



ROBERT GORDON
UNIVERSITY ABERDEEN

GRADUATE APPRENTICESHIP

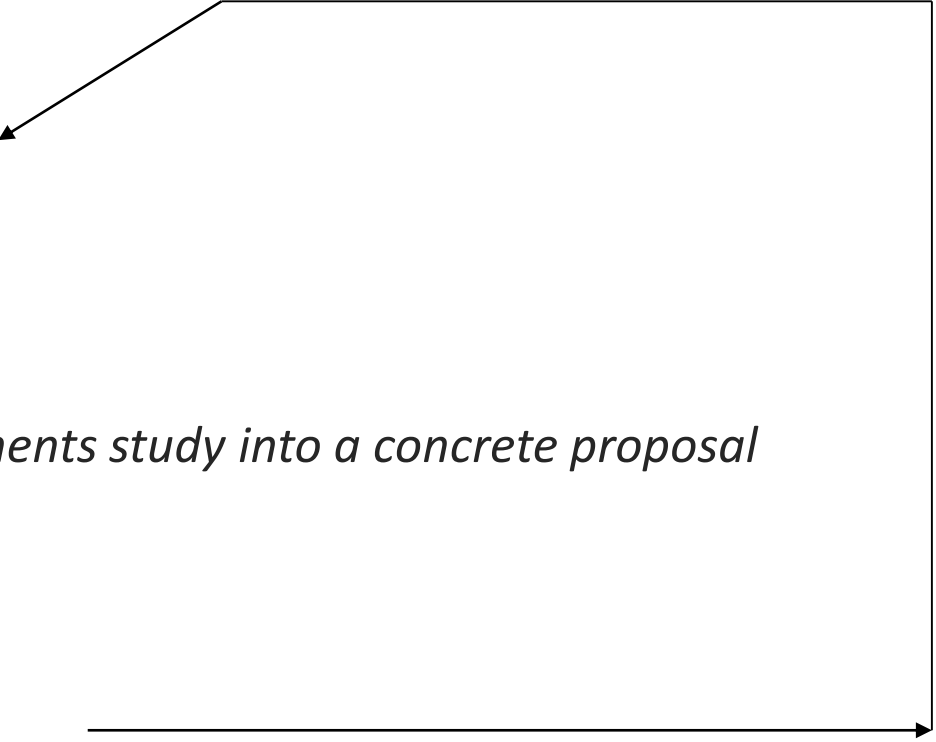
CM4701 - Human Computer Interaction
Week 7: Practical Designs and Evaluation

Carlos Moreno-García

GRADUATE APPRENTICESHIP

Practical Designs

Design

- To design means
 - To make something concrete
 - The word also means to desire something
 - In the case of HCI, design means
 - *To convert the findings of the user requirements study into a concrete proposal for the design of a system*
 - This is the system that the users desire
- 
- A diagram consisting of a horizontal line at the top, a vertical line on the right, and a diagonal line on the left pointing towards the word 'desire' in the third bullet point. Another horizontal line extends from the word 'desire' to the right, ending in an arrowhead.

