Study Guide

PG 253 Drugs and Behavior

Dr. Newland

Use this to guide your study for the quizzes and final exam. The quizzes will draw heavily from the items in this guide, which come from the text, lectures, and supplementary readings. Begin working through this guide after you have read and studied the materials. Answer each question to yourself or, better, to a friend as you would on an exam.

Chapter 1.

Drug Use and Misuse: General Issues

What are some of the ways in which drugs can be classified?

Name the "pharmacological" factors important to the drug experience (they will be defined in better detail later).

Briefly, what is meant by the term "reinforcing effect of a drug?" (we will define this term in greater detail later).

What was the lifetime prevalence of alcohol use among high school seniors in 1987? Of marijuana/hashish use? Cigarettes? Cocaine? How about 1991? What is the difference between prevalence and incidence?

Describe two caveats that must be observed when interpreting the high school senior's survey.

What is "polydrug" use?

Describe the cost of drug use in the US according to the estimates given in the book. Describe the per capita cost. What does per capita mean?

Define the Drug Dependence Syndrome according to the DSM III-R. What is the DSM III-R? The book points out that these criteria can be organized into three dimensions: physical, psychological, and social. Organize them that way.

What is tolerance? What are the different types of tolerance?

Drug-taking has been said to be related to the actions of a drug as a "reinforcer" and to the withdrawal symptoms that appear. Compare and contrast how these two drug effects might be related to drug-taking?
Chapter 2.

Drug Use: Yesterday and Today

For the following drugs, describe approximately when the drug was first used, the source, medical uses (if any) and when its use was prohibited:

- ethanol (alcohol)
- opium
- morphine
- cannabis sativa
- hashish
- cocaine
- tobacco
- caffeine
- peyote

Describe the following regulatory acts, there dates, and their importance:

- San Francisco Ordinance
- Pure Food and Drug Act
- Harrison Narcotic Act
- The Eighteenth Amendment

Describe five "schedules" of controlled substances. Give two examples of each class.

Describe the sources of error associated with the testing of drugs. Name and describe the two types of errors that can occur. If the false alarm rate for a drug test is 1%, then how many non-users will be identified in a population of 1000 people?
Chapter 3.

Drugs and the Nervous System

Name, describe, and spell the components of a neuron.

Name and describe the components of a synapse. Spell synapse.

Describe the stages of neural transmission and how a drug can act on these stages.

What is an enzyme?

What is acetylcholine and how do you spell it?


Compare and contrast an agonist and an antagonist.

What is monoamine oxidase?

Name the components of the autonomic nervous system. How can drugs act on them? What drugs act on them? What will a sympathomimetic drug do? A parasympathomimetic?

Describe the function of the following components of the brain and where drugs might act (where relevant).

- Frontal, temporal, parietal, and occipital lobes.
- Pons, cerebellum, medulla oblongata.
- Reticular activating system.
- Hypothalamus (be sure to know the various functions of this structure).
- Medial forebrain bundle.

- Limbic system.
- Basal ganglia and substantia nigra.
- Hippocampus.

What is MPTP?
Chapter 4.
Pharmacology Principles and New Drug Development

Distinguish among absorption, distribution, and elimination. Why are these important in considerations of our understanding of drug actions.

Define and give advantages and disadvantages of the following routes of administration. Sort them according to the speed at which a drug acts. Give two examples of a drug taken by each of the routes:

- oral (p.o.)
- intravenous (i.v.)
- intramuscular (i.m.)
- subcutaneous (s.c.)
- intraperitoneal (i.p.)
- sublingual
- nasal
- inhalation
- topical

How is a drug distributed? What is (would be) a "magic bullet?"

What is the "blood-brain barrier." Why is it important in understanding behaviorally active drugs.

What role does the liver play in drug kinetics and dynamics. Why do you think the liver is sometimes called the "waste dump of the body?" Do you like liver with onions?

List 4 routes of drug elimination.

Distinguish between a dose-effect curve and a dose-response (quantal dose-effect) curve. Why are these important in understanding the effect of a drug. How would you generate a dose-effect curve describing the effect of ethanol on reaction time? How would you do this with a dose-response curve? What is the ED50, LD50, and ED5 and how are they read on a dose-response curve? How is the effect of weight accommodated when describing the dose of a drug?
What is meant by the term "biphasic effect?"

What is tolerance? Distinguish among dispositional, functional, and behavioral tolerance. Distinguish between protracted and acute tolerance.

Describe the steps that must be taken in bringing a drug to market.

