

EU Twinning project activity D4 – Cognitive aspects in questionnaire design :theory on questionnaire design

Deirdre Giesen – March 30



## Acknowledgement

Input from slides also from:

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Vivian Meertens  
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& Mojca Bavdaž (University of Ljubljana)

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## Behind every record...

13	663	27	2001	00	8 74204	5
14	520	28	2001	00	2 45331	5
15	508	29	2001	00	2 45211	6
16	657	31	2001	00	8 74501	6
17	680	32	2001	00	8 36122	5
18	527	34	2001	00	8 4531	2
19	508	36	2001	00	8 45211	7
20	680	37	2001	00	5 2521	5
21	680	38	2001	00	8 3613	5
22	508	39	2001	00	8 45211	5
23	680	40	2001	00	8 2521	5
24	507	41	2001	00	2 45112	5
25	501	43	2001	00	8 1824	5
26	657	46	2001	00	74501	6
27	657	47	2001	00	2 74501	5
28	679	49	2001	00	8 3340	8

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## ... is a questionnaire..

12	0000	24	2001	00	0	0
13	RE3	27	2001	00	8	74304
14	<p>Rechtspraak bestuursrecht</p> <p>Rechtspraak bestuursrecht</p>					
15	<p>Rechtspraak bestuursrecht</p>					
16	<p>Rechtspraak bestuursrecht</p>					
17	<p>Rechtspraak bestuursrecht</p>					
18	<p>Rechtspraak bestuursrecht</p>					
19	<p>Rechtspraak bestuursrecht</p>					
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25	<p>Rechtspraak bestuursrecht</p>					
26	<p>Rechtspraak bestuursrecht</p>					
27	<p>Rechtspraak bestuursrecht</p>					
28	<p>Rechtspraak bestuursrecht</p>					

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## .. and a respondent.

12	0000	24	2001	00	0	0
13	RE3	27	2001	00	8	74304
14	<p>Rechtspraak bestuursrecht</p> <p>Rechtspraak bestuursrecht</p>					
15	<p>Rechtspraak bestuursrecht</p>					
16	<p>Rechtspraak bestuursrecht</p>					
17	<p>Rechtspraak bestuursrecht</p>					
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23	<p>Rechtspraak bestuursrecht</p>					
24	<p>Rechtspraak bestuursrecht</p>					
25	<p>Rechtspraak bestuursrecht</p>					
26	<p>Rechtspraak bestuursrecht</p>					
27	<p>Rechtspraak bestuursrecht</p>					
28	<p>Rechtspraak bestuursrecht</p>					

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## Why questionnaire design matters



Making statistics is like cooking, and the data are our ingredients!

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## Quality of questionnaires affects

- Quality of collected data
- Efficiency of data collection
- Satisfaction of interviewers
- Response burden
- Reputation of our institutes

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## European statistics code of practice



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## Code of Practice on qnr design

- Principle 4: Commitment to quality: systematically and regularly identify strengths and weaknesses to continuously improve process and product quality
- Principle 7: Sound methodology: requires adequate tools, procedures and expertise
- Principle 8: Appropriate statistical procedures are implemented from data collection to data validation.
  - Indicator 8.2 questionnaires are systematically tested prior to the data collection
- Principle 9: Non-excessive Burden on Respondents
- Principle 10: Cost Effectiveness

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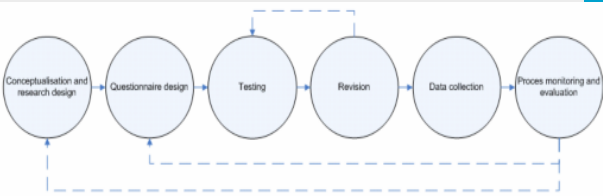
## Handbook of Recommended Practices



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## Questionnaire design as a process



Source: Brancato et al.(2006)

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## Questionnaire design theory

## Do we have a theory on Questionnaire Design?

Do we know how to design questionnaires?

- Yes
- No

- We have bits and pieces: an eclectic theory!



