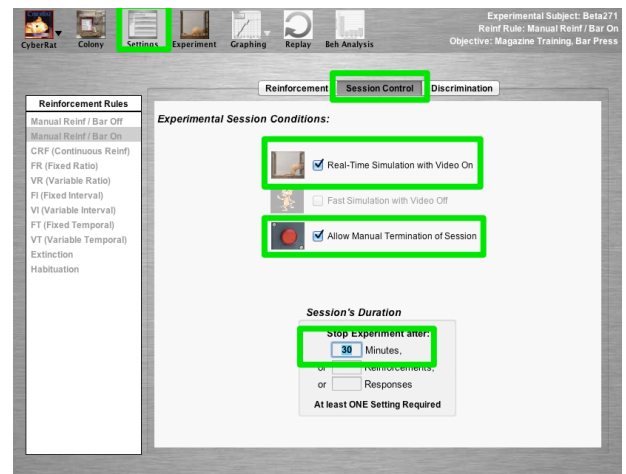
Click the “**Experiment**” menu button at the top of the screen to run your session. Conduct as many successive 30 minute sessions in CyberRat as might be required to successfully shape your animal to BAR PRESS consistently for more than 10 bar presses (click the “**Experiment**” menu button at the top of the screen to run another session with the same settings).

Note: At the conclusion of each session the program will transition to the graphing screen. If there are no target behaviors (default bar presses) to graph a message will appear on the screen. Click OK to dismiss the pop-up message.

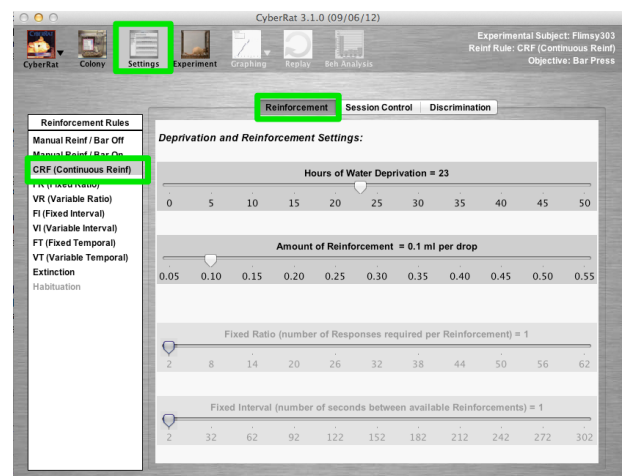
Upon successful completion, conduct 3 additional 60



STAGE 2: Settings - Reinforcement  
Manual Reinf/BarOn



STAGE 2: Settings - Session Control  
Real Time- 30 Min. Sessions



STAGE 2: Settings - Reinforcement CRF

min FAST SIMULATION (No Video) “Maintenance” sessions using the CRF Schedule. Under **Settings>Reinforcement** select **CRF** under the **Reinforcement Rules**. Under the **Session Control** tab select “**Fast Simulation with Video Off.**” Set the duration of the session to **60 minutes**. Click the “**Experiment**” menu button at the top of the screen to run your session. Run an additional two sessions (total of 3).

**STAGE 3 - Adjusting Deprivation Procedure:** What do you think is the role of alternative settings for deprivation regarding how fast the animal reaches satiation in CRF sessions? How would you investigate this in CyberRat (hint: an example graph of some experimental probes appear below using 23 hours vs. 12 hours, vs. 1 hour Deprivation settings).

Run 3 additional 60 min FAST SIMULATION (No Video) sessions: One at 23 hours of water deprivation, one at 12 hours, and one at 1 hour.

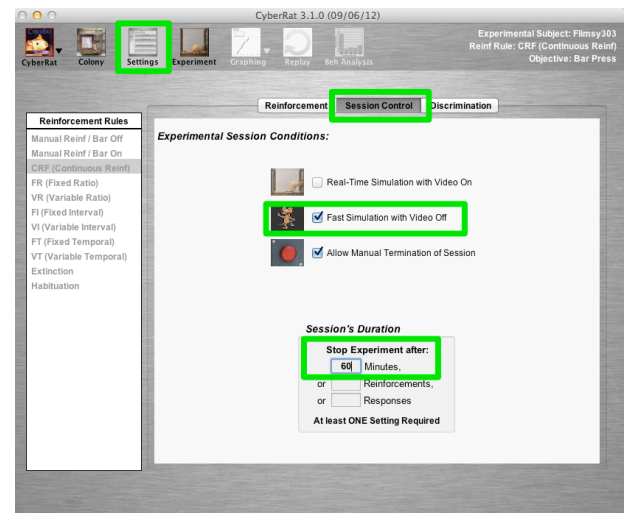
Session 1 (23 hours): Under **Settings>Reinforcement** move the **Hours of Deprivation** slider to **23**. Under **Reinforcement Rules**, select **CRF**. Under the **Session Control** tab select “**Fast Simulation with Video Off.**” Set the duration of the session to **60 minutes**. Click the “**Experiment**” menu button at the top of the screen to run your session.

