

INSTRUCTOR'S MANUAL FOR SNIFFY PRO VERSION 3.0

A Note to Instructors

This manual is designed to assist your implementation of the software package entitled *Sniffy the Virtual Rat™, Pro Version 3.0*. (henceforth referred to as “Sniffy Pro Version 3.0”) in your psychology courses at the secondary, college, or university level.

In writing this manual I have drawn from my own experience with Sniffy Pro Version 1.0 and 2.0 as pedagogical tools for students in an AP psychology course at the Waterford School (Sandy, UT) and in the 3rd-year undergraduate course in learning (Psych 361: Principles of Learning) at Brigham Young University (Provo, UT).

The manual is divided into the following sections:

Why Use Sniffy Pro Version 3.0?

Using Sniffy Pro Version 3.0 in Various Formats

Problems Students Are Likely to Confront

Evaluation Items to Accompany the Exercises

Sample Syllabus

References

As you know, there are pros and cons with the use of information technology in teaching and learning (see Davidson, 2011; Richtel, 2011), and Sniffy Pro Version 3.0 exemplifies some of each. In the “Why Use Sniffy Pro Version 3.0?” section, I describe certain advantages as well as drawbacks. In particular, Sniffy Pro Version 3.0 can never take the place of a laboratory course in which students work with live animals, not least because the virtual rat featured in Sniffy Pro Version 3.0 has a comparatively limited behavioral repertoire—a point repeatedly underscored by its authors. Nevertheless, the new version does provide your students with the opportunity to develop a deeper understanding of conditioning principles and protocols than might be achieved by simply relying on standard textbook content. Sniffy Pro Version 3.0 utilizes an operant chamber environment to explore concepts of both classical and operant conditioning and does so in a way that exposes students to standard methods and a variety of learning phenomena.

The second section of this manual discusses ways to fit Sniffy Pro Version 3.0 into your course format. Undergraduate courses take on a variety of formats, from those used in small, discussion-based sections to those in lecture-based megasections with hundreds of students. Sniffy Pro Version 3.0 can be integrated into almost any format, though it may be used differently depending on course level and section size. The next section of the manual addresses may be helpful to your students when they begin to use the software. The fourth section contains a comprehensive set of evaluation items and is by far the largest section of the manual. Items marked with asterisks (**) are recommended for use in examinations. Each item is accompanied by the correct answer, a page reference for that answer, and additional feedback.

Finally, I have provided a sample syllabus.

You have my best wishes for success in utilizing this manual to promote the success of your students' experience as they make their way through the Sniffy Pro Version 3.0 software.

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Why Use Sniffy Pro Version 3.0?

The Sniffy Pro Version 3.0 software package is a potentially powerful pedagogical tool in psychology courses in learning, conditioning, and behavior. In 1950, Frank Beach (Beach, 1950) criticized the overemphasis on the white laboratory rat in psychology courses. Today, due to growing class sizes and budget cutbacks, psychology students are fortunate to have any hands-on exposure to conditioning procedures. Sniffy Pro Version 3.0 offers you a means of training your students in the basics of laboratory research methodology with the Sprague-Dawley rat. Moreover, the procedures, phenomena, and theoretical issues explored in the Sniffy Pro Version 3.0 software are readily applicable to other specialties in the behavior sciences whether they emphasize laboratory or real-world settings.

If you are fortunate to be an instructor at an institution that offers live animal laboratories, Sniffy Pro Version 3.0 can still be a useful preliminary, acquainting students with shaping and other basic conditioning techniques. Although the Sniffy Pro Version 3.0 simulations are restricted in the types of techniques they include, the general principles they teach are more than sufficient to provide students with significantly increased understanding of traditional operant-chamber methodologies for the study of classical and operant conditioning. Consequently, prior experience with Sniffy Pro Version 3.0 will give students in live-animal courses a head start.

Of course, it is also worth pointing out that even the best-designed lab activities with live animals can go awry. Laboratory rats are notoriously skittish in situations involving light, noise, and people. It is not unusual for students to spend several hours with their animals in the effort to develop sufficient habituation to the lab environment—habituation that is required before the animals are ready for magazine training and shaping of the bar press. Even then, it may prove difficult to maintain a food- or water-deprivation regime that motivates ready and sustained responding across sessions. Within-session satiation is not uncommon and may prevent the emergence of the behavioral phenomenon the activity was designed to demonstrate. These and other difficulties further point up the merits of Sniffy Pro Version 3.0.

The Sniffy Pro Version 3.0 textbook is also helpful for enhancing students' understanding of the topics typically included in courses that focus on learning and behavior. You can direct your students to complete the relevant Sniffy Pro Version 3.0 exercises, including the conceptual material, in order to become better informed about specific topics. Sniffy Pro Version 3.0 provides an excellent introduction to the conditioned emotional response (CER) as a paradigm for the study of classical conditioning and provides the opportunity to study complex classical conditioning phenomena such as blocking, overexpectation, sensory preconditioning, and higher-order

conditioning. Similarly, Sniffy Pro Version 3.0 activities involving operant conditioning provide students with direct exposure to more demanding concepts that a laboratory course would rarely, if ever, include, such as relative frequencies of behavior, adjunctive behavior, the peak shift, and behavioral contrast—concepts that textbook reading alone often fails to elucidate.

Sniffy Pro Version 3.0 relies on the CER as a means of demonstrating classical conditioning (see chapter 2). In particular, the movement ratio (the proportion of time during a trial during which the rat is manifesting freezing and other fear-related behavior) is a response measure that makes it possible to study the CER in an animal that has not been trained to bar press. This feature makes it possible for students to study classical conditioning before they take up operant conditioning and enables instructors to synchronize laboratory exercises more closely with the order in which most textbooks discuss various learning phenomena. Although the CER is a form of classical conditioning widely studied in North American research laboratories, it is probably not the one students are most familiar with, namely, the “ring a bell, see the dog salivate” approach. For this reason, it will be important to devote added attention to the CER methodology in advance of students’ introduction to the exercises dealing with classical conditioning.

Obviously, and as already noted, there are differences between a virtual rat and a live one. Unlike the latter, the subject in Sniffy Pro Version 3.0 does not bite, defecate, satiate, or escape from its home cage. While it might be argued that the virtual rat fails to provide students with the “full experience” that comes from working with live animals, there are students who experience mild to strong phobic reactions when confronted with a live rat. Working with a virtual rat instead can spare them the more traumatic encounter. Allergic reactions, as well as tetanus shots and stitches due to rat bites, also are eliminated.

However, students do not acquire the same sense of responsibility for the care and handling of laboratory animals when they work with a virtual equivalent. Developing that sense may be one of the more valuable aspects of their use of live subjects. Given public concern and highly publicized cases involving the treatment of laboratory animals, it may be important for you to give added attention to issues in the ethical treatment of research animals.

Although most students do not become bonded to the virtual rat in the way they would a live one, some do become quite fond of their virtual subject and, as in the case of the Tamagotchi craze (the small, Japanese-produced virtual pets that owners had to feed, exercise, and play with to keep “alive”) some years ago, are quite affected if the rat eventually “dies.” This is an occurrence that is not described in detail in the Sniffy Pro Version 3.0 textbook. Exercise 24 introduces the cumulative record and states that: “. . . there is a maximum of 10 Cumulative Record windows. . . After that program time limit has been reached, you can examine and save your results; but you cannot add any additional stages to that particular Sniffy Pro file” (p. 148). However, the textbook neglects to mention that the virtual rat appears to expire when the end of the 10th cumulative record window is reached. The animal lies down and curls up, as if asleep or worse. A text box appears in which there is a comment to the effect that the simulation, like the rat, has reached its end. One instructor received frantic phone calls from distraught students whose rat had reached the end and who desperately wanted to bring it

back to life. Some were disturbed that they had done something to cause the rat's demise. You may wish to advise your students in advance that the simulation comes equipped with a "limited life expectancy."

As stated earlier, another difference between the virtual rat and live rats is their variability in behavioral repertoire. Individuals who have worked with Sprague-Dawley rats can attest that individual animals can be quite different in their behavior, learning rates, and reinforcer and response preferences. Although the Sniffy Pro Version 3.0 software uses a randomization function in selecting the rat's on-screen responses, each copy of the software will produce outcomes that are quite similar. Nevertheless, with certain exercises, some students may get results quite different from those of their classmates. In terms of student learning, this is not necessarily a problem, as it demonstrates the variable nature of animal behavior. Still, it can raise difficulties if students submit reports of their exercises as part of a grade. Thus, it may be best to structure assignments in such a way that students always have the opportunity to qualify their results.

The variability of Sniffy's behavior presents additional opportunities for experimentation. Rather than reporting results from a single experiment, students can be encouraged to replicate it—repeating it several times, for example. This will not only demonstrate the variability in the rat's performance from session to session. It will also allow students to understand a very important concept in behavioral research that involves small numbers of subjects—when the individual subject's performance is averaged over several sessions, it tends to display a characteristic pattern, namely, the patterns displayed in the textbooks. The phenomenon of stimulus generalization (Chapter 13) lends itself particularly well to repeated replication in order to make this point.

While the exercises included in the Sniffy Pro Version 3.0 textbook expose students to a wide range of concepts in classical and operant conditioning, the versatility of the software allows students to expand that range considerably. In fact, there is advantage in encouraging your students to design and carry out their own original exercise based on one of those in the text. For example, what happens when the stimulus intensities of the tone and the light are varied during the initial phase of the sensory preconditioning experiment (Exercise 12)? Or what occurs in stimulus generalization testing when the difference between the S+ and the S- used in training is made larger or smaller (Exercise 44)?

In more elaborate extensions of the exercises found in Sniffy Pro Version 3.0, students could be assigned to: (a) find additional, recent published references to the topic; (b) report their results in graphical form using a spreadsheet program; and (c) prepare their report using the style standards of the American Psychological Association (APA).

Finally, Sniffy Pro Version 2.0 points students to notable primary sources, such as Estes and Skinner (1941), Honig, Boneau, Burstein, & Pennypacker (1963), and Rizley & Rescorla (1972). You can assign these and other relevant articles in conjunction with the appropriate Sniffy Pro Version 3.0 exercises and, in that way, increase students' exposure to influential, path-breaking research.

Using Sniffy Pro Version 3.0 in Various Formats

Sniffy Pro Version 3.0 can be used effectively within a wide range of course sizes and types. The central interest is to motivate students to complete the assigned exercises and other material in the Sniffy Pro Version 3.0 textbook. Unless you have a small class in which it is readily apparent who has done the assigned work or a class of especially dedicated students, you will likely need to assign a portion of the final grade to Sniffy Pro Version 3.0 assignments in order to provide adequate motivation.

How you involve assignments from Sniffy Pro Version 3.0 will depend largely on three considerations: the size of your class; whether it is lecture-, lecture and laboratory-, or laboratory-based; and the amount of support that is available to you from Teaching Assistants or other sources.

In large classes (that is, classes with 50 or more students), it may be useful to assign students to work in groups of two or three. The logistics of scheduling meetings if more than three students are in a group sometimes present problems. There is also the difficulty of arranging more than three students around a computer terminal. Group work may lead to problems involving interpersonal dynamics that will require your attention.

Another issue with group work is the grading of assignments. Generally, each group hands in one assignment, and all members of the group receive the same grade. In large classes one of the main advantages of group work is that it reduces the number of assignments that must be graded.

If you are using Sniffy Pro Version 3.0 in a course with an assigned laboratory period, then you can easily use the exercises as weekly laboratory assignments. In this case the laboratory sections will likely be relatively small (that is, 30 students or less), and the Laboratory Assistant can grade the weekly assignments.

With smaller classes the time required for grading may be reduced. Smaller classes also offer greater potential to use Sniffy Pro Version 3.0 as a means of generating class discussion. Students can be asked to complete Sniffy exercises and to present them in class meetings. Some instructors have found it useful to divide their classes into groups of five or six students and ask each group to discuss the presentation for a short period of time. Afterward the class as a whole can debate the issues that emerged from the group discussions. For example, you could ask groups to propose alternative experimental designs by which to study the same research question that the Sniffy Pro Version 3.0 exercise addressed.

Student presentations may be combined in a class “research conference” in which groups present their research findings either as oral or poster presentations. You can use this approach to teach students the essentials of formal presentation of research findings. Similarly, as already mentioned, you might assign specific research topics based on Sniffy Pro Version 3.0 exercises and require students to submit a research paper, using the APA format, that summarizes and discusses their findings.

Finally, Sniffy Pro Version 3.0 assignments can become part of the quizzes and examinations in your course. The evaluation items included in this manual were created for that purpose.

Problems Students Are Likely to Confront

Spending time in the course, especially in advance of assignments involving the Sniffy Pro Version 3.0 exercises, demonstrating how the software works, how it loads, and ways to fix some of the more common problems will be beneficial to you and your students in the long run. A Teaching Assistant or Laboratory Assistant could assume this responsibility and serve as the “fix-it” specialist throughout the course.

Students often skim the Sniffy Pro Version 3.0 textbook on the assumption that what it contains is already familiar to them as a result of their reading in other sources. Failure to read the specific instructions for an exercise can produce real difficulties in understanding the visual, including quantitative, displays that Sniffy Pro Version 2.0 contains. It is critical that students understand that windows with a light blue background represent theoretical variables—inferred mental states. Only those windows with a white background display actual behavioral data. For example, the Movement Ratio and Cumulative Record windows display behavioral data. The Operant Association and CS (DS) Response Strength mind windows display theoretical results intended to describe the internal state of the virtual rat.

It is not unusual for students to have difficulty interpreting the cumulative record. It would be worthwhile to discuss the concept of the cumulative record and its components during a class meeting before students begin the Operant Conditioning exercises. Many students fail to grasp the concept that the cumulative record never decreases because it is cumulative. The only time the pen drops is when the top of the paper is reached. Each upward movement of the pen toward the top of the paper represents one response. Each short, diagonal mark of the pen represents the delivery of a reinforcer.

Another frequent problem involves the design of classical conditioning experiments. A common misunderstanding arises from the distinction between stages and trials in the experimental design. An experiment may involve one or more stages. A stage consists of one or more trials. Stages are represented by numbers—1, 2, 3, etc. The type of trials that occurs during a stage is represented by a letter—A, B, C, etc. Students’ misunderstanding would be considerably reduced if you were to spend time in a class meeting demonstrating the distinction between stages and trials in an actual window and indicating to students how they can determine which stimulus (light, tone, background, etc.) is associated with each trial type in each stage.

Students sometimes ask about the amount of time required to complete a Sniffy Pro Version 3.0 exercise. The answer depends on the speed of their computers and the speed setting of the Sniffy Pro Version 3.0 animation. Most exercises will take little time to run, because it will be possible to accelerate the experimental session. The issue is much more about the amount of time that will be required for a student to read the exercise completely in advance and to understand what must be done to set the parameters for the exercise and to interpret the results. Students would be well advised NOT to approach their Sniffy Pro Version 3.0 assignments with the notion of “getting it done as fast as possible.” Failing to do so is likely to be counter-productive and frustrating. It is important for them to realize as soon as possible that the Sniffy Pro Version 3.0 exercises are rich with possibilities for keener understanding of the concepts they contain. The software allows them considerable latitude for tinkering with the

experiments in order to understand how it functions and, importantly, how and what their virtual rat has learned.

Evaluation Items to Accompany the Exercises

[Note: Asterisks (**) indicate items recommended particularly for examinations.]

Chapter 1: *Introduction to Sniffy*

Question 1

The authors cite reasons for why courses in the psychology of learning generally do not include research featuring live animals. Which of the following is NOT one of the reasons they cite:

- a. Most instructors are unfamiliar with actual research.
- b. The equipment required for all students to engage in research can be prohibitively expensive.
- c. Some people object to such research as unethical.
- d. The cost of meeting official regulations for animal care can be prohibitive.

Correct answer: a

Page reference: 1-2

Answer feedback: The cost of equipment and that of animal care compliant with regulations both can be prohibitively expensive. Complaints about the unethical treatment of animals in research are not uncommon. Most instructors of courses in the psychology of learning have conducted human or nonhuman animal research or both as part of graduate training.

Question 2**

In the Sniffy program,

- a. Sniffy often learns slower than actual rats.
- b. the Mind Windows display actual behavior.
- c. Sniffy never satiates.
- d. classical and operant conditioning both involve associations.

Correct answer: d

Page reference: 4-5

Answer feedback: For purposes of efficiency, the virtual rat typically learns faster than real rats, never satiates. The authors consider classical and operant conditioning to involve associations but are careful to distinguish between what is observable directly (stimuli and behavior) and what is inferred, namely, the associations displayed in the Mind Windows.

Question 3

The Sniffy program will help you learn the _____ of learning but not the _____.

- a. science; art
- b. generalities; specifics
- c. art; science
- d. specifics; generalities

Correct answer: a

Page reference: 6

Answer feedback: The program's design emphasizes the principles of learning featured in most textbooks in the psychology of learning. As such it is consistent with the generalities and specifics of the science study of learning. However, the limitations of the program mean that it is not substitutable for actual, hand-on experience with real rats—the experience from which one acquires the art.

Chapter 2: Introduction to Classical Conditioning

Question 1**

Which windows display simulated psychological states rather than behavioral outcomes?

- a. Suppression Ratio and Movement Ratio
- b. Sensitivity & Fear and CS Response Strength
- c. Movement Ratio and CS Response Strength
- d. Suppression Ratio and Sensitivity & Fear

Correct answer: b

Page reference: 19-25

Answer feedback: The Sensitivity & Fear window and the CS Response Strength window formally are titled “Mind Windows”—a term designating their status as displays of hypothetical variables related to psychological states or processes. The Movement Ratio and Suppression Ratio windows display derived measures of Sniffy's actual behavior. For this reason, they will differ each time the program is run.

Question 2

Which of the following measures is the proportion of Sniffy's freezing behavior that occurs during the presentation of the CS?

- a. Movement ratio
- b. CS response strength
- c. Suppression ratio
- d. CS intensity ratio

Correct answer: a

Page reference: 22

Answer feedback: Both ratios are based on actual behavior that occurs during the experiment. CS response strength is a hypothetical measure of a psychological state of fear. The program does not provide a CS intensity ratio.