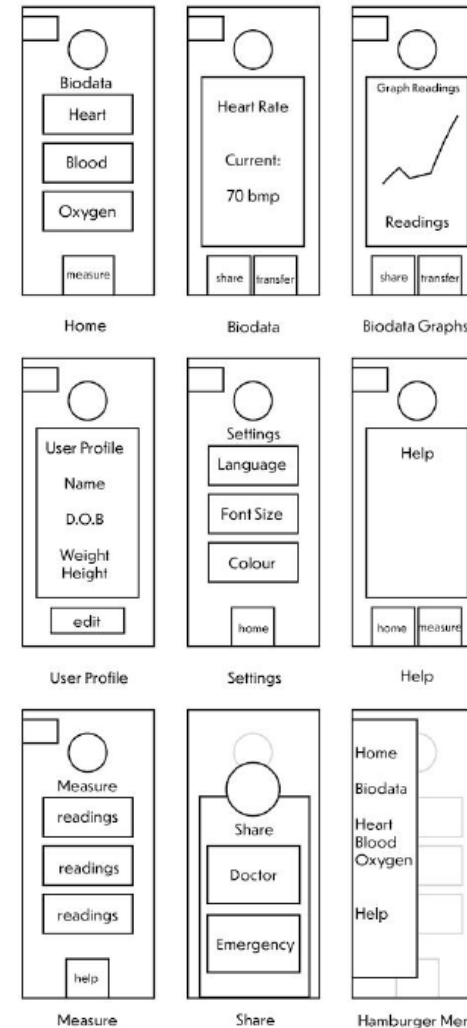
Usability

- Effectiveness
- Learnability
- Flexibility
- Attitude

The new law is oriented towards health and safety and specifies standards for hardware and furniture, but also specifies how software should be made more usable!

Keep in mind accessibility and other issues!