Session 2 (12 hours): Under **Settings>Reinforcement** move the **Hours of Deprivation** slider to 12. Under **Reinforcement Rules**, select **CRF**. Under the **Session Control** tab select “**Fast Simulation with Video Off.**” Set the duration of the session to **60 minutes**. Click the “**Experiment**” menu button at the top of the screen to run your session.

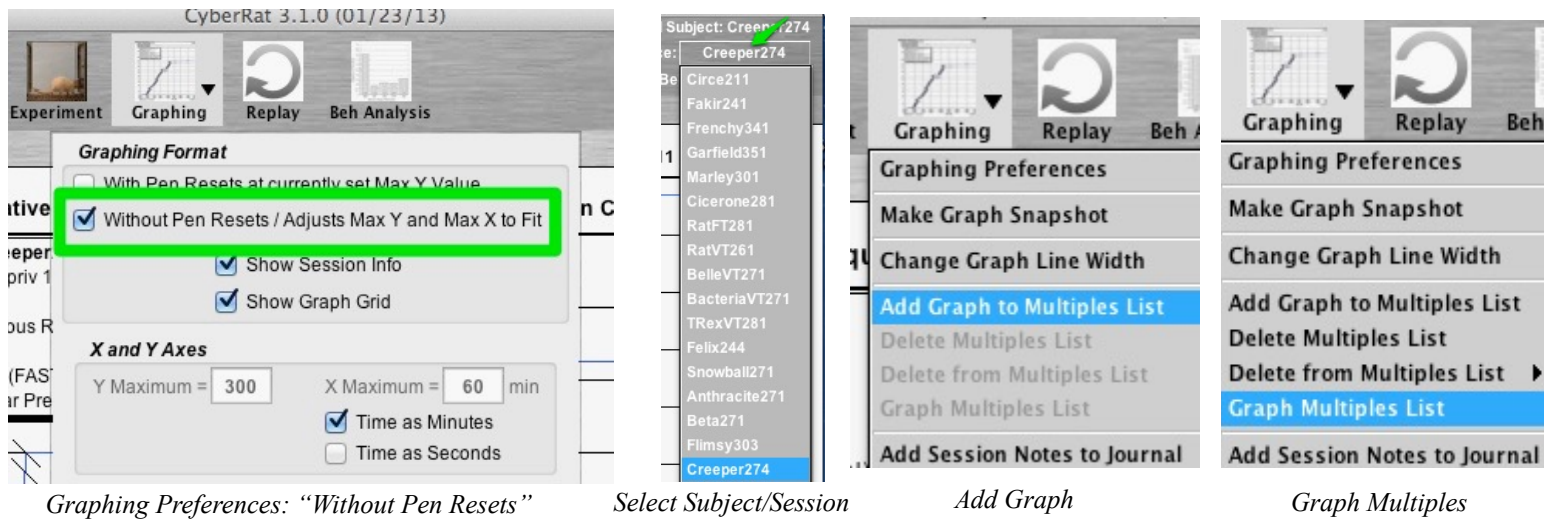
Session 3 (1 hour): Under **Settings>Reinforcement** move the **Hours of Deprivation** slider to 1. Under **Reinforcement Rules**, select **CRF**. Under the **Session Control** tab select “**Fast Simulation with Video Off.**” Set the duration of the session to **60 minutes**. Click the “**Experiment**” menu button at the top of the screen to run your session.

**Graphing - Creating a “Composite” Graph.** See Ch 6 pp. 43 - 45 of the *CyberRat User’s Guide* for additional details ([http://www.ai2inc.com/Downloads/CyberRat\\_User's\\_Guide\\_V3.pdf](http://www.ai2inc.com/Downloads/CyberRat_User's_Guide_V3.pdf)).

First, confirm that under the **Graphing** menu button-> **Graphing Preferences** “**Without Pen Resets**” is selected.



*STAGE 2: Settings - Session Control  
Fast-Sim 60 Min.*



Next, click on your subject which is located on the right hand side of the screen to reveal your subject's **journal**. Click on the 23 hour deprivation session to graph those data.