Question 3

Which of the following is NOT one of the authors' recommendations for assuring reliable, comparable results when using the CER procedure?

- a. Use a VR-trained Sniffy.
- b. Sniffy's response rate should be rapid and steady.
- c. Use the same baseline Sniffy file as the starting point for all experiments.
- d. Make sure the Average Interval Between Trials is always set to 10 minutes.

Correct answer: d

Page reference: 27

Answer feedback: Only use that value when using the high-intensity shock. Otherwise, use 5 minutes.

Chapter 3: *Basic Phenomena of Classical Conditioning: Acquisition, Extinction, Spontaneous Recovery, and Stimulus Intensity Effects*

Question 1

Complete the following analogy:

Acquisition is to *extinction* as

- getting started is to speeding up.
- learning is to performance.
- appearing is to disappearing.
- the US is to the CS.

Correct answer: c

Page reference: 32-33

Answer feedback: Pairing the CS with the US produces the CR (it appears). Removing the US and presenting the CS by itself eliminates the CR (it disappears).

Exercise 1: *Basic Acquisition of a CR*

Question 1

Which of the following is the crucial pairing in the acquisition of a CR?

- CS then US
- CS then CS
- US then US
- US then CS

Correct answer: a

Page reference: 33

Answer feedback: The crucial pairing involves a CS and a US. Acquisition is most effective when the CS precedes the US.

Question 2**

The CS Response Strength Mind Window shows smooth changes in the psychological state of fear across trials. By contrast, the record of behavioral variables displayed in the Movement Ratio and Suppression Ratio windows is usually uneven rather than smooth.

Which of the following best accounts for this difference?

- The program that generates the trial-by-trial results (movement ratio and suppression ratio) is probabilistic.
- Psychological variables are simpler than behavioral variables.
- Behavioral variables are harder to measure than psychological variables.
- Psychological variables are continuous, but behavioral variables are discontinuous (discrete).

Correct answer: a

Page reference: 35-36

Psychological variables are not necessarily simpler, easier to measure, or continuous. The program that generates Sniffy's behavior in the chamber uses probabilities, meaning that the animal's behavior can vary from moment to moment and will not be same if the experiment is repeated..

Exercise 2: *Extinction*

Question 1**

The overall shape of the CS response strength graph most closely resembles the shape of the

- a. movement ratio graph.
- b. suppression ratio graph.
- c. sensitivity graph.
- d. cumulative record.

Correct answer: a

Page reference: 33-34

Answer feedback: The CS response strength and movement ratio graphs show parallel effects—effects essentially complementary to those the suppression ratio shows. The sensitive graph does not appear but would not resemble the CS response strength graph necessarily. The content of the cumulative record is unlike that of the CS response strength window.

Question 2

In Stage 2,

- a.. The data displayed in the Movement Ratio Window have much the same shape as the line representing the tone in the CS Response Strength Mind Window.
- b. The data displayed in the Suppression Ratio Window have much the same shape as the upper line in the CS Response Strength Mind Window.
- c. The data displayed in the Suppression Ratio Window have much the same shape as the data displayed in the Movement Ratio Window.
- d. The trends (that is, the direction of the results) displayed in the Movement Ratio Window and the CS Response Strength Mind Window are both increasing (going up).

Correct answer: a

Page reference: 38-39

Answer feedback: Even though the Movement Ratio Window displays a histogram and the CS Response Strength Mind Window a continuous line, they display a similar pattern. Specifically, the values in each graph decrease over the trials in Stage 2. This is not the case in the Suppression Ratio Window, where the graph has a shape complementary to that in Movement Ratio Window and the CS Response Strength Mind Window.

Question 3

Because the extinction of the CER (Stage 2) proceeded more slowly than its acquisition (Stage 1),

- a. the medium-intensity tone was used in both stages.

- b. the average interval between trials in both stages remained the same.
- c. the suppression ratio provided a better measure of extinction than the movement ratio did.
- d. more trials occurred in Stage 2 than in State 1.

Correct answer: d

Page reference: 37

Answer feedback: The CER extinguishes more slowly than it is acquired. For that reason, more extinction trials were scheduled in order to observe the effects of the extinction procedure (presentation of the CS without the US).

Exercise 3: *Spontaneous Recovery*

Question 1**

In classical conditioning, spontaneous recovery refers to the

- a. sudden disappearance of the CR that occurs during extinction.
- b. fact that the strength of the CR repeatedly fluctuates from low to high during extinction.
- c. reappearance of the CR at the beginning of an extinction session following an original extinction session.
- d. rapid increase in the strength of the CR that appears at the end of successive extinction sessions.

Correct answer: c

Page reference: 33

Answer feedback: The term spontaneous is applied because there was no specific effort to increase behavior after Sniffy was returned to the home cage for a 24-hr period following the extinction session (Stage 2). The reappearance (or recovery) of the CR at the beginning of the next extinction session (Stage 3) was therefore considered to be spontaneous.

Question 2

In the movement ratio and CS response strength windows for the spontaneous recovery experiment (Exercise 3), the results in Stage 3

- a. more nearly resembled those in Stage 1 than in Stage 2.
- b. were nearly identical to those in Stages 1 and 2.
- c. more nearly resembled those in Stage 2 than in Stage 1.
- d. were quite different from those in Stages 1 and 2.

Correct answer: c

Page reference: 40

Answer feedback: Stage 1 was the acquisition condition and Stage 2 the initial extinction condition. A second extinction condition (Stage 3) followed the 24-hr time-out. The results displayed an initial increase in the strength of the CR and a subsequent decrease, much as in Stage 2 and but in contrast to the results in Stage 1.

Question 3

Within the movement ratio and CS response strength windows in Exercise 3, where should one look for clear evidence of spontaneous recovery?

- a. The early trials of Stage 1 and the early trials of Stage 2
- b. The early trials of Stage 1 and the early trials of Stage 3

- c. The late trials of Stage 1 and the late trials of Stage 2
- d. The late trials of Stage 2 and the early trials of Stage 3

Correct answer: d

Page reference: 40

Answer feedback: Spontaneous recovery refers to changes in the CR that occur from the end of one extinction session to the beginning of the next. Specifically, there is an observable increase in the CR as a result of the time-out that occurs between the sessions. Stages 2 and 3 provided this arrangement. Therefore, looking at the CR in terms of the movement ratio or the CS response strength at the end of Stage 2 and at the same measures at the beginning of Stage 3 provides clear evidence of spontaneous recovery.

Exercise 4: *Varying the Strength of the CS*

Question 1

Acquisition occurred most rapidly with

- a. no tone.
- b. the low-intensity tone.
- c. the medium-intensity tone.
- d. the high-intensity tone.

Correct answer: d

Page reference: 41-42

Answer feedback: The experiment was designed to demonstrate the principle that, as the intensity of the CS increases, acquisition occurs more rapidly.

Question 2

The movement ratio grew fastest when the CS

- a. was a low-intensity tone.
- b. was a high-intensity tone.
- c. alternated between low-intensity and medium-intensity.
- d. Alternated between medium-intensity and high-intensity.

Correct answer: b

Page reference: 41-42

Answer feedback: The movement ratio is a proportion: The amount of time during the CS interval that is spent in freezing or other fear-related behavior divided by that same amount plus the amount of time spent in active movement. The high-intensity tone produced the highest level of freezing and other-fear-related behavior, thereby producing the highest values of the movement ratio during acquisition. The procedure did not include the use of alternating stimuli.

Question 3**

Displaying the CS response strength results for the three levels of CS-intensity in a single graph confirmed that

- a. the rate of acquisition was unaffected by the intensity of the CS.
- b. the asymptotic level of conditioning was the same for each level of CS intensity.
- c. acquisition was complete after one trial with the high-intensity CS.
- d. the change in CS response strength from one trial to the next was smaller in the earlier trials than in the later trials.

Correct answer: a

Page reference: 48

Answer feedback: Even though the CS response strength was still lower on the final trial for the low-intensity CS than for the other two intensities, with additional trials it would have eventually reached the same level of CS response strength obtained for the others. In other words, CS response strength approached the same asymptote regardless of CS intensity..

Exercise 5: *Varying the Strength of the US*

Question 1**

Which of the following is affected by changes in the intensity of the US but NOT by changes in the intensity of the CS?

- The speed of acquisition
- The asymptotic level of conditioning
- The movement ratio
- The suppression ratio

Correct answer: b

Page reference: 48-49

Answer feedback: Contrasting the results from Exercises 4 and 5 shows that US intensity is what determines the asymptote of conditioning. The asymptote is not affected by changes in CS intensity. However, both US intensity and CS intensity affect the speed of acquisition and thus the movement and suppression ratios.

Question 2

In Exercise 5, the intensity of the US varied across three sets of trials. Which feature of CS response strength was most indicative of habituation?

- A rapid increase in CS response strength followed by leveling off
- A slow, steady increase in CS response strength
- A steady increase to the asymptote, then a decrease
- A repeating series of rises and falls in CS response strength

Correct answer: c

Page reference: 48-50

Answer feedback: Initial exposure to the low-intensity US produced the familiar increase in CS response strength. With continued exposure, however, CS response strength declined over the remainder of the session. This consistent decline demonstrated habituation. It was not observed in the trials involving the medium-intensity or the high-intensity US.

Chapter 4: *Compound Conditioning, Blocking, Overshadowing, and Overexpectation*

Exercise 6: *Compound Conditioning Compared with Separate Pairings*

Question 1

Which of the following chart notations introduced in Exercise 6 corresponds to a procedure for compound conditioning involving 10 pairings of the compound CS with the US?

- 10: CS_{ML}-US_M
- 10: CS_{MT}-US_M

- c. 10: CS_{ML}&CS_{MT}-US_M
- d. 10: CS_{ML}-US_M + 10: CS_{MT}-US_M

Correct answer: c

Page reference: 54

Answer feedback: The chart notation introduced in this exercise stipulates the use of the ampersand (&) to indicate a compound CS. Specifically, the notation indicates that the medium-intensity light (CS_{ML}) and the medium-intensity tone (CS_{MT}) constitute the compound CS. The US is the medium intensity electric shock (US_M).

Question 2**

Following compound conditioning with a medium-intensity light (CS_{ML}) and a medium-intensity tone (CS_{MT}) in Exercise 6, presentation of the two CSs separately in a pair of extinction trials showed that the

- a. amount of conditioning for each CS was equivalent to that for the compound CS.
- b. light had acquired a much larger amount of conditioning than the tone had.
- c. tone had acquired a much larger amount of conditioning than the light had.
- d. amount of conditioning for the two CSs was essentially equivalent.

Correct answer: d

Page reference: 56

Answer feedback: The amount of conditioning for the light and the tone in the extinction trials was approximately half of what it had been for the compound CS and was approximately equal for the two CSs.

Question 3

The results from the experimental condition in compound conditioning (Exercise 6) support the claim that the conditioned strength of the compound CS is the _____ the conditioned strengths of the two CSs that formed the compound.

- a. difference between
- b. product of
- c. sum of
- d. ratio of

Correct answer: c

Page reference: 56

Answer feedback: The results from the experimental condition demonstrate that compound conditioning is additive, that is, the amount of conditioning for the compound CS is the sum of the separate amounts of conditioning for the CSs that compose it.

Question 4

During the control condition (Stage 1) in compound conditioning (Exercise 6), the medium-intensity tone (CS_{MT}) and medium-intensity light (CS_{ML}) each were paired separately with the medium-intensity electric shock (US_M) on 10 trials, so that the entire stage contained 20 trials. The movement ratio for each CS during the separate extinction trials that followed (Stage 2) were most similar in value to the movement ratio for the

- a. compound CS at the end of Stage 1 of the experimental condition in Exercise 6.
- b. light at the end of Stage 1 of the experimental condition in Exercise 6.

- c. tone at the end of Stage 1 of the experimental condition in Exercise 6.
- d. light and the tone in Stage 2 of the experimental condition in Exercise 6.

Correct answer: a

Page reference: 56, 58

Answer feedback: As a result of being paired with the same US during Stage 1 of the control condition, the movement ratios for the tone and light separately in Stage 2 of the control condition were approximately equal to the movement ratio for the compound CS at the end of Stage 1 in the experimental condition.

Exercise 7: *Blocking*

Question 1**

With respect to the blocking phenomenon, what gets “blocked?”

- a. The US
- b. The conditioning of a new CS that is added to a previously conditioned CS to produce a compound US
- c. A previously conditioned CS
- d. The conditioning of a compound CS that is composed of two previously conditioned CSs

Correct answer: b

Page reference: 60, 63

Answer feedback: When a CS is conditioned to produce a strong CR, presenting that CS with a new CS in a compound CS effectively blocks the conditioning of the new CS, even though the compound CS is paired with the US.

Question 2

In Exercise 7, the movement ratio results for the experimental condition revealed blocking because the value of the movement ratio for the medium-intensity light (CS_{ML}) during the extinction trial (Stage 3) was

- a. virtually zero.
- b. higher than the movement ratio for the tone in Stage 3.
- c. nearly that same as that for the tone in Stage 3.
- d. almost 1.0.

Correct answer: a

Page reference: 62

Answer feedback: If the prior conditioning of the tone in Stage 1 blocked conditioning of the light in Stage 2, then the movement ratio for the light in Stage 3 (extinction) would show almost no conditioning, that is, the movement ratio would be close to zero.

Question 3

In Exercise 7, the conditioning of the medium-intensity light (CS_{ML}) was blocked by the prior conditioning of the medium-intensity tone (CS_{MT}) in Stage 1 before the two stimuli were presented in a compound CS and paired with the medium-intensity electric shock (US_M) in Stage 2. Subsequently, when tested separately in extinction (Stage 3), the movement ratio for the

- a. tone and light were both approximately 0.5.
- b. light was greater than 0.5.

- c. light was less than 0.5 and equal to that for the tone.
- d. light was approximately zero.

Correct answer: d

Page reference: 62

Answer feedback: Blocking is in evidence when there is little, if any, conditioning of the light when it is presented in a compound CS with the tone. This means that there would be virtually no freezing or other fear-related behavior when the light was presented by itself in extinction (that is, the movement ratio would be approximately zero).

Exercise 8: *Overshadowing*

Question 1

Complete the following analogy:

CS salience is to *attention* as

- a. clouds are to the sky.
- b. red is to green.
- c. hot is to cold.
- d. honey is to flies.

Correct answer: d

Page reference: 64

Answer feedback: The definition of stimulus salience refers to the ability of a (CS to attract attention. Of the answer options, honey and flies most clearly exemplifies the notion of attraction. The greater the ability of the CS to attract attention, the greater its salience.

Question 2**

As shown in Exercise 8, compound conditioning can serve as a control for overshadowing as long as the compound CS in the control condition

- a. contains at least three CSs.
- b. contains CSs that have the same salience.
- c. is never paired with the US.
- d. is paired with a US of different intensity than that used in the overshadowing condition.

Correct answer: b

Page reference: 64

Answer feedback: In order to demonstrate the overshadowing that occurs when CSs with different salience are presented together in a compound CS, it is crucial that that the compound CS used in the control condition consist of CSs that have the same salience. This can occur regardless of the number of CSs in the compound CS. The absence of a US or the use of a US with different intensity would weaken the ability of the procedure to serve as a proper control.

Question 3

In Exercise 8, the CS Response Strength Window showed different curves for the low-intensity light (CS_{LL}) and high-intensity tone (CS_{HT}) that were in use during the overshadowing experimental treatment. The different curves corresponded to the greater salience of the tone. Which of the following aspects of the movement-ratio results from the experimental condition was most consistent with the CS-response-strength results?

- a. The rapid growth of the movement ratio in the first few trials of Stage 1 (acquisition)
- b. Values of the movement ratio in excess of 0.5 during Stage 1
- c. The much larger movement ratio for the tone than for the light in Stage 2 (extinction)
- d. The much larger movement ratio for the light than for the tone in Stage 2

Correct answer: c

Page reference: 66

Answer feedback: The difference exhibited in the CS-response-strength results is most clearly reflected in the movement-ratio results from Stage 2, namely, that the movement ratio for the tone was much greater than the movement ratio for the light.

Exercise 9: *Overexpectation*

Question 1**

When two CSs are separately paired with a US for 10 trials each, then combined and paired with the same US for 10 trials, the response strength of each CS declines over the compound trials. This effect is known as

- a. stimulus compounding.
- b. overshadowing.
- c. overexpectation.
- d. blocking.

Correct answer: c

Page reference: 67

Answer feedback: The overexpectation effect refers to the decline in the response strength of CSs when they are presented in a compound and paired with a US subsequent to their first having been paired separately with the US.

Question 2

The initial experiment with a compound CS (Exercise 6) showed that the amount of conditioning of each of the component CSs was approximately half that of the compound CS. Which aspect of the overexpectation experiment (Exercise 9) best parallels that earlier finding?

- a. The essentially equal amounts of conditioning of each of the CSs when they were paired separately with the US before being combined (Stage 1)
- b. The high amount of conditioning of the compound CS when it was first presented (Stage 3)
- c. The fact that the amount of conditioning of the compound CS changed very little across the trials in which it was paired with the US (Stage 3)
- d. The essentially equal amounts of conditioning of each of the CSs when they were presented separately in extinction after having been compounded (Stage 4)

Correct answer: d

Page reference: 66, 69

Answer feedback: In Stage 4, the amount of conditioning of the light and tone was approximately the same, as displayed in both the Movement Ratio and CS Response Strength Windows. In addition, this amount was approximately half of what it had been for the compound CS.

Chapter 5: Inhibitory Conditioning

Question 1

With inhibitory conditioning, the CS signals the subsequent

- a. presentation of the US.
- b. presentation of a compound CS.
- c. absence of the US.
- d. presentation of a stronger US.

Correct answer: c

Page reference: 71-72

Answer feedback: With excitatory conditioning, the pairing of the CS with the US produces a CR. With inhibitory conditioning, the US does not occur, and the CS signals its absence. It is important to distinguish inhibitory conditioning from extinction and from the situation in which stimuli are neutral because they have not undergone acquisition.

