

# **Consciousness**

## **Gleitman *et al.* (2011), Chapter 6, Part 2**

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Psych 9A / Psy Beh 11A

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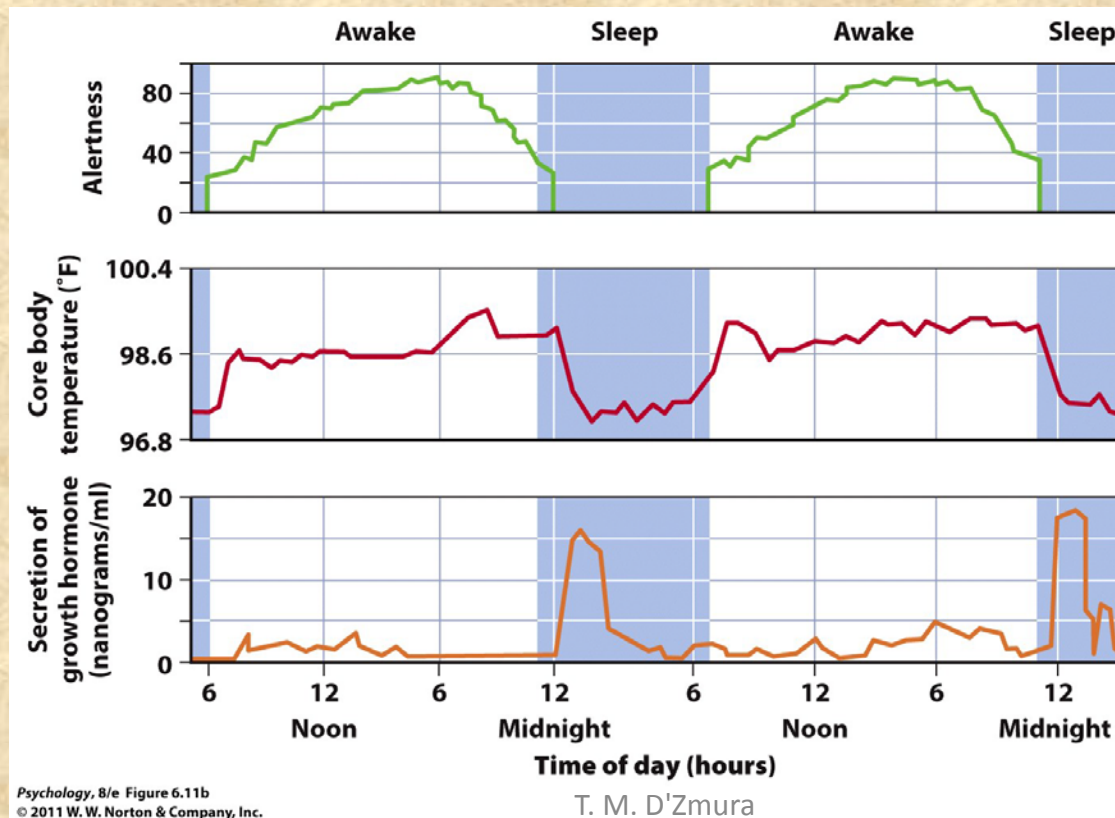


# Varieties of Consciousness

- Sleep & Dreams
- Hypnosis
- Meditation
- Drug-induced Changes

# Sleep & Dreams

- Cells in the hypothalamus control brain arousal level, including the human diurnal circadian rhythm. The hormone melatonin mediates the sleep/wake cycle, which is influenced also by visual input, timing of meals, cortical activity, etc.

