

```

73      Title2 'Analysis of SPOCK versus others';
74      data Jury; set jury;
75      if judge = 'SPOCK' 'S' then JustSpock = 'SPOCK' ; else JustSpock='Other' ;
76      run;

```

NOTE: There were 46 observations read from the data set WORK.JURY.

NOTE: The data set WORK.JURY has 46 observations and 3 variables.

NOTE: DATA statement used (Total process time):

```

real time      0.02 seconds
cpu time       0.03 seconds

```

```

77
78      Title3 'Analysis of variance with PROC GLM';
79      proc glm data=Jury;
80          class JustSpock;
81          model percent = JustSpock;
82      run;
83      quit;

```

NOTE: The PROCEDURE GLM printed pages 25-26.

NOTE: PROCEDURE GLM used (Total process time):

```

real time      0.13 seconds
cpu time       0.08 seconds

```

Chapter 5 : Spock Conspiracy Trial
 Analysis of SPOCK versus others
 Analysis of variance with PROC GLM

The GLM Procedure

Class Level Information			
Class	Levels	Values	
JustSpock	2	Other SPOCK	
Number of Observations Read			46
Number of Observations Used			46

Chapter 5 : Spock Conspiracy Trial
 Analysis of SPOCK versus others
 Analysis of variance with PROC GLM

The GLM Procedure

Dependent Variable: Percent

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	1	1600.622903	1600.622903	32.15	<.0001
Error	44	2190.903124	49.793253		
Corrected Total	45	3791.526027			

R-Square	Coeff Var	Root MSE	Percent Mean
0.422158	26.54530	7.056433	26.58261

Source	DF	Type I SS	Mean Square	F Value	Pr > F
JustSpock	1	1600.622903	1600.622903	32.15	<.0001

Source	DF	Type III SS	Mean Square	F Value	Pr > F
JustSpock	1	1600.622903	1600.622903	32.15	<.0001

```

84
85     Title3 'Analysis of variance with PROC MIXED';
86     proc mixed data=Jury;
87         class JustSpock;
88         model percent = JustSpock / outp=resids;
89     run;
NOTE: The data set WORK.RESIDS has 46 observations and 10 variables.
NOTE: The PROCEDURE MIXED printed page 27.
NOTE: PROCEDURE MIXED used (Total process time):
      real time           0.18 seconds
      cpu time            0.15 seconds
90

```

Chapter 5 : Spock Conspiracy Trial
 Analysis of SPOCK versus others
 Analysis of variance with PROC MIXED

The Mixed Procedure

Model Information

Data Set	WORK.JURY
Dependent Variable	Percent
Covariance Structure	Diagonal
Estimation Method	REML
Residual Variance Method	Profile
Fixed Effects SE Method	Model-Based
Degrees of Freedom Method	Residual

Class Level Information

Class	Levels	Values
JustSpock	2	Other SPOCK

Dimensions

Covariance Parameters	1
Columns in X	3
Columns in Z	0
Subjects	1
Max Obs Per Subject	46

Number of Observations

Number of Observations Read	46
Number of Observations Used	46
Number of Observations Not Used	0

Covariance Parameter Estimates

Cov Parm	Estimate
Residual	49.7933

FitStatistics

-2 Res Log Likelihood	302.6
AIC (smaller is better)	304.6
AICC (smaller is better)	304.7
BIC (smaller is better)	306.4

Type 3 Tests of Fixed Effects

Effect	Num	Den	F Value	Pr > F
	DF	DF		
JustSpock	1	44	32.15	<.0001

```

91      Title4 'Proc univariate check of the residuals from ANOVA';
92      proc univariate data=resids plot normal;
93          var resid;
94      run;

```

NOTE: The PROCEDURE UNIVARIATE printed page 28.

NOTE: PROCEDURE UNIVARIATE used (Total process time):

```

real time      0.09 seconds
cpu time       0.04 seconds

```

95

```

96      Title3 'Raw data with estimated means and residuals';
97      proc print data=resids; run;

```

NOTE: There were 46 observations read from the data set WORK.RESIDS.

NOTE: The PROCEDURE PRINT printed page 29.

