Managing a Successful Computing Project

RESEARCH (p2)
Quantitative Research

UNIVERSITY of GREENWICH
Alliance with FPT Education

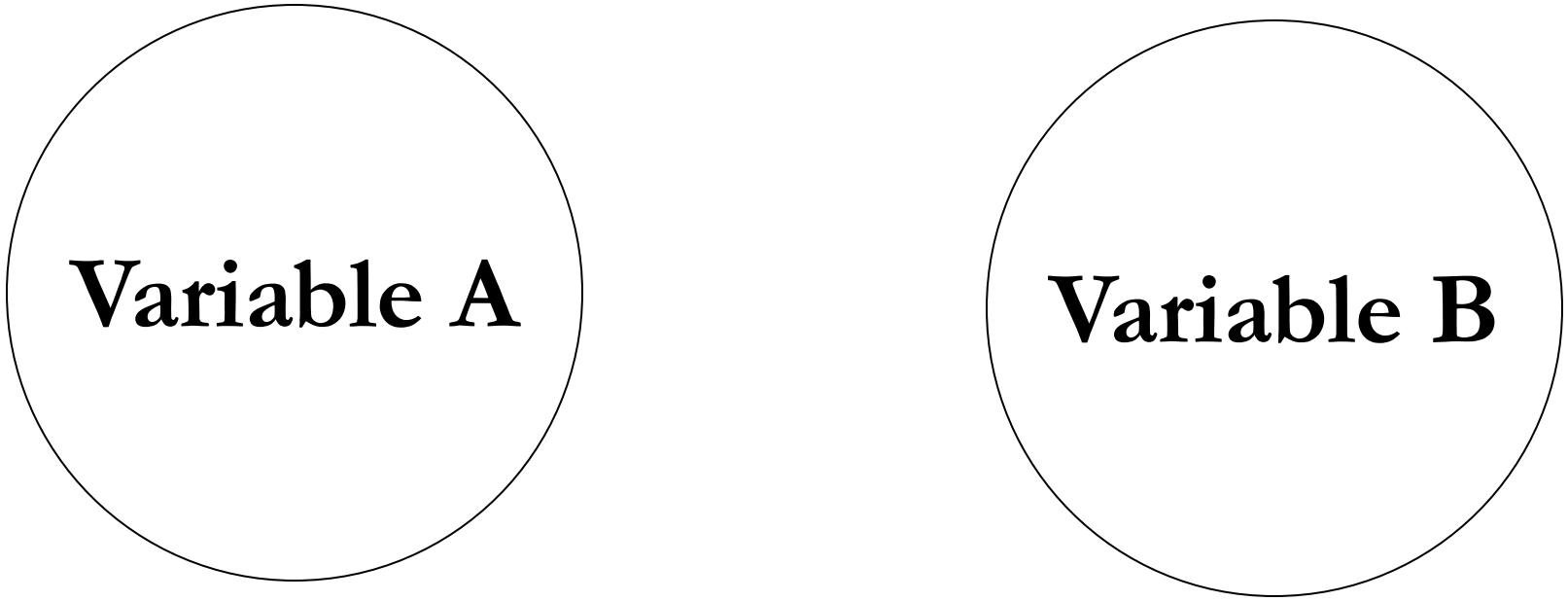
Pearson BTEC

Quantitative research - two concerns.