### The first two stages of Questionnaire Design Process

**Survey objectives**

**Conceptualisation and research design**

**Questionnaire design**

**Defining the topics/contents of Q:**

- What are you going to measure? (in detail; e.g. temperature in C or F)
- What are you going to talk about?

**Defining the measuring instrument/conversation:**

- How are you going to measure it? (like various designs of thermometers)
- What will your conversation be like?

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### Conceptualisation & Research Design

- Research objectives
- Research questions
- Conceptualisation: define concepts
- Operationalisation: define empirical indicators for concepts
- Inventory of available data
- Needs for (remaining) data collection
- Main design characteristics: population, sampling, mode(s)

Tip: Document your choices!

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### General Questionnaire Design Principles

#### Overview

- Reliability and validity
- Question-Answer process
- Questionnaires as communication instruments
- Main sources of measurement errors
- Main guidelines for questionnaire design

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## Reliability and validity

Each respondent should interpret the question

- in the same way
- and as intended by the researcher.

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## Example

"How many hours did you work last week?"

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## Last week is

Sunday - Saturday	17%
Monday - Friday	54%
Monday - Saturday	9%
Monday - Sunday	6%
Sunday - Sunday	4%
Other	10%

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## Question-Answer Process

Stimulus  
presented to  
respondent

Response  
registered on the  
questionnaire

Question →

Respondent  
???

Answer →

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## The Question-Answer Process

Stimulus  
presented to  
respondent

Respondent  
performs cognitive  
tasks in the question-  
answer process

Response  
registered on the  
questionnaire

QUESTION →



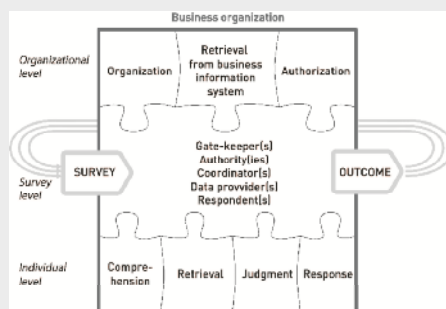
ANSWER →

Source: Tourangeau (1984)

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## The multidimensional integral business survey response model (Bavdaž 2010)



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## Questionnaire design = communication design

A questionnaire is a special form of conversation between researcher and respondent.

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## 4 kinds of languages

1. Graphical elements ('look-and-feel')

e.g. structure, composition, colour,  
position of questions, instructions..

2. Symbols

e.g. signs for backward & forward

3. Numbers

4. Letters (the alphabet)

increasing  
cognitive  
effort

Source: Redline & Dillmann (2002)

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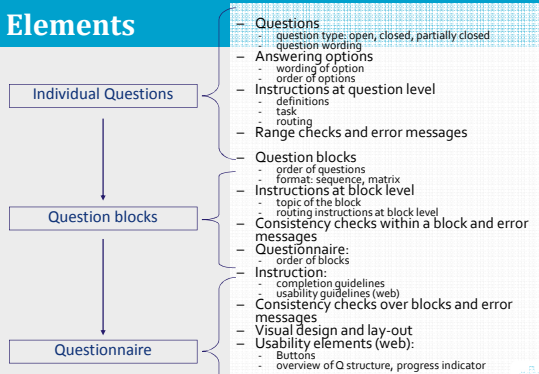
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## Elements



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## Things we take for granted

- ▶ In the conversation we assume that respondents:
  - Can and do read
  - Know how to do arithmetic
  - Know how to use the computer (web)
  - Know the background of the survey
- ▶ But do they?

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## Usability

- “Go with the mouse to the right upper corner ...”



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## Usability

- “Medieval tech support”
  - A new system is introduced: The ‘book’ (“beek”) instead of rolls of paper.
  - Ansgard has called the helpdesk ...



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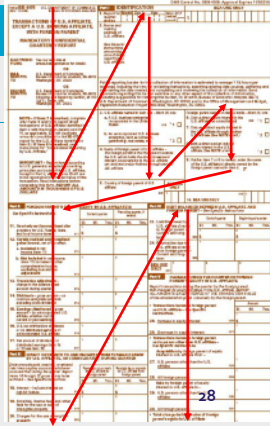
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## Structure

- First impression?
  - “What a chaos!”
  - “Where should I start?”
  - Lots of text
- Where to go next?



## Main sources of measurement error

- Satisficing not performing all steps of the response process or not performing them as well as needed
- Social desirability bias changing true answer to give answer that one thinks is more acceptable
- Acquiescence tendency to agree to any question
- Memory effects quality of answer affected by recall problems
- Context effects response process affected by context of question (e.g. order, position on the page, size of answer box)
- Interviewer effects characteristics of interviewer affect response process

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## Measurement error and mixed mode

- Mixing modes (collecting same data with different modes) often needed because
  - need to use cheap web-based modes &
  - fact we still cannot reach complete population with web
- But: mixing modes problematic because of **mode-specific measurement errors**.
- Mixing modes even more problematic as composition of modes in sample may change over time.

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### Causes of mode-specific measurement error

Modes vary in

- Extent interviewer involvement
- Mode of stimulus presentation: aural or visual
- Question format
- Respondent control over questionnaire

This results in differences in

- the way question is processed
- level of effort (satisficing)
- willingness to disclose (social desirability bias)

Source: Jäckele et al. (2011)

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### Strategies for mixed mode questionnaire design

**Strategies for reducing mode differences:**

Unimode : presenting question identical in all modes

or

Generalised mode design: purposely design questions differently in different modes with the aim of achieving cognitive equivalence

Versus

**Strategy to reduce overall measurement error**

Mode specific optimal design / Best practices approach : designing questionnaires to minimize measurement error for the specific mode

Sources: De Leeuw (2005), Toureangeau, Conrad & Couper (2013)

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### However...

**Unimode:**

- Presenting questions identically over various modes is in practice often impossible.
- Restricting question features to options possible in all modes means we do not use the mode to its full potential (e.g. automatic calculations , show cards).

**Cognitive equivalence:**

- Hard to develop and prove

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## Considerations for choosing strategies

De Leeuw (2009): If one main mode: optimise for this mode and adapt auxiliary modes, if multiple equally important modes: cognitive equivalence.

Toureangeau, Conrad & Couper (2013): if focus on getting best point estimate: best practices approach, but when comparisons across groups or occasions are important or when arbitrary scales are used: unimode approach

More on this on Tuesday!

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## Dependent interviewing

Dependent interviewing: using data known prior to the interview in the questionnaire (for example from previous waves of a panel or from other sources).

- pro-active
- reactive

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## Use of dependent interviewing

Pro:

- Reduces response burden
- Cheaper for collecting and processing data
- Improves quality (especially for longitudinal data)

Cons:

- If respondents are shown t-1 data and asked to correct if necessary risk of satisficing (and under estimation of changes)
- Good logistics needed (including good protection of privacy).

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## Recommendations at Stat Netherlands

- Only use dependent interviewing when expected gains are substantial.
- Do not present edited data to respondent but data as reported.
- When risk of satisficing is high (for example price reporting) use previous report reactively

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## Questionnaire design guidelines

- Questions
- Answer options
- Instructions
- Questionnaire

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## Guidelines for questions 1/5

### Ask for things respondents know

Be aware of:

- Lack of information
  - How much is your house currently worth?
  - In which year did your husband graduate from highschool? (avoid proxy)
  - As a child were you vaccinated against small pox?
- Recall problems : accuracy of recall depends on elapsed time and impact
  - Make reference period consistent with significance of the event
  - Decompose a large complex question in several smaller questions, provide retrieval cues

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## Guidelines for questions 2/5

### Use familiar, easy and unambiguous wording

- Assume limited vocabulary
- Keep questions and sentences brief
- Use active voice
- Provide any necessary definitions  
may be needed for seemingly simple words, e.g. "household",  
"week", "turnover".
- Phrase questions and instructions positive rather than negative:  
"Use a pen" better than "Do not use a pencil"
- Avoid double negatives "Do you favor or oppose that children  
under 16 years of age are not allowed to buy alcohol?"

