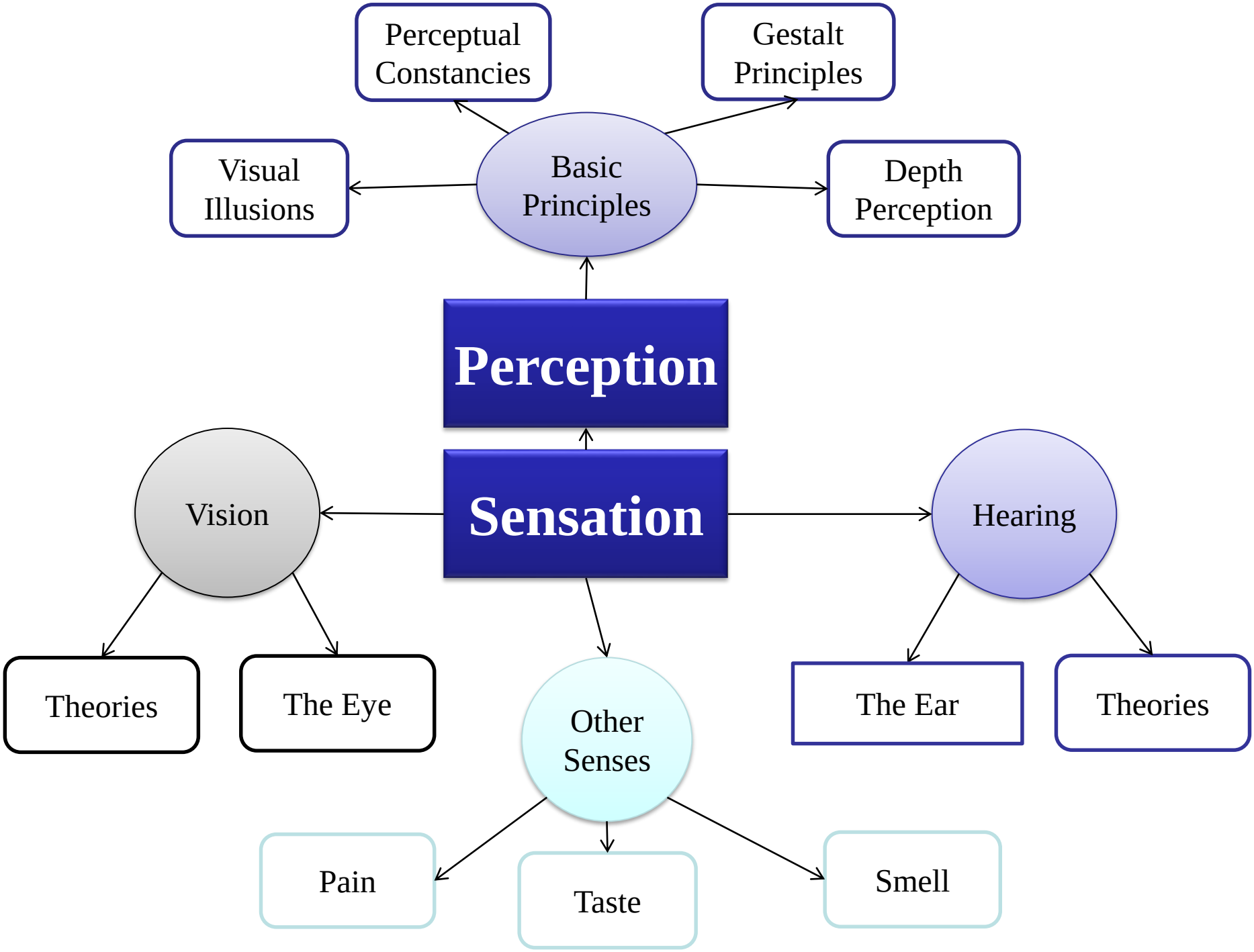
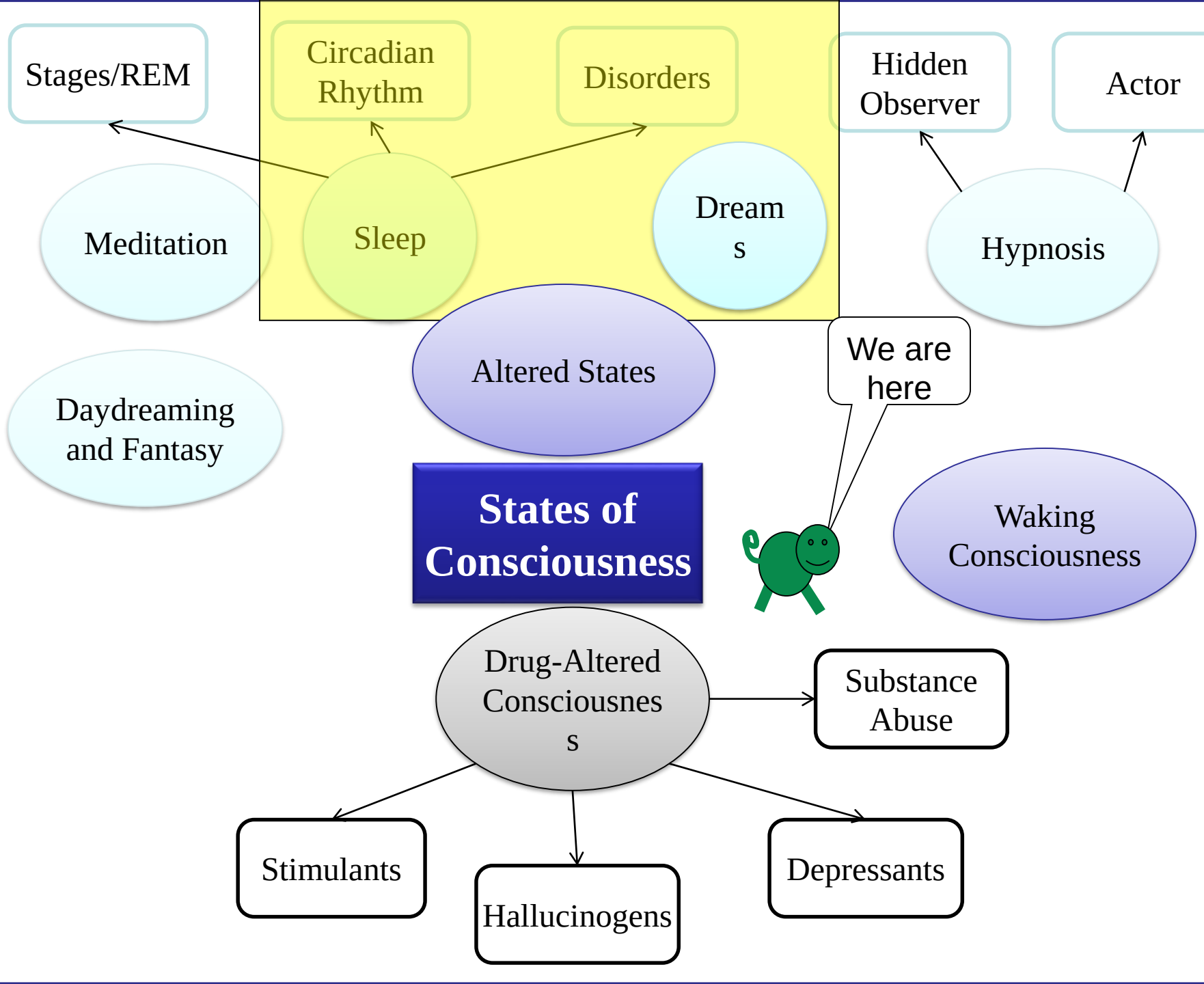
Unit 4: Sensation, Perception and States of Consciousness

