Psychoactive Drugs

Psychoactive drug: A chemical substance that alters perceptions and mood.

Your textbook characterizes three broad categories of psychoactive drugs

- Depressants: Drugs (such as alcohol, barbiturates, and opiates) that reduce neural activity and slow body functions.

- Stimulants: drugs (such as caffeine, nicotine, and the more powerful amphetamines, cocaine, Ecstasy, and methamphetamine) that excite neural activity and speed up body functions.

- Hallucinogens: psychedelic ("mind manifesting") drugs such as LSD, that distort perceptions and evoke sensory images in the absence of sensory input.

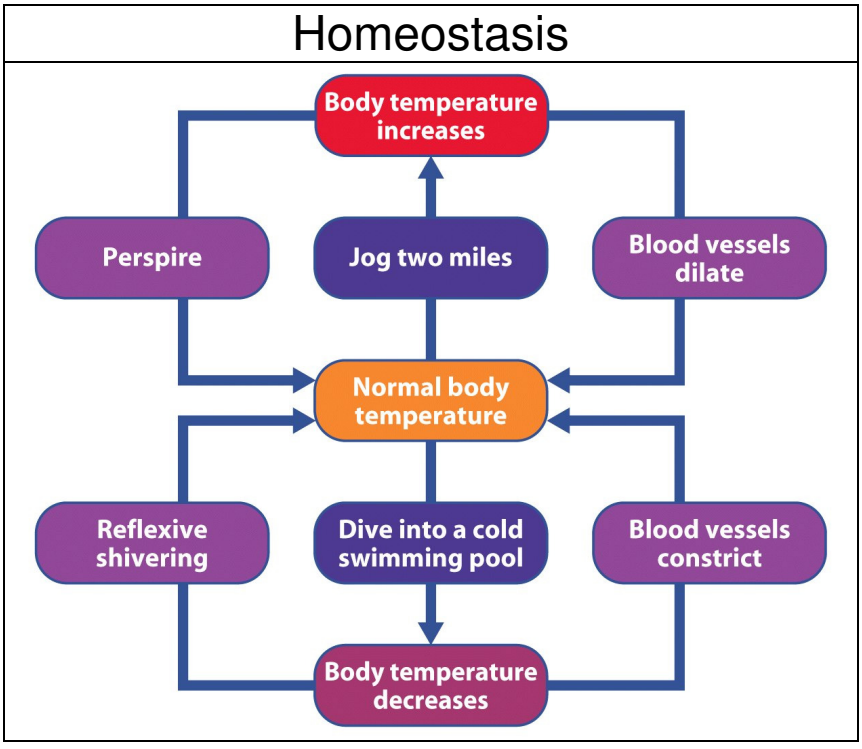
Image source: Carpenter and Huffman

1. What are the neurotransmitters from chapter 2?
2. Which class of drugs probably affects these neurotransmitters?

Compensatory Responses

When people use drugs, the body and brain attempts to maintain homeostasis by reducing the effects of the drug and produces reactions that are opposite to that of the drug.

Compensatory responses: A reaction by the body to drugs in an attempt to maintain a state of homeostasis.



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Compensatory Responses

This biological effect to reduce the effect of the drug is called the compensatory response. Compensatory response can be triggered biologically by taking the drug or triggered psychologically through environmental cues that signal that drug taking behavior is about to take place.

	Drug effect	Compensatory Responses
	Slows the body down	Stimulates the body to restore homeostasis
	Stimulates the body	Slows the body down to restore homeostasis

Image source: Carpenter and Huffman

Compensatory Responses

Compensatory responses can help explain phenomena that most people are familiar with such as:

Drug tolerance: The diminishing effect with regular use of the same dose of a drug, requiring the user to take larger and larger doses before experiencing the drug's effect.

Drug withdrawal: The discomfort and distress that follow discontinuing and addictive drug or behavior.

The experience of strong reactions opposite to those produced by the drug

The withdrawal symptoms may be thought of the body's compensating response still becoming active in the absence of the drug.

