PSYCHOLOGY 281 ASSIGNMENT 2
Due: 22 May 2012

LAST NAME: _____ FIRST NAME: _____ID: _____

LAST NAME: _____FIRST NAME: _____ID: _____

INSTRUCTIONS:

You may work on this assignment singly or in a group of two people. If you work in a group only turn in one assignment with the names and IDs of both students on it. Both members of a group receive the same grade.

Answer the questions in the space provide on this form. You may print off the form and fill in the answers by hand or open the form with a word processor and type your answers. If you write answers by hand your handwriting must be neat and legible. Whether you write answers by hand or type them, ensure that your answers actually make grammatical and syntactic sense. Failure to do so will be reflected in your grade… Also, be aware that **scientific writing should be succinct and to the point!** Rambling answers, sometimes called "shotgun answers", in which lots of material is provided, much of it irrelevant to the actual question at hand, will be penalized during grading.

Once completed, staple (no paperclips or binders) the pages together and turn the assignment in to the instructor by the end of class on 22 May; a 10% penalty will be applied immediately to any assignment not submitted by this time. An additional 10% late penalty will be applied each subsequent day (including weekends and holidays) at 12:00 PM (i.e., noon). Late (or early!) assignments must be submitted *directly* to the instructor, or may be turned in to office staff at the Department of Psychology office (BSP-217), who will date-stamp the assignment (hours of operation Monday–Friday 8:00-12:00 and 1:00-4:00).

This assignment is out of 15 points.

QUESTIONS:

1. Read the brief statements and identify the US, UR, CS, and CR for each. (0.5 pt for each US/UR and CS/CR pair; any error in a pair results in a score of 0 for that pair)

A. There is a woodpecker in my neighbourhood. My wife says she feels happy when she hears the "knock-knock-knock" sound of the woodpecker pecking at trees. She figures this is due to all the Woody Woodpecker cartoons she watched as a kid.

US: _____ UR: _____

CS: _____ CR: _____

B. A soldier serves overseas in a war zone. After she was badly injured by an improvised mine that detonated under the truck he was riding in he was medically sent home and medically discharged from active duty. Even though years have passed, she finds that loud noises, like a car backfiring, induce an extreme stress reaction.

US: _____ UR: _____

CS: _____ CR: _____

C. For years John has regularly started his work days with four double espresso coffees from Starbucks. His friends are amazed that he is actually able to function like this, assuming that he would be a jittery, caffeine-laced wreck, but in fact he seems to function just fine. One day, when in a foreign country on a business trip John can't find a Starbucks and instead orders four double espresso coffees from a local café (let's assume here that he's getting exactly the same amount of caffeine here as he usually does from his Starbuck's fix). Unfortunately, he is wracked by caffeine-induced paroxysms and is unable to focus on his meetings throughout the rest of the morning.

US: _____ UR: _____

CS: _____ CR: _____

2. While it is not too difficult to measure conditional responses of salivation in larger animals, like dogs for example, this can be a challenge in smaller animals, like rats. Fortunately, many animals, rats included, respond to stress or pain by freezing in place (i.e., not moving). One way to utilize this in the study of classical conditioning is to train rats to press a lever for food. Once this behaviour is well established a conditional stimulus (CS) is paired with an aversive unconditional stimulus (US). By comparing the rate of lever pressing for food in the presence and absence of the CS we can get a measure of the strength of the conditional response (CR). Remember, an aversive US will typically cause the animal to freeze or move less, which will result in less lever pressing; if classical conditioning has occurred we say that the lever pressing behaviour has been suppressed, and the measure of the strength of conditioning is called a **suppression ratio**. The suppression ratio equals A/(A+B), where A is the amount of responding during a period of time after the CS is presented and B is the amount of responding during a comparable time period without the presence of the CS (typically a time period just prior to the CS presentation). The smaller the number, the more the behaviour has been suppressed and, hence, the stronger the CR is.

