By this stage, you will have completed many of the early stages of your investigation. Now is a good time to review what you have done and reflect on the biological significance of what you are investigating. Review the first page of this flow chart in light of your findings so far. You are now ready to begin a more in-depth analysis of your results. Never under-estimate the value of plotting your data, even at a very early stage. This will help you decide on the best type of data analysis (see opposite).
Skills in Biology

Calculate mean and 95% CI from replicates

What kind of data are you recording?

Measurements or counts

Frequencies (counts only, not measurements)

What kind of test?

Testing for a relationship between variables

Testing for a difference between groups (e.g. habitats or treatments)

Regression

Linear: The data plot in a straight line (uncommon biologically). Example: club size vs body size in giraffes.

Non-Linear: The data do not plot in a straight line (i.e. curved). Example: oxygen consumption at different temperatures.

ANOVA (Analysis of variance)

Example: Survival of weevils in different pasture types.

Chi-squared test

Example: An expected genetic ratio, or preference for different habitats.

Pearson correlation coefficient

Example: Wing length vs tail length in birds.

Paired t-test

Example: Comparison of ratios of arm to leg length in chimpanzees and gorillas.

Spearman correlation coefficient

Example: Frequency of occurrence of different species at two sites.

Unpaired t-test

Example: Suitability of clay pots and plastic pots for plant growth.

Chi-squared test for association

Example: Association of one plant with another in an area.

Mann-Whitney U-test

Data must be ranked in order of increasing size. Example: Size of fruit from a plant species grown in two different habitats.

Test for goodness of fit

Finding how one factor affects another

Normal data

Non-normal data

More than two groups of data

Two groups of data

Normal data

Non-normal data

Normal data

Non-normal data

Different individuals

Same individuals

Finding how one factor affects another

Comparing observed counts to an expected count

Testing an association between groups of counts

Observation Something...

• Changes or affects something else.

• Is more abundant, etc. along a transect, at one site, temperature, concentration, etc.

• Is bigger, taller, or grows more quickly.

Research To find out...

• Basic biology and proper properties.

• What other biotic or abiotic factors may have an effect.

• Its place within the broader biological context.

Variables Next you need to...

• Identify the key variables likely to cause the effect.

• Identify variables to be controlled in order to give the best chance of showing the effect that you want to study.

Pilot study Lets you check...

• Equipment, sampling sites, sampling interval.

• How long it takes to collect data.

• Problems with identification or other unforeseen issues.

Analysis Are you looking for a...

• Difference.

• Trend or relationship.

• Goodness of fit (to a theoretical outcome).

Hypothesis Must be...

• Testable

• Able to generate predictions so that in the end you can say whether your data supports or allows you to reject your hypothesis.

Be prepared to revise your study design in the light of the results from your pilot study.

Plot a scatter graph

Trend

Finding how one factor affects another

Bar graph

Plot a difference

Testing for a correlation

Linear

Non-Linear

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