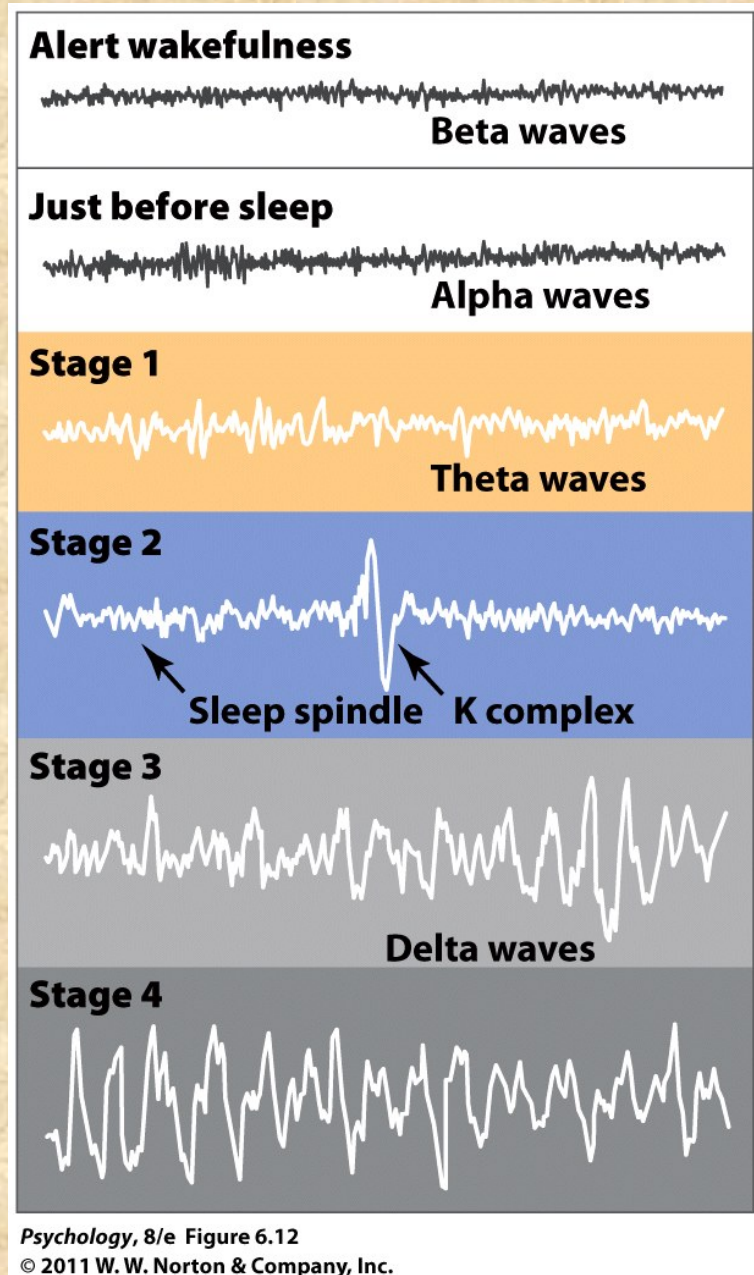


The natural diurnal cycle lasts *longer* than 24 hours.

Jet lag: more pronounced when traveling from west to east.

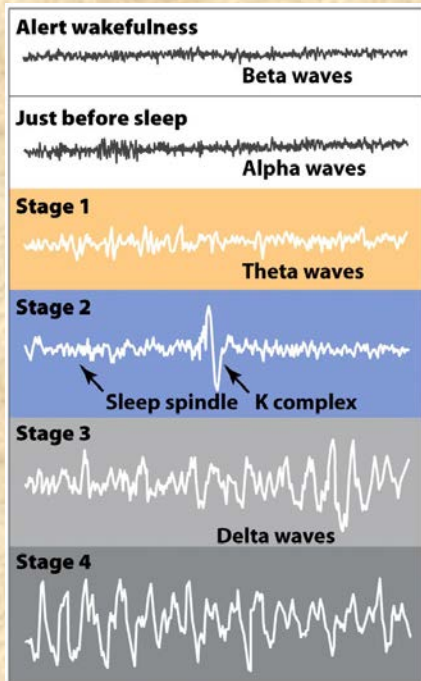
## EEG Records During Sleep

- EEG data let one distinguish distinct stages of sleep.
- alpha rhythm: regular waves in the frequency range 8-12Hz, strongest in EEG of one who is relaxed with eyes closed
- beta rhythm: 13-30Hz, observed when a person is actively thinking and/or moving
- theta waves: 4-8Hz, observed during REM sleep
- delta rhythm: less than 4 Hz, associated with deep “slow-wave” sleep