Question 2**

According to Pavlov, demonstrations of inhibitory conditioning must take place within the context of excitatory conditioning. This is necessary because

- a. an inhibitory CS, by definition, elicits no CR and is therefore not measurable by itself.
- b. excitatory conditioning is stronger than inhibitory conditioning.

- c. the CS for inhibitory conditioning must always be the same as the CS for excitatory conditioning.
- d. excitatory CSs function as signals, but inhibitory CSs have not signaling function.

Correct answer: a

Page reference: 72

Answer feedback: Inhibitory CSs do not elicit CRs. For that reason their effects are only detectable through some alteration of the CRs elicited by excitatory CSs. Both excitatory and inhibitory CSs function as signals.

Exercise 10: *Prior Inhibitory Conditioning Slows Excitatory Conditioning*

Question 1

Unlike the CS in excitatory conditioning, the CS in inhibitory conditioning (Exercise 10)

- a. initially is presented at low intensity.
- b. is presented without the US.
- c. is presented following the US.
- d. is acquired within one or two trials.

Correct answer: b

Page reference: 72

Answer feedback: To be inhibitory, conditioning must involve the absence of the US. In Exercise 10 the compound CS of the tone and light signaled the absence of electric shock, which otherwise was consistently paired with the light alone. Inhibitory conditioning does not occur necessarily more rapidly than excitatory conditioning does.

Question 2**

Unlike the excitatory conditioning of the tone in the control condition of Exercise 10, the excitatory conditioning of the tone in the experimental condition (Stage 2)

- a. involved pairing the tone with shock.
- b. produced a steady increase in the CS response strength of the tone.
- c. progressed from a negative value of CS response strength to a positive value.
- d. resulted in a decrease in the movement ratio across trials.

Correct answer: c

Page reference: 72-75

Answer feedback: The pattern of excitatory conditioning of the tone was much the same in the experimental and control conditions. The main difference was that, in the experimental condition, the CS response strength of the tone began at a negative value and became positive as the trials proceeded (that is, the prior inhibitory conditioning was, in the textbook's term, "unlearned").

Question 3

The tendency for the movement ratios on Type A trials to be higher than those on Type B trials by the end of Stage 1 of the experimental condition in Exercise 10 is evidence that the

- a. tone was more salient than the light.
- b. light was more salient than the tone.
- c. tone had become an inhibitory CS.
- d. light had become an inhibitory CS.

Correct answer: c

Page reference: 74-75

Answer feedback: The two CSs were selected to have equal salience (medium-intensity). However, the tone was presented as a compound CS with the light in the absence of shock (Type B), and because the light was always paired with shock when presented by itself (Type A), the tone became an inhibitory CS. This was reflected in lower movement ratios during Type B trials as Stage 1 progressed.

Exercise 11: *Inhibitory Conditioning Measured by Response Summation*

Question 1

In Exercise 11, the tone was presented in compound with the light (Stage 1) and also in compound with the bell (Stage 2). What was the critical difference between the two compound CSs— $CS_{MT} & CS_{ML}$ and $CS_{MT} & CS_B$?

- $CS_{MT} & CS_B$ was never paired with shock but $CS_{MT} & CS_{ML}$ always was.
- The bell overshadowed the tone but the light did not.
- $CS_{MT} & CS_B$ was always paired with shock but $CS_{MT} & CS_{ML}$ never was.
- $CS_{MT} & CS_B$ was presented only once.

Correct answer: d

Page reference: 76-78

Answer feedback: There was no evidence that the bell overshadowed the tone. Neither compound stimulus was ever paired with shock. $CS_{MT} & CS_{ML}$ was presented on 10 trials during Stage 1 in order for the tone to become an inhibitory stimulus. Then it was paired with the bell for the first (and only) time in Stage 2 to further demonstrate its inhibitory effect.

Question 2

As demonstrated in Exercise 11, response summation refers to

- the combination (summation) of the response strengths of an explicitly excitatory stimulus (the bell) and an explicitly inhibitory stimulus (the tone) in a single trial (Stage 2).
- the growing value of the movement ratio on both Type A and Type C trials in Stage 1.
- the growing value of CS response strength on Type A and Type C trials in Stage 1.
- the fact that the sum of the movement ratios on the two trials in Stage 2 was about equal to the movement ratios on both Type A and Type C trials in Stage 1.

Correct response: a

Page reference: 76-79

Answer feedback: As one of the methods devised by Pavlov for the study of inhibitory conditioning, response summation refers to the compounding of CSs with excitatory and inhibitory strengths in order to determine how the latter subtracts from (reduces) the former.

Question 3**

Response summation is a valid test of inhibitory conditioning as long as

- a. the excitatory CS and the inhibitory CS are combined.
- b. the US has been presented equally often with the two CSs that are being combined.
- c. a third CS is presented in compound with both the excitatory and the inhibitory CSs.
- d. there is a considerable period of extinction before the summation test is introduced.

Correct answer: a

Page reference: 76-79

Answer feedback: The critical ingredient in the response summation test is that two CSs—one that is excitatory and one that is inhibitory—are presented together.

Chapter 6: Associative Structures in Classical Conditioning: Sensory Preconditioning and Higher-Order Conditioning

Question 1

First-order conditioning involves all the following pairs except

- a. CR and UR.
- b. CS and OR.
- c. CS and CS.
- d. CS and US.

Correct answer: c

Page reference: 81

Answer feedback: As a result of pairing the CS (which initially elicits an observing response or OR) with a US, a CR is acquired that may resemble the UR elicited by the US. First-order conditioning does not involve the pairing of one CS with another CS exclusively.

Question 2**

The essential difference between sensory preconditioning and higher-order conditioning is

- a. that sensory preconditioning requires a US but higher-order conditioning does not.
- b. that sensory preconditioning requires a CS but higher-order conditioning does not.
- c. whether first-order conditioning occurs before or after the CS-CS pairing.
- d. whether first-order conditioning is extinguished before the CS-CS pairing.

Correct answer: c

Page reference: 82

Answer feedback: Both phenomena deal with CS-CS pairings. In the case of sensory preconditioning, the pairings occur prior to first-order conditioning. It is just the opposite with higher-order conditioning.

Exercise 12: *Sensory Preconditioning*

Question 1**

The strongest evidence that the sensory preconditioning demonstrated in Exercise 12 involved a stimulus-stimulus (S-S) association is the fact that

- there was no conditioning of either CS_{ML} or CS_{MT} during Stage 1 of the Experimental and Unpaired Control conditions.
- CS_{ML} or CS_{MT} were both conditioned during Stage 2 of the Experimental condition.
- CS_{MT} became conditioned during Stage 2 of the Experimental and Unpaired Control conditions.
- both CS_{ML} and CS_{MT} s were presented during Stage 1 of the Experimental and Unpaired Control conditions.

Correct answer: c

Page reference: 83-85

Answer feedback: The CS Response Strength Window for the Experimental condition showed that CS_{MT} became conditioned during Stage 2 of that condition but not during the Unpaired Control condition. This is strong evidence for an S-S association as a result of the pairing of CS_{ML} and CS_{MT} during Stage 1 of the Experimental condition.

Question 2

Which of the following terms best captures the relationship between CS_{ML} and CS_{MT} during Stage 1 of the Experimental condition in Exercise 12?

- prediction
- excitation
- inhibition
- acquisition

Correct answer: a

Page reference: 87

Answer feedback: The presentation of CS_{ML} prior to CS_{MT} in Stage 1 resulted in an association between the two stimuli—an S-S association in which CS_{ML} predicted CS_{MT}. This did not occur in the Unpaired Control condition, where the two stimuli were never paired with each other.

Exercise 13: *Higher-Order Conditioning*

Question 1

The patterns of acquisition of conditioning in Stages 1 and 2 of Exercise 13 (higher-order conditioning), as reflected in the movement ratio results, differed most in terms of

- starting at different values (the movement ratio in Stage 1 started higher than that in Stage 2).
- ending at different values (the movement ratio in Stage 2 ended lower than that in Stage 1).

- c. their shapes (the movement ratio in Stage 1 rose slowly, that in Stage 2 very quickly).
- d. one being excitatory (Stage 1) and the other inhibitory (Stage 2).

Correct answer: b

Page reference: 89

Answer feedback: The shapes of the acquisition curves for the two stages were quite similar. Both started at essentially zero and rose quickly on the first few trials. However, the movement ratio in Stage 1 ended at a higher value than that in Stage 2.

Question 2**

In Exercise 13 (higher-order conditioning), there was a tendency for the CS response strength curves representing CS₁ and CS₂ to curve downward once they reached their peaks. This tendency was the result of

- a. overshadowing.
- b. habituation.
- c. sensory preconditioning.
- d. extinction.

Correct answer: d

Page reference: 90

Answer feedback: Once the tone (CS₂) was no longer followed by the US, its response strength declined. Once the light (CS₁) was no longer followed by t CS₂, its response strength declined similarly.

Chapter 7: The Nature of the Association in Classical Conditioning

Question 1**

People learn to be afraid. According to the authors' speculative discussion of theories of classical conditioning, learning fear is consistent with _____ theory and learning what to fear is consistent with _____ theory.

- a. S-S, S-R
- b. S-S, R-R
- c. S-R, S-S
- d. R-R, S-R

Correct answer: c

Page reference: 92

Answer feedback: The authors speculate that the acquisition of excitatory classical conditioning (CS-US) could result in S-R conditioning—a person fearing the CS without regard to the US. On the other hand, S-S conditioning would occur if one feared the CS because one also feared the US.

Question 2

The authors' speculative discussion of the S-R and S-S theories of classical conditioning begins and ends with a caveat, namely, that their speculation is unscientific. It is unscientific because

- a. it fails to refer to the theories in quantitative terms.
- b. it refers to imagined events rather than observed events.
- c. classical conditioning is not scientifically respectable.
- d. in reality, there is only one theory of classical conditioning.

Correct answer: b

Page reference: 91-92

Answer feedback: The authors assert the impossibility of getting or looking inside an animal's mind. For that reason, their speculation about what goes on there must remain outside science, which insists on the observability of the phenomena the theory addresses.

Exercise 14: *Basic Acquisition Under the Four Models*

Question 1

The four conditions in Exercise 14 are based on the possible combinations available in the Nature of Association Window. The S-S, S-R combination is set as the program's default, based on published research results. Specifically, the default combination indicates that the CS-US pairing results in an _____ association and the CS₁-CS₂ in an _____ association.

- a. S-S, S-S
- b. S-S, S-R
- c. S-R, S-S
- d. S-R, S-R

Correct answer: b

Page reference: 94

Answer feedback: According to the S-S model, the individual associates the first stimulus with the second stimulus. The published literature indicates that this type of association is acquired when the pairing is CS-US. According to the S-R model, the association is between the first stimulus with the response to the second stimulus. The literature indicates that this is most likely when the pairing is CS₁-CS₂.

Question 2**

Which of the following statements is true?

- a. Each model of the association in classical conditioning (Exercise 14) produced its own highly distinctive outcome for basic acquisition.
- b. The S-S, S-S and the S-R, S-R models in Exercise 14 produced almost identical outcomes for basic acquisition; the outcomes of the S-S, S-R and S-R, S-S models were very different, however.
- c. The S-S, S-R and the S-R, S-S models in Exercise 14 produced almost identical outcomes for basic acquisition; the outcomes of the S-S, S-S and S-R, S-R models were very different, however.
- d. The outcomes for basic acquisition of the four models in Exercise 14 were quite similar.

Correct answer: d

Page reference: 94-96

Answer feedback: The movement ratio results were slightly different across the models due to the probabilistic design of the program. The CS response strength results were identical.

Exercise 15: *Effect of Habituating the UR on First-Order Conditioning*

Question 1

The experiment in Exercise 15 allowed for differential results of the four models of basic acquisition. According to the S-S, S-R and the S-S, S-S models, the CS _____ elicited a CR when it was presented without the US in Stage 3 because _____.

- should have; the UR had habituated
- should have; the CS had habituated
- should not have; the UR had habituated
- should not have; the CS had habituated

Correct answer: c

Page reference: 96, 98

Answer feedback: Presenting the low-intensity electric shock by itself repeatedly during Stage 2 should have produced habituation of the UR. According to the two models this should result in little, if any, response to the CS in Stage 3, as both models stipulate the acquisition of an S-S association in Stage 1.

Question 2**

The S-R, S-S and the S-R, S-R models in Exercise 15 predict that, following first-order excitatory conditioning of the CS (pairing it with the US) in Stage 1, habituation of the UR in Stage 2 produces what effect when the CS is subsequently presented by itself in Stage 3?

- The UR will quickly reappear.
- The CR will be essentially unchanged.
- The CR will no longer resemble the UR.
- The now-habituated UR will interfere with the CR.

Correct answer: b

Page reference: 96, 98

Answer feedback: Habituation of the UR in Stage 2 should have no effect on the S-R association acquired in Stage 1. The CR should remain intact in Stage 3.

Exercise 16: *Basic Higher-Order Conditioning Under the Four Models*

Question 1

The four models of basic acquisition were applied in Exercise 16 in a two-stage procedure. Stage 1 presented CS₂-US trials. In Stage 2, the trials were CS₁-CS₂. In other words, this preparatory exercise involved

- blocking.
- sensory preconditioning.
- higher-order conditioning.
- overexpectation.

Correct answer: c

Page reference: 100

Answer feedback: In Stage 1, CS₂ (a medium-intensity tone) was paired with the US (a medium-intensity shock). In Stage 2, CS₁ (a medium-intensity light) was paired with CS₂. This procedure is known as higher-order conditioning.

Question 2**

The application of all four models of basic acquisition resulted in each of the following outcomes of Exercise 16 EXCEPT:

- an increase in the movement ratio during Stages 1 and 2.

- b. an eventual decrease in CS response strength during Stage 2.
- c. an increase in CS response strength during Stage 1.
- d. a sudden decrease in the movement ratio during Stage 1.

Correct answer: d

Page reference: 101-102

Answer feedback: The results showed that the movement ratio increased over the trials in Stage 1.

Exercise 17: *Effect on Higher-Order Conditioning of Extinguishing the First-Order CR*
Question 1**

In Exercise 17, a CR was acquired by pairing a medium-intensity tone (CS_{MT}) with a medium-intensity electric shock (US_M). Later the tone was used in a higher-order conditioning procedure to establish a CR to a medium-intensity light (CS_{ML}). According to the S-R models of basic acquisition (S-R, S-S and S-R, S-R), extinguishing the CR to the tone should

- a. make the electric shock ineffective in future conditioning.
- b. also eliminate the CR to the light.
- c. leave the CR to the light unaffected.
- d. convert the light into an inhibitory CS.

Correct answer: c

Page reference: 112

Answer feedback: According to the models, the association between the light and the CR should not be affected by the extinction of the CR to the tone, as the tone's only role in these models is to facilitate the association between the light and the CR. Once the association is acquired, the tone essentially becomes irrelevant to it.

Question 2

Which model of basic acquisition predicted that the extinction of the CR that was acquired during Stage 1 of the higher-order conditioning in Exercise 17 will also extinguish the CR that was acquired during Stage 2?

- a. S-R, S-R
- b. S-S, S-S
- c. S-S, S-R
- d. Both a and c

Correct answer: b

Page reference: 102-105

Answer feedback: The S-S, S-S model predicted that extinguishing the CR that was acquired in Stage 1 ($CS_{MT}-US_M$) would also result in the extinction of the CR that was acquired during Stage 2 ($CS_{ML}-CS_{MT}$), as the critical association was between CS_{MT} and CS_{ML} . In other words, rendering CS_{MT} ineffective also undoes the effectiveness of CS_{ML} .

Question 3

Which model of basic acquisition predicted that the extinction of the CR to the tone (CS_{MT}) in Stage 3 of the higher-order conditioning in Exercise 17 would produce a simultaneous decrease in the CS response strength of both the tone and the light (CS_{ML})?

- a. S-S, S-S
- b. S-R, S-S
- c. S-S, S-R
- d. Both a and b

Correct answer: d

Page reference: 102-105

Answer feedback: According to the S-S, S-S and the S-R, S-S models, the extinction of the CR to the tone will simultaneously extinguish the CR to the light because the critical association is between the two CSs. This outcome is represented by the similar decline in the CS response strengths of the tone and light during Stage 3.

Exercise 18: *Effect on Higher-Order Conditioning of Habituating the UR*

Question 1**

The four models of first-order and higher-order (specifically, second-order) conditioning in Exercise 18 made differential predictions of the outcome when the UR was habituated in Stage 3. Which of the models predicted that, following such habituation, the CR to the tone (CS_{MT}) and the CR to the light (CS_{ML}) both would no longer occur?

- a. S-R, S-R
- b. S-R, S-S
- c. S-S, S-S
- d. S-S, S-R

Correct answer: c

Page reference: 106-107

Answer feedback: According to the S-S, S-S model, habituating the UR will eliminate the CR. In other words, the subject will respond to the tone in the same way it would to the shock. Since the UR no longer occurs, the CR will disappear as well. Similarly, because the tone no longer elicits a CR, there will be no CR in response to the light.

Question 2

With respect to the movement ratio, what was the critical aspect of the outcome in Stage 4 of Exercise 18 that confirmed the S-S, S-S model?

- a. The ratio was near-zero when the light and the tone were presented on separate trials.
- b. The ratio was near-zero when the tone was presented but was much higher when the light was presented.
- c. The value of the ratio was near-zero when the light was presented but was much higher when the tone was presented.
- d. The ratio remained high when the light and the tone were presented on separate trials.

Correct answer: a

Page reference: 106, 110

Answer feedback: The S-S, S-S model predicted that the CR elicited by the tone and the CR elicited by the light would both disappear following the habituation of the UR in Stage 3. The movement ratio results for Stage 4 confirmed this.

Question 3

Of the following possible outcomes in Exercise 18, which was most consistent with the predictions made by the S-R, S-S and S-R, S-R models?

- a. The CS response strength of the tone increased during Stage 1 and even more in Stage 2 but then decreased in Stage 3.

- b. The CS response strength of the light increased in Stage 2 but decreased rapidly in Stage 3.
- c. The CS response strengths of the tone and light remained unchanged during Stage 3.
- d. The CS response strengths of the tone and light decreased rapidly in Stage 4.

