

Psychology 515 - Experimental Design

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Homework No. 8 - Not to be handed in

1. Here is the data on 10 subjects from the Red-Green-Gray caper. The scores given are the totals of reaction times in giving word associations while viewing a colored stimulus (red, green, or gray). The order of presentation of the colors was counterbalanced for each subject by presenting each colored stimulus several times, at irregular intervals in the entire sequence of presentations.

| Subject # | Red | Green | Gray |
|-----------|------|-------|------|
| 1 | 22.7 | 23.1 | 20.2 |
| 2 | 20.1 | 18.4 | 17.9 |
| 3 | 21.8 | 20.4 | 21.9 |
| 4 | 22.4 | 18.8 | 20.0 |
| 5 | 28.1 | 24.0 | 20.3 |
| 6 | 20.6 | 18.2 | 21.6 |
| 7 | 20.5 | 20.8 | 22.0 |
| 8 | 36.1 | 22.0 | 18.7 |
| 9 | 17.4 | 17.4 | 14.7 |
| 10 | 19.2 | 15.3 | 17.6 |

The ANOVA summary table is: (Be sure you know how it was obtained.)

| Source | df | SS | MS | F |
|--------|----|---------|---------|------|
| T | 2 | 69.950 | 34.9750 | 3.77 |
| S | 9 | 212.545 | 23.6161 | |
| TxS | 18 | 166.957 | 9.27534 | |

Is the overall effect of stimulus condition significant with no correction for violation of the sphericity assumption? How about when the Greenhouse-Geisser and Huynh-Feldt corrections are applied? Split the two degrees of freedom between conditions and test each component against its own error term. Use Red vs. Gray as contrast 1 and Green vs. others as contrast 2.

2. [From Woods, W.A. (1953). Influence of ink color on handwriting of normal and psychiatric groups. *J. Applied Psychology*, 37, 126-128]. Each entry in the table is the mean 'size' of handwriting for a group of 22 subjects, each writing the same passage in three different colors of ink. Three groups (of 22 subjects each) are classified as 'normal' and the remaining three groups are lumped into a classification arbitrarily labeled 'neurotic.' The data are reported as follows:

| | Group | Color of Ink | | |
|-----------|-------|--------------|-------|-------|
| | | Red | Green | Black |
| Normals | 1 | 20.9 | 22.4 | 21.7 |
| | 2 | 21.6 | 21.1 | 21.5 |
| | 3 | 22.2 | 21.7 | 22.1 |
| Neurotics | 4 | 26.9 | 26.5 | 27.1 |
| | 5 | 27.4 | 27.1 | 24.7 |
| | 6 | 26.4 | 26.7 | 27.5 |

a) Treat the groups as a random variable and test the hypotheses that size of writing is independent of (1) psychiatric classification and (2) of ink color. (Notes: Total $df = 17$. Make sure you think about why this is possible even though there are 22 subjects/group. Also, subtracting 20 from each datum and then multiplying by 10 before you start will save messing with big numbers and decimal points.)

b) Does the effect on size of handwriting due to use of red vs black ink differ depending upon whether the subject is in the normal or neurotic category?