Simple Flowchart for Statistics Used in Biology

What type of data are they?
- Discrete or Categorical

Chi-Square Test: One and Two Sample
\[ X^2 = \sum \frac{(o-e)^2}{e} \]

Is there a difference between the means?
- Two treatments
  - Paired \( t \)-Test
    - Measurements in each treatment are paired with each other
  - Unpaired \( t \)-Test
    - Measurements in each treatment are independent of each other

Is there a relationship between two variables?
- More than two treatments
  - Linear Regression Test
    - \[ r = \frac{\sum_{i=1}^{n} (x_i - \bar{x})(y_i - \bar{y})}{n - 1} \]

What type of data are they?
- Continuous

Statistical Question

Is there a difference between the means?
- Two treatments
  - Paired \( t \)-Test
  - Unpaired \( t \)-Test

Is there a relationship between two variables?
- More than two treatments
  - Linear Regression Test

Parametric Assumptions:
1. Data are normally distributed
2. Samples are unbiased and independent

Analysis of Variance (ANOVA)

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th>P-value</th>
<th>F crit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Groups</td>
<td>24.2</td>
<td>2</td>
<td>12.1</td>
<td>27.8</td>
<td>&lt; 0.01</td>
<td>3.28</td>
</tr>
<tr>
<td>Within Groups</td>
<td>14.36</td>
<td>33</td>
<td>0.435</td>
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<td></td>
</tr>
<tr>
<td>Total</td>
<td>338.92</td>
<td>35</td>
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</tbody>
</table>