Reaction Time Experiment

In this session, students will do an experiment in which your reaction time is measured. There are several lessons about statistical testing (Ch 8 material) that can come out of this activity. If anyone feels threatened by having their reaction time measured, simply do not participate in the measurements. It should be said though, that the measurement is not related to general athletic ability or any important personal characteristic.

Some 300 mm rulers will be distributed. These are the "high tech" measurement instruments! Pairs of students will use one ruler and each one of the pair will measure the reaction time of the other. Here is how to do the measurement:

1. Person A holds the non-tag end of the ruler (the 300 mm end) between your thumb and index finger, and suspends the ruler vertically.
2. The tag end of the ruler (the 0 mm end) is positioned level with the thumb and index finger of person B, and person B separates their thumb and index finger by a cm or so.
3. At an unpredictable time, person A drops the ruler and person B catches it between thumb and index finger as quickly as possible.
4. The mm reading on the ruler just above Person Bs thumb and index finger is read.
5. This distance can be converted into a reaction time using the formula

time = $(\text{distance in mm}/4900)^{1/2}$ in seconds.

(The 4900 comes from the constant of gravitational acceleration, and the formula comes from the physics $s= (1/2)gt^2$)

We will do the following with this data:

1. I predict the distribution will be logNormal with lognormal mean -1.8 and SD 0.1. (p 184 tells us that the mean and SD of the actual reaction times would have to be .166 seconds and .016 seconds, respectively, but these are not too useful for testing since the distribution of the reactions times themselves is not Normal>). So the first activity is to see if my prediction is credible – i.e. compute the probability that the actual sample mean of the log reaction times are as far away from my prediction as we observe.

The logarithm of the reaction times that we measure can tell use whether the prediction of mean =-1.8 is credible or not. While it is reasonable to assume the log data is Normal, it is a small sample and we would need to use the t-statistics to test the hypothesis H_0: μ=-1.8. In my notes, we are looking at Case 1 or 2 depending on whether we want to use the assumed population SD or 0.1 or not. We can do the test by computing a CI (as in Ch 7), but it will not give us a P-value (as in Ch8).

2. The two tables can be thought of as two teams. How do we test the hypothesis that one team has lower average reaction times than the other team? This is a Ch 9 question.