POLITICAL SCIENCE 205

INTRODUCTION TO RESEARCH METHODOLOGY

Agenda

I. Hypothesis testing
II. T-Tests for Independent Samples
III. What's significant?
IV. Starting the activity

T-Tests
Wednesday, October 25

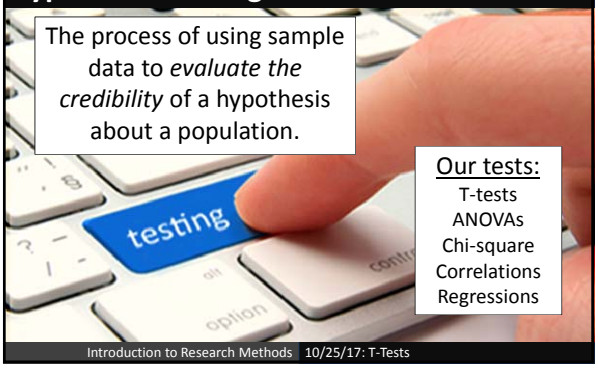
Week 4, Day 1

Lecture Question

How do we use SPSS to start evaluating hypotheses?

Hypothesis Testing

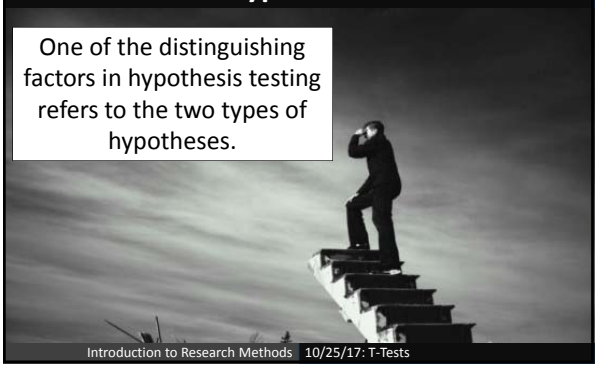
The process of using sample data to *evaluate the credibility* of a hypothesis about a population.



Our tests:
T-tests
ANOVAs
Chi-square
Correlations
Regressions

How do we test hypotheses?

One of the distinguishing factors in hypothesis testing refers to the two types of hypotheses.



Review: Types of hypotheses

Directional hypotheses:	Reflects a difference between groups, but a direction is specified.
Non-directional hypotheses:	Reflects a difference between groups, but no direction is specified.
Null hypotheses:	A statement that there is no relationship between concepts.

Review: Types of hypotheses

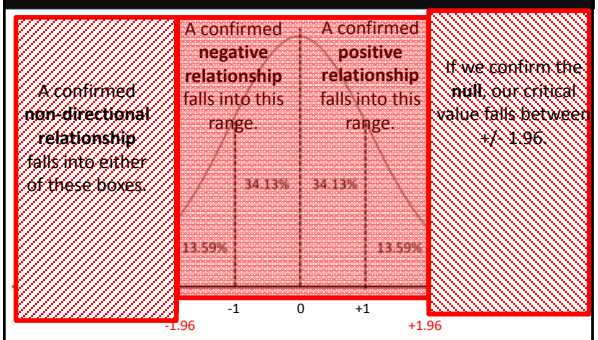
As the GDP of a country increases, the life expectancy of that population also increases.	**Directional**
There is no difference between poor and rich people in their levels of political participation.	**Null**
There is a difference between males and females regarding their opinions about abortion.	**Non-directional**
There is a difference between Trump voters and Clinton voters regarding their levels of political knowledge.	**Non-directional**

Critical Values

A **critical value** is given for every statistical test we conduct.

It is based on the normal curve, giving us a value that allows us to either accept or reject the null hypothesis.

One-tail vs. Two-Tails



T-Tests

A **t-test** is an examination of *two means* from two sets of numbers.

