PSYC 60 – Statistics
Spring 2012
Notes #8

2-samples, Independent

Book: Chapter 14 - t Test For Two Independent Samples

Weighted average

A student is interested in estimating the average grade in a class. She samples 4 students after class on monday and another 2 students on tuesday. Assume there's no reason students from monday are different than tuesday. How does she combine these two pieces of information in a weighted average?

Monday	Tuesday
Sample	Sample
90	70
85	80
95	
90	
sum=360	sum=150
mean=90	mean=75

Formula:

Principle: (do / do not) take the average of the averages
get the _____ for each sample average and _____ them
get the _____ for each sample average and _____ them
_____ to calculate a new, weighted average

Pooled variance (the "weighted average" for variance)

Using the class grade data above, the student now wishes to estimate grade variance. How does she combine these two pieces of information in a *pooled variance*

Monday	Tuesday
Sample	Sample
SS=50	SS=50
var=16.7	var=50

Pooled variance - an estimate of a population variance based on 2 or more samples, weighted by each sample's size

Formula:

2-samples, Independent

Book: Chapter 14 - t Test For Two Independent Samples
Exclude 14.8 - Point estimates and confidence intervals

Example: A drug company is trying to determine if their candidate drug decreases blood pressure in gold fish. They administer the drug to 3 gold fish for a year and give a placebo to 4 different gold fish for a year. Does the drug affect blood pressure? (This example is a 2-tailed test, but 2-sample independent tests can be either 1 or 2 tailed)

Drug	Placebo			
80	90	Drug:	mean = 84	SS = 26
85	94	Placebo:	mean = 91	SS = 30
87	87			
	93			

Characteristics

What does it mean that two samples for different conditions (e.g. DRUG versus PLACEBO) could come from the same population?

if the effect of the drug is _____
then, the DRUG & PLACEBO population have the same _____ & _____

the experimenter believes she is sampling from different populations, but any sample differences are due to

_____

Degrees of freedom

For a 2-sample independent t-test, degrees of freedom (df) = _____

Review: for 2-sample dependent t-test, df = _____

(Optional explanation, will not be tested: One degree of freedom is lost for each calculation of a sum of square (SS) value. Because you calculate SS twice, once for each sample, you lose 2 degrees of freedom.)

Standard Error of the difference between means

Case A: Assume $\mu = 20$. $\sigma_M = 3$. What is the range of typical sample means you would expect?

Case B: Assume $\mu = 20$. $\sigma_M = 3$. Each time you draw a sample, you calculate the sample mean and then find how far that sample mean is from a value of 30. What is the range of typical sample mean differences you would expect?

Case C: Assume $\mu_1 = 20$. $\sigma_M = 3$. As in case B, you find a sample mean. However, you then draw a 2nd sample from a population with $\mu_2 = 30$ and $\sigma_M = 3$. What is the range of typical sample mean differences you would expect?

Formula:

- subscript reflects diff. between samples
- use of pooled variance
- each sample adds to the variance based on how big the sample size is

SE of the sample mean - NOTES #4
how much sample means deviate from the mean of the population

SE of the sample mean difference - NOTES #7
how much sample mean differences deviates from the mean of pop. differences

SE of the difference between sample means - NEW
how much the difference between two sample means deviates from the difference between two population means

Distribution of differences in sample means (like a DSM)

Youtube: http://www.youtube.com/watch?v=zzeSjTQg20U
(Prof. Parris. 18:53 - 21:40)

Just as the DSM is built by repeatedly finding sample means, a distribution can be built by repeatedly finding the difference between samples means from two populations

1. Define two populations, A and B
2. Draw a sample from each population and calculate the sample mean of each
3. Subtract to find the difference in sample means
4. Record that value in the distribution of differences in sample means
5. Repeat many times

The standard deviation of this distribution is
the SE of the difference between sample means

Hypothesis test

All steps of the hypothesis test are the same as 1-sample t-test except for the test statistic

1. State the hypotheses
2. State the alpha value
3. Determine t* (remember df = _____)
4. Calculate test statistic

5. Make a decision. Examples:
   - the difference in sample means between drug and placebo is significant
   - the mean for drug is significantly lower than the mean for placebo
   - the effect of drug is significant

Optional shortcut for SE of the difference in sample means: equal n

If _____, it is not necessary to calculate _____ to find _____

If you forget to use this shortcut, you will still arrive at the correct value for _____

Formula: