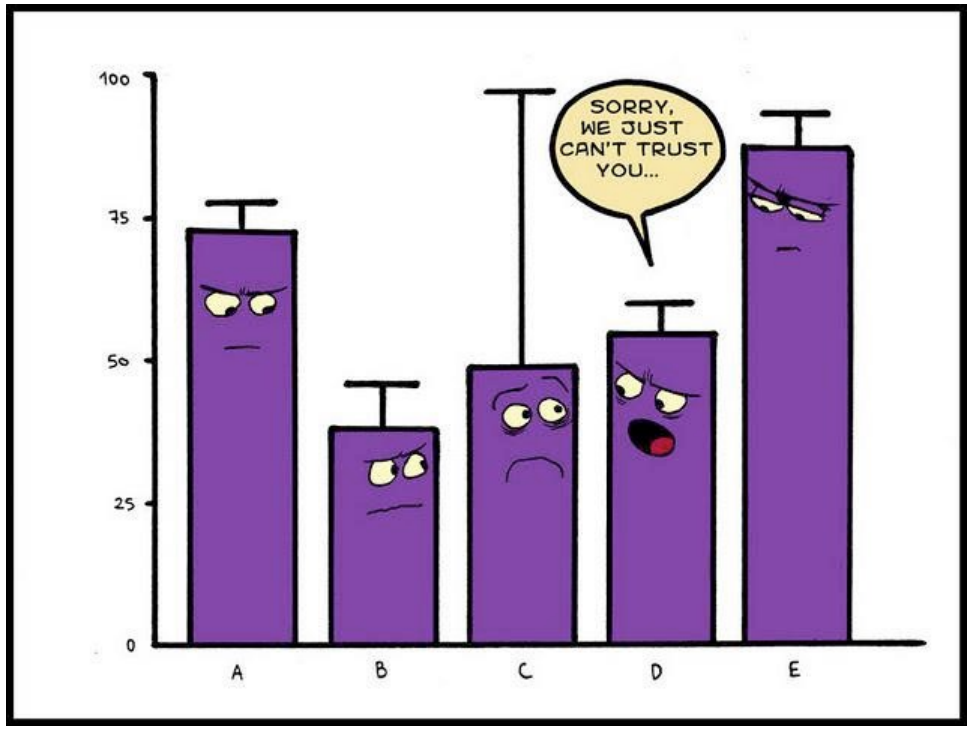
M2D8:
Complete data analysis and organize Research article figures

1. Prelab discussion
2. Apply statistical analyses to data sets
3. Outline Research article



Mark your calendars!

- Research article (20%)
  - completed individually and submitted via Canvas
  - due May 1 at 10 pm
- Notebook (5% and part of 5% Participation score)
  - one entry submitted via Canvas 24 hr after M2D8
- Blogpost (part of 5% Participation score)
  - due 5/2 via Slack

