**PROC GLM Effect Size Estimates**

The EFFECTSIZE option in GLM was introduced in Version 6.2 of SAS. To learn about it pull up SAS Help and search for EFFECTSIZE. Find and read the document “Effect Size Measures for F Tests in GLM Experimental.”

EFFECTSIZE will give point estimates and conservative confidence intervals for the noncentrality parameter, eta-squared (SAS calls it ‘semipartial eta-squared’), omega-squared (SAS calls it ‘semipartial omega-squared’), partial eta-squared, and partial omega-squared. The omega-squared statistics are less biased than the eta-squared statistics. The conservative confidence interval is the same for eta-squared as for omega-squared, as both estimate the same parameter. For a one-way design the semipartial statistic is identical to the partial statistic.

Here is an example of the code necessary to produce these estimates and confidence intervals for a two-way ANOVA:

```sas
PROC GLM data=klw; CLASS Age Condition;
MODEL Items=Age|Condition / EFFECTSIZE alpha=0.1; run;
```

“Alpha=0.1” sets the confidence coefficient equal to 10%, which is appropriate if the alpha for the F test is .05.

The Output

```
2-WAY, EQUAL NS, INDEPENDENT SAMPLES ANOVA
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The GLM Procedure

Class Level Information

Class Levels Values
Age 2 Old Young
Condition 5 Adjective Counting Imagery Intentional Rhyming

Number of Observations Read 100
Number of Observations Used 100
```

```
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The GLM Procedure

Dependent Variable: Items

<table>
<thead>
<tr>
<th>Source</th>
<th>DF</th>
<th>Sum of Squares</th>
<th>Mean Square</th>
<th>F Value</th>
<th>Pr &gt; F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>9</td>
<td>1945.490000</td>
<td>216.165556</td>
<td>26.93</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>Error</td>
<td>90</td>
<td>722.300000</td>
<td>8.025556</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
```
Corrected Total             99     2667.790000

R-Square        Coeff Var       Root MSE       Items Mean
0.729252        24.40087        2.832941        11.61000

Overall Noncentrality

Min Var Unbiased Estimate    228.02
Low MSE Estimate             222.84
90% Confidence Limits        (161.9,317.85)

Proportion of Variation Accounted for

Eta-Square                   0.73
Omega-Square                 0.70
90% Confidence Limits        (0.62,0.76)

Source                      DF       Type I SS     Mean Square    F Value    Pr > F
Age                          1      240.250000      240.250000      29.94    <.0001
Condition                    4     1514.940000      378.735000      47.19    <.0001
Age*Condition                4      190.300000       47.575000       5.93    0.0003

Noncentrality Parameter

Source                     Min Var Unbiased Estimate     Low MSE Estimate     90% Confidence Limits
Age                        28.3                         27.6             13.6     52.3
Condition                  180.6                        176.5            126.2    255.0
Age*Condition              19.2                         18.7             7.2      40.2

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The GLM Procedure

Dependent Variable: Items

Total Variation Accounted For

<table>
<thead>
<tr>
<th>Source</th>
<th>Semipartial Eta-Square</th>
<th>Semipartial Omega-Square</th>
<th>Omega-Conservative</th>
<th>90% Confidence Limits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>0.0901</td>
<td>0.0868</td>
<td>0.0198</td>
<td>0.1867</td>
</tr>
<tr>
<td>Condition</td>
<td>0.5679</td>
<td>0.5542</td>
<td>0.4407</td>
<td>0.6335</td>
</tr>
<tr>
<td>Age*Condition</td>
<td>0.0713</td>
<td>0.0591</td>
<td>0.0000</td>
<td>0.1324</td>
</tr>
</tbody>
</table>
Partial Variation Accounted For

<table>
<thead>
<tr>
<th>Source</th>
<th>Partial Eta-Square</th>
<th>Partial Omega-Square</th>
<th>90% Confidence Limits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>0.2496</td>
<td>0.2244</td>
<td>0.1194 0.3435</td>
</tr>
<tr>
<td>Condition</td>
<td>0.6771</td>
<td>0.6488</td>
<td>0.5579 0.7183</td>
</tr>
<tr>
<td>Age*Condition</td>
<td>0.2085</td>
<td>0.1647</td>
<td>0.0671 0.2867</td>
</tr>
</tbody>
</table>

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