The cognitive aspects of questionnaire design

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The assumptions we all make when we use questionnaires:

1. All respondents understand the questions in a consistent way.

2. The questions are asking for information respondents have and can retrieve.

3. The wording of the questions provides respondents with all the necessary information they require to be able to answer them in the way required by the researcher.


If these assumptions are not fulfilled you cannot be sure the responses your participants give mean what you think they do...
The cognitive processes involved in answering a question

Answering questions is an inherently cognitive process

Collins (2003)
The first thing we need to find out is simply whether the respondent has interpreted the questionnaire item in the way it was intended.

*If this stage fails then the other 3 stages will too...*
Retrieval

Having comprehended the question, the respondent now needs to retrieve the relevant information from their long term memory.

Several factors can affect the accurate retrieval of information (these include):

1. Whether or not the retrieval and encoding context match
2. Whether the required information ever reached long-term memory
3. How rare or distinctive the event was
4. Previously cued information (from questions, or events going on at the moment)

Cognitive misers

Judgement

→ The point at which participants formulate their response to your question

The main thing that can affect the judgement process is context – and this means you have to be very careful in the way you design your questionnaire.

There are two different types of context – the format of the question and the wording of the question:

- **Response Alternatives (format)**
  - Open / closed question format (e.g. Sudman et al., 1996)
  - Scale range issues
    - Frequency scales (Schwarz, Strack, Müller & Chassein, 1988)
    - Likert-type scales (Schwarz, Knäuper, Hippler, Noelle-Neumann & Clark, 1991)

- **Question context (wording)**
  - Ambiguity (Strack, Schwarz & Wänke, 1991)
  - The “given new” (Schwarz, Strack, & Mai, 1991)

Importantly judgements may affect how the comprehension, retrieval and response stages occur (and vice versa)…
Response

Having comprehended, retrieved and made a judgement about the information they have retrieved, respondents now need to make a response.

Social desirability:
It is well known that respondents like to give answers that they believe to be socially desirable

Question wording / format:
The way we word our questions can make this more likely, for example consider the following question:

How often do you exercise?
- Everyday
- Every other day
- At least two or three times a week
- At least once a week
- Less often than once a week
- Never

How can we account for or measure these cognitive processes?

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<th>Method</th>
<th>Stage</th>
<th>Comprehension</th>
<th>Retrieval</th>
<th>Judgement</th>
<th>Response</th>
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<td>Think aloud</td>
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<td><em>(verbal protocols)</em></td>
<td>Concurrent</td>
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<td>Retrospective</td>
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<td>Behavioural coding</td>
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<td>Computer coding</td>
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<td>Cognitive experts</td>
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<td>Sorting</td>
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</table>
Now that you are cognitive experts...let's have a go at assessing a simple scale

This is a mood state scale called the UWIST mood adjective checklist.

1. Try completing it yourselves (this should take a couple of minutes)

2. Then in groups / pairs discuss any difficulties you had answering it / you think other people may have answering it.
The think aloud method

• Also known as protocol analysis

• The development of this method is largely credited to Simon, Newell & Ericsson (see Newell & Simon, 1972, Ericsson & Simon, 1980)

• In the 1990s it was first proposed as a method for piloting questionnaires (Bolton, 1991)

• There are two forms of think aloud, concurrent and retrospective
# The think aloud method

## Concurrent

Participant thinks out loud as they are solving a problem / answering a question

**Pros:**
- No interference from researcher
- Less time consuming overall
- More realistic if your questionnaire isn’t interview administered

**Cons:**
- Less detailed information
- May miss some problems

## Retrospective

Participant solves a problem/ is asked a question by an interviewer and once they give their answer cognitive probes are used to find out how they got to this answer

**Pros:**
- More detailed data than concurrent think aloud
- Cognitive probes will encourage quieter respondents to talk

**Cons:**
- Interviewer probes could cause contamination of results

*“Some respondents, usually those with higher levels of education and greater verbal facility find the concurrent think aloud an easy and interesting task, others however need prompting turning a concurrent think aloud into a retrospective one.”* Sudman *et al* 1996 p 34.
Conducting a think aloud pilot

**Concurrent**

1. Tell the participant to “say out loud everything they think whilst answering the questionnaire”

2. Give them a practice run (using un-related tasks) e.g. solve this anagram – **NPEPHA**, multiply 24 by 34 in your head

