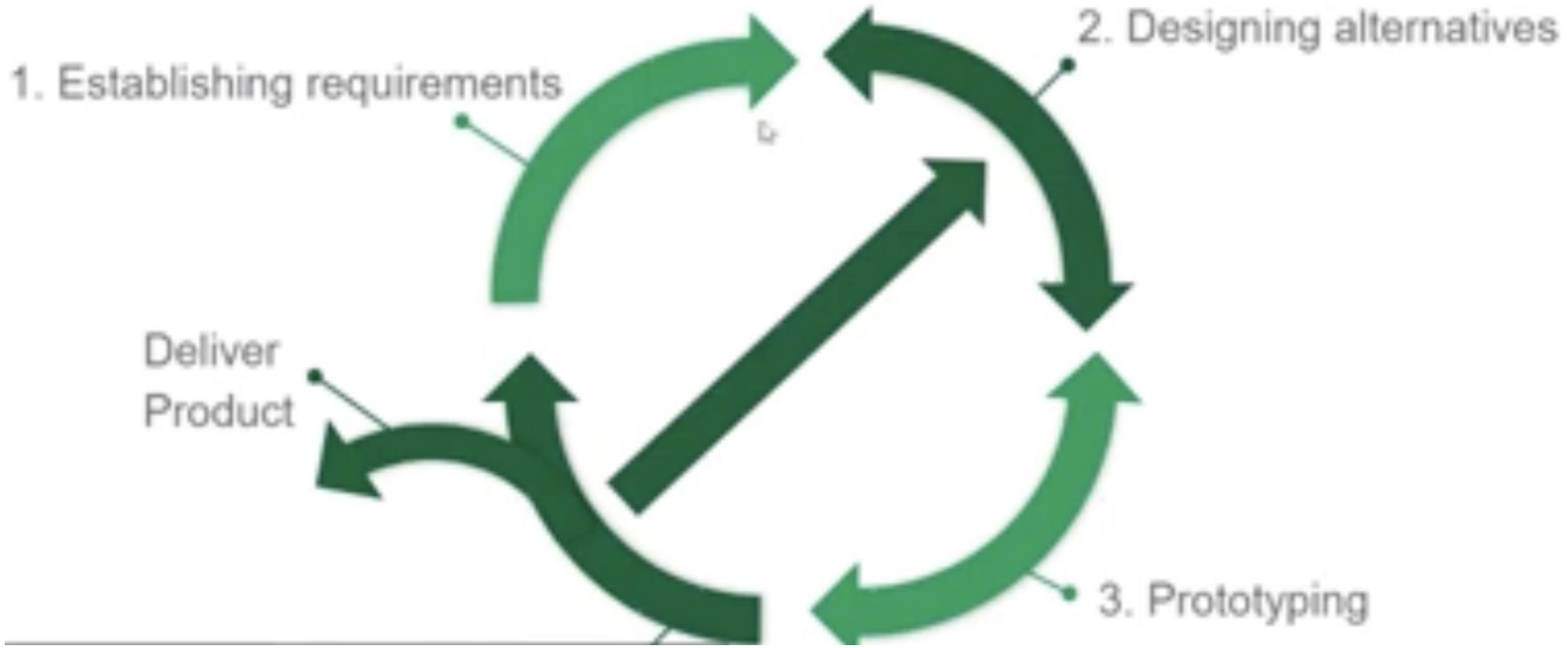
Data analysis, interpretation and presentation

The Process of Interaction Design



Establishing requirements

Data Gathering Techniques

- **Interviews** - good for exploring issues and to elicit scenarios
- **Focus Groups** - gaining a consensus view or highlighting conflict/disagreement
- **Questionnaires** = get a wider perspective on particular issues
- **Direct observation** => understand the nature of the tasks and the context
- **Indirect observation** = usually for improving an existing system (not for new)
- **Studying documentation** = understanding legislation and building a background
- **Researching similar products** » generate alternative designs

