



Numbers are Fab

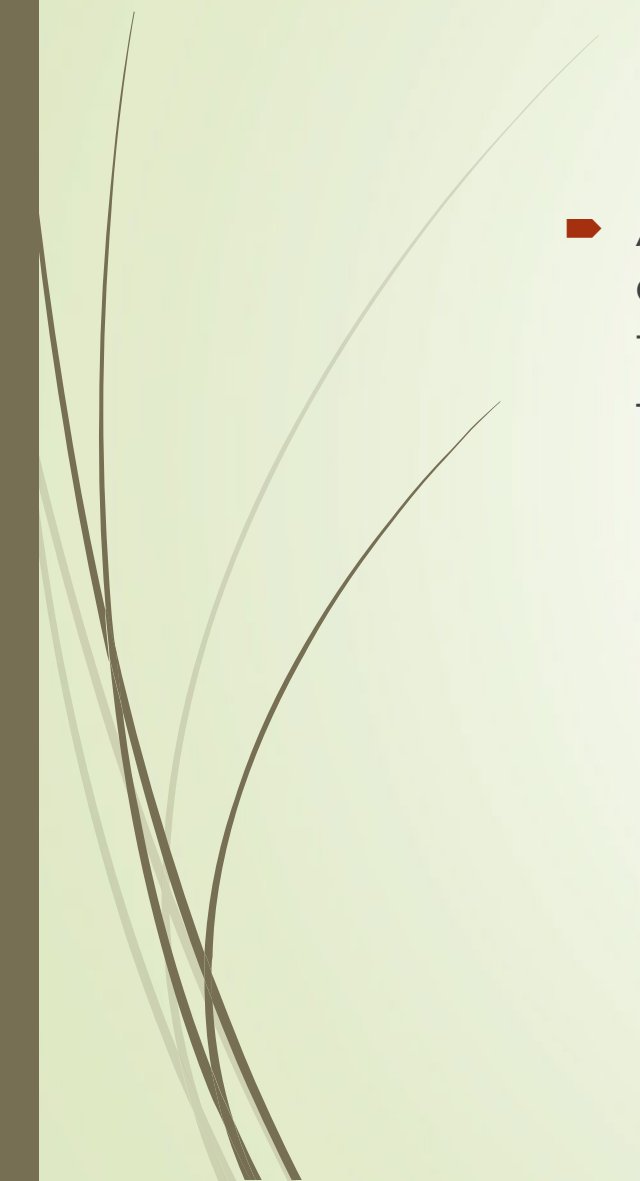
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Session 4



Mean



- A group of numbers that when added together and divided by the number of numbers in the set - this will be the mean.

➤ 2 5 3 7 5 8 9

➤ $2 + 3 + 5 + 5 + 7 + 8 + 9 = 39$

➤ $39 \div 7 = 5.57 \text{ (6)}$

➤ 6 is the mean



Median



- The central point of a set of numbers

- 2 5 3 7 5 8 9
- Next sort in ascending order
- 2 3 5 5 7 8 9
- Then select the middle number
- 5 is the median



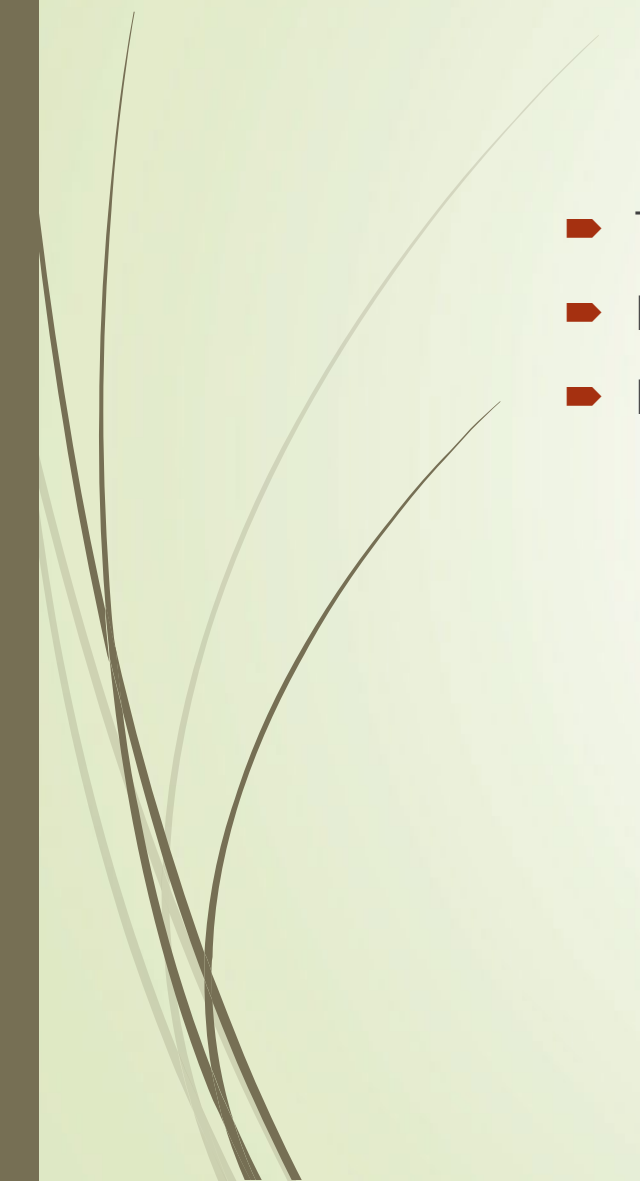
Mode



- The mode - a fashionable figure!
 - The number that occurs most often
- 2 5 3 7 5 8 9
 - Order your numbers
 - 2 3 5 5 7 8 9
 - The mode is also 5

