Chapter 4

Consciousness;
Sleep, dreams, hypnosis and drugs
Consciousness

- **Consciousness** – awareness of what is going on around you organize behavior

- **Waking consciousness** – thoughts, feelings sensation are clear and organized

- **Altered States of Consciousness** – shift in quality /pattern of mental activity
Biological Rhythms

- Biological rhythms –
  - Regular fluctuation in biological system – up & down of functioning

- Circadian rhythms –
  - Body’s clock
  - Biological rhythm within a period of approximately 24 hours
    - Average is 24.18 hours
    - Cave study; 25 hour day; book; 30 hour day
  - Plants, animals and insects
  - Adaptation of organism in relation to rotation of earth on its axis

- Internal desynchronization
  - Clock is out of sync – change time zones; jet lag; change in work shift
    » Exxon Valdez; 3 Mile Island; Chernobyl
"If we ever intend to take over the world, one thing we'll have to do is synchronize our biological clocks."
Sleep Rhythms

- Rapid eye movement (REM)
- Non-REM
  - 4 stages

90 minute cycle btw REM & non-REM sleep
Sleep Rhythms

- **Awake**

**Non-REM**
- **Stage 1** - light sleep, easily awakened – alpha waves small & irregular

- **Stage 2** – minor sound not waken – sleep spindles, short bursts of rapid high peak alpha waves

- **Stage 3** – breathing & pulse slowed – hard to wake – slow high peaked delta waves

- **Stage 4** – deep sleep – shaking or loud noise to wake – sleepwalking – delta waves taken over

- **REM Sleep** – few minutes to 1 hour – dream – alpha & delta waves

Rapid, somewhat irregular
Non REM and REM Sleep
Why We Sleep

• Physical
  – To stay alive
  – Body restores itself

• Mental
  – Memory consolidation
  – Consequences without sleep
    • Stress – cortisol
    • Damage or impair brain cells

• Sleep deprivation – significant loss = poor concentration & irritability
Sleep Disorders

1. **Nightmares** – bad dreams during REM sleep
2. **Sleep walking** – somnambulism  20% due to heredity
3. **Night terrors** – usually children; state of panic
4. **Insomnia** – inability to get to sleep, stay asleep and get quality sleep
5. **Sleep apnea** – stop breathing during sleep
6. **Narcolepsy** – sleep seizures

"On your application it says you have narcolepsy. What is that?"
4 Approaches of Exploring Dreams

1) Psychoanalytic  *Dreams as unconscious wishes*
   - Freud – “royal road to the unconscious”
   - Manifest content – aspect consciously experienced
   - Latent content – hidden – symbolic (can be related to sex)

2) Problem focused approach  *Dreams as a way to deal with problems*
   - Insight into emotional effects of daily life
   - Dream of drowning – feeling overloaded with work / home / school

3) Cognitive approach  *Dreams as thinking*
   - Brain working in sleep like when awake
   - Express concerns; not problem solving

4) Activation-synthesis  *Dreams interpreted brain activity*
   - cortical synthesis and interpretation of neural signals
Which Dream Theory is This?
Evaluating Dream Theories

• **Psychoanalytic** - Freud
  – PRO: dreams do have meaning
  – CON: parts far fetched

• **Problem focused** –
  – PRO: dreams related to problems
  – CON: doubt solve them

• **Cognitive** –
  – PRO: same as waking life; express concerns;
  – CON: yet to be tested

• **Activation – synthesis** –
  – PRO: random signals
  – CON: not explain story-like dreams
Which Approach Matches Statement

• In his dream, James is on a playground crawling through tunnel looking for something he lost.

1. James recently found his lost iPhone.

2. James just broke up with his significant other and is working through the emotions.

3. While James is sleeping, neurons are signaling.

4. James has repressed his sexual attraction to his mother and the tunnel represents her vagina.
Which Approach Matches Statement

- In his dream, James is on a playground crawling through tunnel looking for something he lost.

