**BRAIN FUNCTIONING: INTEGRATION**

2/2/93, 2/1/96, 2/3/98, 2 Feb 05, 6 Feb 08, 3 Feb 10

From Jacob and Francone, Thibibadeau and Patton, Marieb and Martini's 6th: 552-558, 7th: 536-543,

**Integrative functions:** 1) consciousness, 2) use of language, 3) emotions and 4) memory

**CONSCIOUSNESS:** (p 542) RAS arouses and maintains consciousness
RAS relays sensory data to thalamus, radiations stimulate cortical neurons (consciousness)
Without continual stimulation fr RAS, loss of consciousness, cannot arouse
Depress RAS (barbiturates, alcohol), lose consciousness, amphetamines stimulate

**EEG:** (p 542) can be used to diagnose epilepsy, brain tumor, hemorrhage, etc:
- **beta:** 15-60 hertz 5-10 mvols mentally alert, working on problem, visual stim.
- **alpha:** 8-10 hertz 50 mvols calm, relaxed, wakefulness
- **theta:** 4-7 Hz high voltage children, stressed adult, disorders (tumor, etc)
- **delta:** 1-5 hertz 20-200 mvols deep sleep, anaesthesia, or waking adults with brain disorder

**SLEEP:** Two types (p 542):
- **slow-wave sleep** delta waves: (SWS) deep sleep
- **REM:** beta waves: “paradoxical sleep” appear to be conscious, 20% of night's sleep (~1.5 hrs)

If REM is curtailed: anxiety, irritability, increased appetite, eventually hallucinations.
Deprived of REM: people spend more time in REM when possible (later), REM when awake: hallucinations

Sleep is induced by hypnogenic zones inhibiting RAS
in medulla, pons, midbrain, thalamus and suprachiasmatic nucleus to preoptic nucleus in the hypothalamus

**meditation** can train person to relax into alpha waves
**epilepsy** (1% pop) abnormal synchronous discharges, 3 Hz fr millions of neurons. These trigger discharges in many systems: smell, muscle, vision, auditory., depress RAS
- **Petit mal:** deja vu (already seen), strange smell, sense of unreality,
- **Grand mal:** loss of consciousness, powerful muscle contractions

Most seizures are idiopathic (“unknown disease”)

**USE OF LANGUAGE:** speaking, listening, writing, reading,

Found in L hemisphere in 90% population
(95% of R handed persons, 65% of L handed persons.)
L brain better at analysis
R hemisphere at holistic view

Two areas involved in language, noted by studying aphasias (without speech): (p 485)
- **Broca** (#44) damage to portions of lateral L frontal lobe controlling mouth and tongue caused most damage to speech, controls muscles of speech
- **Wernicke** (#40) damage to temporal lobe near auditory center also affected speech, interpretation, comprehension,

**Proposed model of language, communication:**
Connecting tract tells Broca's what Wernicke's thinks when speaking: coordinates speech
**Angular gyrus** connects with visual cortex:
contains programs converting visual input into auditory pattern in Wernicke's area.
Damage to angular gyrus leads to alexia or agraphia

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**Diagrams:**
- EEG waves and stages of sleep
- Localization of Broca and Wernicke areas on the brain

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