The compensatory response can not only explain drug tolerance and drug withdrawal symptoms, but an unexpected observation that

- experienced drug users die of a drug overdose
- without increasing their normal dose
- while consuming drugs in a different location like a park, bathroom, or alleyway.

Drug Tolerance

Tolerance: The diminishing effect with regular use of the same dose of a drug, requiring the user to take larger and larger doses before experiencing the drug's effect.

	Tolerance	
	Dosage	**Effect**
January		
February		
March		
April		

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	Tolerance		
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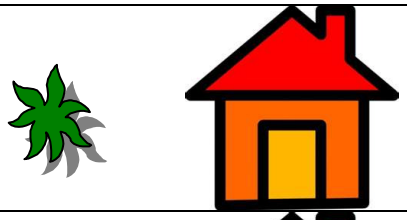
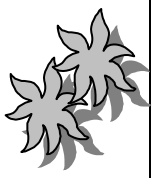
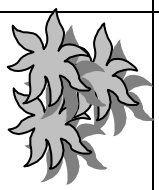
January			
February			
March			
April			

Compensatory Responses

Compensatory responses: A reaction by the body to drugs in an attempt to maintain a state of homeostasis.

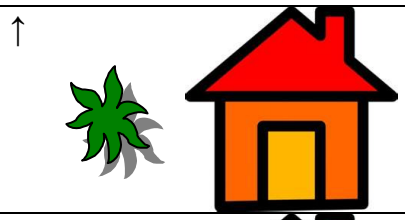
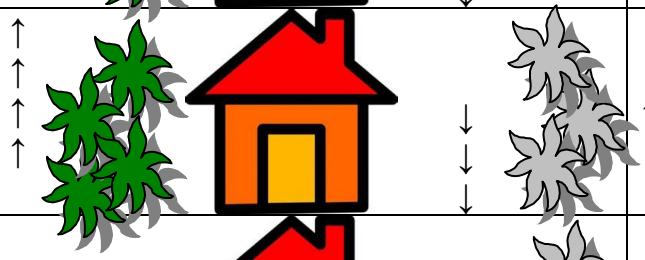
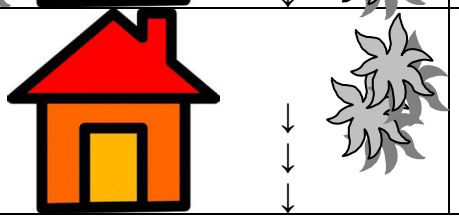
When people use drugs, the body and brain attempts to reduce the effects of the drug and produces reactions that are opposite to that of the drug.

	Dosage +	**Compensatory Response**	**= Drug Effect**
	Drug +	***- Counteracts drug***	
January	↑ 		↑ 
February	↑ ↑ 	↓ 	↑ 
March	↑ ↑ ↑ 	↓ ↓ 	↑ 
April	↑ ↑ ↑ ↑ 	↓ ↓ ↓ 	↑ 

Withdrawal Effects

Withdrawal: The discomfort and distress that follow discontinuing and addictive drug or behavior.