1) James recently found his lost iPhone.
   - Cognitive

2) James just broke up with his significant other and is working through the emotions.
   - Problem Focused

3) While James is sleeping, neurons are signaling.
   - Activation Synthesis

4) James has repressed his sexual attraction to his mother and the tunnel represents her vagina.
   - Psychoanalytic
Hypnosis

• Hypnosis-
  – Practitioner
    • Suggests changes in subject’s sensation, percept., thoughts, feelings or behavior
  – Subject
    • Tries to alter sensation, perception, thoughts, feelings or behavior

• 6 Points of Hypnosis
  1. Hypnotic responsiveness depends on subject more than practitioner

  2. Hypnotized people cannot be forced to do things against their will
    1. Pass to let go of inhibitions

  3. Feats preformed under hypnosis can be performed by motivated people

  4. Hypnosis does not increase accuracy of memory

  5. Hypnosis does not produce re-experiencing of long-ago events

  6. Hypnotic suggestions effective for medical & psychological purposes
    1. Pain management; stress & anxiety
Theories of Hypnosis

• Dissociation Theories
  
  – Compared to lucid dreaming or simple distraction

1) A split in consciousness
  
  • Part of mind operated independent of consciousness
  • One part hidden observer; watching not participating
  • Unless given special instruction; hypnotized part unaware of observer

– Experiment – Ernest Hilgard
  
  • Hypnotized subject & ice water
  • Attempt to question hidden observer directly
    – Arm in ice told minor pain
    – Told feel minor pain
    – Submerged hand in ice could signal pain with key
      » Stated felt no pain
      » Hand repeatedly pressed key
Theories of Hypnosis

Dissociation between executive system (frontal lobes) & other brain systems

- Hypnotist – induces state split; hidden observer & rest of mind respond

Dissociation Theories of Hypnosis

- Hypnotist induces hypnotic state
- Split between hidden observer or executive control system and rest of mind
- Person responds to suggestions (“I’m 4 years old”)
Theories of Hypnosis

- **Socio-cognitive Approach**
  - Interaction btw social (socio) influences & abilities, beliefs/expectations (cognitive)
- **Hypnotist** — “you're going back in time” + subject “I believe ....” = subject conforms
Consciousness Altering Drugs
Drug Categories

Depressants

Stimulants

Hallucinogens

Narcotics

Designer

Inhalants
Depressants

- Alcohol*
- Tranquilizers
- Barbiturates
- Anti-anxiety (benzodiazepine)
  - Valium
  - Xanax
  - Librium
  - Klonopine
- Valium
- “Downers”
- Sleeping Pills

- Slurred Speech
- Lethargic
- Mood Swings
- Poor Co-ordination
- Poor Judgment
- Slowed Reaction Time
- Constricted Pupils
Alcohol involvement:
- 39% of those in prison for violence
- 39% of traffic fatalities
- 67% in domestic violence
- 40% in rape
- 72% date rape
- 60% child abuse and neglect
- 23% of suicide
Alcohol

Youth 3rd leading cause of death
- 21 years highest alcohol use
  - Unintentional; drowning, vehicle accidents
  - Suicide
  - Homicide

Adults
- Liver disease
- Pancreatitis
- Alcohol poisoning
- Diabetes
Alcohol

• Father Martin--*Chalk Talks*:
  – jocose drunk – barrel of laughs
  – amorose – can’t keep hands to himself
  – bellicose – new man with new teeth
  – lachrymose – cry, sad

• Others by book: somnos- (sleepy)
  clamorose, (loud),
  scientose (know it all)
Which has more alcohol?

5 oz wine  12 oz beer  1 shot liquor
How do you sober up?
Alcohol and Driving

- Slowed reaction time
- Poor co-ordination
- Poor judgment

- BAC
  - .08 – Buzzed (impaired vision)
  - .15 – Really buzzed (stagger; gross motor decreases)
  - .20 – Wasted (poor motor skills; unconscious)
  - .30 – Danger (impaired breathing; decreased heart)
  - .40 - Death (comatose)

- BAC peak 30 – 45 minutes after consumption
### Should you drive?

