

9.01 Review topics

(This review sheet is an edited version of one handed out last year. Items not covered this year, or no longer in the reading assignments, have been eliminated)

Sensory systems

Receptive fields: retina, lateral geniculate body, striate cortex (VI, area 17, primary visual cortex)

Ocular dominance columns

"blobs" in the visual cortex

Multiple parallel processing

"Two visual systems" in the hamster

"Blindsight" in monkeys and humans with ablation of striate cortex

Sprague effect in cats: interpretation in terms of corticotectal diaschisis

Inferotemporal cortex lesion effects

Inferotemporal cortex unit responses

The notion of the "grandmother cell"

Spatial disorientation and the parietal cortex (textbook p. 632)

Wrong-way turning behavior resulting from early unilateral lesion of superior colliculus

Anti-predator behavior: dependent on superior colliculus

Frog with unilateral tectal lesion: regeneration of optic tract to wrong side

Behavior of above frog: worms vs stationary barriers

Tonotopic maps

Pattern selectivity in the auditory cortex

Brown-Sequard syndrome and "labelled line" theory of somatic sensations

Pathological pain states

Gate-control theory of pain

Referred pain

Acupuncture

Endorphins

Nucleus raphe magnus and its connections to spinal cord

Neocortical organization

Primary sensory cortex

Association cortex

Hierarchical and parallel processing

Plasticity of cortical maps in the adult brain

Feeding

Fröhlich's syndrome

Goldthiogluucose

Hypothalamic feeding "centers"

Gastrointestinal satiety signals and mechanisms

CCK

Leptin peptide and weight regulation (p. 427-429)

Evolutionary considerations, re: weight regulation

Parabiotic rats: evidence for weight regulation

Metabolic effects explaining hypothalamic hyperphagia
Vagotomy and hypothalamic hyperphagia
Paraventricular nucleus
Conditioned taste aversion (Garcia effect, p. 423)

Sleep and circadian rhythms

Stages of sleep: two major ones
Circadian clock
Free-running activity cycles
Transplants of Suprachiasmatic nucleus
Dreaming and sleepwalking re: sleep stages
Biological functions of sleep
Sleep deprivation studies (testing the theories)
Brain lesions that affect sleep: examples
Suprachiasmatic nuclei
Sleep disorders: sleep apnea, narcolepsy, cataplexy,
insomnia

Hormones and sex

Sexual dimorphism in hypothalamus (p. 390-393)
Aromatization and brain masculinization (p. 389-390)
Alpha fetoprotein

Memory

Short-term memory; long-term memory
Consolidation
Hebb's theory of memory formation; Hebbian synapses
Patient H.M. - lesion and symptoms
Retrograde amnesia
Anterograde amnesia
Explicit and implicit memory: examples
Declarative and non-declarative (procedural) memory
(alternative terms for the above)
Korsakoff's syndrome; diencephalic amnesia
Memory deficits in Alzheimer's disease
Animal models of amnesia
Place cells in hippocampus
Long-term potentiation

Language and lateralization of function; disconnection syndromes

Aphasias: Broca's, Wernicke's, conduction
Alexia and agraphia
Wernicke-Geschwind model of language mechanisms; criticisms
Planum temporale
PET scans and language localization (Note assumptions being
made)
Cerebral dominance and how it is detected: in neurological
patients; in normal people
Language in "split brain" patients
Cross cuing
Visual completion in split brain patients

Role of corpus callosum in reading, or in visual object naming

Limbic system; emotions; "mental" illness

Electrically elicited aggression in cats: two types

Appetitive vs consummatory behavior

Biting attack: hypothalamic modulation of hindbrain reflexes

Klüver-Bucy syndrome

Polygraphic recordings used for "lie detection"

Facial expressions of emotion; deception

Conditioned fear and the amygdala

Androgens and aggressive behavior

Electrical stimulation of amygdala in man; cf. drug states

Dopamine hypothesis of schizophrenia

Neuroleptics

Concordance rates: examples and meaning (p. 506-508)

Monoamine hypothesis of depression; criticism of it (p. 519f)

Dissociated memory states in human pathological conditions

Dissociation between human language systems and consciousness?

Human instinct for perception of unified self: relation to cross cuing, and confabulation by split-brain patients