ECE511/PSY511 PSYCHOPHYSICS

A Joint Offering by the School of Electrical and Computer Engineering

And the Department of Psychological Sciences

Purdue University

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HW #1

Method of Constant Stimuli and Probit Analysis

(1) Estimate absolute detection threshold using MCS (online exp on course website).

a. Run yourself on ***curvature detection*** using the Method of Constant Stimuli, using the JAVA script "OfflineExperiments.jar". Choose the "long" session and "yes" for feedback. Attach a screenshot of the results screen, and a copy of your data file.

b. Run Probit Analysis using SAS on your data. Attach a copy of the output file.

c. Compute the 95% confidence interval for AL.

d. Using a graphing software of your choice, **re-plot** the data and the estimated psychometric function on the same graph. Mark the point corresponding to AL.

e. Discuss your results: are they what you expected; how biased were you and why; how well do you think the psychometric function (a cumulative Gaussian curve) models your data, and why; any ideas to improve the experiment?

[***Hint 1***: Be brief and to the point in your discussion. Think about the points that you want to make before putting words on the paper. One to two paragraphs of discussion (double spacing, preferably typed) is sufficient.]

[***Hint 2***: See the attached Appendix for instructions on running Probit Analysis on SAS.]

[***Hint 3***: Recall that 95% confidence interval = mean±(1.96*SE), where SE stands for standard error. Also recall that SE = SD/$\sqrt{n}$, where SD stands for standard deviation and n denotes the number of data points. Finally, the SAS output gives variance, which is equivalent to SD^2].

(2) Estimate discrimination threshold using MCS using FechDeck (Ferwerda's article). After conducting the density discrimination experiment during lab, attach a copy of the spreadsheet and data plots (a screenshot will do). Discuss your results.

(3) Now that you have tried both detection and discrimination experiments using MCS, list the similarities and differences in using MCS to estimate AL and DL.

Appendix
How to Run SAS for Homework Assignment #1

URL FOR SAS SOFTWARE

Purdue ITaP has a Software Remote site at:

https://engineering.purdue.edu/ECN/Support/KB/Docs/UsingITaPGoRemotesof

You need to log in using your Purdue career account. Follow the instructions online to download and install Citrix Receiver, and add "SAS 94 English" application to your FAVORITES folder.

CREATE A DATA FILE

Run your experiment. At the end of the experiment, a data file window will pop up. Cut and paste the contents of this window to a text file in your home directory. **Save your data file**. ***Caution: you may want to jot down your results if you are not sure that the data have been saved properly. Once you close the data window, the results are gone! You will then have to run the experiment again – Ouch!!***

Here is a sample data file for subject XYZ:

```
Data XYZ;
input strength NUM RESP;
cards;
90.00  100  2
97.00  100  8
105.00  100  35
113.00  100  81
121.00  100  91
128.00  100  100
136.00  100  100
144.00  100  100
152.00  100  99
160.00  100  100
;
proc print;
title ' Method of Constant Stimuli';
proc probit lackfit;
model RESP/NUM=strength;
run;
quit;
```

If you see extra "." (period) or "," (comma) in your data file, delete them.

Note that your data file should look the same as the above example except that (1) your initial, instead of "XYZ", should appear in the first line, and (2) the actual numbers in the data columns would be different.

HOW TO RUN SAS

Four windows will appear with the following titles:

Explorer

Log

Output

Editor

Click on the "Editor" window to activate it. You can cut and paste your data file into the "Editor" window. Then right-click anywhere in that window and a menu will pop up. Scroll down and select "Submit All". After a short pause, the results will appear in the Output window. Note that "MU" and "SIGMA" stand for the mean and the standard deviation of the cumulative Gaussian function, respectively. The variances for MU and SIGMA appear at the end of the output file in a 2x2 covariance matrix, along the main diagonal. You need to convert variance to SD, and then to SE, before computing the 95% confidence interval.