

Study Guide for the first examination (Friday, 18 February 2005). Be able to answer the following questions and be familiar with the concepts involved in the answers.

1. Draw a “typical” **psychometric** function relating percent correct to stimulus intensity. Be sure to label the axes. Indicate on the graph how the stimulus “threshold” is defined. What is the relationship between the “threshold” as a point on a psychometric function and threshold as a theoretical concept?
2. Be able to describe the classical psychophysical methods of Fechner: the method of adjustment, the method of limits and method of constant stimuli.
3. 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. How do you compute sensitivity (d') from the hit rate and the false alarm rate for the equal-variance dual-Gaussian signal detection model? (Memorize the formula).
4. Draw a diagram of the eye including the following structures: cornea, lens, pupil, iris, sclera, aqueous humor, vitreous humor, choroid, retina, optic disk and optic nerve.
5. Be able to define the following optical properties of the eye: dioptres, optical power, relative optical power, accommodation, near point, far point, resting point, range of accommodation, emmetropia, myopia, and hyperopia. (Memorize the formula for computing relative optical power from viewing distance).
6. If a person is classified as a +4 dioptre myope, where is his/her far point located? What kind of optical correction will be needed to make the person emmetropic?
7. Define the term “receptive field.” Describe the receptive fields of retinal ganglion cells. How do ganglion cell receptive fields differ from those of cells in the primary visual cortex?
8. Offer an explanation of the Hermann Grid phenomenon based on ganglion cell receptive field characteristics.
9. Why do dark-adaptation curves obtained from different parts of the visual field and the Purkinje shift indicate that there are two receptor systems in our retina? Explain.
10. What happens to contrast sensitivity and visual acuity as illuminance goes down? Why is it hard to read at night without artificial illumination?
11. If a person is injured in the upper left region of the primary visual cortex, what change in vision, if any, do you expect?
12. Draw a diagram of the major visual pathways from the eye to the thalamus, the cortex, and the midbrain. Include the optic nerve, optic chiasm, lateral geniculate nucleus, superior colliculus and the visual cortex.