SPSS: k Between Groups ANOVA & Trend Analyses

Application: To examine the "shape" of the IV-DV relationship (only used when IV conditions are equally spaced)

Research Hypothesis: Theory suggests an inverted U-shaped relationship between level of anxiety and performance.

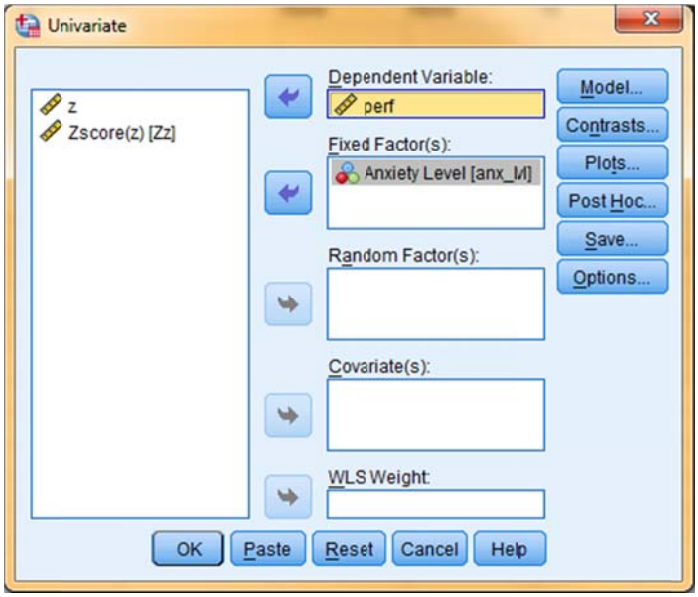
H0: for this analysis: There is no mean differences among mean performance in the different anxiety conditions.

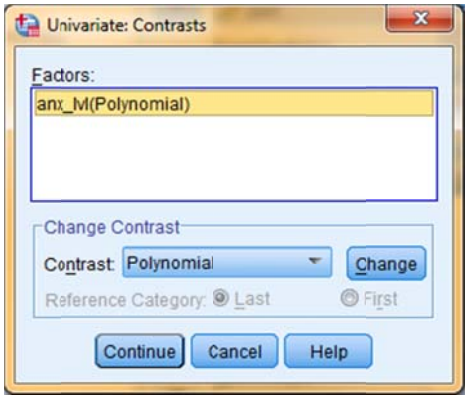
Analyze ➔ General Linear Model ➔ Univariate

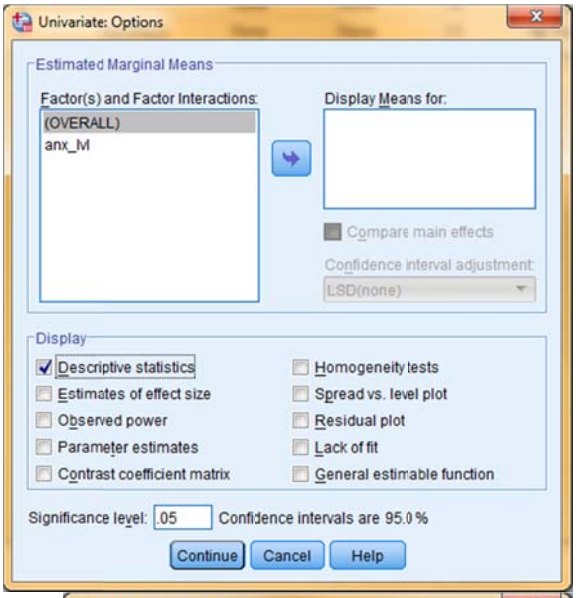
- highlight the "Dependent" variable (be sure it is **quantitative**) and click the arrow
- highlight the "Factor" (IV, grouping) variable (be sure it is **qualitative**) and click the arrow
- "Options" — check that you want "Descriptive Statistics
- "Contrasts" – Highlight "Polynomial" & click "Change"
- "Plots" – Move IV into "Horizontal Axis" then click "Add"

