Multiple Comparisons with JMP

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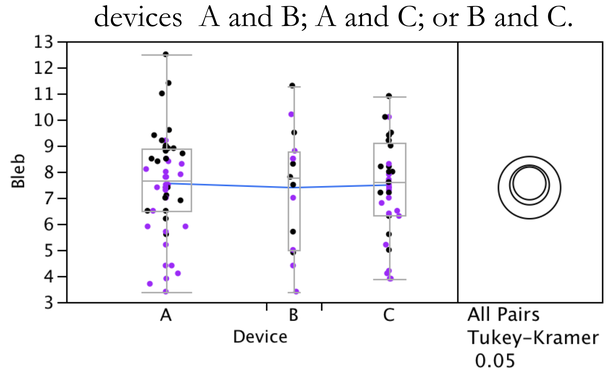
Multiple Comparisons

Any time you make comparisons with two or more treatments you are working with a "multiple comparison." In the case of just two treatments the student's *t*-test is often the appropriate method to test for a treatment effect. However, using multiple applications of the *t*-test to test multiple comparisons within a single study is not appropriate. Rather, one should choose a multiple comparison method suited for the particular question your data is to address. The key point to multiple comparison techniques is that they are designed to control the overall error rate of your study.

All pairwise comparisons Tukey-Kramer

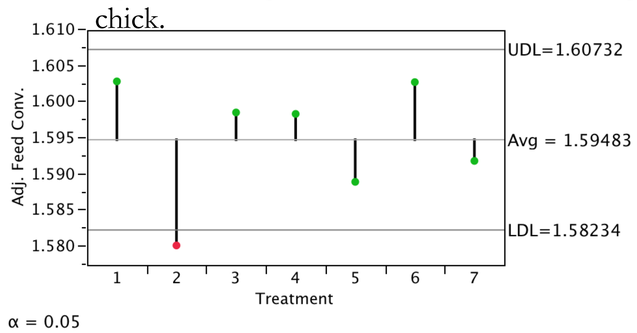
TK can be used to compare two or more groups where the outcome of interest are pair-wise differences. For example, three needle free injection devices were tested and the size of the bleb (bump under the skin) left after the injection was measured. The TK procedure shows that at the 0.05 significance level there is no difference between devices A and B; A and C; or B and C.



Analyze>Fit Y by X>>Compare Means>All Pairs, Tukey HSD

Comparison to the overall Analysis of Means (ANOM)

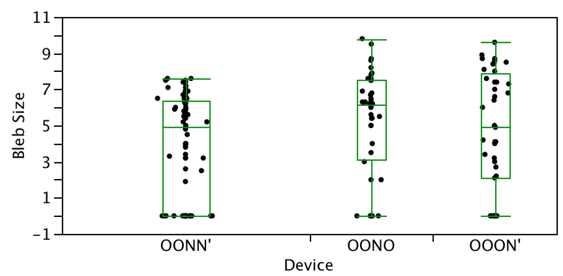
ANOM compares the mean of each of a group of treatments to the mean of all treatments. Group means that differ significantly from the overall mean plot beyond the decision lines on the ANOM chart. Here 7 variations of feed were fed to chicks and their weights were compared after 42 days. Chicks eating feed number 2 were significantly lighter at day 42 than the average chick.



Analyze>Fit Y by X>>Analysis of Means>ANOM

All pairwise comparisons Steel-Dwass

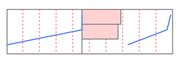
The Steel-Dwass procedure is a non-parametric alternative to the TK all pairs comparisons. The results of a study to compare three devices found that there was a difference in bleb sizes between device OONO and OONN'.



Nonparametric Comparisons For All Pairs Using Steel-Dwass Method

q* 2.34370 Alpha 0.05

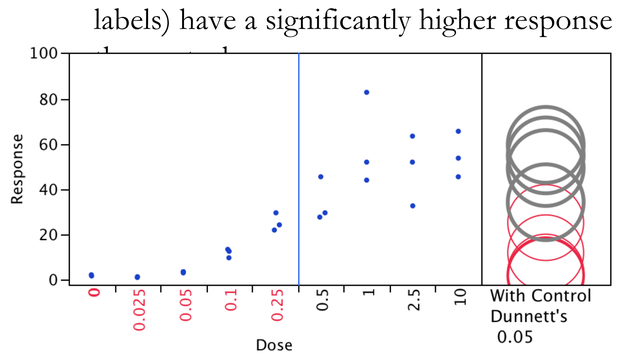
Level	- Level	Score Mean Difference	Std Err Dif	Z	p-Value	Hodges-Lehmann	Lower CL	Upper CL
OONO	OONN'	16.3125	6.670659	2.44541	0.0384*	1.100000	0.00000	2.500000
OOON'	OONN'	12.4875	6.658258	1.87549	0.1458	1.000000	0.00000	2.400000
OOON'	OONO	-1.4000	5.174609	-0.27055	0.9605	0.000000	-2.10000	1.300000



Analyze>Fit Y by X>>NonParametric>NPMC>Steel-Dwass All Pairs

Comparison to a control Dunnett's

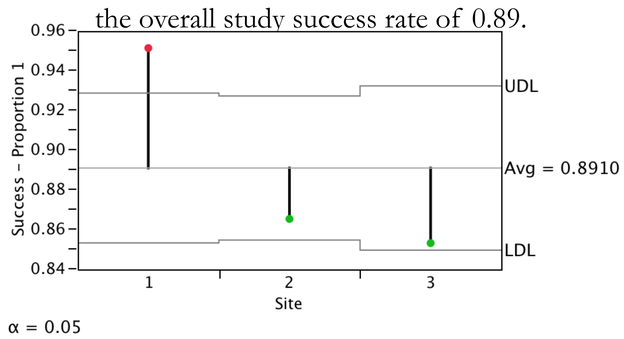
A simplistic way to look at a dose finding study is to use Dunnett's multiple comparison with a control (i.e., the placebo or zero dose). In this example there were 8 doses, the first 4 (red labels) are no different than the control while the last 4 (black labels) have a significantly higher response than



Analyze>Fit Y by X>>Compare Means>With Control, Dunnett's

Comparison of proportions Analysis of Means for Proportions

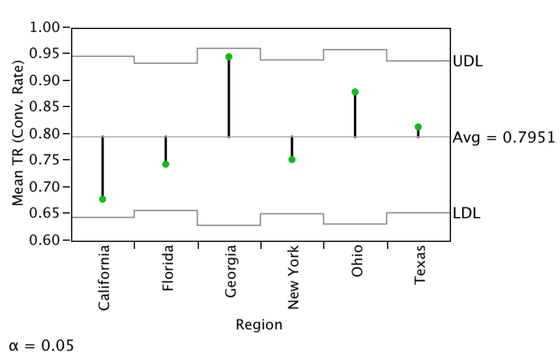
When sample sizes are large enough to use the normal approximation then ANOM can be applied to proportions (ANOMP). A clinical trial was conducted at three sites. ANOMP was used to test for differences in success rate due to site. The indication is that Site 1 has a better success rate than the overall study success rate of 0.89.



Analyze>Fit Y by X>>Analysis of Means for Proportions

Non-parametric ANOM Transformed Ranks

ANOMTR can be applied to groups where the measurements within each group are clearly not normally distributed. Conversion rates for an online ad were gathered by region and found to be skewed. ANOMTR was applied to test for group differences and no regions differed in response rate from the overall rate of nearly 80%.



Analyze>Fit Y by X>>Analysis of Means>ANOM