

# *Measuring the girth of a tree*

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Anna Roddate



- Being a researcher is as much about doing a practical job as being academically competent.

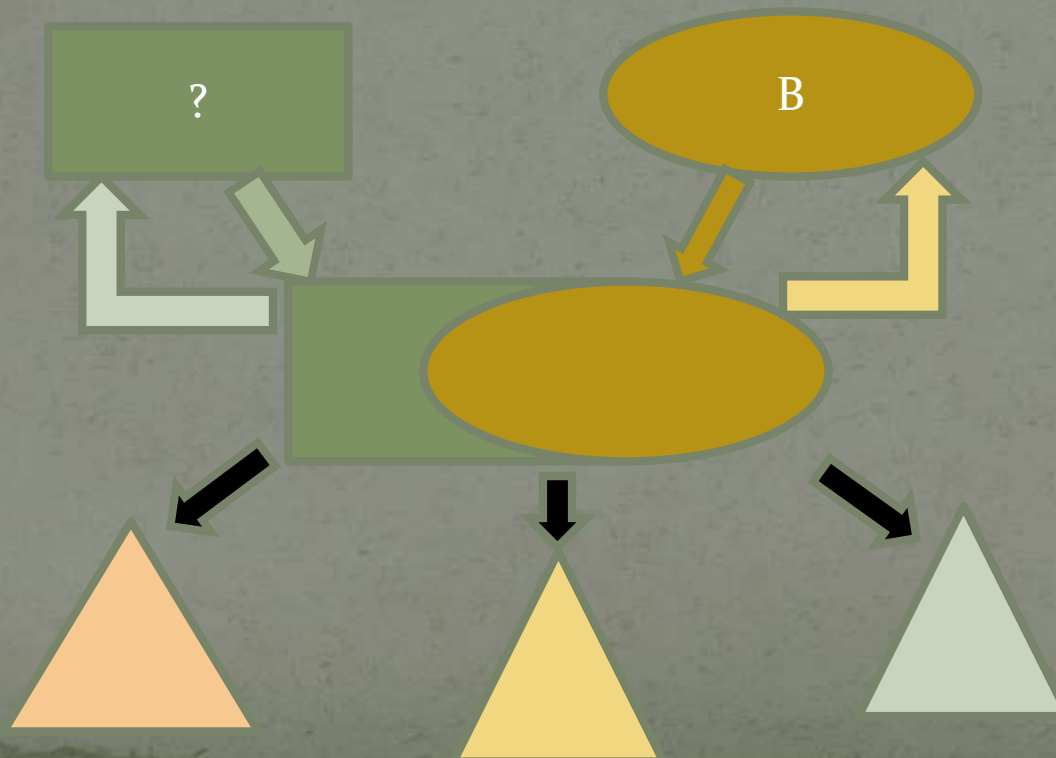
Identifying a subject to research, finding and collecting information and analysing it, presents you with a range of practical problems that need to be solved.

*Nicholas Walliman (Senior Lecturer in the Department of Architecture at Oxford Brookes University, UK.)*

# The purpose of the study

- To involve students in the process of developing and using simple tools to measure the height of a tree, its spread and density using different angles and simple formulas. This creates opportunities for discussion on the accuracy of their measurements and how these might be used in real life situations, for example, to survey their school grounds or local community spaces and develop the schemes for tree planting, as well as to consider the mathematical skills needed for working in the field of forestry.

- The biological sciences have long benefited from the intellectual and pragmatic input of ideas and techniques from other disciplines, including medicine, chemistry, engineering, and mathematics.



# DESCRIPTIVE RESEARCH

- This design relies on observation as a means of collecting data. It attempts to examine situations in order to establish what can be predicted to happen again under the same circumstances. 'Observation' can take many forms. What is important is that the observations are written down or recorded in some other way, so that they can be subsequently analysed. The scale of the research is influenced by two major factors: the level of complexity of the survey and the scope or extent of the survey.

# EXPERIMENTAL RESEARCH

- Attempts to isolate and control every relevant condition which determines the events investigated and then observes the effects when the conditions are manipulated. At its simplest, changes are made to an independent variable and the effects are observed on a dependent variable – i.e. cause and effect.
- Although experiments can be done to explore a particular event, they usually require a hypothesis (prediction) to be formulated first in order to determine what variables are to be tested and how they can be controlled and measured.

# CORRELATIONAL RESEARCH

- Correlational research or studies examine differences of characteristics or variables of two or more entities. A correlation exists when one variable increases or decreases correspondingly with the other variable.