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<th>Number of Drinks Per Hours</th>
<th>100 lbs</th>
<th>120 lbs</th>
<th>140 lbs</th>
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<td>.07/.09</td>
<td>.06/.08</td>
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</tbody>
</table>
Metabolism & Alcohol

• Liver:
  – organ that metabolizes alcohol
  – alcohol circulates in the bloodstream (every cell) until metabolized
  – Alcohol = acetaldehyde = acetic acid = carbon dioxide & water (poison)

🌟 Alcohol absorbed through
🌟 stomach and 80% small intestine

• People metabolize approx. ½ oz. Per hour
  • 5 oz glass of wine
  • 12 oz glass of beer
  • 1 shot
Metabolism & Alcohol

- Men have special enzymes help.
- Women metabolize $\frac{1}{2}$ the rate of men
- Flushing in Asians
- Synergy -
  - Multiplying effect of 2 drugs $2 + 2 = 10$
  - One drug to come down from another
- Tylenol plus Alcohol >liver failure.
Alcohol continued

• Health effects
  – heart
  – liver
  – pancreas
  – diabetes

• 7-10% of drinkers get addicted
  – Youth addicted in 2 years
  – Adults addicted in 7 years

• Tolerance
  • woman with .26 BAC
  • 0.4 B.A.C. may be comatose

• Tolerance reversal
  – Liver shot so handle less

• Cross tolerance
  – High tolerance for drugs in same category
Alcohol

• **Withdrawal (tremors, nausea)**
  • 24 hours to 3 to 4 days
  • Hangover

• **Blackouts:**
  – common at 0.3 BAC
  – *Chemical induced amnesia*

*Alcohol interferes with the ability to form new memories. Large amounts of alcohol, particularly if consumed rapidly, can produce partial or complete blackouts, which are periods of memory loss for events that transpired while a person was drinking.*
Medical Consequences: Alcohol

• Brain
  – Shrinkage of brain
  – Poison of brain cells
  – Damage to nervous system

• Wernicke syndrome – Paralysis of normal eye movement
  Confusion
  Problems with balance

• Korsakoff psychosis – “Wet brain”
  Long term brain damage
  Confusion and memory loss
  Confabulation – fantasizing to fill gaps
Medical Consequences

• Peripheral neuropathy - lack of Vitamin B

• Malnutrition

• Liver damage...removes toxins from blood
  – Alcoholic hepatitis 2nd stage liver damage
  – Cirrhosis

• Yellow skin tone
  – immune system breakdown

• Heart – nicotine, cocaine
Fetal Alcohol Syndrome:

- small head circumference
- low nasal bridge
- short face
Drinking Rates in Liters of Alcohol

- **Iran**—0.0
- India—.82
- Cuba—3.65
- Mexico—4.62
- Norway—5.81
- Japan—7.38
- **U.S.**—8.51
- Italy—9.14
- Greece—9.30
- UK—10.39
- Denmark—11.93
- France—13.54
- **Ireland**—14.45
Stimulants

- Cocaine*
  - Sense of arousal
  - Bloody nose
- Methamphetamine *
- Amphetamines
- Nicotine* / Caffeine
- “Speed” / “uppers”
- Ritalin
- Diet Pills

- Increased Heart Rate
- Lack of appetite
- Sense of well being
- Heart Attack
- Increased Movement
- Increased Speech
- Fidgety – “Hyper”
- Aggressive
- Dilated Pupil

1800 grams of cocaine
Stimulants

Cocaine

- Cocaine - crack and powder
  - in urine 3 days
  - Chew, snort or smoke
  - smoked for faster high

- Crack
  - $\text{H}_2\text{O}$, ammonia & baking soda

- Freebasing
  - Mix with combustibles
  - Richard Prior

- Brain blocks reuptake of dopamine
  - Addicted rats die
  - Heart attack
  - Dehydration
  - Starvation

- Cocaine/nicotine easiest to get addicted

Meth

- Snort, inject, smoke
- Ephedrine / psudoephedrine
- Developed for soldiers
- Tooth decay

- leading cause of emergency room visits for illicit drugs

- Anhedonia - inability to feel pleasure due to drug-induced brain injury

- Paranoia / delusions
COCAINETOOTHACHE DROPS
Instantaneous Cure!
PRICE 15 CENTS.
Prepared by the
LLOYD MANUFACTURING CO.
210 HUDSON AVE., ALBANY, N. Y.
For sale by all Druggists.
(Registered March 1885.)
Every doctor in private practice was asked:
—family physicians, surgeons, specialists...
doctors in every branch of medicine—
“What cigarette do you smoke?”

