

Re: ANOVA on ordinal data

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The short answer to your question is yes you can do a t-test and ANOVA on ordinal data. The major caveat comes from interpreting your results. If you find a significant difference, you should only report that one group mean is higher or lower than another group mean—an ordinal statement. You get into trouble if you start making interval statements such as “group one is twice as much as the other group.” The major difference between ordinal and interval data is that the latter has equal differences between each number, whereas with ordinal data, you cannot say much more than the order (x is greater than y). With interval data you can say (x is twice as likely as y).

You should know however, that there are two camps when it comes to this issue. The more purist camp will tell you that you CANNOT use those parametric tests with ordinal data. The other camp (most social scientists and practitioners) will tell you it's fine.

The purist camp will cite the work of SS Stevens. He's the guy who came up with the whole hierarchy of data (Nominal, Ordinal, Interval and Ratio) in his 1946 work “On the Theory of Scale Measurement”. According to Stevens, it's only permissible to use Interval or Ratio data to use parametric tests (t-test, ANOVA etc). In fact, even computing the mean and standard deviation aren't permissible unless you have at least interval data.

The “practitioner” camp (for lack of better word) argues that such a rigid structure, although meaningful for classifying data should not dictate the tests one performs. They say that “the numbers don't know where they come from.” One of the best works is “On the Statistical Treatment of Football Numbers” by F. M. Lord. Lord shows how football numbers (Nominal Data) can be averaged and manipulated to settle an argument about whether Freshman have lower numbers than upper classmen.

For a good discussion of both sides (with a bias toward the practitioner camp) you should read a publicly available paper: “Nominal, Ordinal, Interval, and Ratio Typologies are Misleading” <http://www.spss.com/research/wilkinson/Publications/Stevens.pdf>

In fact, the vast majority of scales and measurements used in modern psychology are ordinal scales! With this in mind, I'd proceed to see what conclusions you would draw with the t-test and ANOVA and just be careful about equal-interval statements.

Good Luck
Jeff

On 23 Nov 04 12:05:14 -0500 (EST), Kelly wrote:

>*Can you reasonably do t-tests or anovas on ordinal data.*

Additionally,

>*would this be considered ordinal data: a ratio of two concentrations*

>*of two reagents and the ratio of this product can only be between 0*

>*and 1.*

>*Thanks for any help*