Overview

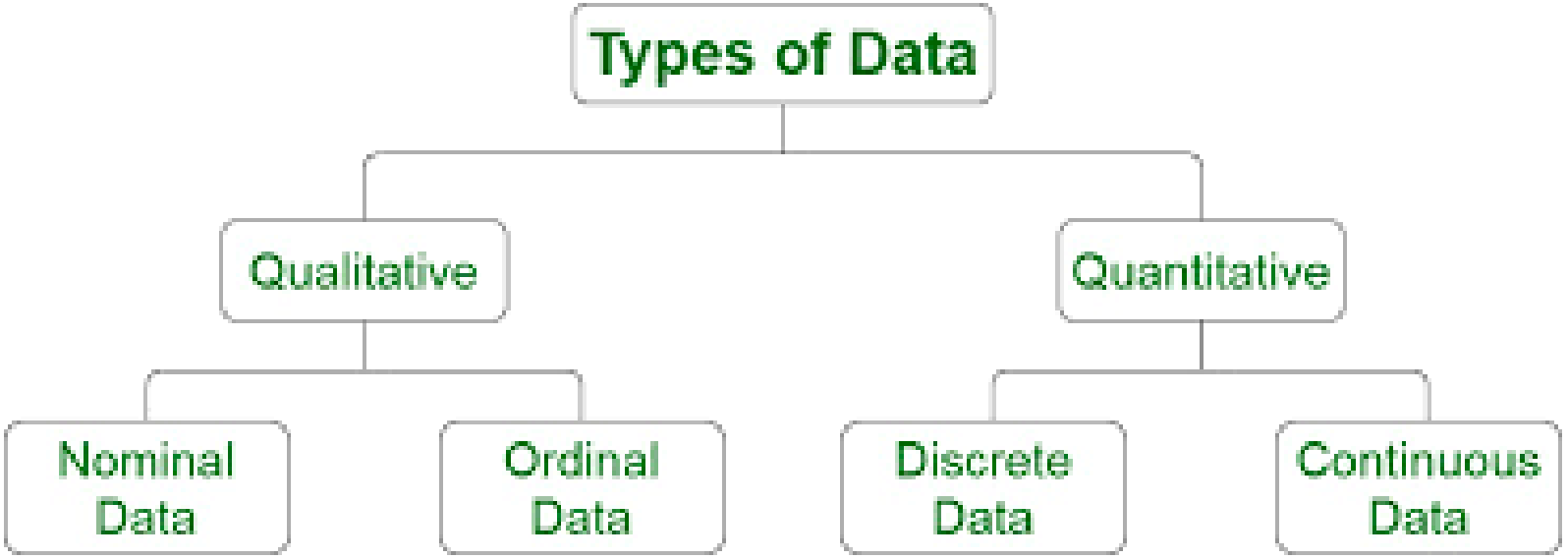
- Qualitative and quantitative
- Simple quantitative analysis
- Simple qualitative analysis
- Tools to support data analysis
- Presenting the findings: rigorous notations, stories, summaries

Quantitative and qualitative

- Quantitative data – expressed as numbers
- Qualitative data – difficult to measure sensibly as numbers, e.g. count number of words to measure dissatisfaction
- Quantitative analysis – numerical methods to ascertain size, magnitude, amount(have a solid number=fact)
- Qualitative analysis – expresses the nature of elements and is represented as themes, patterns, stories

- Be careful how you manipulate data and numbers!

Quantitative and Qualitative



Quantitative and qualitative

» Red. Blue, Yellow. Black.	Qualitative Nominal
» Very Unhappy. Unhappy.	Qualitative Ordinal
» 15. 123. 12. -10.	Quantitative Discrete
» 14.2. 11.09. 1000	Quantitative Continuous
» Baby, Child, Teenager, Adult, Old	Qualitative Ordinal
» Alexandria, Cairo, Luxor	Qualitative Nominal
» East. West. North, South	Qualitative Nominal
» Student Age	Quantitative Discrete
» Product Weight	Quantitative Continuous
» Price	Quantitative Discrete
» Gender	Qualitative Nominal
» Phone Numbers	Qualitative Nominal
» Course Grades: A. B. C.E.E	Qualitative Ordinal
» User Feedback Paragraph	Qualitative Nominal
» Neutral, Happy, Very Happy	Qualitative Ordinal

Quantitative VS Qualitative

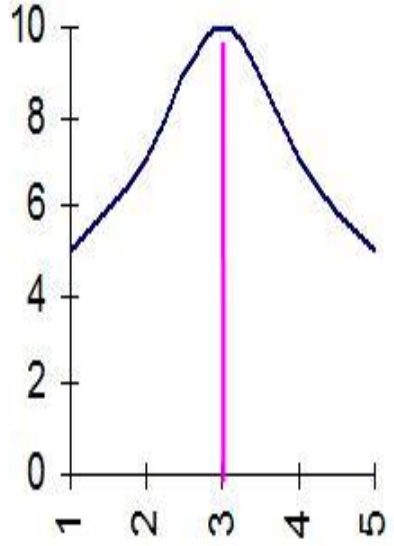
- **Objectives** variables for data gathering.
- Values that can be **counted** such as age, weight, volume, and scale.
- Researcher aim to **increase** the sample size. The more data points, the more accurate.
- Definite. Fixed & Measurable reality

- **Subjective** parameters for data gathering
- Things that can be **described** using the 5 sensory such as color, smell, taste, touch or feeling, typology, and shapes.
- Researcher aim to get a **variety** of values to examine and understand.
- It is costly to have large sample size.
- Dynamic & Negotiable reality

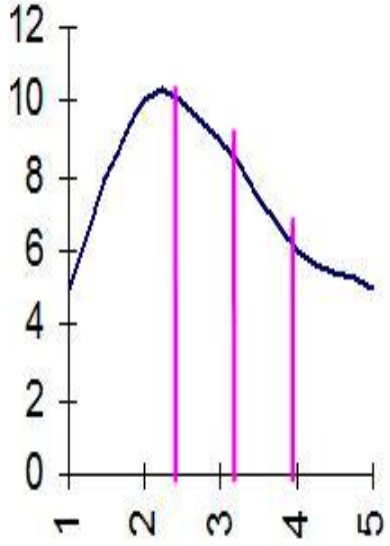
Simple quantitative analysis

- Averages
  - Mean: add up values and divide by number of data points
  - Median: **middle** value of data when ranked
  - Mode: figure that appears **most** often in the data
- Histogram
- Skewness
- Outliers