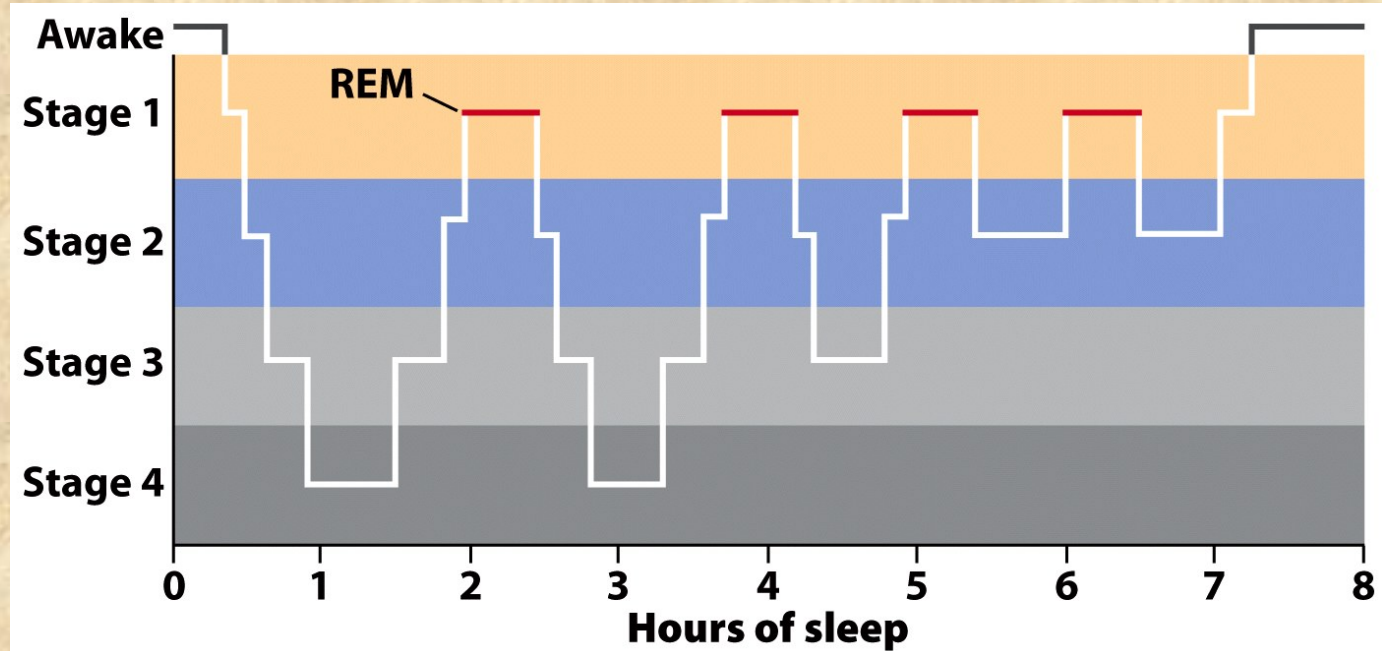


Slow-wave sleep (stages 3&4). Heart rate, breathing rate and brain activity are reduced.

REM sleep (rapid eye movements). Brain is active and the sleeper is least sensitive to external stimulation. Dreaming occurs. Skeletal muscles are paralyzed, a paralysis that extends into wakefulness on occasion.



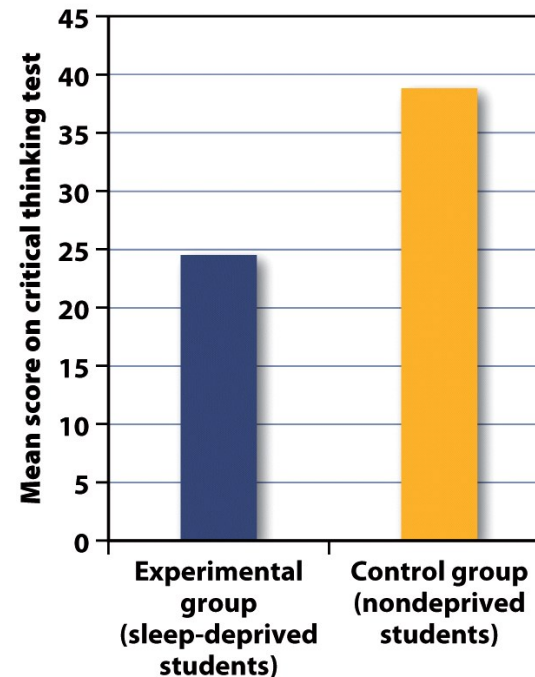
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## The need for sleep

- People seem to need an adequate amount of sleep as well as the right amounts of both slow-wave and REM sleep.
- Sleep deprivation: leads to loss of alertness, feeling bad, poor task performance.