Correct answer: c

Page reference: 106, 110

Answer feedback: Both models predicted that the CR to the tone and the CR to the light would be unaffected by the habituation of the UR in Stage 3. In fact, the CS response strengths of both CSs remained at a level similar to that at the end of Stage 2.

Question 4

Of the four models that were tested in Exercise 18, which one predicted different results on the extinction trials in Stage 4? That is, which model predicted that the response to the tone would differ from the response to the light in that stage?

- a. S-S, S-S
- b. S-S, S-R
- c. S-R, S-S
- d. S-R, S-R

Correct answer: b

Page reference: 106-107, 109

Answer feedback: According to the S-S, S-R model, which is strongly supported by published research on second-order conditioning, the habituation of the UR in Stage 3 should have reduced the response strength of the tone (which was paired with electric shock in Stage 1) but not that of the light (which was paired with the tone in Stage 2). Thus, in Stage 4, the response strength of the light should have been notably greater than that of the tone.

Chapter 8: Habituation, Sensitization, Background Conditioning, and the CS and US Pre-Exposure Effects

Question 1

Which of the following produces sensitization of the UR?

- a. Both low- and medium-intensity electric shock
- b. Both low- and high-intensity electric shock
- c. Both medium- and high-intensity electric shock
- d. High-intensity electric shock only

Correct answer: d

Page references: 113

Answer feedback: The program was designed so that the repeated presentation of low-intensity electric shock results in habituation, of medium-intensity no change, and of high-intensity sensitization.

Question 2**

Background conditioning occurs when medium- or high-intensity electric shock is presented but not preceded by an explicit CS. The authors attribute the failure of low-intensity electric shock to produce background conditioning to _____ and the near-absence of background conditioning when a CS precedes electric shock to _____.

- a. habituation; overshadowing
- b. blocking; sensory preconditioning
- c. overexpectation; sensitization
- d. the S-S, S-R model of basic acquisition; the S-S, S-S model of basic acquisition

Correct answer: a

Page reference: 114

Answer feedback: According to the authors, the habituation of the UR in response to repeated presentation of the low-intensity electric shock counteracts background conditioning. Also, they account for the very low level of background conditioning when an explicit CS precedes the electric shock in terms of the much greater salience of the explicit CS. It overshadows the stimuli that otherwise might become associated with the electric shock.

Exercise 19: *Habituation, Sensitization, and Background Conditioning*

Question 1

Of the four measures of Sniify's response in the Low-Intensity US condition in Exercise 19, the only one to show non-zero values was

- a. Fear.
- b. the movement ratio.
- c. Pain Sensitivity..
- d. CS response strength.

Correct answer: b

Page reference: 116-118

Answer feedback: There were occasional non-zero values of the movement ratio during the condition, particularly on the earlier trials.

Question 2**

Exercise 19 included conditions where electric shock was the US and became increasingly more sensitizing. What behavioral effects did the Movement Ratio Window reveal?

- a. Freezing and other fear-related behaviors increased as US intensity increased.
- b. The likelihood of freezing and fear-related behaviors was unrelated to sensitization.
- c. Freezing and other fear-related behaviors decreased as US intensity increased.
- d. Freezing and other fear-related behaviors increased as US intensity increased but then gradually habituated.

Correct answer: a

Page reference: 118-119

Answer feedback: There was no evidence of habituation of the UR as the intensity of the US increased across conditions. Instead, freezing and other fear-related behaviors increased with each increment in US intensity.

Exercise 20: *CS Pre-Exposure Effect*

Question 1**

The CS pre-exposure effect refers to the _____ as a result of repeated pre-exposure prior to pairing with the US.

- a. sensitization of the CS
- b. devaluation of the US
- c. slowing of conditioning
- d. slowing of extinction

Correct answer: c

Page reference: 119

Answer feedback: The retardation or slowing of acquisition is the principal feature of the CS pre-exposure effect.

Question 2

A comparison of the results from the two conditions in Exercise 20 revealed that

- a. the movement-ratio data from the two conditions were almost identical, but the CS- response-strength curves were very different in shape.
- b. the CS-response-strength curves from the two conditions were almost identical in shape, but the movement-ratio data were very different.
- c. the CS-response-strength and the movement-ratio results from both conditions were virtually identical.
- d. although the CS-response-strength and the movement-ratio results from both conditions were similar, acquisition was slowed in the experimental condition.

Correct answer: d

Page reference: 120-121

Answer feedback: A comparison of the results from the two conditions revealed that, although acquisition occurred during both, it was noticeably slower to develop in the experimental condition—evidence for the CS pre-exposure effect.

Exercise 21: *US Pre-Exposure Effect*

Question 1

Recall that habituation refers to the decrease of the UR with repeated exposure to the US by itself. The movement-ratio results and the CS-response-strength results from Stage 1 in Exercise 21 suggest that the US pre-exposure effect is not the result of habituation because

- a. there were only 10 presentations of the US.
- b. although CS response strength remained at zero, the movement ratio was occasionally greater than zero.
- c. although the movement ratio remained at zero, the CS response strength rose above zero.
- d. the non-zero levels of both measures indicated that background conditioning had taken place.

Correct answer: d

Page reference: 123

Answer feedback: The movement-ratio results and the CS-response-strength results both suggest that a low level of background conditioning developed during Stage 1. This would have been unlikely had the UR habituated.

Question 2**

A comparison of the results from the experimental condition with those from the control condition in Exercise 21 revealed that prior exposure to the US by itself

- a. slowed the subsequent conditioning of the CS at least slightly.
- b. had no effect on the subsequent conditioning of the CS.
- c. had no effect on the subsequent conditioning of the CS provided the CS was introduced with high intensity.
- d. sped the subsequent conditioning of the CS.

Correct answer: a

Page reference: 123

Answer feedback: The CS was presented at medium intensity. A comparison of the results from the two conditions indicates that acquisition proceeded more slowly in the experimental condition, consistent with the US pre-exposure effect.

Question 1**

Like pre-exposure to the US (Exercise 21), pre-exposure to the CS (Exercise 20)

- a. lowered the asymptotic level of conditioning.
- b. reduced the rate of acquisition by approximately half.
- c. accelerated the rate of acquisition by approximately half.
- d. made conditioning more resistant to extinction.

Correct answer: b

Page reference: 124

Answer feedback: The definitions of CS and US pre-exposure make no reference to their effects on extinction. Instead, a comparison of the two phenomena indicates that both result in a lowered asymptote, while CS pre-exposure also slows the rate of acquisition.

Chapter 9: Introduction to Operant Conditioning

Question 1

Thorndike used a device he called a(n) _____ to study trial-and-error learning in animals. On the basis of his results he formulated the Law of Effect, which viewed learning as the strengthening or weakening of _____ between situations in which responses occur and are followed either by satisfaction or discomfort.

- a. operant chamber; reflexes
- b. operant chamber; connections
- c. puzzle box; reflexes
- d. puzzle box; connections

Correct answer: d

Page reference: 127-128

Answer feedback: In his pioneering work, Thorndike constructed a puzzle box into which he placed animals, such as cats, then waited until they succeeded in escaping from the box by correctly manipulating the mechanism that allowed exit. The pattern of results that Thorndike observed, namely, that, over successive trials, the amount of time required to exit from the puzzle box sharply decreased, resulted in his Law of Effect. It stated that, when responses occurred in a situation and were followed by satisfaction or by discomfort, the connections between those responses and the situation were strengthened or weakened, respectively.

Question 2

Unlike Thorndike's procedure that involved the use of _____, Skinner's procedure allowed the subject the continual opportunity to respond. In Sniffy's case, the _____ is the response device this is continually available.

- a. trials; magazine
- b. trials; bar
- c. stages; magazine
- d. stages; bar

Correct answer: b

Page reference: 128, 131

Answer feedback: Skinner dispensed with trials procedures like those Thorndike used in favor of a continuously-available opportunity to respond. In the virtual chamber that Sniffy is exposed to, the response device is the bar. The magazine is located behind the rear wall (and is therefore unseen) and dispenses the food pellets.

Question 3**

The authors characterize Skinner as "agnostic" on what issue?

- a. The relevance of the goings on inside the organism for a science of learning
- b. The widespread reliance on negative reinforcement and on punishment for the control of human behavior
- c. The distinction between emitted and elicited behavior
- d. The categorization of reinforcement and punishment as positive and negative

Correct answer: a

Page reference: 130

Answer feedback: According to the authors, Skinner was agnostic regarding the necessity of including psychological or physiological (or both) variables in accounting for the relationship between an organism's behavior and its environment. His agnosticism can be characterized in at least two ways. First, he was unsure of what actually was occurring within the organism. Second, he was unsure of whether efforts to understand what was going on there were reliable and valid.

Question 4

Which analogy do the authors employ in presenting Skinner's so-called "black box" view of the organism in a science of behavior?

- a. A computer
- b. A television set
- c. Traffic lights
- d. Black holes

Correct answer: b

Page reference: 130

Answer feedback: The authors utilize the analogy of a television set. A person can operate the set by means of external controls and do so without knowing about the internal workings of the set. Similarly, on Skinner's view, the experimental analysis of behavior can proceed successfully by controlling the environment in which an organism's behavior occurs—and in the absence of knowledge about what is occurring within the organism.

Question 5

Which of the following is NOT a component of the operant chamber?

- a. Parallel metal bars that form its floor
- b. A food hopper
- c. A projection screen
- d. A water spout

Correct answer: c

Page reference: 131-132

Answer feedback: There is no projection screen in the chamber. Instead, it also contains a speaker, a light, a bell, and a bar.

Question 6

Banging on the wall in an effort to get the person in the next room to turn down the loud music playing there is an operant response. If the music becomes softer, the response becomes more likely to occur in the future when loud music is heard. In other words, the response has been

- a. positively punished.
- b. negatively punished.
- c. positively reinforced.
- d. negatively reinforced.

Correct response: d

Page reference: 133-134

Answer feedback: That the response has become more likely to occur indicates that it has been reinforced. That the consequence of the response was the removal of (or escape from) a stimulus otherwise occurring (the loud music) means that the response was negatively reinforced.

Question 7

Money is an example of a(n) _____ reinforcer.

- a. intrinsic
- b. primary
- c. conditioned
- d. emitted

Correct answer: c

Page reference: 134

Answer feedback: One learns to value money as it is paired with primary reinforcers, such as food, drink, and temperature regulation, for example. In other words, it becomes a reinforcer through classical conditioning. For this reason, it is categorized as a conditioned, or secondary, reinforcer.

Chapter 10: Basic Operant Phenomena: Magazine Training, Shaping, Extinction, Spontaneous Recovery, and Secondary Reinforcement

Question 1

Which problem is solved by establishing the magazine sound in the operant chamber as a secondary reinforcer?

- a. Locating the food hopper
- b. Providing a reinforcer immediately

- c. Establishing food as a reinforcer
- d. Strengthening the bar-food association

Correct answer: b

Page reference: 137-138

Answer feedback: Reinforcement becomes less effective as it is delayed. The immediacy of the sound of the magazine following a reinforced bar press means that the sound can become an effective secondary reinforcer as a result of repeated pairing with the presence of the food pellet in the hopper. The magazine is located behind the back wall and is not visible. Thus the sound of the magazine does not signal the physical location of the hopper. Nor does it establish food as a reinforcer. A separate procedure, such as food deprivation, is required. Finally, the Sniffy program does not include a bar-food association.

Question 2**

The sound-food association in the Operant Associations Mind Window measures the

- a. intensity of the sound of the food magazine and the number of pellets that are dispensed.
- b. degree to which the sound of the food magazine has become a secondary reinforcer.
- c. extent of classical conditioning involving the chamber (the background CS) and food (the US).
- d. association between Sniffy's behavior and the food.

Correct answer: b

Page reference: 138-139

Answer feedback: The sound of the food magazine becomes a secondary reinforcer as a result of being paired with the delivery of food. This is essentially a classical conditioning procedure. The sound does not vary in intensity. Action Strength is the program's measure of the association between a particular pattern of behavior (such as a bar press) and the delivery of food.

Question 3

The cumulative record provides a time-based record of each of the following EXCEPT

- a. the presentation of a light, tone, or bell
- b. a bar press or other designated behavior
- c. the program's automatic presentation of a food pellet
- d. the manual presentation of a food pellet

Correct answer: a

Page reference: 139

Answer feedback: The cumulative record does not provide a record of the presentation of stimuli other than food pellets. It also records the occurrence of bar presses or other designated behavior.

Question 4

The amount of elapsed time between successive vertical solid and dotted lines in the cumulative record is

- a. 30 seconds.

- b. 1 minute.
- c. 5 minutes.
- d. 10 minutes.

Correct answer: c

Page reference: 139

Answer feedback. Solid and dotted vertical lines alternate in the cumulative record. Each marks the end of a 5-minute interval.

Exercise 22: *Magazine Training*

Question 1

The instructions for magazine training contain each of the following EXCEPT

- a. delivering several pellets in rapid succession when Sniffy closely approaches the hopper.
- b. keeping close watch on the sound-food association in the Operant Associations Mind Window.
- c. letting Sniffy move away from the hopper a short distance before delivering the next pellet.
- d. making sure that Sniffy finishes consuming one pellet before delivering another.

Correct answer: d

Page reference: 140-141

Answer feedback: The suggestion to deliver pellets in rapid succession when Sniffy is close to the hopper implies that it is not necessary that he finish consuming one before the next is delivered.

Question 2**

During magazine training, the Lab Assistant will indicate that the association between the sound of the magazine and the food is sufficiently strong that the sound now functions as a reinforcer. This message will appear when the sound-food association has reached approximately _____ of its full value.

- a. 50%
- b. 75%
- c. 90%
- d. 100%

Correct answer: b

Page reference: 141

Answer feedback: The message appears when the value of the sound-food association is three-quarters of the way up the scale. .

Exercise 23: *Shaping: Shaping Sniffy to Press the Bar*

Question 1**

Shaping involves all of the following EXCEPT

- a. behavioral variability.
- b. successive approximations.
- c. delayed reinforcement.
- d. target behavior.

Correct answer: c

Page reference: 141-142

Answer feedback: Shaping refers to the selective reinforcement of successive approximations to the target behavior. In other words, reinforcement is withheld until the desired behavior occurs and is delivered immediately. Shaping succeeds because behavior is variable.

Question 2

Which of the following behaviors should be reinforced during the shaping of Sniffy's bar-press behavior?

- a. Rearing up and looking away from the back wall
- b. Touching the bar and the hopper simultaneously
- c. Rearing up with his feet against the back wall
- d. Looking at the hopper before pressing the bar

Correct answer: c

Page reference: 142-144

Answer feedback: Because the target behavior is the bar press, behavior that places Sniffy in close proximity to the bar and with a posture that makes bar pressing more likely to occur is included in the successive approximations to the bar press. The bar is located on the back wall, so that rearing up on that wall increases proximity to the bar. And rearing up with feet against the wall is a posture that favors eventual bar pressing.

Question 3

The shaping of Sniffy's bar press differs from that with real laboratory rats because

- a. the program will automatically shape Sniffy's bar press if necessary.
- b. shaping real rats to bar press requires patience and close observation.
- c. Sniffy's behavioral repertoire is much larger than that of real rats.
- d. Sniffy does not satiate with continued food consumption.

Correct answer: d

Page reference: 142

Answer feedback: In fact, shaping Sniffy's bar press requires patience and close observation unless it occurs automatically. Sniffy's behavioral repertoire is smaller than that of real rats and, unlike real rats, Sniffy does not satiate.

Exercise 24: *Cumulative Records: Visualizing Sniffy's Responding*

Question 1**

In Skinner's version of the cumulative record, the rate of responding corresponded to the

- a. length of the paper on which the cumulative record was drawn.
- b. number of movements of the pen from the bottom to the top of the paper.
- c. steepness of the line that the pen traced on the paper.
- d. distance from the bottom to the top of the paper.

Correct answer: c

Page reference: 147

Answer feedback: As responding becomes faster, the line that the pen traces on the page becomes steeper, that is, each upward movement of the pen occurs after a shorter period of time.

Question 2

A short, oblique (diagonal) line drawn through the continuous line in the cumulative record indicates

- a. a pause in responding.
- b. a reinforced response.
- c. the occurrence of a response other than bar pressing.
- d. a bar press.

Correct answer: b

Page reference: 147-148

Answer feedback: Pausing, as might occur when behavior other than bar pressing takes place, would appear as a flat segment in the continuous line. A bar press advances the line in the vertical direction. The occurrence of reinforcement following a bar press is recorded as a short, oblique line drawn through the continuous line.

Question 3

In a cumulative record, the number of responses required to move the pen from the bottom to the top of the record (from which it will reset to the bottom) is.

- a. 25.
- b. 50.
- c. 75.
- d. 100.

Correct answer: c

Page reference: 149

Answer feedback: It requires 75 responses for the pen to move from the bottom to the top of the record.

Question 4

The cumulative record also contains short, vertical lines near the top of the record. These lines indicate

- a. reinforcers delivered manually.
- b. the occurrence of behaviors other than bar presses.
- c. pauses in bar pressing that were longer than 10 seconds.
- d. changes in Action Strength.

Correct answer: a

Page reference: 148

Answer feedback: The short, vertical lines indicate the manual delivery of reinforcement. Thus there is the possibility that they will coincide with the short, oblique lines in the record. However, as Sniffy increasingly produces reinforcers on his own, the short, oblique lines will continue to appear, but the short, vertical lines will not.

Exercise 25: *Extinction*

Question 1**

Extinction is marked by all of the following EXCEPT

- a. the termination of reinforcement.
- b. the extinction burst.
- c. a gradual decrease in the rate of reinforcement.
- d. a gradual decrease in the rate of responding.

Correct answer: c

Page reference: 149, 151

Answer feedback: Extinction refers to the behavior effects of the termination of reinforcement—a termination that is abrupt rather than gradual. A sudden, temporary increase in responding following the termination of reinforcement is known as the extinction burst. It is followed by a decrease in responding.

Question 2

What is the criterion for the extinction of Sniffy's bar pressing?

