

Please answer the below questions succinctly:

1. **Contingency degradation:** Goal directed behavior should be sensitive to the value of its goal as well as to the contingency between the action and the outcome/goal. In “contingency degradation” the animal is first trained to leverpress for an outcome on some schedule, usually a high random ratio.
 - a. (5 points) On such a schedule, say, RR20, what is the probability of obtaining an outcome per leverpress?
 - b. (10 points) After training has completed, the experimenter starts giving the outcome with the same probability for every second in which there was a leverpress, and for every second in which there was no leverpress, in order to degrade the contingency between the leverpress and the outcome. How would you expect this manipulation to affect the responding of a rat that has been mildly trained in the first phase?
 - c. (10 points) How would you expect this manipulation to affect the responding of a rat that has been trained extensively in the first phase? Why?
 - d. (Bonus: 10 points) Can you suggest a reinforcement learning explanation for this pattern of behavior?

2. Responding on a **variable interval schedule** is slower than that on a **variable ratio schedule** in which outcomes are earned with roughly the same rate.
 - a. (10 points) Explain how an experimenter might “yoke” the reward schedule of a rat pressing on an interval schedule to that of a rat pressing on a RR20 schedule, such that they earn rewards at roughly the same rate.
 - b. (10 points) Can you explain why the interval rat presses at a slower rate than its ratio counterpart in this situation?

3. (10 points) Suggest one (testable) prediction of **tonic dopamine hypothesis**, and describe how it can be tested.

4. In a **cost-benefit experiment** a rat is faced with a T maze in which one arm has a small reward (say, 1 pellet) while the other has a larger reward (say, 4 pellets), but the rat must scale an obstacle in order to reach that reward. The experiment is designed such that rats will prefer the higher reward even at the expense of scaling the obstacle. However, dopamine depleted rats show the opposite preference.
 - a. (10 points) Explain the effect that depletion of tonic dopamine should have on behavior in this maze. Would it explain this preference reversal?
 - b. (10 points) Suggest a way in which an attenuation of the phasic dopaminergic signals (as a result of the depletion) would affect preference in the task.

Review of classical conditioning: each question = 4 points (if you get them all correct you get 4 points bonus)

5. Conditioned taste aversion is special in that:
 - a. it includes both a CS and a US
 - b. learning is possible even with large CS-US intervals

- c. for effective learning many presentations of the CS and the US are necessary
 - d. it has only been demonstrated in humans
6. Why are test trials (in which only the CS is presented) used to measure conditioning, and in what different conditioning paradigms (delay, trace, simultaneous or backward conditioning) are they necessary.
7. Which of the following procedures **does not** cause a stimulus to become inhibitory
- a. phase 1: B+; phase 2: AB-
 - b. phase 1: A+; phase 2: A-
 - c. in different trials B+ or A-
 - d. in different trials A- or US
8. For each of the following, will the animal approach or withdraw from the stimulus?
- a. an excitatory stimulus for food
 - b. an inhibitory stimulus for shock
 - c. an excitatory stimulus for shock
 - d. an inhibitory stimulus for food
9. Which of the following findings can be explained by Konorski's suggestion that there are two antagonistic motivational centers?
- a. the finding that it is difficult to countercondition a stimulus
 - b. the finding that an excitatory CS for shock will decrease leverpressing for an appetitive outcome
 - c. the finding that an inhibitory CS for food will increase avoidance responses
 - d. all of the above findings can be explained by Konorski's theory
10. Which of the following phenomena refutes the claim that conditioning happens only if at least one of the stimuli has motivational value
- a. higher order conditioning
 - b. counter conditioning
 - c. sensory preconditioning
 - d. blocking