Examples of practical designs

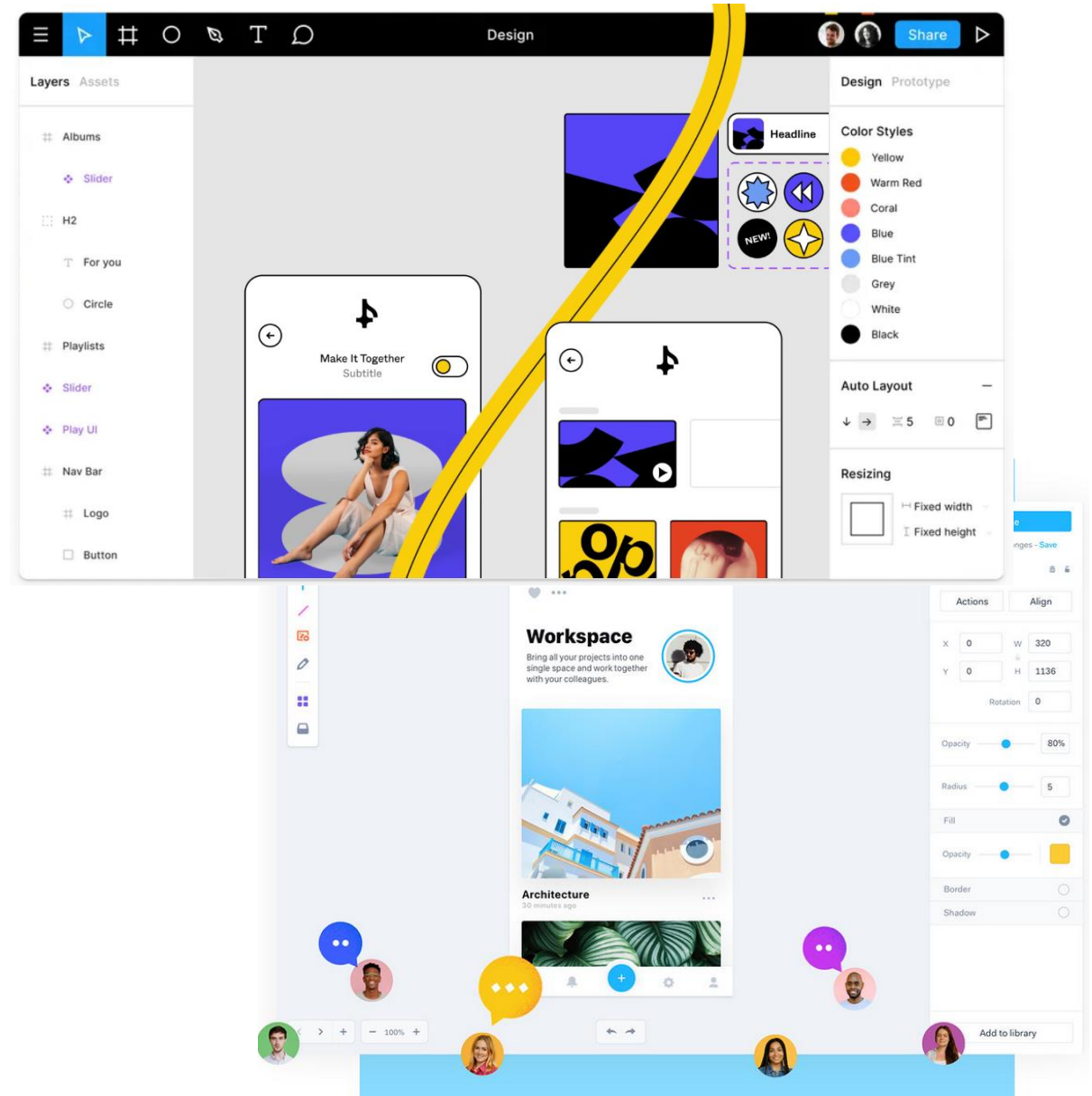


<https://xd.adobe.com/view/040d3f8a-9695-4908-7899-ab2d655d5640-723c/?fullscreen&hints=off>

<https://youtu.be/BB18XlofqwM>

Tools for PD Design

- [Marvel app](#)
 - Free trial version allows you for one design, so you would need to open two accounts!
- [Figma](#)
 - The free version should be enough for you...
- [Adobe XD](#)
 - Has a free trial, but if you already have access to Adobe Cloud products then use it!
- Paint, PowerPoint, Photoshop, etc.





**ROBERT GORDON
UNIVERSITY ABERDEEN**

GRADUATE APPRENTICESHIP

Demo (Marvel)

Go to Moodle to download the source files and to
watch the video demo

GRADUATE APPRENTICESHIP

Scenarios (+ walkthroughs)

Scenarios

- We need a process of discovering things about users and how they use!
- Descriptions of people using technology?
- Scenario-Based Usability Engineering
- User Interaction Scenarios

The Magic Formula

$$PROFILES \times PRACTICAL_DESIGNS = SCENARIOS$$

What is a scenario?

- A scenario is a description of something
 - Stakeholders and users
 - Typical usage
 - Problems
- Who writes scenarios?
 - Designers
 - Users
 - Designers and users - groups
 - Experts
 - Anybody who can provide information that is relevant

Are scenarios too simple?

- Scenarios can give an impression of simplicity
- A basic scenario is simple and is meant to be simple
 - Can be written by users with no technical skills or knowledge
 - Can be read and understood by everyone
 - Allows evaluation with users
- Scenarios form the basis for more complex analysis
 - Claims analysis Pros and Cons of various features
 - Various analyses of situations and contexts
 - Formal task analysis
 - Further studies, including experiments

Key concepts in scenarios

Scenarios have components:

- Setting
- Actor(s)
- Claims
- Task Goals
- Actions
- Plans
- Evaluation

- Analysing Requirements (AR)
 - Setting + Actor(s) + Claims
- Activity Design
 - AR + Task Goals + Evaluation
- Information Design
 - AR + Plans + Evaluation
- Interaction Design
 - AR + Actions + Evaluation

Scenario example w/ user feedback

- You have created your scenarios and analysed your claims.
 - You are the designer and it is your informed perception that led you to create these scenarios
 - Time to ask potential user their feedback. You need to know what they think will work and will not work. What they like or did not like?
- At the end of the process, you will know how your system is most likely to be received and how usable potential users think it will be.
- Moreover, you will know the “bit” that you must review or change.

Scenario Example

- You are testing an app that provides COVID guidelines if the “Trace and Protect” programme finds out that you may have caught the disease
- Mary (user) is not technology-savvy, and she may not see the value of the app, therefore she may be apprehensive!
 - Problem: There is a danger that Mary finds the system patronising as she is (or feels she is) mildly affected.
 - Problem: Mary is reliant on someone else’s technical ability, and she may not trust herself to understand and set up the app.
 - Problem: If Mary thinks of something that needs to be added to the device reminders, she is not capable or able to, as she does not know how to properly access the app.
- Consequences
 - What happens if she forgets the device at home? Can she input/get info once she is back?

Walkthrough

- For each task, a walkthrough considers...
 - What impact will interaction have on the user?
 - What cognitive processes are required?
 - What learning problems may occur?
- Analysis focuses on users goals and knowledge:
does the design lead the user to generate the correct goals?



