

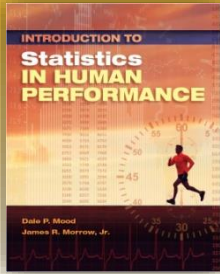


Chapter 9

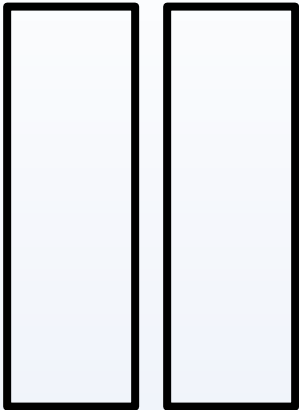
One-Way Between Groups ANOVA

Analysis of Variance (ANOVA)

One-way ANOVA

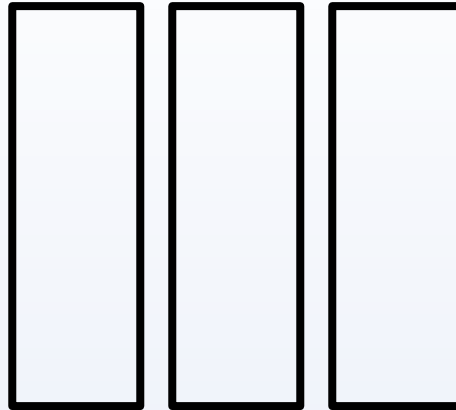


t-test



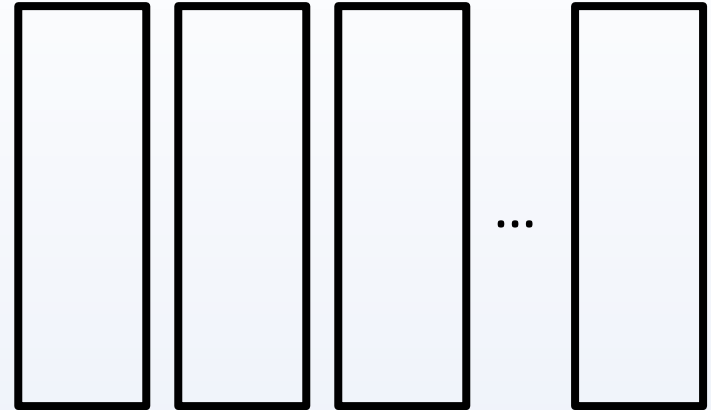
Two Levels

One-way ANOVA



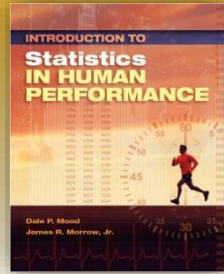
**One Independent Variable (X)
Three Levels**

One-way ANOVA



**One Independent Variable (X)
> Two Levels**

One-way ANOVA



Why not “multiple “ t-tests?

A vs. B; A vs. C; B vs. C

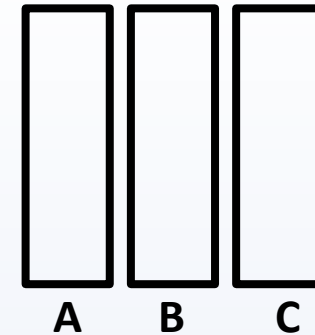
Increased (inflated) Type I error (α).

Partition the variance (ANOVA):