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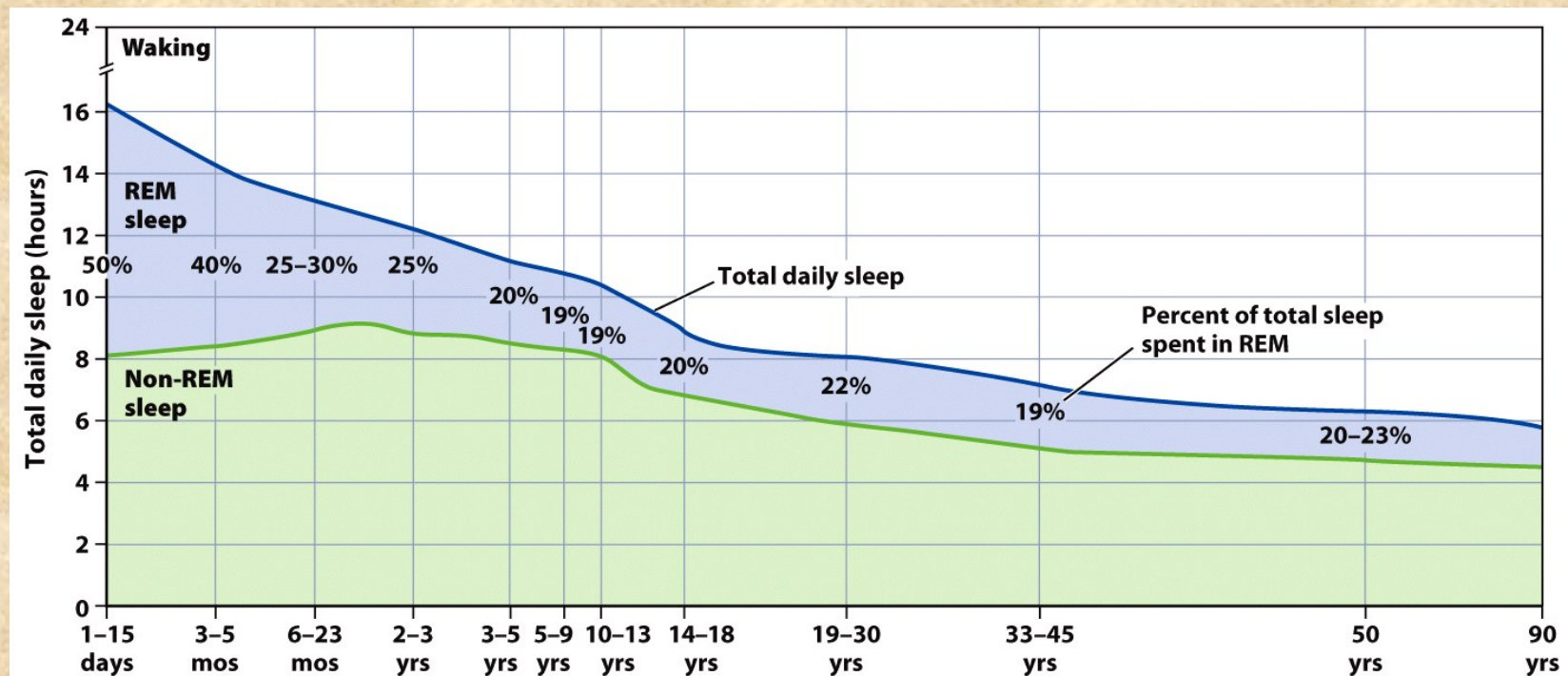


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- Sleep deprivation: leads to loss of alertness, feeling bad, poor task performance.
- Interrupting sleep during stages 3 and 4 one night will cause periods of slow-wave sleep to be longer than average the next night.
- Interrupting sleep during REM sleep will cause an increase in REM sleep over baseline levels the next night (“REM rebound”).
- Several nights of partial sleep deprivation decrease the body’s immune response.
- How much sleep is needed depends on age.