Walkthroughs

- Cognitive walkthroughs are used to examine the usability of a product
 - Designed to see whether or not a new user can easily carry out tasks within a given system or application
 - It is a task-specific approach to usability (i.e. relates to functionality)
- Walkthroughs are sanity checks for your design
- Examine and check the usability of a product.
- See whether or not a new user can easily carry out tasks within a given system or application.
- Task-specific approach to usability based on exposed functionality
- You should ask assessors to go over these walkthroughs and answer these four question:
 - *Will the user try and achieve the right outcome?*
 - *Will the user notice that the correct action is available to them?*
 - *Will the user associate the correct action with the outcome they expect to achieve?*
 - *If the correct action is performed; will the user see that progress is being made towards their intended outcome?*

Walkthrough Example

- Task: Add a new pair of augmented reality glasses to an app that controls them, starting from the home page.
- Debbie starts by opening the app and powering the glasses on. She then goes to the settings icon, which takes her to the settings page where a list of settings are displayed. She selects the add device button which takes her to a new page with tabs for New device and current device. The new device tab is open when the page loads. The new page gives instructions on how to add the device and a button with the option to scan for devices. She selects the button to scan for devices. After scanning, the app finds the glasses and displays them as an option on the screen. She clicks on the device name and chooses select device. The app then asks for the PIN which is printed on the frame of the glasses. After locating the PIN, Debbie enters it and selects that yes she would like to add the device. After this the glasses are connected to the app.

GRADUATE APPRENTICESHIP

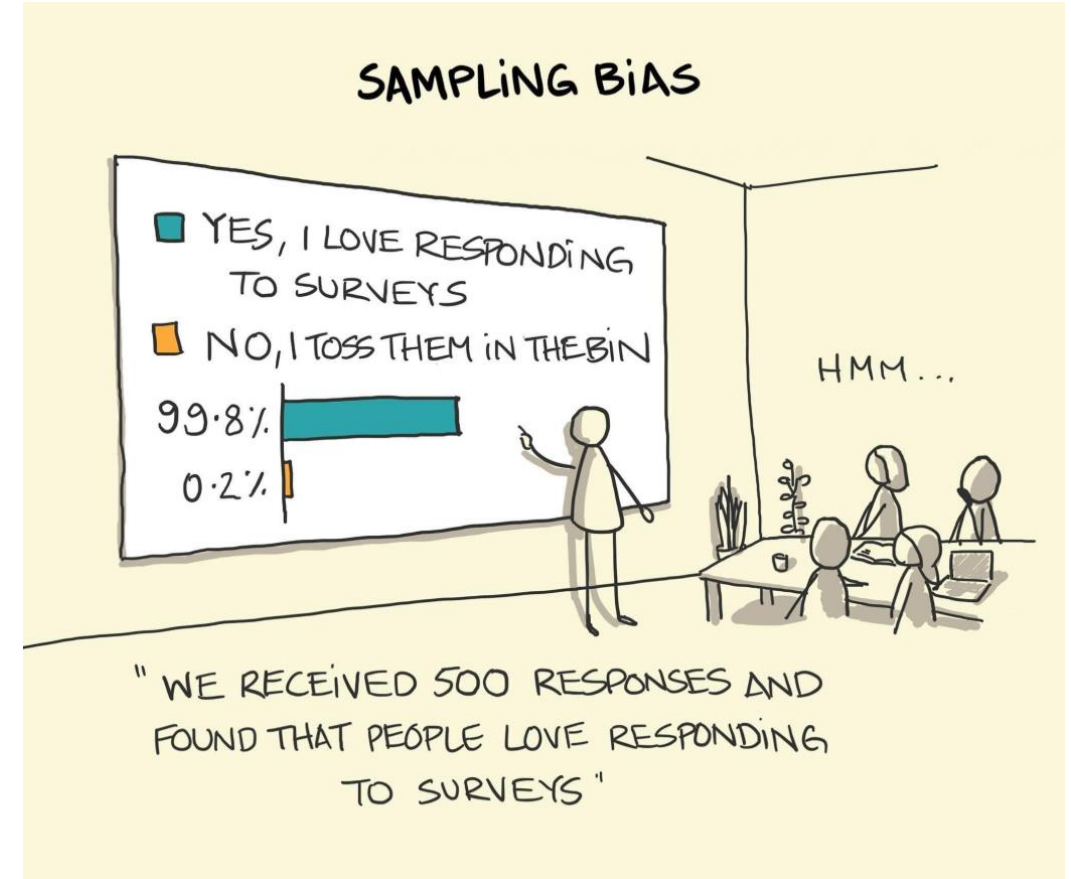
Human Evaluation and Measurement

Survey Sampling



What is it?

- The proper way to select your target audience
- Selection of participants for a **population**
- **Census:** Surveying all members of a population
- In most cases, this is **not possible**



Key features

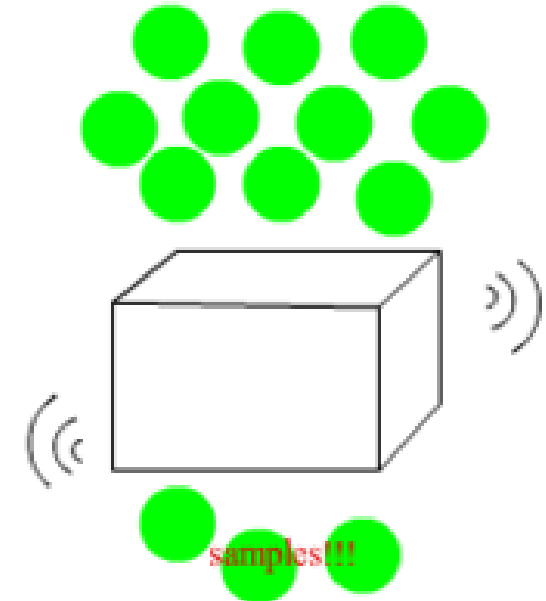
- Representativeness
- Flexibility
- Effectiveness
- Consistency
- Diversity
- Transparency
- Probabilistic or non-probabilistic?

Probabilistic Sampling

- Every individual of the population has a non-zero chance of being selected
- Ensures representativeness
- Three sub-categories:
 - Random
 - Systematic
 - Stratified

Random Sampling

- Used when identifying characteristics is (almost) impossible
- Sample selected independently of others
- Equal chance of being selected as subject when sampling
- **Advantage:** Reduce bias
- **Issue:** It may be biased already without you knowing! (e.g. phone polling)



https://alevel-sociology.fandom.com/wiki/Simple_random_sample

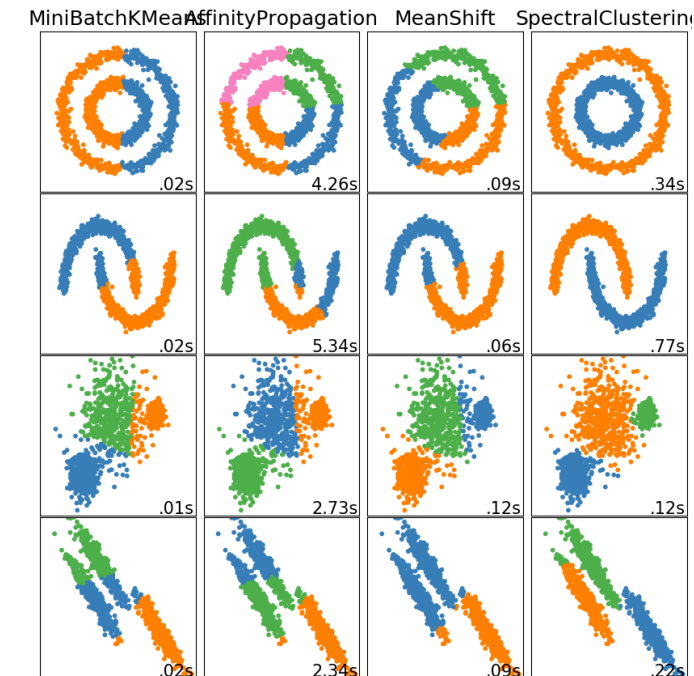
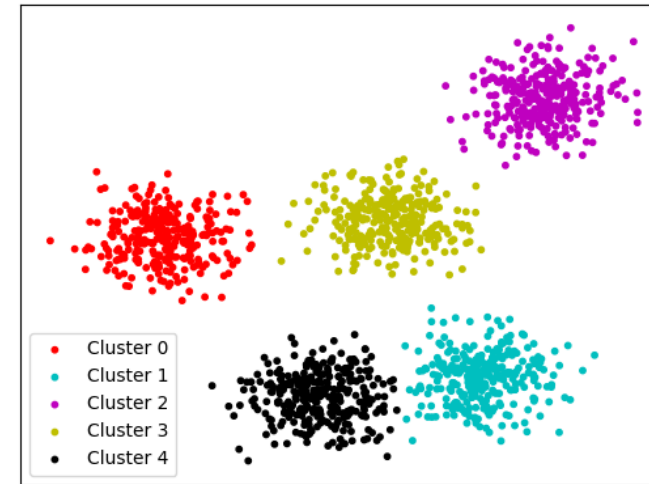
Systematic Sampling

