**Assignment 2: Neuroscience of Decision Making PSY 3/507 (Monsoon 2023)**

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**Instructions:** Please write your own responses and do not copy or lift text/code from any source (including the paper). If you are referring to credible external sources other than the attached paper for your answers, please cite those sources (within the body of text and the provide a reference list at the end) in the APA citation format (<https://www.mendeley.com/guides/apa-citation-guide>). Word limits given are indicative and less than the indicated numbers may also be used.

**Please download this MS word question-cum-response template to TYPE your answers and feel free to add sheets as required. Convert this document to a PDF and rename the file: name\_roll no. before submitting. Please note that answers in this template only will be evaluated and hand-written or scanned answer sheets will not be evaluated.**

**[Strict deadline for submission: 28.10.2023 Saturday 10.00 PM]**

**Q1)**

**Fill the following form** [**https://forms.gle/BYotcMpVrtcVn1QQ9**](https://forms.gle/BYotcMpVrtcVn1QQ9)

**Q2)**

**A researcher conducted a random dot motion discrimination task with 2 different motion coherence levels as different conditions. 30 participants performed 100 trials in each condition and the evidence accumulation was recorded. Column 1 of cell array = Condition 1 and each cell of Column 1 has one participant’s data. Each cell has a 100 x 1000 matrix. Each row of the matrix = one trial for 1000 ms. The evidence accumulation starts from 300 and reaches the decision threshold at 600.The same convention applies to data from Column 2.**

**The data is attached herewith: Assignment2-NDM.mat’.**

**[ links about importing MATLAB data arrays into Python and R**

[**https://in.mathworks.com/help/matlab/matlab\_external/matlab-arrays-as-python-variables.html**](https://in.mathworks.com/help/matlab/matlab_external/matlab-arrays-as-python-variables.html)

[**https://stackoverflow.com/questions/11671883/importing-an-array-from-matlab-into-r**](https://stackoverflow.com/questions/11671883/importing-an-array-from-matlab-into-r) **]**

**Now solve the following. Insert a figure (wherever required) and paste the MATLAB/Python/R code for the same. Any figure must provide all information necessary to interpret it including axes labels, captions/legends (simple figure titles as captions are not enough).**

1. **i) Create two subplots for the two conditions separately. Plot the mean evidence accumulation (across 100 trials) of each participant in grey colour and the mean evidence accumulation (across 30 participants) in blue colour in each subplot.**

[Answer]

**Calculate the rate of mean evidence accumulation (across participants) for each of the two conditions separately and report on the title of each subplot.**

**[Hint: Fit a straight line to the data between the starting point of mean evidence accumulation and the earliest point of reaching the threshold of maximum evidence to calculate the average rate.]**

**[4 + 3 points]**

[Answer]

**ii) To compare the mean rate of evidence accumulation (across participants) between the two conditions, conduct an appropriate statistical test and report the results with test statistics and p values. What can be concluded about the motion coherence in the two conditions from the results? [2+1 points]**

**(Hint: If the data in each of the two groups follow a normal distribution, use a parametric statistical test for testing the difference of two independent group means. Otherwise, use a suitable non-parametric counterpart of the parametric test.**

[**https://in.mathworks.com/help/stats/hypothesis-tests-1.html**](https://in.mathworks.com/help/stats/hypothesis-tests-1.html)**). Normality assumption can be checked using Lilliefors test.)**

[Answer]

1. **i) From the data, calculate reaction time (RT) for all 100 trials of each participant. Divide the time axis in 20 bins and plot the mean RT for all 30 participants for both conditions separately. Plot one histogram of the reaction time distribution for each condition. Interpret the findings with respect to motion coherence. [8 points]**

[Answer**]**

**ii) From the data, calculate the median bias of evidence accumulation (across participants) separately for condition 1 and condition 2. Conduct the appropriate statistical test to compare both with a reasoning. Report relevant test statistics and p values. [Use the hint in the previous question to conduct the test] [2 points]**

[Answer]