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1. You learned in the lecture that a set of stimulus cues from multiple sensory modalities can be used to integrate information. How is this process called and what is it most obviously used for?

A: Multisensory integration / cross-modal integration / amodal integration

2. Give an example from experimental animal research

A: Monkeys look to the individual that they represent / integrate with a call perceived: calls of own offspring is obviously represented as the offspring itself, unrelated offspring calls are obviously visually represented as “mother and child”
Horse: Other individuals are representation by calls and visual appearance. Violation of the cue information from both sensory modalities lead to changed looking behavior.
Hamster: Representation of cage-mates by multiple odor gland secretion – this is actually one modality, but multiple odors can represent the mating status etc. of a familiar individual.

3. Where is the neuronal basis?
A: In association areas of the neocortex

4. Give a coarse (general) workflow
A: 1) Detection of cues and features
2) Recognition of objects
3) Representation / memory in multiple modalities

5. Shortly depict the necessary steps preceding the integration of multiple sensory modalities in the visual system

A: 1) light sensation in the photoreceptors
2) preprocessing of basic stimulus cues in the retina: space, color, brightness, contrast, (partly also motion and time)
3) Transmission of the signal to visual cortex by optic nerve, optic tract, optic ratiation
4) Object recognition in distinct specialized visual cortex areas

6. Shortly depict the necessary steps preceding the integration of multiple sensory modalities in the auditory system

A: 1) sound sensation in the cochlea

2) preprocessing of basic stimulus cues in the brainstem: frequency, loudness, laterality, latencies, left/right differences, modulation of amplitude and frequency
3) Integration of different stimulus parameters in the midbrain
4) Filtering in the thalamus and input to the auditory cortex

7. How can we examine distinct (multisensory) brain functions in animal and human studies?

A: Animals: electrophysiology, behavior, anatomical
Human: anatomical (imaging techniques), non invasive electrophysiology, perception and sensation (psychophysics), brain lesioned patients and invasive electrophysiologically during skull surgery

8. What are common electrophysiological, non invasive techniques for the function of the peripheral visual and auditory senses?

A: brainstem response audiometry (ABR, BERA), electroretinogram (ERG)

9. What are common electrophysiological, non invasive techniques for the function of the central visual and auditory senses?

A: EEG and MEG, evoked potentials (auditory evoked response, visual evoked potential)

10. Give an example for the violation of perception by multimodal integration

A: Jumping lines: Two lines flashing evenly my appear to follow the rhythm of an pip tone presented at irregular intervals
McGurk Effekt: Sound perception of syllables changes with the view of a slightly different mouth /face movement
Stroop interference: Naming colors of color words is extremely difficult if the color word is not congruent with the color.