

Lecture 13 -- Introduction to Sensory Systems and Receptor Physiology -- Qian

The sensory systems provide inputs for the brain to process. The processing may result in perception, memory formation or recall, emotion, motor responses, plans for future actions, etc.

A. Sensory modalities

1. Visual
2. Auditory
3. Vestibular
4. Somatosensory
5. Gustatory
6. Olfactory

B. Common features of sensory modalities

1. Transduction of physical stimuli into electrical signals
 - a. Direct activation of sensory receptors by stimuli
 - b. Indirect activation through second messenger systems
2. Specific pathways for transmitting the signals to higher centers
3. Hierarchical and parallel processing
4. Receptive fields and topographic maps for some modalities
5. Receptor response is a monotonic function of stimulus intensity.
6. More complex coding schemes at higher centers

C. Perception is an active process.

1. Perception is not a passive record of physical reality.
2. Sensory inputs do not contain enough information to uniquely specify the world.
3. The brain has to make assumptions about the world.
4. Perceptual illusions are a manifestation of these assumptions.
5. Understanding information processing in the brain requires a computational theory, in addition to experimental studies.

Relevant reading: chapter 21 in “Principles”