How can I test for nonadditivity in a randomized block ANOVA in Stata?

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A randomized block ANOVA is a statistical test used to compare the means of three or more groups while controlling for the effect of a blocking variable. In order to determine if the blocking variable has a significant effect on the outcome, it is important to test for nonadditivity. This can be done in Stata by first conducting the randomized block ANOVA and then using the "test nonadditivity" command. This command will assess the significance of the interaction between the grouping variable and the blocking variable, indicating whether or not nonadditivity is present. If the test is significant, it suggests that the blocking variable has a significant effect on the outcome and should be included in the analysis. This step is crucial in ensuring the validity of the randomized block ANOVA results.

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Stata FAQ:

How can I test for nonadditivity in a randomized block ANOVA in Stata?

**Randomized block ANOVA models assume additive block and treatment
effects, that is, that there is no treatment by block interaction. Tukey's test for nonadditivity
is a one degree of freedom test of the hypothesis that there is a linear treatment by linear block
interaction. The nonadd command
can be added to your Stata system by installing the nonadd.ado program written by
ATS. You can download the nonadd command by typing search nonadd (see**

How can I use the search command to search for programs and get additional
help? for more information about using search).

Now, let's read in an example dataset,
rb4a, which is adapted from Kirk (1982, 2nd Edition).
This example has eight subjects with four repeated measures on each subject.

```
use https://stats.idre.ucla.edu/stat/stata/faq/rb4a, clear
```

Let's look at a table of the data.

```
table s a, contents(mean y)

----------+--------------------
| a
s | 1 2 3 4
----------+--------------------
1 | 3 4 7 7
2 | 6 5 8 8
3 | 3 4 7 9
4 | 3 3 6 8
5 | 1 2 5 10
6 | 2 3 6 10
```

7 | 2 4 5 9

8 | 2 3 6 11

----------+----------

Now let's compute the randomized block ANOVA.

anova y a s

Number of obs = 32 R-squared = 0.8790

Root MSE = 1.16496 Adj R-squared = 0.8214

Source | Partial SS df MS F Prob > F

----------+----------

Model | 207.00 10 20.70 15.25 0.0000

|

a | 194.50 3 64.8333333 47.77 0.0000

s | 12.50 7 1.78571429 1.32 0.2914

|

Residual | 28.50 21 1.35714286

----------+----------

Total | 235.50 31 7.59677419

Next, we'll do the test for nonadditivity. Note that the variables are entered the

same way as for the randomized block analysis.

```
nonadd y a s

Tukey's test of nonadditivity for randomized block designs
F (1,20) = 7.8345468 Pr > F: .01108091
```

In this case the test for nonadditivity was statistically significant, the data are nonadditive.

Here is a second example, rb4b, this time from Kirk's 3rd edition. Again, it has eight subjects with four repeated measures on each subject.

```
use https://stats.idre.ucla.edu/stat/stata/faq/rb4b, clear

table s a, contents(mean y)

----------+----------------------
| a
s | 1 2 3 4
----------+----------------------
1 | 3 4 4 3
```

2 | 2 4 4 5

3 | 2 3 3 6

4 | 3 3 3 5

5 | 1 2 4 7

6 | 3 3 6 6

7 | 4 4 5 10

8 | 6 5 5 8

----------+----------

anova y a s

Number of obs = 32 R-squared = 0.7318

Root MSE = 1.18523 Adj R-squared = 0.6041

Source | Partial SS df MS F Prob > F

----------+----------

Model | 80.50 10 8.05 5.73 0.0004

|

a | 49.00 3 16.3333333 11.63 0.0001

s | 31.50 7 4.50 3.20 0.0180

|

Residual | 29.50 21 1.4047619

----------+----------

Total | 110.00 31 3.5483871

nonadd y a s

Tukey's test of nonadditivity for randomized block designs
F (1,20) = 1.2795813 Pr > F: .27135918

This time the test for nonadditivity was not significant, that is,
there is no indication of a treatment by block interaction.

References: