



Intro to Stats

Significance Testing

“Significant”

- Suggests that the difference or relationship is systematic and not due to chance
- A significance level gives the risk that the effect is due to chance
- At $p < .05$, there is about a 5% (5/100) chance that an effect just happened in a normal distribution and is not related to any other variable

Never Sure

- ▶ Researchers can never be sure that their hypothesis is “true”
 - Sample may not perfectly reflect the population
 - Other influences (confounds) may cause the results
 - It just might be one of those few chances
- ▶ These concerns are lessened every time that a finding is replicated

Can lead to errors

- ▶ The null is rejected, but there really is no effect (Type I error)
- ▶ Or the null is accepted, but there really is an effect (Type II error)

Never Sure 2

- ▶ Never know the truth about the null hypothesis
- ▶ The likelihood of a Type I error is defined by the level of significance
 - $p < .05$ means there is a 5% chance of rejecting the null when the null is true (conclude there is a difference when there is none)
- ▶ Type II error is related to power and sample size

Significance vs. Meaning

- ▶ Studies may show significant differences but the differences may not be meaningful
 - Small differences in large samples
 - Small differences that come with a large cost
- ▶ Studies may not show significance but the differences may be meaningful
 - Small differences in small samples
 - Small differences that come with a big benefit and little cost

Inferential Statistics

- ▶ Inferences made about the population based on a sample
- ▶ Which test determined by
 - Continuous vs. categorical variables
 - Number of variables
 - Whether variables vary between subjects or within subjects

Setting the Stage

- ▶ 1. State the null hypothesis
- ▶ 2. Set the level of risk (usually .05)
- ▶ 3. Select the appropriate test statistic
- ▶ 4. Compute the test statistic
- ▶ 5. Determine the critical value for rejection of the null
- ▶ 6. Determine whether the statistic exceeds the critical value (usually at $p < .05$)
- ▶ 7. If over the critical value, the null hypothesis is unlikely THEREFORE effect must be due to other variable
- ▶ If not over the critical value, the null is accepted