Statistical Significance Testing

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Key Terms

- Population
- _____
- Descriptive statistics
- _____statistics
- _____

Chance (or Probability) and Error

- _____
  - Probability of statistical event occurring due simply to _____ _____in characteristics of samples of given sizes selected randomly from population
- _____
  - AKA random _____ error
  - Differences between sample characteristics and characteristics of larger population
  - Caused merely by random fluctuations, or _____, involved in process of selecting random samples from population
  - When we randomly select two samples of same size from same population likely to find differences between these two samples

Walkup's First Laws of Statistics

- Law No. 1
  - Everything _____ with everything, especially when the same individual defines the variables to be correlated
- Law No. 2
  - It won't help very much to find a strong correlation between two variables that you don't understand well
- Law No. 3
  - Unless you can think of a logical reason why two variables should be connected as cause and effect, it doesn't help much to find a correlation between them.
  - For example, in Columbus, Ohio the mean _____ correlates very nicely with the _____in the names of the months!

4

Hypotheses

- Unproven proposition that tentatively explains certain facts or phenomena
- _____ hypothesis
  - Statement about status quo
  - Indicates that no difference exists
  - Goal: _____ the null
- _____ hypothesis
  - Indicates that _____ difference exists

5

Null vs. Alternative Hypotheses

- _____hypothesis that the mean is equal to 0

$$H_0 : \mu = 0$$

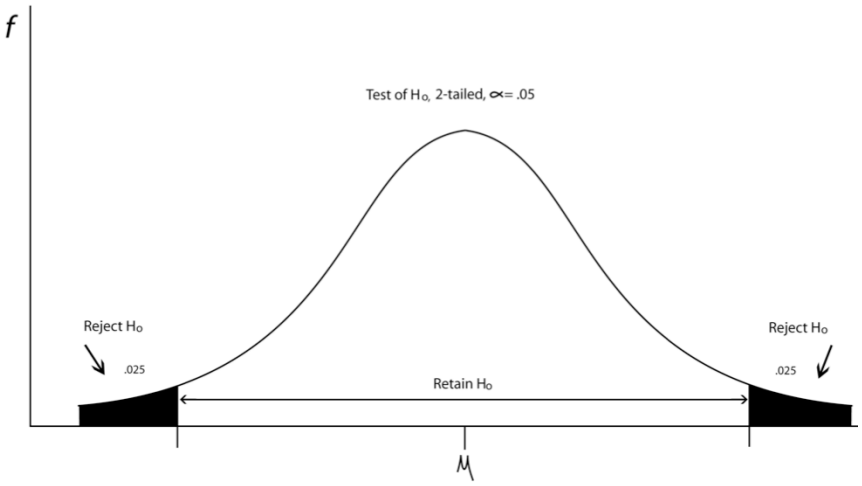
- Alternative hypothesis that the mean does _____to 0 (i.e. _____-tailed test)

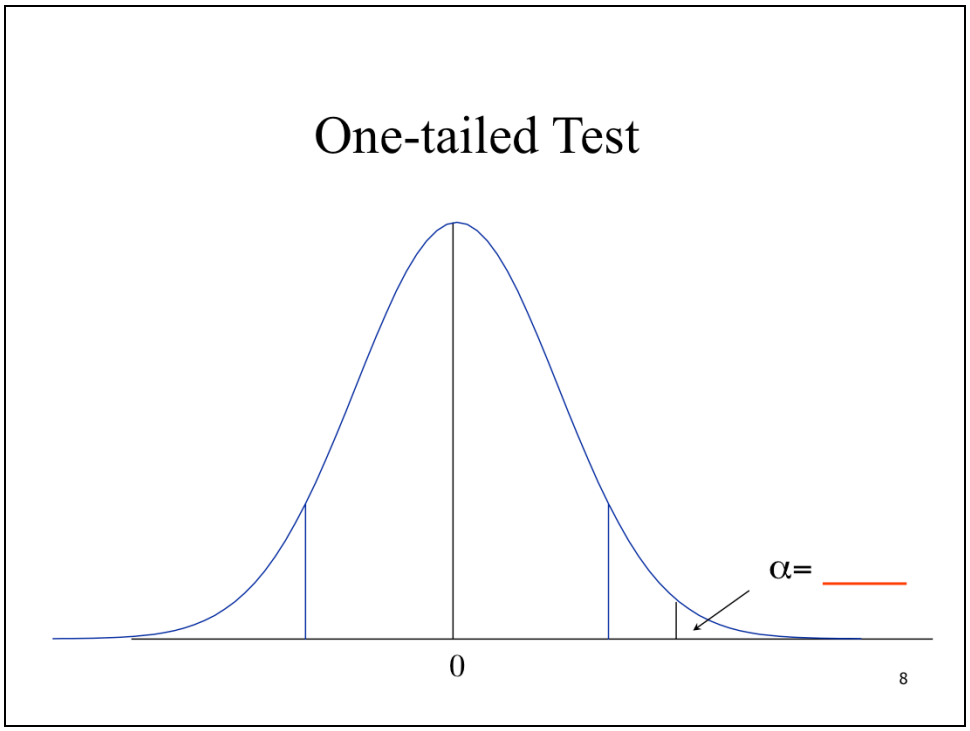
$$H_1 : \mu \neq 0$$

- Alternative hypothesis that mean is _____than 0.0: (_____-tailed test)

$$H_1 : \mu > 0$$

Two-Tailed Test




One-tailed Test
α=
0
8

Type I and Type II Errors

	Accept null	Reject null
Null is true	Correct- no error	α = _____ error
Null is false	β = _____ error	Correct- no error

9

Statistical Significance

- Critical probability in choosing between the null hypothesis and the alternative hypothesis
- _____ Level (95% confident)
- _____ (risk of Type I error)
  - typically p < _____
  - Indicates probability that 95% of other samples randomly drawn from same population would not support null hypothesis

10

Statistical Significance (cont'd)

- Statistical significance
  - _____ (*p* or *p*-value) that this result that arises in this sample is from chance alone and does not truly represent population
  - In other words, effect observed in sample data is not due to random _____or chance
- To determine statistical significance:
  - We must compare size of effect to our measure of random sampling error, which is usually a measure of _____

Statistical Significance (cont'd)

- Problem
  - Because measures of statistical significance rely on standard error, and
  - Standard error is greatly influenced by _____
  - Large sample sizes often produce statistically significant results, even for small effects
- Example
  - Comparing sample mean of 105 to population mean of 100
  - With standard deviation of 15
  - For sample of n = 25, t = 1.67, _____
  - For sample of n = 1600, t = 13.33, p _____

Effect Size & Practical Significance

- Provides measure of statistical effect while minimizing role of sample size
- Calculated by essentially removing sample size from standard error
- Causes effect to be expressed in standard deviation units rather than standard error units
- Effect sizes provide a measure of _____ significance, using following guidelines:
  - *d* is measure size of difference between two groups
  - $d < .25$ is small
  - $.25 \leq d < .75$ is moderate
  - $d \geq .75$ is _____

That's all folks!

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