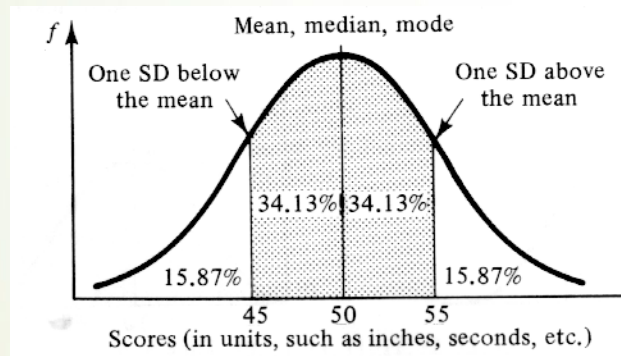


Distribution and Frequency

- The normal distribution
 - Frequency the number of occurrences
 - Distribution the spread
- 

Mean - Mode - Median

- The normal distribution





Mean Deviation

- Number which indicates how much, on average, the scores in a distribution differ from a central point, the mean.
- 

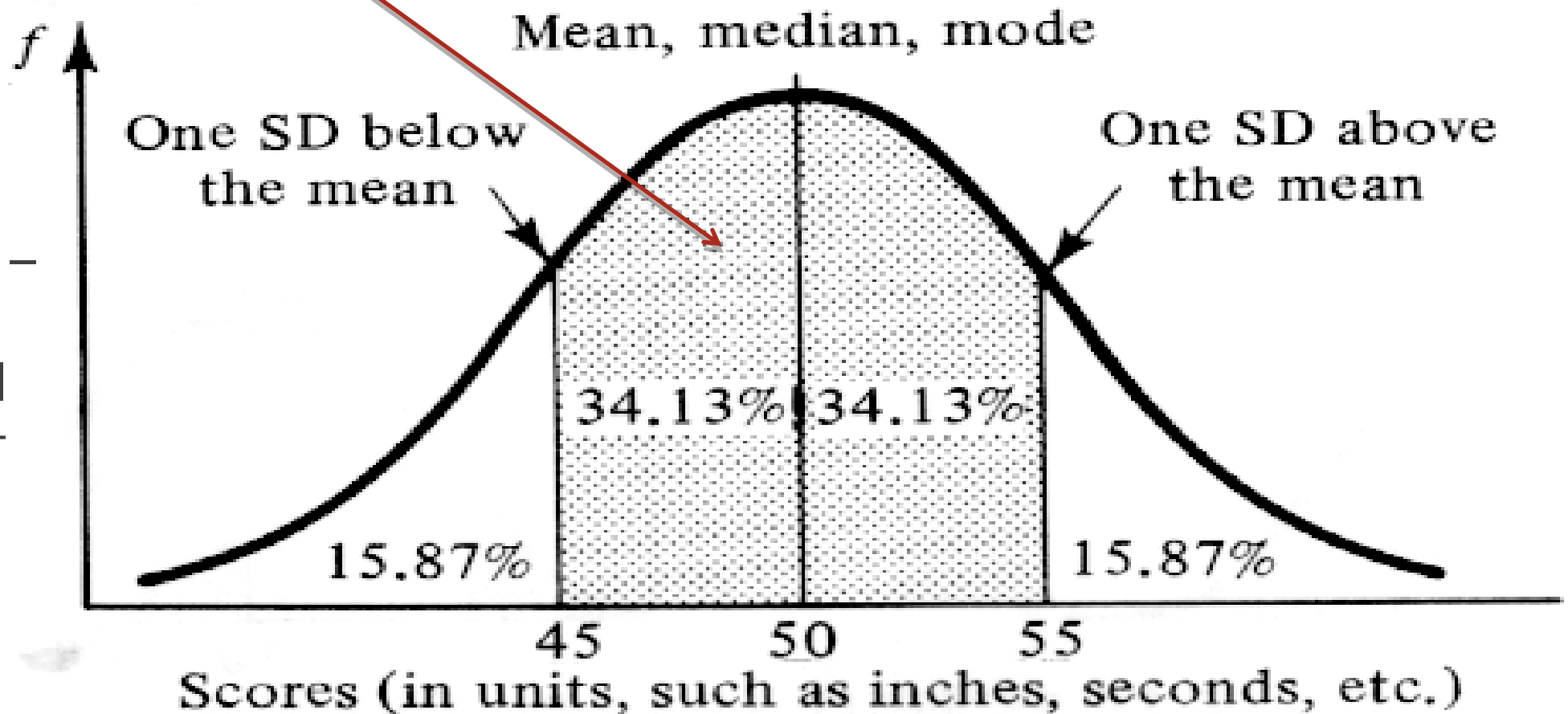
- 
- 
- 8 9 10 11 12
 - Mean is 10
 - the range is 4
 - The number 8 is 2 points away from the mean and so is the number 12
 - Numbers 9 and 11 are both 1 point away from the mean
 - 10 is the mean so does not differ at all
 - so you get
 - $2 + 1 + 0 + 1 + 2 = 6$

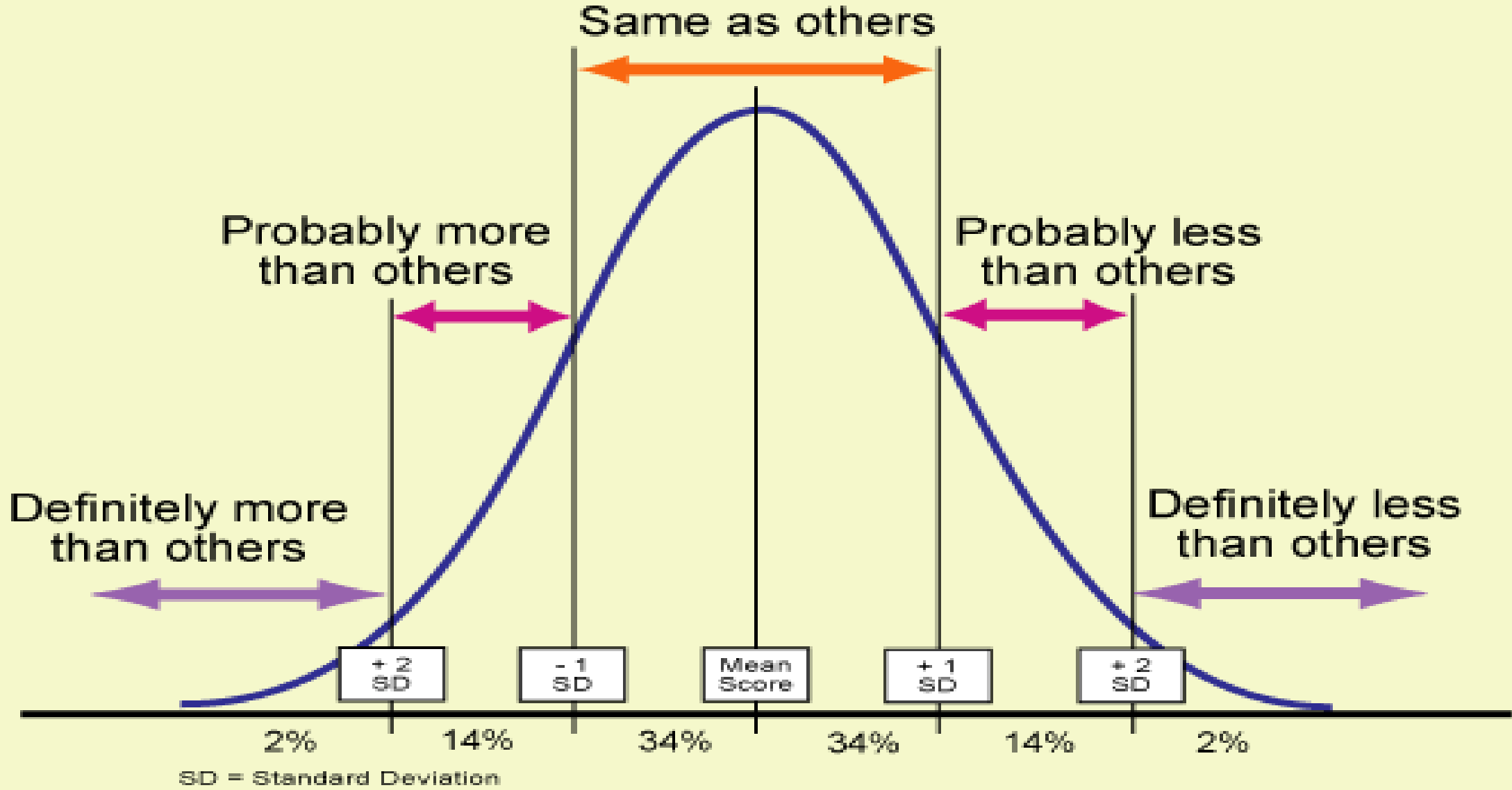
- 
- 
- $2 + 1 + 0 + 1 + 2 = 6$
 - Five numbers in the group
 - the average (mean) amount they all vary from the mean is 6 divided by 5
 - i.e 1.2 points - mean deviation of the group
 - The differences 2, 1, 0 etc which were obtained are called the deviations
 - (1.2 is the mean of the deviations from the mean)

- 
- 
- Add the difference together
 - (ignoring the signs so that the total does not equal zero - this is NOT pleasing to mathematicians!)
 - The figure has no powerful mathematical properties

Now the Whole Thing!

- In total 68.2%
- Within + or -
- 2/3rds of people will be within + or - 1 standard deviation





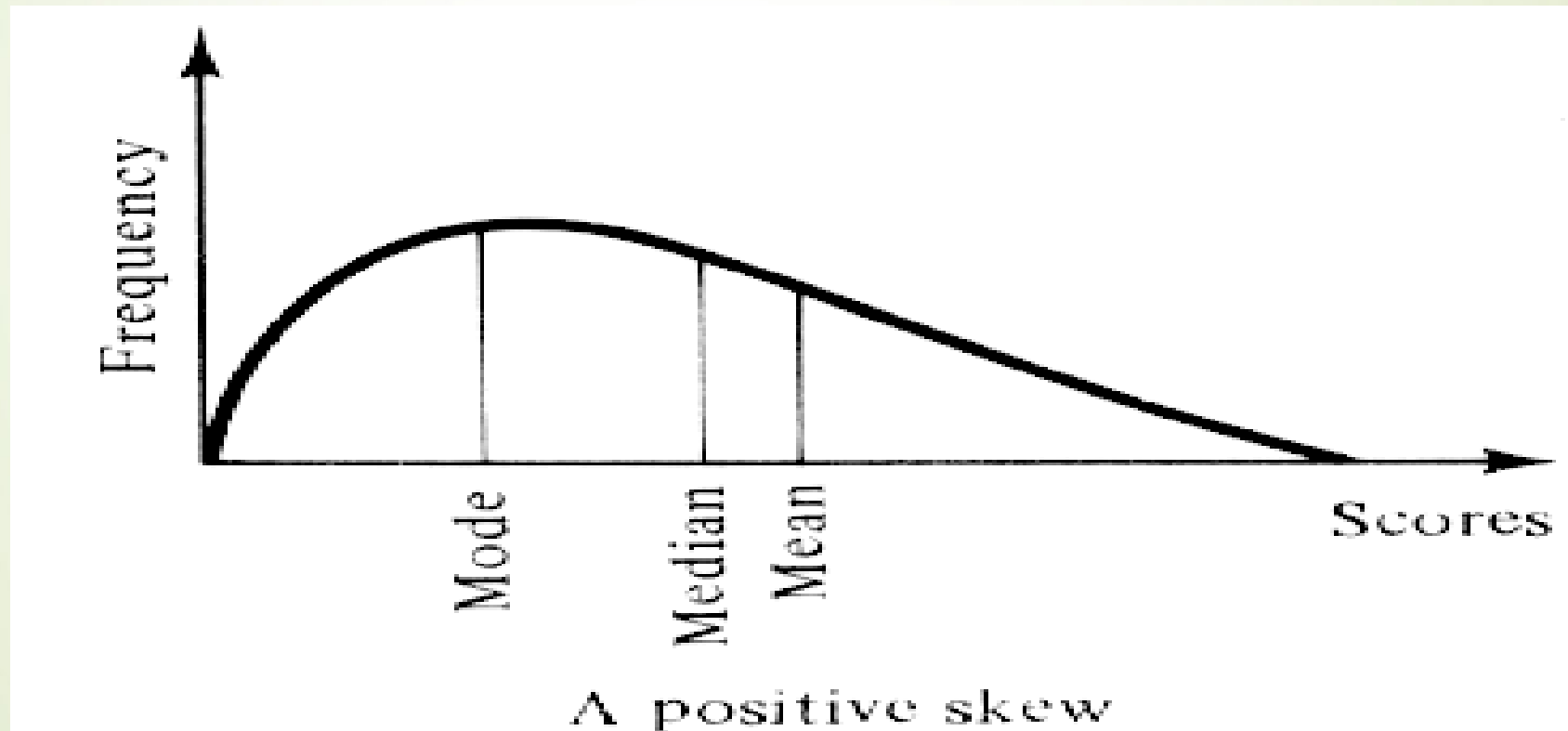
And Always
Remember
when
Working
with People
..