# Sleep across the life span

- Infants: lots of sleep, especially REM
- Elderly: less
- Considerable variation from one person to the next
  - amount of sleep
  - time of sleep (morning people, night people)



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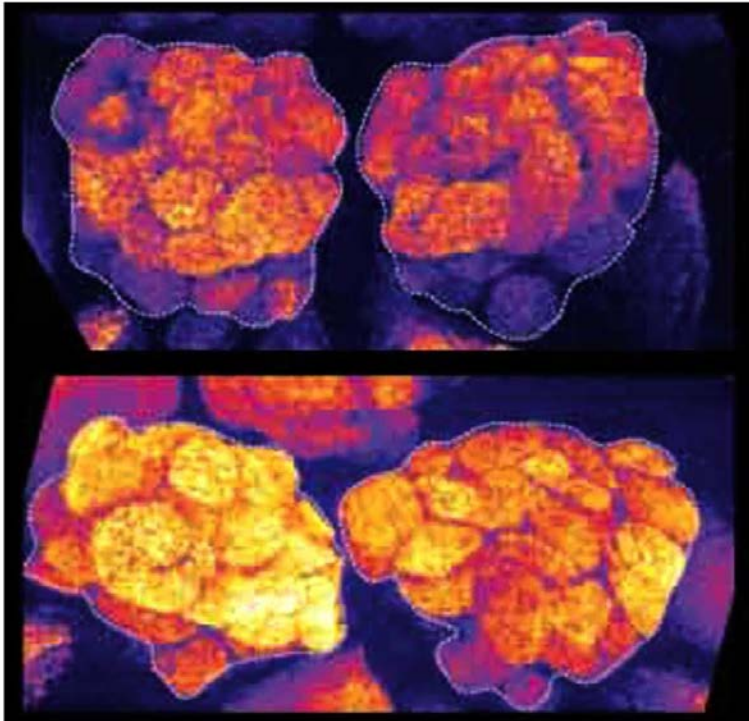


## Function of sleep

- What's going on?
  - Our bodies repair themselves or restore substances used up while we are awake. For example, physical fatigue leads to longer periods of slow-wave sleep.
    - What is being repaired is not quite clear. Clear waste products created by normal metabolic activity? Perhaps growth hormones released during sleep promote body repair.

## Function of sleep

- What's going on?
  - Neurons reset their activity levels or consolidate connections made during the day.



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Fruit-fly brains, with brightness indicating synaptic activity.

Top: well-rested brains have lesser activity levels at the synapses.

Bottom: sleep-deprived brains show greater activity.

Sleep may allow neurons to “calm down” after a day’s activity



## Function of sleep

- What's going on?
  - Neurons reset their activity levels or consolidate connections made during the day.
  - Neural activity during both slow-wave and REM sleep helps to consolidate memories gained during the previous day.
    - Performance on certain motor tasks improves markedly after a period of REM sleep.

## Function of sleep

- What's going on?
  - Organisms need time to digest food (presumably in an inactive state, sheltered and safe from predators).
  - Organisms that rely on daytime (photopic) vision for important tasks have little to do once it is dark.



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# Dreams

- Dreams are associated with REM sleep. Such dreams are often pictorial and seem more or less real with the dreamer as actor.
  - People often report dreaming if being woken out of slow-wave sleep. Such dreams are likely less vivid and engaging.
- REM sleep dreams seem to have a reported duration that matches the duration of the REM sleep episode.
- Dreams often include current daytime activities (play tetris? dream about falling blocks) and emotional preoccupations.
- They also include weird or illogical elements (flying, naked in public, being late for the final exam).
- There are recurrent themes for most people; themes differ (illness, fighting, romance).
- While relatively few dreams reported have detectable sexual content, REM sleep in both males and females is associated with genital arousal.
- Most dreams have predominantly bad outcomes and negative emotions.