NOTE: PROCEDURE PRINT used (Total process time):

```

real time      0.10 seconds
cpu time       0.05 seconds

```

98

Chapter 5 : Spock Conspiracy Trial

Analysis of SPOCK versus others

Analysis of variance with PROC MIXED

Proc univariate check of the residuals from ANOVA

The UNIVARIATE Procedure

Variable: Resid (Residual)

Moments

N	46	Sum Weights	46
Mean	0	Sum Observations	0
Std Deviation	6.97758813	Variance	48.6867361
Skewness	0.39016066	Kurtosis	0.59842975
Uncorrected SS	2190.90312	Corrected SS	2190.90312
Coeff Variation	.	Std Error Mean	1.02878924

Basic Statistical Measures

Location		Variability	
Mean	0.00000	Std Deviation	6.97759
Median	0.25811	Variance	48.68674
Mode	-1.99189	Range	32.40000
		Interquartile Range	9.16967

NOTE: The mode displayed is the smallest of 3 modes with a count of 2.

Tests for Location: Mu0=0

Test	-Statistic-	-----p Value-----
Student's t	t 0	Pr > t 1.0000
Sign	M 2	Pr >= M 0.6587
Signed Rank	S -4.5	Pr >= S 0.9614

Tests for Normality

Test	--Statistic--	-----p Value-----
Shapiro-Wilk	W 0.973735	Pr < W 0.3785
Kolmogorov-Smirnov	D 0.094566	Pr > D >0.1500
Cramer-von Mises	W-Sq 0.051733	Pr > W-Sq >0.2500
Anderson-Darling	A-Sq 0.352132	Pr > A-Sq >0.2500

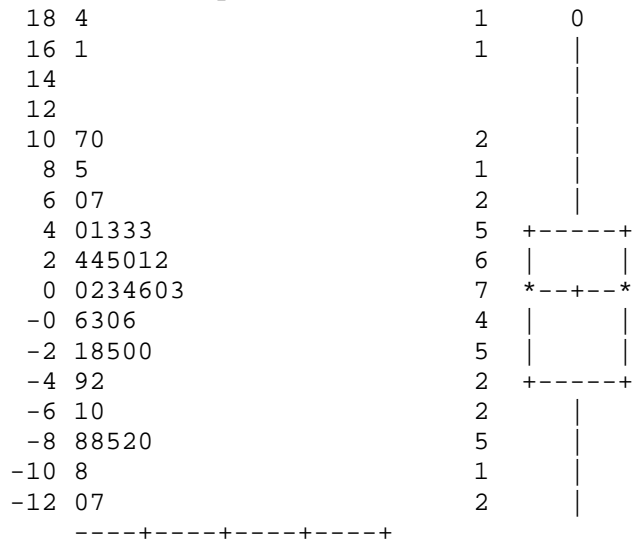
Quantiles (Definition 5)

Quantile	Estimate
100% Max	19.408110
99%	19.408110
95%	11.008108
90%	8.477778
75% Q3	3.977778
50% Median	0.258108
25% Q1	-5.191893
10%	-8.791891
5%	-11.791891
1%	-12.991892
0% Min	-12.991892

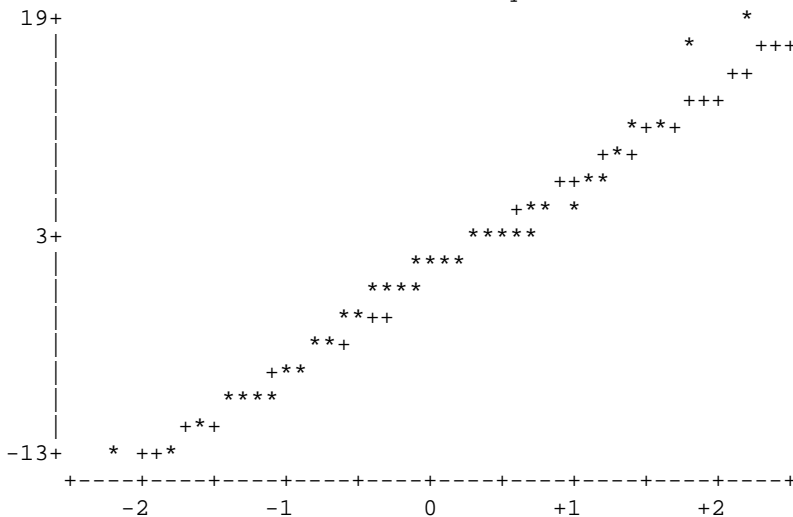
Extreme Observations

-----Lowest-----		-----Highest-----	
Value	Obs	Value	Obs
-12.99189	29	8.47778	46
-12.69189	1	10.70811	28
-11.79189	23	11.00811	4
-9.79189	24	16.10811	11
-8.79189	30	19.40811	5

