Statistical Methods

2. Questionnaire Design

Based on materials provided by Coventry University and Loughborough University under a National HE STEM Programme Practice Transfer Adopters grant

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Summary

We will consider:

- What is a questionnaire?
- Response rates
- Data types and question types
- Question design principles
- Questionnaire layout
- Rating scales
- Questionnaire design process
What is a questionnaire?

- A collection of questions given to different people in the same form
- Observational or experimental (e.g. observing a class before and after an intervention, or measuring a variable in experimental and control groups)
- The focus may be opinions or facts
- Can be administered by paper, phone, email or via a website
- Completed by the researcher, subject or a third party
- Questions can be organised into groups (as often in a standard instrument)
Comparison with other data collection techniques

Pros:
- Cost-effective:
  - Large samples can be gathered
  - Greater potential of statistically significant results
- Can be carried out by different people

Cons:
- Honesty of responses may be an issue
- Low response rates, especially for email/online
- How to deal with ‘missing’ / ‘no opinion’ answers?
- Free response answers tend to be very short
Mode of delivery may affect what is possible

- Self-completed or interviewer-led?
- Is help/explanation available?
- Paper, phone, online or an electronic form via email?
- If online, questions can be delivered one at a time, with a progress bar to show level of completion
Response rates

- The proportion of questionnaires given to your sample that are completed should be as high as possible in order to minimise possibility of bias (you also need to make sure your sample is representative of the population).
- Notorious problem with online and postal questionnaires.

Population

Sample

Respondents

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How to maximise your response rate

- Try to engage with the respondent as a person, e.g. give out paper-based questionnaires on a clipboard face-to-face while you are waiting or email people who already know you (but watch out for possible bias)
- Give your questionnaire a short and meaningful title
- Begin by introducing yourself and the purpose of your research
- Keep it as short and succinct as possible
- Offer incentives for responding, if appropriate
- Make it look attractive, e.g. use colour and images
- Make it convenient, e.g. enclose a stamped address envelope for a postal questionnaire
## Question types and data types

<table>
<thead>
<tr>
<th>Question type</th>
<th>Data type</th>
<th>Analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multiple choice</td>
<td>Nominal or ordinal</td>
<td>Quantitative: nonparametric only</td>
</tr>
<tr>
<td>Multiple choice scale with words at the ends</td>
<td>Scale</td>
<td>Quantitative: parametric and nonparametric</td>
</tr>
<tr>
<td>Multiple answer multiple choice</td>
<td>Multiple binary (e.g. true/false)</td>
<td>Quantitative: treat each value separately – only have a few</td>
</tr>
<tr>
<td>Number field</td>
<td>Scale</td>
<td>Quantitative</td>
</tr>
<tr>
<td>Ranking</td>
<td>Ordinal</td>
<td>Quantitative: hard to analyse – avoid</td>
</tr>
<tr>
<td>Text field</td>
<td>Text</td>
<td>Qualitative</td>
</tr>
</tbody>
</table>
Activity: Question design

In pairs or small groups:

- Refer to the Sample Questions handout - this contains a series of poorly written questions – some are real!

- Look at each question in turn

- State one potential problem with each question

- Spend at most 1 minute on each question
Questions 1-4

1. Smoking in public places should not be abolished.
   - Yes □
   - No □
   - Not sure □

2. What percentage of your annual salary do you spend on petrol?

3. If students were to receive more discount, where would be most appropriate?
   - Restaurants □
   - Supermarkets □
   - Bars □

4. How much money do you spend per week on alcohol, if any?
   - £0 □
   - £10-20 □
   - £20-30 □
   - £30-40 □
   - £40-50 □
   - £50+ □
Question design principles

- Question wording should be clear and unambiguous: avoid double negatives – Q1
- Questions should not be too difficult to answer – Q2
- Responses should **exhaust** all possible options or have a residual option such as 'Other' – Q3
- Responses should be **mutually exclusive** if only one option can be chosen – Q4 (e.g. £20?)
Questions 5-9

5. Are you thinking of booking a family holiday for this summer?
   Yes ☐  No ☐  Not sure ☐

6. Wouldn’t you agree that the government’s decision to re-classify Cannabis as a Class B drug is the right one?
   Yes ☐  No ☐  Not sure ☐

7. How would you rate our service?
   1  2  3  4  5
   Excellent  Very good  Good  Undecided  Poor

8. Have you ever stolen stationery from work for home use?
   Yes ☐  No ☐  Not sure ☐

9. Do you have or have you ever had a health condition which has lasted for over 6 months and has limited the kind of work you can do?
   Yes ☐  No ☐  Not sure ☐
Question design principles (2)

Avoid:

- Possible incorrect responses (boxes next to wrong response) – Q5
- Leading questions – Q6
- Biased scaling – Q7
- “Prestige bias” – may not be answered truthfully – Q8
- Overly complicated questions – Q9
Questions 10-11

10. Rank the following television programmes in the order that you watch them, indicating the most watched channel with a 1 and the least watched channel with a 10.