Essential Task 4-9:
Discuss aspects of sleep and dreaming:
— stages, characteristics of the sleep cycle and circadian rhythms.
— theories of sleep and dreaming (activation synthesis, information processing, cognitive theory, and psychodynamic)
— symptoms and treatments of sleep disorders (sleep apnea and narcolepsy)


Perceptual Constancies
Gestalt Principles
Visual Illusions
Basic Principles
Depth Perception
Perception
Vision
Sensation
Hearing
Theories
The Eye
Other Senses
The Ear
Theories
Pain
Taste
Smell


Stages/REM
Circadian Rhythm
Disorders
Hidden Observer
Actor
Meditation
Sleep
Dream s
Hypnosis
Altered States
We are here
Daydreaming and Fantasy
States of Consciousness
Waking Consciousness
Drug-Altered Consciousnes s
Substance Abuse
Stimulants
Hallucinogens
Depressants

Essential Task 4-9:

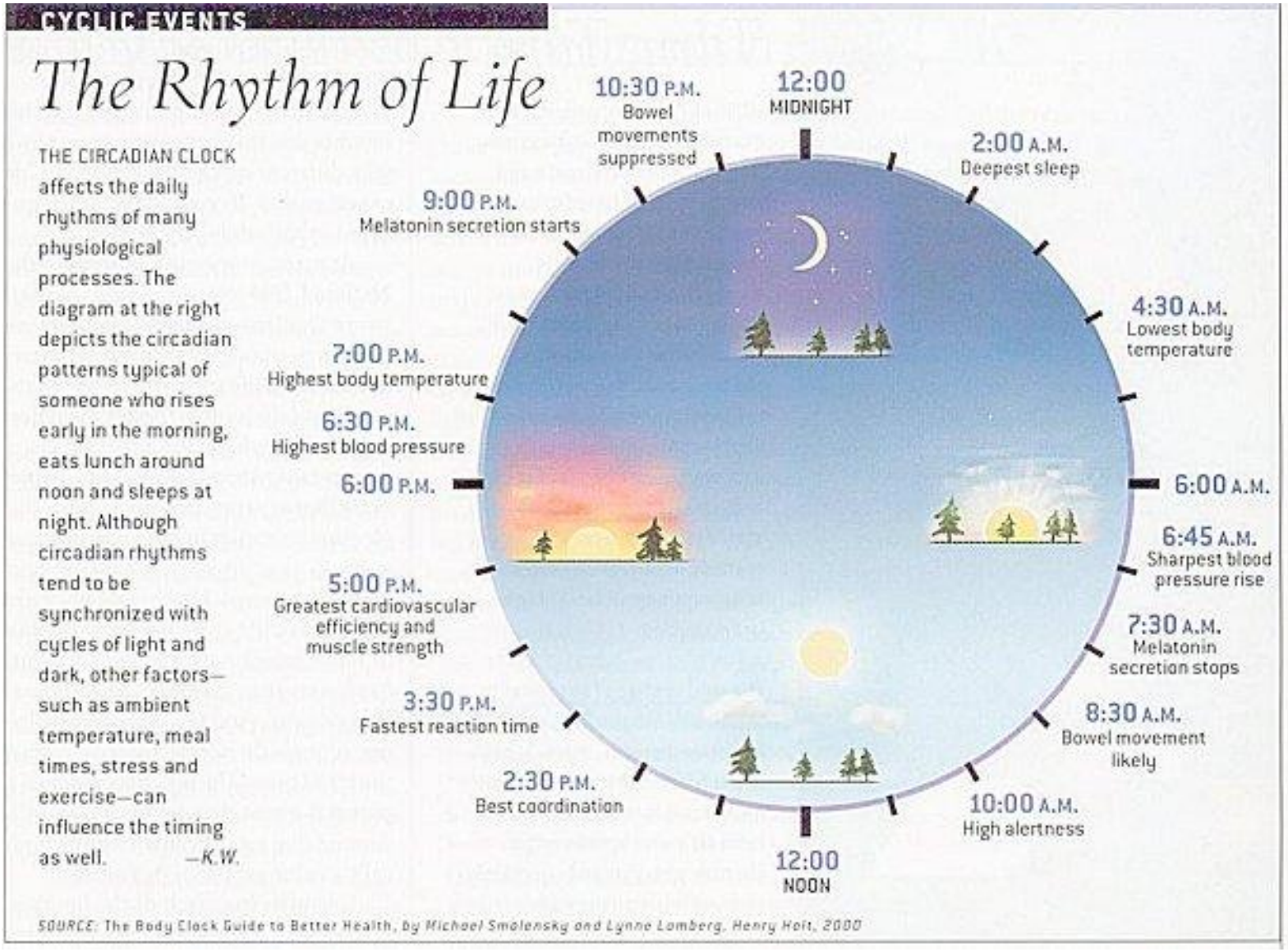
Outline

- Sleep
  - Sleep stages
  - Characteristics of the sleep cycle
  - Theories of sleep
  - Circadian rhythms
  - Sleep Disorders
    - Insomnia
    - Sleep talking and walking
    - Night terrors
    - Sleep apnea
    - REM Behavior Disorder
    - Sleep Paralysis
    - Narcolepsy
- Dreaming
  - Theories
    - activation synthesis,
    - information processing,
    - cognitive theory
    - psychodynamic

How does sleep work?

