Consciousness

Chapter 6
Part 1: Attention, disorders of attention, hypnosis and meditation
p177-186; 203-207

Functions of Consciousness

- Subjective awareness of internal and external events
- Monitor
  - Keep track of thoughts, perceptions, feelings
  - Keep track of environment
  - Ignore irrelevant information
- Control
  - Alter behavior in order to approach or avoid

What is attention?

- How do you use attention to drive a car? You…
  - “Pay attention”
  - Use effort to attend to other objects or locations
  - Divide attention between tasks — or multi-task
  - Sustain attention
  - Orient to objects or locations sometimes reflexively
  - Restrict attention - select particular objects to attend to and try not to attend to irrelevant info
  - Search for particular objects
  - Don’t pay attention to body movements (sometimes)
  - If bad conditions, you focus your attention

Definitions of attention

- Attention is a mental process
  - Effortful
- Attention requires mental resources
  - Limited
- Attention can be involuntary or voluntary
  - Stimulus-driven or automatic (like a reflex)
  - Goal-driven or controlled (like a filter or zoom lens)

Research question:
- Do we capture MORE or LESS information than we realize?

Flicker task

- This task tests how well you can detect changes when you are trying your best to find them. A photo of a scene will appear briefly and then it will be replaced by a blank screen. After a fraction of a second a changed version of the scene will appear. The original and changed images will alternate for about 10s. Try to find the change.
Change blindness: Rensink (2002)

- **Method**
  - Flicker Task
  - IV: time of blank between original and modified image
  - IV: location of change in picture

- **Results**
  - "Blind" to changes
  - Impossible to attend to all aspects of a scene at 1 time

- **Conclusions**
  - Failure to automatically notice change
  - Requires *focused* attention (to objects or locations)

Instructions

- You will see 2 teams of players – one wearing white t-shirts and one wearing black t-shirts. Try to count the total number of times the team wearing white passes the ball.

Inattentional blindness: Simons & Chabris (1999)

- **Method**
  - Selective attention to white team passing ball

- **Results**
  - 50% miss an unexpected object

- **Discussion**
  - Selective attention to objects or locations
  - Attention based on goal
  - Can be "blind" to highly salient events


- **Method**
  - Pedestrian asks directions, interrupted by door, change pedestrian

- **Result**
  - 7 of 15 noticed change
  - 7 were same age-grp as ped’s

- **Conclusions**
  - Need effortful attention for complete representation

Controlled attention

- Deliberate, voluntary allocation of attention

  - **Selective attention:**
    - Attend to one, ignore other
    - Real world examples

  - **Auditory tasks:**
    - Dichotic listening task
    - Shadow task

  - **How much is processed before selected?**
    - Physical analysis: early selection
    - Meaning analysis: late selection

Change detection and Inattentional blindness

- Change detection vs. Inattentional blindness
  - Purposeful search for change or not

- **Comments:**
  - External validity: not a real world event
  - Assumption of unchanging visual world
  - Cause of effect:
    - Where is focus of attention?

- **Conclusions**
  - We do not have a detailed visual representation of the world – especially if information is not attended to
Early selection
- Cherry (1953)
  - Dichotic listening
  - Don’t remember much about 2nd message
- Broadbent’s dual-task
  - Hear 3 pairs of digits in each ear
  - Subjects recall digits from one ear then other
  - Support for physical analysis
- Problem:
  - *Cocktail party effect*

Late selection
- Shadowing technique
  - Message in each ear, attend to one, ignore other
- Treisman (1960) results:
  - Attention can switch with message meaning
  - Unattended message “reduced”

Current theory of selective attention
- What do we select to pay attention to?
- Selection based on *combination* of:
  - Physical characteristics
  - Pertinence based on meaning
- Attention is flexible
  - Trade-off between capacity and stage of selection

Automaticity
- Real world examples:
  - Riding a bike
  - Driving a car
  - Turning off alarm clock
  - Turning off hotel alarm clock
  - Turn to loud noise
  - Watch a tennis match
  - Tying your shoes
  - Teaching how to tie shoes
  - Writing your name
  - Writing name after married
- Little or no conscious effort or awareness
- Attention without draining resources
- Rapid process

Task instructions
- Your task is to name the color of the stimuli as quickly and accurately as possible. You will see 2 columns. Start at the top left and after finished with the first column, start with the top of the next column. Again, you want to say the colors as quickly and accurately as possible.
- We will do this 4 times.