A researcher will gather data about two or more variables in a particular group. These data are numbers that reflect measurement of the characteristics of research questions. Correlational results can be represented using various means of visualisation, e.g. using a scatterplot which allows a visual inspection of the relationship between two variables

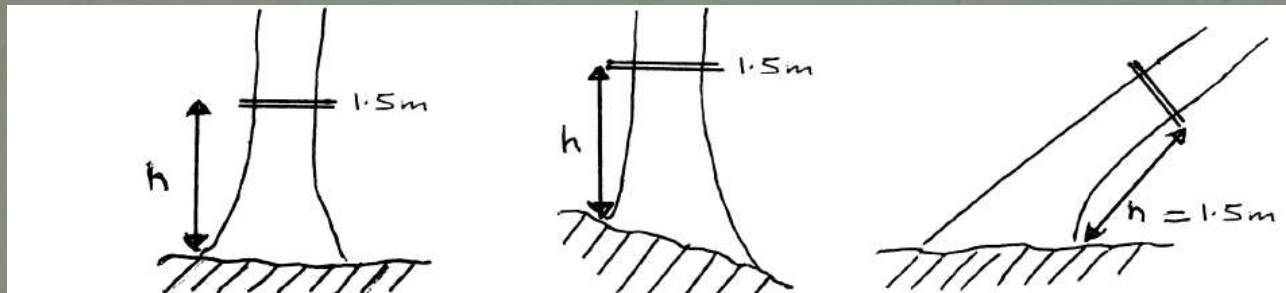
# Independent, Dependent and Controlled Variables

DESCRIPTIVE RESEARCH <u>Observation</u>	EXPERIMENT
Begin with stating the research question	Begin with stating the research question
?	Hypothesis
<p><b><u>Dependent Variable</u></b></p> <p>Observation studies are involved in both quantitative and qualitative research methods. However, in quantitative methods, the focus of observation studies is on a particular factor and it is quantified</p>	<p><b><u>Independent Variable</u></b> <b><u>Dependent Variable</u></b> <b><u>Controlled Variable</u></b></p>
<p><b>Is there a correlation?</b> <b>ANALYSIS OF RESULTS</b></p>	<b>ANALYSIS OF RESULTS</b>



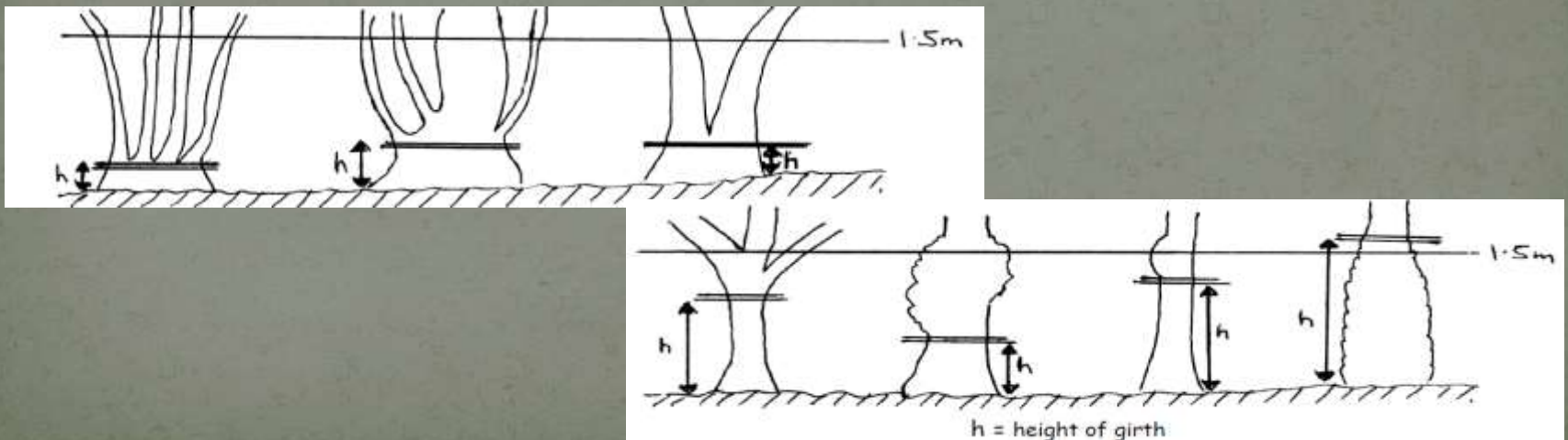
# Dependent Variable

- The dependent variable is what is measured or observed. It is the "effect" in the cause-and-effect relationship.
- *Measuring the girth of a tree*



# Controlled Variable

- In order for the test to be fair, other factors that could affect the outcome of the experiment should be kept the same, or controlled.
- If the tree forks or is swollen at 1.5m, then measure its girth at the narrowest point below 1.5m, as well as measure the height of the tree from the ground at which that girth measurement was taken.



