States of Consciousness
2-4%
States of Consciousness

- Sleep and Dream content survey
States of Consciousness
What’s new(ish)?

• Stage 3 and 4 of sleep have been combined
• It is now NREM 3
States of Consciousness

- Radiolab: Sleep
- Resource: Mouse Party
Unit Presentation:
States of Consciousness
Sleep

If you live to be 90...
Sleep Deprivation
The National Sleep Foundation Survey: Asleep at the Wheel?

Key findings from the Sleep in America Poll, a national survey of randomly selected American adults:

- 37% reported being so sleepy during the day that it interfered with their daily activities.
- 40% compensated for sleep lost during the week by sleeping an extra hour or more on the weekends.
- 43% use caffeine to help them stay awake during the day.
- 51% have driven when drowsy during the past year.
- 17% have actually fallen asleep at the wheel in the past year.
- 1% have had a traffic accident due to being drowsy or falling asleep at the wheel.

A story: Peter Tripp (radio DJ)

1959: 201 hours or 8.5 days

A story: H.S. senior Randy Gardner

1965: 264 hours or 11 days

How much sleep do we really need to function?

Animal studies of deprivation (cats and dogs)
Microsleeps
Why do we sleep?

How has evolution molded our sleep patterns?

*other animals and uni-hemispheric sleep

* monophasic vs. polyphasic sleep
  • Note: “predation risk”

* sleeping in new places?
Why do we sleep?

Adaptive or Evolutionary Theory:

*Humans sleep at night because it’s historically been best for their survival to do so*
Restorative Theory:

Humans sleep to replenish physical energy

Memory Consolidation Theory: (aka: Information Processing Theory)

Human sleep helps in sorting and filing info, and in strengthening some neural connections, while pruning others away
The Sleep Cycle
Biological Rhythms and Sleep

Sleep Stages

An EEG

Awake, relaxed

Alpha waves
Biological Rhythms and Sleep

Sleep Stages

An EEG
Biological Rhythms and Sleep

Sleep Stages

An EEG
Biological Rhythms and Sleep

Sleep Stages

- Awake, relaxed
- Stage 1 sleep
- Stage 2 sleep
- Stage 3 sleep
- Stage 4 sleep

An EEG

- Alpha waves
- Spindle (burst of activity)
- Delta waves
Awake, relaxed

Stage 1 sleep

Stage 2 sleep

Stage 3 sleep

Stage 4 sleep

REM sleep

Alpha waves

Spindle (burst of activity)

Delta waves

Eye movement phase
The stages in a typical night’s sleep

**Young Adults**

- Awake
- REM
- NREM-1
- NREM-2
- NREM-3

**Older Adults**

- Awake
- REM
- NREM-1
- NREM-2
- NREM-3
The stages in a typical night’s sleep

### Young Adults

- **Awake**
- **REM**
- **NREM-1**
- **NREM-2**
- **NREM-3**

REM increases as night progresses.

### Older Adults

- **Awake**
- **REM**
- **NREM-1**
- **NREM-2**
- **NREM-3**

Hours of sleep
The stages in a typical night’s sleep

**Young Adults**

- Awake
- REM
- NREM-1
- NREM-2
- NREM-3

REM increases as night progresses.

**Older Adults**

- Awake
- REM
- NREM-1
- NREM-2
- NREM-3

Hours of sleep
Insomnia?

Hypersomnia?
Sleep Disorders:

*Sleep Apnea
(Frequent stoppages of breathing during sleep)
*Narcolepsy
(A sudden, involuntary drop into REM sleep)
*Night Terrors
(Screaming, sweating etc., can’t link to dream, no recall in AM)
*Somnambulism and Somniloquy
(Sleep Walking ------ Sleep Talking)
*REM Sleep Behavior Disorder
(The muscles don’t shut down as they should – potentially dangerous!)
‘Sleep Related Eating Disorder’

More common in females; *somnambulism* combined with compulsive eating, with no recall of the binge; some have been known to eat raw bacon, cat food, tubs of butter, “soap slice sandwiches”, etc.
A bit more on REM
"Boy are my eyes tired! I had REM sleep all night long."
REM ("paradoxical sleep")

- The dream stage?
- Paralysis
- Tetris (link to info processing)
- REM deprivation (lab studies)
- REM rebound (lab studies)
- Babies and REM
Marked drop in REM during infancy

Average daily sleep (hours)

REM sleep

Non-REM sleep

Waking

Infancy  Childhood  Adolescence  Adulthood and old age
Circadian Rhythms:

“about a day”

