Kappel
COGS 107A

Week 7 – Chapter 4

Principles of sensory processing in any modality

_____ - collects, filters, and amplifies relevant information

Sound (A1) – _____
Touch (S1) – _____
Sight (V1) – _____
Taste (GC) – _____ (Gustatory cortex)
Smell (OC) – _____ (Olfactory cortex)

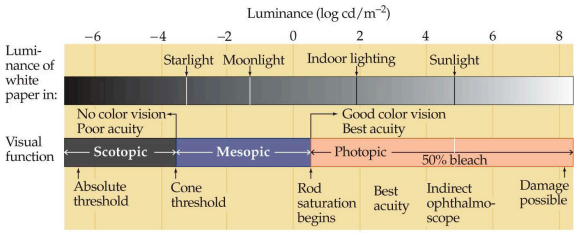
_____– receptor cells convert environmental stimulus into an electrical signal

Receptor Class

Sound (A1) – _____
Touch (S1) – _____
Sight (V1) – _____
Taste (GC) – _____ (Gustatory cortex)
Smell (OC) – _____ (Olfactory cortex)

_____ –sensory processing changes to be most sensitive to relevant stimulus levels. This maximizes the amount of sensory information that can be processed.

light adaptation: photopic v. scotopic vision
range of light processing: more than ____ orders of magnitude



_____ – Rods are active, no color vision, poor acuity

_____ – Cones are active, color vision, high acuity

_____ – measure of discrimination; accuracy of sensory system determined largely by density of receptors

Stimulus duration and adaptation

_____ (phasic) receptors – convey changes, stimulus onset and offset

_____ (tonic) receptors – reports that the stimulus is ongoing

Organization of Sensory Cortices

Topographic organization

_____ – more cortical area is devoted to tasks that require more processing

_____ – Neurons with similar functional properties are grouped together

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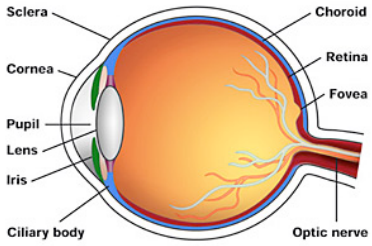
Mutltisensory integration

Vision

Fovea – most dense region of photoreceptors
Blind spot – a region where no photoreceptors exist
Saccades – fast eye movements cover blind spots and areas of low acuity. 3-4 times per seconds

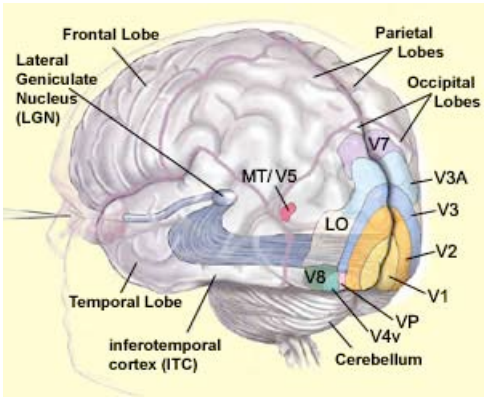


Rods (black/white) Cones (RGB)
Bipolar cells
Horizontal cells – _____ information processing
Amacrine cells – _____ information processing
Ganglion
Feedforward and feedback information

Information flows to the Lateral Geniculate Nucleus (LGN) of the Thalamus

and reaches the primary visual cortex (V1) in a _____ (topographic) manner

Two visual information streams
'Where' pathway – _____ stream: Parietal cortex, spatial relations
'What' pathway – _____ stream: Temporal cortex, form and color



Organization:

Is sensory processing hierarchical or distributed?
_____ – the region that when stimulated, elicits a sensory response
2-point discrimination test

A _____ defines the stimulus to which the cell is maximally responsive
e.g. Stimulus orientation in visual cortex

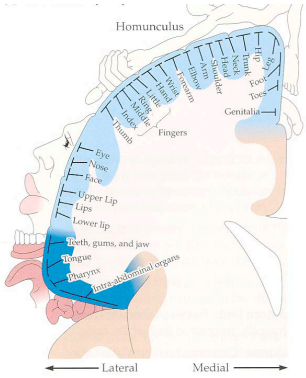
Sensory Coding

_____ – the pattern of activity of an array of neurons, each with a different tuning curve, represents sensory information (fyi: not to be confused with place cells!)

_____ – Information about the stimulus (intensity…) is encoded in the firing rates of a neuron or population of neurons

_____ – temporal information (onset, offset, persistence…) is encoded by the precise timing of action potentials

_____ – The "real-world" stimulus must be inferred from the neural representation formed by our sensory systems (*Empirical coding*



Topographic representations – Identify the primary cortex for each:
Retinotopic
Tonotopic

Somatotopic