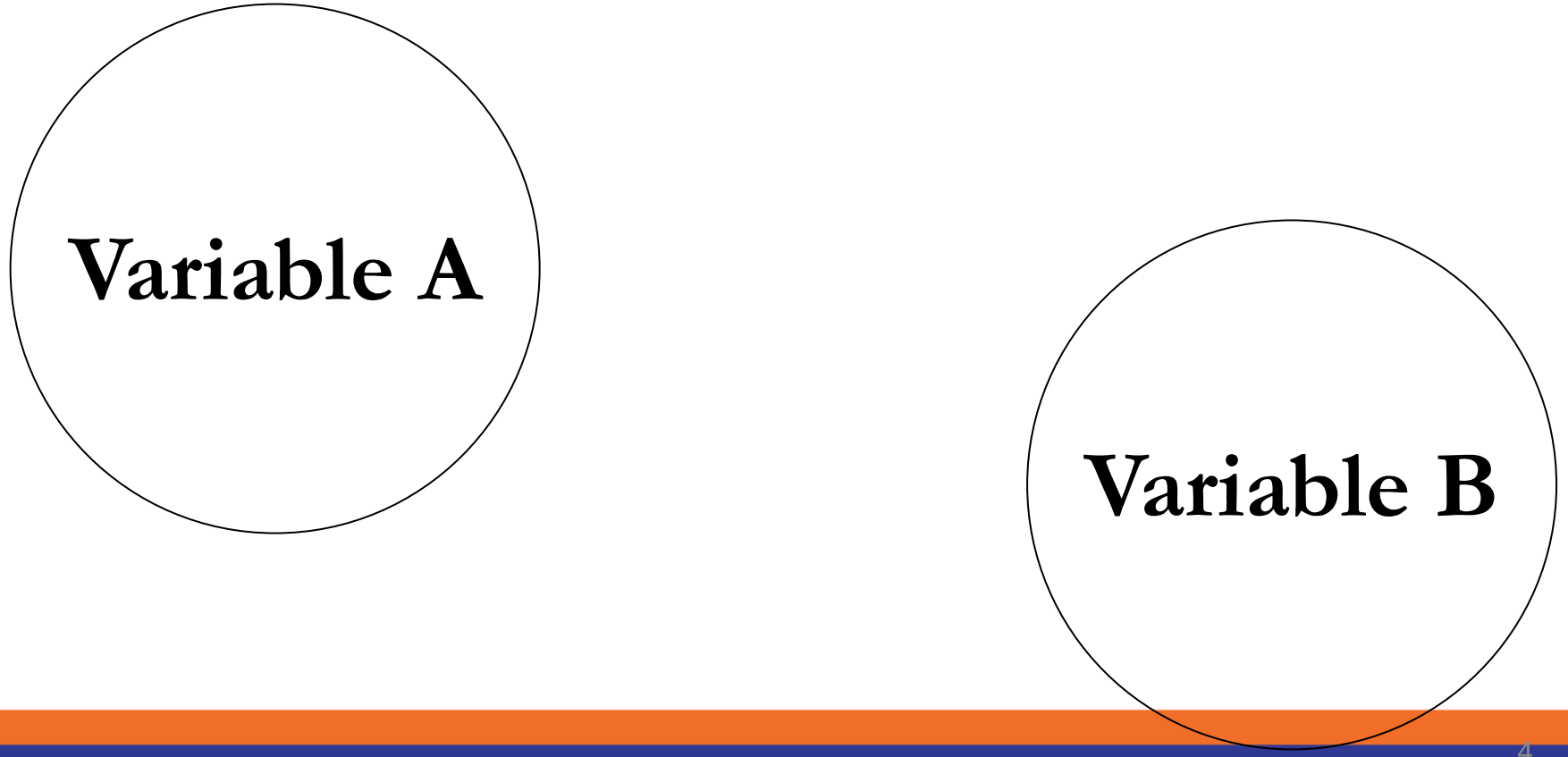
Quantitative research is interested in the nature of relationships among variables.

Quantitative researchers are interested in whether their discoveries are generalizable.

Quantitative research is interested in the nature of relationships among variables.



The variables might be unrelated.