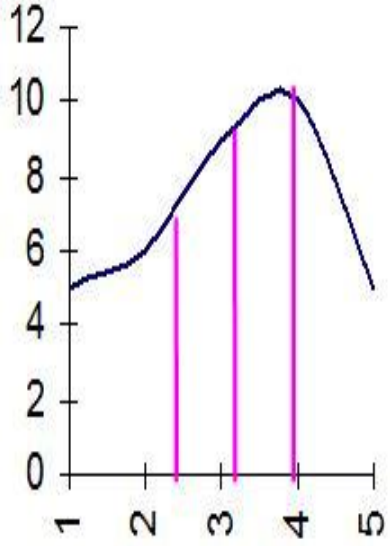
Skewness



Mean = Median = Mode

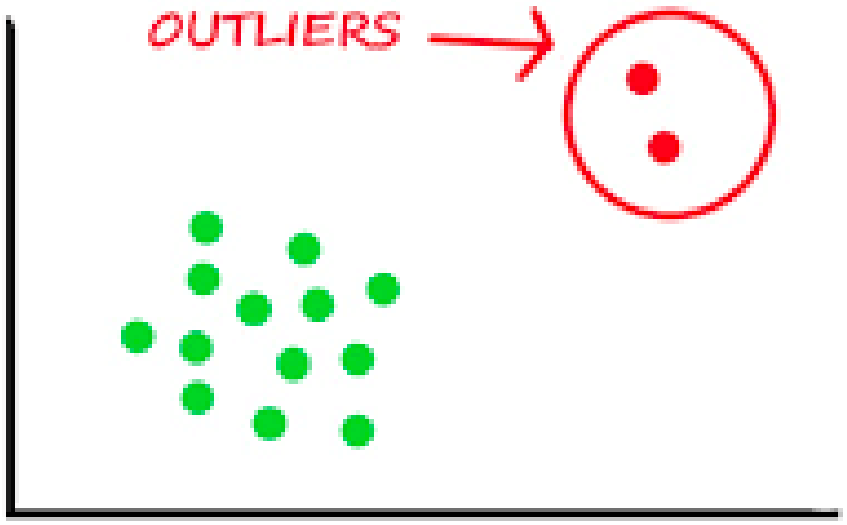


Mode >Med> Mean



Mean< Med<Mode

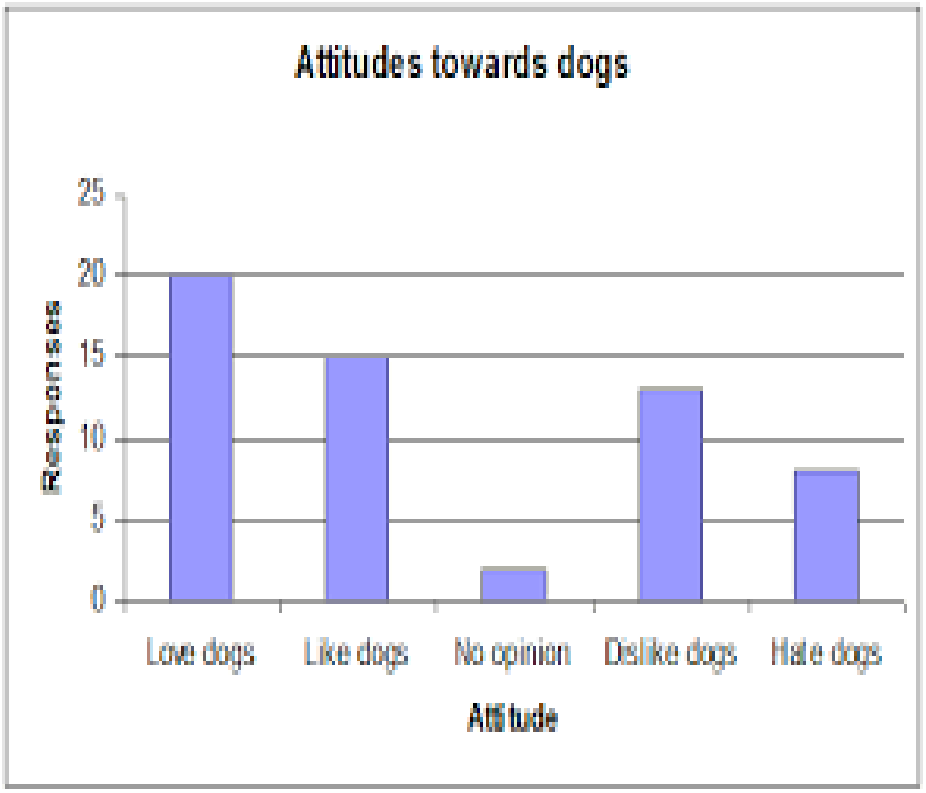
Outliers



Qualitative

Ordinal

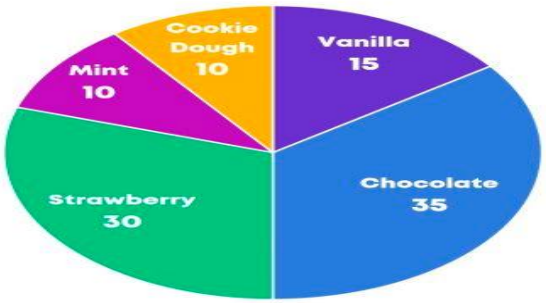
- It has a rank or order.
- It establishes a relative rank.
- It has no standardized **interval** scale.
- The **Median** and **Mode** can be analyzed.
- Can't have a Mean.

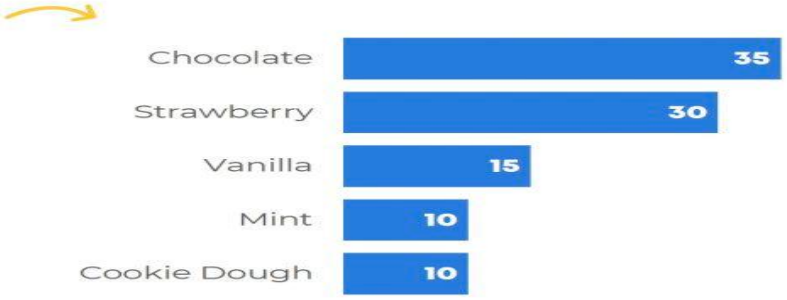


Qualitative

Nominal

- »Usually represents Categories
- »Can't establish a rank or order
- »Can calculate **Mode** only
- »If used with numbers, then it is just of identify, but can't associate order or calculations over it
- »Example
  - »Phone numbers, Football player, T-shirt number