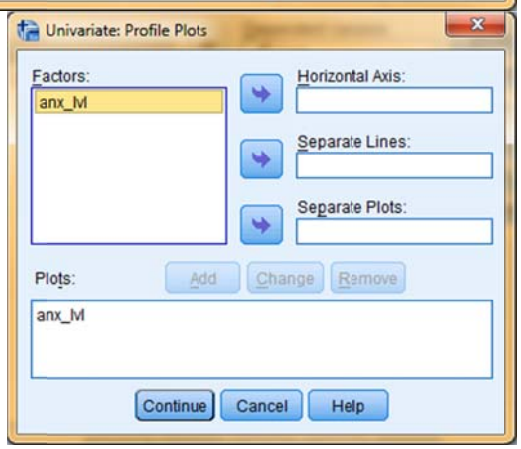
SPSS Syntax

```
UNIANOVA perf BY anx_lvl            ← DV "by" IV
  /CONTRAST(anx_lvl)=Polynomial ← get trend analysis
  /METHOD=SSTYPE(3)
  /PLOT=PROFILE(anx_lvl)            ← get means plot
  /PRINT=DESCRIPTIVE.               ← get descriptive stats
```







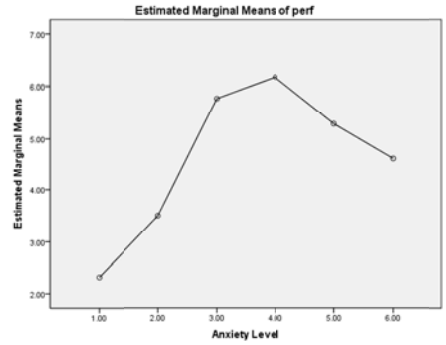


Please Note: You can also perform this analysis using the "ONEWAY" procedure we used for the 2 BG ANOVA and analytic comparisons. It has the same polynomial choices and produces equivalent output.

Descriptive Statistics

Dependent Variable:perf

Anxiety Level	Mean	Std. Deviation	N
1.00	2.3145	1.43834	10
2.00	3.5037	1.42093	10
3.00	5.7605	1.32364	10
4.00	6.1776	1.51531	10
5.00	5.2733	.41903	10
6.00	4.6027	1.93537	10
Total	4.6054	1.91186	60



Tests of Between-Subjects Effects

Dependent Variable:perf

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	107.142[a]	5	21.428	10.663	.000
Intercept	1272.579	1	1272.579	633.268	.000
anx_lvl	107.142	5	21.428	10.663	.000
Error	108.515	54	2.010		
Total	1488.236	60			
Corrected Total	215.657	59			

a. R Squared = .497 (Adjusted R Squared = .450)

Remember, even if the printout shows it, never report p = .000, because that would suggest there is no possibility of a Type 1 error. Instead, report "p < .001"

The p-value of .000 means that there less than a .1% chance that this result is a Type I error

Anxiety Level	Polynomial Contrast[a]	Depende... perf
Linear	Contrast Estimate	2.052
	Hypotheszed Value	0
	Difference (Estimate - Hypotheszed)	2.052
	Std. Error	.448
	Sig.	.000
Quadratic	Contrast Estimate	-2.394
	Hypotheszed Value	0
	Difference (Estimate - Hypotheszed)	-2.394
	Std. Error	.448
	Sig.	.000
Cubic	Contrast Estimate	-.195
	Hypotheszed Value	0
	Difference (Estimate - Hypotheszed)	-.195
	Std. Error	.448
	Sig.	.666

a. Metric = 1.000, 2.000, 3.000, 4.000, 5.000, 6.000

The trend analysis results show…

A significant linear trend
- Inspection of the means and plot shows that this is a positive linear trend
- This results does not support the RH:

A significant quadratic trend
- Inspection of the means and plot shows that this is an inverted U-shaped quadratic trend
- This results supports the RH:

A nonsignificant cubic trend
- This results supports the RH:

Note:
You can compute the t-value for each comparison using
t = Difference (Estimate – Contrast) / Std. Error

For the Linear trend this would be t = 2.052 / .448 = 4.580
With df = 54

Or if you prefer, $F = t^2$ F = 4.5802 = 20.975 df = 1, 54

Reporting the Results

The average performance for each anxiety level is summarized in Table/Figure 1. There were significant mean differences in the performances among the anxiety levels, F(5, 54) = 10.663, Mse = 2.010, p <.001. Trend analyses revealed that, as hypothesized, there was a quadratic component to the relationship, F(1,54) = 28.552, p<.001, with the highest average performance for anxiety level 4. Also, there was no cubic trend, F(1,54) = .198, p = .666. However, contrary to the research hypothesis, there was also a positive linear component to the relationship, F(1, 54) = 20.975, p<.001, with higher average performance for the higher anxiety levels than for the lower anxiety levels.