

KEPPEL'S NOTATION AND AN EXAMPLE

	Factor A				
	Level 1	Level 2	Level 3	Level 4	Level 5
	$Y_{11} = 8$	$Y_{12} = 4$	$Y_{13} = 5$	$Y_{14} = 3$	$Y_{15} = 6$
	$Y_{21} = 6$	$Y_{22} = 5$	$Y_{23} = 3$	$Y_{24} = 4$	$Y_{25} = 7$
	$Y_{31} = 7$	$Y_{32} = 5$	$Y_{33} = 3$	$Y_{34} = 2$	$Y_{35} = 5$
	$Y_{41} = 7$	$Y_{42} = 6$	$Y_{43} = 6$	$Y_{44} = 2$	$Y_{45} = 4$
	$Y_{51} = 6$	$Y_{52} = 3$	$Y_{53} = 2$	$Y_{54} = 3$	$Y_{55} = 6$
Totals	$A_1 = 34$	$A_2 = 23$	$A_3 = 19$	$A_4 = 14$	$A_5 = 28$
Means	$\bar{Y}_{A1} = 6.8$	$\bar{Y}_{A2} = 4.6$	$\bar{Y}_{A3} = 3.8$	$\bar{Y}_{A4} = 2.8$	$\bar{Y}_{A5} = 5.6$
	$\sum Y_{i1}^2 = 234$	$\sum Y_{i2}^2 = 111$	$\sum Y_{i3}^2 = 83$	$\sum Y_{i4}^2 = 42$	$\sum Y_{i5}^2 = 162$

Grand total: $T = 118$ Grand mean: $\bar{Y}_T = 4.72$ Y_{ij} refers to an observation (e.g., $Y_{11} = 8$) A_j is the total for level j (e.g., $A_1 = 34$) \bar{Y}_{Aj} is the mean for level j (e.g., $A_1 = 6.8$) T is the grand total \bar{Y}_T is the grand mean Y refers to the set of all the Y_{ij} (i.e., the entire data set) A is the set of all A_j totals (e.g., 34, 23, 19, 14, 28) \bar{Y} is the set of all \bar{Y}_{aj} means (i.e., 6.8, 4.6, 3.8, 2.8, 5.6) a is the number of levels on the A factor n is the number of observations per level of A (also called per cell or per treatment level or per group)

Analysis of Variance:

$$[T] = T^2/an = (118)^2/5(5) = 556.96 \quad [Y] = \sum Y^2/1 = 632$$

$$[A] = \sum A^2/n = (34^2 + 23^2 + 19^2 + 14^2 + 28^2)/5 = 605.2$$

$$SS_{\text{Mean}} = [T] = 556.96$$

$$SS_A = [A] - [T] = 48.24$$

$$SS_{S/A} = [Y] - [A] = 26.80$$

Source	df	SS	MS	F
Mean	1	556.96	556.96	415.64*
A	4	48.24	12.06	9.00*
S/A	20	26.80	1.34	

$$F^*(1,20) = 4.35 \quad F^*(4,20) = 2.87 \quad p = .05$$