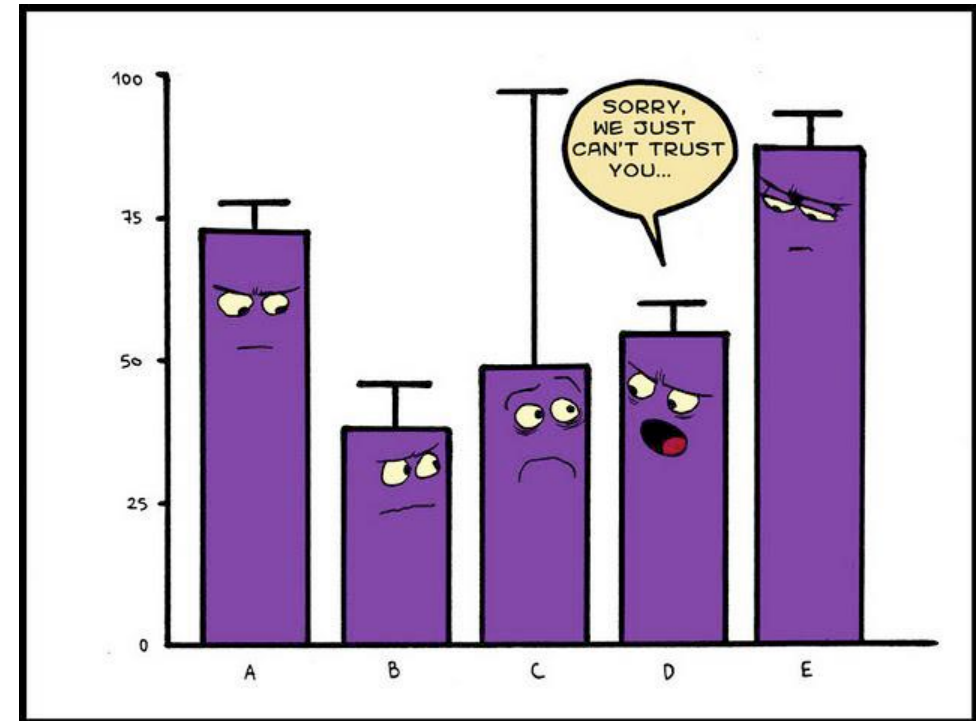


M2D8:

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 Monday, April 29 at 10 pm
- **Notebook (5% and part of 5% Participation score)**
 - Submit M2D2 via Canvas 24 hr after M2D8
- **Blogpost (part of 5% Participation score)**
 - due Tuesday, April 30 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?

How will you evaluate and interpret your data?

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

Error bars

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

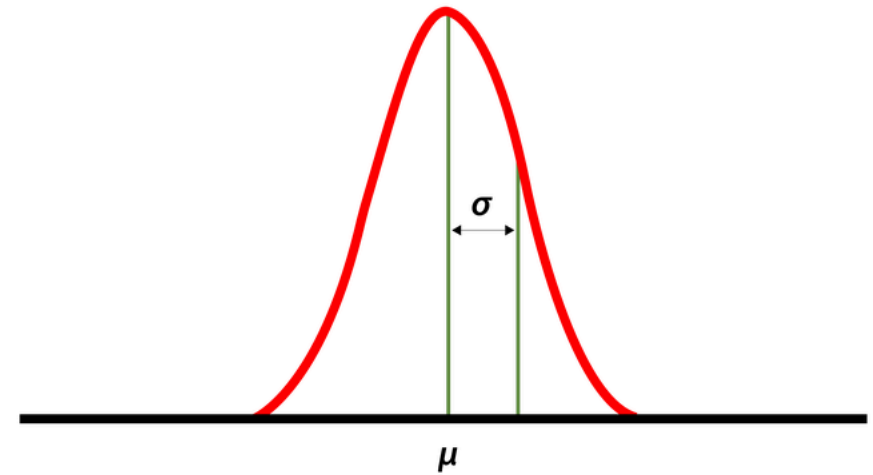
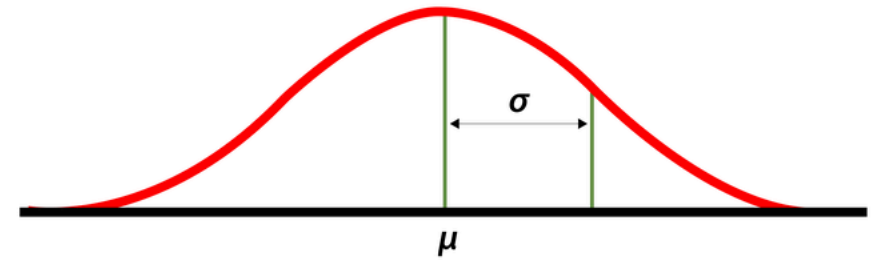
Statistical tests (student's t)