- a. No bar presses for at least 5 minutes
- b. No more than 2 bar presses during a 5-minute interval
- c. No more than 5 bar presses during a 10-minute interval
- d. No more than 10 bar presses during a 10-minute interval

Correct answer: b

Page reference: 151

Answer feedback: The extinction criterion has been met when a 5-minute interval has passed in which no more than 2 bar presses occurred.

Question 3

Which of the following does NOT decrease during extinction?

- a. Sound-food association
- b. Bar-sound association
- c. Bar pressing
- d. Action strength

Correct answer: a

Page reference: 153

Answer feedback: The sound-food association does not decrease because the food magazine is muted (inoperative) during extinction. That is, neither the sound of the magazine nor the release of food pellets occurs.

Exercise 26: *Secondary Reinforcement*

Question 1

During an extinction procedure in which food is no longer delivered but the sound of the food magazine still occurs,

- a. the bar-sound association disappears.
- b. the extinction burst disappears.
- c. the sound-food association remains intact.
- d. Extinction occurs more rapidly than when the sound is also absent.

Correct answer: b

Page reference: 155

Answer feedback: In fact, the bar-sound association remains intact because pressing the bar continues to produce the sound. The sound-food association disappears because the sound now occurs without being followed by food. With the sound still produced by bar presses, it takes longer to reach the extinction criterion.

Question 2

What accounts for the absence of the extinction burst during the procedure in which the secondary reinforcer (the sound of the food magazine) is still presented but food is not?

- a. The distraction provided by the sound of the magazine
- b. The use of a continuous reinforcement schedule prior to extinction
- c. The much lower rate of bar pressing that occurs once food is withheld
- d. Following a bar press, in order to sniff the food hopper, Sniffy moves off the bar

Correct answer: d

Page reference: 155

Answer feedback: The explanation for the extinction burst in Exercise 25 was that, when the magazine sound and food were no longer available, Sniffy remained on the bar, thus allowing a high rate of responding to occur. Moving to sniff the hopper in response to the magazine sound means moving off the bar, thereby reducing the rate of responding.

Question 3**

What are two results of continuing to present the secondary reinforcer (the magazine sound) during extinction rather than eliminating it together with the primary reinforcer (food)?

- a. The extinction criterion is reached sooner, and a larger number of responses is produced.
- b. The extinction criterion is reached later, and a larger number of responses is produced.
- c. The extinction criterion is reached sooner, and a smaller number of responses is produced.
- d. The extinction criterion is reached later, and a smaller number of responses is produced.

Correct answer: b

Page reference: 153-155

Answer feedback: The presence of the secondary reinforcer produces more sustained responding in the earlier portion of the extinction session, thereby deferring the extinction criterion and assuring that more responses occur than would otherwise.

Exercise 27: *Spontaneous Recovery*

Question 1**

Following an initial extinction session, then a rest period in his home cage, Sniffy is returned to the chamber for another extinction session. At the beginning of this second session, the rate of bar pressing will be

- a. intermediate between what it was prior to the first extinction session and what it was at the end of the first extinction session.
- b. greater than it was prior to the first extinction session.
- c. the same as it was at the end of the first extinction session.
- d. the same as it was at the beginning of the first extinction session.

Correct answer: a

Page reference: 156

Answer feedback: The responding that is observed at the outset of the second extinction session generally has a rate greater than it was at the end of the first extinction session (responding is said to have “recovered”) but lower than the rate that was observed prior to the first session.

Question 2

Spontaneous recovery appears at the beginning of extinction sessions that are separated by rest periods. Eventually, with continued extinction sessions, it is most likely that the

- a. level of spontaneous recovery will increase to the point that extinction is essentially reversed.
- b. sessions will take less and less time to complete, and fewer and fewer responses will be emitted.
- c. animal will continue to rest after being returned to the chamber, and very little activity will be observed there during the sessions.
- d. period of spontaneous recovery will move from the beginning of the session to the middle and then to the latter portion of the session.

Correct answer: b

Page reference: 164

Answer feedback: The comparison of results from the first and second extinction sessions will reveal that the second session was shorter and included fewer responses. If

these trends are projected over additional extinction sessions, the length of the session and the number of responses may be expected to continue to decrease.

Question 1**

The program identifies 22 separate behaviors that constitute Sniffy's naïve behavioral repertoire. The program records the total number of times each behavior occurs during a specified interval of time (measured in seconds). It also divides the total number by the total time, which produces a measure known as the _____ of the behavior.

- a. slope
- b. rate
- c. relative frequency
- d. cumulative frequency

Correct answer: b

Page reference: 158

Answer feedback: Dividing the total number of times a behavior occurs by the total amount of time in which it was counted produces the rate of the behavior.

Question 2

Suppose that the components of Sniffy's naïve behavioral repertoire occur a total of 4,800 times during a 30-minute period of time. Of those components, sniffing occurs 1,200 times. The relative frequency of sniffing is

- a. 0.2.
- b. 0.25.
- c. 0.8.
- d. 4.0.

Correct answer: b

Page reference: 158

Answer feedback: The relative frequency of a behavior is calculated by dividing the total number of times it occurred within a specified span of time by the sum total of all behaviors that occurred in that same span. In this example, 1,200 divided by 4,800 equals 0.25.

Exercise 28: *The Effects of Acquisition and Extinction on the Relative Frequencies of Sniffy's Behaviors*

Question 1

Exercise 28 contrasts the effects of different experimental conditions on the relative frequencies of the behaviors that constitute Sniffy's naïve behavioral repertoire. Which of the following is NOT one of the conditions included in the exercise?

- a. Extinction of the bar press
- b. Magazine training
- c. Acquisition of the bar press
- d. Spontaneous recovery of the bar press

Correct answer: d

Page reference: 160

Answer feedback: The conditions involved in Exercise 28 are untrained (naïve) Sniffy, magazine-trained Sniffy, Sniffy shaped to bar press, and Sniffy with bar pressing

extinguished. Only one extinction session figured in the final condition, so spontaneous recovery was not part of it.

Question 2**

Of the components of Sniffy's behavioral repertoire recorded in Exercise 28, which did NOT increase in relative frequency as a result of bar-press training?

- a. Rearing up against the back wall
- b. Sniffing at the hopper
- c. Dismounting from the bar
- d. Eating food pellets

Correct answer: a

Page reference: 162

Answer feedback: The comparative results showed the bar-press training had the overall effect of increasing the relative frequencies of those behaviors related to bar pressing and its consequences and decreasing the relative frequencies of all other behaviors. Thus, the relative frequency of rearing against the back wall decreased, as Sniffy went from the bar to the hopper and back again, and no longer reared up against the back wall as he had during the shaping of the bar press.

Chapter 11: *The Effects of Punishment on Response Elimination*

Question 1**

Which of the following pairs shares a similar effect on response rate?

- a. Reinforcement and punishment
- b. Reinforcement and extinction
- c. Punishment and extinction
- d. Sensitization and habituation

Correct answer: c

Page reference: 165

Answer feedback: The effect of punishment is to reduce response rate, similar to the effect of eliminating reinforcement for a previously reinforced response, which is the procedure of extinction. Like reinforcement and punishment, sensitization and habituation refer to increasing and decreasing response rate, respectively.

Exercise 29: *The Effect of a Single Mild Punishment*

Question 1

The effect of administering a single mild shock following the first response in the extinction condition of Exercise 29 was to

- a. produce a much larger and more prolonged extinction burst than would have occurred without punishment.
- b. accelerate extinction.
- c. eliminate all bar pressing for approximately a half-hour.
- d. defer the appearance of the extinction burst and the subsequent course of extinction.

Correct answer: d

Page reference: 166

Answer feedback: The presentation of a punisher is not the same as extinction, which is what Exercise 29 was designed to demonstrate. Although the single mild shock suppressed bar pressing for a couple of minutes, bar pressing resumed, and a characteristic pattern of extinction, including the extinction burst, ensued.

Question 2**

In Exercise 29 you compared to the effects of extinction in two difference conditions: one in which a mild electric shock was administered following the first response in extinction versus one in which no shock was administered during extinction. In terms of the number of responses required to meet the extinction criterion, you likely found that the number of responses was

- a. much larger when the shock occurred.
- b. much smaller when the shock occurred.
- c. about the same under the two conditions..
- d. a poor measure of the difference between the two conditions, as Sniffy never responded after the shock was delivered..

Correct answer: c

Page reference: 166-167

Answer feedback: The administration of a mild shock following the first response in extinction briefly suppressed responding, but, by the time Sniffy reached the extinction criterion, the total number of responses was similar to that under the extinction condition in which no shock was delivered.

Exercise 30: *The Effect of a Single Severe Punishment*

Question 1**

In Exercise 30, the critical difference between the effect of extinction and the effect of extinction plus a single severe punisher following the first bar press after extinction began was that

- a. bar pressing did not gradually decrease after punishment was administered; it stopped suddenly.
- b. punishment produced a much larger burst of bar pressing after its administration than typically occurs with the onset of extinction.
- c. bar pressing took much longer to disappear after the administration of punishment than during extinction without punishment.
- d. there was no burst of responding following punishment; instead bar pressing continued at a steady rate for several minutes before gradually declining.

Correct answer: a

Page reference: 168

Answer feedback: The effect of a single severe electric shock was stark: Bar pressing ceased and remained at near-zero frequency for the remainder of the session.

Exercise 31: *The Effect of Repeated Mild Punishment*

Question 1**

The flat appearance of the cumulative record in Exercise 31, when bar pressing during extinction consistently produced a mild electric shock, was due to the fact that

- a. punishment and extinction are equivalent.

- b. the repeated occurrence of the mild punisher eliminated the extinction burst.
- c. punishment tends to tire the subject.
- d. the punisher suppressed responding for a few minutes each time it occurred

Correct answer: d

Page reference: 169-170

Answer feedback: Because each response was followed by the mild electric shock, and its effect was to suppress responding for a few minutes, the net effect was a nearly-flat cumulative record. In other words, it was not just the extinction burst that was eliminated. Moreover, there is no indication that punishment caused Sniffy to tire. Finally, the logic of the design in Exercise 31 was to demonstrate the contrasting effects of punishment and extinction.

Question 2

Compared with the results of the standard extinction procedure, following each response with a mild electric shock during extinction in Exercise 31

- a. decreased then increased responding.
- b. increased then decreased responding.
- c. left responding largely the same as when no shock occurred during extinction.
- d. produced a very different pattern of responding that demonstrated the distinctive effect of punishment.

Correct answer: d

Page reference: 169-170

Answer feedback: Comparison of the results shows that far fewer bar presses were emitted when a mild shock followed each press. Thus the cumulative record was noticeably different from that produced during the standard procedure. There was no clear differentiation of an increase followed by a decrease in responding nor vice versa.

Chapter 12: Schedules of Reinforcement

Question 1

Continuous reinforcement

- a. is not a schedule of reinforcement.
- b. produces less resistance to extinction than partial reinforcement does.
- c. produces long pauses on a cumulative record.
- d. is not a ratio schedule but rather an interval schedule of reinforcement.

Correct answer: b

Page reference: 171-173

Answer feedback: Technically, a continuous reinforcement schedule is the same as a fixed-ratio (FR) 1 schedule of reinforcement. Under such a schedule, each response produces the reinforcer. As many previous exercises have shown, the schedule produces a moderate rate of response with few, typically brief pauses.

Question 2

The authors' best advice to parents of a child who is beginning to display tantrum behavior is to

- a. never reinforce the behavior.
- b. always punish the behavior.
- c. sometimes reinforce the behavior, thus making it easier to eventually extinguish it.
- d. sometimes punish the behavior, thus making it easier to eventually extinguish it.

Correct answer: a

Page reference: 172

Answer feedback: The authors' best advice is straightforward: Never reinforce tantrum behavior. However, if parents reinforce it, they should do so consistently so that it will extinguish more readily once extinction is implemented. Partial reinforcement, as well as partial punishment, of a behavior render it more resistant to extinction.

Question 3

In a typical sequence from preschool to first grade, the schedules of reinforcement that are in place in the classroom tend to

- a. remain unchanged.
- b. be interval schedules rather than ratio schedules.
- c. alternate in a regular way with schedules of extinction.
- d. change from continuous to partial reinforcement.

Correct answer: d

Page reference: 172

Answer feedback: Continuous reinforcement is effective for the acquisition of behavior and is a feature of teachers' performance with younger children. In kindergarten and first grade, teachers employ partial schedules of reinforcement, thereby strengthening already-acquired behaviors and increasing their resistance to extinction.

Question 4

The number 50 that appears in the schedule of reinforcement known as FR-50 refers to

- a. the number of reinforcements that must be given before behavior is stable at the asymptote.
- b. the number of responses that must occur before the reinforcer is delivered.
- c. the minimum amount of time that must pass between two successive reinforcers.
- d. the total number of reinforcements that occur during the session in which the schedule operates.

Correct answer: b

Page reference: 173

Answer feedback: The number that appears in the name of the schedule is a reference to a response-based requirement, namely, the fixed number of responses required for the delivery of the reinforcer.

Question 5**

Which pair of terms is best matched?

- a. Variable-ratio (VR) schedule / scalloping
- b. Fixed-interval (FI) schedule / Las Vegas-style slot machines
- c. Fixed-ratio (FR) schedule / piecework
- d. Variable-interval (VI) schedule / regular pauses following reinforcement

Correct answer: c

Page reference: 173-174

Answer feedback: VR schedules are akin to those with which Vegas-style slot machines are equipped. With larger schedule values, FI schedules and FR schedules are marked by regular pauses after reinforcement. FI schedules produce a characteristic scalloped pattern of responding. FR schedules are the basis of piecework arrangements in the workplace.

Question 6

When a VR schedule of reinforcement is in place, the reinforcer occurs after the

- a. final response in a fixed number of responses (for example, 5).
- b. final response in a variable number of responses. The schedule is designated by the average number of responses that is required (for example, 5 responses).
- c. first response after a variable length of time has transpired. The schedule is designated by the average length of time that is required (for example, 5 minutes).
- d. first response after a constant interval of time (for example, 5 minutes) has occurred.

Correct answer: b

Page reference: 173-174

Answer feedback: A variable-ratio (VR) schedule is defined as a sequence of variable response requirements. When one requirement is completed, the reinforcer is delivered, and a new requirement is implemented. The average number of responses required for reinforcement is the schedule's value (for example, VR-5).

Question 7

Technically, the number of responses required for delivery of the reinforcer under an FI-50 schedule of reinforcement is the same as that under a(n) _____ schedule.

- a. FR-1
- b. FR-50
- c. VR-1
- d. VR-50

Correct answer: a

Page reference: 174

Answer feedback: Although the fixed-interval category of schedules of reinforcement is time-based, reinforcement still requires a response—namely, the first response that

occurs after the completion of the fixed interval of time. Technically, no other responses are required. For this reason, the number of required responses is the same as that for an FR-1 schedule (also known as a CRF schedule). A VR-1 schedule is meaningless, as there would not be a variable number of responses under such a schedule.

Question 8**

Responding under a VI schedule of reinforcement

- a. will be slower than that on a VR schedule of reinforcement when the rates of reinforcement on the two schedules are equated.
- b. resembles that on an FI schedule of reinforcement. Following the reinforcer there is a period of no responding, followed by a rapid rise in responding.
- c. is usually sporadic (now fast, now slow) rather than steady.
- d. shows the same short pause immediately after reinforcement that an FR schedule produces.

Correct answer: a

Page reference: 175, 182

Answer feedback: VI schedules characteristically produce steady rates of responding—smooth lines in a cumulative record rather than the scalloped pattern that characterizes FI responding or the pausing after reinforcement that is typical of FR responding. However, the rates of responding maintained by VI schedules are lower than those maintained by VR schedules with comparable rates of reinforcement, as Reynolds's experiment involving yoked schedules of reinforcement showed.

Question 9

The principal finding in Reynolds's (1975) experiment with pigeons and a yoked experimental design was that

- a. ratio schedules produce greater resistance to extinction than interval schedules do.
- b. pauses following reinforcement are longer with ratio schedules than interval schedules
- c. VR schedules produce higher rates of responding than VI schedules do.
- d. Both FI and FR schedules produce a scalloped response pattern in the cumulative record.

Correct answer: c

Page reference: 175-177

Answer feedback: Reynolds used the yoked experimental design in order to equate rates of reinforcement and showed that VR schedules produced higher rates of responding than VI schedules did. The scalloped pattern of responding is associated with FI schedules of reinforcement.

Exercise 32: *Placing Sniffy on a Small VR Schedule*

Question 1

What typically occurs when the schedule of reinforcement is switched from continuous (under which Sniffy was fully trained) to a VR-5 as in Exercise 32?

- a. Responding rapidly declines to almost zero, due to extinction.
- b. The bar-sound association and action strength decrease, then increase.

- c. The sound-food association and action strength decrease, then increase.
- d. The bar-sound and sound-food associations both decrease, then increase.

Correct answer: b

Page reference: 180

Answer feedback: Because each bar press no longer produces the reinforcer, the bar-sound association will decrease, and responding will extinguish. This will produce a decrease in action strength as well. With additional exposure to the VR-5 schedule, responding will recover, and both the bar-sound association and action strength will return to their maxima.

Question 2**

The cumulative record for VR-5 performance in Exercise 32 was characterized by all of the following EXCEPT

- a. steady responding.(only brief pauses)
- b. rapid responding (approximately 30 responses per minute)
- c. irregular placement of the short, oblique lines designating reinforcement
- d. regular placement of the short, oblique lines designating reinforcement

Correct answer: d

Page reference: 180

Answer feedback: The short, oblique lines indicating the delivery of the reinforcer are irregularly placed in the cumulative record, as the schedule provides reinforcement after variable numbers of responses rather than a fixed number.

Exercise 33: *Increasing the Value of Sniffy's VR Schedule*

Question 1**

Changing from a VR-5 schedule to a VR-50 schedule in one step will most likely produce

- a. a smooth acceleration in response rate.
- b. a cyclical pattern of responding—fast then slow.
- c. faster reinforcement.
- d. extinction.

