Recall the memory-process experiment from the previous lectlet...

A psychologist is studying memory processes. She devises three training sessions, one of which involves "priming," another involves "heuristics," and another involves "interference." She enlists 18 participants, and randomly assigns 6 to the priming condition, 6 to the heuristic condition, and 6 to the interference condition. The dependent measure is the number of errors in a syllable recognition task, where participants are shown a list of nonsense syllables and asked whether they have seen those syllables in the earlier training session. The data are shown below.

<table>
<thead>
<tr>
<th>Group 1</th>
<th>Group 2</th>
<th>Group 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Priming</td>
<td>Heuristics</td>
<td>Interference</td>
</tr>
<tr>
<td>3</td>
<td>12</td>
<td>6</td>
</tr>
<tr>
<td>6</td>
<td>17</td>
<td>11</td>
</tr>
<tr>
<td>9</td>
<td>8</td>
<td>14</td>
</tr>
<tr>
<td>7</td>
<td>15</td>
<td>13</td>
</tr>
<tr>
<td>5</td>
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For the memory-process experiment, state the null hypothesis
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Answer:

Review #2: When we performed the analysis of variance, we rejected the null hypothesis. On the basis of that result, which of those six hypotheses (three pairwise and three complex) should we reject?
Review #2: When we performed the analysis of variance, we rejected the null hypothesis. On the basis of that result, which of those six hypotheses (three pairwise and three complex) should we reject? **Answer:**

<table>
<thead>
<tr>
<th>Yours</th>
<th>Yours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mine</td>
<td>Mine</td>
</tr>
</tbody>
</table>

New material begins...

Rejecting the ANOVA null hypothesis tells us that there is a significant effect somewhere in these data. **But where?**

To find out, we perform "post hoc" tests.

"Post hoc" is Latin for "after the fact," that is, after we reject the ANOVA omnibus null hypothesis.
Tukey HSD post hoc method:
Tests all pairwise null hypotheses
Does not test complex null hypotheses (use Scheffe's method)
Computes a separate $Q$ test statistic for each null hypothesis

<table>
<thead>
<tr>
<th>Comparison</th>
<th>Null Hypothesis</th>
<th>$Q$ statistic</th>
</tr>
</thead>
<tbody>
<tr>
<td>priming vs heuristics</td>
<td>$\mu_1 = \mu_2$</td>
<td>$Q_1$</td>
</tr>
<tr>
<td>priming vs interference</td>
<td>$\mu_1 = \mu_3$</td>
<td>$Q_2$</td>
</tr>
<tr>
<td>heuristics vs interference</td>
<td>$\mu_2 = \mu$</td>
<td>$Q_3$</td>
</tr>
</tbody>
</table>
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Post hoc tests are versatile but not powerful.

A priori tests are the most powerful tests available, but you can do only one.

"A priori" is Latin for "from before" -- you must plan an a priori test before you see the data.
Two example comparisons:

<table>
<thead>
<tr>
<th>Type</th>
<th>Null hypothesis</th>
<th>Comparison</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pairwise</td>
<td>priming equals heuristics</td>
<td>$\mu_1 = \mu_2$</td>
</tr>
<tr>
<td>Complex</td>
<td>priming equals average of heuristics and interference</td>
<td>$\mu_1 = \frac{\mu_2 + \mu_3}{2}$</td>
</tr>
</tbody>
</table>

Choose which comparison to test before you look at the data
(remember, this is an "a priori" or "planned comparison")

The test statistic is $t$

*End of lectlet.*