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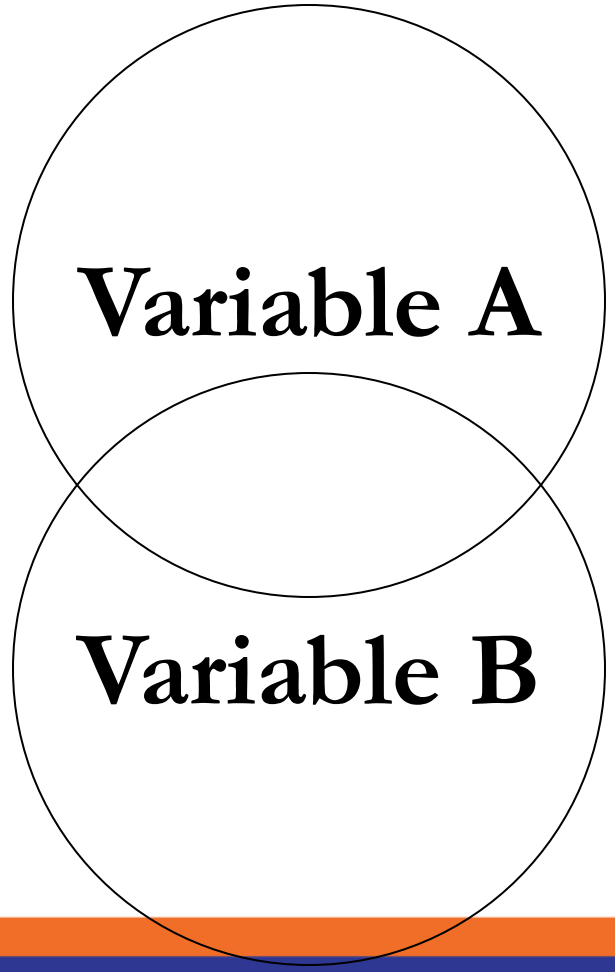