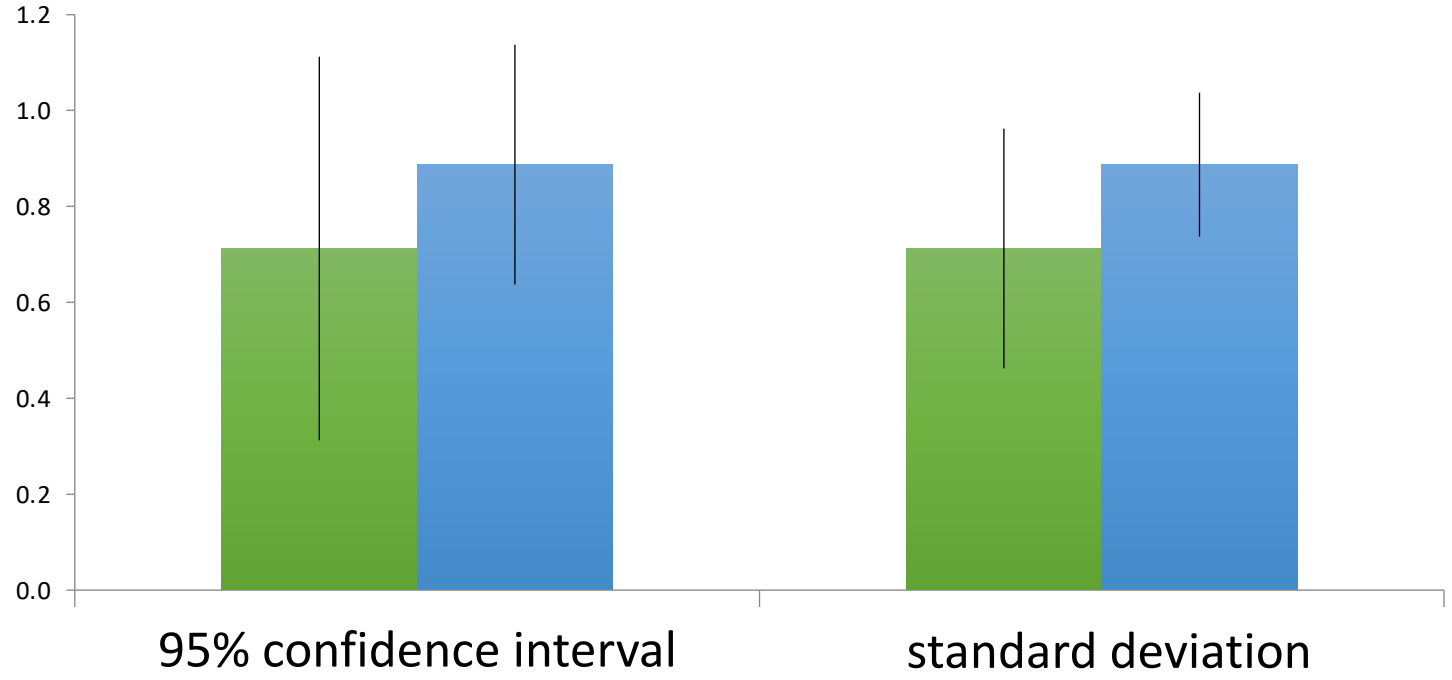
How will you evaluate and interpret your data?

1. What is the variation / noise in your data?

2. Do your data support that there is a difference between the populations / treatments?

Confidence intervals show variance in data

- At 95% confidence interval, there is a 95% chance that the true mean is within the defined range
- Error bars used to represent variance