Stroop: say the color

<table>
<thead>
<tr>
<th>GLPD</th>
<th>XTPB</th>
<th>RSLJ</th>
<th>ZMQ</th>
</tr>
</thead>
<tbody>
<tr>
<td>BAR</td>
<td>ROD</td>
<td>CUT</td>
<td>HEAD</td>
</tr>
<tr>
<td>RED</td>
<td>BLUE</td>
<td>GREEN</td>
<td>BROWN</td>
</tr>
<tr>
<td>BLUE</td>
<td>BROWN</td>
<td>RED</td>
<td>GREEN</td>
</tr>
</tbody>
</table>
Stroop

- Stroop (1935)
  - Congruent (same word/color): 63s/100 items
  - Incongruent (diff word/color): 110s/100 items
  - Measure interference: Reaction time or errors

- How does automatic processing explain Stroop?
  - Automatic processing (reading) interferes with controlled processing (name color)

- Other examples
<table>
<thead>
<tr>
<th>33</th>
<th>4444</th>
<th>22</th>
<th>333</th>
<th>4444</th>
</tr>
</thead>
<tbody>
<tr>
<td>33</td>
<td>222</td>
<td>44</td>
<td>2222</td>
<td>444</td>
</tr>
</tbody>
</table>

How to develop automaticity

Hirst, et al. (1980)

- Divided attention: Dual-task
  - Read stories silently
  - Copy irrelevant words being dictated

- Results
  - Week 1: handwriting illegible, reading slow
  - Week 6: improvement, poor recall of dictated words

- Conclusion
  - Practice can alter limits of attentional capacity

Thought paper

- So…Do we attend to MORE or LESS than we realize?
- Given your answer then…
- Should talking on the cell phone while driving be illegal? Why or why not given what you’ve learned about attention?

Horswill & McKenna (1999)

- Question: Does talking on a cell phone negatively affect driving?
- Method:
  - Single-task: Simulated driving
  - Dual-task: Also monitor auditory list for letter “K”
  - Divided attention

- Results:
  - Dual-task: worse driving performance and worse on monitoring task

- Conclusion:
  - Participants took more risks driving in dual-task condition
  - Limited attention resources

Strayer & Johnston (2001):
Cell-phones & driving

Strayer & Johnston (2001):
Cell-phones & driving

Disorders of attention

- Attention deficit/hyperactivity disorder
  - General difficulty in maintaining concentration
  - Debate regarding diagnosis criteria
  - Serotonin or dopamine system possibly involved
  - Treatment: medication, training programs

- Visual neglect
  - Damage to right parietal lobe
  - Tend to ignore left side of visual field
  - “Burning house” example in text (p185): conscious vs. unconscious awareness
Unilateral visual neglect

Hypnosis

A social interaction in which one person (the hypnotist) suggests to another (the subject) that certain perceptions, feelings, thoughts, or behaviors will spontaneously occur.

Facts and Fiction

Those who practice hypnosis agree that its power resides in the subject’s openness to suggestion.

- Can anyone experience hypnosis? Yes, to some extent.
- Can hypnosis enhance recall of forgotten events? No.

Explaining the Hypnotized State

1. Social Influence Theory: Hypnotic subjects may simply be imaginative actors playing a social role.

2. Divided Consciousness Theory: Hypnosis is a special state of dissociated (divided) consciousness (Hilgard, 1986, 1992).

Both Theories

Attention is diverted from an aversive odor. Why?