# Independent Variable

- Think of the experiment as a "cause-and-effect" exercise.
- The independent variable is the "cause" factor.

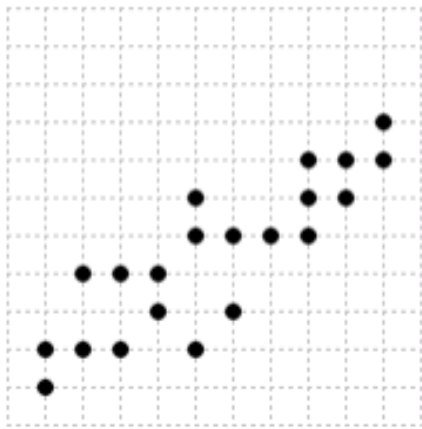
1. Factors (biotic) \_\_\_\_\_
2. Factors (abiotic) \_\_\_\_\_
3. Factors (anthropogenic) \_\_\_\_\_

- Correlational results

# Correlation of results (example)

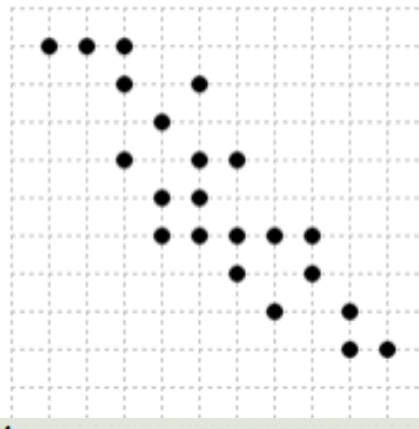
Dependent Variable

a) pozitīva korelācija;



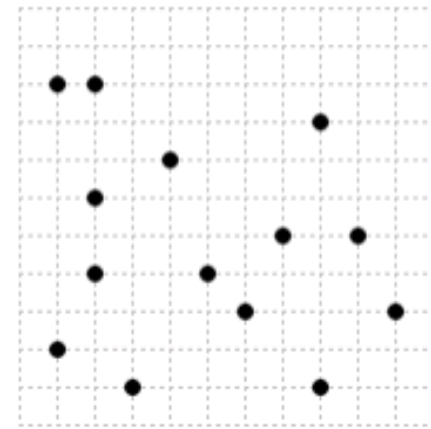
*Distance to the nearest tree (Biotic)*

b) negatīva korelācija;



*Amount moss on a tree trunk (Biotic)*

c) korelācijas nav.