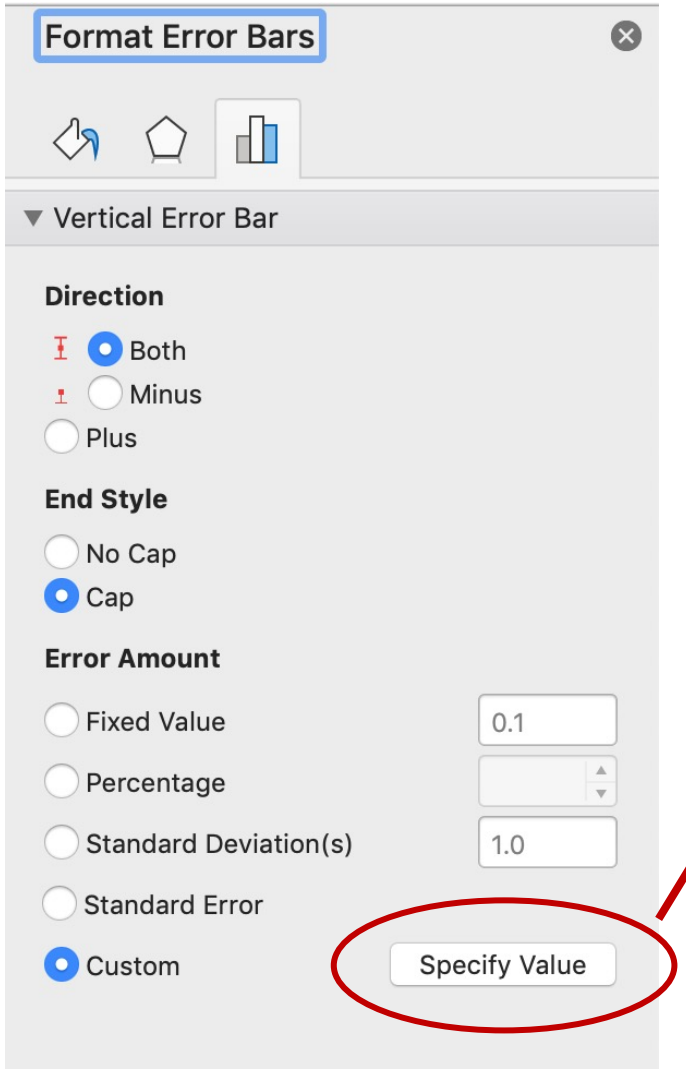


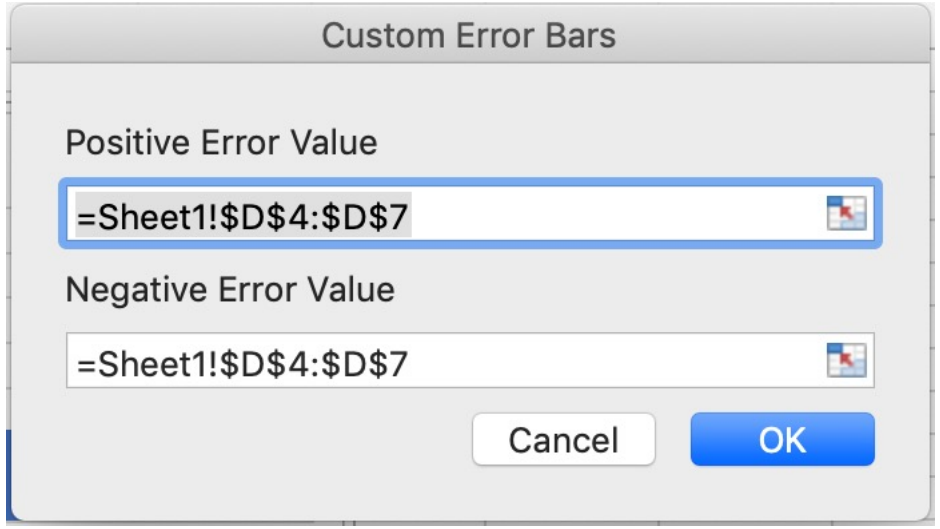
Calculating confidence interval in Excel

= CONFIDENCE(confidence level, standard dev., size)

- Confidence level:
- Standard deviation:
- Size:

How do you customize error bars in Excel?

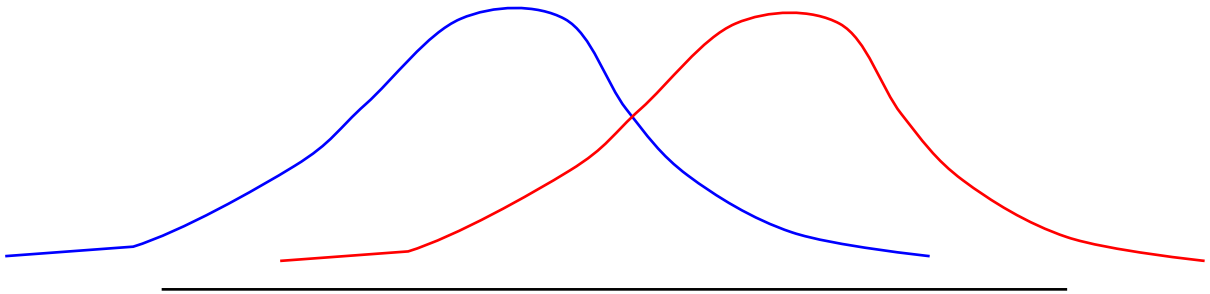




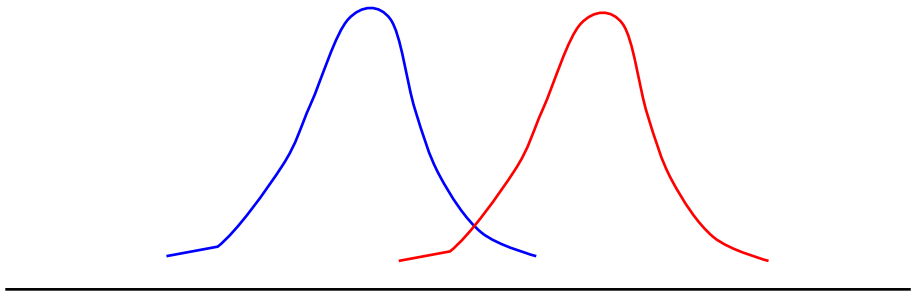
Enter value calculated for confidence level as custom error bars

