# Research Design

Lecture 5

# Measurement

what is reliability

# Measurement

True scores of error

# Measurement

Reliability in terms of true scores and error

$$r_{test,test} = \frac{\sigma^2_{True}}{\sigma^2_{Test}} = \frac{\sigma^2_{True}}{\sigma^2_{True} + \sigma^2_{error}}$$

# Measurement

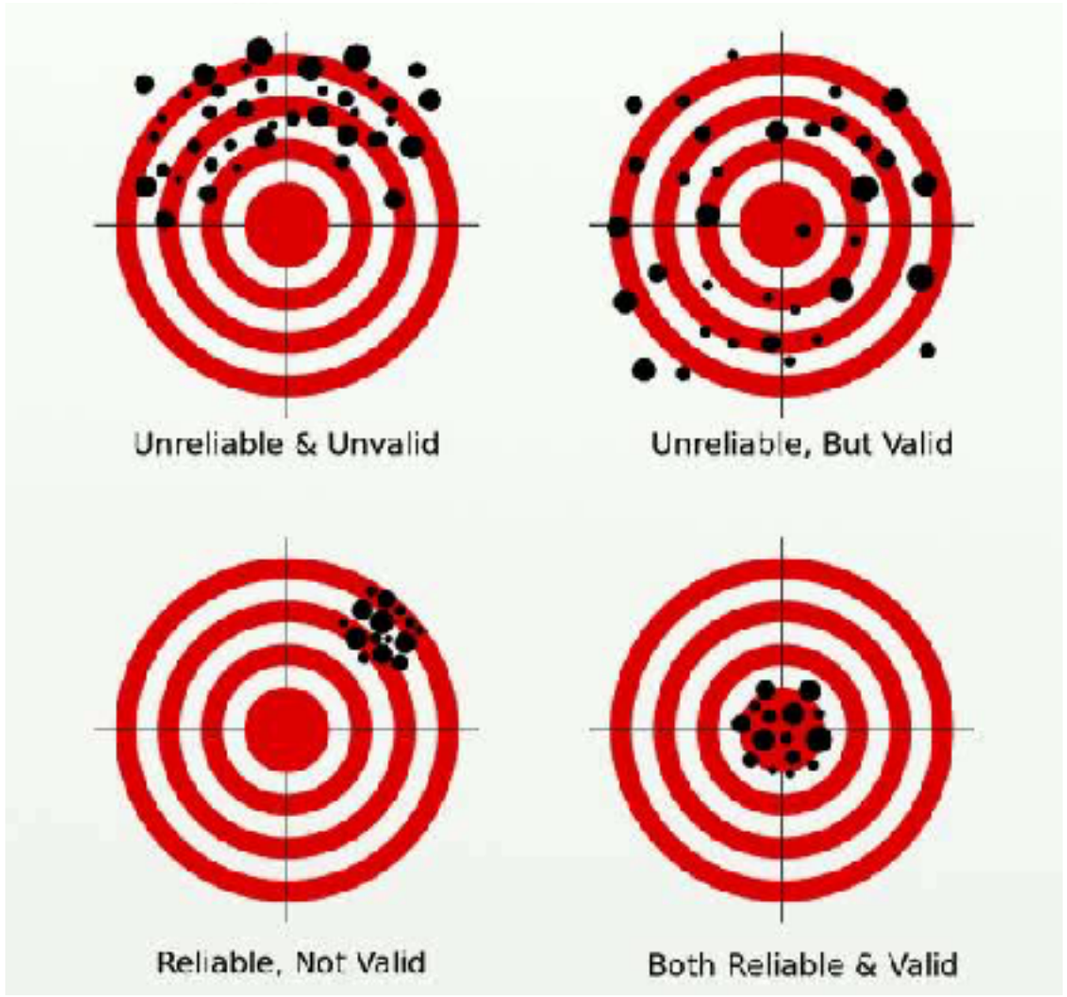
## Assessing error of measurement

$$S_{measurement} = S_{test}\sqrt{1 - r_{test,test}}$$

# Measurement

Increasing reliability

# Validity




Source: **https://en.wikipedia.org/wiki/File:Reliability_and_validity.svg**

# face validity

# Predictive validity

# Construct validity

# Reliability and Predictive Validity

# Basics of data collection

| Student Name | Hair Color | Gender | Major | Height | Computer Experience |
|---|---|---|---|---|---|
| Norma | Brown | Female | Psychology | 5'4" | Lots |
| Amber | Blonde | Female | Social Science | 5'7" | Very little |
| Paul | Blonde | Male | History | 6'1" | Moderate |
| Christopher | Black | Male | Biology | 5'10" | Lots |
| Sonya | Brown | Female | Psychology | 5'4" | Little |

