Where we are

- ## Informatics
  - management, manipulation, integration
  - emphasis on scale, some emphasis on tools

- ## Analytics
  - statistical estimation and prediction

- ## Visualization
  - communication and presentation

Background: Statistical Inference

- Methods for drawing conclusions about a population from sample data

- Two key methods
  - Hypothesis tests (significance tests)
  - Confidence intervals

Hypothesis Testing

- Compare an experimental group and a control group
- H_0: Null Hypothesis
  - No difference between the groups
- H_A: Alternative Hypothesis
  - Statistically significant difference between the groups
- "difference" defined in terms of some **test statistic**
  - Different means (e.g., t-test), different variances (e.g., F-test)
- Groups defined through careful experimental design
  - randomized, blinded, double-blinded
- Examples:
  - "The new ad placement produces more click-throughs"
  - "This treatment produces better outcomes"

Background: Hypothesis Testing

	Do not reject H0	Reject H0
H0 is true	*Correct Decision* $1 - \alpha$	*Type 1 error* α
H0 is false	*Type 2 error* β	*Correct Decision* $1 - \beta$

The ***power*** of the test