

ECE511/PSY511 PSYCHOPHYSICS
A Joint Offering by the School of Electrical and Computer Engineering
And the Department of Psychological Sciences
Purdue University
Fall 2018

HW #4 (Assigned: 09/13/2018; Due: *before lecture on 09/20/2018*)

Topic: ROC, 1-I and 2-I Paradigms (Calculation of Standard Errors of d')

- (1) Plot ROCs, on linear (H versus F) coordinates, *and* on z-score coordinates [$z(H)$ versus $z(F)$], for the data points shown in the table below. The table entries are the H values for the corresponding F and d' values. Explain how you can use the z-score plots to confirm the values of d' .

F \ d'	0.5	1.0	2.0	3.0
0.01	0.03392	0.09244	0.37222	0.74984
0.02	0.06012	0.14598	0.47850	0.82790
0.10	0.21712	0.38894	0.76358	0.95704
0.25	0.43094	0.62778	0.90756	0.98998
0.50	0.69150	0.84130	0.97720	0.99870

- (2) The rest of this homework involves running experiments on yourself. This part requires that you report the experimental results from three separate experiments:

Exp. A is the curvature detection experiment using a 1-I paradigm. Go to the course website, and following the links “Online Experiments”, “Part II. Decision Model for Psychophysics”, “**One-interval** Experiment”, “Curvature Detection.” Choose the “long” session with “feedback.”

Exps. B & C are curvature detection experiments using a 2-I paradigm. Follow the “Online Experiment” link in the course website, and select “Part II. Decision Model for Psychophysics”, “**Two-interval** Experiment”, “Curvature Detection.”

- ◆ For **Exp. B**, select “long” session with “feedback,” and “temporal” order.
- ◆ For **Exp. C**, select “long” session with “feedback,” and “spatial” order.

Once you have run yourself and obtained results for all three experiments, report the following for Exps. A, B and C:

- ◆ 2-by-2 stimulus-response matrix (paying attention to whether the stimuli should be labeled S_1 & S_2 or U_1 & U_2)
 - ◆ H and F
 - ◆ d' and c . (*Note: please specify whether the d' value you report here has been adjusted by the factor $\sqrt{2}$ already. You should take this into account when you compare the experimental results, as required below.*)
 - ◆ the standard deviations of d'
- (3) Compare the experimental results. Discuss your subjective assessment of the relative ease of each experiment. Discuss how the values of sensitivity index are related. Discuss whether different values of response bias are observed. Discuss any additional issues that you have noticed. Suggest ways that the experimental design of Exps. A, B and C can be improved. List as many items as you can think of even if some of them are just a “hunch,” but keep the discussion succinct and to the point. ***Bear in mind that the same pair of straight/curve lines (S_1 and S_2) are used in all three experiments.***