# Sampling Bias

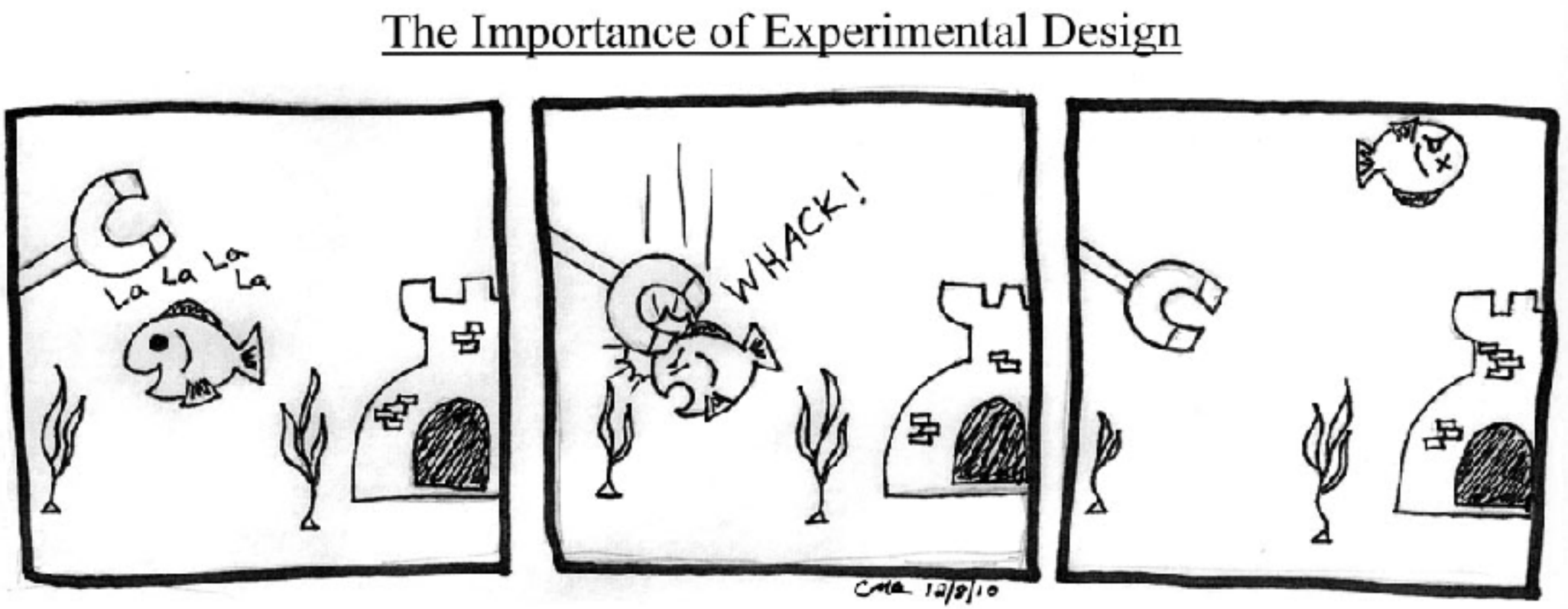
- Self Selection Bias
- Undercoverage Bias
- Survivorship Bias

# Experimental Designs

- Between Subjects Designs
- Multi Factor Between Subject Designs
- Within Subjects Designs
- Complex Designs

