Today
Sleep
Why do we need it?
Dreams
Why do we dream?

Sleep deprivation
Peter Tripp
1959
Stayed awake for ________________________
Experienced ________________________
Minor sleep deprivation
Exhaustion
Trouble focusing
________________________
Anger
Correlations between ________________________ and lack of sleep

Sleep deprivation
Other Symptoms of Minor Sleep Deprivation
________________________
Speech problems
Glucose metabolism ________________________ up to 40%
Can lead to symptoms of early ________________________
Side note:
Guinness Book of Records record is 18 days, 21 hours, 40 minutes

Drastic Effects of Sleep Deprivation
Sleep deprivation implicated in ________________________
Three Mile Island nuclear meltdown
________________________ oil tanker disaster
________________________ explosion
Bhopal, India chemical leaks

Sleep Deprivation: Adolescents
Teens don’t get enough sleep ________________________
Try to make up for it on the ________________________

Sleep is a Biological Rhythm
Seasonal migrations
________________________ seasons
________________________
Circadian rhythms:
Sleep

Zeitgebers: External Cues Help Set Circadian Rhythms
Internal clocks interact with _____________________
________________________

Without light: Human “________________________” cycle is about 25 hours
Blind individuals and ________________________serving on submarines may
experience sleep problems

**Individual Variations in Sleep Patterns**
“Larks” are ________________________
“Owls” are night people
Many people are in between these extremes
Most adolescents are ________________________
Revert back to their individual preference after adolescence
   Accommodation by the schools to an adolescent’s natural schedule is beneficial
       Changed 7:15 start to 8:40 start
   ________________________________ increased

**Shift Work**
Nurses, Doctors, Public Safety workers
Shift workers average ___________________________, and are more prone to sleep-related illnesses and ________________________disorders.
Higher accident rates
   Swing shift is higher than day shift
   Night shift is highest overall
More mistakes made as well
   Nurses more likely to make ________________________ than in the daytime

**Jet Lag**
Internal clock and ________________________ disagree
Experience fatigue, ________________________, and sleepiness
East-west travel is BAD
   Adjustment to jet lag requires about 1 day per time zone crossed.
North-South travel is GOOD

**Chronic Jet-Lag**
Airline crews traveling across time zones vs. airline crews that don’t travel across time zones
   Slower ____________________________
   ________________________________ in memory task

**Adjustments to Phase Delays Are Easier than Phase Advances**

**Daylight savings**
Started in WW2
“________________________” much worse than “________________________”
   Similar to jet lag
Coren (1996)
Found a 7% ________________________ in accidents after the Fall daylight savings change
Found a 7% ________________________ in accidents after the Spring daylight savings change

**History of sleep**
2000 years ago
Noticed that after you eat, you feel sleepy
“________________________”
Deduced that _______________________________ cause sleepiness
Now we know that the brain regulates sleep

**The Internal Clock**
Hypothalamus
______________________________ (SCN)
Light is important for circadian rhythms
tied closely to SCN
______________________________ pathway

**SCN Activity and Light/Dark Cycles**
The SCN is active during the day in both _______________________________ animals
The SCN tells the animal whether it’s day or night, but not how to behave

**The SCN**
Isolated SCN tissue maintains its _______________________________
Transplants of SCN establish donor rhythms in _______________________________
Breeded hamsters with 20 hour internal clock
Transferred into regular 24 hour internal clock hamsters
A ________________________ cycle ensued
The SCN may control other “internal clocks”
Rhythmic activity found in _______________________________ and muscles

**Origin of the Internal Clock**
Lesions of the maternal SCN do not disrupt _______________________________ rhythms
Genetics plays a role
Oscillations of _______________________________ and degradation serves as the “ticking” of the internal clock
Light may participate in the triggering of some of these protein fluctuations

**Protein Fluctuations and Fruit Fly Circadian Rhythms**

**The Biochemistry of Circadian Rhythms**
_____________________________ is the neurotransmitter of the retinohypothalamic tract
_____________________________ signals the release
PACAP modulates Glutamate activity in the SCN
_____________________________ is released only at night (by the retina and the pineal gland)
Peak is around 4am
Blind individuals peak at different times every day
Used to treat insomnia and jet lag

Biochemistry of Circadian Rhythms
________________________is released during deep sleep
________________________release is highest in the morning and drops during the day
Released during times of stress
Possibly why it is hard to sleep when stressed

Seasonal Affective Disorder (SAD)
Depression related to the_________________________
1.4% of Florida residents experience SAD
9.7% of New Hampshire residents experience SAD
________________________may enjoy some genetic immunity
________________________levels normally drop in late fall through winter—people
with SAD may experience too much of a drop
________________________uses lights of 2500 lux (normal indoor light is about 100 lux, sunlight is about 10,000 lux)

Evaluating Sleep and Wakefulness
________________________ (EEG)
Evaluation of muscle tone
Evaluation of __________________________