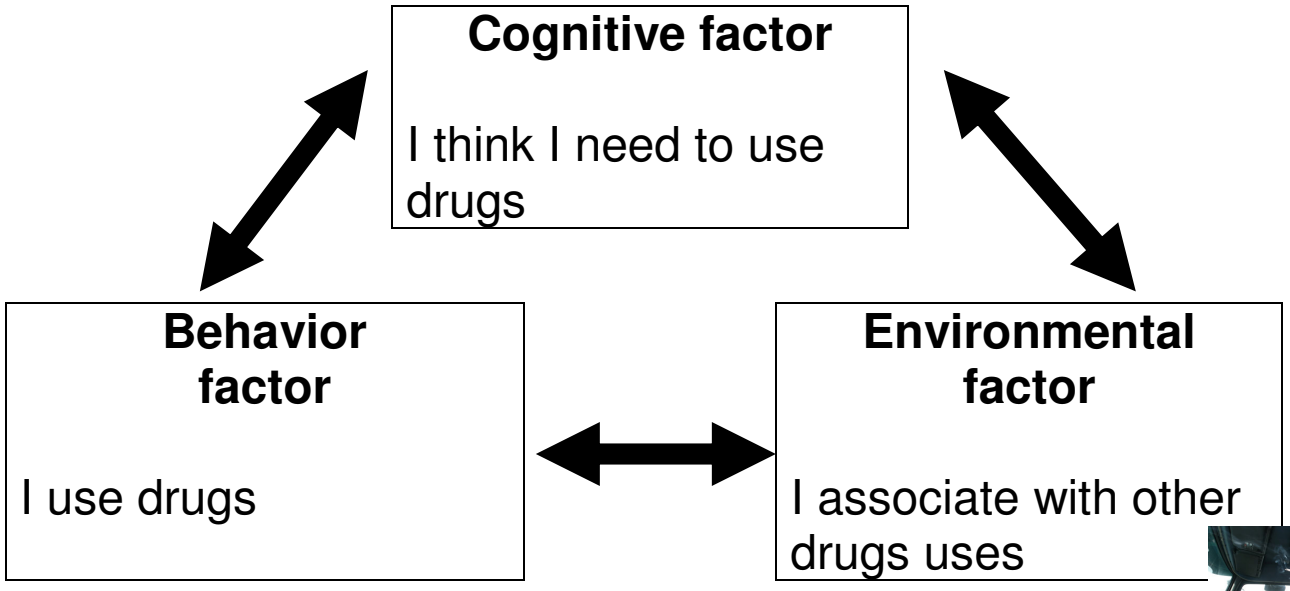
The experience of strong reactions opposite to those produced by the drug

	Dosage + Compensatory Response	Drug Effect	Withdrawal
	Drug + - Counteracts drug		
January			
February			
March			
April			
May			**Withdrawal effects** 

Withdrawal Effects

Not only can the compensatory response become triggered biologically through the use of a drug, it can be triggered by environmental cues.

If you want to reduce drug use, you may need to change environments. According to the principle of reciprocal determinism, beliefs, environment and behavior are intertwined.



In order to understand the problems of drug abuse, you need to understand

- the process of reciprocal determinism,
- as well as the neurochemical basis of addiction (the neurotransmitter dopamine) and
- learning (classical conditioning and operant conditioning).

You can easily replace this with criminal behavior. This helps explain some programs to help disrupt the cycle of criminal behavior and drug use.

Examples of Drugs and their Compensatory Responses (that can lead to withdrawal effects)

Drug	Drug Effects	Withdrawal effects
Amphetamines	Manic sense of well-being and euphoria	Severe depression
Tranquilizers • Alcohol, • anti-anxiety medication,	Slows the body down	Arouses the body
Heroin	Slows stomach contracts, constipation	Stomach cramps, diarrhea
Nicotine	Increase in heart rate	Slowing of the heart rate

Classically Conditioned Compensatory Responses

	Dosage + Compensatory Response	Drug Effect	Withdrawal
	Drug + - Counteracts drug		
January	↑	↑	
February	↑ ↑ ↓	↑	
March	↑ ↑ ↑ ↓ ↓	↑	
April	↑ ↑ ↑ ↑ ↓ ↓ ↓	↑	
May 1	↓ ↓ ↓		Withdrawal effects
May 2	↑ ↑ ↑ ↑ ↓	↑ ↑ ↑ Drug over dose	

What are the physical effects of alcohol?

For most people, alcohol is not a terribly dangerous drug—but it is a powerful drug and should be treated accordingly. No one would take a powerful antibiotic or heart medication without the advice of a physician. But alcohol is available to virtually anyone who wants to have it without a prescription (Buzzed, page 31)

- Low doses of alcohol decrease (inhibits) the sympathetic nervous system (see chapter 3). This has a calming effect for some and reduces the ability to respond to a situation.
    - 40-90% of chronic male drinker reported reduced sex drive. They also showed a reduced capacity for penile erection, decreased semen production and lower sperm counts.
- In animal studies, it appears that there is an increase in dopamine levels when the concentration of alcohol rises and not while it is falling, therefore… and risks… (addiction)
- Small doses of alcohol can initially make people feel good, relaxed and sociable. When alcohol is eliminated from the body, these feelings can be replaced with drowsiness. To avoid these withdrawal effects, people may be motivated to drink more to maintain this initial pleasant buzz.