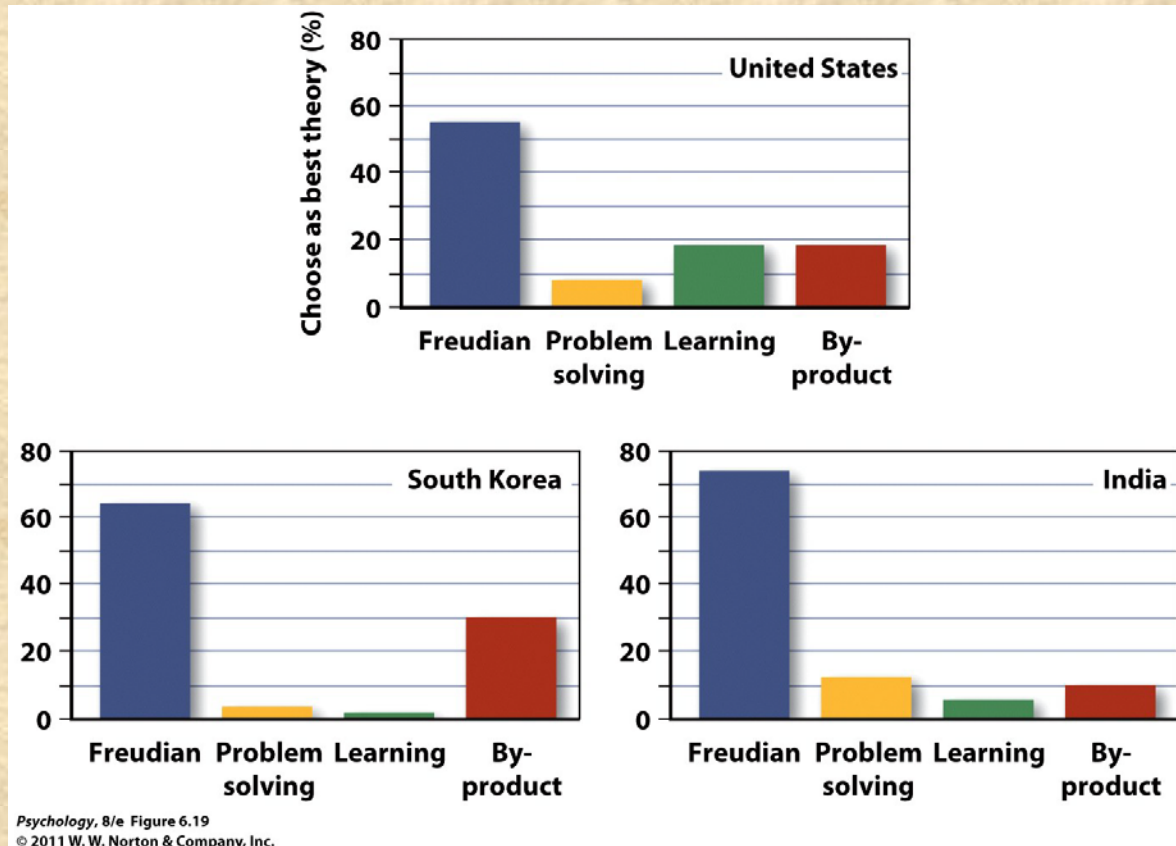


# Dreams

- Many people propose that dreams have hidden meaning.
- Freud: dreams present latent content consisting of unconscious desires and impulses (wishes) masked normally by self-censorship of consciousness.