Divided-consciousness theory: hypnosis has caused a split in awareness

Social influence theory: the subject is so caught up in the hypnotized role that she ignores the odor.
Meditation

Meditation involves the use of attention focusing techniques (mantras, objects, movement or prayer/chant)

- Often associated with Eastern Faith/Religions (Buddhism and Hinduism)
  - Goal: a concentrated focus

- Two types:
  - Concentration Meditation (specific focus device)
  - Mindfulness Meditation (focus on the moment-to-moment flow)

- Outcome:
  - Brings about state of relaxation and possible insights
  - Takes practice to learn to “quiet the mind”

Zzzzz: Thought paper

- How much sleep did you get last night?
- How many hours of sleep is optimal for you?
- How much sleep does the average adult need?
- Why do we need to sleep?
- Why do we dream?

Dr. Maas: “Power Sleep”
http://www.powersleep.org/

- Dr Maas:
  - Anyone who sleeps less than 6-7 hours per night (over 1/3 of the U.S. population) is missing a significant amount of sleep

Amount of sleep by age

- We spend 1/3 of our lives sleeping
- Individual differences in amount needed
  - In part, age dependent

![Amount of sleep by age chart]

Studying sleep

- In 1950’s Kleitman and Aserinsky
  - Studies on daughter and themselves
- Rapid Eye Movement (REM)
  - When woke participant they often reported vivid dreams
- EEG: measures brain activity
  - Correlated eye movements with EEG
- Study behavior and physiological changes
Measuring sleep: About every 90 minutes, we pass through a cycle of five distinct sleep stages.

**Sleep Stages**

- During light sleep (stages 1-2), the brain enters a slow, regular wave form called theta waves. A person who is daydreaming shows theta activity too.

**Sleep Stages 1-2**

- During deepest sleep (stages 3-4), brain activity slows down. There are large-amplitude, slow delta waves. The % of delta distinguishes the stages.

**Sleep Stages 3-4**

- After reaching the deepest sleep stage (4), the sleep cycle starts moving backward towards stage 1. During REM, although still asleep, the brain engages in low-amplitude, fast and regular beta waves much like awake-awrouse state.

**Stage 5: REM Sleep**

- A person during this sleep exhibits Rapid Eye Movements (REM) and reports vivid dreams.

**Sleep cycle: stages of sleep**

- With each 90-minute cycle, stage 4 sleep decreases and the duration of REM sleep increases.
Sleep Cycle: Stages of sleep

REM: rapid eye movement
- REM: 20% of total sleep
  Every 90min, increasing in length during night
  REM occurs 4-6 times/night (depend on time)
- Characteristics
  Eyes dart & heartbeat more rapid/irregular
  “Paradoxical sleep”: EEG resembles beta waves
  Muscle system mostly inactive
- If awoken during REM
  Seem instantly alert (unlike stage 4)
  Likely to report dreaming

SleepTracker alarm clock

“Why do we dream?”
- Freud and the unconscious
  Expression of wishes and feelings
  Dreams have hidden meanings (latent content) vs. actual symbols (manifest content)
- Efficiency and restoration
  Exercise neurons v. trash unused
  Sleep enhances memory for new material!
- Activation-synthesis theory
  Make sense of random neural activity
- Neural-cognitive
- Combination of above (?)

Why do we sleep?
- Two major theories:
  Repair and restore
  Survival/evolution
- What happens without sleep?
  Sleep deprivation studies
  REM rebound

Sleep disorders
- Insomnia
  Persistent problem falling or staying asleep
  20-65yrs: most likely due to stress
- Narcolepsy
  Overwhelming sleepiness (directly into REM)
  Genetic w/ no cure
- Sleep apnea and SIDS
  Cessation of respiration
- Night terrors/sleepwalking
  20% of 3 to 12yr olds experience 1+ episode
- Sleep paralysis
  Muscle paralysis of REM persists past awakening
Common dream questions

- Does everyone dream?
  - During REM: 80% report pictorial dream
- Why do people have trouble remembering dreams?
- How can I improve my dream memory?
- Are dreams in color?
  - 61% say always, 31% sometimes, 8% say never
- Do dreams have meaning?
- Are nightmares normal?

Biological Rhythms and Sleep

Circadian Rhythms occur on a 24-hour cycle; include sleep and wakefulness; and are altered by artificial light.

Psychoactive Drugs

A chemical substance that alters perceptions and mood (affects consciousness).