Stem Leaf Boxplot



Normal Probability Plot



Chapter 5 : Spock Conspiracy Trial
 Analysis of SPOCK versus others
 Raw data with estimated means and residuals

Obs	Percent	Judge	Just Spock	Pred	StdErr Pred	DF	Alpha	Lower	Upper	Resid
1	16.8000	A	Other	29.4919	1.16007	44	0.05	27.1539	31.8299	-12.6919
2	30.8000	A	Other	29.4919	1.16007	44	0.05	27.1539	31.8299	1.3081
3	33.6000	A	Other	29.4919	1.16007	44	0.05	27.1539	31.8299	4.1081
4	40.5000	A	Other	29.4919	1.16007	44	0.05	27.1539	31.8299	11.0081
5	48.9000	A	Other	29.4919	1.16007	44	0.05	27.1539	31.8299	19.4081
6	27.0000	B	Other	29.4919	1.16007	44	0.05	27.1539	31.8299	-2.4919
7	28.9000	B	Other	29.4919	1.16007	44	0.05	27.1539	31.8299	-0.5919
8	32.0000	B	Other	29.4919	1.16007	44	0.05	27.1539	31.8299	2.5081
9	32.7000	B	Other	29.4919	1.16007	44	0.05	27.1539	31.8299	3.2081
10	35.5000	B	Other	29.4919	1.16007	44	0.05	27.1539	31.8299	6.0081
11	45.6000	B	Other	29.4919	1.16007	44	0.05	27.1539	31.8299	16.1081
12	21.0000	C	Other	29.4919	1.16007	44	0.05	27.1539	31.8299	-8.4919
13	23.4000	C	Other	29.4919	1.16007	44	0.05	27.1539	31.8299	-6.0919
14	27.5000	C	Other	29.4919	1.16007	44	0.05	27.1539	31.8299	-1.9919
15	27.5000	C	Other	29.4919	1.16007	44	0.05	27.1539	31.8299	-1.9919
16	30.5000	C	Other	29.4919	1.16007	44	0.05	27.1539	31.8299	1.0081
17	31.9000	C	Other	29.4919	1.16007	44	0.05	27.1539	31.8299	2.4081
18	32.5000	C	Other	29.4919	1.16007	44	0.05	27.1539	31.8299	3.0081
19	33.8000	C	Other	29.4919	1.16007	44	0.05	27.1539	31.8299	4.3081
20	33.8000	C	Other	29.4919	1.16007	44	0.05	27.1539	31.8299	4.3081
21	24.3000	D	Other	29.4919	1.16007	44	0.05	27.1539	31.8299	-5.1919
22	29.7000	D	Other	29.4919	1.16007	44	0.05	27.1539	31.8299	0.2081
23	17.7000	E	Other	29.4919	1.16007	44	0.05	27.1539	31.8299	-11.7919
24	19.7000	E	Other	29.4919	1.16007	44	0.05	27.1539	31.8299	-9.7919
25	21.5000	E	Other	29.4919	1.16007	44	0.05	27.1539	31.8299	-7.9919
26	27.9000	E	Other	29.4919	1.16007	44	0.05	27.1539	31.8299	-1.5919
27	34.8000	E	Other	29.4919	1.16007	44	0.05	27.1539	31.8299	5.3081
28	40.2000	E	Other	29.4919	1.16007	44	0.05	27.1539	31.8299	10.7081
29	16.5000	F	Other	29.4919	1.16007	44	0.05	27.1539	31.8299	-12.9919
30	20.7000	F	Other	29.4919	1.16007	44	0.05	27.1539	31.8299	-8.7919
31	23.5000	F	Other	29.4919	1.16007	44	0.05	27.1539	31.8299	-5.9919
32	26.4000	F	Other	29.4919	1.16007	44	0.05	27.1539	31.8299	-3.0919
33	26.7000	F	Other	29.4919	1.16007	44	0.05	27.1539	31.8299	-2.7919
34	29.5000	F	Other	29.4919	1.16007	44	0.05	27.1539	31.8299	0.0081
35	29.8000	F	Other	29.4919	1.16007	44	0.05	27.1539	31.8299	0.3081
36	31.9000	F	Other	29.4919	1.16007	44	0.05	27.1539	31.8299	2.4081
37	36.2000	F	Other	29.4919	1.16007	44	0.05	27.1539	31.8299	6.7081
38	6.4000	SPOCK'S	SPOCK	14.6222	2.35214	44	0.05	9.8818	19.3627	-8.2222
39	8.7000	SPOCK'S	SPOCK	14.6222	2.35214	44	0.05	9.8818	19.3627	-5.9222
40	13.3000	SPOCK'S	SPOCK	14.6222	2.35214	44	0.05	9.8818	19.3627	-1.3222
41	13.6000	SPOCK'S	SPOCK	14.6222	2.35214	44	0.05	9.8818	19.3627	-1.0222
42	15.0000	SPOCK'S	SPOCK	14.6222	2.35214	44	0.05	9.8818	19.3627	0.3778
43	15.2000	SPOCK'S	SPOCK	14.6222	2.35214	44	0.05	9.8818	19.3627	0.5778
44	17.7000	SPOCK'S	SPOCK	14.6222	2.35214	44	0.05	9.8818	19.3627	3.0778
45	18.6000	SPOCK'S	SPOCK	14.6222	2.35214	44	0.05	9.8818	19.3627	3.9778
46	23.1000	SPOCK'S	SPOCK	14.6222	2.35214	44	0.05	9.8818	19.3627	8.4778

```

99      options ps=56 ls=111;
100     Title3 'Scatterplot of residuals';
101     proc plot data=resids;
102         plot resid * JustSpock / vref=0;
103         plot resid * pred / vref=0;
104     run;
105     options ps=256 ls=111;
106

