Chapter 2
Behavioral Analysis of Drug Effects

CHAPTER SUMMARY

- Scientific experiments consist of an independent variable that is manipulated by a researcher and a dependent variable that is measured. In most experimental research in behavioral pharmacology, the independent variable is the presence of a drug in the body, and the dependent variable is some aspect of behavior.

- Treatment of control subjects in an experiment should be as similar as possible to treatment of experimental subjects. For this reason, control subjects are usually given a placebo, an inactive substance administered in exactly the same way as the drug. This procedure controls for differences that result from the placebo effect.

- The placebo effect refers to the observation that when people expect a drug, they often show effects of a drug even if they are administered only an ineffective substance.

- Experimental and control conditions may be administered to the same subjects on different occasions (within-subjects design) or to different subjects (between-subjects design).

- A double-blind procedure, where neither the researcher nor the experimental participant knows which group they are in, is used to eliminate the effect of experimenter bias.

- The three-groups design is used in testing new therapeutic drugs. In this design there is a drug group, a placebo group, and a group that receives an established treatment.

- In nonexperimental drug research, when relationships between two measured variables are found, one cannot assume the existence of any causal relationships between variables.

- The performance of the senses is determined by measuring their threshold. Cognitive performance is measured by tests of the ability to process, store, and retrieve information. Motor performance may be measured by simple or choice reaction time, or pursuit rotor tests.

- Effects of drugs on unconditioned behavior of nonhumans can be measured by observing the amount of activity in an open field or using an inclined plane or an elevated plus maze. Analgesic effects can be measured as paw lick latency on a hot plate.

- Conditioned behavior may be classical or operant. In classical conditioning, involuntary reflexive behavior is brought under the control of a previously neutral stimulus. This is also known as Pavlovian conditioning. In operant conditioning, voluntary behavior is brought under control by delivery of a contingent reinforcement.

- When reinforcement is not given for every response but is given according to some pattern, the pattern is called a schedule of reinforcement.

- Animals can be trained to avoid and escape a noxious stimulus such as an electric shock.

- Dissociation refers to the fact that information acquired in one drug state may not be readily available in another drug state.

- Animals can be trained to make one response after being given a drug and a different response after being given saline or a different drug. The responses of an animal trained to discriminate a drug can be a useful tool in testing the biochemical mechanisms responsible for the subjective effects of a drug.

- Therapeutic drugs are first screened for effect and safety using nonhumans. They then go through four phases of testing on humans.

Multiple Choices

2-1. What were the reason(s) that promoted the development of behavioral pharmacology into a separate field of research in 1950s?
    A. toxicity of widely used psychoactive drugs
    B. general worry about increased drug abuse
    C. success and commercial use of antipsychotic drugs
    D. need to develop animals tests to study promising psychoactive compounds
    E. Both C and D
Bloom's Taxonomy: Know

2-2. An independent variable is the variable in an experiment that
    A. an experimenter must control for.
    B. is manipulated by the experimenter.
    C. is measured by the experimenter.
    D. is usually a measure of behavior.
    E. is frequently a within-subject measure.
Bloom's Taxonomy: Understand

2-3. A dependent variable in an experiment is the variable that
    A. is measured by the experimenter.
    B. is frequently a drug dose in behavioral pharmacology research.
    C. must be controlled for by using a placebo.
    D. is manipulated by the experimenter.
    E. is difficult to predict ahead of time.
Bloom's Taxonomy: Understand

2-4. If you can only use a small number of subjects in your experiment
    A. you should use a within-subjects design.
    B. you should use a between-subjects design.
    C. you cannot do any meaningful research.
    D. you must use a nonexperimental design.
    E. use laboratory animals rather than humans.
Bloom's Taxonomy: Apply

2-5. A research design that compares the behavior of a subject under the influence of a drug with the behavior of the same subject after being given a placebo is
    A. a statistically significant design.
    B. a within-subject design.
    C. a dependent variable design.
    D. not properly controlled.
    E. a between-subject design.
Bloom's Taxonomy: Know

2-6. In behavioral pharmacology research, a placebo is used
    A. to calm anxious participants.
    B. to determine the toxicity of a drug combination.
    C. as a control.
    D. only in within-subject designs.
    E. to plot the DRC.
Bloom's Taxonomy: Know

2-7. How many groups are there in a balanced placebo design?
    A. 1
    B. 2
    C. 3
    D. 4
    E. 5
Bloom's Taxonomy: Know