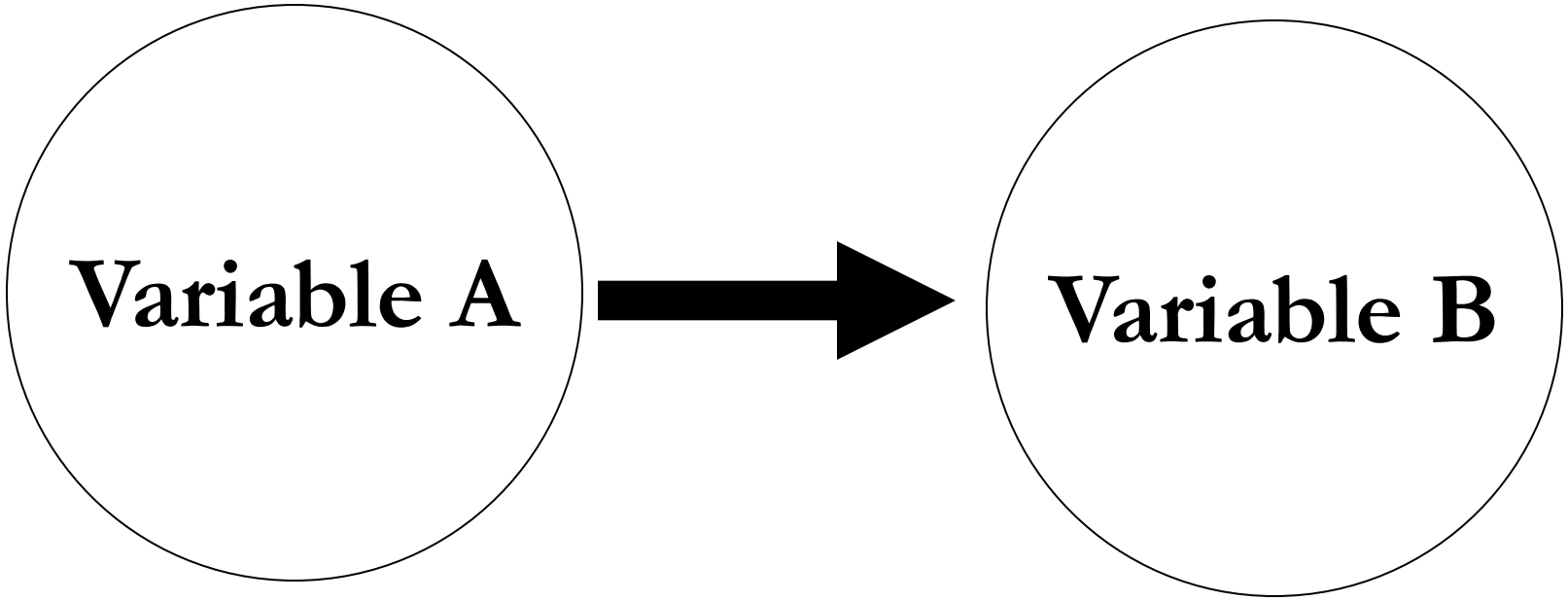
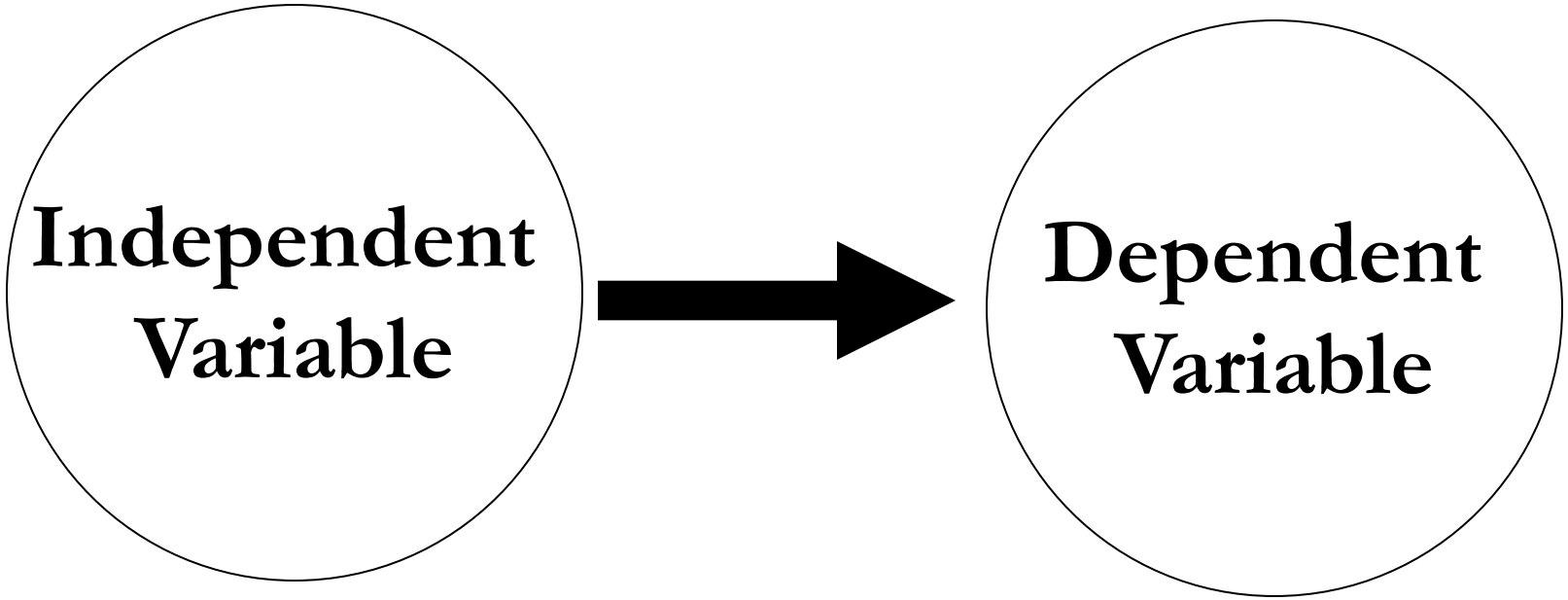