Major Classes of Psychoactive Drugs:
1) Depressants
2) Stimulants
3) Opiates (or narcotics)
3) Hallucinogens

Consciousness

Ch 6
Pt 3: Drugs

Dependence & Addiction

- Continued use of a psychoactive drug produces tolerance.
  - With repeated exposure to a drug, the drug’s effect lessens.
- Drug dependency
  - Physical need
  - Psychological need
- Withdrawal symptoms
  - Physical reactions
  - Psychological reactions

Misconceptions About Addiction

Addiction is a craving for a chemical substance, despite its adverse consequences (physical & psychological).

1. If an addict has enough willpower, they can stop abusing drugs.
   - Addiction is just a bad habit; result of overindulgence
2. Most people relapse so treatment doesn’t work.
3. Addiction is no different than repetitive pleasure-seeking behaviors.
Depressants

- **Depressants** are drugs that reduce neural activity and slow body functions. They include:
  - Alcohol
  - Barbiturates (Amytal, Nembutal)
  - Tranquilizers (Valium, Xanax)
- Enhance GABA and dopamine (inhibitory messages)
- Produce feelings of relaxation; affects motor skills, judgment and memory

Stimulants

- **Stimulants** are drugs that excite neural activity and speed up body functions.
  - Caffeine
  - Nicotine
  - Cocaine
  - Ecstasy
  - Amphetamines
  - Methamphetamines
- Some increase effectiveness of norepinephrine & dopamine
- Produce feelings of euphoria &/or energy, followed by crash
- Also increase heart and breathing rates and other autonomic functions to provide energy

Opiates

- **Opiates** (narcotics): depress neural activity, temporarily lessening pain and anxiety, elevate mood.
  - Mimic endorphins
  - They are highly addictive.
  - Examples: heroin, morphine

Hallucinogens

- **Hallucinogens** (psychedelics): distort perceptions and evoke sensory images in the absence of sensory input.
  - Act on serotonin receptors
    1. LSD (acid): synthetic drug
    2. THC: major active ingredient in marijuana (hemp plant) that triggers a variety of effects, including mild hallucinations

Drugs Summary

<table>
<thead>
<tr>
<th>Drug</th>
<th>Type</th>
<th>Pharmacologic Effects</th>
<th>Adverse Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alcohol</td>
<td>Depressant</td>
<td>Initial high followed by relaxation and disinhibition</td>
<td>Depression, memory loss, organ damage, impaired micturation,</td>
</tr>
<tr>
<td>Amoxicillin</td>
<td>Stimulant</td>
<td>Decrease in appetite, nausea, increased alertness</td>
<td>Amoxicillin-induced diarrhea, allergic reactions, drowsiness</td>
</tr>
<tr>
<td>Caffeine</td>
<td>Stimulant</td>
<td>Increased alertness, increased energy</td>
<td>Cardiac arrhythmias, hypertension, seizures, depression</td>
</tr>
<tr>
<td>Cocaine</td>
<td>Stimulant</td>
<td>Increase in motivation, mood, energy</td>
<td>Sleep disturbances, hallucinations, paranoia</td>
</tr>
<tr>
<td>Acetaminophen</td>
<td>Analgesic</td>
<td>Pain relief</td>
<td>Hepatic failure, jaundice, gastroenteritis</td>
</tr>
<tr>
<td>Codeine</td>
<td>Analgesic</td>
<td>Pain relief</td>
<td>Respiratory depression, constipation, nausea</td>
</tr>
<tr>
<td>Morphine</td>
<td>Analgesic</td>
<td>Pain relief</td>
<td>Hypnotic, respiratory depression, miosis</td>
</tr>
<tr>
<td>Marijuana</td>
<td>Hallucinogen</td>
<td>Alteration of consciousness, perception, memory</td>
<td>Hallucinations, paranoia, respiratory depression, nausea</td>
</tr>
</tbody>
</table>

Influences on Drug Use

The use of drugs is based on biological, psychological, and social-cultural influences.
Influence for Drug Prevention and Treatment

1. Education about the long-term costs
2. Efforts to boost people’s self-esteem and purpose
3. Attempts to modify peer associations and teaching refusal skills