Why are animals used in research? Describe some implications of not using animals. What western government has banned animal research in the twentieth century? What subjects did this government endorse for biological research?

**Questions pertaining drugs as positive reinforcers.**

Describe how a positive reinforcer is identified.

Describe the experimental procedure used to demonstrate that cocaine was a "positive reinforcer."

We described three variables that influence positively-reinforced behavior: delay, response effort, and alternate activities.

How have these three things been shown to influence positively reinforced behavior?

Cocaine self-administration in rats? The difference in the abuse potential of intranasal (snorted) cocaine vs smoked crack.

Alcohol or cocaine self-administration in humans?

How might they influence nicotine self-administration in humans?

How might they contribute to an understanding of a drug-abuse career (e.g., Table 6-2, p. 151)?
Study Guide For Chapter 5

Major Stimulants: Cocaine and the Amphetamines.

What are some "caine" drugs?

Describe how route of administration can influence cocaine's actions. What routes have been used? Answer the same question for nicotine.

Name the psychomotor stimulants.

Describe (and distinguish where possible):

The actions of cocaine and amphetamine at the receptor.

The kinetics of cocaine and amphetamine.

The acute effects of cocaine and amphetamine.

The effect of chronic use in humans of cocaine and amphetamine.


Why is the U.S. Olympic committee, among others, concerned about possible amphetamine use by athletes? Describe the experimental basis for their concern.

What are the effects of cocaine withdrawal?

What are the medical uses of cocaine? The amphetamines? What is methylphenidate (methylPHENidate?) Where is it used?

What is "ice?"
Chapter 6.

The Minor Stimulants.

What techniques have been used in the past to increase the "response cost" of tobacco use among people (e.g., Pope Urban VIII, Sultan Murad IV, etc.)? How effective were they?

List all of the currently accepted medical uses for nicotine (short answer).

Fig. 6-2. As the number of men who quit smoking increased the number of men who still smoke decreased. This was not true for women. Why not? If you were marketing cigarettes, how would you use this information?

To what does your book attribute the increase in smokeless tobacco?

What are some of the hazards associated with tobacco use?

Describe the receptor actions of nicotine.

Describe the autonomic actions of nicotine.

Briefly describe behavioral and pharmacological approaches to the treatment of nicotine addiction. How successful have they been?

What is nicotine craving? When does it begin? When does it occur? When does it go away?

Table 6-2 describes the "career" of cigarette smoking. Expand this concept to drug-abuse careers in general. Apply the concept of abused drugs as positive reinforcers to the drug-abuse career.

Identify a representative beverage, over-the-counter, and prescription source of caffeine and state how much is available in each.

What are the acute and toxic effects of caffeine?

Describe caffeine withdrawal.

At what receptor does caffeine act? How does it act?

What are the effects of compounds that act in opposition to caffeine at this receptor. What are they called?

What are the potential medical benefits of the adenosine agonists and adenosine antagonists?
If the half-life of caffeine in the body of A. Denny O'Seen is 4 hours and he drinks two cups of coffee at 6:00 P.M., how much caffeine will he have in his body at 10:00? At 2:00 AM?
Chapter 7.

Alcohol

Name three types of alcohol. Which one is in a bottle of Jack Daniels? Molson's Golden Ale? Windshield wiper fluid? Rubbing Alcohol?

What is the difference between fermentation and distillation? What does this have to do with the ethanol content of beverages.

What is per capita consumption of ethanol in the U.S. as of 1984. How does that compare with the U.S. in the early 19th century?

How much ethanol is absorbed through the stomach wall? Through the intestine wall? What factors influence the rate of absorption?

How is the BAC calculated? How much ethanol is in 100 ml of blood if the BAC is .1. Should you be driving? Would you be arrested?

What is the LD50 for ethanol in units of blood-alcohol content? Drinks? Does this mean that everyone who drinks will die at that level?

On page 189 is a formula for estimating the BAC. How accurately will you be able to make this calculation if your BAC is .01? .05? 1.0? Make a table describing the general effects of BACs between 0.01 and 1.0

Describe the four stages of alcohol withdrawal. How does this compare with benzodiazepine withdrawal?

What is meant when it is said that acute tolerance develops to ethanol? How would the Highway Patrol view a lecture on acute tolerance on a busy Saturday night?

Describe the acute dose-effect curve for ethanol-intoxication as presented in table 7-4. How would dispositional tolerance change this? How would functional tolerance change it? By what mechanism would dispositional tolerance arise to ethanol?