Data Presentation

1. Rigorous Notations
   - » Using charts, annotations and spreadsheet
   - » Summarizing the findings in bullets
2. Using Stories/Scenarios:
   - » Participants tell story
   - » Stories about participants, and
   - » Stories formed by repeated patterns

Lie Factor

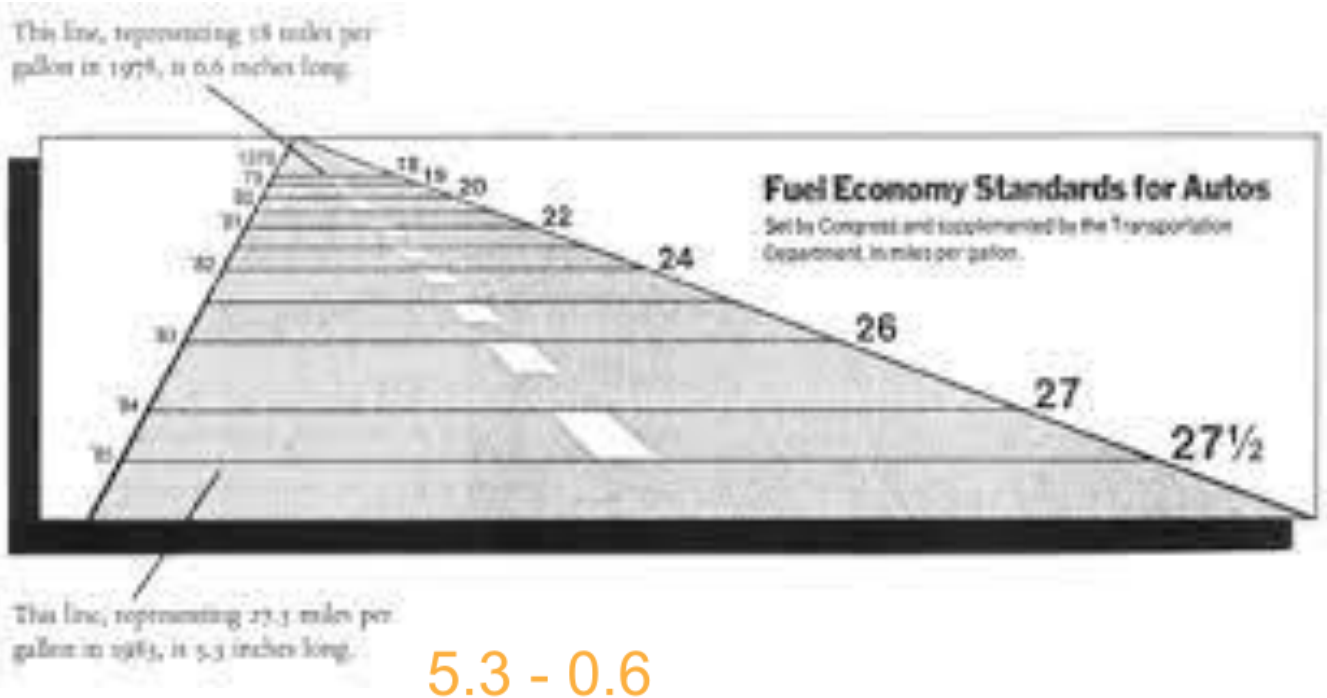
$$size\ of\ effect = \frac{|\text{second value - first value}|}{\text{first value}}$$

c — **size of effect**
— **n in the data.**

Where

It is acceptable to be between 0.95 to 1.05

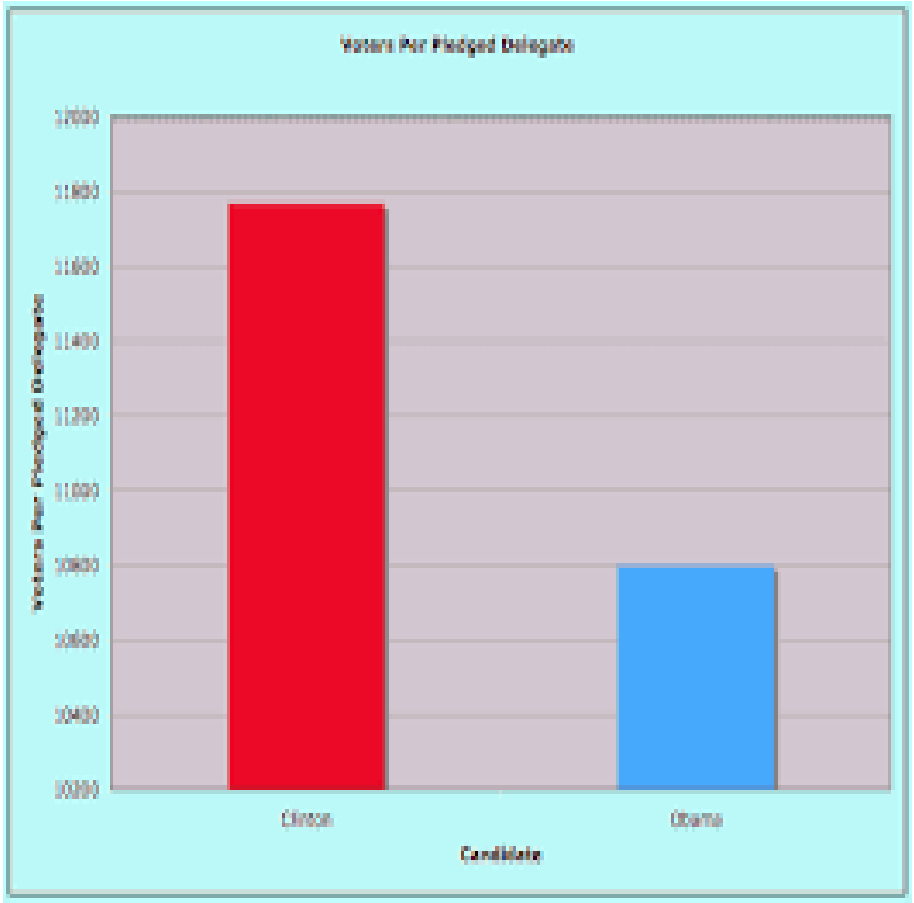
Lie Factor



$$\text{Lie Factor} = \frac{\frac{5.3 - 0.6}{0.6}}{\frac{27.5 - 18}{18}} = 14.8$$

Lie Factor

- Graphic = (1550 - 600) / 600 = 1.58
- Actual = (11750-10800) / 10800 = 0.088
- Lie Factor = 18