Alcohol and the Brain

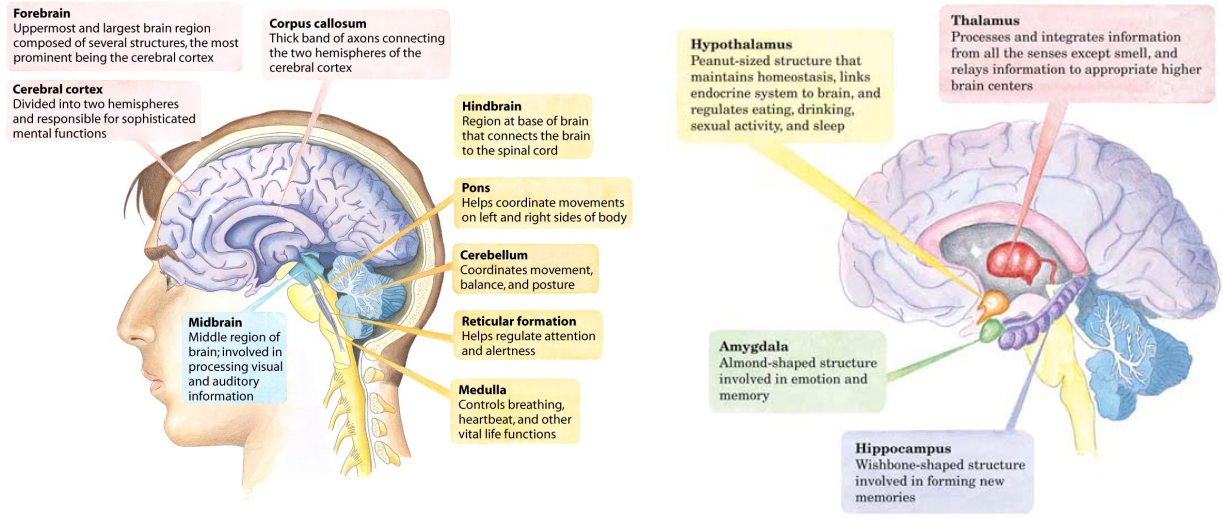


Image source: Hockenbury and Hockenbury

- Alcohol affects the hippocampus, impairing the ability to form new memories—even in low doses before an exam (it may help you relax (see above), but not remember and learn new information).
    - Recall of memories already formed do not seem to be impaired.
- Alcohol affects the cerebellum, impairing the ability to have coordinated movements, such as walking in a straight line.
- Alcohol affects the frontal lobes, depressing activity there, suggesting that…
- Because the frontal lobes don't fully develop until about age 20, children and adolescents who drink impair their brain functions important for their ability to plan, make complex judgments, think abstractly and control their emotions. In addition, chronic drinkers have difficulties solving complex problems that require the development of new strategies.

- Alcohol can depress activity of the medulla suggesting that…

- Alcohol increases the neurotransmitter GABA (Chapter 3). GABA is an inhibitory neurotransmitter. Large doses of alcohol (binge drinking, doing shots, Everclear Jell-O) can suppress the brain center (_____) that controls breathing. Mixing alcohol with other depressants (such as…) can lead to death.

Chronic drinking:

- Chronic drinkers have more difficulties with word puzzles, and solve geometry and algebra problems.
- Chronic drinkers have more difficulties focusing attention and maintaining concentration and usually appear in more challenging situations.
- In extreme cases, of chronic alcohol abuse among men, they can begin to lose body hair and develop breast tissue (feminization syndrome).
- The life span of the addicted alcoholic is 12 years shorter than average.