FORMAT and SAMPLE QUESTIONS --- PSY 500 (EXAM #2)

OVERALL

As for Exam #1, the second exam for PSY 500 will include four separate sections: a PROBLEM section, a section of SHORT-ANSWER ITEMS, an ID section, and an ESSAY section. Each of these sections is described in the following material. You may work on any of the four sections in any order.

Exam #2 should be completed in no more than an hour and 40 minutes. The **MAXIMUM POSSIBLE SCORE on Exam #2 is 60 points**; a breakdown by sections is shown below. The maximum for the Final Exam will be 100 points.

PROBLEM Section MAX = 12 points

Answers to Problems are to be written on the Exam itself (although you may also use additional scrap paper, if you wish). Answers to Problems are generally either right or wrong, but there is some allowance for showing the correct approach. If you demonstrate a **reasonable** procedure for getting the right answer, but forget a minor step or make a small calculation error, you may get partial credit.

The examples given below are not necessarily exhaustive, but they certainly include a large majority of anything you will find on the exam.

1. **ANATOMY**. You should be able to draw an anatomical representation of the upper visual systems, and/or be able to label either anatomical ***or*** schematic diagrams of the same.

2. **BASIC PSYCHOPHYSICS**. Given a suitable outline graph, you should be able to take some *simple* data and use them to determine either an Absolute or Difference Threshold or a value for the JND. You should be able to use a graph to determine a threshold from staircase data. You should be able to follow the steps of an experimental session using the PEST procedure.

3. **SIGNAL DETECTION THEORY**. You should be able to use either Yes-No data or the results from a rating experiment to determine an ROC curve and a value for d' (using double-probability paper and a straight-edge). You should be able to convert the slope of such an ROC curve into information about the (approximate) relative sizes of σ_n and σ_{s+n}.

SHORT-ANSWER Section MAX = 30 points

Answers to this section should also be written directly on the exam. Where blanks are provided, it is better to avoid the blank and write in the space below the question itself.

These items often have answers that require no more than a single good sentence (and sometimes less than that). You may provide as short a response as you wish, as long as you clearly include the requested information.

In this instance, you are trying to demonstrate that you recall the course material sufficiently to know the specified situation. For these questions, you are writing to confirm your knowledge for the instructor, not to explain to others.

Each item is worth up to two points. (One point credit will be given for answers that are partially correct.) The Maximum for this part of the exam, however, is 30 points. NOTE: This maximum is less than the total points available. Thus, you could stop when you have answered 15 items (15 items X 2 pts each = 30 pts.) or, if you are less confident of your answers, you could continue through the final item or until you're sure that you've earned the maximum.

SAMPLE ITEMS (followed by possible answers)

1. Name three structures (nuclei) in the human thalamus through which visual information must pass.

2. Which of the four major lobes of the cortex have at least some involvement in the processing of visual information?

3. What important reorganization occurs at the optic chiasm?

4. Most of the early recordings of single cells in the optic nerve show patterns of activity that can best be described as "transient" (i.e., brief bursts of impulses when the level of stimulation changes). Yet such a pattern is mostly characteristic of "magno cells." Given that "parvo cells" are also represented in the optic nerve, explain why the early findings may have been skewed.

5. Imagine an individual who has undergone a so-called "split-brain" operation as a treatment for severe epilepsy. Now imagine that this same individual is traveling by train and is seated on the left side of the car (facing forward (in the direction of travel). If he or she were to catch a momentary visual glimpse of an event outside the train, and to the left of fixation, then would he/she be likely to mention the event to a traveling companion? Why or why not?

6. If one wanted to systematically "map" the receptive field of a ganglion cell using small spots of light, how might one manipulate the light stimulus and what might one record, in order to establish the map?

7. A radiologist "reading" the image from a medical scanner, an engineer evaluating the welding on an oil pipeline by means of x-ray pictures, and the manager of an R&D firm specializing in snack foods, all have very different jobs. Each of these individuals, however, can be described as being involved with psychophysical issues, because they are all:

8. The so-called Classical Techniques were originally described by _____ sometimes referred to as the Father of Psychophysics. What were the three techniques he described – and which method generally takes the longest to use? Which takes the least time?

9. What is meant by "adaptive testing" and why do such methods have an advantage over the various classical methods?

10. How do Staircase and Double-Staircase procedures differ? Why would one use a Double-Staircase?

11. The Theory of Signal Detection presupposes that all detection and discrimination experiments are conducted in the context of _____. Two specific assumptions that are usually made include:

12. A researcher runs a standard Yes-No signal detection experiment and plots the results within a square graph having linear axes. Each axis starts at 0 and ends at 1. (The ROC curve for such a graph would usually be a curved line.) What result would probably surprise the experimenter and why?