Primary example = 24 hr. sleep/wake cycle
**Table 4.1**

**Examples of Human Circadian Rhythms**

<table>
<thead>
<tr>
<th>Function</th>
<th>Typical Circadian Rhythm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peak mental alertness and memory functions</td>
<td>Two daily peaks: around 9:00 A.M. and 9:00 P.M.</td>
</tr>
<tr>
<td>Lowest body temperature</td>
<td>About 97°F around 4:00 A.M.</td>
</tr>
<tr>
<td>Highest body temperature</td>
<td>About 99°F around 4:00 P.M.</td>
</tr>
<tr>
<td>Peak physical strength</td>
<td>Two daily peaks: around 11:00 A.M. and 7:00 P.M.</td>
</tr>
<tr>
<td>Peak hearing, visual, taste, and smell sensitivity</td>
<td>Two daily peaks: around 3:00 A.M. and 6:00 P.M.</td>
</tr>
<tr>
<td>Lowest sensitivity to pain</td>
<td>Around 4:00 P.M.</td>
</tr>
<tr>
<td>Peak sensitivity to pain</td>
<td>Around 4:00 A.M.</td>
</tr>
<tr>
<td>Peak degree of sleepiness</td>
<td>Two daily peaks: around 3:00 A.M. and 3:00 P.M.</td>
</tr>
<tr>
<td>Peak melatonin hormone in blood</td>
<td>Between 1:00 A.M. and 3:00 A.M.</td>
</tr>
<tr>
<td>Peak allergic sensitivity to pollen and dust</td>
<td>Between 11:00 P.M. and 1:00 A.M.</td>
</tr>
</tbody>
</table>

**SOURCES:** Campbell (1997); Czeisler & Dijk (2001); Refinetti (2000); M. Young (2000).
Remember the hypothalamus?

It’s also a sleep control center, monitoring day/night changes, especially in a part of it called “the suprachiasmatic nucleus” (SCN)
First thing in the morning

Shortly after light exposure

Later in the day
Dreaming
Why do we dream?

Is dream interpretation worthwhile?
Memory Consolidation/Information Processing Theory

*Dreams help in sorting and filing info, and in strengthening some neural connections, while pruning others away*

Activation-Synthesis Theory

Our brains are very active in firing electrical messages during REM, and we try to “make” those random signals into a coherent storyline.

Freudian “Psychoanalytic” Theory

Our dreams are often a symbolic expression of unconscious wishes and fears and aggressive impulses.
Freud & Psychoanalytic thought

- Wish fulfillment?
- “royal road to the unconscious”
- “Guardian of sleep”
- Manifest content
- Latent content
Criticisms of Freud?
Hypnosis
Under hypnosis, a subject is in an “altered state of consciousness” and is thus not in control of how he or she behaves.
Hypnosis: from Greek for ‘sleep’ (even though it’s not sleep!)

What is it?

* An “altered state” of consciousness?

* Simply a relaxed state of heightened suggestibility?
Hilgard’s hidden observer
Hypnosis terms

- Induction
- Hypnotizability
- Post-hypnotic suggestion
- Post-hypnotic amnesia
What is it used for?
Hypnosis and pain management?

Hypnosis and addiction control?

Hypnosis and age or memory regression?

Hypnosis as placebo effect?
## Help Through Hypnosis

Research has demonstrated that hypnosis can effectively:

- Reduce pain and discomfort associated with cancer, rheumatoid arthritis, burn wounds, and other chronic conditions
- Reduce pain and discomfort associated with childbirth
- Reduce the use of narcotics to relieve postoperative pain
- Improve the concentration, motivation, and performance of athletes
- Lessen the severity and frequency of asthma attacks
- Eliminate recurring nightmares
- Enhance the effectiveness of psychotherapy in the treatment of obesity, hypertension, and anxiety
- Remove warts
- Eliminate or reduce stuttering
- Suppress the gag reflex during dental procedures
Psychoactive Drugs

What factors most contribute to drug use/abuse?

Perceptual set and expectation?

Tolerance?

Physical and psychological dependence?

Withdrawal?
The Blood-Brain Barrier?
Recall: agonists and antagonists?

(a) Neurotransmitters carry a message from a sending neuron across a synapse to receptor sites on a receiving neuron.

(b) The sending neuron normally reabsorbs excess neurotransmitter molecules, a process called reuptake.

(c) By binding to the sites that normally reabsorb neurotransmitter molecules, cocaine blocks reuptake of dopamine, norepinephrine, and serotonin (Ray & Ksir, 1990). The extra neurotransmitter molecules therefore remain in the synapse, intensifying their normal mood-altering effects and producing a euphoric rush.
Stimulants
Caffeine, Nicotine, Cocaine

Ex. Amphetamines
(Think “I’m amped up”?)
Suggestion:
Don’t use meth
Depressants

Ex. Alcohol, Anti-anxiety drugs, Barbiturates
Opiates (also depressants)

Ex. Heroin, Morphine, Oxycodone

*mimick endorphins

Note: Methadone
Hallucinogens

Ex. LSD, THC
Another suggestion: don’t use ecstasy

Serotonin Present in Cerebral Cortex Neurons

Control  2 weeks after Ecstasy  7 years after Ecstasy
Structuralism

• Wundt and others...
• Study the structures (elements) of thought using introspection
Functionalism

- William James
- Study the adaptive functions of thought
End of

“States of Consciousness”

powerpoint