One variable might affect another.



When one variable affects another



Quantification

The term "quantitative" refers to this research approach because we wish to *quantify* these two concepts:

- The size of the relationships among variables.

- The probability that the results are generalizable.

Level of measurement

Nominal

Numerical values are used only as names for different categories.

Ordinal

The attributes can be rank-ordered. However, distances between attributes do not have any meaning.

Interval

The distances between scores have meaning and are treated as equal. For example, when we measure temperature, the distance from 30-40 is equal to the distance from 70-80. The interval between values is interpretable.

Ratio

In social science research most "count" variables are ratio, for example, the number of children eligible for special education services.

Quantifying Data

- Before we can do any kind of analysis, we need to quantify our data
- “Quantification” is the process of converting data to a numeric format
  - Convert social science data into a “machine-readable” form, a form that can be read & manipulated by computer programs

Quantifying Data

Some transformations are simple:

- Assign numeric representations to nominal or ordinal variables:
  - Turning *male* into “1” and *female* into “2”
  - Assigning “3” to *Very Interested*, “2” to *Somewhat Interested*, “1” to *Not Interested*
- Assign numeric values to continuous variables:
  - Turning *born in 1973* to “35”
  - Number of children = “02”

Quantitative Analysis

- You should choose a level of analysis that is appropriate for your research question

- You should choose the type of statistical analysis appropriate for the variables you have
  - Nominal/Categorical, Ordinal, or Continuous

Quantitative Levels of Analysis

- Univariate - simplest form,describe a case in terms of a single variable.
- Bivariate - subgroup comparisons, describe a case in terms of two variables simultaneously.
- Multivariate - analysis of two or more variables simultaneously.

Univariate

- Univariate analysis is the simplest form of analyzing data.
- “Uni” means “one”, so in other words your data has only one variable.
- It doesn’t deal with causes or relationships (unlike regression) and it’s major purpose is to describe; it takes data, summarizes that data and finds patterns in the data.

Univariate

- Describe data
  - Frequency Distribution Tables.
  - Bar Charts..
  - Frequency Polygons.
  - Pie Charts.

Univariate

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Class (Marks)	Frequency
11 - 15	2
16 - 20	3
21 - 25	3
26 - 30	5
31 - 35	6
36 - 40	6
41 - 45	3
46 - 50	2
Total	**30**

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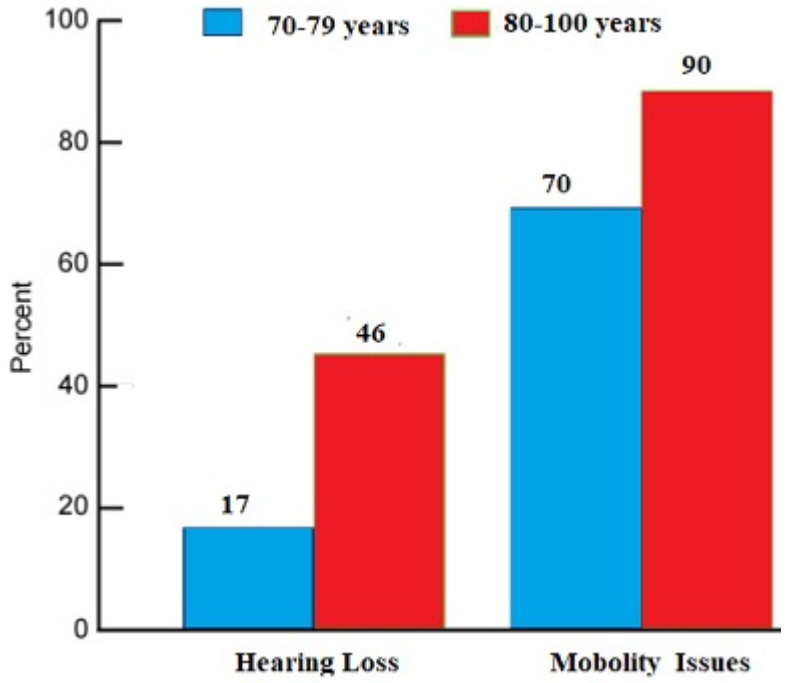