<table>
<thead>
<tr>
<th>Channel</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>BBC1</td>
<td></td>
</tr>
<tr>
<td>BBC2</td>
<td></td>
</tr>
<tr>
<td>BBC3</td>
<td></td>
</tr>
<tr>
<td>BBC4</td>
<td></td>
</tr>
<tr>
<td>ITV1</td>
<td></td>
</tr>
<tr>
<td>ITV2</td>
<td></td>
</tr>
<tr>
<td>ITV3</td>
<td></td>
</tr>
<tr>
<td>ITV4</td>
<td></td>
</tr>
<tr>
<td>Channel 4</td>
<td></td>
</tr>
<tr>
<td>Five</td>
<td></td>
</tr>
<tr>
<td>Sky One</td>
<td></td>
</tr>
<tr>
<td>Virgin 1</td>
<td></td>
</tr>
<tr>
<td>Sky Sports 1</td>
<td></td>
</tr>
<tr>
<td>Sky Movies Premier</td>
<td></td>
</tr>
</tbody>
</table>

11. Indicate if you agree or disagree: A chemical used in food production that has a negligible cancer risk should be prohibited even though it delays spoilage, prevents rancidity, or prolongs storage time.
Question design principles (3)

- Avoid asking to rank too many items (and numbers don’t make sense!) – Q10
- In fact, it is better to avoid ranking questions altogether as they are difficult to analyse – ask about each item individually then rank the mean response values
- Ensure a questionnaire is the best vehicle for collecting your data – Q11
Question design principles (4)

- Make the first few questions easy, e.g. demographics
- Then have your most important questions
- Leave open/complex questions to the end
- Avoid very similar questions, unless you are constructing scales
- Try to minimise bias through:
  - Socially acceptable responses
  - Respondent pleasing the questionnaire setter ⇒ mix positively and negatively worded questions
  - Too many or too few answer categories ⇒ use 6 or 7 (see later)
Demographic questions

- Good to start with these
- Examples are:
  - Age
  - Gender
  - Level of education
  - Socioeconomic background
  - Employment
  - Region
- Useful for comparing groups
- Only ask what you need
Questionnaire layout

Good layout can increase response rate and accuracy:

- Make the design eye catching
- Be clear and succinct
- Group questions logically
- Sequence the questions sensibly
- Use consistent wording and answer formats
- Be polite
Activity: Questionnaire evaluation

- 10 minutes

- In pairs or small groups, evaluate one of the questionnaires provided according to the principles given on the checksheet:
  - National Student Survey
  - Parent questionnaire
  - Coffee consumption questionnaire
  - Diabetes questionnaire

- Report back your findings to the main group

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Rating scales

- A rating scale is an ordered scale of responses.
- They are commonly used in questionnaires.
- They typically have 5 or 7 values:
  - Less values reduce data quality.
  - More values are hard to process mentally (people end up just choosing bottom, middle or top values).
- There is an argument to have an even number of values (e.g. 6) to force respondents to make a choice, although most people tend to choose more positive answers anyway.
- There is also an argument to word some of the questions negatively to stop respondents from giving responses without thinking.
Example 1

Indicate the extent to which you agree or disagree with the statement:

“Staff on this workshop are good at explaining things”

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly agree

Yields ordinal data: limited analysis options
Example 2

Indicate the extent to which you agree or disagree with the statement:

“Staff on this workshop are good at explaining things”

1  2  3  4  5  6  7

Strongly disagree  Strongly agree

Yields richer scale data: more analysis options
Likert scales

Many people refer to rating scales like the previous examples as **Likert scales**

Strictly speaking, a Likert scale is a **series** of numbered rating scale questions which are used to measure responses to a **series** of carefully developed 'attitude statements’, e.g. via a focus group.

The **Likert scale value** is then the overall sum of the numbered ratings (once negatively worded items have been reversed). However this should not be done without first testing the scale for **reliability** (not recommended for Level 4 or 5 students).

For more information see [http://www.socialresearchmethods.net/kb/scallik.php](http://www.socialresearchmethods.net/kb/scallik.php)
Questionnaire design process: Don't let the tail wag the dog!

- **Do not start** designing your questionnaire by simply writing questions.
- **Start** by first considering what your research questions are.
- Use this to determine what data you need and the analysis you will do.
- Test your questionnaire in a **pilot survey**.
Carry out a pilot survey

- Always pilot your questionnaire with a few friends before carrying out your full survey

- This will allow you to:
  - Check the integrity of your questions
  - Identify missing response categories
  - Check for spelling and grammatical mistakes
  - Assess any difficulties
  - Check the analysis you plan to do

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Recap

We have looked at:

- What is a questionnaire
- Maximising response rates
- Data types and question types
- Question design principles
- Questionnaire layout
- Rating scales
- Questionnaire design process
Bibliography


Loughborough University (n. d.) *Questionnaire Design*. [pdf] Available at: [http://www.lboro.ac.uk/media/wwwlboroacuk/content/library/downloads/adVICESheets/questionnaire.pdf](http://www.lboro.ac.uk/media/wwwlboroacuk/content/library/downloads/adVICESheets/questionnaire.pdf) [Accessed 6/01/14].