Standard deviation describes the variance in the data

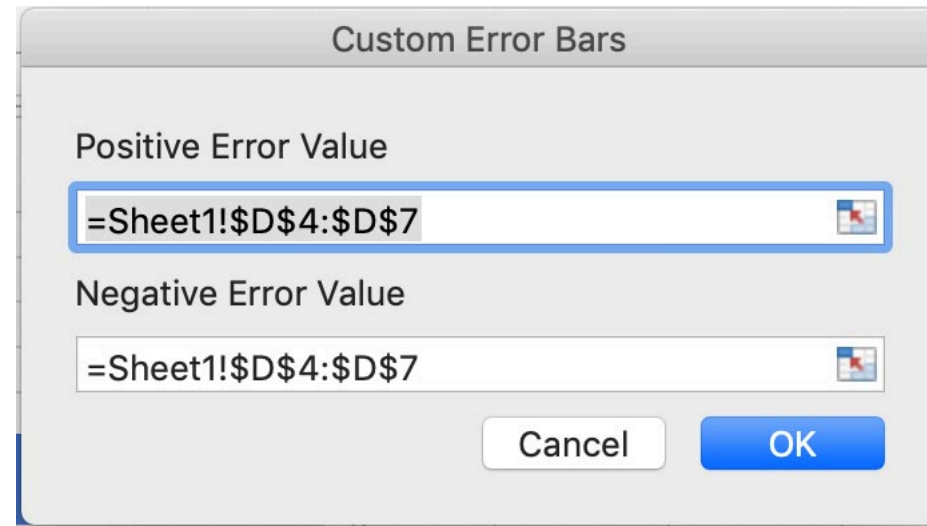
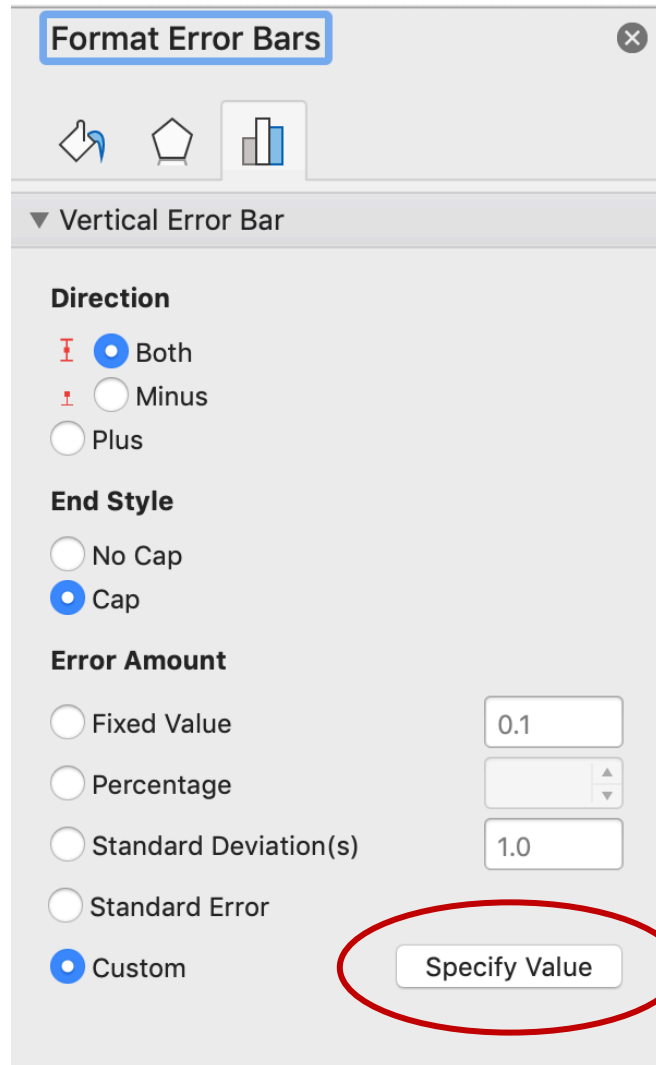
- Equal to the square root of the variance:

$$\sigma = \sqrt{\frac{\sum (x_i - \mu)^2}{N}}$$

- Calculated value used as error bars to represent variance in the population



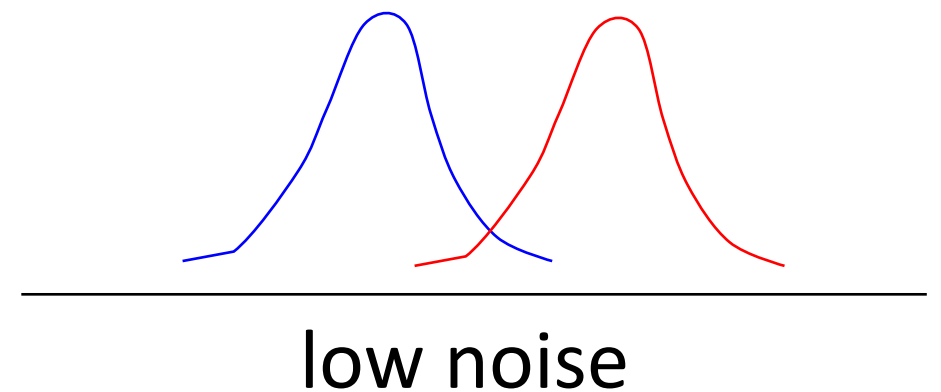
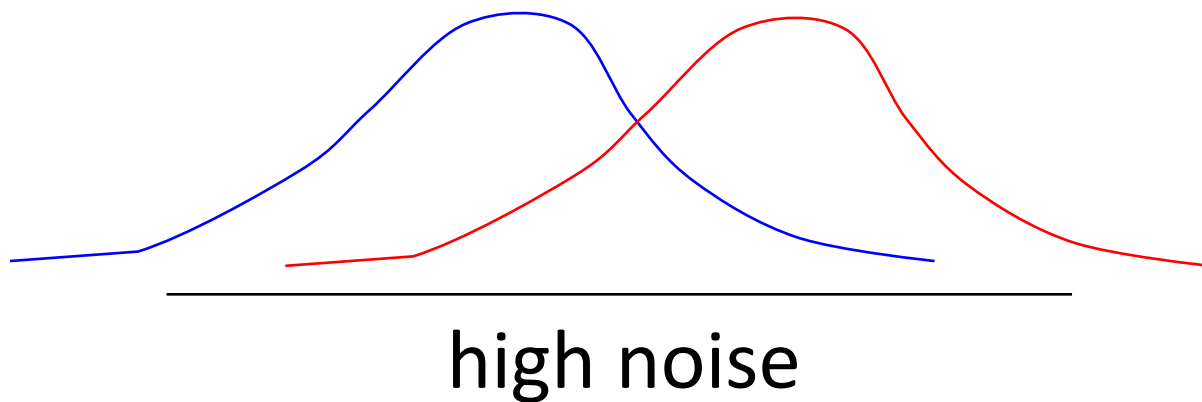
How do you customize error bars in Excel?