- The proposed location is logically homogenous
- First decide sample size, then arrange elements to select members at regular intervals
- Good as random sampling if there is no hidden order
- **Issue:** Periodicity tends to create patterns
- **Solution:** Randomise before sampling



Stratified Sampling

- You divide the population into groups of characteristics (depending on focus)
- Then you sample within each category and select randomly
- **Issue:** More complex
- **Solution:** Machine learning!



Non-Probabilistic Sampling

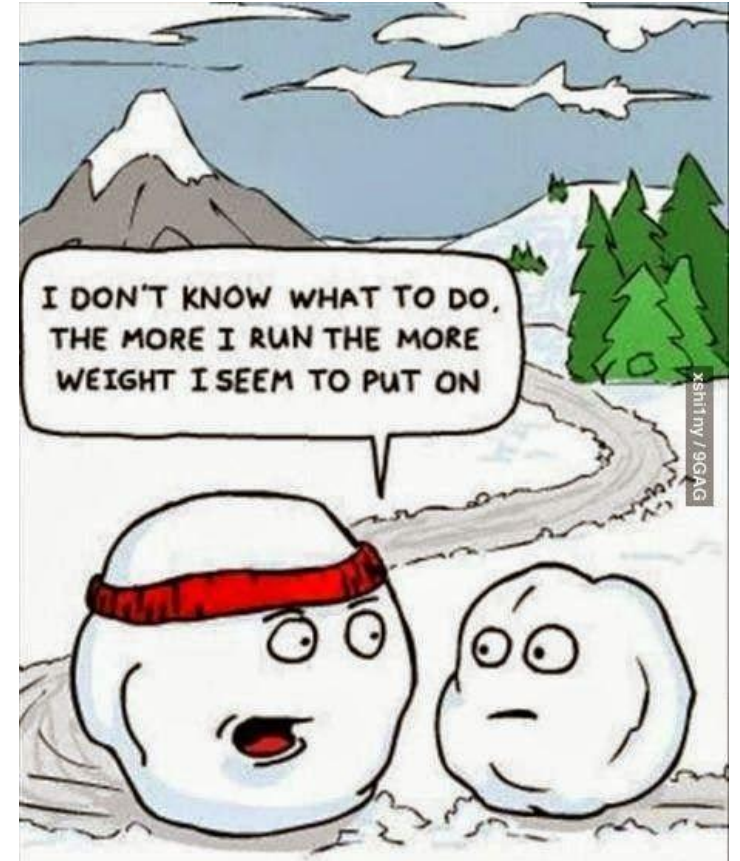
- Samples are collected with no specific structure in mind
- Ensures practicality
- Three sub-categories:
 - Convenience
 - Snowball
 - Quota

Convenience Sampling

- Samples are selected based on availability and accessibility (to the test)
- Created rapidly without extra load
- **Issues:** Poor representativeness, **should only be used as an approach!**

Snowball Sampling

- Select an individual, and then this leads you to someone else.
- Used in academic research (not as you may think!)
- **Advantage:** Low cost, high relevance
- **Issues:** Homogeneity



Quota Sampling

- You need your sample to be of certain features
- (In a way) equivalent to stratified
- Superior to the previous two, but doesn't have any statistical insight

So which one is this?!