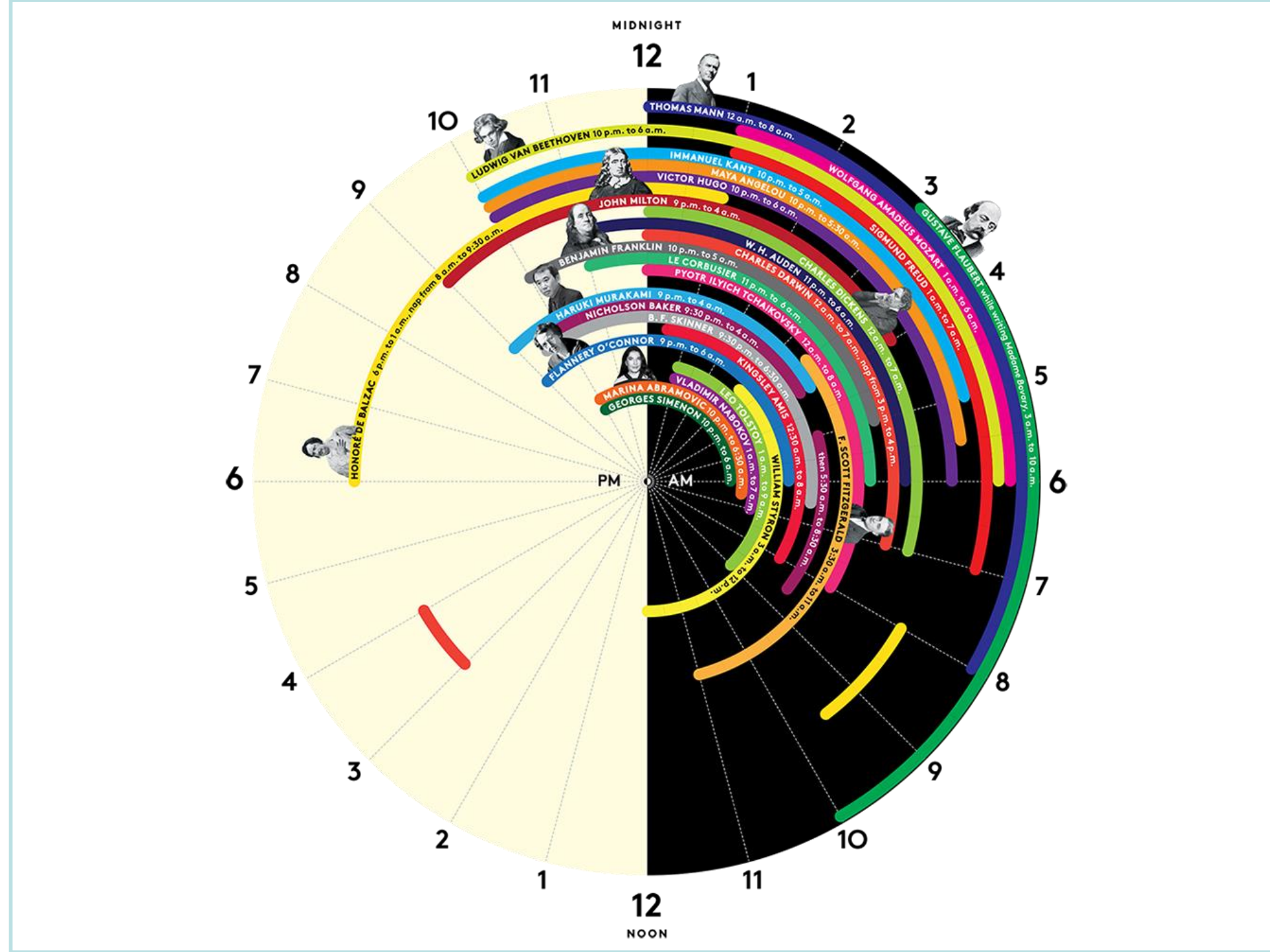
1. decreasing light
2. hypothalamus' suprachiastmatic nucleus stimulates the pineal gland
3. increase production of melatonin
4. Sleep

Circadian Rhythm



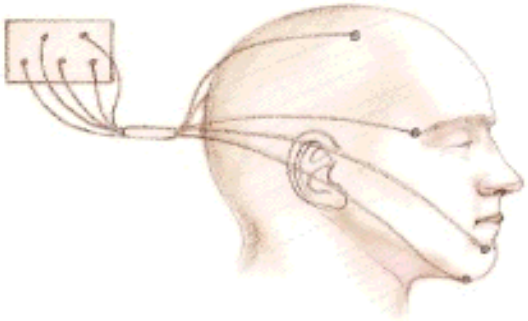
Circadian Rhythms

- Circadian rhythms are physical, mental and behavioral changes that follow a roughly 24-hour cycle, responding primarily to light and darkness in an organism's environment. They are found in most living things, including animals, plants and many tiny microbes.
- The "master clock" that controls circadian rhythms consists of a group of nerve cells in the brain called the suprachiasmatic nucleus, or SCN. The SCN contains about 20,000 nerve cells and is located in the hypothalamus, an area of the brain just above where the optic nerves from the eyes cross.
- Jet lag is the disruption and re-shifting of your circadian rhythms.

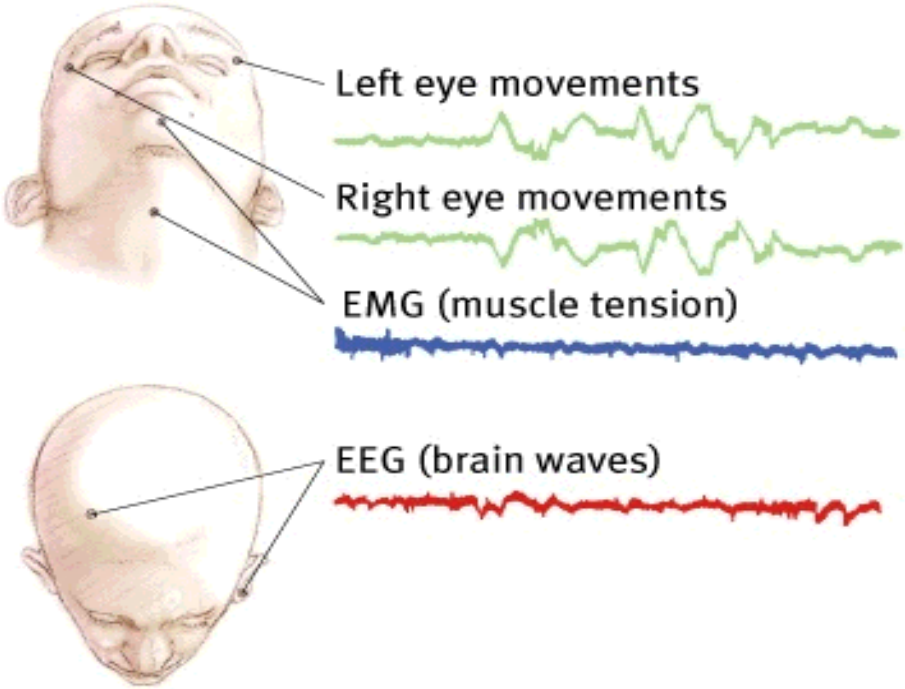

MIDNIGHT
12
NOON
AM
PM
1
2
3
4
5
6
7
8
9
10
11
THOMAS MANN 12 a.m. to 8 a.m.
WOLFGANG AMADEUS MOZART 1 a.m. to 6 a.m.
GUSTAVE FLAUBERT while writing Madame Bovary, 3 a.m. to 10 a.m.
SIGMUND FREUD 1 a.m. to 7 a.m.
F. SCOTT FITZGERALD 3:30 a.m. to 11 a.m.
then 5:30 a.m. to 8:30 a.m.
WILLIAM STYRON 3 a.m. to 12 p.m.
LEO TOLSTOY 1 a.m. to 9 a.m.
VLADIMIR NABOKOV 1 a.m. to 7 a.m.
KINGSLEY AMIS 12:30 a.m. to 8 a.m.
B. F. SKINNER 9:30 p.m. to 8:30 a.m.
PYOTR ILYICH TCHAIKOVSKY 12 a.m. to 8 a.m.
CHARLES DICKENS 12 a.m. to 7 a.m.
CHARLES DARWIN 12 a.m. to 7 a.m., nap from 3 p.m. to 4 p.m.
W. H. AUDEN 11 p.m. to 6 a.m.
LE CORBUSIER 11 p.m. to 6 a.m.
MARINA ABRAMOVIC 10 p.m. to 6:30 a.m.
GEORGES SIMENON 10 p.m. to 6 a.m.
FLANNERY O'CONNOR 9 p.m. to 6 a.m.
HARUKI MURAKAMI 9 p.m. to 4 a.m.
NICHOLSON BAKER 9:30 p.m. to 4 a.m.
IMMANUEL KANT 10 p.m. to 5 a.m.
MAYA ANGELOU 10 p.m. to 5:30 a.m.
VICTOR HUGO 10 p.m. to 6 a.m.
JOHN MILTON 9 p.m. to 4 a.m.
BENJAMIN FRANKLIN 10 p.m. to 5 a.m.
LUDWIG VAN BEETHOVEN 10 p.m. to 6 a.m.
HONORÉ DE BALZAC 6 p.m. to 1 a.m., nap from 8 a.m. to 9:30 a.m.

