

# Some pointers on statistics for your senior thesis

Senior Seminar  
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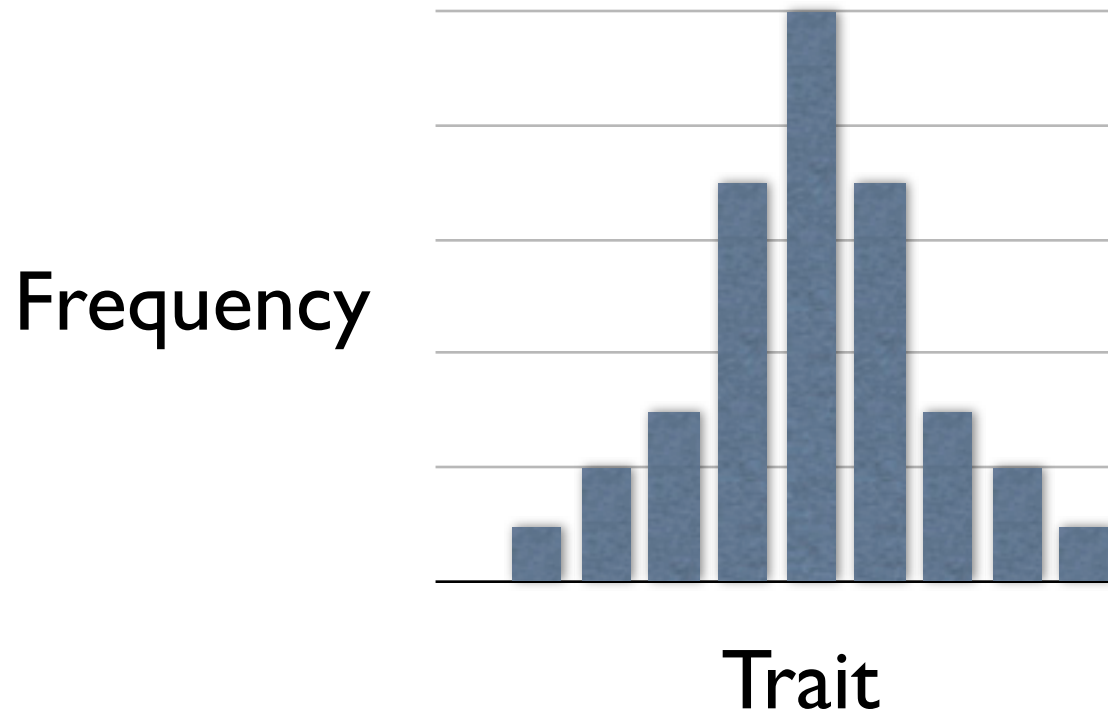
# General Advice

- Look at the methods used in related work (other papers, especially those by your mentor and their colleagues)
- Talk to your mentor (or their lab managers, graduate students, postdocs, techs, etc.)
- Use the statistical consulting service: [consult@stat.columbia.edu](mailto:consult@stat.columbia.edu)
- Read a (portion of a) book!

# Author's Responsibility

- Know what your statistical methods do!
- Be aware of the assumptions and limitations of your statistical tests
- Report all the proper results
- Understand what your results mean

# Variation



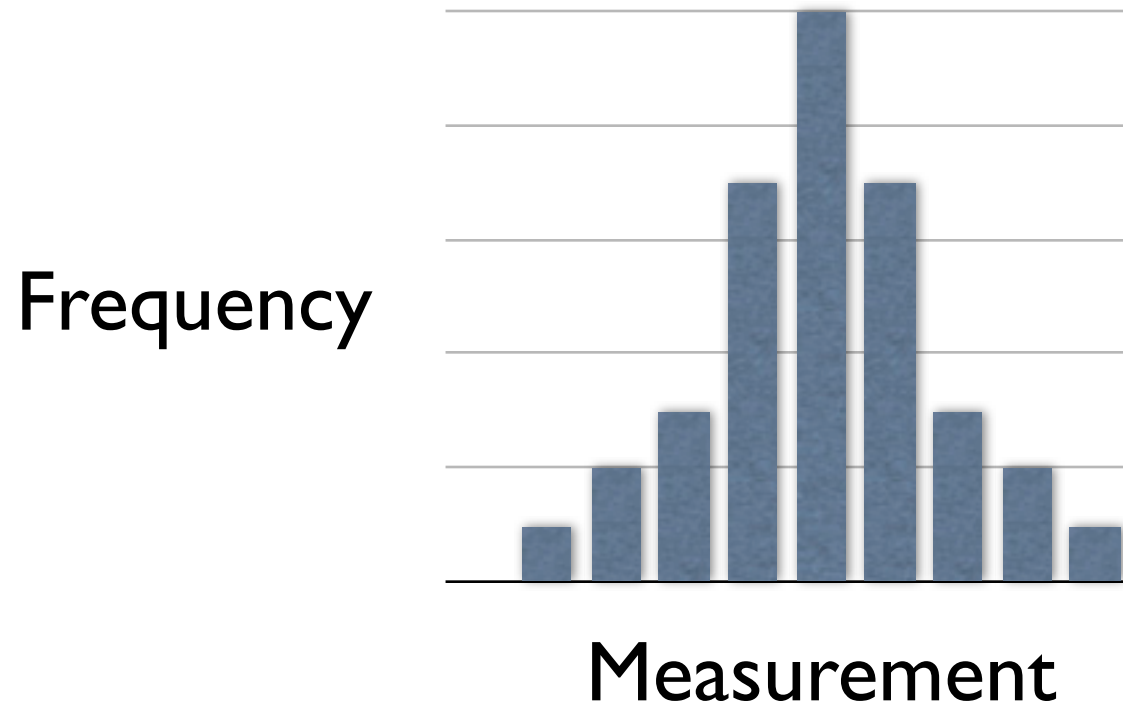
# Reporting variation

- Every measure which summarizes a distribution (e.g., a mean) should include some measure of spread (e.g., a standard deviation)
- A graph without error bars is incomplete and potentially misleading!

# Hypothesis testing

- Comparing two or more hypotheses in light of the data
- Scientists generally make a null hypothesis of no effect - any variation in the data is just random
- We reject the null when the data deviate strongly from random. This lends support to the hypothesis that some phenomenon is responsible for part of the variation

# Normal Distribution



# Probability

$$P = \frac{\text{number of outcomes}}{\text{number of trials}}$$