# Experimental Designs

- Between Subjects Designs



# Experimental Designs

- Multi Factor Between Subject Designs

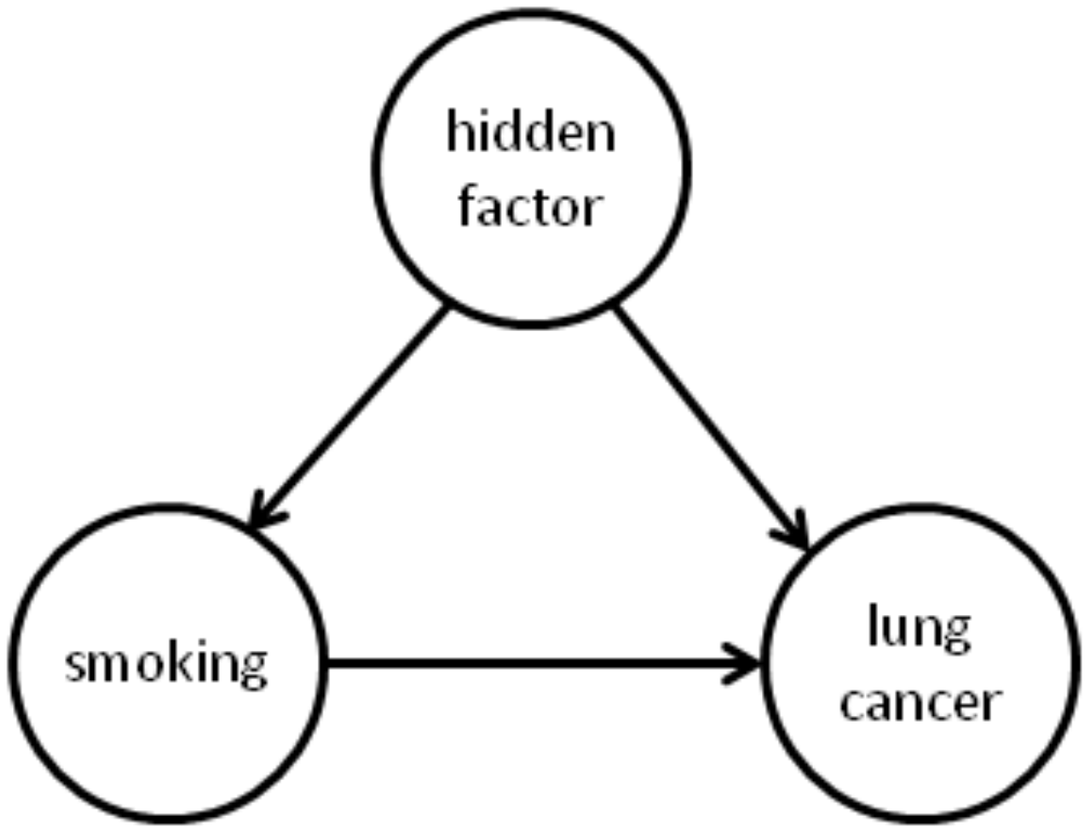
# Experimental Designs

- Within Subjects Designs

