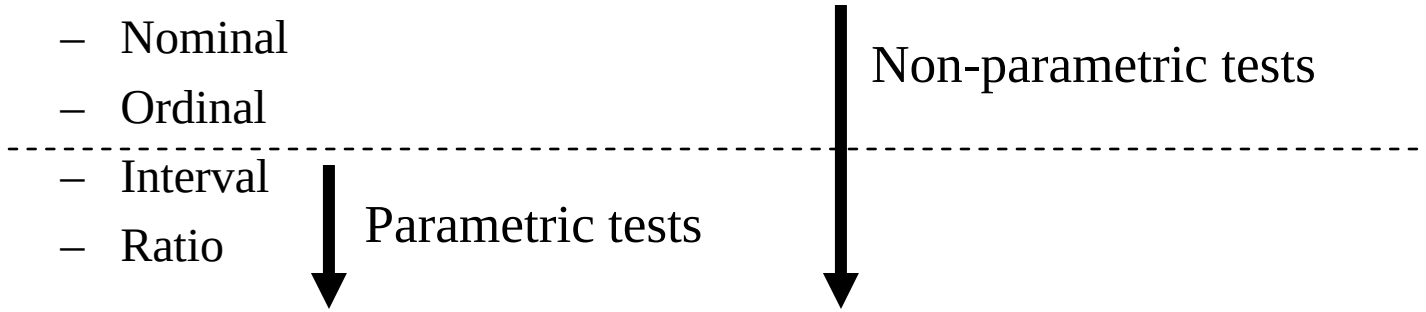
Questions?

- Project

Statistical tests

- Type of scale
  - Nominal
  - Ordinal
  - Interval
  - Ratio



- Variables
  - Might be measured with different scales

Statistical significance

- Statistical significance
  - Comparing to the null hypothesis: “There is no effect”
  - Type I errors are the most disruptive

Researcher’s Decision	Actual Situation: Null Hypothesis is True	Actual Situation: Null Hypothesis is False
Fail to reject the null hypothesis	Correct decision	**Type II error**
Reject the null hypothesis	**Type I error**	Correct decision

- Design significance?
  - 3.00s versus 3.05s?

Simple χ^2 test

- Setting
  - N different groups, with some expected frequency distribution
  - For each group you gathered observed frequencies

- Null hypothesis
  - The observed frequencies matched the expected frequency distribution

χ^2 test Formula

$$\chi^2 = \sum \frac{(f_o - f_e)^2}{f_e}$$

- Assumptions
  - Mutually exclusive and exhaustive categories
  - Independence of observations
  - Be careful about the size of each expected frequencies

- Two-variable contingency tables

$$f_e = \frac{(\text{row sum})(\text{column sum})}{\text{N}}$$

χ^2 test examples

Mann-Whitney test

- Setting
  - 2 different groups (mouse and pen), n_A and n_B with N = n_A + n_B,
  - All members are ordered from 1 to N

- Null hypothesis
  - The two distribution are identical

Mann-Whitney test formula

$$\sum R_A$$

- Assumptions
  - Independence of observations
  - Independent variable is continuous
    - *See book on how to deal with ties*

- For large samples use the normal approximation

$$z = \frac{\sum R_A - .5(n_A)(N+1)}{\sqrt{\frac{n_A n_B (N+1)}{12}}}$$

Mann-Whitney test example