Statistics in research

Kinds of data

<table>
<thead>
<tr>
<th>Level</th>
<th>Properties</th>
<th>Observations reflect</th>
<th>Example</th>
<th>Type of data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal</td>
<td>Classification</td>
<td>Differences in</td>
<td>Favorite food</td>
<td></td>
</tr>
<tr>
<td>Order</td>
<td>classification</td>
<td>Differences in degree</td>
<td>___________</td>
<td>Ranked</td>
</tr>
<tr>
<td>Equal</td>
<td>Order classification</td>
<td>Differences in</td>
<td>___________</td>
<td>Ranked</td>
</tr>
<tr>
<td></td>
<td></td>
<td>total amount</td>
<td>IQ</td>
<td>Quantitative</td>
</tr>
<tr>
<td>Ratio</td>
<td></td>
<td>Differences in</td>
<td>___________</td>
<td>Height</td>
</tr>
<tr>
<td></td>
<td></td>
<td>___________</td>
<td>___________</td>
<td>Quantitative</td>
</tr>
</tbody>
</table>

Descriptive statistics: Describing your data

- Measures of central tendency
  - Mode (____ and up)
  - Median (____ and up)
  - Mean (____ and up) – most _________
  - Measures of dispersion or ___________
  - Entropy (__________) – higher = ______ possibilities
  - Range of 1, 2, 3, 4, 5; _______ = 5; “ranged from 1-5”
- ___________
  - Average distance of each score from ______
  - ________________ squared

Correlation

- How ______ are two variables?
- One variable ______ another.
  - _______ goes both ways—can’t say it’s causal
    unless you have _________ one of the variables!

Correlations

Vary from ________ to ________

Vary from ________ to ________

Vary from ________ to ________

Vary from ________ to ________
More on correlations

- Pearson’s r for _______ or _______ data
- Spearman’s rho ρ for _______
- Advanced techniques
- Regression
  - _______ (X) variable and dependent (Y) variable
- Multiple regression
  - Several continuous _______ (X1, X2, X3…) and Y

Inferential statistics: Comparisons

- _______ - groups design (more next week)
  - Experimental group vs. _______
  - _______ vs. placebo group
- Drug group: 3 headaches/month
- Placebo group: 3.7 headaches/month

- Are these different?
  - If the range was 1-15 headaches a month?
  - If the range was 2-5 headaches a month?
- Intuition: different if the difference _______ the two groups is large vs. the variability _______ the groups

Inferential statistics: Comparisons

- Drug group: 3 headaches/month
- Placebo group: 3.7 headaches/month
- Intuition: different if the difference _______ the two groups is large vs. the variability _______ the groups

\[
\frac{\text{Difference between groups}}{\text{Error variance}} = \frac{\text{Effect of IV + Error variance}}{\text{Error variance}}
\]

Graphically

Inferential statistics: Comparisons

- One group to [null] population:
  - Higher incidence of cancer than in population?
  - Better performance than chance would predict?
- Two groups to each other: _______
  - Drug to placebo
  - Music therapy vs. art therapy
  - _______, low-prob novel words vs. high-prob novel words
- Three groups to each other: _______
  - 10 mg of drug to _______ of drug to placebo
  - Music therapy vs. art therapy vs. no therapy
  - Red room vs. blue room vs. _______

- F, t, z, χ² all have associated _______
- Always: look for low probability that your difference is due to chance