THE TESTER'S APPEARANCE CAN MATTER

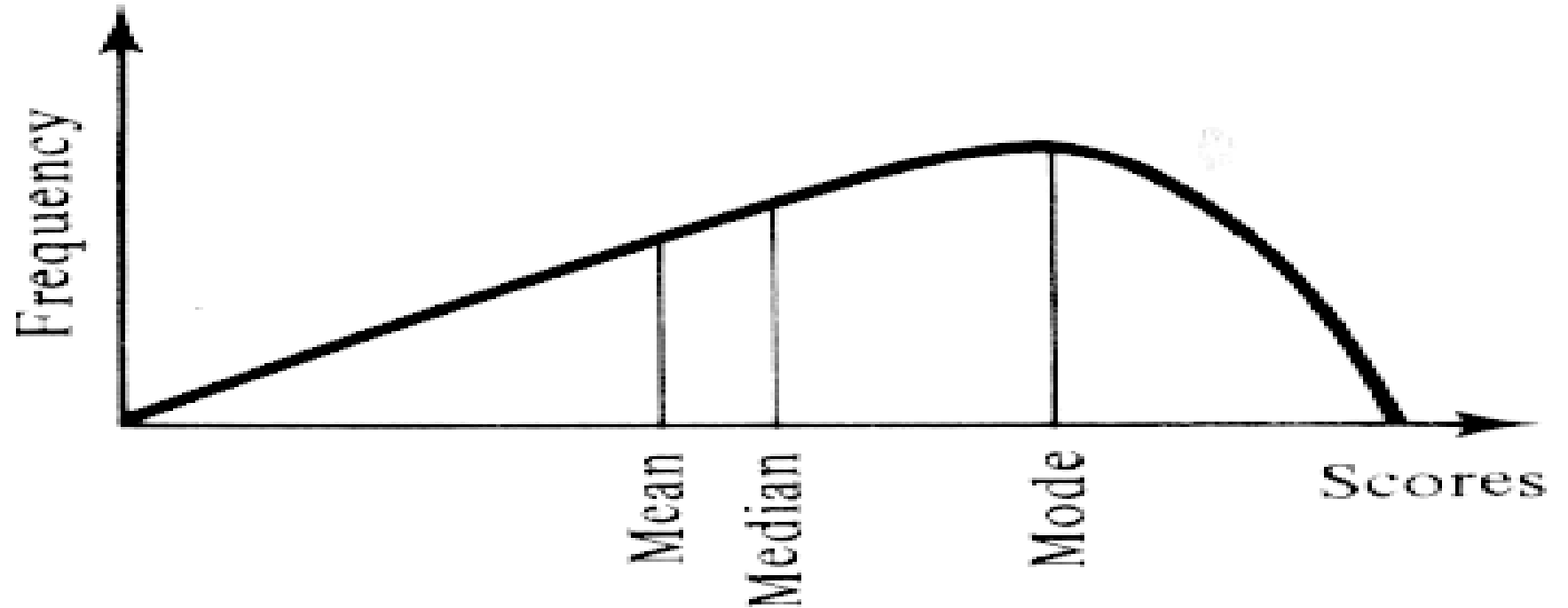
Mean - Mode - Median

► A positive skew



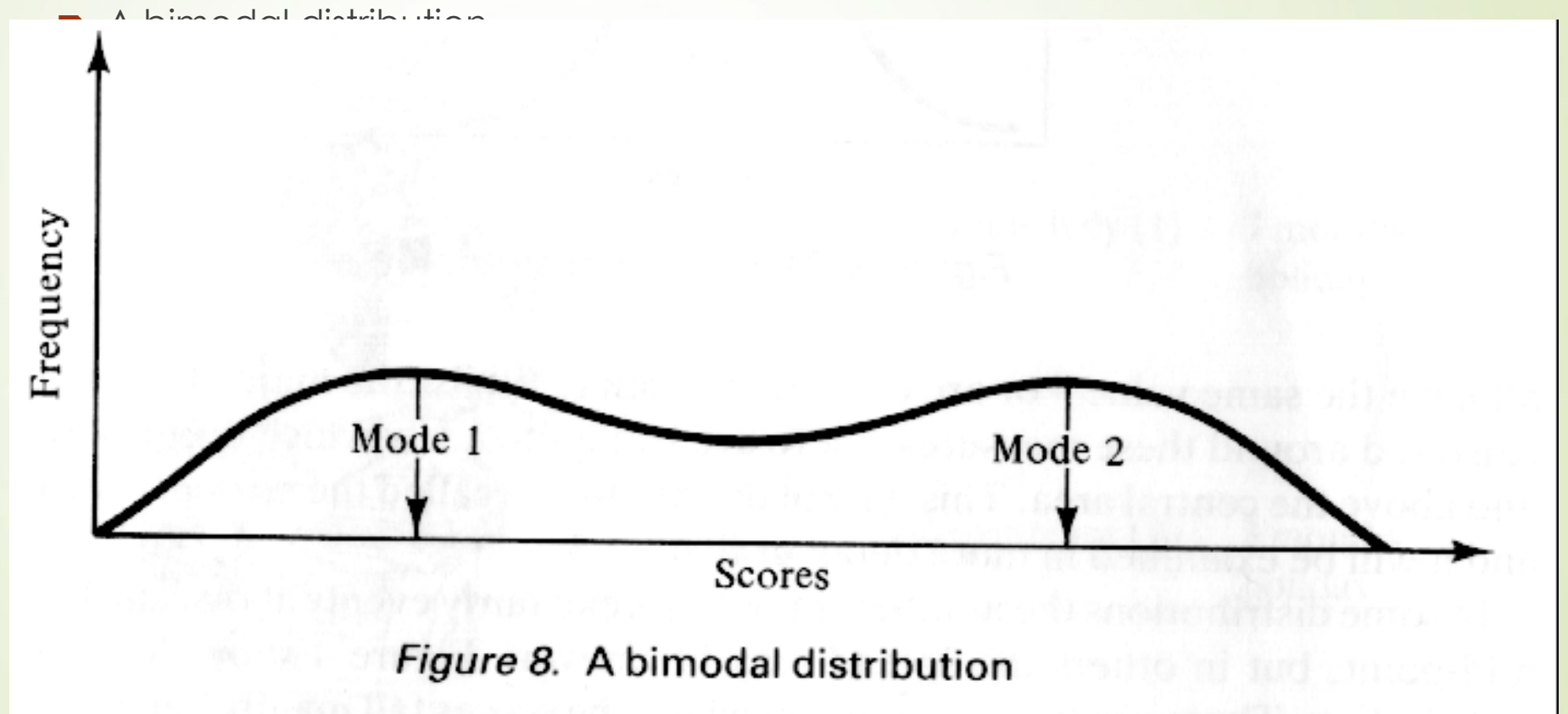
Mean - Mode - Median

■ A negative skew



A negative skew

Mean - Mode - Median





P Values

- ▶ http://www.youtube.com/watch?feature=player_detailpage&v=eyknGvncKLw



Data, Samples & Populations

Dr Caroline Lohmann-Hancock

ECGE7004Q



Skills of Finding and Researching Information

- ▀ Card Index
 - ▀ Referencing
 - ▀ Articles in journals
 - ▀ Note taking
 - ▀ Categorisation of evidence
 - ▀ Noting quotations
- 

Assess the Quality of a Given Research Article

- Sceptical
- The article needs to convince you!
- What have you learned?





What is Important?

- It is important to carry out a critical analysis of a text. This requires careful reading and reflection informed by critical questions:
- Use the following questions to analysis the article



Questions to Ask

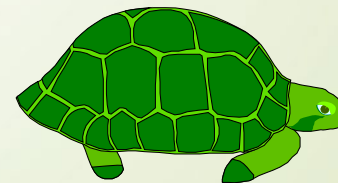