Describe acute tolerance with ethanol.

What are some of the effects of chronic exposure to ethanol?

What is Wernicke-Korsakoff’s syndrome?

What is FAS? How has it been studied in humans? What are the risk factors?

Trace the development of how alcoholism is viewed and how this might bear on the social perception and treatment of alcoholics.
What is the balanced placebo design?

Describe some of the effects of chronic ethanol on the brain, the liver, sexual functioning, the next generation.

Ethanol, like many drugs, has many effects. I thought you might enjoy the following quote that points clearly to the ambivalence that our society, and its representatives, feel about alcohol. It has been attributed to Judge Noah S. (soggy) Sweat of Corinth, Mississippi and was described by William Safire (Britishisms Lying Doggo. New York Times Magazine, July, 1991). The quote was made when Judge Sweat was asked his position on whether a district should go "wet" or "dry."

"If by whisky, you mean the water of life that cheers men's souls, that smooths out the tensions of the day, that gives gentle perspective to one's view of life, put my name on the list of the fervent wets.

"But if by whisky you mean the devil's brew that rends families, destroys careers, and ruins one's abilities to work, then count me in the ranks of the dries."
Chapter 8.

Depressants.

At what receptor does ethanol act? Pentobarbital? Diazepam? RO15-4513?

What are the acute effects of the barbiturates? Benzodiazepines? How do they compare with ethanol?

What is the main way of distinguishing among the different benzodiazepines?

Name a short-acting, an intermediate, and a long-acting benzodiazepine and state their half-lives.

What are the stages of anesthesia?

Describe the acute effects of the depressants.

Describe withdrawal from the depressants.

Name some inhalants used recreationally. Why do you think these are included in this chapter and not another?

What is cross-tolerance and how does it work with diazepam and ethanol?

What is potentiation? What does this have to do with warnings about mixing sleeping pills and liquor?

What does the term "antipunishment effect" mean when applied to anxiolytics. Describe the laboratory model behind this effect.

Rate the abuse potential of the barbiturates and the benzodiazepines. How was this determined?

Would you recommend a drink or a valium before bedtime? Why or why not? What is "rebound insomnia?" What is REM rebound?

List the 4 major classes of depressants and give two examples of each class.

What are the medical uses of the depressants?
Chapter 9.
Psychiatric Drugs

This chapter describes antipsychotic, antidepressant, anxiolytic, and stimulant drugs. Fill in the following table for these drugs:

<table>
<thead>
<tr>
<th>Major drug classes.</th>
<th>Anti-psychotic</th>
<th>Anti-depressant</th>
<th>Anxiolytic</th>
<th>Stimulant</th>
<th>Mood Stabilizers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Representative drugs.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tranquilizer or stimulant?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Abuse Potential</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Neurotransmitter system(s) affected</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nature of above effect (agonist?)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

When was chlorpromazine introduced? What was its first proprietary name? What is its mechanism of action?

What is haloperidol, its proprietary name, and its mechanism of action?

Describe schizophrenia and some other treatments that have been suggested.

How is chlorpromazine usually administered. What is "first-pass" metabolism?"

Where in the brain does chlorpromazine act?

At what receptors does chlorpromazine act?

Name some of the other effects of the antipsychotic drugs.
What are the advantages and disadvantages of clozapine (CLOzapine) and fluoxetine (fluOXetine).

What is the difference between endogenous and exogenous depression? What are some of the signs and symptoms of depression.

What are the two types of antidepressants most commonly used?

Name the putative mechanism(s) of action associated with the antidepressants. Considering these, why do you think that stimulants were once used in treating depression? Why do you think they are no longer used?

Describe the antianxiety drugs. Spell benzodiazepine (BENzodiAzepine). Describe their major clinical uses. What are the caveats associated with their use? What does caveat mean?

What are some mood stabilizing drugs and what do they do.

What receptor mediates the effects of anxiolytics? Would you expect cross tolerance to ethanol? Barbiturates? Chlorpromazine?

What does teratogenic mean? How would one determine if a new drug is teratogenic?
Chapter 10

The Opiates

Name some representative opiates. Where do they come from? What does narcosis mean and when did Dorothy and Toto experience it?

How are the different opiates administered?

Why is heroin more potent than morphine? Other than potency, would you expect these two drugs to act differently? Why or why not?

What is naloxone, what does it do to a heroin addict? To someone who is not addicted? Name two clinical uses for naloxone.