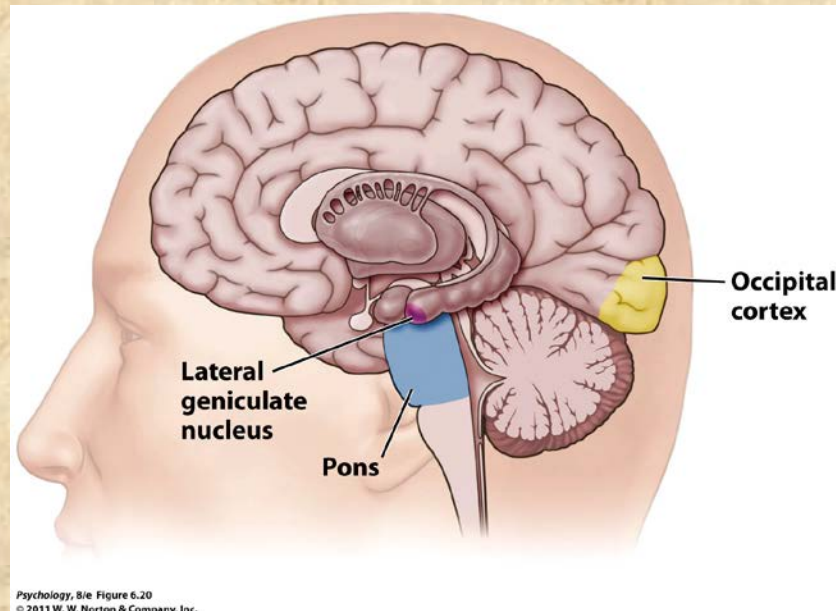
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  - Priming by a person's recent experiences and recurrent thoughts brings certain images into awareness.
  - There is no orderly narrative linking the images that come to mind; the sequence is random.
  - However, the dreamer attempts to synthesize these visual elements into a somewhat-coherent narrative. It is at this point that Freud's latent content may be expressed...



# Hypnosis

- *Hypnosis*: a highly relaxed, suggestible state of mind in which a person is likely to feel that his or her actions and thoughts are happening to him or herself rather than being produced voluntarily.
- Franz Mesmer (1734-1815): mesmerization
- Hypnotist asks subject to sit quietly and focus on some sound or object. The hypnotist speaks encourages the subject to relax in a quiet, monotonous voice. The hypnotist suggests that will happen: “your eyelids are getting droopy” etc.
- Many extraordinary claims about hypnosis have no basis in fact. (1) Hypnotism *does not* cause a person to do things they would not otherwise do. (2) Hypnotism *cannot* return a person to “an earlier age” (hypnotic age regression). (3) There is *no* reason to believe that hypnosis improves memory (courtroom testimony enhanced by hypnosis is banned).