```

NOTE: There were 46 observations read from the data set WORK.RESIDS.

NOTE: The PROCEDURE PLOT printed pages 30-31.

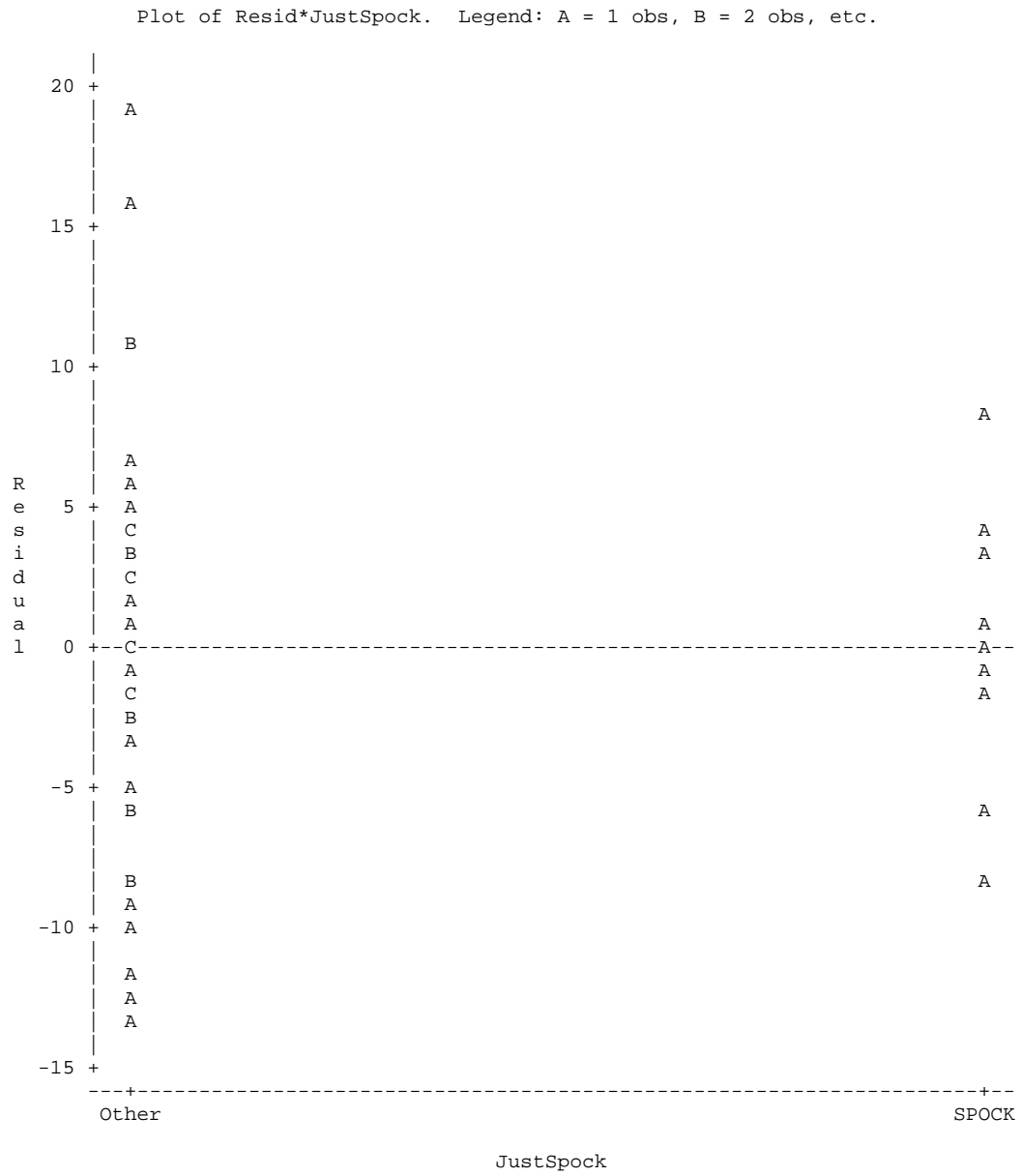