What is an endorphin? Do you think the vertebrate brain evolved so poppy plants could make it feel good?

Define analgesic and name other, nonopiate analgesics.

Name some other effects of opiates (e.g., on the gastrointestinal tract, the eye, coughing, respiration.

Do you think that tolerance to the analgesic effect of morphine would cross to heroin? To codeine? To aspirin? Why or why not?

Why do heroin addicts need to worry about tolerance.

It was once thought (certainly in the thirties and, by some, even today) that only "conscious" organisms (i.e., humans) who could make complex associations and to whom the effects of drugs can be explained could possibly become addicted to a drug. What was figure 10-5 say about this claim?

Describe opiate withdrawal.
Chapter 11
Marijuana

Briefly describe the history of the use, and regulation, of marijuana in the U.S.

Where does marijuana come from? What is the active ingredient? Spell it.

What population is the most frequent user of marijuana?

Do you think that tolerance to marijuana would cross to hash? Why or why not?

What is the half-life of marijuana elimination? What does this say about one's ability to detect its use by sampling blood?

Describe the abuse potential of marijuana in terms of self-administration, of withdrawal signs, and of its use in the population.

What are the potential medical uses of marijuana? The actual uses? Is it Schedule I or II. Why?

Describe the acute effects of THC. The effects of chronic use. How might you model "amotivational syndrome" in an animal laboratory?
Chapter 12
Hallucinogens

Name some of the hallucinogens and how they are classified (Schedule I?, II?, III?)

How was LSD discovered?

What neurotransmitter system mediates the action of LSD and mescaline? Would you expect cross tolerance between these two drugs? Between them and marijuana?

Describe the abuse potential of LSD. How would you evaluate this in an animal study?

What is MDMA? Describe the acute effects of it. Is it Schedule I or II?

Same with PCP, XTC,

Characterize the serotonergic hallucinogens. Describe their effects, the neurotransmitters thought to mediate them, the time course, the prevalence of use, and name some representative compounds.

Do the same with the methylated amphetamines and the dissociative anesthetics.
Chapter 13
Other prescription and over-the-counter drugs.

Who is Ben Johnson?

What is an anabolic steroid?

Why are anabolic steroids taken by athletes?

What are their medical benefits of anabolic steroids?

If you were considering writing a learned report on why athletes use anabolic steroids, how might you apply reinforcement principles? Consider both direct effects of the drug and the direct effects of losing.

Describe the side effects of anabolic steroids.

What do the following acronyms stand for and what do they mean: GRAS, GRAE, OTC.

What are the three main benefits of acetylsalicylic acid? If acetylsalicylic is called "Bufferin" do you think that its actions will be different than if it is called "Exedrin PM?" Why or why not?

What are the other over-the-counter analgesics and when are they used?

Describe the OTC appetite suppressants. What is the main ingredient? Do you think that if the main ingredient is packaged as "Dexatrim" then it will be more effective than "Appedrine?"

List the side effects of PPA.

Describe the uses of:
  pseudoephedrine
  guaifenesin
  dextromethorphan
  diphenhydramine.

Compare and contrast a NoDoz and a cup of coffee.
Chapter 14.

Social and Personality Factors.

What does the term "addictive personality" refer to? Describe its usefulness of this construct to drug abuse research.

A study describing different "personality characteristics" in marijuana users and non-users might be used as evidence in favor of the concept of the addictive personality. Critically assess such evidence. What questions might you ask of the researchers and why?

What is an "expectancy" and how might it alter the drug experience? How could you change the expectancy in another person?

The text describes "microenvironmental" influences. How might these fit into the concept of drugs as reinforcers, i.e., into the "three-term contingency."

List some "macroenvironmental" influences.

What are the odds that the alcohol industry would spend over $1 billion on advertising if it is ineffective?

What are the odds that the alcohol or tobacco industry would tell you that the drug they sell has adverse health effects if they weren't required to do so.

List some social factors associated with drug use. How might these fit into the concept of a drug as a reinforcer?
Chapter 15.

Treatment of Psychoactive Substance Abuse Disorders

Describe the different settings that have been tried in treating alcohol abuse (e.g., milieu, self-help groups, etc).

Methadone maintenance and administration of naloxone (which is not use), and antabuse might be considered as pharmacological treatments aimed at targeting the direct reinforcing properties of the drug. Defend this position.

Compare and contrast methadone and LAAM.

What is craving and how might respondent (pavlovian) conditioning principles account for its development?

What is the major effect of desipramine? What is the putative neurochemical mechanism?