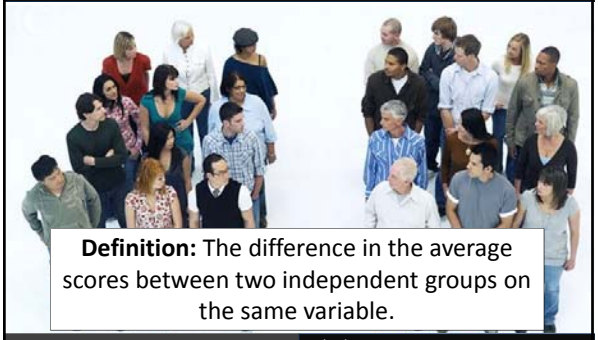
Two types:

1) Independent samples
2) Dependent samples

Always used for non-directional hypotheses

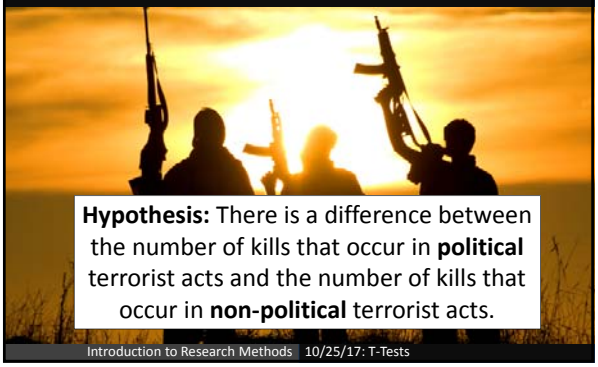
A **t-test** yields a critical value that allows you to accept or reject your null hypothesis.

T-Tests for Independent Samples



Definition: The difference in the average scores between two independent groups on the same variable.

Terrorist Attacks



Hypothesis: There is a difference between the number of kills that occur in **political** terrorist acts and the number of kills that occur in **non-political** terrorist acts.

Assumptions for this T-Test

1. Your independent variable will only have TWO categories

2. Your dependent variable *has* to be interval-ratio

Terrorism Causalities

Political Acts			Non-Political Acts		
15	12	11	11	9	10
10	7	9	4	5	7
11	19	8	2	3	4
9	11	8	9	7	8
14	13	7	11	12	9
14	8	7	10	10	12

$\overline{X_1} = 10.72; s_1^2 = 10.31; n_1 = 18 \quad \overline{X_2} = 7.94; s_2^2 = 9.39; n_2 = 18$

T-Test Equation

$$t = \frac{\overline{X_1} - \overline{X_2}}{\sqrt{\left(\frac{(n_1-1)s_1^2 + (n_2-1)s_2^2}{n_1+n_2-2}\right)\left(\frac{n_1+n_2}{n_1 n_2}\right)}}$$

Political Acts | **Non-Political Acts**

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T-Test Equation

$$t = \frac{10.72 - 7.94}{\sqrt{\left(\frac{(18-1)10.31 + (18-1)9.39}{18+18-2}\right)\left(\frac{18+18}{18\times 18}\right)}}$$

Political Acts | **Non-Political Acts**

$\overline{X_1} = 10.72; s_1^2 = 10.31; n_1 = 18 \quad \overline{X_2} = 7.94; s_2^2 = 9.39; n_2 = 18$

T-Test Equation

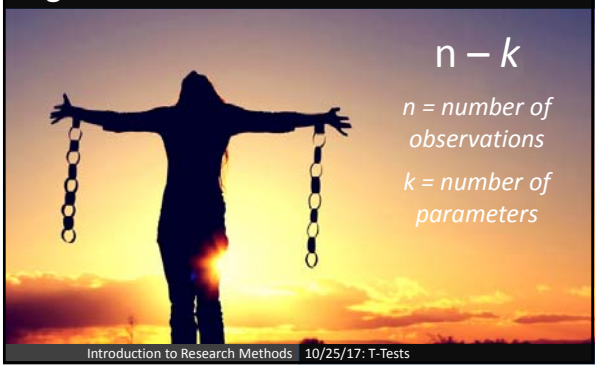
$$t = -2.581$$

How do we interpret this t-test statistic?