13. By using double-probability (normal-deviate) graph paper, it is possible to determine **d'** regardless of the violation of which of the basic assumptions of Signal Detection Theory? How?

14. What three photo-pigments would one typically find in the cones of the "normal" human visual system?

15. Color mixing can create new chromatic appearances, but in the everyday world mixtures also affect the apparent lightness of the results. Specifically, the outcome of a _____ will generally appear darker than the original colors; the outcome of a _____ will appear lighter.

16. Identify three means by which one can vary the perception of HUE?

17. The standard experimental procedure for determining a "metameric" color match involves setting up a basic "rule" for the observer's task. What is this rule?

18. Identify two different patterns of inheritance for color deficiencies.

ANSWERS for SAMPLE ITEMS

1. LGN, Lateral Posterior N., Pulvinar N.

2. All four (occipital, temporal, parietal, frontal).

3. The nasal fibers from each retina cross over to the opposite side of the head. (The fibers from the temporal retinae remain on the same side as they originated.)

4. Magno cells are physically larger and, hence, researchers were more likely to be recording from one of that class than from a parvo cell.

5. Probably not, since events to the left of fixation are processed by the right hemisphere and that portion of the brain has minimal language skills and lacks control of the speech mechanisms.

6. Move the spot to different locations on a projection screen in front of the eye. Turn the spot on-and-off. Record whether the cell responded to the light with any changes in activity and, if so, when the changes occurred (e.g., at the start or at the end of the light).

7. Concerned with the relationship between the state of the physical world and subjective experiences (their own or other people's). Also, they must all make their decisions in the context of costs for being right or wrong.

8. Method of Adjustment (quickest, but poorly controlled) ***vs*** Method of Limits and especially the Method of Constant Stimuli (most control, but very time consuming).

9. Adaptive testing takes into account the early behavior (performance) of the participant, to guide the choices for later presentations. Such techniques have a improved efficiency, because they eliminate time spend on presentations which do not contribute to the sought-after threshold value.

10. In the Double-Staircase, the experimenter essentially runs two staircase procedures simultaneously. The participant is given no way to know which sequence (staircase) will determine the next presentation. This procedure has an advantage over a single staircase, in that simple alternation of responses will not produce "convergence" on a common threshold value.

11. .....context of unavoidable noise (either external or internal). (1) The noise can be considered as a normally-distributed random variable. (2) The effect of the occurrence of any signal is to shift the noise distribution to the right (i.e., the signal acts as an additive constant).

12. It would be a surprise if the ROC curve fell significantly below the diagonal, because that cannot happen if the participant is following directions and trying to detect the signal. (Such an ROC can only occur if the participant is confused about how to report the presence/absence of the signal or is intentionally trying to "mess up" the results.)

13. The assumption that the signal acts as an additive constant. The value for **d'** can be found by using the point where the ROC curve crosses the P(H) = .50 axis, regardless of any differences in variability of the N and the S+N distributions.

14. cyanolabe, chlorolabe, and erythrolabe

15. subtractive mixture (darker); additive mixture (lighter)

16. Change the wavelength of the light; change the background; present a pattern of flickering neutral lights (e.g., such as Benham's top).

17. On a bipartite field, present a test "color" on one side. Use the three primaries however necessary, in order to make the boundary between the two sides disappear. Any one primary can be mixed with the test color itself, as long as the end result creates a uniform appearance.

18. Protanopia and deutanopia are inherited as sex-linked recessive traits. Full monochromatic vision is inherited, but is not sex-linked (i.e., equal numbers of men and women are monochromats).

IDENTIFICATION & ESSAY Sections

Blank paper will be provided for the IDs and Essays. If you prefer to use lined paper, you may bring your own. DO **NOT** USE OR TURN IN PAGES that have been torn from a spiral notebook or other pages having rough, interlocking edges.

The ID items on this Exam can usually be answered in approximately 4-5 **well-constructed, substantive sentences**. The Essay Questions can usually be answered in three or four **well-constructed, substantive paragraphs**. (This is not to suggest exactly the grammatical structure of your responses; it is merely an indication of the average length expected to be necessary for a good answer. Some answers may virtually require a good drawing, in order to be answered within the suggested space.)

You will respond to a total of **2 ID items --- each one worth a *possible* 4 points,** and **1 ESSAY Item --- worth a *maximum* of 10 points.** There will be at least 6 ID items and 4 ESSAY items from which to choose. You will need to keep track of your time, since you will have about 10 minutes *per* ID and 20-25 minutes for the essay, if you plan to take 25-30 minutes or so to answer the SHORT-ANSWER Items and another 25-30 minutes do the PROBLEMS. You might want to check over the Problems first, to decide how much time you need to reserve.