Planning Surveys

How to start?

- State a question, pose a problem
 - State the hypothesis
- Plan your study
 - What do you want to find?
 - Which is the basis of comparison?
 - How will you measure?
 - Which are the users (sample)
 - Which tool to use?
- You will need to ... results
 - Summarise
 - Analyse
 - Visualise
 - Interpret
 - Discuss

The central principle

- A good evaluation captures **qualitative and quantitative** data
- It establishes a proper **scale** for each!
- Which is best?
 1. The proper one to get the most reliable data
 2. Mix approaches

Scales

- The measurements that you choose influence on the participants' responses
- Types of scales:
 - Nominal: Used for tally
 - Membership, characteristics, etc
 - Ordinal: Same, but with an order
 - Never – Sometimes – Always
 - Interval: There is an unclear scaling
 - Never 1 2 3 4 5 6 7 Always
 - Ratio/Continuous: Score
- Retrofit?



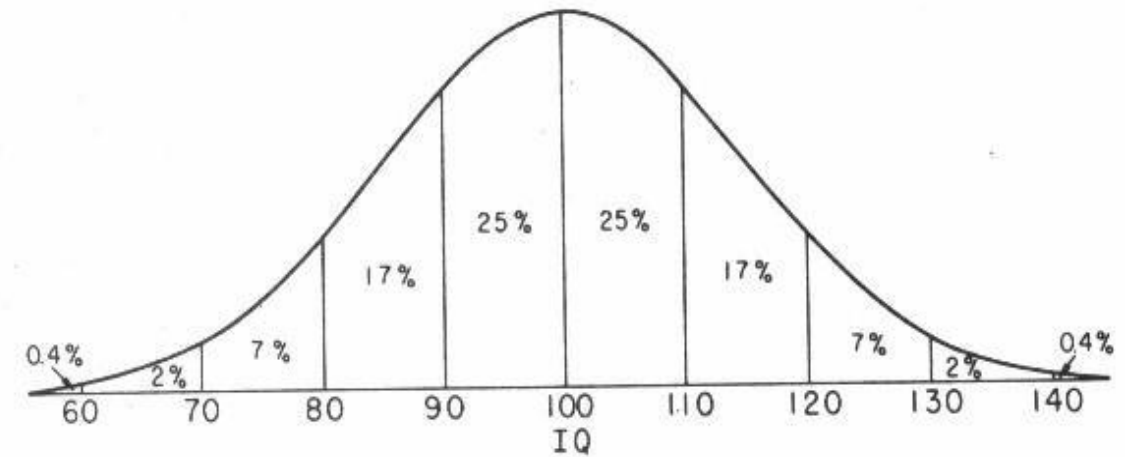
Statistics

Reporting Counts

- Nominal and ordinal counts have to be summarised
 - Tally each response
 - Average frequency of each category
 - You can discuss this!
- Interval
 - Summarised
 - Compared between levels (as if it were ordinal)
 - Stats are limited
- Ratio/Continuous
 - Summarised
 - Stats can be applied