Between Group means

Within the cells

One-way ANOVA

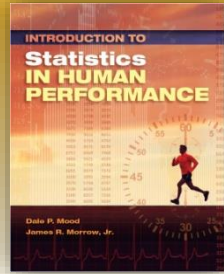


One Independent Variable (X)
Three Levels

$$H_0: \mu_1 = \mu_2 = \mu_3 = \dots = \mu_N$$

$$H_1: \mu_1 \neq \mu_2 \neq \mu_3 = \dots \neq \mu_N$$

One-way ANOVA



Assumptions

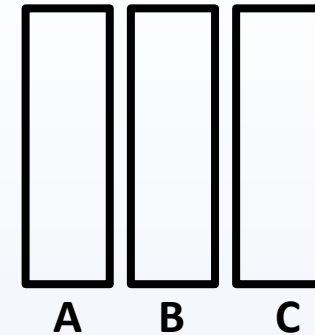
Normality

Homogeneity of variance

Continuous measurement

Independent observations

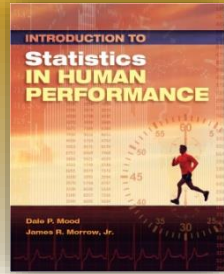
One-way ANOVA



One Independent Variable (X)
Three Levels

Robust

ANOVA Source Table



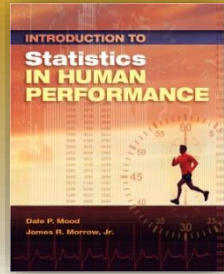
Source of Variation	Sum of Squares (SS)	Degrees of Freedom (df)	Mean Squares (MS)	F-ratio
Between Groups	SS_B	$J - 1$	SS_B/df_B	MS_B/MS_W
Within Groups	SS_W	$N - J$	SS_W/df_W	
Total		$N - 1$		

If Null is TRUE then F-ratio is expected to be = 1.0.

If Null is NOT TRUE then F-ratio is expected to be > 1.0.

BUT....is it “significantly larger”?

SPSS One-way ANOVA



Independent Variable (X) Levels

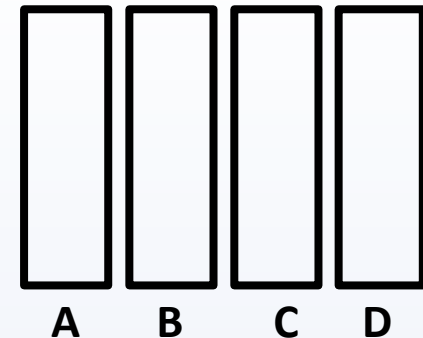
A = Pedometer Only

B = Pedometer and Written Support

C = Pedometer and Personal Support

D = Pedometer, Personal, and Computer Support

One-way ANOVA



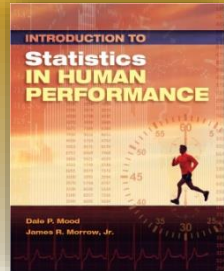
One Independent Variable (X)
Four Levels

Dependent Variable (Y) is Steps per Week

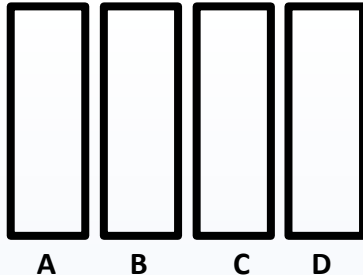
$$H_0: \mu_A = \mu_B = \mu_C = \mu_D$$

$$H_1: \mu_A \neq \mu_B \neq \mu_C \neq \mu_D$$

SPSS One-way ANOVA



One-way ANOVA

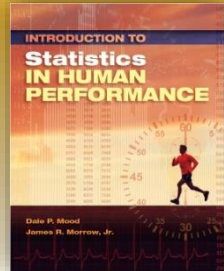


N = 50 in EACH Level

One Independent Variable (X)
Four Levels

Source of Variation	Sum of Squares (SS)	Degrees of Freedom (df)	Mean Squares (MS)	F-ratio
Between Groups	SS_B	$4 - 1 = 3$	SS_B/df_B	MS_B/MS_W
Within Groups	SS_W	$200 - 4 = 196$	SS_W/df_W	
Total		$200 - 1 = 199$		

SPSS ANOVA Output



Steps Per Week (Nearest 1000)

	N	Mean	Std. Deviation
Pedometer Only	50	31420.00	9994.059
Pedometer and Written Support	50	36820.00	13745.040
Pedometer and Personal Support	50	42080.00	15891.006
Pedometer, Personal and Computer Support	50	50660.00	18736.857
Total	200	40245.00	16442.407

ANOVA

Steps Per Week (Nearest 1000)

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	10072535000.0	3	3357511667	15.049	.000
Within Groups	43727660000.0	196	223100306.1		
Total	53800195000.0	199			

Reject H_0 at $\alpha < .001$