Sleep Stages

Measuring sleep: About every 90 minutes, we pass through a cycle of five sleep stages.



Hank Morgan/ Rainbow

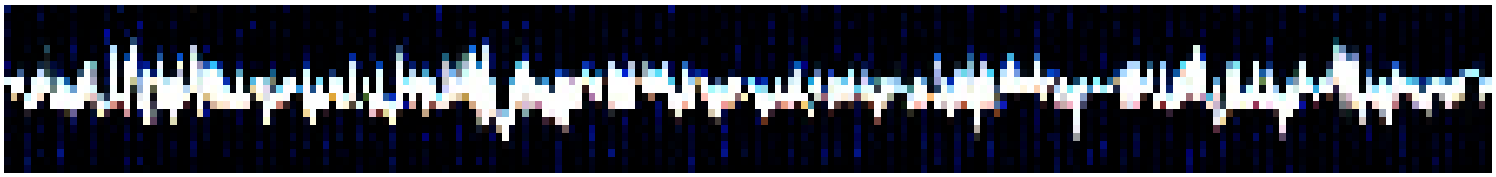


I. Awake & Alert

During strong mental engagement, the brain exhibits low amplitude and fast, irregular beta waves (15-30 cps). An awake person involved in a conversation shows beta activity.

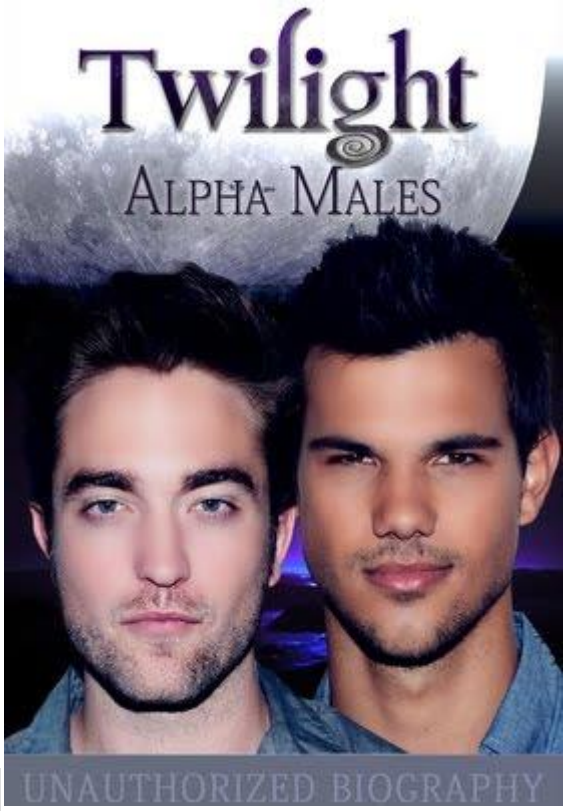
We will also see Beta waves during REM sleep!

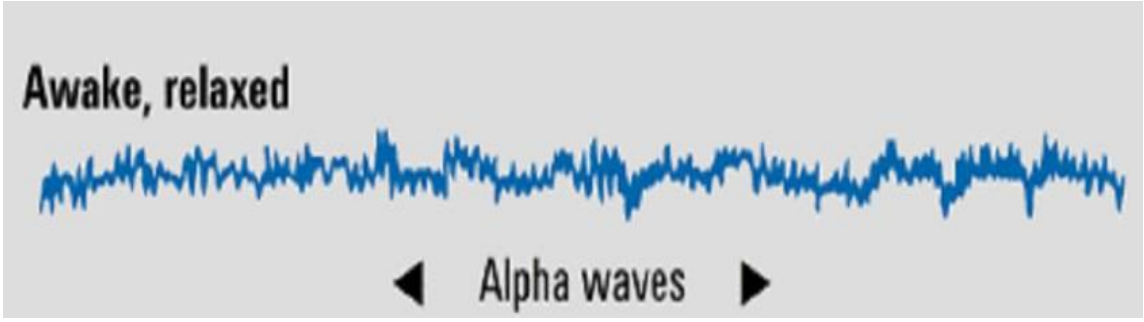
Beta Waves – It's BETA to be awake!



II. Awake but Relaxed (Sleep onset)

When an individual closes his eyes but remains awake, his brain activity slows down to a large amplitude and slow, regular alpha waves (9-14 cps). A meditating person exhibits an alpha brain activity.



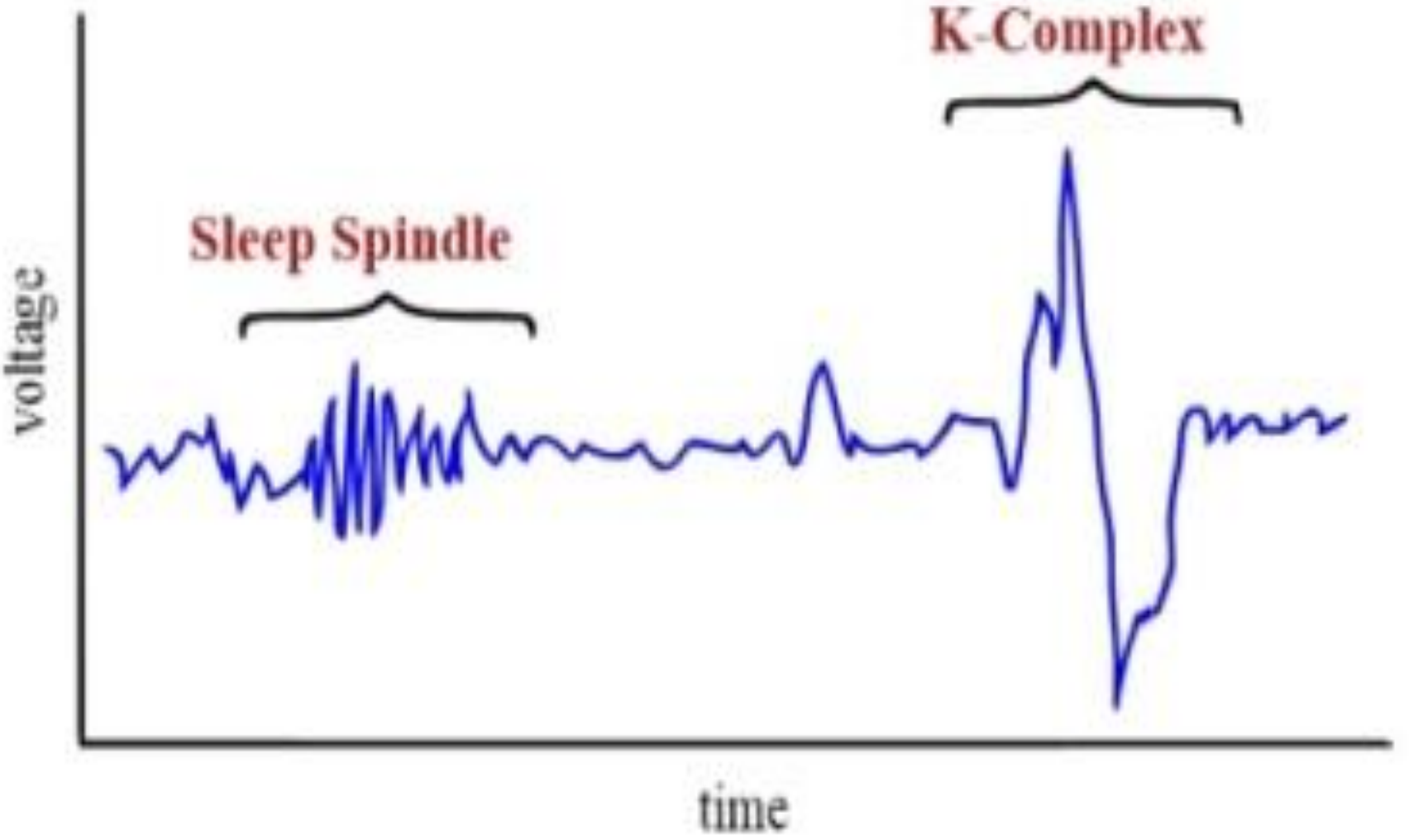


Sleep Stages 1-2

- N1 Sleep
  - Loss of awareness but still responsive to external stimuli
  - Theta waves appear
  - Hallucination
  - hypnagogic sensations (Sensation of falling or floating)