Student's *t*-test determines if populations are significantly different

- Assume data follows *t*-distribution
- At $p < 0.05$, there is less than a 5% chance that populations are the same (95% chance that populations are different)
- Examines signal (means) : noise (variance) ratio



high noise



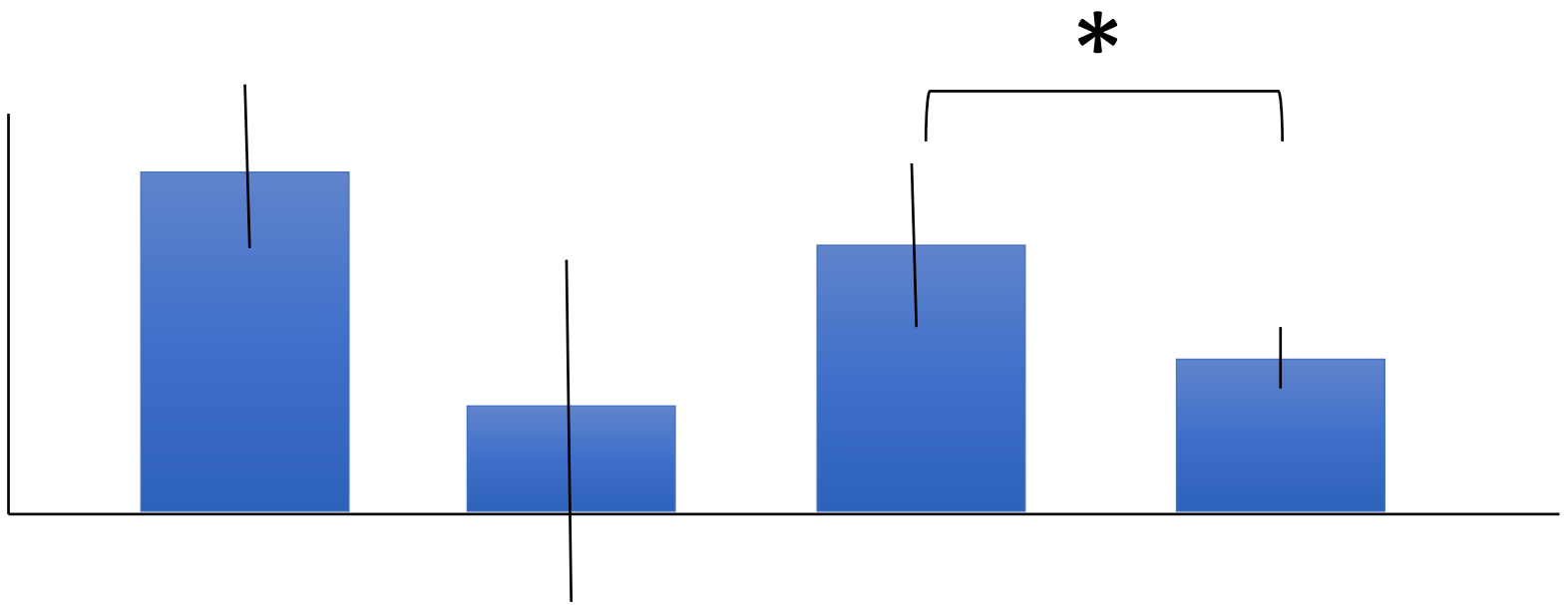
low noise

Calculating Student's *t* in Excel

P = TTEST (array1,array2,2,3)

- Arrays:
- 2 = two-tailed test:
- 3 = population variances not assumed:

How will you use statistics in your data analysis?



- Student's t-test can only be used to compare two populations

- What if data are not significant? Almost significant?

For today…

- Apply statistics to evaluate your data
- Use extra time to get a head start on your Research article!

For M3D1…

- Prepare for the Research proposal presentation by listing ideas / problems that you find interesting