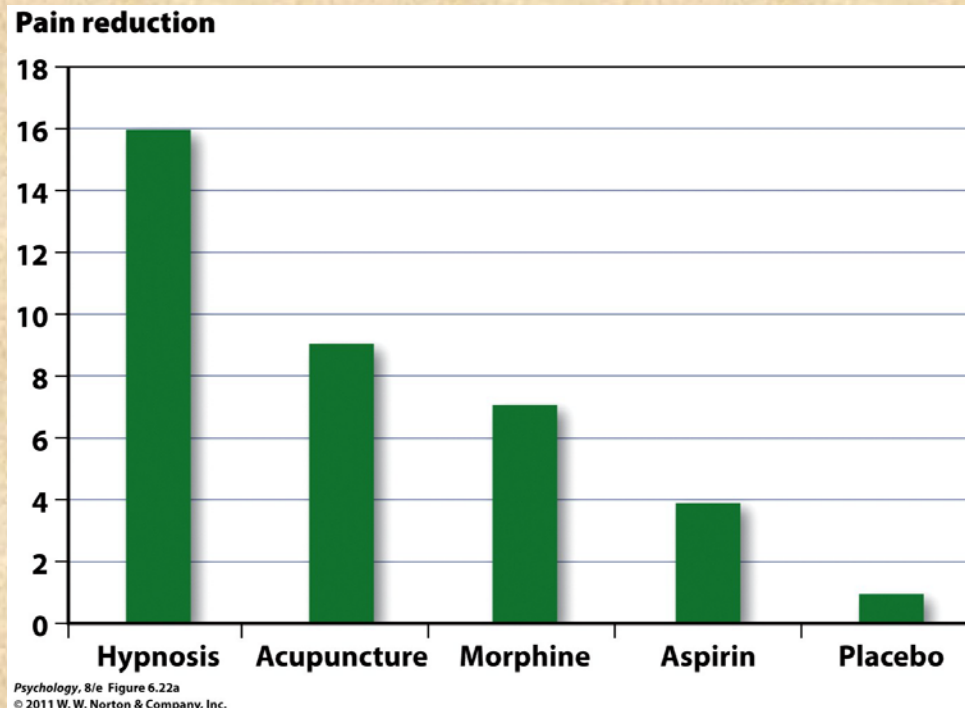



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- Even so, hypnosis can have striking effects.
  - posthypnotic effects
    - suggestions as to how to behave after hypnosis (e.g. stop smoking)
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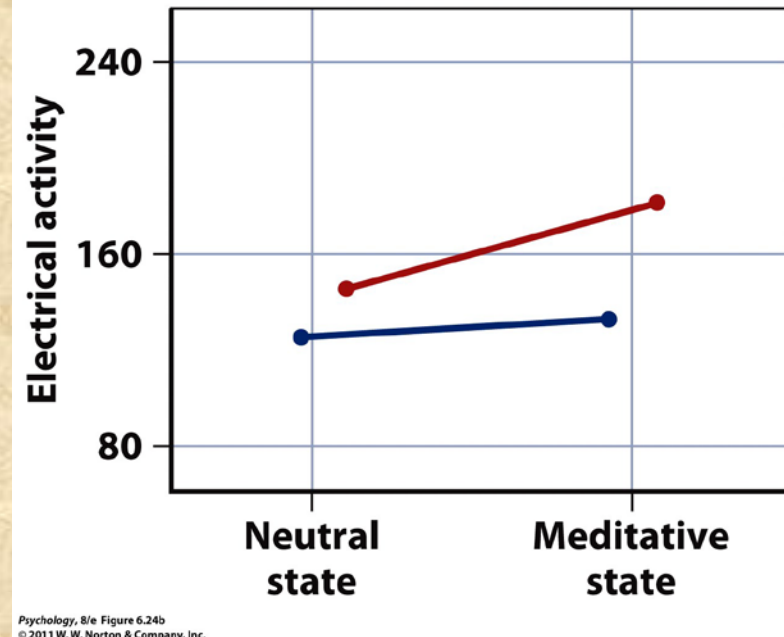
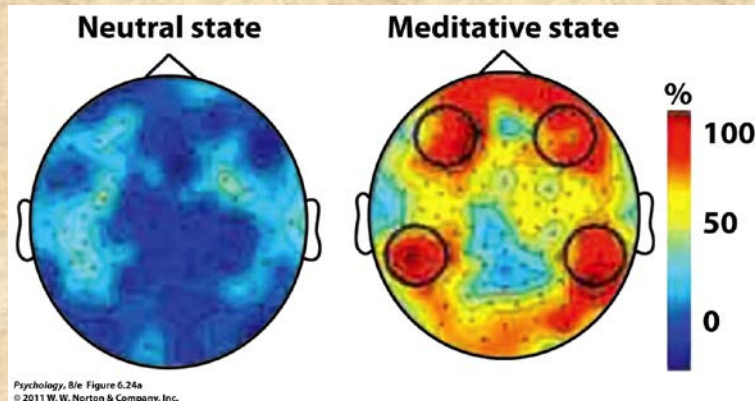


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- Theories of hypnosis
  - an exaggerated form of social influence: the hypnotist has an enormous influence on the person hypnotized
  - hypnosis involves *dissociation*, a mental perspective in which one leaves the normal “first-person” perspective and instead feels like one is “outside” of oneself
    - Hilgard: hypnosis splits consciousness into two streams, one responsive to hypnotist’s instructions, the other remaining as hidden observer

# Meditation

- Brain activity changes during meditation, especially those with great practice
  - pronounced alpha rhythm (relaxation)
  - pronounced gamma rhythm (>30Hz; thought to be involved in coordinating and integrating brain activity from different brain areas)



# Drugs

- *Depressants*
  - alcohol, sleep medications, and antianxiety medications
- *Stimulants*
  - caffeine, cocaine, amphetamine, and MDMA
    - decrease need for sleep and lift a person's energy level and mood
    - bad side effects



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- All drugs have associated risks.
  - medical and psychological problems
  - bad choices under their influence
  - dependence or addiction



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- Marijuana
  - activates cannabinoid receptors in the brain that ordinarily respond to anandamide, involved in mood and appetite regulation and in pain perception
  - is also a mild *hallucinogen*; more powerful hallucinogens include LSD, mescaline, and PCP.
    - Hallucinogens can trigger powerful perceptual experiences, but they can also produce emotional distress and delusions.

# Drug Addiction

- People differ in how readily they become dependent on a drug, depending on:
  - genetic factors
  - personality
  - environmental factors
    - social support
    - personal circumstances