According to a recent Nationwide survey:
More Doctors Smoke Camels
than any other cigarette!

The “E-Zone” Test will tell you

Not a guess, not just a trend... but an actual test based on the statements of doctors themselves to a nationally known independent research organization.

Yes, your doctor was asked...along with thousands of other doctors from Maine to California. And they’ve named their choice—the brand they themselves smoke.... Camels! It’s not just doctors who choose Camels...it’s nearly 2 million other people who prefer Camels to any other brand. And they’re not just people who choose Camels; they’re people who prefer Camels over any other brand.
The Brain and Addiction
Cocaine in the Brain

Slides are from the National Institute on Drug Abuse (NIDA) (www.nida.nih.gov)
• Depletion following cocaine use. (Nicotine)

The loss of red areas in the right scan indicates that the brain is using less glucose ---less active.

---reduction in activity results in disruption of many brain functions.
**Nicotine**

- Can both stimulate and relax
- Natural insecticide
- 90% lung cancer deaths
- 3,000 die from secondhand smoke
- 80-90% emphysema
  - chronic lung disease
- 80-95% of alcoholics smoke
  - reduces alcohol effects.
  - Smokers 10 x more likely to become alcoholic (which can first)
- Nicotine decreases BAC levels
- Nicotine and cocaine easiest to get addicted
Narcotics

- Pain Killers
- Morphine
  - Extract of opium
- Codeine
- Opium
  - from opium poppy
- Vicodin
- Heroin
  - Synthetic opium
  - Smoked, snorted or injected
  - Treated: methadone clinic
  - “Trainspotting”
- Oxycontin
  - For cancer patients
  - Long lasting

- Same as Depressants
- Prescribed by Doctor
- Needle Marks
- Flu – like symptoms
Hallucinogens

- Marijuana *
- Lysergic Acid Diethylamide (LSD)
  - Acid / Microdot
  - Blotter / Windowpane
- Psilocybin Mushrooms
  - “Magic” / “shrooms”
- Peyote Cactus
  - Mescaline
  - “Buttons”
- Phencyclidine “PCP”
  - Sense of indestructibility
  - Combative
  - Lack of Pain
  - Blank Stare
- Bufotenine Toad

- See / hear things
- Anxiety / Paranoia
- Slurred Speech
- Flashbacks
Cannabis

• Marijuana
  – Weed
  – Pot
  – Smoke
  – Grass

• Hash
  – Made from resin

• THC, the psychoactive ingredient,
  • Delta 9 Tetrahydocannabinol
  – lowers blood glucose
  – gaiety, laughter
  – increases appetite
  – Stored in fat cells
  – long term use possibly associated with apathy

• 10 times more potent than “back in the day” (60s-70s)
Designer Drugs

• **Ecstasy**
  – MDMA methylenedioxymethamphetamine
  – Once used to treat trauma patients
  1. Hallucinogen & Stimulant
     • Confidence
     • Sense of arousal
  2. Dehydrate
     • Dry / sore mouth & throat
  3. High Blood Pressure
  4. Body Temp. 110*
  5. Can’t get back to original high / brain changes

• **Date Rape**
  – Unconscious
  – Odorless / colorless
    1. Gamma-hydroxybutyrate “GHB”
    2. Rohypnol “Roofies”
Long Term Effects of Ecstasy

- Liver damage
- Anxiety disorders
- Irregular heartbeats
- Brain damage
- Depression
- Confusion
- Paranoia
Inhalants

• House Hold Items
  1. Glue
  2. White Out
  3. Paint
  4. Thinner
  5. Solvents
  6. Aerosols

• Varied Effects
• Increase Heart Rate
• Decrease Heart Rate
• Headache
• Dizziness
• Loss of Sense of Smell
• Paint at Nose/Mouth
• Lung Collapse
• Confusion
Costs to Get High
Estimates Differ by Region

• Crack: $5-10 quick fix only lasts 30 min.