What is meant by the term "self-medicate?"

Discuss some of the difficulties associated with treatment of polydrug use.

How does alcoholics anonymous view alcohol abuse and its progression.

Describe the basic principles of recovery and its progression as espoused by alcoholics anonymous.

Describe the 'controlled drinking' controversy.

What is spontaneous remission? How does it complicate the assessment of treatment effectiveness.

Describe how you might conduct a study to assess the effectiveness of alcohol treatment.

Discuss how the issues raised in treatment, prevention, and social aspects of drug use participate in the "three-term contingency of reinforcement."

Design of a study that might be used to evaluate a treatment program. List the important components. How long do you think it should last?
Chapter 16.
Prevention of Substance Abuse

Distinguish among primary, secondary, and tertiary prevention programs.

Discuss Wilkinson's sociocultural model of prevention and its critics.

Discuss the consumption, zero-tolerance, and proscriptive models.

How might these models view a campaign designed to convince teenagers that marijuana will cause cancer, birth defects, prostitution, and insanity? How might they view a campaign that asserts that marijuana smoking is immoral?

How might you evaluate the effectiveness of a prevention campaign? What are some of the factors that influence their effectiveness (in either direction)?

What are "dram shop laws" and whom do they target?

Describe the prevention program at the University of Washington.
Ethan Nadelman identified "unintended beneficiaries" and "unintended victims" of drug laws. What did he mean by this? Give three detailed examples of each.

The DEA had a budget of $500 million in 1988 and the National Institute on Drug Abuse budget is $250 million. What is the per capita contribution to this budget? It has been estimated that the "Savings and Loan Bailout" will cost $500 billion (give or take a few tenths of a trillion). What is the per capita contribution to this? What is your family's contribution to it?

Nadelman said that "If degrees of immorality were measured by levels of harm then the traffickers in tobacco and alcohol would be vilified as the most evil of all substance purveyors." Why did he say such a thing?
Study Guide for the article:

Contingent Reinforcement of abstinence with individuals abusing cocaine and marijuana.


What is a polydrug use? Which drugs did these subjects use?

How many subjects are described here.

Outline the basic treatment plan from beginning to end.

How was compliance established?

What was the dominant mode of therapy, punishment of drug use, reinforcement of drug abstinence, or reinforcement of activities incompatible with drug use? Defend your answer.

How was cocaine use targeted? What was the effect of intervention on cocaine use? Marijuana use?

What controls were used?

Discuss the ethical obligations that the researchers had to the patient and to the community at large. Do you think that they are obligated to inform law enforcement officials about drug users? What are the implications of a "Yes" answer? A "No" answer?

If this turned out to be the only way to treat cocaine use, do you think it would be worth the cost?
Study Guide for the article:
Addictive drugs: The cigarette experience.
Thomas C. Schelling

How many deaths were attributed to smoking in 1982.
How did people learn of these dangers, according to Schelling?
Do most people quit smoking the first time?
Name 4 ways in which smoking has become more difficult since about 1980.

Fewer cigarettes are smoked now than in 1970. Is this because each smoker smokes less? Or because there are fewer smokers. What does the answer imply about the smoking habit (that is, the quantity of drug required by the addict)?

What are some of the reasons that Schelling lists for the difficulty in quitting?

By what criteria is nicotine an addictive drug?

What other chemicals do smokers get exposed to? Why do scientists think that nicotine is responsible for the addictive nature of the drug? Is nicotine also responsible for the adverse health effects?

Schelling says: "being addicted to nicotine is more like being addicted to chocolate than to the hard drugs." What does he mean by that? What is the connection to chewing coca leaves?

How long does it take to get over nicotine "withdrawal?"

Schelling asserts that "society' can tolerate addiction to a chemical substance if the behavioral consequences hurt only the addicted consumers." What do you think? Is it true that only the smoker suffers the consequences?
Study Guide for the article:

Secondary prevention with college drinkers:

Evaluation of an alcohol skills training program.

There are many statistics and technical "trees" that obscure the "forest" in this paper. Try to get the main point. What was done? What happened? And what was concluded?

Describe the three groups and how they differed.

Which was the "control" group. What are the strengths and weaknesses of the control group used? Specifically, how did the control group differ from the average college student?

Name the four dependent measures used?

When were the dependent measures assessed?

How did the "skills training" group differ from the other two groups?

What conclusions are permitted by the study, and the control groups used?

What is the difference between this approach, and the "just say no" approach?