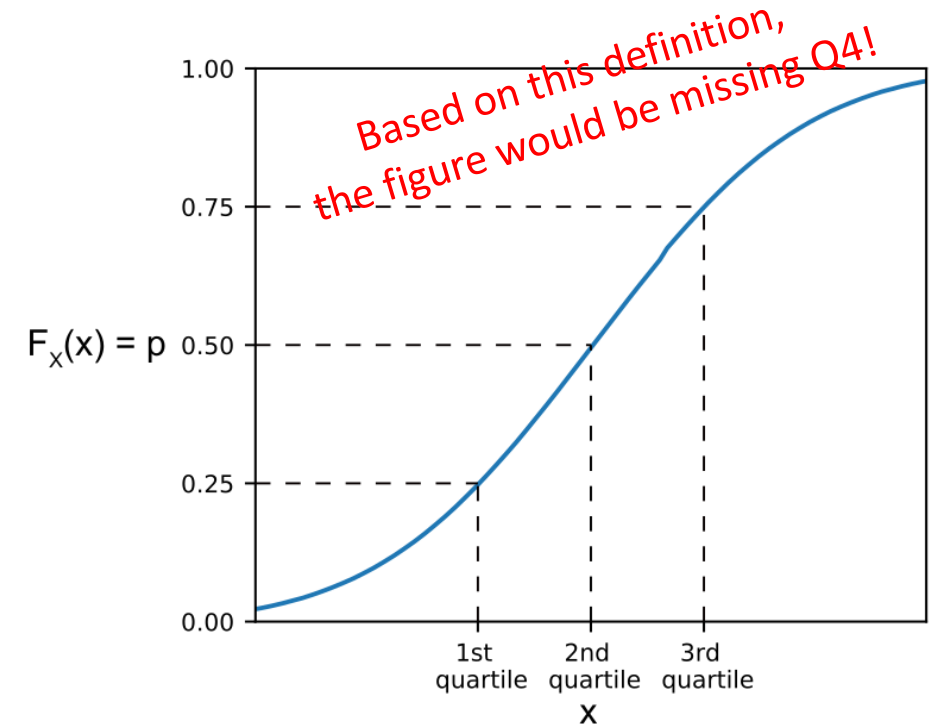
Counting

- Simplest form to measure things → frequency analysis
- Can be applied to different types of data
- You can convert to a **percentage**



Quartiles

- A type of quantile/percentile (i.e. way to split counts) which divides data points into four (more or less) equal parts
- Q1 would be the top 25%, Q2 the following 25% and so on...
- Used by the Journal Citation Reports ([JCR](#)) to see which are “the best” journals



Example from JCR

PATTERN RECOGNITION

ISSN: 0031-3203
eISSN: 1873-5142
ELSEVIER SCI LTD
THE BOULEVARD, LANGFORD LANE, KIDLINGTON, OXFORD OX5 1GB, OXON, ENGLAND
[ENGLAND](#)

[Go to Journal Table of Contents](#) [Go to Ulrich's](#) [Printable Version](#)

TITLES
ISO: Pattern Recognit.
JCR Abbrev: PATTERN RECOGN

CATEGORIES
ENGINEERING, ELECTRICAL &
ELECTRONIC -- SCIE

COMPUTER SCIENCE, ARTIFICIAL
INTELLIGENCE -- SCIE

LANGUAGES
English

PUBLICATION FREQUENCY
12 issues/year

Journal Impact Factor Calculation

$$\text{2018 Journal Impact Factor} = \frac{4,276}{725} = 5.898$$

How is Journal Impact Factor Calculated?

$$\text{JIF} = \frac{\text{Citations in 2018 to items published in 2016 (1,839) + 2017 (2,437)}}{\text{Number of citable items in 2016 (320) + 2017 (405)}} = \frac{4,276}{725}$$

Example from JCR

Rank



JCR Impact Factor



JCR Year ↕	COMPUTER SCIENCE, ARTIFICIAL INTELLIGENCE			ENGINEERING, ELECTRICAL & ELECTRONIC		
	Rank	Quartile	JIF Percentile	Rank	Quartile	JIF Percentile
2018	14/134	Q1	89.925	25/266	Q1	90.789
2017	16/132	Q1	88.258	37/260	Q1	85.962
2016	15/133	Q1	89.098	23/262	Q1	91.412
2015	15/130	Q1	88.846	20/257	Q1	92.412
2014	15/123	Q1	88.211	20/249	Q1	92.169

Measures of Central Tendency

- Arithmetic mean
- Variance & Standard Deviation
- Median
- Mode

Final Tips

- Do I have sufficient data to extract the measures?
- Is my data of any distribution
- Is the data sufficiently skewed so that these are representative?



**ROBERT GORDON
UNIVERSITY ABERDEEN**

GRADUATE APPRENTICESHIP

Demo (Python)

Go to Moodle to download the source files and
to watch the video demo



ROBERT GORDON
UNIVERSITY ABERDEEN

GRADUATE APPRENTICESHIP

Lab (Your do the same, using Excel!)