ANOVA: Analysis of Variance

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Analysis of Variance (ANOVA)

- When things differ, can variation be attributed to one factor more than another?
- Example: Species richness due to diet, geographic location, climate, predators, human influences, invasive species, etc.
- Example: Runoff due to precipitation, soil type, plant life, urban infrastructure, slope, permeability, etc.
- What matters most?

Book Examples: 7.1 and 7.5

	Substrate (columns)			
	Brick rubble	*Colliery spoil*	*Subsoil*	*Application totals*
Fertiliser	Sample 1	Sample 2	Sample 3	Fertiliser total
	12	11	16	$(n_{Fert} = 15)$
	13	10	12	
	10	8	14	$\Sigma x_{Fert} = 180$
	12	10	15	$\Sigma x^2_{Fert} = 2224$
	11	12	14	
Applications (rows)	$\Sigma x_1 = 58$	$\Sigma x_2 = 51$	$\Sigma x_3 = 71$	
	$\Sigma x_1^2 = 678$	$\Sigma x_2^2 = 529$	$\Sigma x_3^2 = 1017$	
	$SS_1 = 5.2$	$SS_2 = 8.8$	$SS_3 = 8.8$	
	$s_1^2 = 1.3$	$s_2^2 = 2.2$	$s_3^2 = 2.2$	
Control	Sample 4	Sample 5	Sample 6	Control total
	12	9	12	$(n_{Control} = 15)$
	10	6	14	
	11	9	14	$\Sigma x_{Control} = 163$
	12	10	13	$\Sigma x^2_{Control} = 1865$
	8	8	15	
	$\Sigma x_4 = 53$	$\Sigma x_5 = 42$	$\Sigma x_6 = 68$	
	$\Sigma x_4^2 = 573$	$\Sigma x_5^2 = 362$	$\Sigma x_6^2 = 930$	
	$SS_4 = 11.2$	$SS_5 = 9.2$	$SS_6 = 5.2$	
	$s_4^2 = 2.8$	$s_5^2 = 2.3$	$s_6^2 = 1.3$	

Substrate totals	*Brick rubble total*	*Colliery spoil total*	*Subsoil total*	Grand total
	$(n_{Brick} = 10)$	$(n_{Colliery} = 10)$	$(n_{Subsoil} = 10)$	$(n_T = 30)$
	$\Sigma x_{Brick} = 111$	$\Sigma x_{Colliery} = 93$	$\Sigma x_{Subsoil} = 139$	$\Sigma x_T = 343$
	$\Sigma x^2_{Brick} = 1251$	$\Sigma x^2_{Colliery} = 891$	$\Sigma x^2_{Subsoil} = 1947$	$\Sigma x_T^2 = 4089$

Two-way ANOVA

- Video
- Dataset: Free throws
- Change your data to the needed format
- Run a two-way ANOVA with replication.
- What does it mean?

Iris data: For the three species, what varies significantly?