- N2 Sleep
  - less responsive to external environment
  - Sudden high amplitude brain waves *Sleep spindles & K Complex*

N2

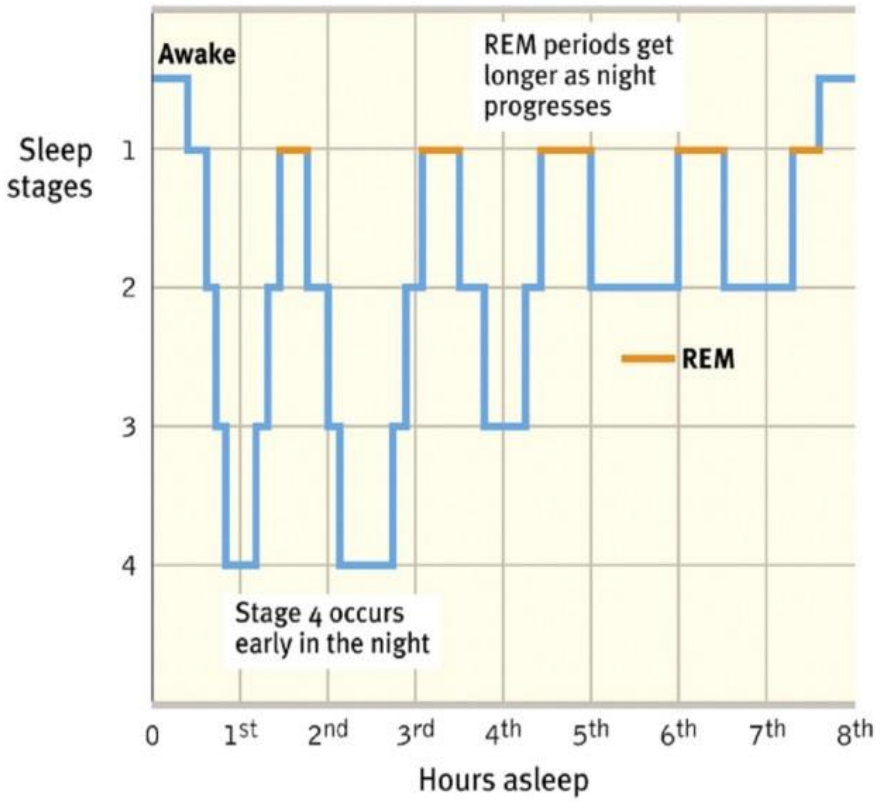


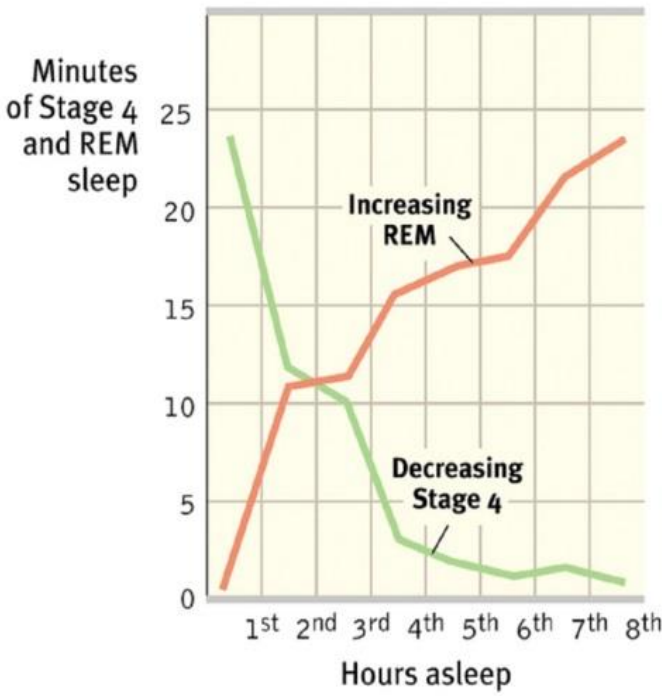
IV. N3 Sleep

- Stage 3
  - Delta waves
  - Deepest level of normal sleep
  - Almost a total lack of awareness


Relaxed wakefulness
Alpha waves
Stage N1
Theta waves
K-complex
Stage N2
Sleep spindles
Stage N3
Delta waves
REM or dreaming sleep

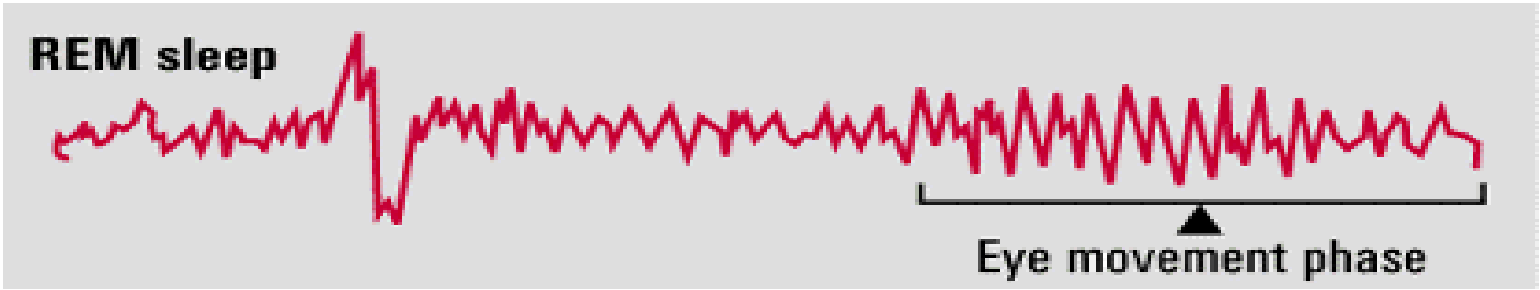
With each 90-minute cycle, stage 4 sleep decreases and the duration of REM sleep increases.





V. REM Sleep (Rapid Eye Movement)

After reaching the deepest sleep stage (N3), the sleep cycle starts moving backward towards stage 1. Although still asleep, the brain engages in low- amplitude, fast and regular beta waves (15-40 cps) much like awake-aroused state.