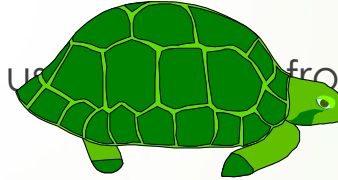
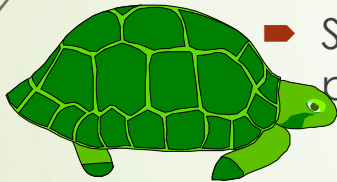
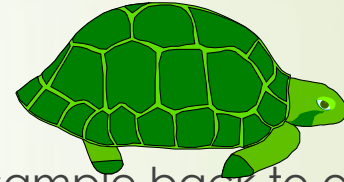
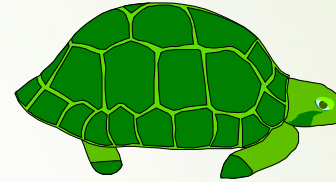
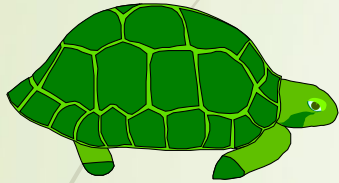
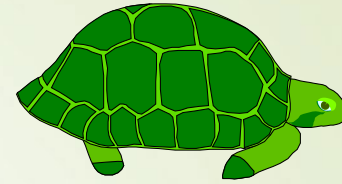
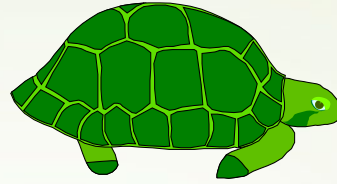
- What is being claimed?
- How far is there backing for the claims?
- How adequate is any conceptual or theoretical orientation to back the claims?
- How far does any value stance adopted affect the claims?
- How far are claims supported or challenged by others' work?
- Summary Evaluation

Sampling

➤ What is sampling?

➤ Why do we use it?

➤ Statistical techniques can help us go from our sample back to our previously defined population





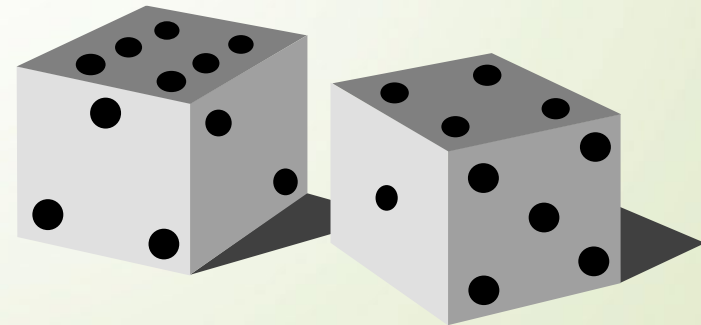
Population



- ▀ Define the population:
 - ▀ population is everyone or everything we are interested in studying.
 - ▀ individuals
 - ▀ educational institutions
 - ▀ examination papers

Who are the Members of Your Population?

