Interpreting t-test output

Total depression score by gender

Independent Samples Test

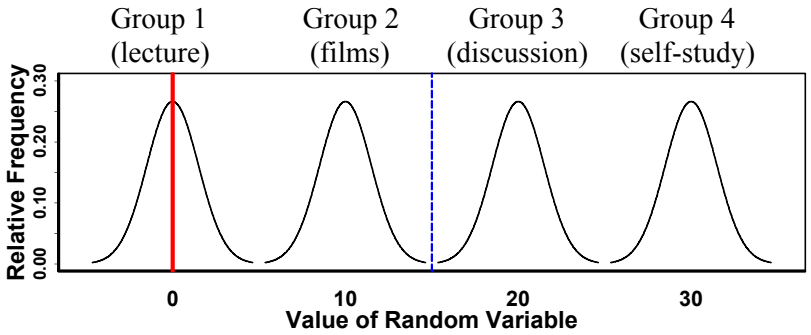
		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Total Depression Score	Equal variances assumed	1.8	.18	-.187	53	.853	-.3730	1.997	-4.379	3.633
	Equal variances not assumed			**-.187**	**51.84**	**.852**	-.3730	1.991	**-4.368**	**3.622**

One-way Analysis of Variance (ANOVA)

Hypothetical Example (from Albert Bartz, *Basic Statistical Concepts in Education and the Behavioral Sciences*, 1976, Burgess Publishing Company)

Want to determine which of four methods of teaching introductory psychology produces the best results: lecture, films and video tapes, discussion groups, or self-study

- 200 college students are available
- Randomly assign 50 to each group
- All 200 students are given a final exam covering basic psychological principles at the end of the semester



- Assume that 50 scores per group are normally distributed
- No overlap between any groups

Sources of Variation

Self-study group had highest scores and the lecture group had the lowest scores

Three kinds of variability shown:

1. variability in the distribution of all 200 scores; exemplified by $X_1 - \bar{X}_T$; contribution to *total* variability of a single score 199 more of these that contribute to *total* variability
2. $X_1 - \bar{X}_T$ can be broken down into two separate components:
   - Deviation of a given score from its group mean: $X_1 - \bar{X}_1$ (variability ***within*** groups)
   - Deviation of the group mean from the total mean: $\bar{X}_1 - \bar{X}_T$ (variability ***between*** groups)

These two pieces are additive both graphically and algebraically:

$$\left(X_1 - \bar{X}_1\right) + \left(\bar{X}_1 - \bar{X}_T\right) = X_1 - \bar{X}_T$$

Significant difference between means

Aim is to determine if there are significant differences between the group means

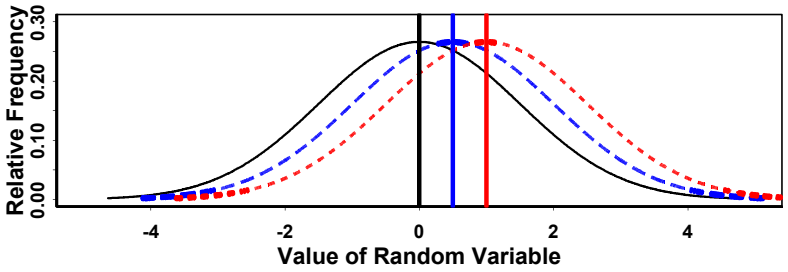
H_0: $\mu_1 = \mu_2 = \mu_3 = \mu_4$

H_a: $\mu_1 \neq \mu_2 \neq \mu_3 \neq \mu_4$ for at least one pair of means

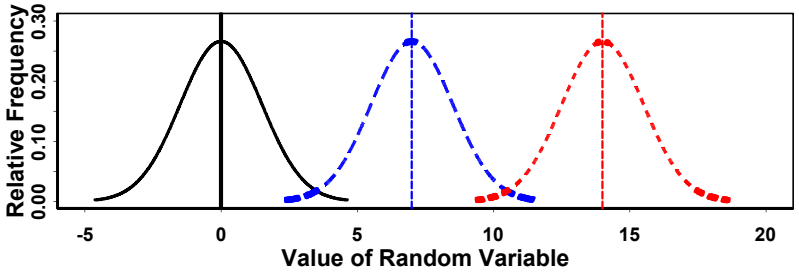
Will conduct test by comparing the variability *between* groups with the variability *within* groups

Within any single distribution of scores there will be variability due to sampling variation—always expect to find *within group* variability

If there are no significant differences between the means of the groups would expect only a small amount of *between group* variability (sampling error)



No significant differences between the means



Significant differences between the means

One-way grouped on Socioeconomic status

ANOVA

Total Strategic Coping Score

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	13.853	4	3.463	.899	.472
Within Groups	192.583	50	3.852		
Total	206.436	54			

Mean square = Sum of Squares/df

F = Mean square between/Mean square within

Expect ratio to be about 1.0 under the null hypothesis because both values are estimates of the same population variance

If ratio is quite a bit larger than 1.0, reject the null hypothesis

One-way grouped on Socioeconomic status

ANOVA

Total Experienced Racism Scale

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	791.327	4	197.832	2.246	.077
Within Groups	4491.173	51	88.062		
Total	5282.500	55			