2-8. A double blind experiment is
    A. where a participant closes both eyes and reports hallucinations.
    B. where the participant does not know whether he/she is in the experimental or the control group.
    C. where neither the researcher nor the participant knows whether a given participant is in a control or in an experimental condition.
    D. where only those given a placebo are not told which group they are in.
    E. none of the above.
Bloom's Taxonomy: Know

2-9. Nonexperimental research
    A. can demonstrate that a relationship does not exist.
    B. can demonstrate that a drug causes adverse effects.
    C. must be used with humans for ethical reasons.
    D. determines whether there is a relationship between two manipulated events.
    E. cannot demonstrate that one event causes another.
Bloom's Taxonomy: Understand

2-10. SMA refers to
    A. Stimulus Management Activity.

B. Spontaneous Motor Activity.
C. Stimulus-bound Movement, Type A.
D. Super Modulated Associations.
E. Special Stimulus Attributes.
Bloom's Taxonomy: Know

2-11. Which of the following is a measure of muscle tone in rats?
A. inclined plane test.
B. pursuit rotor.
C. elevated plus maze.
D. paw lick latency.
E. DSST.
Bloom's Taxonomy: Know

2-12. Which of the following is a measure of analgesia in rats?
A. inclined plane test.
B. pursuit rotor.
C. elevated plus maze.
D. paw lick latency.
E. DSST.
Bloom's Taxonomy: Know

2-13. Which of the following is a measure of anxiety in rats?
A. inclined plane test.
B. pursuit rotor.
C. elevated plus maze.
D. paw lick latency.
E. DSST.
Bloom's Taxonomy: Know

2-14. If the paw lick latency decreases, this indicates
A. greater analgesia.
B. less analgesia.
C. tolerance.
D. decrease in anxiety.
E. decrease in muscle tone.
Bloom's Taxonomy: Apply

2-15. Ivan Pavlov studied
A. operant conditioning.
B. classical conditioning.
C. spontaneous motor activity.
D. schedules of reinforcement.
E. REM sleep.
Bloom's Taxonomy: Know

2-16. Which of the following is not a schedule of reinforcement?
     A. FR 3.
     B. FI 10 min.
     C. DRL.
     D. SMA.
     E. VR 10.
Bloom's Taxonomy: Know

2-17. The situation where a response terminates a stimulus that precedes a shock is called
     A. punishment.
     B. escape.
     C. avoidance.
     D. Sidman avoidance.
     E. AMPT.
Bloom's Taxonomy: Understand

2-18. The situation where a response terminates a shock is called
     A. punishment.
     B. escape.
     C. avoidance.
     D. Sidman avoidance.
     E. AMPT.
Bloom's Taxonomy: Understand

2-19. Drugs that are useful in treating anxiety and psychosis in humans will also normally
     A. block avoidance responding in doses that have no effect on escape responding.
     B. block escape responding in doses that have no effect on avoidance responding.
     C. slow responding on an FR and increase FI responding.
     D. be subject to abuse.
     E. be highly toxic.
Bloom's Taxonomy: Apply

2-20. If you can only remember when you are drunk things that you learned when you are drunk, this is an example of
     A. dissociation.
     B. alcoholic amnesia.
     C. drug-state discrimination.
     D. mithridatism.
     E. none of the above.
Bloom's Taxonomy: Know

2-21. Which of the following is a procedure that can tell us about the subjective drug experience of nonhumans?
     A. drug-state discrimination.
     B. operant analysis of behavior.
     C. spontaneous motor activity.

D. the POMS.
E. the EEG.
Bloom's Taxonomy: Know

2-22. In a drug discrimination learning task, one drug will generalize to another when the two drugs produce
    A. euphoria.
    B. gas pains.
    C. a hallucinogenic experience.
    D. a similar subjective effect.
    E. either A. or C.
Bloom's Taxonomy: Understand

2 -23. Rate of self-administration is not a good measure of the relative reinforcing capacity of different drugs. This is because of which of the following?
    A. drugs may have effects that can interfere with the ability of the organism to make the response.
    B. some drugs may have the effect of stimulating the response.
    C. it has been shown that the rate of responding does not reflect the reinforcing properties of any stimulus.
    D. all drugs are so reinforcing that the animal responds at the maximum rate possible.
    E. both A. and B.
Bloom's Taxonomy: Understand

2-24. Breaking point is
    A. the dose of a drug that is no longer reinforcing.
    B. the point of food deprivation at which an animal will choose food over a given dose of a drug.
    C. the point at which price increases of a drug will cause a person to reduce consumption.
    D. the dose that will completely suppress responding on a progressive ratio schedule.
    E. the point where the demand on a progressive ratio schedule causes an organism to cease responding.
Bloom's Taxonomy: Know

2-25. Which of the following techniques have been used to measure the reinforcing value of a stimulus?
    A. progressive ratio
    B. choice
    C. place conditioning
    D. all of A., B., and C.
    E. none of A., B., or C.
Bloom's Taxonomy: Know

2-26. Introspection is
    A. the subjective study of one's own mind.

B. a method of behaviorism.
C. a branch of psychopharmacology.
D. a method of investigation that is never used in psychopharmacology.
E. an index of CFF.
Bloom's Taxonomy: Know

2-27. The POMS and the ARCI are
A. sleep stages.
B. research institutes.
C. enzymes.
D. paper and pencil tests of subjective drug effects.
E. indices of drug effectiveness.
Bloom's Taxonomy: Know

2-28. Critical frequency at fusion is
A. a measure of bar pressing rate.
B. a measure of visual acuity.
C. a measure of reaction time.
D. a measure of arousal.
E. a schedule of reinforcement.
Bloom's Taxonomy: Know

2-29. Which of the following is not a direct measure of motor performance?
A. simple reaction time
B. pursuit rotor task.
C. complex reaction time.
D. respondent conditioning.
E. hand steadiness.
Bloom's Taxonomy: Know

2-30. If a new drug appears safe and effective when tested on nonhumans it then goes into a four-phase program of testing on humans. Expanded clinical trials are conducted in
A. phase 1.
E. phase 2.
C. phase 3.
D. phase 4.
E. none of the above. Expanded clinical trials are conducted before the four testing
    phases are initiated.
Bloom's Taxonomy: Know

Short Answers

1. Explain the difference between of an independent variable and a dependent variable in a scientific experiment.
Bloom's Taxonomy: Understand

2. Explain why a placebo control group is needed in behavioral pharmacology.
Bloom's Taxonomy: Understand

3. What is a double-blind procedure?
Bloom's Taxonomy: Understand

4. Why is dissociation an important concept in behavioral pharmacology?
 Bloom's Taxonomy: Understand

5. What are the four most common schedules of reinforcement, and how can they be applied in behavioral pharmacology?
Bloom's Taxonomy: Apply

6. Explain the differences between classical conditioning and operant conditioning, and how they can be used in behavioral pharmacology.
Bloom's Taxonomy: Apply

7. Explain the new drug development process; include descriptions of pre-clinical and clinical trials in your answer.
Bloom's Taxonomy: Apply

8. Why are avoidance and escape tasks used in behavioral pharmacology?
Bloom's Taxonomy: Apply

9. Describe some tests that can be used to study the effects of psychoactive drugs on human performance.
Bloom's Taxonomy: Apply

10. Describe and analyze the usefulness of the open-field test and elevated plus maze in testing anxiolytic drugs in nonhumans. How many times can you use these tests in the evaluation process?
Bloom's Taxonomy: Analyze

11. Explain the drug discrimination task used with rats in behavioral pharmacology. Analyze and explain why it is an important and useful test.
Bloom's Taxonomy: Analyze

12. What would happen if a placebo control was not used in a drug clinical trial?
Bloom's Taxonomy: Analyze

13. Why do you think that the double-blind procedure and the three-group design are important in drug testing?
 Bloom's Taxonomy: Analyze

14. What type of performance in humans can be affected by psychoactive drugs? Describe the types of tests that can be performed to detect such effects.

Bloom's Taxonomy: Evaluate

15. Compare pre-clinical testing methods and the measures used to study human performance. How well do you think they complement each other?
Bloom's Taxonomy: Evaluate

Essays

1. If you were to design a research study with mice to test a new psychoactive drug, describe all the factors you have to include in your study design.
Bloom's Taxonomy: Apply

2. Describe the drug discrimination task and paw lick latency test used in nonhumans in behavioral pharmacology. Analyze and explain the differences between these two tests.
Bloom's Taxonomy: Apply

3. Which part of the drug development process is the most important, in your opinion - pre-clinical, clinical, or post-surveillance? Explain your answer.
Bloom's Taxonomy: Analyze

4. Evaluate the process of new drug development. Is there anything that could be left out, or shortened, due to any special circumstances? In your opinion, is the whole, lengthy, complicated process needed?
Bloom's Taxonomy: Evaluate

5. If you were to design the perfect drug testing protocol, what would you include in your design?
Bloom's Taxonomy: Hypothesize