Assignment 5

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Q1. What is the expected reaction time for the individual called “the dude”?

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b) With only one measurement, how are we able to give a 95% credible interval for “the dude”? This is not possible using frequentist statistics.

Using Bayesian approach, we will be able to use data of other individuals, but we will not be able to do it with frequentist statistics.

Q2. What is the group’s reaction time?

1. Given a random new individual from our group, e.g. someone that simply “forgot” to do the test (you all know who you are ;)), what is the:
   * 1. expected reaction time for that random individual?

The information about the mean, the median, and the confidence bounds are plotted on the figures.

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* + 1. predicted reaction time for a single measurement for that individual? (provide the posterior predictive distribution for the reaction time) In STAN you can do this in the “generated quantities { }” section in your STAN code. In python/matlab/julia: 1) pick a posterior sample from mu, tau and sigma given your data. 2) simulate a new theta given these samples, i.e. theta~N(mu,tau). 3) simulate a reaction time measurements given this theta and sigma (from step 1 above), i.e. logy~N(theta,sigma). 4) Calculate y from logy or zlogy. Repeat 1-4) and you will have posterior predictive samples from a new individual.

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b) Compare the posterior predictive histogram with the statistics you can see at the [website](https://www.humanbenchmark.com/tests/reactiontime/statistics).

The mean and the median of the given results is higher than that of reported in the website. The difference between the results could be due to the fact that the website is used a huge dataset (81 million).

Q3. Provide a figure that compare thetas obtained with our hierarchical Bayesian model above with thetas obtained by treating the participants individually and using the sample means (i.e. theta[j] is in the latter case the sample mean of the j:th participants logarithmic reaction times).

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1. Can you explain the differences?

I have a problem in interpreting the figure!