Stages of Waking and Sleeping
________________________ is characterized by relatively desynchronized alpha
and beta waves
________________________ (SWS) is characterized by relatively synchronized
theta and delta waves.
Rapid-eye-movement sleep (REM) is characterized by an EEG resembling
________________________
90-120 minute cycles
90–120 minute ultradian cycles characterize both sleep and wakefulness

EEG During Wakefulness and Sleep
Stage 2:
________________________: bursts of activity
________________________: responses to outside stimuli
Stages 3 and 4 show larger percentages of __________________________
REM sleep combines an active EEG, eye movements and muscular paralysis

Sleep Patterns in a Typical Night
The first 4 hours contain more __________________________, especially Stages 3 and 4
The second 4 hours contain more REM
REM episodes occur approximately every __________________________minutes
Brain Activity in Wakefulness, SWS and REM
REM vs. waking (top):

________________________more active during wakefulness
primary visual cortex equally active
________________________more active during REM

REM vs. SWS (lower):

most of the brain is more active during REM than during SWS
_______________________________ is more active during SWS

Sleep Patterns Across the Lifespan
REM sleep is more ________________________________
_______________________________ is associated with drops in overall sleep and proportion of SWS

Dreaming
Dreams occur during both ________________________________
REM dreaming is more vivid, less logical, story-like and longer
Calvin Hall found that we usually dream about _______________________________ and routine activities, but unfamiliar people

Theories of Dreams
_______________________________: Dreams incorporate ongoing functions (e.g. vestibular activity) and/or environmental events (e.g. your alarm clock)
_______________________________: Dreaming is a way to forget irrelevant information
Winson’s evolutionary approach: Animals integrate memories and experience while dreaming

A Freudian Approach
Believed the ID was freely expressed in _______________________________
The ID is a ___________________________ driven mechanism
Common dream interpretations
Circular items such as apples, oranges, balls: _______________________________
Snakes and longer items: _______________________________

Random Dream Notes
70% of dreams have negative emotional content

________________________
Falling
________________________
Needing to take an exam, but being unprepared

Lucid Dreaming
Having the realization that _______________________________ during the dream
Typically can change the dream
May have uses in __________________________________
    Getting people to face their fears in their dreams

**Nightmares and Night Terrors**

________________________: bad dreams during REM sleep

Night Terrors: during __________________________
    Start with a scream
    May sit up and move
    __________________________ until woken up

**Nightmares vs. Night Terrors**

**Why Do We Sleep?**

Sleep keeps us __________________________

Sleep preserves energy

Sleep __________________________

**Functions of SWS**

Rest, repair body

________________________ (HGH) is released during Stages 3 and 4 SWS

Deprivation produces __________________________

**Functions of REM**

Birds and mammals show __________________________

REM increases __________________________ has occurred

REM rebound after deprivation

People can live and learn without REM

________________________

SSRIs suppress REM

________________________ improves mood

**What Parts of the Brain Manage Sleep Phenomena?**

________________________ proved that sleep is a behavior, not just the
lack of brain activity

Brémer’s sections identified parts of the brain responsible for sleep mechanisms

________________________: responsible for SWS

________________________ in brainstem: play a role in SWS

Reticular Formation: also plays a role in arousal
    Inhibited by the raphe nuclei

**The Control of Wakefulness**

________________________ activity wakes animals

Locus coeruleus (pons) (norepinephrine)

________________________ may promote sleep by inhibiting the reticular formation

**Control of REM Sleep**
Occur with eye movements
Caudal reticular formation (Pons) controls REM phenomena
REM sleep is inhibited by both the ______________________ and the locus coeruleus
Active during SWS

Summary of Sleep Control

Biochemical Correlates of Sleep
Not well understood
Reticular formation
Arousal: ______________________
Raphe nuclei
________________________: promotes sleepiness
________________________: a serotonin agonist
Locus coeruleus
________________________: inhibits REM sleep

Biochemical Correlates of Sleep

Sleep Disorders
________________________ involve difficulties with the initiation, maintenance, timing
and quality of sleep
________________________ involve unusual behaviors that intrude on normal sleep

Dyssomnias
Insomnia
________________________ insomnia
________________________ insomnia
________________________ Ceasing to breathe during sleep

Narcolepsy
________________________: episodes and features of REM sleep occur during
wakefulness
________________________
Muscle paralysis during wakefulness
Triggered by a stressor
Sleep paralysis
Muscle paralysis immediately ______________________
Hypnagogic and hypnopompic ______________________
Dreaming immediately after or before sleeping

Cause of Narcolepsy
Highly ______________________
Can breed for a narcoleptic gene in dogs
____________________________abnormally
Due to abnormal amounts of certain neurotransmitters

**Parasomnias**
Nightmares
Night terrors
Sudden infant death syndrome (SIDS)
Sleep ______________________
Sleep walking
____________________ (bedwetting)
REM behavior disorder
Restless leg syndrome