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## Guidelines for questions 3/5

### Define unit and reference period

- Make sure that both for the questionnaire and each question it is  
clearly indicated for which unit (household, specific person,  
specific business unit) and which period the questions must be  
answered.
- Use a reference period for any question for which the answer may  
vary over time:  
Not: "How often do you go to the cinema?"  
But: "How often have you been to the cinema in the last 4  
weeks?"

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## Guidelines for questions 4/5

### Only ask one question at a time

- If a question consists of more than one question we do not know  
what the answer means. Watch out for words like "and" "or"  
"because".
  - Do you want to be rich and famous?
  - Are you economical with energy because of the costs?

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## Guidelines for questions 5/5

### Avoid leading questions

- Keep it neutral.
- Ask balanced questions
  - "Do you agree or disagree with ..."
- Do not suggest some answers to be socially undesirable.
  - "Do you agree with the majority of people that the quality of the health care in the country is falling?"
- Also pictures or cues in a question may be leading:
  - Picture: The question only refers to that situation
  - Cues: Only the cues listed are included in the cognitive steps.

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## Guidelines for answer options 1/9

### Considerations when designing answer options

- Required measurement level for analyses
- Costs of collecting and processing data
- How much effort they require from respondent
- How design may affect Q-A process

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## Guidelines for answer options 2/9

### Answer options should be obvious from the question

- Not: "When did you move here?"
- Instead: "In which year did you move here?"

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## Guidelines for answer options 3/9

### What to do with 'don't know'?

- Offer it explicitly as one of the options. This may cause satisficing in self-administered surveys. DK is selected to avoid having to think.
- Offer it implicitly. It is not in the list. If respondents insist they do not know (in CAPI/CATI) or leave question open in Web, there is an option to choose DK.
- Do not offer DK. This is bad practice if DK is a possible answer.
- Use a filter question that first asks the respondents whether they have an opinion. If yes, ask for opinion.

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## Guidelines for answer options 4/9

### Open question

- Simple to ask
- Sometimes vague answers
- Answer possibilities may be overlooked
- Difficult to interpret the answer
- Difficult to analyse the answers
- Avoid as much as possible

What do you consider the most important aspect of your job?

.....

How many people are there in your household? ☐ ☐

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## Guidelines for answer options 5/9

### Closed question

- All possible options must be listed, including 'don't know' (if relevant)
- No overlap
- Check match of Question and Answer

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## Guidelines for answer options 6/9

### Closed question, more than one answer

- All possible answers must be there
- Present options in order meaningful to respondent
- Primacy and recency effects possible
- Risk of satisficing: only a few answers are selected.

What are your normal modes of transport to work?  
Check all that apply.

- ☐ Car
- ☐ Motorcycle
- ☐ Train
- ☐ Bus, tram
- ☐ Bicycle
- ☐ Walk
- ☐ Other mode of transport:

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## Guidelines for answer options 7/9

### Format of answer options affects the interpretation of a question

For how many hours a day do you watch television?

Option 1	$\leq \frac{1}{2}$	$\frac{1}{2} - 1$	$1 - 1\frac{1}{2}$	$1\frac{1}{2} - 2$	$2 - 2\frac{1}{2}$	$> 2\frac{1}{2}$
Option 2	$\leq 2\frac{1}{2}$	$2\frac{1}{2} - 3$	$3 - 3\frac{1}{2}$	$3\frac{1}{2} - 4$	$4 - 4\frac{1}{2}$	$> 4\frac{1}{2}$
Option 3	Open question					

(Toepoel, Das, and Van Soest, 2009)

% of respondents that watch more than 2.5 hours of TV a day:

- Option 1: 22%
- Option 2: 54%
- Option 3: 52%

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## Guidelines for answer options 8/9

### Matrix questions, grid questions:

- Cognitively difficult (but not for professional business R)
- Risk of satisficing (straightlining).
- Avoid as much as possible for general population

	Excellent	Very good	Good	Fair	Poor
How would you rate the overall quality of the radio station?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
How would you rate the quality of the news programs?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
How would you rate the quality of the sport programs?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
How would you rate the quality of the music programs?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

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## Guidelines for answer options 9/9

### Closed questions – Rating scales

- Increasing number of categories up to 7 increases quality of measurement
- Number of categories must be balanced to ease of administration (mode specific!)
- Labeling categories with words seems to provide more reliable ratings than just labeling end points or using numbers.
- Direct rating better than indirect rating
  - Not : "Do you agree or disagree with the statement 'my health is very good'. But: "How would you rate your health: poor/fair/good/very good/excellent?".

