Example of a 3-way Factorial

The purpose of the design was to examine the individual and joint effects of Stimulus Type (shape vs. Texture stimuli), Modality (vision vs. touch) and Practice (0 vs. 10 practices) upon discrimination performance. The DV is given as %-correct.

Effects Examined in the Design

- **Main effects** – the effect of one IV, ignoring the other two IVs (based on comparisons among marginal means that are formed for each condition of the IV, aggregating across levels of the other two IVs).
  - there are three main effects in this design
    - Stimulus Type
    - Modality
    - Practice

- **2-way Interaction Effects** – the joint effect of two IVs, ignoring the third IV (based upon comparisons among semi-marginal means that are formed for each joint condition of the two IVs, aggregating across the levels of the third IV)
  - there are three 2-way interactions in this design
    - Stimulus Type x Modality
    - Stimulus Type x Practice
    - Modality x Practice

- **3-way Interaction Effect** – the joint effect of three IVs (based upon comparisons among cell means)
  - there is one 3-way interaction – Stimulus Type x Modality x Practice

Notice that this description focuses on practice effects, looking at how they differ for each modality, and how this practice by modality difference differs across types of stimuli.
There is a three way interaction or stimulus type, modality and practice, as they relate to performance. There is no modality by practice effect for texture stimuli, however for shape stimuli the pattern of this interaction is that visual performance is not improved by practice, whereas touch performance is.
Constructing Marginal Means to Examine Main Effects

Stimulus Type

<table>
<thead>
<tr>
<th>Practice</th>
<th>Practice</th>
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</thead>
<tbody>
<tr>
<td>0</td>
<td>10</td>
</tr>
<tr>
<td>Shape</td>
<td>Texture</td>
</tr>
<tr>
<td>0</td>
<td>10</td>
</tr>
</tbody>
</table>

Modality

<table>
<thead>
<tr>
<th>Modality</th>
<th>Practice</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vision</td>
<td>90</td>
</tr>
<tr>
<td>Touch</td>
<td>60</td>
</tr>
</tbody>
</table>

Key

Main Effect of Modality: Vision vs. Touch
Main Effect of Practice: 0 vs. 10
Main Effect of Stimulus Type: Shape vs. Texture
### Modality x Practice 2-way Interaction

**Key**
- Vision with 0 Practices
- Vision with 10 Practices
- Touch with 0 Practices
- Touch with 10 Practices

There is a two-way interaction of modality and practice, such that practice produces more improvement for touch than for vision.
There is a 2-way interaction of modality and stimulus, with vision performing better than touch with shape stimuli, but no modality effect for texture stimuli.
Constructing Semi-Marginal Means to Examine 2-way Interactions (3rd of 3)

Practice x Stimulus Type 2-way Interaction

Key
Shape Stimuli with 0 Practices
Shape Stimuli with 10 Practices
Texture Stimuli with 0 Practices
Texture Stimuli with 10 Practices