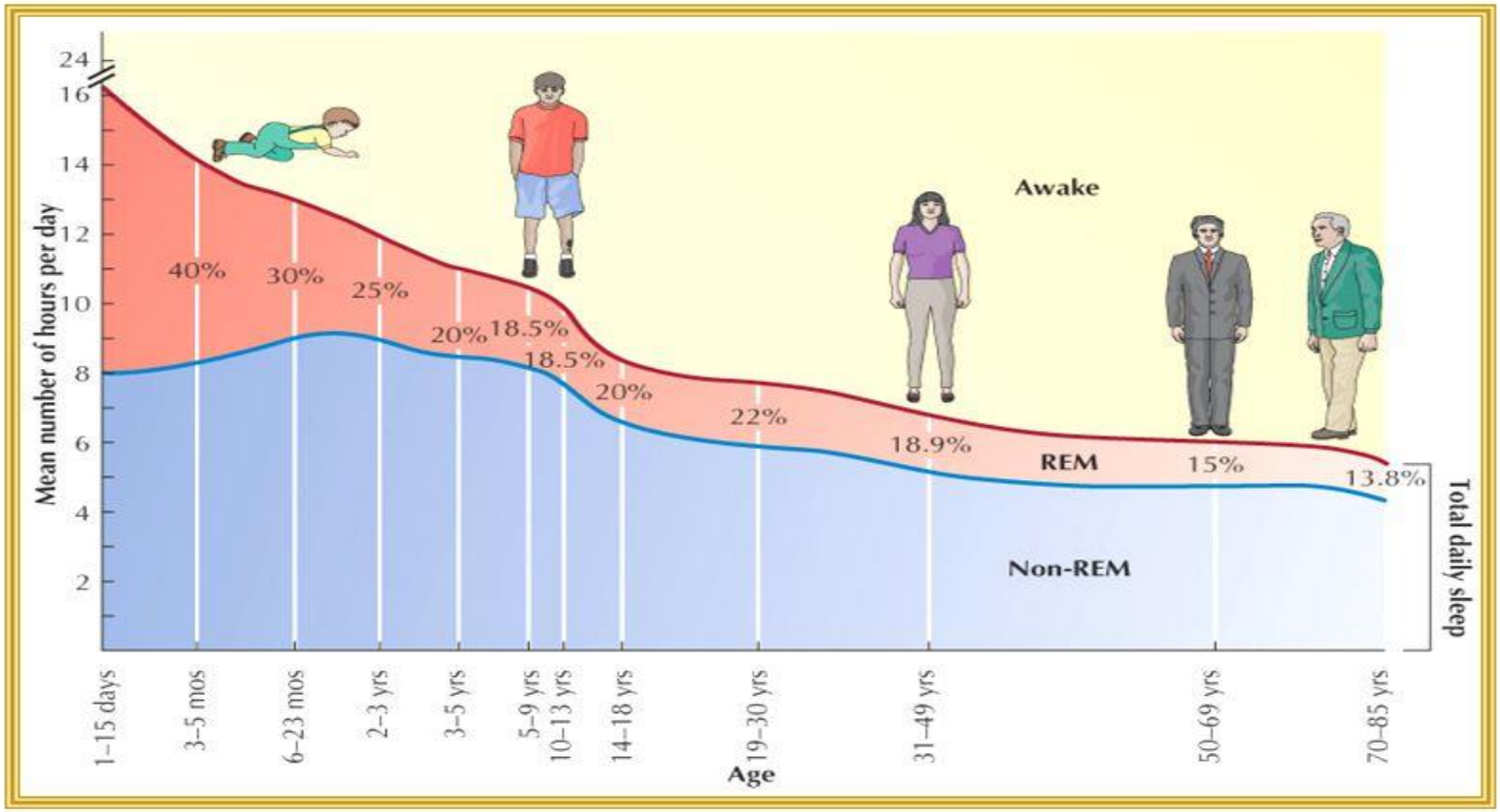


A person during this sleep exhibits
Rapid Eye Movements (REM)
and reports vivid dreams.

