

Study Guide for the final examination (Wednesday, 8 May 2013, 13:30–16:00). Be able to answer the following questions and be familiar with the concepts involved in the answers. Review your homework and lab assignments and be familiar with the concepts included in them as well.

1. Diagram the three parts of the auditory system: Outer, middle and inner ear. How is sound mapped onto the basilar membrane? Know these terms: pinna, concha, external auditory canal, tympanic membrane, malleus, incus, stapes, semicircular canals, oval and round windows, cochlea, basilar membrane, organ of Corti, Eustachian tube, inner, outer hair cells.
2. What are the three main physical dimensions of the sound stimulus? What are the three main psychological dimensions of the sound experience? What are the relationships and interdependencies among them?
3. What is the critical band? Describe three different methods for measuring the critical band.
4. According to Plomp and Levelt (1965), how far apart in frequency must two sine wave tones be in order to sound maximally unpleasant? Why do some musical notes (e.g., the octave or the fifth) sound consonant when played together with the tonic and some other notes (e.g., the second or the seventh) sound dissonant when played with the tonic?
5. What are the three main components of the speech production system? What factors determine the frequency of the first and second formants? What determines the pitch of a speech sound?
6. Describe how you measure the two-point threshold. How do somatosensory receptive fields, inferred from the two-point acuity thresholds, differ on different parts of the body?
7. What do you experience when you attempt to move your paralyzed eyes to the right? Explain the phenomenon in terms of Erik von Holst's "Reafference Principle" (*Das Reafferenzprinzip*).
8. Be able to identify the major components of the olfactory and the gustatory systems (not the projections to the brain): taste bud, papillae, olfactory epithelium, tongue, cribriform plate, olfactory bulb, glomerulus, turbinate bones, olfactory receptor, and olfactory nerve.
9. Are there primary tastes? Discuss evidence for or against. How, if at all, does the molecular shape of odorants affect the smell experience?
10. What is the distinction between taste and flavor? What role does the sense of smell play in the taste and the flavor of food?
11. What is the definition of a pheromone? Discuss two pieces of evidence that humans are able to communicate with each other by means of chemical stimuli.
12. Consider the **functional** properties of the visual system and the auditory system such as localization, object identification, basic sensory experiences. Discuss two ways in which these systems are similar and one way in which they are different.
13. There have been several recurrent themes about perceptual processing in this class. Pick one of these themes and discuss how it applies to two sensory systems of your choice by comparing and contrasting them with each other.

Study Guide for the first examination (Monday, 4 March 2013, 11:00–11:50). Be able to answer the following questions and be familiar with the concepts involved in the answers. Review your homework and lab assignments and be familiar with the concepts included in them as well.

1. Using the concepts in Lab 1, draw a psychometric function illustrating discriminating dimmer and brighter lights from a standard light. Be sure to label the axes. Indicate on the graph how the discrimination “threshold” is defined.
2. Using the concepts in Lab 2, illustrate a dual-Gaussian signal detection model describing recognition memory performance for familiar faces (s_1) and unfamiliar faces (s_0). Let s_0 have a mean of 0.0 and a standard deviation of 1.0. Let the distance between the two means be 1.5 standard deviation units. In the illustration draw two response criteria that create three response categories corresponding to your confidence that you have seen each face before: “no,” “not sure” and “yes.”
3. Using the concepts in Lab 3, discuss the evidence supporting the existence of opponent-process color mechanisms. Describe their characteristics and present two perceptual phenomena that can be explained by them. Be prepared to describe the color experience an observer will have if you know the activity of the rg and of the yb channels;
4. Define hit rate and false alarm rate. Describe the receiver operating characteristic (ROC) predicted by the High Threshold Model and by the Signal Detection Theory of detection. Memorize the formula for computing sensitivity (d') from the hit rate and the false alarm rate for the equal-variance dual-Gaussian signal detection model.
5. Draw a diagram of the eye including the following structures: cornea, lens, pupil, iris, sclera, aqueous humor, vitreous humor, choroid, retina, fovea, optic disk and optic nerve.
6. If an object appears in the lower right part of your visual field, what part of the primary visual cortex will be processing the object information?
7. Offer an explanation of the Hermann Grid phenomenon based on ganglion cell receptive field characteristics. Why is this explanation insufficient?
8. Discuss the evidence that our color vision is based on three different types of cone receptors.
9. What happens to contrast sensitivity and visual acuity as illumination goes down? Why is 3.2 Lux, the illumination level at the end of civil twilight, used as a rule-of-thumb reference level for the lower limit of visual performance?
10. Describe the “size/distance” (size constancy) hypothesis of certain visual illusions. Pick two such illusions and explain them in terms of this hypothesis.
11. Describe three monocular depth cues. Give a real-world example of each.
12. What could you do to enhance the impression of depth in a photograph or painting while you are viewing it? What are the basic principles?
13. Give two examples in normal, healthy individuals of psychological phenomena caused by difficulties in paying attention.