Under the Graphing menu button, select **"Add Graph to Multiples List"**

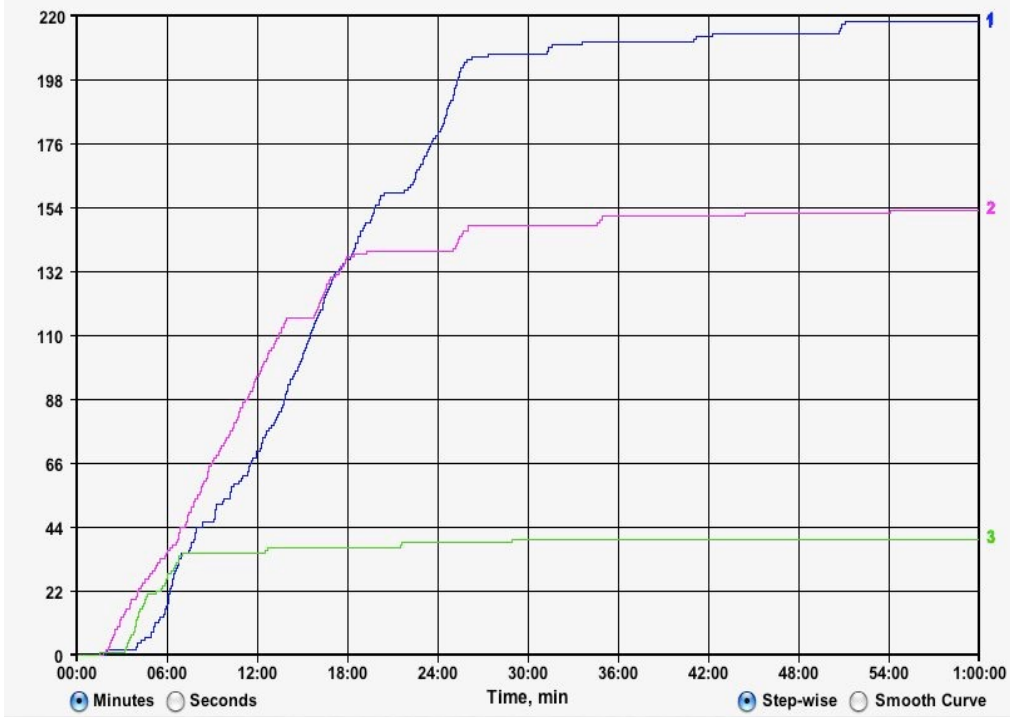
Next, select your subject again and graph the 12 hour deprivation session. Add this session to **"Multiples List"** by selecting **"Add Graph to Multiples List"** from the Graphing menu button.

Next, graph and add the 1 hour deprivation session to **"Multiples List."**

Note: If you make a mistake (i.e., select the wrong session to graph) you may delete the last session added to the list by clicking on the **Graphing** menu button and selecting **"Delete from Multiples List"**. If you would like to delete the entire list (start over) select **Graphing->Delete Multiples List**.

Lastly, under Graphing select **"Graph Multiples List."**

Take a screenshot of the figure for use in your executive summary by clicking on the **"Graphing"** menu button and selecting **"Make Graph Snapshot"** [image saved to desktop]. Click OK to dismiss the pop-up message.



*Example Figure: Sample Bar Press and within-session water satiation results typical of alternative Pre- Experimental Deprivation Settings of 23 hours (labeled as 1 on the right hand Y-axis), 12 hours (labeled as 2 on the right hand Y-axis), and 1 hour (labeled as 3 on the right hand Y-axis). NOTE: This graph was created using the "Graph Set" feature explained on pp. 43-45 in the CyberRat User's Guide (available at: [http://www.ai2inc.com/Downloads/CyberRat\\_User's\\_Guide\\_V3.pdf](http://www.ai2inc.com/Downloads/CyberRat_User's_Guide_V3.pdf))*

## **Analysis: Executive Summary**

- I. **Define:** Introduce the shaping process and define the behavioral operations used in this laboratory sequence (Consequential Operations & Establishing Operations; Catania, 2013, Table 2-1).
- II. **Method & Procedure:** Summarize the settings and sequence of this lab. Briefly explain how the first set of three fast simulation sessions were used to confirm stable bar press rates.
- III. **Discussion:** Interpret your results (refer to your graph). Be prepared to describe:
  - a) Bar-press warm-ups as habituation to being introduced into the chamber, and
  - b) Satiation as another potential form of habituation to water (cf., McSweeney & Murphy, 2000; McSweeney, 2004). What do you think is the role of alternative settings for deprivation regarding how fast the animal reaches satiation in CRF sessions?

## **IV. References:**

- Catania, A. C. (2013). *Learning* (5th ed.). Cornwall-on-Hudson, NY: Sloan Publishing.
- Ray, R. D., & Miraglia, K. M. (2011). A sample of CyberRat assignments and their pedagogical functions as experimental activities in a learning course. *Journal of Behavioral and Neuroscience Research*, 9(2), 44-61.
- Ray, R. D., Belden, N. R., & Eckerman, D. A. (2005). *Learning and conditioning tutorials*. Winter Park, FL: (AI)2, Inc.