Here's a some data from a study. Rats are trained to press a lever for a food reward. Once this is learned a classical conditioning protocol is put in place. A 5 second tone (CS) is paired with an aversive shock (US). After 20 pairings of the tone and shock the rats are put back into the chamber with the lever and allowed to press for food again. Periodically the tone is presented as a test trial (remember, this means that the CS is presented without the US so that we can measure for just the CR without the UR appearing). The number of times each rat presses the lever is recorded for the 30 seconds before (B) and after (A) the presentation of the CS (so the numbers

below are number of responses in 30 seconds). To summarize, the number of presses made in 30 seconds are recorded (B), then the CS is presented, and then the number of responses made in the next 30 seconds are recorded (A). Here's the data for ten trials for five rats.

Trial	Rat 1	Rat 2	Rat 3	Rat 4	Rat 5
1 A	8	11	2	2	6
B	15	16	16	15	14
2 A	5	12	5	4	2
B	13	13	18	20	17
3 A	7	14	3	2	3
B	18	15	16	17	16
4 A	6	9	4	3	5
B	15	14	18	19	13
5 A	8	15	2	3	3
B	13	19	13	17	16
6 A	5	10	6	4	7
B	17	13	24	20	22
7 A	5	14	2	1	4
B	13	16	19	18	18
8 A	5	11	3	4	4
B	18	13	18	15	17
9 A	5	11	7	2	5
B	12	14	18	18	13
10 A	7	10	6	5	6
B	12	12	24	19	18

Complete the following:

A. Calculate the suppression ratio for each of the rats. Use 3 decimal places in your calculations. (2.5 pts)

	Rat 1	Rat 2	Rat 3	Rat 4	Rat 5
Suppression Ratio					

B. Which rat shows the strongest classical conditioning? (1 pt)

C. What is the average suppression ratio for rats in the study? (1 pt)

D. If you are interested in learning behaviour in rats in general, is it better to look at each rat's individual suppression ratio or the average suppression ratio? Why? (1 pt)

E. Let's imagine that one of the five rats was given a bit of morphine before the classical conditioning phase of our study. Which rat do you think it might have been and why? (1 pt)

F. Let's say that we take another group of five rats and go through the same lever pressing training and classical conditioning of the tone with the shock. However, in this group before we go on to giving the test trials needed to calculate our suppression ratio we do a "mystery learning phase". We subsequently carry out the test trials and get an average suppression ration of 0.46. What was most likely done to the rats during the "mystery learning phase"? (1 pt)

3. Use the Rescorla-Wagner equation: $\Delta V_n = c(\lambda - V_{n-1})$ for this question.

Imagine you are conducting a simple classical conditioning study in which you are using short-delay conditioning where the CS is a light and the US is shock. You'd like to have some idea of how quickly the rats you are using as subjects will acquire the learning. Based on previous perceptual research with rats you conclude that the salience of the light and shock (i.e., c in the equation) is 0.15. Also, for the purposes of calculation you decide to set the maximum associative strength (λ) at 50 units of conditioning. Because your rats are naïve (i.e., they've never been exposed to the CS before; they've had no prior conditioning trials) you conclude that V_{n-1} should start at 0. Note: V_n on the tables below might also be called V_{Total}, if you prefer.

A. Using the Rescorla-Wagner equation calculate ΔV for the first five (5) trials of acquisition and fill in the following table. (2 points)

Trial	1	2	3	4	5
ΔV_n					
V_n (or V_{Total})					

B. It doesn't look like your rats are going to be learning very quickly. Perhaps the solution is to use a more salient light. Try the calculations over and record your results in the table below, but this time use a salience of 0.3 for c (λ is again 50 and V_{n-1} starts at 0). (2 points)

Trial	1	2	3	4	5
ΔV_n					
V_n (or V_{Total})					

C. Taste aversion learning is a type of classical conditioning, but it is somewhat unusual in that it is learned very quickly, usually with only a single pairing of the CS and US. For this reason it is sometimes referred to as "one-trial learning". Answer the following: within the framework of the Rescorla-Wagner model of classical conditioning, what would have to happen for one-trial learning to occur? (In other words, what would allow ΔV to equal Vmax (Aj) in a single conditioning trial?) (0.5 point)