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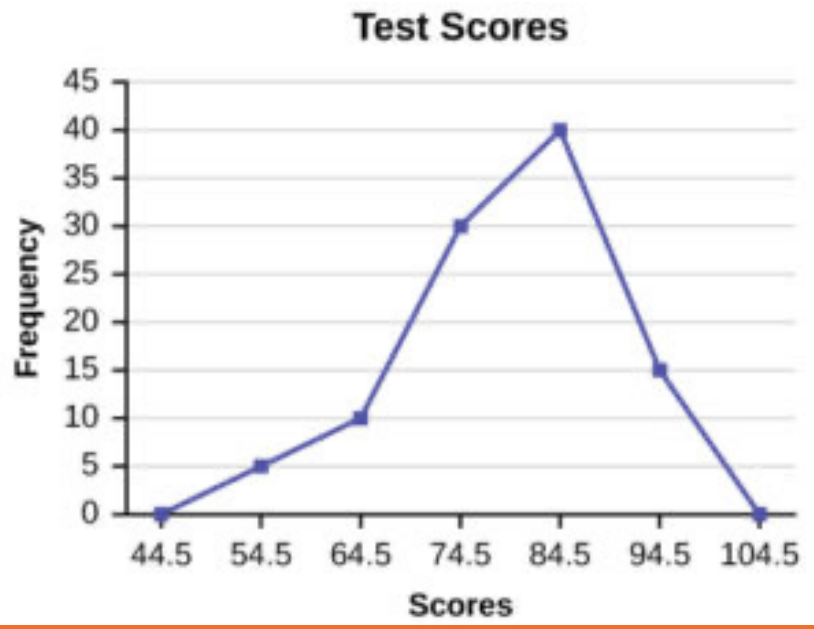

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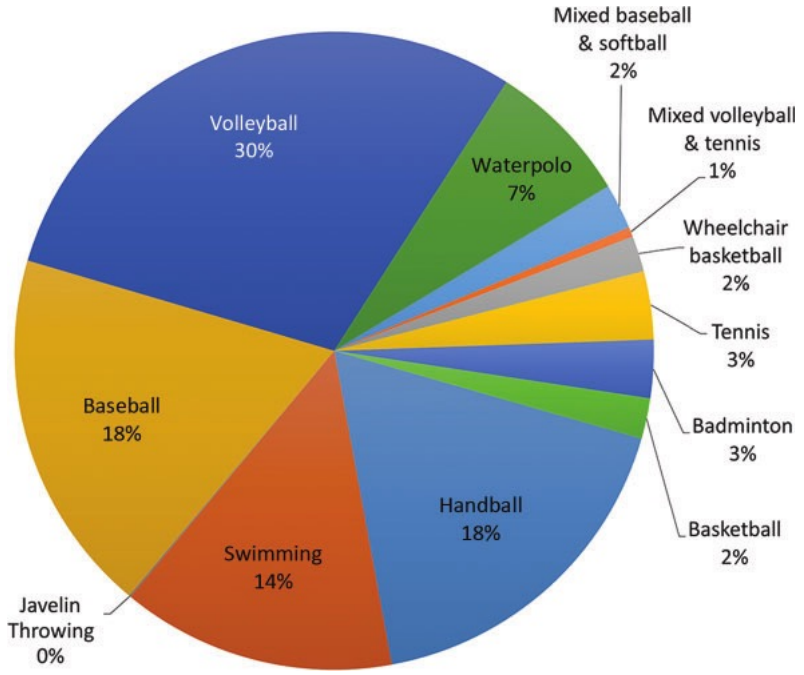

Bivariate

- Bivariate analysis is the simultaneous analysis of two variables (attributes).
- It explores the concept of relationship between two variables, whether there exists an association and the strength of this association, or whether there are differences between two variables and the significance of these differences.