3. Give them the questionnaire and ask them again to “say out loud everything they think whilst answering the questionnaire”

4. Record their think alouds on a dictaphone

5. Transcribe think alouds verbatim

6. Analyse transcripts for question issues using pre-determined codes (see following slides)

*(give them somewhere quiet to carry this out so they don’t feel shy or inhibited!)*

**Retrospective**

1. Use the practice tasks so that they get used to thinking aloud

2. Administer the questionnaire via an interview (usually face-to-face)

3. Use cognitive probes to elicit think alouds (see following slide)

4. Record with a dictaphone

5. Transcribe think alouds verbatim

6. Analyse transcripts for question issues using pre-determined codes (see following slides)

Procedure by Ericson & Simon (1993)
## Retrospective think aloud probes

<table>
<thead>
<tr>
<th>Cognitive stage</th>
<th>Probes</th>
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</thead>
</table>
| Think aloud /general | - How did you go about answering that question?  
- Tell me what you are thinking?  
- I noticed you hesitated before you answered – what were you thinking about?  
- How easy or difficult did you find this question to answer?  
- Were there any questions you felt uncomfortable answering?  
- Why do you say that?  
- How did you find the wording of the question?  
- Did you think about anything when you answered that question, or was your answer immediately obvious? |
| Comprehension      | - What does the term X mean to you?  
- What did you understand by X?                                                |
| Retrieval          | - How did you remember that?  
- Did you have a particular time period in mind?  
- How did you calculate your answer?                                           |
| Judgement          | - How well do you remember this?  
- How sure of your answer are you?                                            |
| Response           | - How did you feel about answering this question?  
- Were you able to find your first answer to the question from the response option shown? (Why/ why not?)  
- Does your true answer fit in the response options shown? (why/why not?) |

*Reproduced from Collins (2003) – Table 2 pg. 235*
Identifying problems in the think aloud transcripts

<table>
<thead>
<tr>
<th>Comprehension</th>
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<th>Judgement</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>I don’t know...what that means</td>
<td>I forget</td>
<td>Use of words like “maybe”, “perhaps”, “probably”</td>
<td>Can’t say / Don’t know</td>
</tr>
<tr>
<td>Re-reading the question several times / asking the</td>
<td>Long pauses (&gt; 3secs)</td>
<td>All of which indicate lack of confidence in their answer</td>
<td>Indicates they have retrieved information but they are still not sure how to answer the question</td>
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<tr>
<td>researcher to repeat / rephrase the question</td>
<td>Broken utterances</td>
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<tr>
<td>Quite often you will notice that participants will</td>
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<tr>
<td>say something that clearly indicates they don’t</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>understand the question</td>
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</table>

Bolton (1993)
What to do when you identify a problem in a questionnaire

- Oskenberg, Cannell and Kalton (1991) suggest an arbitrary index of 15% to identify problem items.

- Altering a question may make it worse, you assume it will lead to more reliable responses. Therefore if you decide to alter the way a question is worded or presented, you must pilot again asking people to think aloud.

- For retrieval, comprehension problems and judgement problems there is literature available suggesting which words, formats etc make it harder for people to respond in the way you want and ways that you can improve on this. Sudman et al’s book (1996) outlines a lot of these methods which you can use to guide any alterations you do wish to make.

- In my own work, I tend to use pre-validated questionnaires. Many of these were designed before cognitive testing of questionnaires became widespread, so I still run pilot studies with a think aloud. When I have found issues with specific items I have contacted the authors of the questionnaires for their advice on how to make adaptations to the questionnaires to improve their validity in my sample.
Think aloud pilot study with the UWIST

2 of the UWIST items were found to cause measurement errors for \( \geq 15\% \) of the sample; these were:

**Item 7**
“At the moment I feel passive”

37\% of the participants did not understand the word “passive” in this item.

**Item 19**
“At the moment I feel unenterprising”

53\% of the participants did not understand the word “unenterprising” in this item.

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"passive [pause] ummm [pause] passive I dunno how you feel passive [pause] umm I don’t really know what that is so no I don’t feel passive"

*Pharmacy Student Participant 8*

“Unenterprising err not sure hmm unenterprising what does that mean I’ll just say umm slightly”

*Qualified Pharmacist Participant 23*
References