Correct answer: d

Page reference: 181

Answer feedback: When previous schedule exposure has been limited only to a small VR schedule, a switch to a schedule with a response requirement 10 times greater is most likely to produce extinction. For this reason, the switch should occur through a series of progressively greater schedule values until the value of 50 is reached.

Question 2

Compared to the cumulative record for the VR-5 schedule in Exercise 32, the cumulative record for the VR-50 schedule in Exercise 33 showed

- a. a lower rate of responding.
- b. about the same rate of responding.
- c. a higher rate of responding.
- d. a pattern of responding with frequent long pauses.

Correct answer: c

Page reference: 180, 182

Answer feedback: If the VR-50 schedule value was approached through a series of intermediate steps, the cumulative record should display roughly parallel response lines with a steep slope, indicating a high, steady rate of responding.

Exercise 34: *Variable-Interval Schedules*

Question 1**

In a comparison of the cumulative record produced by the VR-50 schedule of reinforcement in Exercise 33 with the cumulative record for the VI-50 in Exercise 34 , which feature of the pattern of responding do the two records share?

- a. High rate
- b. Low rate
- c. Steady rate
- d. Scallop

Correct answer: c

Page reference: 182

Answer feedback: The rates of responding produced by the two schedules were very different, with the rate under the VR-50 schedule being much higher. However, both schedules produced responding that was steady. Neither record displayed the scalloped pattern of responding that characterizes FI schedules (scalloped).

Exercise 35: *Fixed-Ratio Schedules*

Question 1**

The characteristic features of behavior that developed with an FR-50 schedule of reinforcement in Exercise 34 included all of the following EXCEPT

- a. an immediate resumption of responding following reinforcement.
- b. a constant number of responses following one instance of reinforcement before the next reinforcer is delivered.
- c. an extended pause immediately following reinforcement.
- d. a rapid sequence of responses following the post-reinforcement pause.

Correct answer: a

Page reference: 183

Answer feedback: Fixed-ratio schedules of reinforcement characteristically produce a pattern of behavior marked by a post-reinforcement pause, following by a high, steady

rate of responding. Successive instances of reinforcement are separated by the same, fixed number of responses.

Exercise 36: *Fixed-Interval Schedules*

Question 1**

The essential features of the “scallop” that distinguishes FI schedules of reinforcement are

- a. a low, steady rate of responding and a long pause following reinforcement.
- b. a high, steady rate of responding and a long pause following reinforcement.
- c. a low rate of responding following reinforcement and a gradual transition to a high rate of responding prior to delivery of the next reinforcer.
- d. a high rate of responding following reinforcement and a gradual transition to a low rate of responding prior to delivery of the next reinforcer.

Correct answer: c

Page reference: 174,176,183

Answer feedback: The scallop that is characteristic of FI schedules is the result of pausing following reinforcement, then a gradual transition to a high rate of responding before the next reinforcer is presented.

Question 1**

The virtual Sniffy differs from real rats in that

- a. Sniffy adapts to new or changed schedules of reinforcement much faster than real rats.
- b. unlike real rats, Sniffy’s behavior is much closer to idealized performance.
- c. Sniffy’s cumulative records are idealized.
- d. Real rats, but not Sniffy, interrupt bar pressing by drinking, wandering, and grooming.

Correct answer: a

Page reference: 183-184

Answer feedback: In order to illustrate Sniffy’s behavior under a variety of schedules of reinforcement, the program greatly reduces the amount of exposure that real rats would require in order to adapt to new or changed schedules.

Exercise 37: *The Effect of Partial Reinforcement on Extinction*

Question 1**

Compared to the continuous reinforcement schedule, partial-reinforcement schedules

- a. produce much higher rates of responding during acquisition.
- b. result in many more responses during subsequent extinction..
- c. are less resistant to extinction.
- d. are much more effective for use in shaping.

Correct answer: b

Page reference: 184-185

Answer feedback: Partial reinforcement produces greater resistance to extinction than continuous reinforcement, including a much larger number of responses before the extinction criterion is reached.

Question 2

The analysis of resistance to extinction in Exercise 37 involved

- a. summing up all the pauses that occurred before the extinction criterion was satisfied.
- b. counting the number of responses that occurred after the extinction burst occurred.
- c. determining the total amount of time that elapsed before the extinction criterion was satisfied.
- d. comparing the time required to reach the extinction criterion with that required following continuous reinforcement.

Correct answer: d

Page reference: 184-185

Answer feedback: The comparison between extinction following continuous reinforcement to extinction following partial reinforcement involved both the total number of responses and the total time that elapsed before the extinction criterion was reached.

Question 3

Which of the following categories of reinforcement schedule tends to produce more resistance to extinction than the others?

- a. VR
- b. VI
- c. FR
- d. FI

Correct answer: a

Page reference: 184

Answer feedback: Generally, ratio schedules tend to produce greater resistance to extinction than interval schedules do. It is also the case that such resistance tends to be greater following variable schedules than fixed schedules.

Exercise 38: *Adjunctive Behavior*

Question 1

Behavior that becomes more frequent as a by-product of the reinforcement of another behavior is referred to as _____.

- a. associative
- b. adjacent
- c. accessory
- d. adjunctive

Correct answer: d

Page reference: 185-186

Answer feedback: The term *adjunctive* is used to describe such behavior.

Question 2

The logic of Exercise 39 was to compare the relative frequencies of the behaviors in Sniffy's behavioral repertoire under continuous reinforcement and the four basic schedules, each with a value of 50. Of specific interest was the relative frequency of drinking and whether it increased in frequency under the standard schedules—a phenomenon known as

- a. scheduled thirst induction.
- b. schedule-induced polydipsia.
- c. schedule-elicited hyperhydration.
- d. schedule-invoked complementarity.

Correct answer: b

Page reference: 186

Answer feedback: The original research by Falk termed the excessive drinking that was observed polydipsia, which is a clinical term, and because it was the by-product of reinforcement schedules, therefore, schedule-induced.

Question 3**

Which of the four partial-reinforcement schedules utilized in Exercise 38 produced the highest level of drinking?

- a. FI-50
- b. FR-50
- c. VI-50
- d. VR-50

Correct answer: a

Page reference: 187-188

Answer feedback: Consistent with the original findings by Falk, the highest levels of schedule-induced polydipsia were observed under the FI-50 schedule of reinforcement.

Chapter 13: *Stimulus Discrimination and Stimulus Generalization*

Question 1

As a result of operant conditioning, individuals learn to behave differently in the presence of different stimuli. This is referred to as

- a. stimulus-specific learning.
- b. stimulus acquisition.
- c. stimulus discrimination learning.
- d. differential response acquisition.

Correct answer: c

Page reference: 191

Answer feedback: Discrimination refers to telling the difference between stimuli.

Learning a discrimination involves learning the difference between stimuli in the presence of which responding produces reinforcers and those in the presence of which it doesn't.

Question 2**

In the presence of an S- (S^Δ), responding is _____ and, in its absence, _____.

- a. extinguished; reinforced
- b. extinguished, extinguished

- c. reinforced, extinguished
- d. reinforced, reinforced

Correct answer: a

Page reference: 192

Answer feedback: In negative stimulus discrimination learning, the presence of a negative discriminative stimulus (S^- or S^Δ) indicates that responding will be extinguished. In its absence, responding will be reinforced.

Question 3**

Responding to stimuli that are similar but not identical to the original training stimulus is referred to as stimulus _____ and typically is conducted under _____.

- a. discrimination; continuous reinforcement
- b. discrimination; extinction
- c. generalization; continuous reinforcement
- d. generalization; extinction

Correct answer: d

Page reference: 191-193

Answer feedback: Recognizing stimuli as similar is referred to a generalization and may be considered the inverse of discriminating between them. Tests of stimulus generalization are carried out under conditions of extinction, which avoids some of the complications that would otherwise occur if it were carried out under conditions of reinforcement.

Question 4

Generalization testing presents the problem of order effects, that is, the order in which different stimuli are presented during the generalization test may affect the subject's response to them. For example, a stimulus presented soon after extinction has begun may be responded to differently than if that same stimulus were presented later during extinction. To solve this problem, the Sniffy program

- a. presents the generalization stimuli during reinforcement rather than during extinction.
- b. presents each generalization stimulus as though it were the first one to be presented after extinction began.
- c. alternates periods of extinction with reinforcement during generalization testing.
- d. gradually introduces extinction by presenting the reinforcer less and less often until reinforcement is replaced by extinction.

Correct answer: b

Page reference: 193-194

Answer feedback: The Sniffy program solves the problem of order effects during extinction by restarting the same file for each stimulus presentation during generalization testing. In this way, each stimulus is treated as the "first" to be presented during testing, that is, each stimulus that is presented occurs in the same order—namely, first.

Question 5

Complete the following analogy:

The idealized generalization gradient following tone-on S^+ simple discrimination

learning : the idealized generalization gradient following tone-off S- simple discrimination learning ::

- a. the crest of a wave : the ebb between two waves.
- b. the crest of a wave : the crest of a second wave.
- c. the ebb between two waves : the crest of a wave.
- d. the ebb between two waves : the ebb between two waves.

Correct answer: a

Page reference: 194-195

Answer feedback: The idealized shape of the generalization gradient following tone-on S+ discrimination learning is \cap -shaped and resembles a wave at its crest. The idealized shape of the generalization gradient following tone-off S- discrimination learning is U-shaped and resembles the ebb between two waves.

Question 6

The generalization gradients produced by the Sniffy program are based on those that resulted from visual stimulus discrimination learning involving pigeons. The translation from visual stimuli and pigeons to auditory stimuli and rats was instituted in order to introduce you to two by-products of S+/S- discrimination learning:

- a. gradient displacement and gradient peak.
- b. gradient flattening and gradient shift..
- c. generalization contrast and behavioral peak.
- d. peak shift and behavioral contrast.

Correct answer: d

Page reference: 195-196

Answer feedback: The Sniffy program simulates auditory stimulus discrimination learning and stimulus generalization in order to replicate findings with pigeons that identified the peak shift phenomenon and that of behavioral contrast.

Question 7**

The S+/S- discrimination-learning experiments with Sniffy involve each of the following EXCEPT

- a. the use of CRF rather than PRF schedules.
- b. alternating S+ and S- periods each lasting 1 minute.
- c. the alternating presence of reinforcement and extinction.
- d. the presentation of a 2.0 kHz tone during S+ and no tone during S-.

Correct answer: d

Page reference: 197-199

Answer feedback: The experimental design for the S+/S- discrimination-learning experiments involves the use of two tones—one as the S+ (2.0 kHz) and the other as the S- (2.25 kHz). The two alternate in 1-minute segments featuring a CRF schedule during S+ and extinction during S-.

Question 8

The acquisition criteria for stimulus discrimination learning include

- a. only positive values should appear in the DS Response Strength Mind Window.
- b. near-zero values of the bar-sound association and action strength measures should appear in the Operant Associations Mind Window.
- c. flat lines should appear in the cumulative record when the S- is presented.
- d. the movement ratio should decline rapidly during S- trials.

Correct answer: c

Page reference: 199-200

Answer feedback: The movement ratio is not part of the results. The values on display in the DS Response Strength Mind Window will be positive and negative but largely unchanging. The values of the bar-sound association and action strength will be near their maxima.

Question 9

The authors provide two warnings in connection with stimulus generalization testing. One is NEVER to save the file at the end of a generalization test. The other warning is to be sure to

- a. use the same value of the test stimulus on two consecutive trials.
- b. use the Revert command at the end of each generalization test so that the next test has the same starting point.
- c. save the file at the end of each generalization test and before beginning the next one.
- d. present the test stimuli in ascending, then descending, order so that each one is exposed twice.

Correct answer: b

Page reference: 203

Answer feedback: The authors are very clear about the critical importance of using the Revert command after each generalization test so that the subsequent test will begin with the same starting conditions. Doing so avoids the problem of presenting successive stimuli as extinction proceeds.

Exercise 39: *Simple Tone-On S+ Discrimination Learning*

Question 1

In Exercise 39, discrimination learning involved a tone-on S+, and

- a. extinction occurred both during the S+ and the S-.
- b. extinction occurred only during the S-.
- c. extinction occurred only during the S+.
- d. there was no use of extinction.

Correct answer: b

Page reference: 194, 203-204

Answer feedback: In simple tone-on (S+) tone-off (S-) discrimination learning, the absence of the tone signals extinction.

Question 2**

In Exercise 39, once the simple tone-on tone-off discrimination learning was completed, response rate during the

- a. S- was approximately half of what it is during the S+.
- b. S- was about the same as that during the S+.
- c. S+ was essentially zero.
- d. S- was essentially zero.

Correct response: d

Page reference: 204

Answer feedback: Discrimination learning was complete when responses occurred almost entirely during the S+, with very few, if any, responses during the S-.

Question 3

If a generalization test were performed following the completion of simple tone-on/tone-off discrimination learning (as in Exercise 39) involving a 2.0-kHz tone, the DS Response Strength results from discrimination learning predict that responding during the generalization test would be

- a. highest during the 1.0-kHz and 3.0 kHz tones.
- b. lowest during the 1.0-kHz and 3.0-kHz tones.
- c. highest during the 2.25-kHz tone.
- d. lowest during the 2.0 kHz tone.

Correct answer: b

Page reference: 204

Answer feedback: During generalization testing, the S+ is predicted to produce the maximal rate of responding and the tones farthest from the S+, namely, 1.0 kHz and 3.0 kHz, the minimal rate.

Exercise 40: *Stimulus Generalization after Simple Tone-On S+ Discrimination Learning* Question 1**

In the generalization gradient produced following simple tone-on S+ discrimination learning (see Exercise 40), the x-axis displays _____ and the y-axis displays _____.

- a. responses during the tone; responses during the absence of the tone
- b. responses during the tone; the different tones used during generalization testing.
- c. the DS response strength; the different tones used during generalization testing..
- d. the different tones during generalization testing; responses during the tone..

Correct answer: d

Page reference: 194, 205

Answer feedback: The y-axis of the generalization gradient represents the number of responses that were emitted and the x-axis the stimuli (measured in kHz) that were presented during the generalization testing.

Question 2

The generalization gradient produced by the generalization test in Exercise 40

- a. had its maximum at 3.0 kHz.
- b. was essentially symmetrical around the center of 2.0 kHz.
- c. had a V shape with a minimum at 2.0 kHz.
- d. was essentially flat across the range from 1.0 to 3.0 kHz.

Correct answer: b

Page reference: 205

Answer feedback: The maximum of the gradient was at the frequency used during discrimination training (2.0 kHz). The number of responses fell off on both sides of 2.0 kHz in about the same way, making the gradient symmetrical.

Exercise 41: *Simple Tone-On S- Discrimination Training*

Question 1

In Experiment 41, once simple tone-on S- discrimination learning was complete, the rate of bar pressing

- a. remained at about the same moderate level in the presence and absence of the S-.
- b. was highest during the S- and lowest during the S+.
- c. was lowest during the S- and highest during the S+.
- d. rarely rose above zero.

Correct answer: c

Page reference: 206

Answer feedback: The cumulative record showed bar pressing at a high rate during the S+ (no tone). Few, if any, responses occurred during the S- (2.0 kHz tone).

Question 2**

In Exercise 41, the DS response strength graph following discrimination training showed both positive and negative response strength at all but the extreme values of the nine levels of tone frequency. If the positive and negative strengths for each stimulus were to be summed, what shape would the resulting curve have?

- a. A straight line with a slope of zero
- b. A straight line with a slope of 1.0
- c. A U-shaped curve with its minimum at 2.0 kHz
- d. An inverted U-shaped curve with its maximum at 2.0 kHz

Correct answer: c

Page reference: 207

Answer feedback: The positive DS response strength was about the same for each of the stimuli. The negative DS response strength was lowest at 2.0 kHz. If the response strengths at each frequency were summed, the response strength for 2.0 Hz would be

essentially zero, while that for the other stimuli would be greater than zero and would increase the farther they were from 2.0 kHz.

Exercise 42: *Stimulus Generalization after Simple Tone-On S- Discrimination Learning*
Question 1

The Revert command was used during generalization testing in Exercise 42 so that

- each of the stimuli used during generalization testing was already familiar.
- generalization testing included stimuli different from the S+ used in discrimination training in order to produce a generalization gradient.
- continuous reinforcement would be in effect for each of the stimuli that were presented.
- the presentation of each stimulus began at the same point—the introduction of extinction immediately following stimulus discrimination learning.

Correct answer: d

Page reference: 203, 207

Answer feedback: The repeated use of the Revert command assured that each of the stimuli used during generalization testing was introduced at the same point, namely, the point at which discrimination learning was completed, and extinction was introduced.

Question 2**

In Exercise 42, the generalization gradient that was produced following simple tone-on S- (2.0 kHz) discrimination learning covered the range from 1.0 to 3.0 kHz. The gradient was highest at

- 1.0 kHz.
- 1.5.kHz.
- 2.0 kHz.
- 2.25 kHz

Correct answer: a

Page reference: 208

Answer feedback: The gradient's minimum was at 2.0 kHz. From there it increased in both directions, reaching maxima at 1.0 kHz and 3.0 kHz.

Exercise 43: *S+/S- Discrimination Learning*

Question 1**

In the S+/S- discrimination training in Exercise 43, each of the following occurred EXCEPT for,

- the S+ was a series of tones of different frequency.
- the S- was a tone on.
- the S+ and S- were different tones.
- the S+ was a tone on.

Correct answer: a

Page reference: 195, 208

Answer feedback: In S+/S- discrimination training the S+ and S- were tones with different frequencies. Specifically, the S+ was a 2.0 kHz tone and the S- a 2.25 kHz tone.

Question 2

Based on the DS response strength results in Exercise 43, with S+ = 2.0 kHz and S- = 2.25 kHz, which stimulus would have the lowest net response strength (that is, the sum of positive and negative strengths)?

- a. 1.75 kHz
- b. 2.0 kHz
- c. 2.25 kHz
- d. 2.5 kHz

Correct answer: d

Page reference: 209

Answer feedback: Positive DS response strength was maximal at 2.0 kHz. Negative DS response strength was minimal at 2.25 kHz. Adding the positive and negative strengths for each frequency indicates that net strength would be lowest at 2.5 kHz.