Bivariate

- Types of bivariate:
  - Numerical & Numerical
  - Categorical & Categorical
  - Numerical & Categorical

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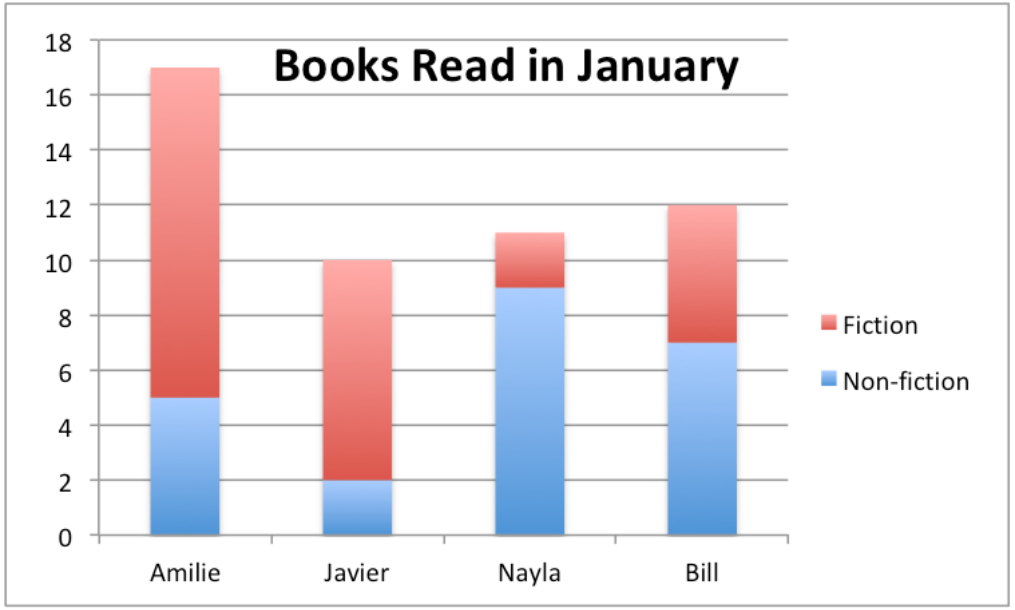

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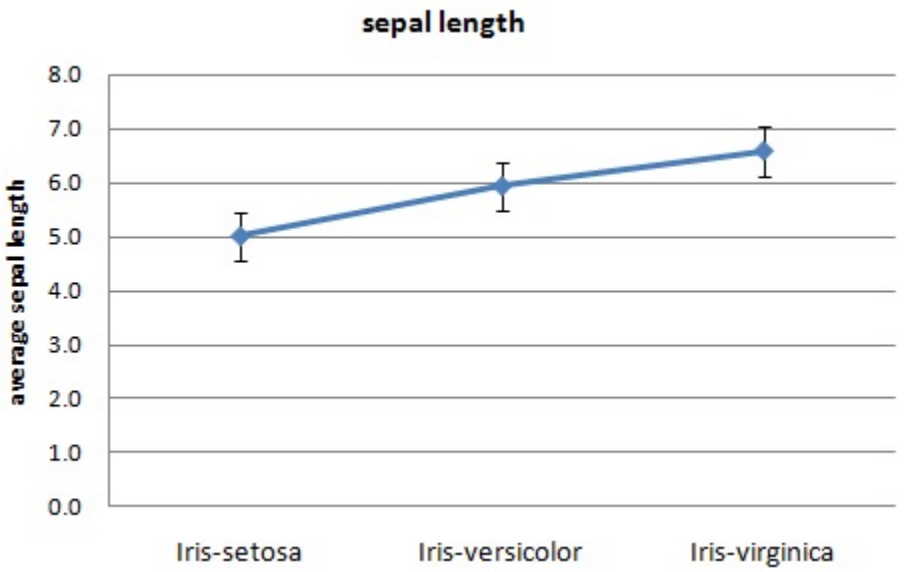

