**On the final (Monday 10 June, 3 to 6, in the usual classroom), there will be 6 questions from a list of 30 or so, from which you can pick 5 to answer.**

**Below is my very preliminary list of questions. The list may be considerably revised before week 10, but questions 1 to 9 (page 1) will be included in it.**

**Coming up with decent answers requires considerable thought and reflection on the material you’ve been exposed to. That is, of course, the point.**

**Study tips:**

**1. You can answer these without doing extra reading, but if you know or can discover anything relevant outside of the assigned reading, don’t hesitate to use it. Material from other sources (Psych 102, the internet, etc.) can be highly relevant and is completely admissible.**

**2. Devote a lot of your prep time to constructing and refining OUTLINES of what you might write in answer to each question. With luck, you will be able to remember most essentials of the outline during the exam. I would be interested in seeing your outlines if you email them to me, but I’m afraid I can’t generally offer to comment on them.**

**3. The questions should obviously help you distinguish the bits of the textbook that are important (for the exam) from those that are not.**

**4. Good answers often consist of a sequence of general claims or proposals that make up a coherent response to the question, each of which is backed up by specific evidence or examples after you state it. Graphs and diagrams are welcome and often helpful.**

**5. Study groups are efficient (and might be fun) so I recommend them. That said, I will be particularly impressed with answers that don’t completely overlap with most other people’s.**

**6. If someone wants to supply me with a receipt I will spring for food for the study groups, up to $10 per head.**

**8. If you haven’t yet emailed me your presentation, please do. I will be following up by email soon with those that I’m missing.**

**Enjoy your explorations,**

**Don**

1. How sensitive are individual rods? And how do we know?
2. What are the factors that degrade the retinal image?
3. Describe and illustrate the functional benefits of having lateral inhibition in a sensory system.
4. Why can we not perceive every photon of light that arrives at the retina in near-darkness?
5. Explain how the Contrast Sensitivity Function is defined, and its significance for vision.
6. Explain, with a diagram or two, how having looked at a grating of high contrast for a long time (pattern adaptation) changes your perception of similar test gratings, or ones slightly different in frequency or orientation.
7. What can we learn about perception from the study of adults who recover vision after prolonged blindness?
8. Discuss how the theoretical framework of Bayes’ Theorem can be applied to our selection among possible interpretations of ambiguous sensory data, with one or two specific examples.
9. Show how the perception of shape from texture can be considered at each of Marr’s 3 levels of analysis.
10. What factors are important in limiting our ability to resolve fine detail?
11. How does the circuitry of the visual system create cortical cells that are selectively excited by specific orientations?
12. Review the evidence that particular areas of the cortex are specialized for representing and recognizing faces.
13. Discuss and evaluate the “inner screen”, “human interface” and “isomorphic model” conceptions of the perceptual representation.
14. Explain the ‘packing problem’ created by the orientation-selective nature of single cells in primary visual cortex, and discuss how the visual system solves it.
15. Outline how Marr and Hildreth proposed that edges are detected in noisy images, showing how it is consistent with retinal receptive fields.
16. Some neurophysiological results suggest an increasing diversity and selectivity of sensory neurons at successively more central stages of processing. Do you agree with this characterization, and do you think it makes functional sense?
17. Signal Detection Theory provides a theoretical framework for understanding the sensitivity of a human subject. Sensitivity is mainly related to the parameter d’; explain the role of the second parameter, the bias or criterion (beta).
18. What are the minimal requirements to make a directionally selective neuron. What are the theoretical proposals and experimental findings as to how such cells can be created at the retinal level?
19. What is the “aperture problem” in motion perception, and how can it be solved?
20. How is the encoding of contrast by the retina helpful for lightness constancy? And in what way is the encoding of contrast an incomplete account of lightness perception?
21. Describe the ‘correspondence problem’ that arises in stereo vision, and explain Marr and Poggio’s suggestion about how the visual system exploits ‘natural constraints’ to solve it.
22. Defend the statement that we are all partially color blind.
23. What are the functional benefits of encoding of color by color-opponent cells, and what is the physiological evidence for this encoding scheme?
24. What is the role of “top-down” processes in vision, and how would you expect them to be implemented physiologically?
25. Show for the various types of retinal cell how their interconnections with sign-inverting or sign-conserving synapses account for the polarity (hyperpolarization vs. depolarization), or increased vs. decreased firing of each cell’s response to a small spot centered in the cell’s receptive field.
26. What causes myopia, and how does it develop?
27. What do we know about the physiological basis of the ability to recognize faces and other objects visually regardless of the viewpoint from which they are observed?
28. Discuss the relative merits of theories of object perception based on two-dimensional views on the one hand, and object-centered representations on the other.
29. In what ways does perception resemble the generation and testing of scientific hypotheses? Discuss with reference to physiology/anatomy and phenomena such as ambiguous or impossible figures.