NOTE: PROCEDURE PLOT used (Total process time):

```

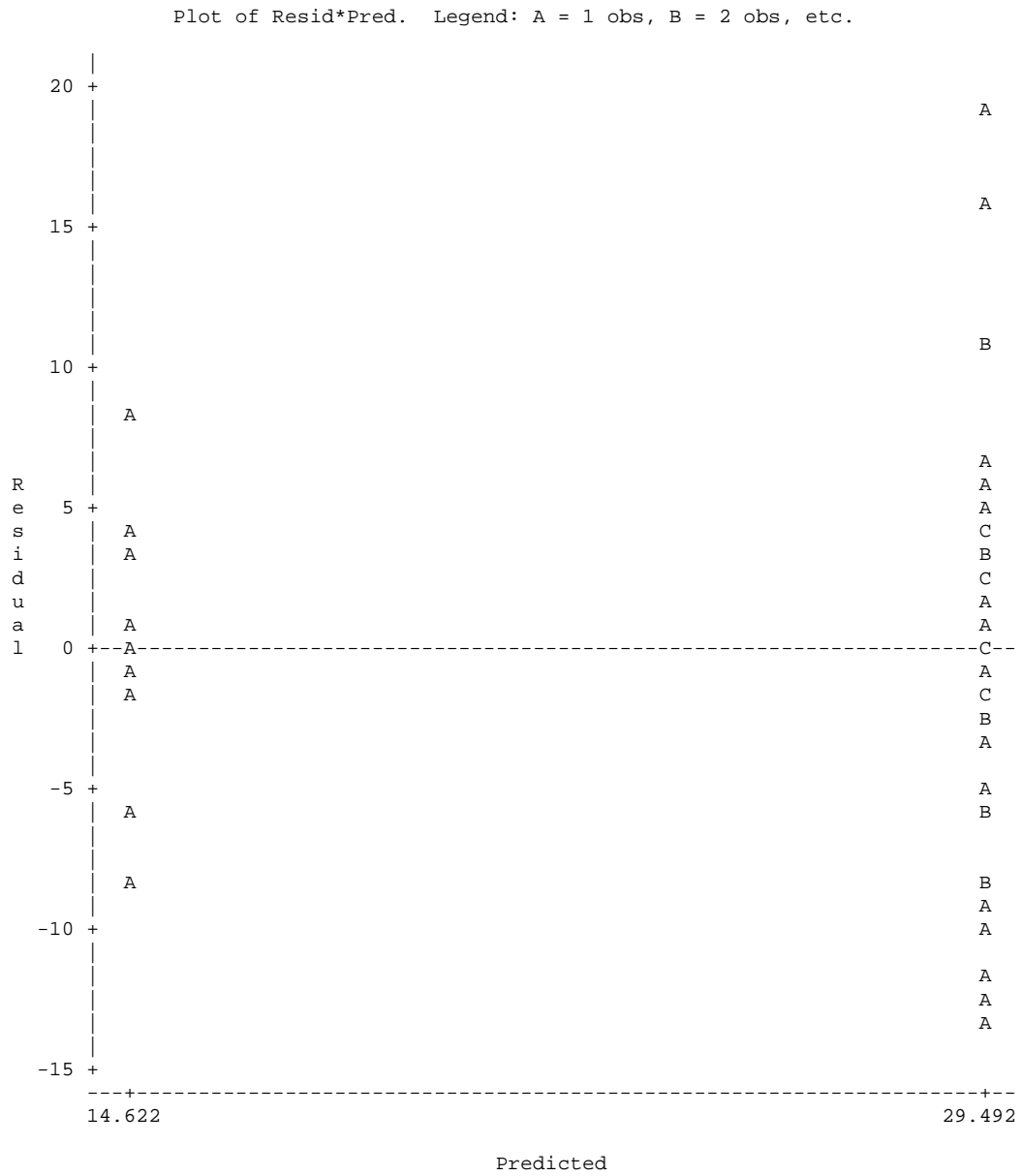
real time      0.06 seconds
cpu time       0.01 seconds