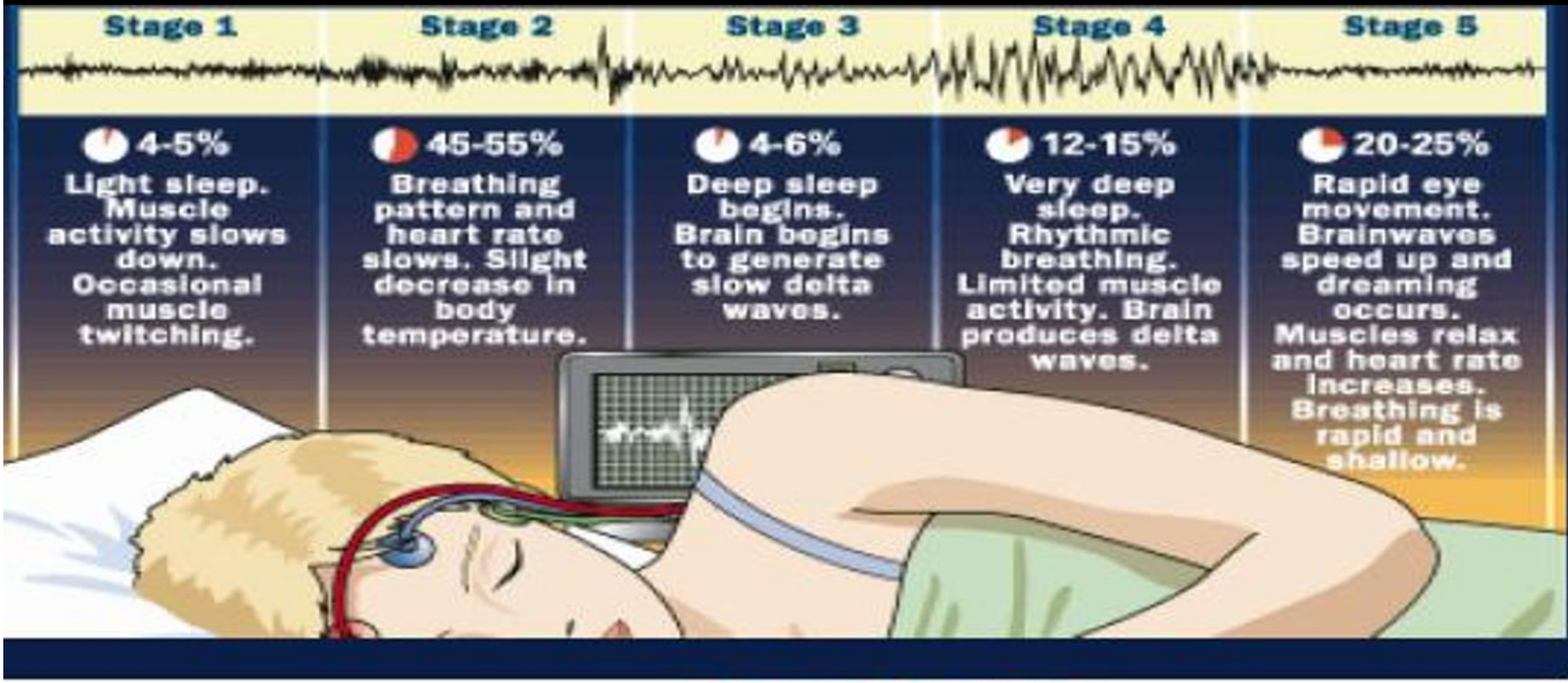
Paradoxical Sleep = REM Sleep

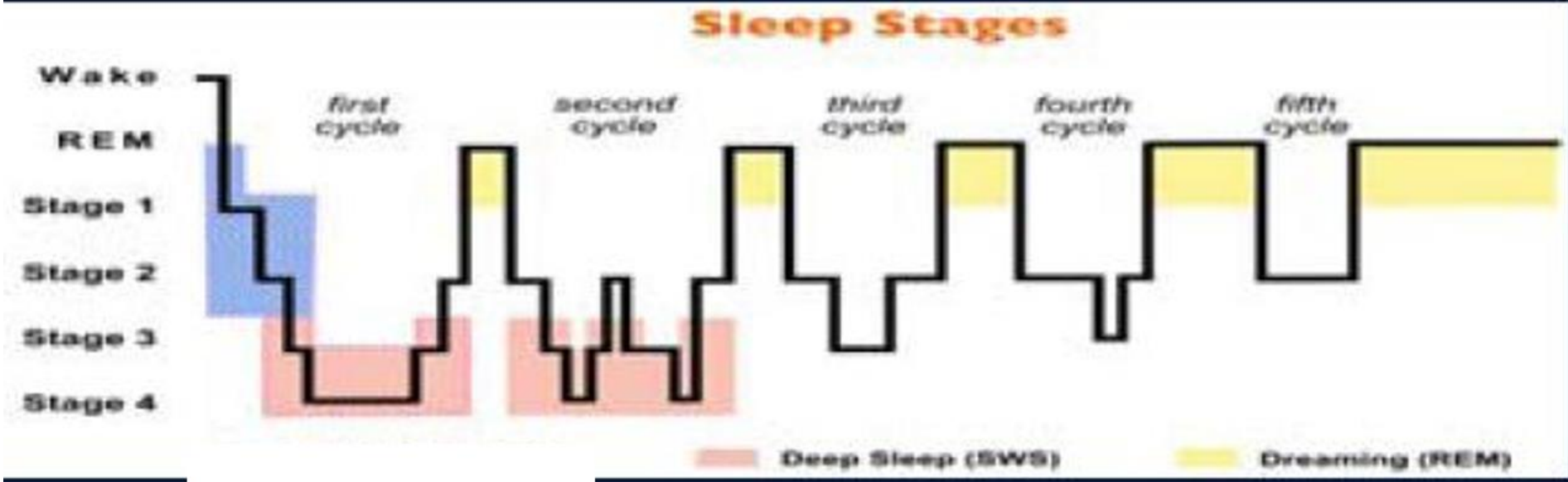
- REM Sleep
  - The Cortex is very active!
  - Beta waves on EEG
  - Dreams occur during this stage
  - REM sleep is associated with long-term memory
    - rem sleep deprivation led to interference of memory
  - Muscle Paralysis – Brain stem blocks signals
  - Genital Arousal

Sleep and Dreams: Over the Life Span



Infants: 16 Hours (half of it is REM)
Ages 5-13: 10 Hours (+2 Hours of REM)
20s: 7.5-8 Hours (2 Hours of REM)
+50: 6 Hours (Less than 2 Hours of REM)

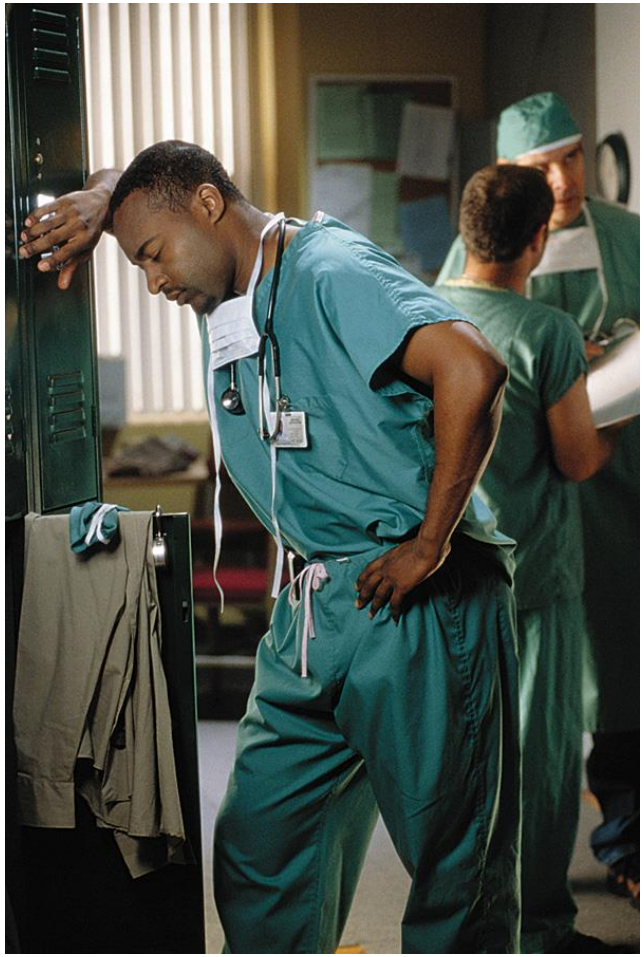

Stage 1
Stage 2
Stage 3
Stage 4
Stage 5
4-5%
Light sleep. Muscle activity slows down. Occasional muscle twitching.
45-55%
Breathing pattern and heart rate slows. Slight decrease in body temperature.
4-6%
Deep sleep begins. Brain begins to generate slow delta waves.
12-15%
Very deep sleep. Rhythmic breathing. Limited muscle activity. Brain produces delta waves.
20-25%
Rapid eye movement. Brainwaves speed up and dreaming occurs. Muscles relax and heart rate increases. Breathing is rapid and shallow.


Sleep Stages
Wake
REM
Stage 1
Stage 2
Stage 3
Stage 4
first cycle
second cycle
third cycle
fourth cycle
fifth cycle
Deep Sleep (SWS)
Dreaming (REM)

Why do we sleep?

We spend one-third of our lives sleeping.

If an individual remains awake for several days, they deteriorate in terms of immune function, memory, concentration, emotional control and accidents.



Jose Luis Pelaez, Inc./ Corbis

Sleep Deprivation

- Immune system is compromised
  - Sick
- Loss of cognitive functions
  - Higher chances of accidents (car accidents)
  - Poor memory & concentration
- Loss of emotional control
- The brain is unable to clear cellular waste
- Skin deterioration
- Craving for food (sugars and carbs)

- Guess what is the longest time somebody stayed awake?


#1

REM Rebound

- When you are sleep deprived you lose out on two types of sleep, REM and NREM (non-REM). Typically when you have a chance to fall asleep after sleep deprivation you have a tendency to get more REM sleep than you would normally get.
- This is your body's way of trying to catch up on its REM sleep.
- Can be observed in almost all mammals – (**Biological function**)

Sleep Theories/ Functions

1. Sleep Protects: (Adaptive Theory) Sleeping in the darkness when predators loomed about kept our ancestors out of harm's way.
2. Sleep Recuperates: (Repair Theory) Sleep helps restore and repair brain tissue.
3. Sleep Helps Remembering: Sleep restores and rebuilds our fading memories.
4. Sleep and Growth: During sleep, the pituitary gland releases growth hormone. Older people release less of this hormone and sleep less.