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## Guidelines for instructions 1/2

### Use of explanations and instructions:

- Place general background information about the survey in an accompanying letter or in separate folder or on a web site.
- An instruction that applies to most of the questions may be placed at the beginning.
- Keep explanations as short as possible.
- With computer assisted questionnaires, position any error messages where they occur (and preferably not somewhere at the end of the form) and in such a way that the original question remains visible. Formulate error messages in a friendly and clear way so that reader will understand what the problem is and how it can be solved.

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## Guidelines for instructions 2/2

### Place of explanations and instructions

Possible places to put explanations and instructions regarding specific questions, ordered by likelihood of respondents actually reading them:

- Translated into questions
- In the question text, before the actual question
- Short and to-the-point in a separate explanation, near the question or answer space
- In an extensive explanation at the bottom of the page, or clickable from the question
- As a separate document; refer to this document where relevant close to or in questions

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### Guidelines questionnaire 1/3

#### Title

- Use a clear title for the questionnaire:
  - Make sure that people know what you are talking about.
- Use a clear title for subparts/blocks of the questionnaire:
  - Indicate that you now addressing a new topic.

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### Guidelines questionnaire 2/3

#### Structure of the questionnaire:

- Make clear how the questionnaire is structured  
Divide the questionnaire into logical and small parts:
  - So the R can take those step by step
  - Make sure that every block fits on one page / one screen
  - Web questionnaires: use paging in stead of scrolling
- Make clear how to navigate through the questionnaire:
  - Take the respondent by the hand

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### Guidelines questionnaire 3/3

#### Order

- Group together questions about the same topic.
- Uninteresting questions near the end (income, education).
- Questions that require much effort preferably early in questionnaire
- Context effects: the answer to a question may be affected by earlier questions

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## Example order effects

Version 1	Version 2
	Preceding question about most important disadvantages (too fast extension of EU, Turkey becoming a member, introduction of euro, loss of identity, lack of democratic rights, etc).
Taking everything into consideration, would you say that the country has on balance benefited from being a member of the European Union?	Taking everything into consideration, would you say that the country has on balance benefited from being a member of the European Union?
Yes: 69%	Yes: 43%

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## Example visual design

- Compare an old and a revised version of an agricultural questionnaire (revised by Dillman et al.)
  - What is different?
  - How does the difference affect the design?

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## Guidelines visual design

- Aspects that belong together (e.g. answer options for a question) must also be visually clustered
- Information that is irrelevant for the interviewer or respondent (e.g. intended only for internal processing) must be less visually conspicuous.
- Make sure there is a clear visual indication of where the answers are to be entered (e.g. a light-coloured background with white answer boxes).
- The design must always be functional and consistent: use the same font sizes, letter types, colour and graphical symbols for the same components (e.g. block titles, answer options and explanations).
  - Do not change the visual language, Rs might get confused
- Use colours only to supplement the layout.
  - Be aware of colour blindness (e.g. red/green)
- Use design conventions that are familiar to respondents.

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## SBS web version

The screenshot shows a web application titled 'SBS web version'. On the left is a sidebar menu with options like 'Home', 'Questionnaires', 'Reports', 'Settings', and 'Help'. The main area displays a questionnaire form with sections for 'Personal information', 'Demographics', 'Health status', 'Lifestyle', 'Mental health', and 'Physical health'. Each section contains several input fields for text, numbers, and checkboxes. At the bottom, there are buttons for 'Save', 'Cancel', and 'Print'.

## Guidelines for Web questionnaires

- Include some intelligence in the questionnaire; people expect that:
  - automated calculations
  - range checks
  - be careful with consistency checks
- Usability: Include clear functionalities, like going back, making changes, check if saving & printing is needed
- The process starts for the R with going to the internet, finding the questionnaire; then follows completion and finally sending the data and receiving feedback

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## Just remember



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