Qualitative vs Quantitative

QUALITATIVE METHODS	QUANTITATIVE METHODS
○Emphasis on **understanding** ○Focus on understanding **from respondent's** point of view ○**Interpretation** and rational approach ○Observations and measurements in **natural settings** ○**Subjective "insider view"** and closeness to data ○Explorative orientation ○**Process oriented** ○Holistic perspective ○**Generalization by comparison of properties and contexts** of individual organism	○Emphasis on **testing** and verification ○Focus on **facts** or reasons for social events ○Logical and critical approach ○**Controlled measurement** ○**Objective "outsider view"** distant from data ○ Hypothetical-deductive; focus on hypothesis/theory testing ○**Result oriented** ○Particularistic and analytical ○**Generalization by population membership**

Qualitative vs Quantitative

Techniques	**Qualitative** / **Quantitative**	Techniques
○Conversation ○Unstructured and semi-structured interviews, etc.		○Structured observation ○Structured interview ○Structured surveys ○etc

SURVEYS

- Surveys refer to a **method** of data collection that **utilizes questionnaires or interview** techniques. The survey is an effective tool to get **opinions, attitudes and descriptions** as well as for getting **cause-and-effect relationships**

Conceptualize and structure the research problem	**1. Consider the aims of the research** **2. Review the current state of knowledge** **3. Assess the various resources available**
Analytic survey?	**- Test a theory by** identifying the **independent, dependent** **and extraneous variables**, and their relations, and **- Controlling variables** through statistical techniques such as multiple regression
Descriptive survey?	- Identify the phenomena whose **variance** you wish to describe - The focus is more on a **representative sample**
Establish a priori **assumptions/ hypotheses**	
Determine the **sampling strategy** by defining the research population and designing a means of accessing a representative (random) sample	
Are data to be collected through **one approach**? Or does the research problem require the **repeated contact** of a single sample or several equivalent samples?	
Interviewer-administered questionnaire/schedule	- **More expensive** **- Risk of interviewer bias**
Respondent-completed/ **postal administered questionnaire**	**- Less expensive** - **High rates of "non-response"**

GUIDELINES FOR CONSTRUCTING QUESTIONNAIRES

- The **questions** must be asked in a very **simple and concise language**
- The **alternative answers** (close-ended questions) should use clear and unambiguous language
- Checking and ensuring that **everybody understands the question in the same manner**
- **Each question should deal with only one dimension or aspect**
- **We should not offer an alternative such as “Don't know” or “No comment”**

GUIDELINES FOR CONSTRUCTING QUESTIONNAIRES

- The questions **should not be of a suggestive nature**
- Questions should be formulated in **a polite and soft language** (by answering questions, the respondent **is doing us a favour**)
- Questions should be placed in a "**right" order** (easy-to-answer questions and positive types of questions should be placed first)
- There should also be a **logical order from general to specific questions**
- **The layout of the questionnaire is also important**
- **Pre-testing the questionnaire on several real companies or respondents**

Exercise

- ToyRus company has a very successful product line of super hero toys but business indicators show the slowdown of this product line. The company wants to bring to market an alternative product line of super villain toys. They should study the feasibility of this product line. The two selected research methods are focus group and interview. Research objects are boys 5-12 years old.
- Create a survey of structured questions and send to respondents
- Applied some quantitative analysis on retrieved data

Guide for exercise

- Using online survey tool such as Google Form: https://www.google.com/forms/about/
- Some types of structured questions:
  - Yes/no questions – The respondent answers with a “yes” or a “no”.
  - Multiple choice – The respondent has several option from which to choose.
  - Scaled questions – Responses are graded on a continuum (example : rate the appearance of the product on a scale from 1 to 10, with 10 being the most preferred appearance).
- Using Excel to draw charts for quantitative analysis