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

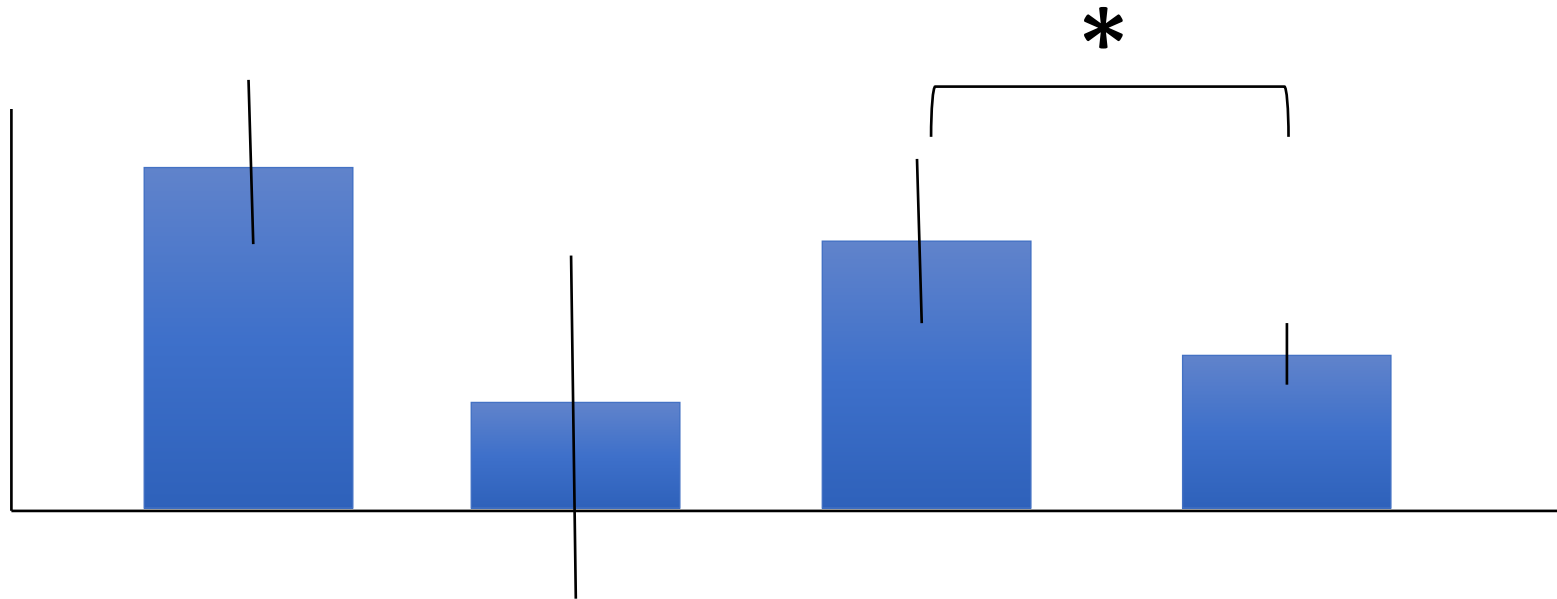


Calculating Student's t in Excel

$P = \text{TTEST}(\text{array1}, \text{array2}, 2, 3)$

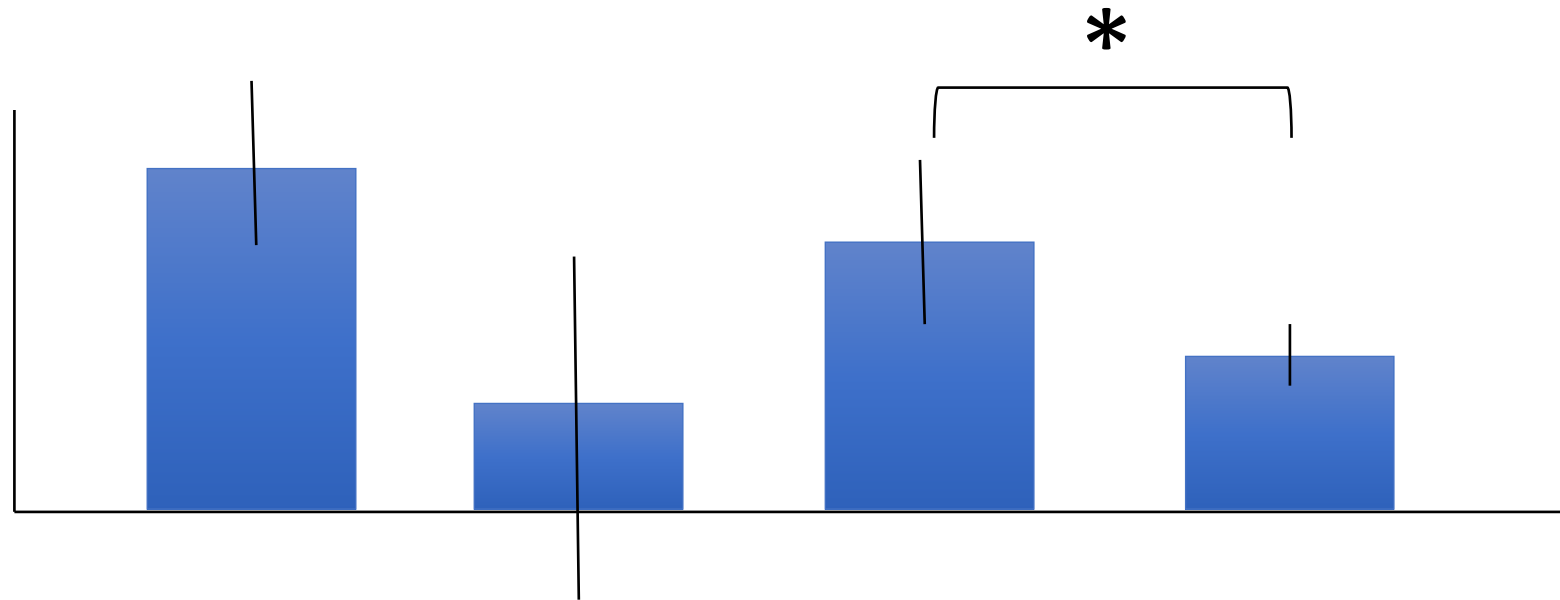
- Arrays:
- 2 = two-tailed test:
- 3 = population variances not assumed:

