

## Within Subjects Analysis of Variance

Multiple independent treatments may be administered to the same subjects. This design offers the advantage of lower errors by not introducing between group errors. We will use the file labeled itemdata.LAZ to demonstrate. Test items administered to subjects are essentially independent measures of the knowledge the subjects have for a certain topic. As such the analysis of variance for these repeated measures also serves as a basis for estimating the test reliability. The theory of this method was initially developed by Hoyt. Here then is the form that appears to complete the analysis. Note the options we have selected.

Within Subjects ANOVA and Hoyt Reliability Estimates

Directions: The repeated measures ANOVA requires you to select two or more variables (columns) which represent repeated observations on the same subjects (rows.) Homogeneity of variance and covariance are assumed and may be tested as an option. In addition, the ANOVA provides the basis for estimates of reliability as developed by Hoyt (Intraclass reliability) with the adjusted estimate equivalent to the Cronbach Alpha estimate. Finally, you

Available Variables: LastName, FirstName, IDNO

Selected Variables: VAR1, VAR2, VAR3, VAR4, VAR5

Options:

- ☒ Reliability Estimates
- ☒ Test Assumptions
- ☒ Plot Means

Reset Cancel

Compute Return

When we press the Compute button we obtain:

Treatments by Subjects (AxS) ANOVA Results.

Data File = C:\lazarus\Projects\LazStats\itemdat.LAZ

SOURCE	DF	SS	MS	F	Prob. > F
SUBJECTS	15	6.350	0.423		
WITHIN SUBJECTS	64	13.200	0.206		
TREATMENTS	4	3.050	0.763	4.507	0.003
RESIDUAL	60	10.150	0.169		
TOTAL	79	19.550	0.247		

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TREATMENT (COLUMN) MEANS AND STANDARD DEVIATIONS

VARIABLE MEAN STD.DEV.

VAR1	0.875	0.342
VAR2	0.688	0.479
VAR3	0.563	0.512
VAR4	0.438	0.512
VAR5	0.313	0.479

Mean of all scores = 0.575 with standard deviation = 0.497

RELIABILITY ESTIMATES

TYPE OF ESTIMATE VALUE

Unadjusted total reliability	0.513
Unadjusted item reliability	0.174
Adjusted total (Cronbach)	0.600
Adjusted item reliability	0.231

BOX TEST FOR HOMOGENEITY OF VARIANCE-COVARIANCE MATRIX

SAMPLE COVARIANCE MATRIX with 16 cases.

Variables

	VAR1	VAR2	VAR3	VAR4	VAR5
VAR1	0.117	0.025	0.008	-0.008	0.042
VAR2	0.025	0.229	0.121	0.079	0.037
VAR3	0.008	0.121	0.263	0.071	0.079
VAR4	-0.008	0.079	0.071	0.263	0.054
VAR5	0.042	0.037	0.079	0.054	0.229

ASSUMED POP. COVARIANCE MATRIX with 16 cases.

Variables

	VAR1	VAR2	VAR3	VAR4	VAR5
VAR1	0.220	0.011	0.011	0.011	0.011
VAR2	0.048	0.219	0.010	0.010	0.010
VAR3	0.048	0.046	0.219	0.010	0.010
VAR4	0.048	0.046	0.044	0.219	0.009
VAR5	0.048	0.046	0.044	0.042	0.218

Determinant of variance-covariance matrix = 0

Determinant of homogeneity matrix = 0

ChiSquare = 56.769 with 13 degrees of freedom

Probability of larger chisquare = 6.96E-007