- ▀ Which members are 'under represented'?
- ▀ Sample Frame
 - ▀ Those selected, at random, from your population
- ▀ Random sampling is ideal



The Size of the Sample

- General rule: have a large a sample as possible





Important Elements in a Study

- Size of the phenomenon you are studying
- Variability of the phenomenon
- Power of the statistical test
- Sample size
- Selecting a large sample is therefore the only chance you have to influence directly your chances of success



Selecting the Sample

- ▶ Random Sampling
 - ▶ Stratified Sampling
 - ▶ Systematic Sampling
- 



Non-Response

- You must record the non-response rate for each questionnaire item as well as overall.
- Non-response can lead to bias in the results

Data

- Nominal data
- Ordinal data
- Interval data
- Ratio data
- Discrete data
- Continuous data





Different Types of Data

- ▶ http://www.youtube.com/watch?feature=player_detailpage&v=hZxnzfnt5v8
- ▶ Video

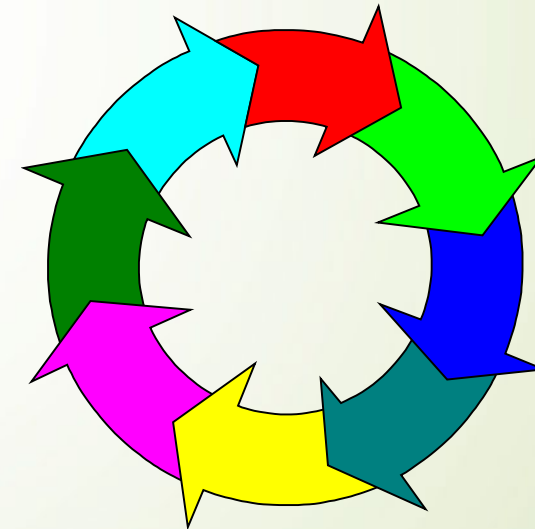
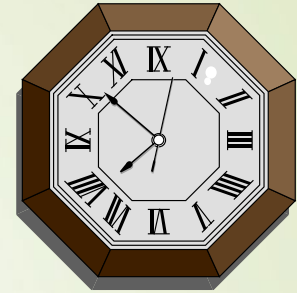


Which Statistical Test?

- ▶ http://www.youtube.com/watch?feature=player_detailpage&v=rullUAN0U3w
- ▶ Video

Types of Research

- Case Studies
- Correlational Research
- Surveys
- Longitudinal Study
- Cross-sectional Study
- Action Research
- Participatory Research





ECGE7004Q

Questionnaire Design

Dr C Lohmann-Hancock
Dr N Welton



The Question!

- Start with the question
 - Methods are dictated by the information that you are trying to investigate
 - Question then the research methodology follows
- 



Lecture Outcomes

- To explore the advantages and disadvantages of the questionnaire in a research project
- Examine the design of an effective questionnaire



I have to Undertake a Piece of Research . . .

- ▀ I know what . . . I'll send out a questionnaire!



Gillham (2000)

- ▀ No single method has been so abused as the questionnaire
- ▀ It has become the quick fix for social research methods



Gorard (2001)

- The practice is so widespread in Educational Research that some commentators appear to equate quantitative approaches only with surveys
- 



Oppenheim (1996)

- The easy option . . .
- The world is full of well meaning people who believe that anyone who can write plain English and has a modicum of common sense can produce a good questionnaire.



When would We Use the Survey/Questionnaire?

- When the data we require does not already exist.
- The research questions are not susceptible to experimental trial



Remember!

- Questionnaires are good at gathering relatively simple facts
 - Not so good at gathering opinions, attitudes or explanations
- 



Questionnaire

- Why are you using a survey?
 - Function - measurement
 - Put reasons in methodology to justify the use of questionnaire
- 



Problems with Questionnaires

- Survey vs. experiment
 - Survey vs. national statistics
 - Survey vs. understanding causes
 - Limited data
 - Difficult to gather
-
- Even good questionnaires generate poor data!



Questionnaire Types

- Face to face
 - Self administered
 - Postal questionnaire
 - Technology questionnaire
- 



So What Else?

- ▀ Response rate
 - ▀ Cost
 - ▀ Speed
 - ▀ Amount of data
 - ▀ Sample size
- 



Face to Face

- ▢ Advantages
 - ▢ children
 - ▢ education
 - ▢ accessibility
- ▢ Disadvantages
 - ▢ time



Self Administered

- ▀ Advantages
 - ▀ confidentiality
 - ▀ anonymous
- ▀ Disadvantages
 - ▀ low literacy
 - ▀ low motivation
 - ▀ difficult to collect



Postal Questionnaire

- Advantages
 - large sample
 - specific target group
- Disadvantages
 - low response rate - 20-40% only
 - overload from other companies/organisations



Technology Questionnaire

- ▀ Advantages
 - ▀ Higher response rate
- ▀ Disadvantages
 - ▀ population only those with email!