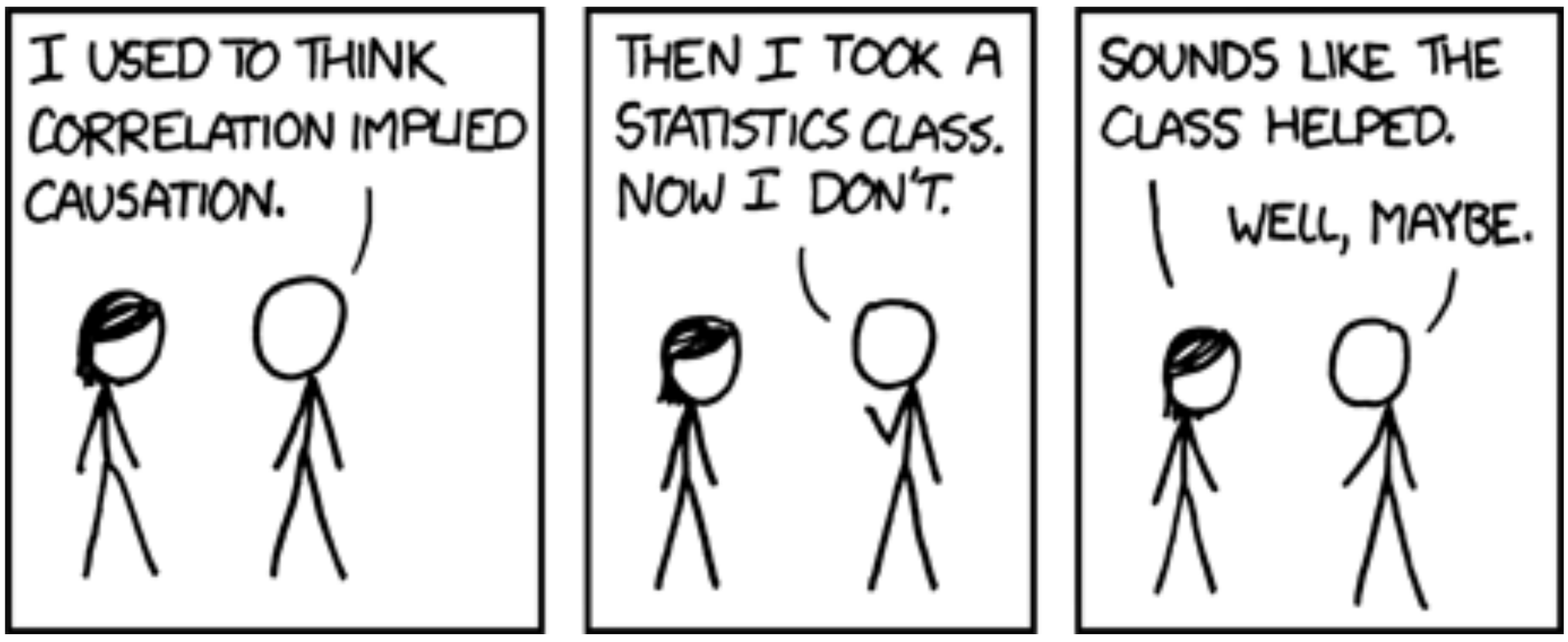
# Experimental Designs

- Complex Designs

# Causation

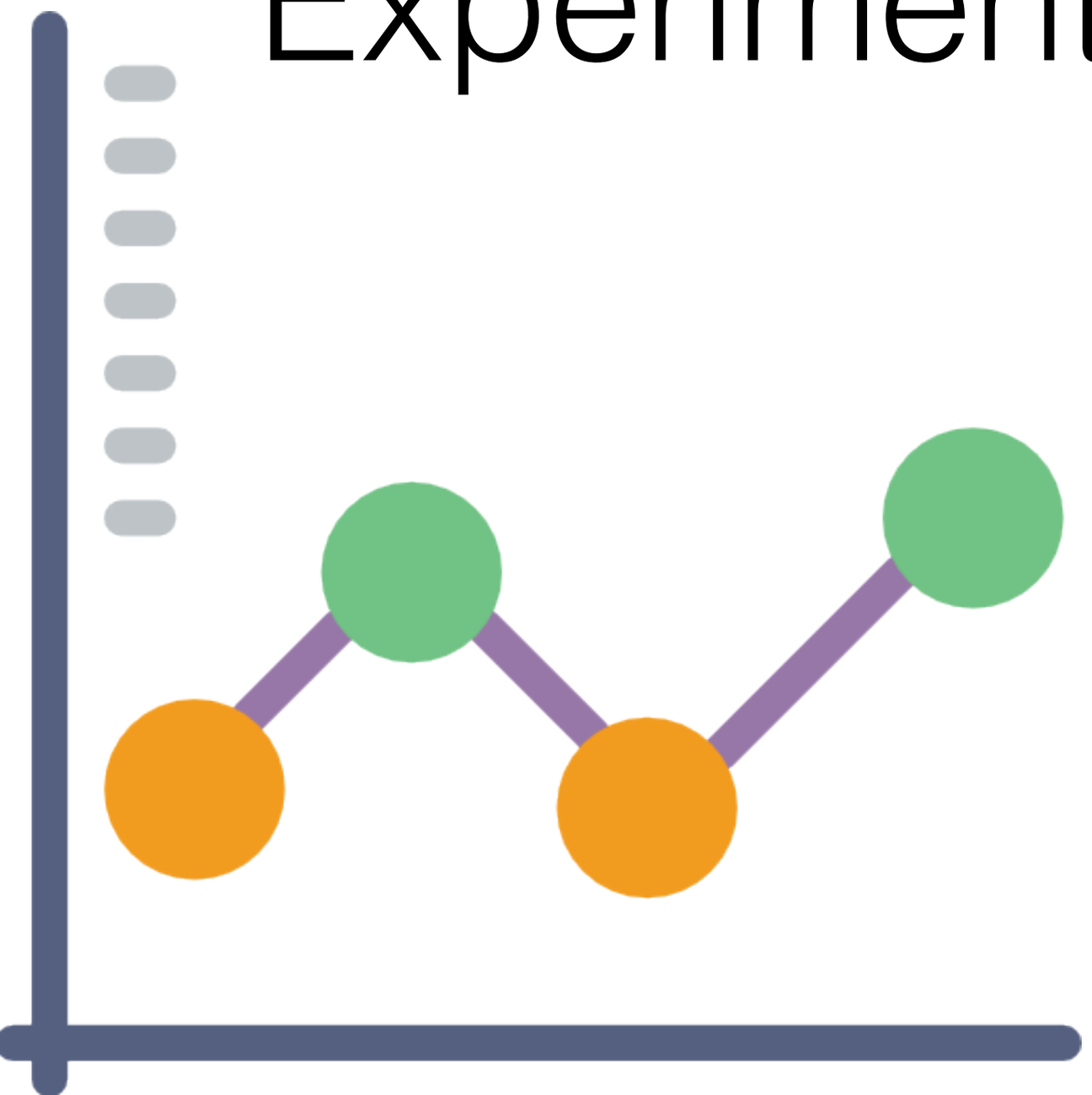


# Establishing Causation in Experiments



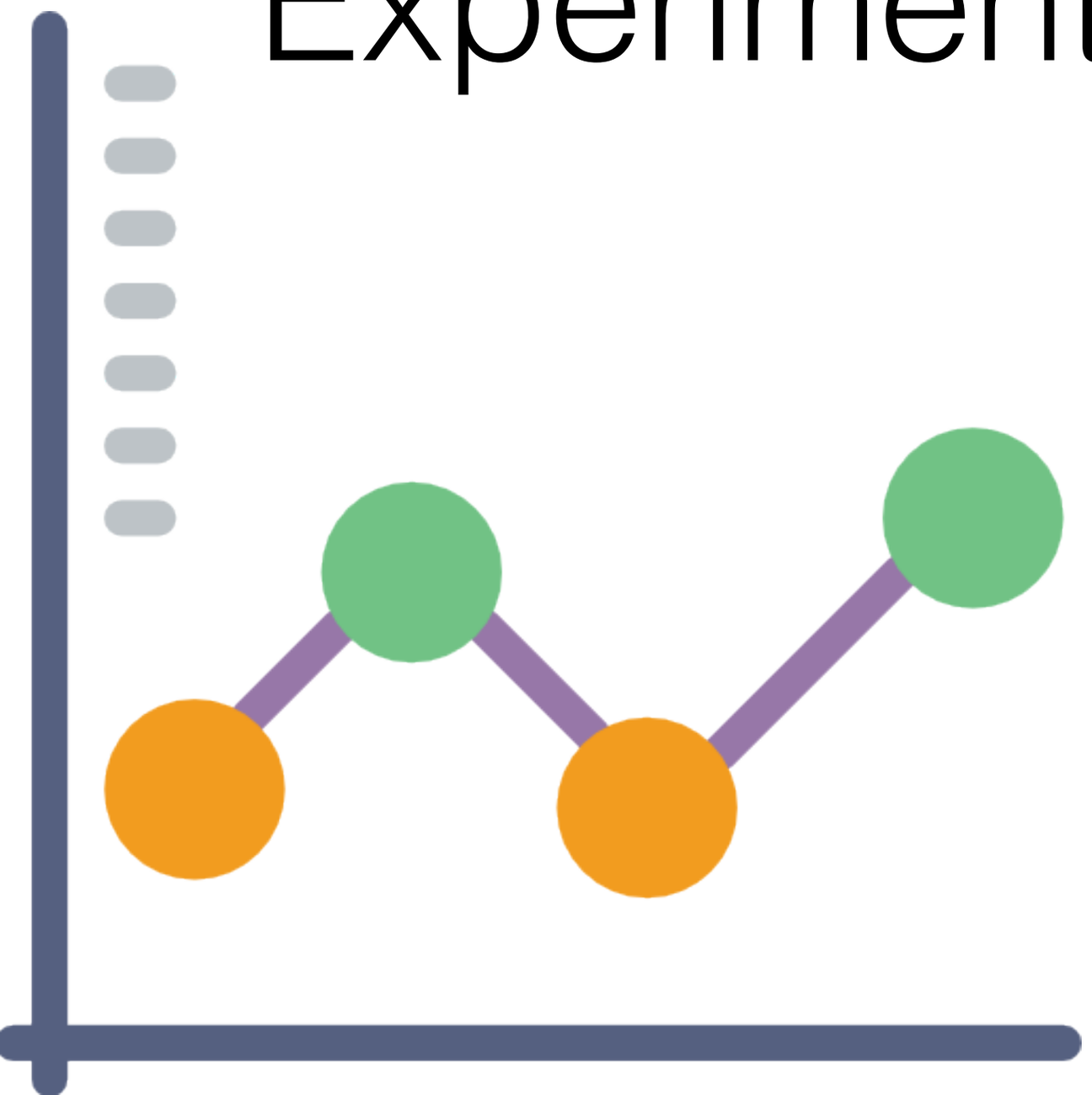
# Establishing Causation in Experiments

# Causation in Non-Experimental Designs



# Causation in Non-Experimental Designs

# Causation in Non-Experimental Designs



# The end