Statistics Session 1

Analysis of biological data

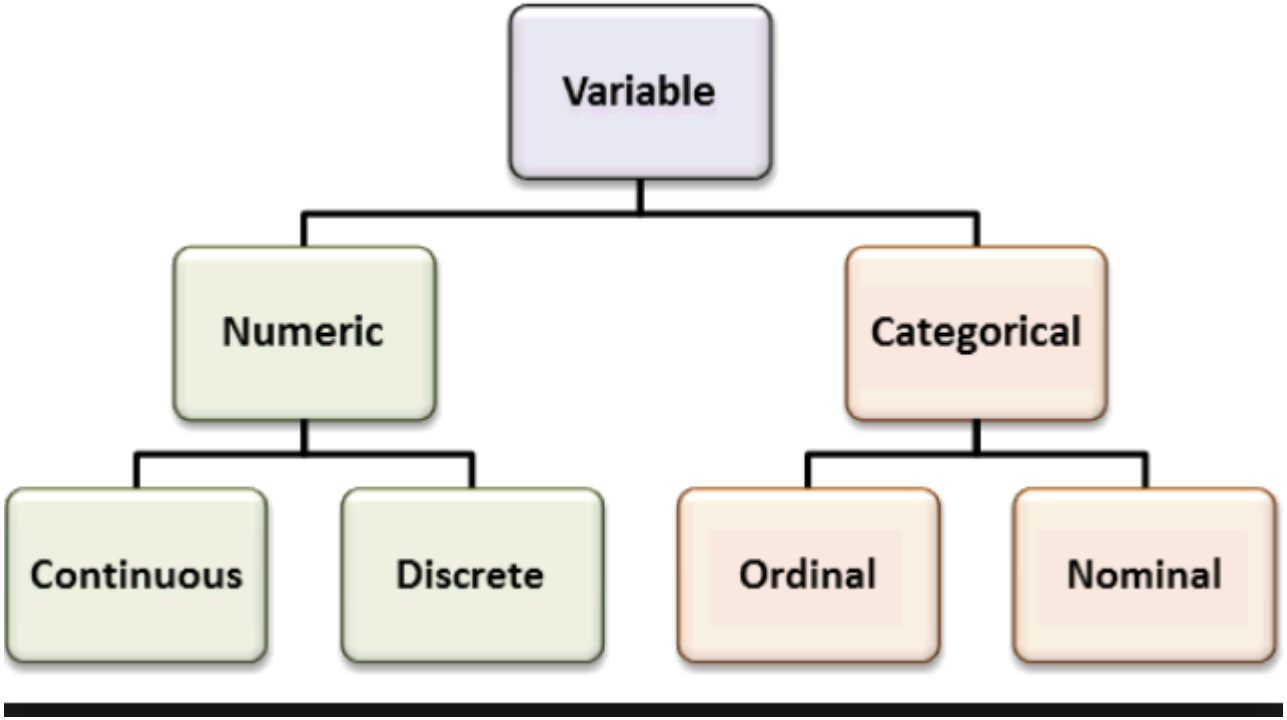
Slides prepared from biostathandbook.com

How to determine the appropriate statistical test?

1. Specify the biological question you are asking.
2. Put the question in the form of a biological null hypothesis and alternate hypothesis.
3. Put the question in the form of a statistical null hypothesis and alternate hypothesis.
4. Determine which variables are relevant to the question.
5. Determine what kind of variable each one is.
6. Design an experiment that controls or randomizes the confounding variables.
7. Based on the number of variables, the kinds of variables, the expected fit to the parametric assumptions, and the hypothesis to be tested, choose the best statistical test to use.
8. Do the experiment.
9. Examine the data to see if it meets the assumptions of the statistical test you chose
10. Apply the statistical test you chose, and interpret the results.
11. Communicate your results effectively, usually with a graph or table.

Types of biological variables

- Variables – Set of values which changes with every observation!

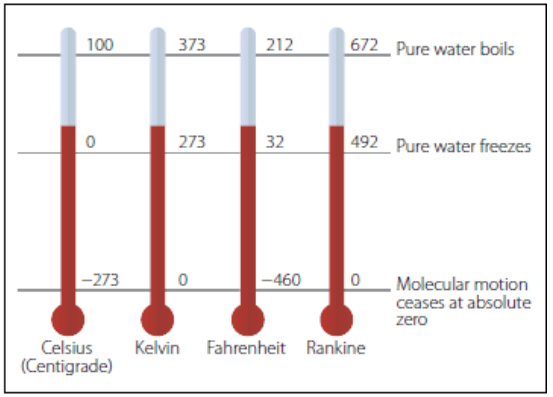


http://makemeanalyst.com/basic-statistics-explore-your-data-cases-variables-types-of-variables/

Numeric

- Quantifiable numbers– Quantitative variables

Amazon.com



http://www.flight-mechanic.com/temperature/

Continuous – If in-between values makes sense eg, Time, Temperature data

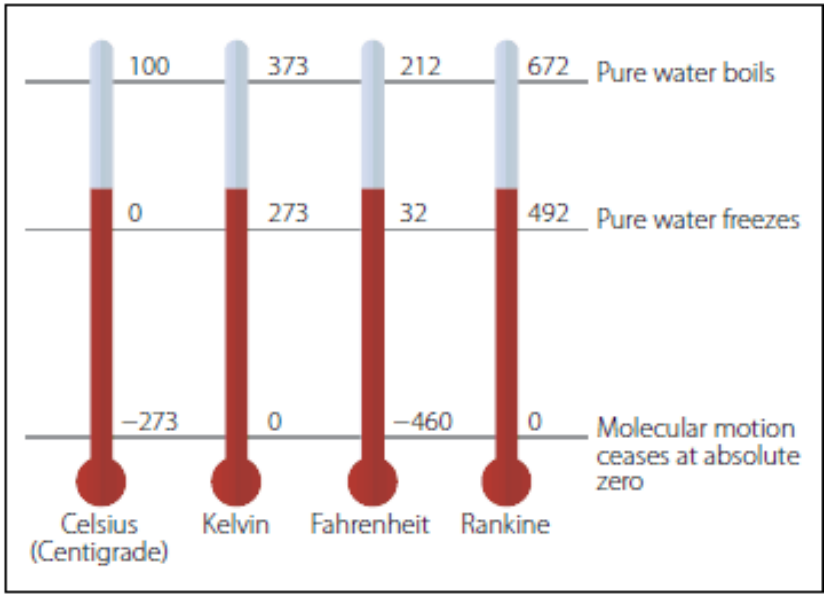
Discrete – If in-between values makes no sense eg, Number, Count data


Bharat Parthasarathy

Categorical

- Variables classified into categories/classes

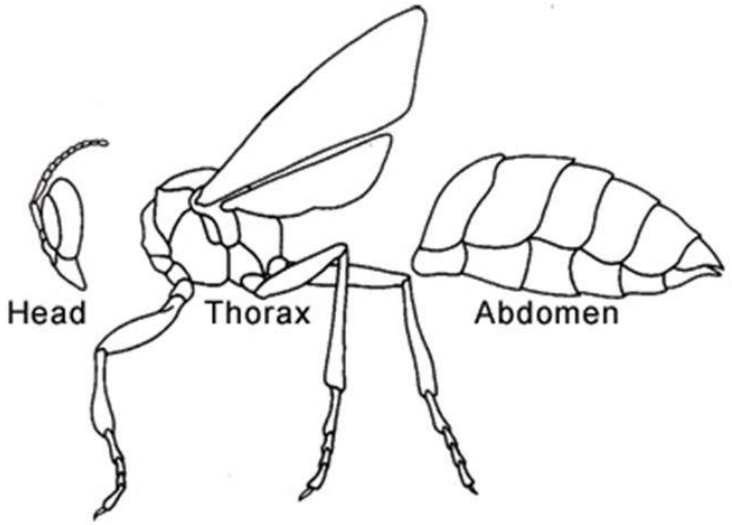
Ordinal



http://www.flight-mechanic.com/temperature/

The order matters!

Nominal



https://www.english-online.at/biology/insects/insects.htm

Order has no meaning

Independent and dependent variables

- Independent - predictor, explanatory, or exposure variable
- Dependent - outcome or response variable

“Independent is a variable that you think may cause a change in a dependent variable”

Temperature vs bee fanning

Prey type vs spider response

Confounding variables

- The variables, other than the independent variable which may affect the dependent variable
- Control of confounding variables
    - Randomization
    - Matching
    - Statistical control

How to determine the appropriate statistical test?

1. Specify the biological question you are asking.
2. Put the question in the form of a biological null hypothesis and alternate hypothesis.
3. Put the question in the form of a statistical null hypothesis and alternate hypothesis.
4. Determine which variables are relevant to the question.
5. Determine what kind of variable each one is.
6. Design an experiment that controls or randomizes the confounding variables.
7. Based on the number of variables, the kinds of variables, the expected fit to the parametric assumptions, and the hypothesis to be tested, choose the best statistical test to use.
8. Do the experiment.
9. Examine the data to see if it meets the assumptions of the statistical test you chose
10. Apply the statistical test you chose, and interpret the results.
11. Communicate your results effectively, usually with a graph or table.

To be continued!

http://emgn.com