How will you use statistics in your data analysis?



- Student's t-test can only be used to compare two populations with one experimental difference
- What if data are not significant? Almost significant?

How will you use statistics in your data analysis?



- Student's t-test can only be used to compare two populations with one experimental difference
 - What if data are not significant? Almost significant?
- Do NOT try and oversell your data.
NS = Not significant

How will you report your data?

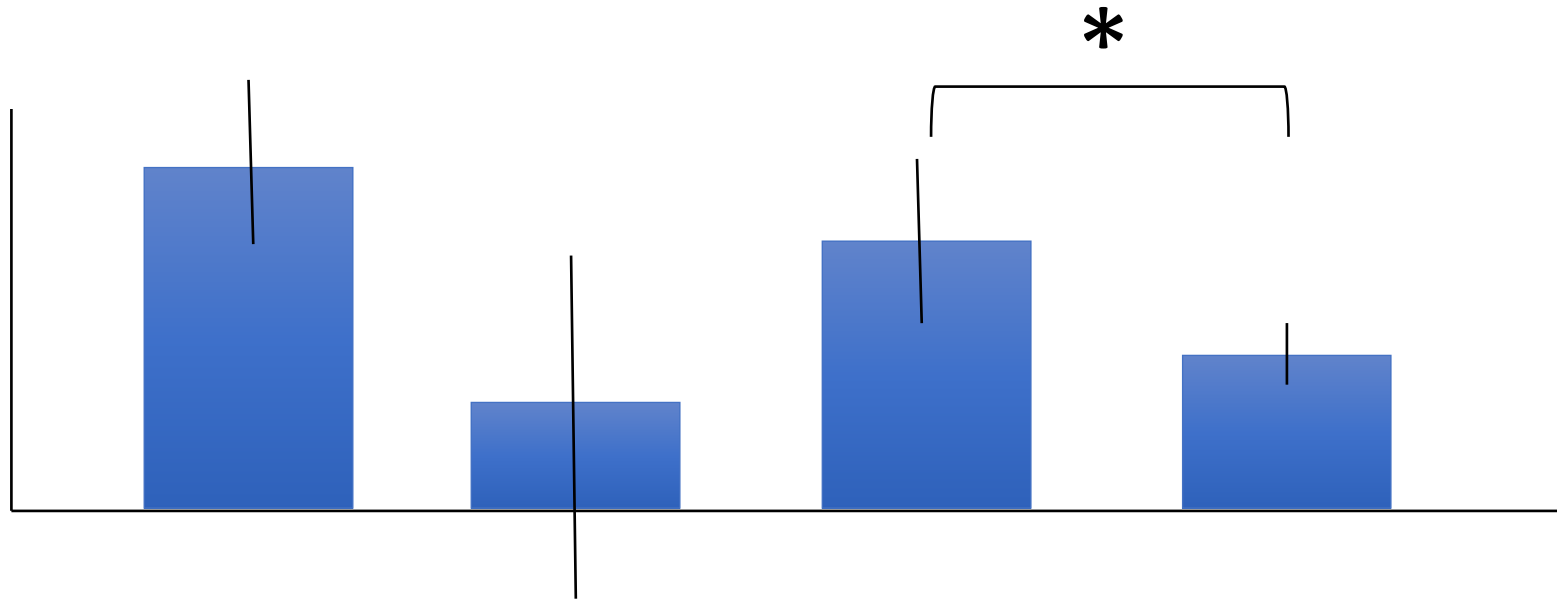


Figure X. Treatment Y Increases Susceptibility to Z

Text describing the figure

The error bars represent _____. (*) represents $p < 0.05$

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