Population

- ▀ Everyone who could possibly be in your research
 - ▀ Sample within population
- 



Instrumental Design

- ▶ Question order
 - ▶ vital
 - ▶ leading questions
 - ▶ your own value system - bias
- ▶ Pilot
 - ▶ trial your questionnaire with a small section of your proposed population
 - ▶ this will identify any problems



Order of Questions

- Impact upon response to question
 - Impact upon likelihood of completion
- 



What Goes Where?

- Explain why they are being surveyed
 - why
 - who
 - purpose of data
 - what will happen to data
 - polite and cover ethical issues
 - consent



Respondent Information

- Selection check
 - who
 - what are you doing
 - number of people you manage
 - are you the SEN teacher



Substantive Questions

- ▀ About Research
 - ▀ Likert type scales



Background Questions

- Concerning personal characteristics
 - age
 - postcode
 - email address
 - Sex or gender



Sex or Gender

- The Publication Manual of the American Psychological Association (2.12) has this to say about it:
 - “Gender is cultural and is the term to use when referring to men and women as social groups.
 - Sex is biological so use it when the biological distinction is predominant.
 - Note that the word sex can be confused with Sexual Behaviour. Gender helps keep the meaning unambiguous, ...”



Simply Put

- ▀ Sex

- ▀ male and female

- ▀ Sex refers to biological differences; chromosomes, hormonal profiles, internal and external sex organs.

- ▀ Gender

- ▀ masculine and feminine

- ▀ Gender describes the characteristics that a society or culture delineates as masculine or feminine.



General Points

- ▣ Size
 - ▣ no more than 8 pages (max)
 - ▣ no more than 100 items (max)



Layout

- ▀ Design and appearance
 - ▀ grammar
 - ▀ readability
 - ▀ translation/back translation (include a selection on the translation of your survey)
 - ▀ light colour
 - ▀ SAE



Question Design

- Key aspect to survey design
 - BUT
- Question design can limit the analysis of data
 - Every question should have an explicit purpose!
 - Why are you asking this question?
 - What will you get from it?
 - what can you do with it?



Open and Closed Questions



- Open ended questions
 - respondents answer in their own terms
 - e.g. please indicate what you think about...?
- Closed questions
 - specific terms of reference
 - e.g. what degree class?
 - i
 - i(i)
 - i(ii)
 - iii
 - Fail



Open Ended Questions

- Advantages
 - richer information
 - no constraints
 - more realistic
 - useful for testing hypothesis
- Disadvantages
 - time consuming
 - effort on behalf of participants
 - coding answers slow and unreliable



Closed Questions

- ▀ Advantages
 - ▀ little time
 - ▀ no extended writing
 - ▀ process into SPSS
 - ▀ group comparisons
 - ▀ useful for specific hypothesis



Closed Questions

- Disadvantages
 - loss of spontaneous response
 - bias in answer category
 - crude response
 - irritate the respondents



Scales

- Batteries of similar format questions
- Social scales
- Attitudes
- IQ
- Likert scale
 - strongly agree, agree, undecided, disagree, strongly disagree



Difficulties

- Only when a single (proxy) measurement not possible
- Tendency towards agreement or 'weaker' opinions
- False quantification (ordinal scale leading to real numbers)
 - agree, don't know, disagree
 - do not use just agree/disagree unless you wish to force a answer!



The Old Favourites

- Standard questions
 - age
 - gender
 - social class
 - ethnicity
 - postcode data
- Age or date of birth?
 - Which is least likely to offend?



Pilot Studies



- Friends whole research design
- Selecting a sample
- Negotiating access
- Delivery - the instrument
- Calculating response rates
- Analysing the data



Stage Two

- Small scale pilot with expert friends and family
- Full scale pilot
 - extra brownie points for doubled piloting



Leading Questions!

- ▀ Some importance
 - ▀ Medium importance
 - ▀ Very importance
-
- ▀ Do not assume that it is important!



Ambiguous Terms or Phrases

- ▶ Do you have a car? Yes/no
 - ▶ You - individual, household or family?
 - ▶ Have - ownership or availability?



Other Difficult Questions

- Double Barrelled Questions
 - Do you own a bicycle or a motor cycle?
- Double negatives
 - Cremation of the dead should not be allowed
 - agree or disagree?



More Difficult Questions

- Baffling them with terminology!
 - technical terms
 - abbreviations
 - acronyms
 - jargon
 - slang or colloquialisms



And a Few More!

- ▀ Words with alternative meanings
 - ▀ different locations
 - ▀ cultures
 - ▀ generations
- ▀ Emotive words & offensive language
 - ▀ fair
 - ▀ low class
 - ▀ alcohol linked with those of Muslims faith



Conclusions

- Is the survey appropriate?
 - What implication does your sample have of the survey?
 - What kind of survey?
 - Respondents point of view
 - Why are you asking the questions?
- 



Finally!

- ▀ Are you measuring what you think your are measuring?
- ▀ How to collect the data?
- ▀ Pilot all stages
- ▀ Show it to everyone!

- ▀ Be 100% happy BEFORE you use it!