```

Chapter 5 : Spock Conspiracy Trial
 Analysis of SPOCK versus others
 Scatterplot of residuals



Chapter 5 : Spock Conspiracy Trial
 Analysis of SPOCK versus others
 Scatterplot of residuals



```

107      Title3 'Analysis of variance with PROC GLM';
108      Title4 'Type I sum of squares';
109      proc glm data=Jury;
110          class JustSpock judge;
111          model percent = JustSpock judge;
112      run;
113      quit;
NOTE: The PROCEDURE GLM printed pages 32-33.
NOTE: PROCEDURE GLM used (Total process time):
      real time          0.13 seconds
      cpu time           0.08 seconds
114
115      Title3 'Analysis of variance with PROC MIXED';
116      Title4 'Type I test of hypothesis';
117      proc mixed data=Jury;
118          class JustSpock judge;
119          model percent = JustSpock judge / outp=resids HType=1 3;
120      run;
NOTE: The data set WORK.RESIDS has 46 observations and 10 variables.
NOTE: The PROCEDURE MIXED printed page 34.
NOTE: PROCEDURE MIXED used (Total process time):
      real time          0.19 seconds
      cpu time           0.15 seconds

```

Chapter 5 : Spock Conspiracy Trial
 Analysis of SPOCK versus others
 Analysis of variance with PROC GLM
 Type I sum of squares

The GLM Procedure

```

          Class Level Information
Class      Levels      Values
JustSpock      2      Other SPOCK
Judge          7      A B C D E F SPOCK'S
Number of Observations Read      46
Number of Observations Used      46

```

Dependent Variable: Percent

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	6	1927.080772	321.180129	6.72	<.0001
Error	39	1864.445255	47.806289		
Corrected Total	45	3791.526027			

R-Square	Coeff Var	Root MSE	Percent Mean
0.508260	26.01027	6.914209	26.58261

Source	DF	Type I SS	Mean Square	F Value	Pr > F
JustSpock	1	1600.622903	1600.622903	33.48	<.0001
Judge	5	326.457869	65.291574	1.37	0.2582

Source	DF	Type III SS	Mean Square	F Value	Pr > F
JustSpock	0	0.0000000	.	.	.
Judge	5	326.4578692	65.2915738	1.37	0.2582

Chapter 5 : Spock Conspiracy Trial
 Analysis of SPOCK versus others
 Analysis of variance with PROC MIXED
 Type I test of hypothesis

The Mixed Procedure

Model Information

Data Set	WORK.JURY
Dependent Variable	Percent
Covariance Structure	Diagonal
Estimation Method	REML
Residual Variance Method	Profile
Fixed Effects SE Method	Model-Based
Degrees of Freedom Method	Residual

Class Level Information

Class	Levels	Values
JustSpock	2	Other SPOCK
Judge	7	A B C D E F SPOCK'S

Dimensions

Covariance Parameters	1
Columns in X	10
Columns in Z	0
Subjects	1
Max Obs Per Subject	46

Number of Observations

Number of Observations Read	46
Number of Observations Used	46
Number of Observations Not Used	0

Covariance Parameter Estimates

Cov Parm	Estimate
Residual	47.8063

FitStatistics

-2 Res Log Likelihood	274.0
AIC (smaller is better)	276.0
AICC (smaller is better)	276.1
BIC (smaller is better)	277.6

Type 1 Tests of Fixed Effects

Effect	Num		Den		F Value	Pr > F
	DF		DF			
JustSpock	1		39		33.48	<.0001
Judge	5		39		1.37	0.2582

Type 3 Tests of Fixed Effects

Effect	Num		Den		F Value	Pr > F
	DF		DF			
JustSpock	0		.		.	.
Judge	5		39		1.37	0.2582