Exercise 44: *Stimulus Generalization after S+/S- Discrimination Learning*

Question 1**

The generalization gradient obtained through testing following S+/S- discrimination learning in Exercise 44, using tones of 2.0 kHz (S+) and 2.25 kHz (S-), had its maximum at _____ kHz and minimum (minima) at _____ kHz.

- a. 2.0; 2.25
- b. 2.0; 2.5
- c. 1.75; 1.0 and 2.0
- d. 1.75; 1.0 and 2.25

Correct answer: d

Page reference: 210

Answer feedback: The generalization gradient had a maximum displaced from the S+ used during training. It was displaced in the direction away from the S- used during training. The maximum occurred at 1.75 kHz. Minima were at 1.0 and 2.25 kHz as well as the stimuli greater than 2.25 kHz.

Question 1**

The generalization gradients produced by generalization testing following simple tone-on S+ discrimination learning, simple tone-on S- discrimination learning, and S+/S- discrimination learning were different in several respects. The differences included all of the following EXCEPT

- a. the maximum of the simple tone-on S+ gradient was highest of all.
- b. the S+/S- gradient was narrower than either of the other two gradients.
- c. although the simple tone-on S- gradient was U-shaped, the other two gradients had an inverted-U shape.

- d. the maxima of the simple tone-on S- gradient were lower than those for the other two gradients.

Correct answer: a

Page reference: 211

Answer feedback: The maximum of the S+/S- generalization gradient was highest of all.

Question 2

The generalization gradient for S+/S- discrimination learning in Exercise 44 peaked at a _____ point than the tone-on S+ gradient (Exercise 40) did and was displaced to the _____ of the peak for that gradient. This displacement demonstrated _____.

- higher; left; peak shift
- higher; right; behavioral contrast
- lower; left; peak shift
- lower; right, behavioral contrast

Correct answer: a

Page reference: 211

Answer feedback: Peak shift refers to the displacement of the S+/S- generalization gradient in the direction away from the S- stimulus. The gradient Exercise 44 had a higher peak than the tone-on S+ gradient in Exercise 40 and was displaced to its left.

Question 3

Which of the following results of generalization testing following discrimination learning in Exercises 40, 42, and 44 demonstrated behavioral contrast?

- The fact that both the tone-on S+ (Exercise 40) and tone-on S- (Exercise 42) generalization gradients were centered at 2.0 KHz (the stimulus used in training)
- The fact that the tone-on S+ generalization gradient (Exercise 40) had its maximum at 2.0 kHz and the tone-on S- gradient (Exercise 42) had its minimum at the same point on the x-axis
- The fact that the maximum of the S+/S- generalization gradient (Exercise 44) was higher than that of the tone-on S+ gradient (Exercise 40)
- The fact that the maximum of the S+/S- generalization gradient (Exercise 44) was displaced to the left of the tone-on S+ gradient (Exercise 40), that is, toward the lower frequencies

Correct answer: c

Page reference: 211

Answer feedback: The phenomenon of behavioral contrast appears in the fact that the peak of the S+S- gradient in Lesson 44 was higher than that of the tone-on S+ gradient in Lesson 40. However, the phenomenon appears in pigeons but not necessarily in real rats that learn to discriminate between tones of different frequencies.

Chapter 14: *Shaping Behaviors Other than Bar Pressing*

Question 1**

Shaping Sniffy to emit behaviors other than bar pressing involves each of the following EXCEPT

- a. a shaping hierarchy.
- b. beginning at the first step in the shaping hierarchy.
- c. a protracted training program consisting of a large number of small steps.
- d. previous magazine training in order to establish a secondary reinforcer.

Correct answer: c

Page reference: 213-214

Answer feedback: The authors readily point out that the program contains a number of features that would be unrealistic in real-world settings. Training real animals is a matter of skill and persistence that leads to major change in an animal's behavior only after a large number of small changes have taken place. For this reason, the authors note that the concluding exercises in the textbook do not provide a realistic view and are meant to teach principles rather than practicable procedures.

Exercise 45: *Shaping Sniffy to Beg*

Question 1**

In order to successfully shape Sniffy's begging behavior in Exercise 45, it is essential that the sound-food association be at its maximum, because

- a. such shaping will require the sound of the magazine but not food.
- b. such shaping requires the previous establishment of a secondary reinforcer.
- c. the begging behavior to be shaped resembles a bar press.
- d. the sound-bar association will be close to zero.

Correct answer: b

Page reference: 213, 216

Answer feedback: The prior establishment of secondary reinforcer that the trainer can present at just the right moment is critical for successful animal training. The secondary reinforcer in Exercise 43 is the sound of the magazine. For this reason, the sound-food association should be at its maximum at the outset of shaping.

Question 2

Failure to produce successful shaping of the begging response could be due to all of the following EXCEPT

- a. reinforcement of Sniffy's rearing while facing the back wall.
- b. an incomplete sound-food association.
- c. too long a delay between Sniffy's rearing behavior and the operation of the food magazine.
- d. the use of the CRF schedule.

Correct answer: d

Page reference: 216

Answer feedback: The use of the CRF schedule is highly effective in shaping. Failure to achieve successful shaping is likely due to one or more of the other factors that are mentioned.

Exercise 46: *Shaping Sniffy to Wipe His Face*

Question 1**

The precursor behavior for the Face Wipe response

- a. always occurs after Sniffy has finished eating a food pellet.

- b. is touching the face with a paw but not moving it repeatedly up and down.
- c. is also the precursor behavior for the bar press.
- d. will disappear after shaping is complete.

Correct answer: b

Page reference: 217

Answer feedback: Touching the face with a paw is the precursor to wiping the face. It will continue to be part of the target behavior once it is shaped. It is not a precursor to the bar-press response and may not always occur following the consumption of a food pellet.

Question 2

The shaping criterion in Exercise 46 was _____.

- a. at least 10 face touches in a 5-minute period
- b. at least 5 face touches in a 10-minute period
- c. at least 10 face wipes in a 5-minute period
- d. at least 5 face wipes in a 10-minute period

Correct answer: c

Page reference: 218

Answer feedback: It was the face-wipe response, as distinguished from face touching, that was shaped in Exercise 46. The shaping phase was considered complete when 10 or more responses occurred within a 5-minute period as indicated in the cumulative record.

Exercise 47: *Shaping Sniffy to Roll*

Question 1**

Which of the following was the correct order of precursor and target behaviors in Exercise 47?

- a. head tucking; rolling
- b. genital grooming; rolling
- c. genital grooming, head tucking, rolling
- d. head tucking, genital grooming, rolling

Correct answer: c

Page reference: 219

Answer feedback: In order to successfully shape the roll response, it was first necessary to shape the genital-grooming response, followed by the head-tucking response.

Question 2

To successfully shape roll behavior in Exercise 47,

- a. it was necessary to continue to reinforce both precursor behaviors and the target behavior each time they occurred.
- b. each precursor behavior was no longer reinforced once it occurred with sufficient frequency.
- c. reinforcement was withheld following the first precursor behavior once it occurred frequently enough and always followed the second precursor behavior.
- d. reinforcement was withheld following the second precursor behavior once it occurred frequently enough but continued always to follow the first precursor behavior.

Correct answer: b

Page reference: 219

Answer feedback: The procedure for successfully shaping roll behavior discontinued reinforcement for the genital-grooming response once it became frequent. The procedure also discontinued reinforcement for the head tuck after the first 50 rolls (or thereabouts) had occurred.

Exercise 48: *Shaping Sniffy to Perform Other Behaviors*

Question 1**

In order to successfully shape other “tricks” in Sniffy’s repertoire, all of the following are essential EXCEPT

- a. patience.
- b. a strong sound-food association.
- c. at least occasional reinforcement of bar pressing—as a reminder.
- d. good timing, so that the reinforcer quickly follows both precursor and target behaviors.

Correct answer: c

Page reference: 221

Answer feedback: Maintaining the maximal sound-food association is essential for successful shaping of precursor and target behaviors, as are patience and good timing. The bar press is not a necessary component of other “tricks.”

Question 2

In which of the following responses in Sniffy’s “sniff” repertoire is his nose not visible?

- a. Sniff front
- b. Sniff rear
- c. Sniff left
- d. Sniff right

Correct answer: b

Page reference: 222

Answer feedback: Only when Sniffy sits facing the rear wall is his nose no longer visible. In this case, wiggling is a cue for his sniffing.

Exercise 49: *How Training to Beg, Face Wipe, and Roll Affects the Frequency of Other Behaviors in Sniffy’s Behavior Repertoire*

Question 1**

In Exercise 49, the relative frequencies of begging, face wiping, and rolling were compared to the

- a. effects of magazine training.
- b. effects of extinction.
- c. relative frequency of bar pressing.
- d. relative frequency of drinking.

Correct answer: c

Page reference: 222-223

Answer feedback: The comparisons in Exercise 49 were to bar pressing and to Sniffy’s behavior before any training at all had occurred.

Question 2

Of the multiple categories in Sniffy's behavioral repertoire, which behavior had a relative frequency most similar to that of face wiping in Exercise 49?

- a. Eating a pellet
- b. Dismounting the bar
- c. Drinking
- d. Genital grooming

Correct answer: a

Page reference: 223-224

Answer feedback: The almost identical relative frequency of eating a pellet may be attributable to the fact that face wiping does not preclude proximity to the food hopper. This would allow Sniffy to eat a food pellet as soon as it arrived.

Exercise 50: *Shaping a Cat to Beg or Walk on Its Hind Legs*

Question 1

Which of the following precursor behaviors was most likely to immediately precede begging behavior in Exercise 50?

- a. The cat jumped onto your shoulder or into your lap.
- b. The cat responded immediately to the sound of the clicker.
- c. The cat raised its head higher and higher off the ground.
- d. The cat was sitting with its front paws off the ground.

Correct answer: d

Page reference: 225

Answer feedback: With patience, the right timing, and the right treat, the cat should have moved through the precursor behaviors of approaching you and raising its head higher until it sat on its hind legs with its front paws off the ground. At this point it was most likely to emit begging responses.

Question 2**

To successfully shape a cat to walk on its hind legs, which of the following should you avoid?

- a. Holding treats directly above the cat's head
- b. Punishing the cat for jumping into your lap while you are keeping treats there
- c. Sounding the clicker before presenting a treat
- d. Sound the clicker at increasing distances from the cat

Correct answer: b

Page reference: 226

Answer feedback: It may be necessary to first elicit standing behavior by holding a treat above the cat's head. Punishing undesired behavior (and thus frightening the animal) will disrupt shaping. Being sure to operate the clicker before presenting a treat and increasing the distance from the cat before operating the clicker are additional assets to successful shaping.

Question 3

Dogs

- a. will not respond to clickers as part of shaping.

- b. respond readily to the secondary reinforcer of verbal praise.
- c. always require treats in order for shaping to be successful.
- d. require little, if any, shaping in order to acquire unusual behaviors.

Correct answer: b

Page reference: 226

Answer feedback: Enthusiastic verbal praise that signals the delivery of physical affection is an effective secondary reinforcer for use in shaping dogs' behavior. Dogs form social bonds with humans more readily than cats do, so affection by itself may suffice as a primary reinforcer. Clicker training also is very effective with dogs.

Question 4

Complex circus acts involving animals are often shaped by first training the behavior that will produce the primary reinforcer (such as food), then training the behavior that will immediately precede it, and so on until a complex series of behaviors has been established. This procedure is known as

- a. progressive chaining.
- b. successive approximations.
- c. backward chaining.
- d. successive behavioral ordering.

Correct answer: c

Page reference: 226

Answer feedback: Although shaping occurs by means of successive approximations, the procedure described here is known as backward chaining.

Sample Syllabus

Psychology 361: Principles of Learning Fall 2011

COURSE SYLLABUS

Overview and Goals of the Course. The phenomena of learning and theories by which to account for those phenomena have been central to American psychology for at least a hundred years. Much of the history of the scientific study of learning within psychology has a decidedly behavioristic cast. The behavioristic perspective will dominate our study of learning theory during the course. In effect, it will ask you to acquire a new way of talking and thinking about learning if you are not already familiar with behaviorism and behavior analysis. You may find that doing so is unsettling and demanding, since it requires you to talk and think in ways that may be foreign, even counterintuitive. In this sense, the course may appear similar to one in a foreign language or culture.

In addition to reading about learning theory, you will also observe, analyze, and report the behavior of a simulated subject—a virtual rodent named Sniffy. Class meetings will include conversations and presentations based on the assigned reading and the results of Sniffy exercises. These conversations will give way alternately to Readiness Assessments and Application Activities based on the assigned reading. Mid-semester and final examinations consisting of essay items will also be part of the course.

The course is organized on the Team-based Learning format. Final grades will be based on individual performance as well as Team performance.

The individual- and Team-based goals of the course are to:

- (1) Expand your understanding of and facility with the concepts by which behavior analysis makes sense of learning phenomena;
- (2) Connect those concepts to the behavior of a simulated laboratory subject;
and
- (3) Gain familiarity with applications of learning theory to human behavior, including your own.

Your first assignment is to study this syllabus thoroughly. You should become conversant with it. Failure to do so could jeopardize your performance in the course.

The Textbooks and Other Readings. The textbooks required for purchase are:

Alloway, T, Wilson, G., & Graham, J. (2012). *Sniffy the virtual rat, Pro Version 3.0*. Belmont, CA: Thomson/Wadsworth

Powell, R. A., Symbaluk, D. G., & Honey, P. L. (2009). *Introduction to learning And behavior* (3rd ed.). Belmont, CA: Thomson/Wadsworth.

Recommended for purchase is:

American Psychological Association. (2010). *Publication manual of the American Psychological Association*, 6th ed. Washington, D.C.: American Psychological Association.

In addition to the required textbooks, other supplementary readings will be assigned:

- Bem, D. J. (2004). Writing the empirical journal article. In Darley, J. M., Zanna, M. P., & Rodiger III, H. L. (Eds.), (pp. 185-220). *The compleat academic: A career uide*, 2nd ed. Washington, D.C.: American Psychological Association.
- Pryor, K. (1999). Shaping: Developing super performance without strain or pain. In *Don't shoot the dog: The new art of teaching and training*, Rev. ed. (pp. 34-67). New York, NY: Bantam Books.
- Rachlin, H. (2003). Autonomy from the viewpoint of teleological behaviorism. *Social Philosophy and Social Policy*, 20, 245-264.
- Roberts, S. (2004). Self-experimentation as a source of new ideas: Ten examples about sleep, mood, health, and weight. *Behavioral and Brain Sciences*, 27, 227-287.

Each of the readings is available from Electronic Reserve at the Blackboard Web site for the course.

Assessments and Application Activities. Class meetings will occasionally include either a Assessment or an Application Activity based on the assigned reading. Each Assessment will have an individual and a Team component and will consist of 25 multiple-choice items. The Application Activities will require the Team to develop a brief written response that will be submitted by e-mail to me. Each Team member will receive the Team's score for the Team component of the Assessments and the Application Activities regardless of whether she or he is in attendance at the class meeting when these events take place.

There are no makeup opportunities for the Assessments. But should you miss one or more, you will have the opportunity at semester's end to inform me of the reasons for your absence. You will use the End-of-Semester Considerations Form to do so. I will consider the extenuating reasons in the process of assigning final grades.

The Sniffy Exercises, Research Reports,, and Research Manuscripts. I have produced one or more data-based questions for each exercise in the Sniffy textbook (see below). These questions are meant to stimulate your thinking about the results of the exercise.

During the semester you will perform several of the exercises in the Sniffy textbook (see the Course Calendar for the due dates) and, for six of the exercises, will author a brief Research Report that answers the question(s) for the specific exercise. The Research Report should be one double-spaced page in length (APA-conventional margins and 12-pt font) and should answer the question(s) clearly and directly. At least one tabular or graphical summary of data should be included in the report. Research Reports should be submitted by e-mail to the Mark Henderson before midnight on the deadline date that appears in the Course Calendar. A penalty for late submission will be imposed—20% of the score per day of lateness. You may author the Research Report by yourself or with another member of the course. If the latter, then be sure to include both names at the top right of the page. Only one set of data should be reported (that is, it will not be necessary to pool two sets of data if you co-author your Reseach Report.

Each Team will also author three Research Manuscripts during the semester. You should prepare the manuscripts using the format for manuscripts described in the *Publication Manual of the American Psychological Association*, 6th ed. and also the Bem article. The manuscripts will be longer and more in-depth than the Research Reports will be.

The Research Manuscripts should report the data from the multiple replications (i.e., each Team member's data should be included). The manuscripts should be typewritten (double-spaced) and should include tabular or graphical presentation (or both) of the pertinent data (that is, you should provide tables or figures whose content is copied and pasted into a Word file from the Sniffy software). There will be two evaluations of each manuscript. The deadlines for submission of the two drafts are found in the Course Calendar. They are due by e-mail to me on those dates no later than midnight. There will be a penalty for late submission of the drafts—20% of the final score per day of lateness. Manuscripts will typically average 7-10 pages in length, including the title page, reference page, tables, and figures. A rubric for evaluation of the manuscripts will be provided.

In-class Conversations and Presentations of Sniffy Exercises. Teams should provide three questions per chapter (unless otherwise indicated in the Course Calendar) in advance of the conversations scheduled during the semester. The questions should be related to the assigned reading for that class meeting and should focus on topics found there that are potentially confusing. As your Team authors its questions, strive to avoid those that merely ask students to recall or recognize the content of the textbook. Strive for questions that go beyond what is given there so that the questions are more thought-provoking and not just recitative. The three questions should be e-mailed to Mark Henderson before midnight on the day prior to the class meeting when the conversation is scheduled.

In addition, each Team will make two In-class Presentations during the semester (see the Course Calendar). The Team should create PowerPoint slides that report the Sniffy exercise assigned for the presentation. It should introduce the exercise in terms of the concepts on which it focused, describe the procedure it involved, summarize the results, and draw conclusions from them. Feel free to be visually and auditorily creative with the presentations.