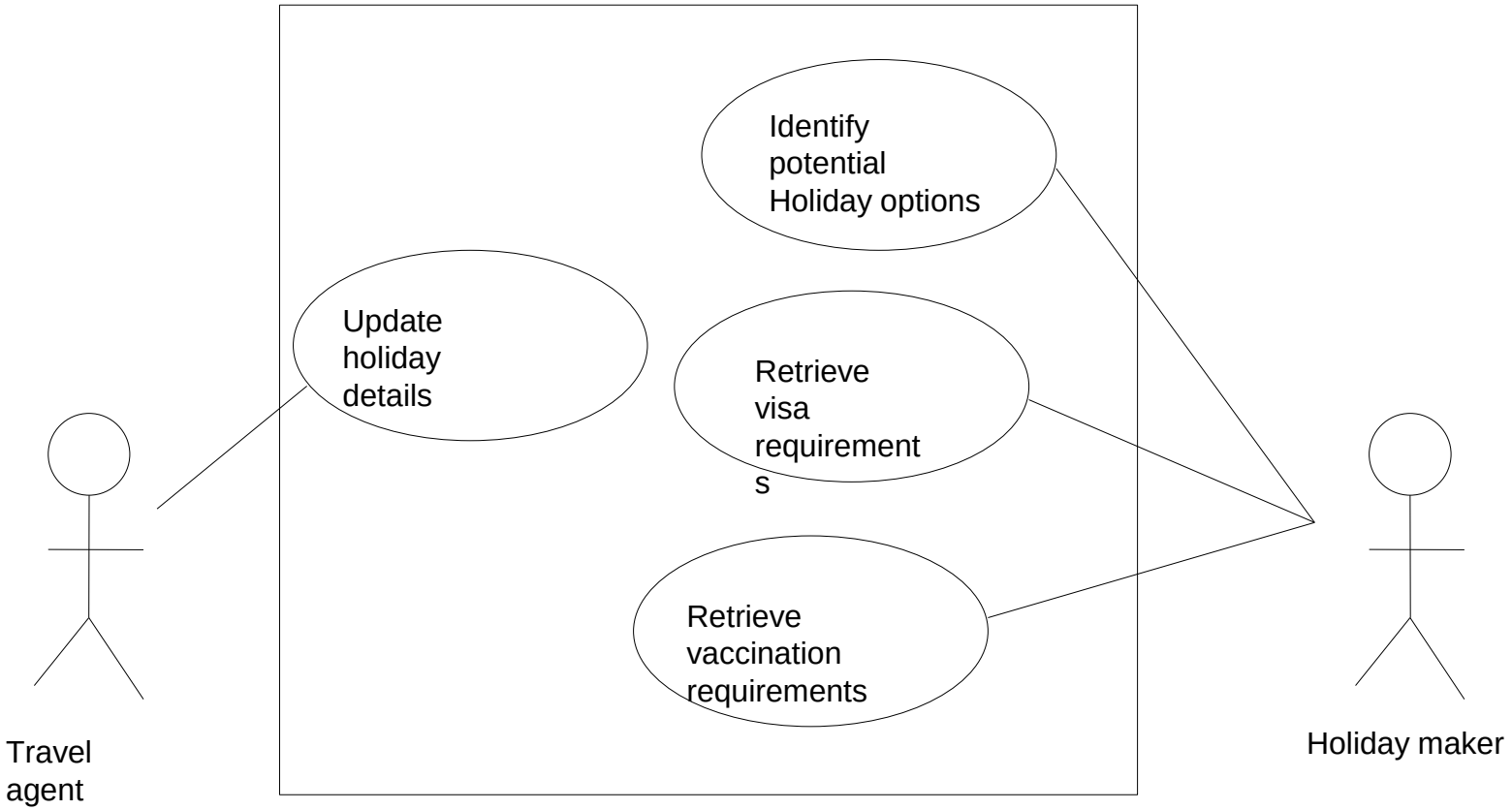
Data

1. Data description
    1. Scenarios
    2. UML :use case
    3. Essential use case
2. Data analysis
    1. Hierarchical Task Analysis (HTA)

Data description <—Scenario for holiday planner

"The Thomson family enjoy outdoor activity holidays and want to try their hand at sailing this year. There are four members of the family: Sky who is 10 years old, Eamonn who is 15 years old, Claire who is 35, and Will who is 40. While out on a shopping trip they call by at the travel agents in their local town to start exploring the possibilities ... The travel organizer is located in a quiet corner of the agents' office, where there are comfortable seats and play things for young children. They all gather around the organizer and enter their initial set of requirements—a sailing holiday for four novices. The stand-alone console is designed so that all members of the family can interact easily and comfortably with it. The system's initial suggestion is that they should consider a flotilla holiday, where several novice crews go sailing together and provide mutual support for first-time sailors…"

Example use case diagram for holiday planner



Example—>Essential use case for holiday planner

USER INTENTION (cardholder).	SYSTEM RESPONSIBILITY. (ATM)

Data analysis

- Data descriptions are often used to envision new systems or devices
- Data analysis is used mainly to investigate an existing situation
- It is important not to focus on superficial activities

  What are people trying to achieve?

  Why are they trying to achieve it?

  How are they going about it?
- Many techniques, the most popular is Hierarchical Task Analysis (HTA)

Hierarchical Task Analysis

- Involves breaking a **task** down into **subtasks**, then sub-sub-tasks and so on. These are grouped as plans which specify how the tasks might be performed in practice
- HTA focuses on physical and observable actions, and includes looking at actions not related to software or an interaction device
- Start with a user **goal** which is examined and the main tasks for **achieving** it are identified
- Tasks are sub-divided into sub-tasks

Example Hierarchical Task Analysis

0. In order to borrow a book from the library
    1. go to the library
    2. find the required book
        2.1 access library catalogue
        2.2 access the search screen
        2.3 enter search criteria
        2.4 identify required book
        2.5 note location
    3. go to correct shelf and retrieve book
    4. take book to checkout counter

Example Hierarchical Task Analysis (plans)

plan 0: do 1-3-4.