ADVICE and SUGGESTIONS

1. If you are asked to define or identify one or more terms or concepts, then you should not only give a basic description of each term, but also demonstrate your understanding of the term by clarifying its relationship to a broader setting. You might do this by including some examples, or a few important facts about the term or its context, beyond what is minimally necessary. It would be inadequate, for example, to define the ID "myopia" simply as "nearsighted; trouble with far objects."

2. If an essay question asks you to "compare and contrast" two or more terms, then you are expected, not only to provide a basic definition of each term, but also to relate the terms to each other. This means that you will need to concentrate specifically on comparing and contrasting the component terms. Are the concepts in some ways similar to each other? Are they different? Are they opposites? Make clear such relationships explicitly.

   For example, how are "protanopia" and "deuteranopia" related? Surely you can be more specific than writing: "they are both problems with color vision." Ask yourself how these particular terms are related *to each other* in a way that would distinguish them from most other "color vision problems." It could involve the fact that both are forms of red-green dichromatic vision. There are frequently many quite specific comparisons, if you have really thought about the terms.

3. Organization, clarity and being specific (and correct) about important details are obviously crucial to the effectiveness of any answer. Use examples when necessary to illustrate your discussions. Avoid vague or ambiguous generalities. Try to bring your response into a cohesive whole. Don't just put down a string of unrelated facts; tie them together to make them meaningful to your "target" audience --- the person who is trained in scientific psychology, but who may not possess any specific knowledge about the topic you are discussing.

   Do **not** write these answers for the instructor. That is, **do not assume** a lot of technical expertise on the part of your reader. If your reader were just the course instructor, why would you be writing a lengthy ID or essay at all? You could just say: "remember what you told us about **X**." **WRITE TO TELL SOMEONE NEW ABOUT THE TOPIC**, using your clearest, most direct style.

4. You may certainly include drawings, graphs, tables, etc. in your answers, if you wish. Certain topics virtually "cry out" for some sort of illustration. Do **not**, however, just put a figure or formula (or table); describe what is referred to in words/sentences. Of course, unlabeled graphs carry little or no meaning.

5. For some topics, you will need to integrate material from the readings with the "framework" provided by the lecture presentations. Some topics depend primarily upon the text or supplementary readings.

6. Conceptually, **IDs and essays are graded on a "points off" basis.** This means that I have a certain level of expectation for each answer. Satisfactory graduate-level performance results in 1 point off. If you get **3**'s and a **9**, you are doing fine. (This grading scheme allows for rewarding *unusually* good answers --- by deducting 0 points.) Less adequate performance obviously may result in more points off.

IDENTIFICATION Section MAX = 8 points

Remember, a good identification must include **both** a basic definition of the term **and** some extra detail, such as example(s) and/or an indication of the context for the term. See above "Advice" for additional suggestions.

SAMPLE ID ITEMS

____ LATERAL GENICULATE NUCLEUS
____ RECEPTIVE FIELD
____ SHADOWING TECHNIQUE
____ ROC CURVE
____ ADDITIVE COLOR MIXTURE
____ TECTOPULVINAR VISUAL SYSTEM
____ THE THREE "CLASSICAL" METHODS
____ MULTI-DIMENSIONAL SCALING
____ "MEMORY COLOR"
____ GRAHAM & HSIA'S UNUSUAL SUBJECT

ESSAY Section MAX = 10 points

SAMPLE ESSAY ITEMS

What are "receptive fields?" How are they studied (e.g., what is the distinction between "ON" and "OFF" areas within such fields and what is a "map" of a receptive field)? *Briefly* indicate the sorts of differences in receptive field organization that one might find at different levels of the visual system.

Discuss the significance for understanding **perceptual** phenomena of research on the differences between pathways in the primary visual system associated with the parvo- and magno-cellular layers of the LGN.

Describe the general model underlying the Theory of Signal Detection, including a description of the two common assumptions. B*riefly* indicate how you could deal with violations of the assumptions, without abandoning the whole TSD approach.

Compare and contrast the **indirect** and the **direct** approaches to psychophysical scaling (i.e., the approaches of Gustav Fechner and S. S. Stevens).

Describe the several **dimensions of color experience** that must be distinguished, in order to discuss color vision. Relate each experiential dimension to the kinds of physical variations that can affect it.

Why is it necessary to include "opponent process" mechanisms in any complete description of color vision --- what psychological evidence seems to require opponency for its explanation? What physiological evidence supports the existence of such mechanisms?

Discuss how those individuals with protan and deutan defects (both the true dichromats and those who are anomalous trichromats) differ from normal trichromatic observers, in terms of visual structure and function.