The Sniffy Exercise Sets. Each exercise in the 8 sets included in the table below is accompanied by one or more questions that are meant to stimulate your thinking about the results of the exercise. You should address the question(s) in your Research Reports. (Note: The exercises are found in the Alloway et al. textbook.)

Exercise	Data-based Questions
1	Compare and contrast the course of acquisition using the Movement Ratio, Suppression Ratio, and CS Response Strength windows.
2	Compare and contrast the course of extinction using the Movement Ratio, Suppression Ratio, and CS Response Strength windows.
3	Compare and contrast the evidence for spontaneous recovery using the Movement Ratio, Suppression Ratio, and CS Response Strength windows.
4	Use a spreadsheet program to create a graph that displays the effect of CS intensity in terms of the Movement Ratio or the Suppression Ratio (not CS Response Strength). How does it differ from the graph of the effect of CS intensity in terms of the CS response strength that

	appears in the textbook on p. 53?
5	Use a spreadsheet program to create a graph that displays the effect of US intensity in terms of the Movement Ratio or Suppression Ratio (not US Response Strength). How does it differ from the graph for the effect of US intensity in terms of the US response strength that appears in the textbook on p. 55?
6	How do the data evidence the fact that compound conditioning is additive?
7	Which two aspects of the data most clearly depict blocking? Give reasons for your selections.
8	Which two aspects of the data most clearly depict overshadowing? Give reasons for your selections.
9	Which two aspects of the data most clearly depict overexpectation? Give reasons for your selections.
10	Which two aspects of the data from the experimental and control conditions provide the clearest evidence for the effect of the inhibitory stimulus on excitatory conditioning?
11	Which two aspects of the data from the two stages of the experiment provide the clearest evidence for the effect of the inhibitory stimulus on excitatory conditioning? Give reasons for your selection.
12	Which two aspects of the data most clearly depict sensory preconditioning? Give reasons for your selection.
13	Tell how the data answer the question of whether higher-order conditioning is more potent than first-order conditioning.
19	What is the relation between background conditioning and habituation? Between background conditioning and sensitization?
20	Which aspect of the data most clearly defines the CS pre-exposure effect? Give reasons for your selection.
21	Which aspect of the data most clearly defines the US pre-exposure effect? Give reasons for your selection
22	How is classical conditioning involved in magazine training?
23	What could you have done differently to make shaping more efficient?
24	What do you consider the three most significant aspects of the shaping data to be? Give reasons for your selections.
25	How long did it take to reach the extinction criterion? What two features of extinction most clearly distinguish it from shaping?
26	Which two aspects of the data provide the best evidence for secondary reinforcement? Give reasons for your selections
27	Which two aspects of the data provide the best evidence for spontaneous recovery? Give reasons for your selections.
28	What are the most notable two features of the comparison between the results from Sniffy shaped to bar press and Sniffy after bar pressing was extinguished?
29	Compare and contrast the effect of a single mild shock on the course of extinction following shaping.
30	Compare and contrast the effect of a single severe shock with the effect of a single mild shock (Exercise 28) on the course of extinction.
31	Which two aspects of the data provide the best evidence for the differential effects of extinction v. repeated mild punishment on behavior? Give reasons for your selections.
32	Which two characteristics of responding on VR schedules are clearly revealed by the data?
33	Which two aspects of the data most clearly illustrates the effect of increasing the VR requirement?
34	Which two characteristics of responding on VI schedules are clearly revealed by the data?
35	Which two characteristics of responding on FR schedules are clearly revealed by the data?
36	Which two characteristics of responding on FI schedules are clearly revealed by the data?
37	Which two aspects of the data most clearly illustrate the partial reinforcement effect?
38	What does your inspection of the data produced by the five schedules suggest about why FRI schedules are particularly likely to produce adjunctive behavior?
39	Which two aspects of the data most clearly illustrate stimulus discrimination?

40	Which two characteristics of generalization gradients are most clearly revealed by the data?
41	Which two aspects of the data most clearly illustrate stimulus discrimination?
42	Which two characteristics of generalization gradients are most clearly revealed by the data?
43	Which two aspects of the data most clearly illustrate stimulus discrimination?
44	Which two aspects of the data most clearly illustrate the effect of S+/S- discrimination learning on generalization?
45	What were your criteria for success in shaping Sniffy's begging behavior? How successful were you? In what ways did your performance demonstrate the procedure of shaping?
46	What were your criteria for success in shaping Sniffy's face-wiping behavior? How successful were you? In what ways did your performance demonstrate the procedure of shaping?
47	What were your criteria for success in shaping Sniffy's rolling-over behavior? How successful were you? In what ways did your performance demonstrate the procedure of shaping?
48	What other behavior did you shape? How successful were you? In what ways did your performance demonstrate the procedure of shaping?
49	What do you consider the clearest evidence that shaping Sniffy to beg, face wipe, and roll affected the frequency of alternative behaviors? Give two reasons for your answer.
50	Optional. How successful were you in shaping the cat to beg or walk on its hind legs? In what ways did your performance demonstrate the procedure of shaping?

The Examinations. There will be a Mid-semester Examination and a Final Examination. Each will consist of two essay items. There will be a 400-word limit to the response to each item. You are welcome to develop your responses on your own, in partnership with one other member of the class, or with your Team. Feel free to use your textbooks and notes in developing your responses. University policy prohibits administering the Final Examination prior to the scheduled date and time. Please do not ask to take it early. You will be able to make up the Mid-semester Examination only if you notify me in advance of your absence. A list of candidate items will be posted in advance of the Final Exam.

The Course Calendar.

Date of Meeting	Agenda	Reading and Other Assignments Due
29 August	Introduction to the Course	
31 August	Syllabus review; Team formation	Course Syllabus; e-mail the Team's questions to Mark Henderson before midnight on Thursday, 1 Sept
2 September	Conversation about assigned reading	Chapter 1 in Powell et al., Chapter 1 in Alloway et al.
7 September	Demonstration of Sniffy software led by Mark Henderson	E-mail the Team's questions to Mark Henderson before midnight on Thursday, 8 Sept
9 September	Conversation about assigned reading	Chapter 2 in Powell et al., Chapter 2 in Alloway et al.; e-mail the Team's questions to Mark Henderson before midnight on Saturday, 10 Sept
12 September	Conversation about assigned reading	Bem article, pp. 185-204; e-mail the Team's questions to Mark Henderson before midnight on Tuesday, 13 Sept
14 September	Conversation about assigned reading	Bem article, pp. 205-219
16 September	Assessment 1	Chapters 1-2 in Powell et al., Chapters 1-2 in Alloway et al.; e-mail the Team's questions to Mark Henderson before

		midnight on Saturday, 17 Sept
19 September	Conversation about assigned reading	Chapter 3 in Powell et al., Chapter 3 in Alloway et al.; e-mail the Team's questions to Mark Henderson before midnight on Tuesday, 20 Sept; e-mail Research Report 1 (Sniffy Exercise 3) to Mark Henderson before midnight on Tuesday, 20 Sept
21 September	Conversation about assigned reading	Chapter 4 in Powell et al., Chapters 4-5 in Alloway et al. (3 questions between the two chapters)
23 September	Team Meetings	Development of the initial draft of Research Manuscript 1 (Sniffy Exercise 7)
26 September	Team Meetings	Development of the initial draft of Research Manuscript 1 (Sniffy Exercise 7)
28 September	Application Activity 1	E-mail the Team's response to Application Activity 1 to Dr. Miller before midnight on Thursday, 29 Sept.
30 September	Presentation 1	Sniffy Exercise 9; e-mail the initial draft of Research Manuscript 1 to Dr. Miller before midnight on Saturday, 1 Oct; e-mail the Team's questions to Mark Henderson before midnight on Saturday, 1 Oct
3 October	Conversation about assigned reading	Chapter 5 in Powell et al., Chapters 6 and 8 in Alloway et al. (three questions between the two chapters)
5 October	Presentation 2	Sniffy Exercise 10; e-mail Research Report 2 (Sniffy Exercise 13) to Mark Henderson before midnight on Thursday, 6 October
7 October	Assessment 2	Chapter 5 in Powell et al., Chapters 6 and 8 in Alloway et al
10 October	Team meetings	Development of the final draft of Research Manuscript 1; e-mail the Team's questions to Mark Henderson before midnight on Tuesday, 11 Oct
12 October	Conversation about assigned reading	Roberts article, pp. 227-228, 248-253 (three questions total); e-mail the Team's questions to Mark Henderson before midnight on Thursday, 13 Oct
14 October	Conversation about assigned reading	Roberts article, pp. 254-261 (three questions total); e-mail final drafts of Research Manuscript 1 to Dr. Miller before midnight on Saturday, 19 February; Mid-semester Exam posted
17 October	Application Activity 2	E-mail the Team's response to Application Activity 2 to Dr. Miller before midnight on Tuesday, 18 Oct;
19 October	Conversation about assigned reading; discuss Final Grade Weightings	Chapter 6 in Powell et al., Chapters 9-10 in Alloway et al. (three questions between the two chapters)

21 October	Presentation 3	Sniffy Exercise 23; Final Grade Weightings Proposals are due at the beginning of the class meeting; e-mail Research Report 3 (Sniffy Exercise 20) to Mark Henderson before midnight on Saturday, 22 Oct
24 October	Team meetings	Development of initial draft of Research Manuscript 2 (Sniffy Exercise 26); e-mail the Mid-semester Exam to Mark Henderson and Dr. Miller before midnight on Tuesday, 25 Oct
26 October	Assessment 3	Chapter 6 in Powell et al., Chapters 9-10 in Alloway et al.; e-mail the Team's questions to Mark Henderson before midnight on Thursday, 27 Oct
28 October	Conversation about assigned reading; Presentation 4	Chapter 7 in Powell et al., Chapter 12 in Alloway et al.; Sniffy Exercise 31; e-mail Research Report 4 (Sniffy Exercise 3) to Mark Henderson before midnight on Saturday, 29 Oct
31 October	Presentation 5	Sniffy Exercise 33; e-mail the Team's questions to Mark Henderson before midnight on Tuesday, 1 Nov
2 November	Conversation about assigned reading	Chapter 8 in Powell et al., Chapter 11 in Alloway et al.; read the Pryor chapter on E-reserve (Course Documents); e-mail the initial draft of Research Manuscript 2 to Dr. Miller before midnight on Thursday, 5 Nov
4 November	Presentation 6; Application Activity 3	Sniffy Exercise 35; e-mail the Team's response to Application Activity 3 to Dr. Miller before midnight on Saturday, 5 Nov; e-mail the Team's questions to Mark Henderson before midnight on Saturday, 5 Nov
7 November	Conversation about assigned reading	Chapter 9 in Powell et al., Chapter 13 in Alloway et al.; e-mail Research Report 5 (Sniffy Exercise 37) to Mark Henderson before midnight on Tuesday, 8 Nov; e-mail the Team's questions to Mark Henderson before midnight on Tuesday, 8 Nov
9 November	Presentation 7; Conversation about assigned reading	Sniffy Exercise 38; Chapter 10 in Powell et al.
11 November	Assessment 4	Chapters 9 and 10 in Powell et al., Chapter 13 in Alloway et al.; e-mail the Team's questions to Mark Henderson before midnight on Saturday, 12 Nov
14 November	Conversation about assigned reading	Chapter 11 in Powell et al.
16 November	Team meetings	Development of initial draft of Research Manuscript 3 (Sniffy Exercise 37)
18 November	Presentation 8	Sniffy Exercise 44; e-mail the Team's questions to Mark Henderson before midnight on Saturday, 20 Nov

21 November	Conversation about assigned reading	Chapter 12 in Powell
22 November	Team meetings	E-mail the initial draft of Research Manuscript 3 to Dr. Miller before midnight on Tuesday, 22 Nov
28 November	Conversation about assigned reading	Rachlin article, pp. 245-254; e-mail the Team's questions to Mark Henderson before midnight on Tuesday, 29 Nov
30 November	Conversation about assigned reading	Rachlin article, pp. 254-264
2 December	Application Activity 4	E-mail the Team's response to Application Activity 4 to Dr. Miller before midnight on Saturday, 3 Dec
5 December	Team meetings	Development of the final draft of Research Manuscript 3; e-mail Research Report 6 (Sniffy Exercise 47) to Mark Henderson before midnight on Monday, 5 Dec
7 December	Concluding conversation led by Dr. Miller	Revised Final Grade Weightings Proposals are due at the beginning of the class meeting; End-of-Semester Considerations Forms and Peer Evaluations Forms distributed; Final Exam Candidate Items posted at Blackboard Web site
M, 12 December	Final Examination, 2:30-5:30 p.m.	Completed End-of-Semester Considerations Forms and Peer Evaluation Forms are due at the beginning of exam; e-mail the final draft of Research Manuscript 3 to Dr. Miller before the exam

Peer Evaluations. At the end of the semester, you will receive a quantity of points (based on the number of Team members) to assign to other Team members on the basis of their performance during the semester. The only stipulation is that the same number of points cannot be assigned to each Team member (that is, at least 1 score of 9 and one score of 11 must be assigned if a score of 10 is assigned to the other Team members, with no score exceeding 15 points) in order to reflect the relative strength of contribution. This will be your only formal opportunity to fairly (and accurately) recognize the work each Team member has done during the semester.

The Final Grade. Points toward the final grade will be awarded as follows:

Individual Readiness Assessments (4 @ 25 pts each)	100 points
Team Readiness Assessments (4 @ 25 pts each)	100
Application Activities (4 @ 25 pts each)	100
Exams (40 points for Mid-semester; 80 for Final)	120
Questions for conversation (18 sets @ 4 pts. each)	75
In-class Sniffy Exercise Presentations (2 @ 50 points each)	100
Sniffy Research Reports (6 @ 25 points each)	150
Sniffy Research Manuscripts (3 @ 50 pts each)	150
Peer Evaluation	<u>100</u>
Total	995

Final grades will be assigned according to weightings that will be determined by the class. The categories to be assigned weights are:

- Individual Performance (Readiness Assessments, Exams, Sniffy Research Reports)
- Team Performance (Readiness Assessments, Application Activities, Questions, In-class Sniffy Exercise Presentations, and Sniffy Research Manuscripts)
- Peer Evaluation

No category weighting can be less than 20% nor more than 50%. The weightings for the three categories will add up to 100%. Final grades will be assigned according to the distribution of scores. It is assumed, but not guaranteed, that most final grades will be higher than C.

The Instructional Staff. I am a professor of psychology. My scholarly interests lie in the experimental analysis of behavior, behavioral economics, self-control and altruism, radical behaviorism, and education reform. My office is 1074 SWKT, phone number 422-8939, and e-mail address harold_miller@byu.edu. My consultation hours are Mondays and Thursdays, 12-12:50 p.m. (unless I am out of town) or otherwise by appointment. Mark Henderson is the Teaching Assistant. His e-mail address and consultation hours and location will be posted at the Blackboard Web site for the course. Please don't be a stranger to consultation.

I welcome suggestions for improving the course.

Important Note. Enrollment in 300-level courses in the undergraduate psychology curriculum beyond Psychology 304 is contingent on prior completion of Psych 101; Psych 111; Psych 210; Psych 301; Psych 302; Engl 314, Engl 315, or Psych 303; and Psych 304. You may only enroll in this course if you have completed these prerequisite courses, are concurrently enrolled in Psychology 304, or have my consent to do so.

Department of Psychology Expected Student Learning Outcomes for Majors

The objectives of the department's undergraduate curriculum are closely matched to those advocated by the American Psychological Association, the discipline's primary professional body. Graduates with a B.S. degree in psychology will:

- (1) Be able to demonstrate that they understand and can apply basic research methods in psychology, including research design, data analysis, and interpretation of results in light of previous findings.
- (2) Be able to use computers and other research-related technology to competently collect, access, and manage information, communication, and other purposes.
- (3) Be able to express realistic ideas about how to implement their psychological understanding, skills, and values in occupational and family-related pursuits in a variety of settings.

(4) Be able to critically reflect on the content of psychology as well as on disciplinary values in light of their knowledge of and commitment to the restored gospel of Jesus Christ and to sustain personal values that are true to the gospel while maintaining their serious study of psychology.

Department of Psychology Expected Student Learning Outcomes for Psych 361

- Students will develop their understanding of and facility with the concepts by which behavior analysis makes sense of selected learning phenomena.
- Students will connect the concepts to the behavior of a virtual laboratory rat.
- Students will apply the concepts to human behavior, including one's own.

University Policies

Honor Code Standards

In keeping with the principles of the BYU Honor Code, students are expected to be honest in all of their academic work. Academic honesty means, most fundamentally, that any work you present as your own must in fact be your own work and not that of another. Violations of this principle may result in a failing grade in the course and additional disciplinary action by the university.

Students are also expected to adhere to the Dress and Grooming Standards. Adherence demonstrates respect for yourself and others and ensures an effective learning and working environment. It is the university's expectation, and my own expectation in class, that each student will abide by all Honor Code standards. Please call the Honor Code Office at 422-2847 if you have questions about those standards.

Preventing Sexual Discrimination or Harassment

Sexual discrimination or harassment (including student-to-student harassment) is prohibited both by the law and by Brigham Young University policy. If you feel you are being subjected to sexual discrimination or harassment, please bring your concerns to the professor. Alternatively, you may lodge a complaint with the Equal Employment Office (D-240C ASB) or with the Honor Code Office (4440).

Students with Disabilities

If you have a disability that may affect your performance in this course, you should get in touch with the University Accessibility Center (2170 WSC) 801-422-2767. This office can evaluate your disability and assist the professor in arranging for reasonable accommodations.

A Final Word. Please do your best to work fairly and productively and, I hope, enjoyably with the others in the class. Don't hesitate to contact Mark Henderson or me at any point for clarification of course requirements, for help in understanding the assigned reading, for help with your Sniffy-related assignments, or for encouragement otherwise. Mark and I are committed to enlarging your understanding of the subject matter of the course and will be diligent to that end. Best wishes for success!

Hal Miller

References

- Beach, F. A. (1950). The snark was a boojum. *American Psychologist*, *5*, 115-124.
- Davidson, C. N. (2011). *Now you see it: How the brain science of attention will transform the way we live, work, and learn*. New York, NY: Viking.
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