Political Acts | **Non-Political Acts**

$\overline{X_1} = 10.72; s_1^2 = 10.31; n_1 = 18 \quad \overline{X_2} = 7.94; s_2^2 = 9.39; n_2 = 18$

Degrees of Freedom



Interpreting the T-Test

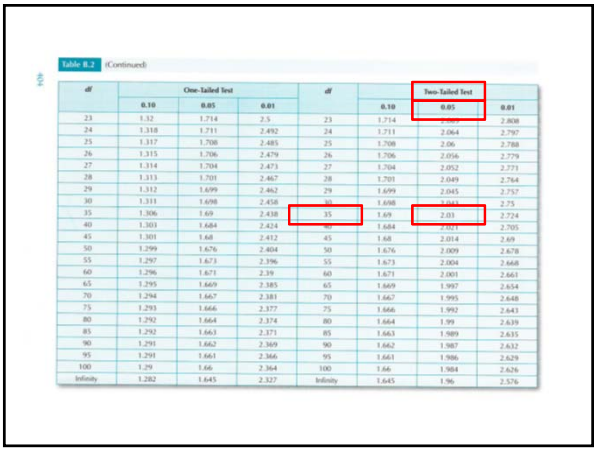
$t = -2.581$

Use the appendix on page 403 to find the critical value needed to reject the null hypothesis

Hypothesis: There is a difference between the number of kills that occur in **political** terrorist acts and the number of kills that occur in **non-political** terrorist acts.

We need to calculate the degrees of freedom:

$$df = (n_1 - 1) + (n_2 - 1)$$
$$df = (18 - 1) + (18 - 1)$$
$$df = 34$$



Interpreting the T-Test

$t = -2.581$

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Hypothesis: There is a difference between the number of kills that occur in **political** terrorist acts and the number of kills that occur in **non-political** terrorist acts.

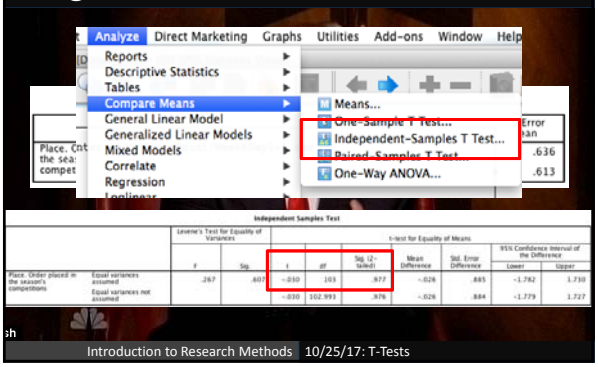
We need to calculate the degrees of freedom:

$$df = (n_1 - 1) + (n_2 - 1)$$
$$df = (18 - 1) + (18 - 1)$$
$$df = 34$$

t = -2.03

This is our value needed to reject the null hypothesis

Using SPSS to Calculate the T-Test



Significance Values

Significance values (or ***p-values***) tells us if our hypothesized relationship is due to random chance.

Three rules:

1) 0 < Significance Values < 1

2) Relationships exist only if your significance value is under .05.

3) If your significance value is above .05, then the relationship does not exist.

Significance Values Examples

Significance value: .033

This relationship is **significant** as it is under .05.

There is a 3.3% probability this relationship is due to chance. We confirm the hypothesis.

Significance value: .510

This relationship is **not significant** as it is over .05.

There is a 51.0% probability this relationship is due to chance. We confirm the null hypothesis.

Significance value: .000

This relationship is **significant** as it is under .05.

There is a 0.0% probability this relationship is due to chance. We confirm the hypothesis.

Activity

Hypothesis: There is a difference between males and females in our class on their thermometer score for Hillary Clinton.

Activity 3, Part C