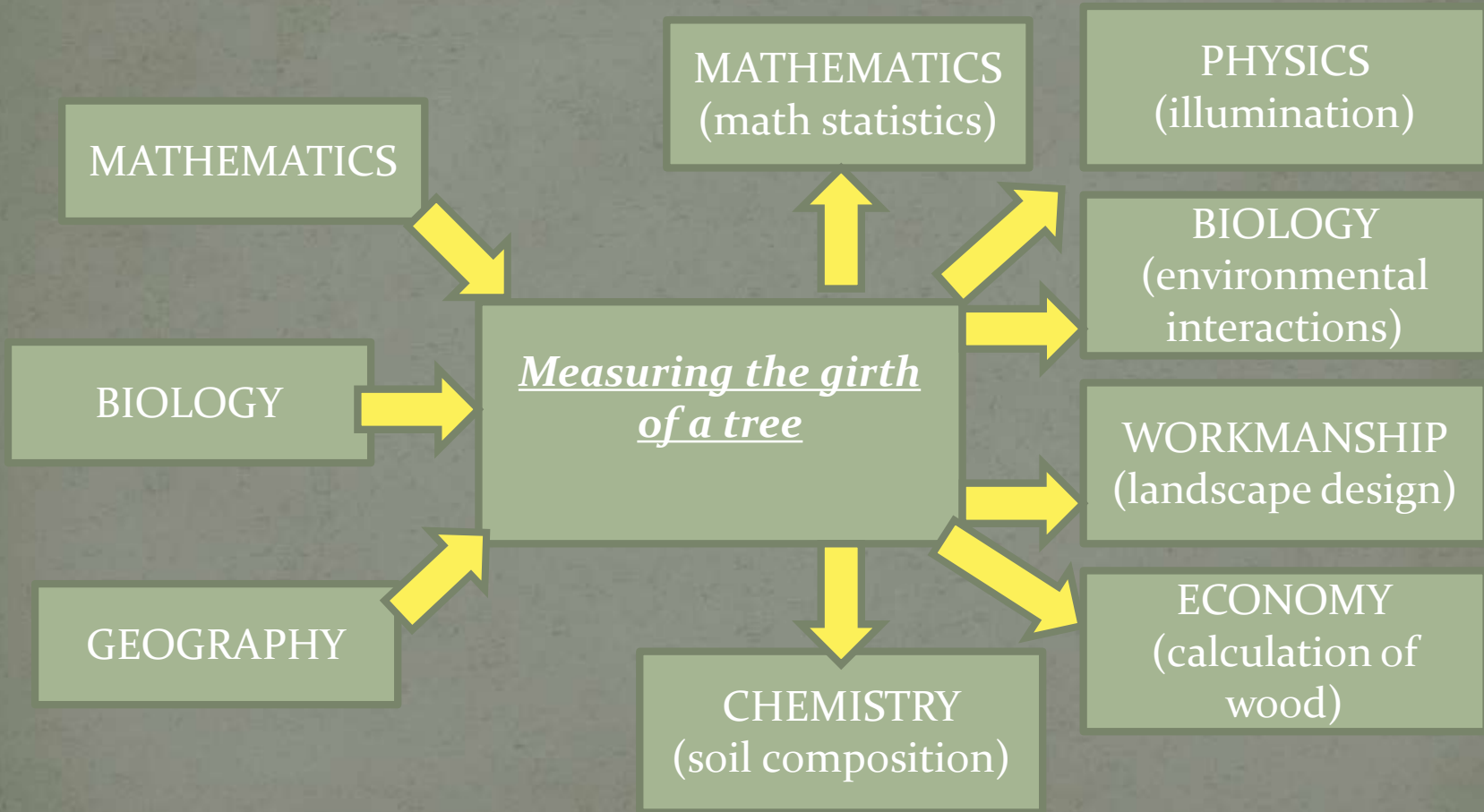


**Soil relief**

Independent Variable

- If the value of one attribute increases together with the value of the other attribute, then the correlation is positive.
- If the value of one attribute increases but the value of the other attribute decreases, then the correlation is negative. For example, a negative correlation can be observed between the output of production and the unit cost of production.
- If the points are very “scattered,” then there is no correlation between the attributes, or it is very small.

# The place of an observation lesson in the lesson network



# Suggested factors

BIOTIC FACTORS	ABIOTIC FACTORS	ANTHROPOGENIC FACTORS
<p>Amount of the trees <b>nearby(?)</b></p> <p><i>Amount of the moss on a tree trunk</i></p> <p><b>Lichens</b></p> <p><b>Mushrooms</b></p> <p><i>Distance to the nearest tree</i></p> <p><b>Competition</b> among the trees (of a single species)</p> <p>The number of <b>branches</b> (?) on a tree</p> <p><b>Insects</b></p>	<p>The <b>amount of minerals</b> ( Ca, Na, P....) in the soil</p> <p><i>Lighting 1-5</i></p> <p><b>Soil structure</b></p> <p><b>Lots (amount ?)</b> of rainfall</p> <p><b>Soil relief</b></p> <p><b>Wind</b></p> <p><b>The soil</b></p> <p><u><b>Shadow falling on a tree</b></u></p>	<p><b>Stone roads</b></p> <p><b>Tearing leaves and fruits from branches</b> (?!?!)</p> <p><i>Distance to the road</i></p> <p><b>Proximity to the road</b></p> <p><i>Mechanical damage to the tree trunk</i></p> <p><i>Distance to fence posts</i></p> <p><b>Cars</b></p>

# Independent, Dependent and Controlled Variables

<u>Independent Variable</u>	<u>Dependent Variable</u>	<u>Controlled Variable</u>
<p><i>Amount of the moss on a tree trunk (Biotic)</i></p> <p><i>Distance to the nearest tree (Biotic)</i></p> <p><b><u>Shadow falling on a tree</u></b> (abiotic)</p> <p><u>Lighting 1.-5.</u> (abiotic)</p> <p><i>Distance to the road</i> (antr)</p> <p><i>Mechanical damage to the tree trunk (antr)</i></p> <p><i>Distance to fence posts (!)</i> (antr)</p>	<p>DBH or “Diameter at Breast height”</p>	<p>ABIOTIC FACTORS, .....</p>



- <http://www.carinadizonmaellt.com/LANGRES/pdf/28.pdf>
- <https://sciencing.com/dependent-independent-controlled-variables-8360093.html>
- <http://web.csulb.edu/~msaintg/ppa696/696vars.htm>
- <https://edubirdie.com/blog/biology-research-topics>
- <https://www.owlscotland.org/images/uploads/resources/files/TreeMeasuring2018.web3.pdf>