Sleep Disorders

- Insomnia
  - Difficulty falling asleep or remaining asleep
  - Affects about 35 million Americans
  - May be related to stress, depression, medication
  - Can also be caused by noise, temperature, or trying to sleep in a new environment

Sleep Disorders

- Narcolepsy
  - Suddenly falling asleep without warning during waking hours
  - Narcoleptics often experience loss of muscle tone as well
  - May also drop into REM sleep immediately, causing hallucinations
  - Likely caused by a central nervous system defect
  - https://www.youtube.com/watch?v=X0h2nleWTwI&feature=related

Sleep Disorders

- Sleep Apnea
  - Person stops breathing momentarily during sleep (it wakes them up)
  - Associated with obesity
  - Affects about 10 to 12 million Americans
  - Sudden Infant Death Syndrom (SIDS)

  https://www.youtube.com/watch?v=TgC_S09Xea4

Sleep Disorders

- Sleepwalking and Sleep talking
  - Somnambulism
  - Usually occurs during Stage 4 sleep
  - sitting up in bed, walking to a bathroom, and cleaning, or as hazardous as cooking, driving, violent gestures, grabbing at hallucinated objects, or even homicide!
  - More common in children (boys)

Sleep Disorders (parasomnia)

- Nightmares
  - Unpleasant dreams that can cause a strong emotional response from the mind, typically fear but also despair, anxiety and great sadness
  - Mostly occurs during REM sleep
- Night terrors
  - Episodes of fright that occur during stages 3 or 4 of NREM sleep
  - Person may sit up or scream, but likely will not recall the episode in the morning
  - https://www.youtube.com/watch?v=bSVwmSzxKtU

https://www.youtube.com/watch?v=PCZSAwSasdQ&feature=youtu.be
https://www.youtube.com/watch?v=Tl2qM7_7cdk&feature=youtu.be
Sleep Paralysis

Sleep Disorders

- REM Behavior Disorder
  - Body fails to paralyze during REM sleep.
  - Sleepwalk with me
- Sleep Paralysis
  - Body fails to undo the paralysis briefly upon walking.
  - Hallucinations

Sleep Disorders

- Narcolepsy
  - Suddenly falling asleep without warning during waking hours
  - Narcoleptics often experience loss of muscle tone as well
  - May also drop into REM sleep immediately, causing hallucinations
  - Likely caused by a central nervous system defect
  - https://www.youtube.com/watch?v=X0h2nleWTwI&feature=related

Not a sleep disorder… but still important!

The cocktail party effect is the phenomenon of the brain's ability to focus one's auditory attention (an effect of selective attention in the brain) on a particular stimulus while filtering out a range of other stimuli

Butterfly dream

Once upon a time, I, Zhuangzi, dreamt I was a butterfly, fluttering hither and thither, to all intents and purposes a butterfly. I was conscious only of my happiness as a butterfly, unaware that I was Zhuangzi.

Soon I awaked, and there I was, veritably myself again. Now I do not know whether I was then a man dreaming I was a butterfly, or whether I am now a butterfly, dreaming I am a man.

Dream Findings

1. Negative Emotional Content: 8 out of 10 dreams have negative emotional content.
2. Failure Dreams: People commonly dream about failure, being attacked, pursued, rejected, or struck with misfortune.
3. Sexual Dreams: Contrary to our thinking, sexual dreams are sparse. Sexual dreams in men are 1 in 10; and in women 1 in 30.
4. Dreams of Gender: Women dream of men and women equally; men dream more about men than women.

Dreaming is weird – let's understand this better.

I. Psychodynamic Theory -- Freud

Wish-fulfillment

- Suppressing antisocial urges and desires
- Libido (life/sex drive) and Thanatos (death/aggression)
- Dreams provide a psychic “safety valve” to discharge unacceptable feelings from the Id.
- manifest (what is showing) content -- your story of the dream
- latent (hidden) content – the hidden meaning of the dream

Psychodynamic Theory
Wish-fulfillment continued

Example1 :

Manifest Content: You have a dream that you are naked in public.

Latent Content: We may interpret the dream to mean that you fear exposure, that you feel insecure or that you fear other people will notice your shortcomings.

Example 2:

Manifest Content: You are being chased by something scary

Latent Content: you are avoiding a big issue. You may be avoiding a big challenge in your life.

II. Information Processing– Cartwright Extension of Waking Life Theory

- Dreams help us sort the days events and consolidate (sort) our memories
- Dreams may help sift, sort, understand, and fix a day's experiences in our memories.
- They may also help us work out unsolved problems. We go to bed with a problem, and when we wake up the problem is solved (or forgotten, which may be a solution in itself).
- When we are under stress or depressed, we sleep longer, and the amount of time spent in REM increases. This fact strongly suggests that we are working on the things that are worrying us while we dream.

Information-Processing Theory: Dreams as reflections of current concerns

- Dreams reflect the ongoing conscious preoccupations of waking life (concerns over relationships, work, sex, or health)
- Dreams are more likely to contain material related to a person's current concerns than chance would predict.
  - Students dream about exams
  - Instructors dream of forgetting lecture notes
- Males and females appear to dream about similar issues now that lives and concerns of the two sexes have become similar.
  - Women→ children, clothes, household objects
  - Men→ weapons, violence, sex, achievement

III. Activation-Synthesis Theory - Hobson

- Dreams result from random activation of brain cells responsible for eye movement, muscle movement, balance, and vision.
- The brain then synthesizes (combines) this activity with existing knowledge and memories as if the signals came from the environment.
  - We interpret the random images and sensations is the dream's meaning.

IV. Cognitive Theory – G. Stanley Hall

Dreams reflect emotional preoccupations of waking life—relationships, sex, work, health.

Images in a dream are sometimes symbols for things in everyday life.

This theory agrees with Freud that dreams contain symbols, but there is no “latent” (unconscious) meaning. The meaning is at the surface level—”manifest” content.

V. Evolutionary Perspective

- Dreams serve as a type of “simulation” to help the organisms prepare for potential dangers in the environment. This is why young children have common dreams such as:
  - Falling dreams
  - Being chased by something dangerous
  - Fighting
  - Getting embarrassed

VI. Physiological function theory

- Regular brain stimulation from REM sleep may help develop and preserve neural pathways
  - Does your car run better when its cold or when its been warmed up?
  - Does your body perform better when its cold or when its been warmed up?

Dream Theories

- Activation Synthesis
- Information Processing
- Cognitive Theory
- Psychodynamic Theory

Dreams mean very little

Dreams mean quite a bit.

OA

- You just awoke from a dream where you had a fight with somebody in your class. Explain the dream using the theories you have learned in class.

1. Psychodynamic Theory
2. Activation – Synthesis Theory
3. Information Processing
4. Cognitive development processing
5. Evolutionary Theory

Dream Theories

DREAM THEORIES

Theory	Explanation	Critical Considerations
Freud's wish-fulfillment	Dreams provide a "psychic safety valve"—expressing otherwise unacceptable feelings; contain manifest (remembered) content and a deeper layer of latent content—a hidden meaning.	Lacks any scientific support; dreams may be interpreted in many different ways.
Information-processing	Dreams help us sort out the day's events and consolidate our memories.	But why do we sometimes dream about things we have not experienced?
Physiological function	Regular brain stimulation from REM sleep may help develop and preserve neural pathways.	This may be true, but it does not explain why we experience *meaningful* dreams.
Activation-synthesis	REM sleep triggers impulses that evoke random visual memories, which our sleeping brain weaves into stories.	The individual's brain is weaving the stories, which still tells us something about the dreamer.
Cognitive theory	Dream content reflects dreamers' cognitive development—their knowledge and understanding.	Does not address the neuroscience of dreams.

Lucid Dreaming

- any dream in which one is aware that one is dreaming
- https://www.youtube.com/watch?v=lYSX51xBkos&feature=youtu.be
- The next time you have a lucid dream, find a way to call yourself and ask any question you like.