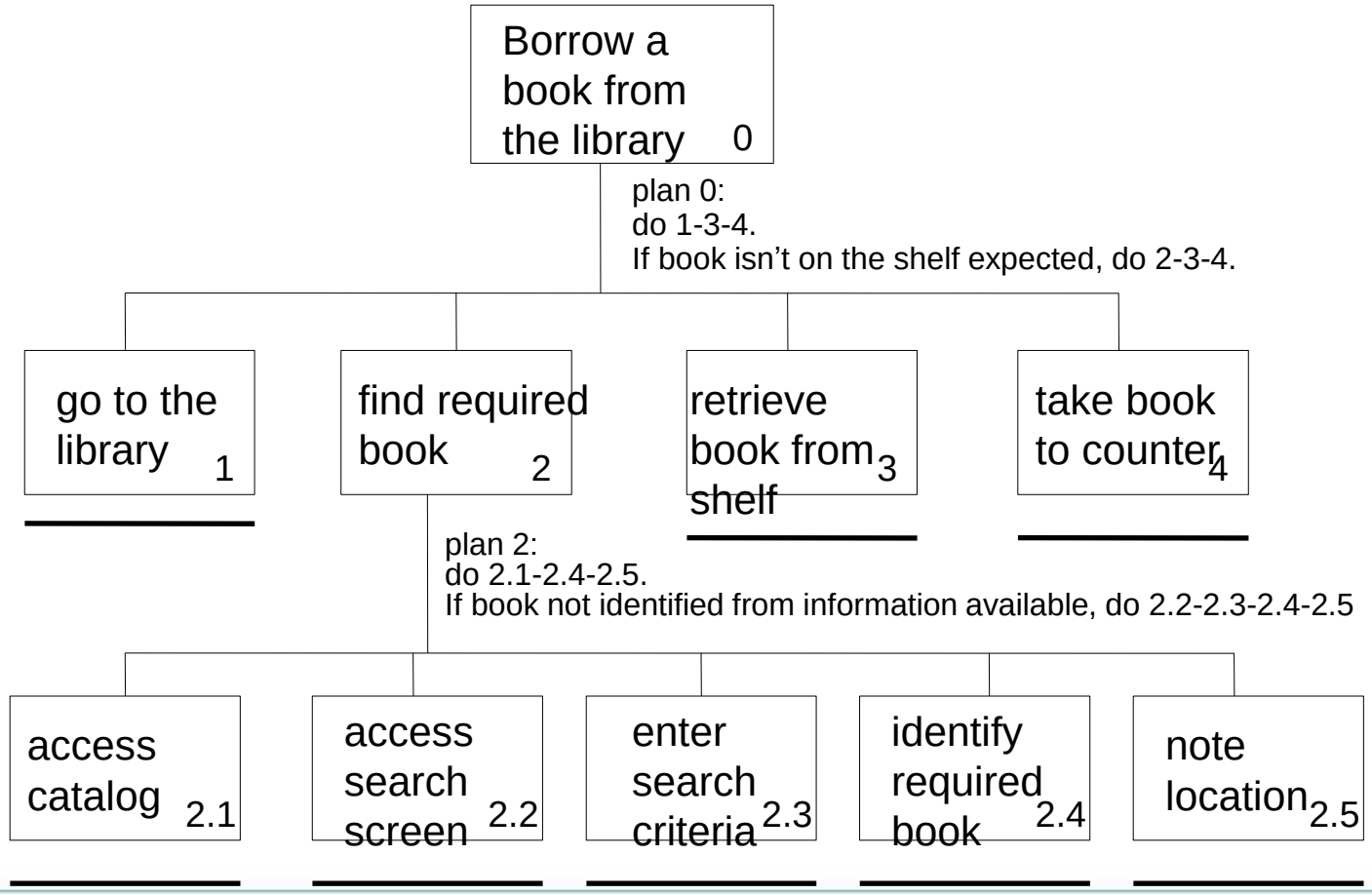
If book isn’t on the shelf expected,

do 2-3-4.

plan 2: do 2.1-2.4-2.5.

If book not identified do 2.2-2.3-2.4.

Example Hierarchical Task Analysis (graphical)



Summary

- The data analysis that can be done depends on the data gathering that was done
- Qualitative and quantitative data may be gathered from any of the three main data gathering approaches
- Percentages and averages are commonly used in Interaction Design
- The most commonly-used techniques for data gathering are: questionnaires, interviews, focus groups, direct observation, studying documentation and researching similar products
- Scenarios, use cases and essential use cases can be used to articulate existing and envisioned work practices.
- Task analysis techniques such as HTA help to investigate existing systems and practices