• Heroin: $100-200 day—
  – $20 day can buy maintenance dose inject a couple of times

• Ecstasy: $10-20 may take 5 or so pills.

• Meth: $25 long-lasting high,
  – popular in gay party scene in
  – Seattle, factory workers in Iowa

• Marijuana: $25 or higher, depends on quality
The Brain

• Adaptation

• Addicted brain
  – Different due to chemical changes from use
  – Cravings
  – Drug rush
  – Memory of past euphoria
    • Euphoric recall
  – Use to alleviate withdrawal
Brain Regions and Their Functions

- movement
- sensations
- vision
- judgement
- reward
- memory
- coordination
How Neurons Communicate

- Synapse – site where transmission of nerve impulse from one nerve cell to another occurs;
  - axon terminal
  - synaptic cleft
  - receptor sites in membrane of receiving cells
How Neurons Communicate

• **Action potential** – brief change in electrical voltage that occurs btw the inside/outside of axon when a neuron is stimulated; produces an electrical impulse

• **Neurotransmitter** – chemical substance that is released by transmitting neuron at the synapse & alters the activity of a receiving neuron
Neurotransmission / Synapse*

1. Neuron at rest (- inside + outside)

2. Neural impulses move down axon; gate opens; +Na enters cell; voltage changes from (-) to (+)

3. When impulse reach button tip; must get across synaptic cleft (gap); synaptic vesicle release neurotransmitter

4. When reaches the other side; briefly bond w/ receptor sites (lock & key)

5. Receiving membrane will change; excite – increase firing (+ voltage) inhibit – decrease firing (- voltage)

6. Neuron returns to resting state (- voltage)

Action potential - a sequence of gates opening down length of the cell (as 2\textsuperscript{nd} gate opens 1\textsuperscript{st} closes)

-multiple +/- messages sent; take average
Nervous System Chemicals

1) Neurotransmitters (affected by drug use)

• Serotonin — sleep; pain suppression; mood
  adult male; alcohol & decreased serotonin = suicide

• Dopamine — learning; memory; emotion;
  *pleasure or reward* “feel good” neurotransmitter
cocaine use – depletion = crash

• GABA - *(gamma-aminobutyric acid)* major inhibitory neurotransmitter in brain
  alcohol

• Acetylcholine - muscle action; cognitive functioning; memory; emotion

• Norepinephrine - heart rate; slow intestinal activity during stress;
  learning, memory; dream; wake from sleep; emotion

• Glutamate – major excitatory neurotransmitter in brain; 90% of neurons
Why do People do Drugs?
The Brain and Addiction
## Addictive Substances \^ Dopamine

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<thead>
<tr>
<th>Substance / Activity</th>
<th>Peak Dopamine Release</th>
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<tbody>
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<td>Food / Sex</td>
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<td>Cannabis</td>
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<td>Ethanol</td>
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<td>Nicotine</td>
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<td>Heroin / Morphine</td>
<td>150- 300%</td>
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<td>Cocaine</td>
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<td>Amphetamines</td>
<td>1000%</td>
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Memory and Craving

• Addict never gets original high—brain has changed

• Addiction is a brain disease

• Cues can trigger memory...
  – Picture of alcoholic beverages activates certain areas of the brain.
  – Smell
  – Being in bar

• Prozac reduces craving by regulating serotonin levels
• Medications to reduce cravings
  – Antabuse (old) made you sick if drank alcohol (mouthwash)
  – Campral (new) reduce cravings and reduce relapse length
Substance Abuse and Dependences

- **Tolerance** – needing more of a drug to get the same effect

- **Dependence** – need drug to continue well being
  - Physical
  - Emotional

- **Withdrawal** – physical symptoms; shakes; nauseated; pain