EU Twinning project activity D4: Cognitive aspects in questionnaire design: testing and evaluating

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Statistics Netherlands

Today's programme

- Overview of methods for testing and evaluation questionniares
- Cognitive interviewing: theory and practice
- Discussion of applications at ICBS

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Content

- What is testing and evaluation of questionnaires?
- Purposes of testing and evaluation
- Overview of frequently used methods at NSIs
- Recommended strategy for developing testing programme

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What are we talking about?

– Testing and evaluation of questionnaires:
all activities designed to evaluate the quality of a survey instrument in order to find and fix the main problems.

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General purposes of testing and evaluation

– Improve respondent friendliness
Respondents should:
  - understand question as intended
  - be willing to answer the question
  - be able to answer the question

– Increase data quality
  - Prevent measurement errors caused by questionnaire problems
  - Increase unit response
  - Increase item response
  - Increase timeliness of response

– Reduce costs of data collection
  - Reduce costs of "respondent chasing", long interviews, dissatisfied interviewers, data editing.

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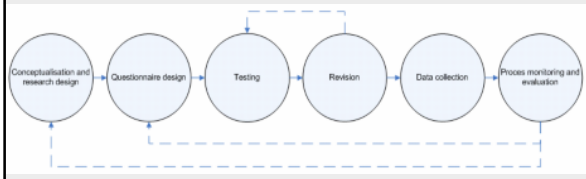
Testing and Evaluation methods: used at every stage



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Typical purposes for testing and evaluation (1/3)

- Conceptualisation and research design
  - Explore concepts
  - Explore data availability
  - Get feedback on feasibility of new design
- Designing and pre-testing draft questions/questionnaire
  - Can respondents understand the questions?
  - Are they willing and able to answer them?
  - Will the questionnaire measure what is intended?
  - How long does completing the questionnaire take?
  - Are certain new procedures feasible?

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Typical purposes for testing and evaluation (2/3)

- Functionality/technical testing of the 'final' questionnaire
  - Does the actual questionnaire in production environment work as intended (e.g. do all routings and automatic fills work)?
- Pilot testing
  - How do instrument and procedures work in realistic conditions?
    - Data quality: unit response, item response, response distributions
    - Response burden: completion times, respondents perception of questionnaire
    - Interviewers experiences

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Typical purposes for testing and evaluation (3/3)

- During data collection
  - Detect any remaining problems early on in the field work to make 'emergency repairs'.
  - Collect relevant data for evaluation (e.g. respondent debriefing, para data)
- After data collection
  - What lessons can we learn for future data collection of same of similar surveys?

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Example: Development of health survey for residents of elderly and nursing homes

- Purpose: Find out if we can do a regular health survey among population of elderly and nursing homes
- Main challenges:
  1) Sampling and contacting units
  2) The ability of sampled units to participate in survey research.

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Sequential design

- Literature review and expert review
- Development concept questionnaires and data collection procedure
- Qualitative interviews with contact persons in hospitals and client councils
- Revision data collection procedures
- Qualitative test interviews with 6 residents
- Revision data collection procedures and questionnaires
- Pilot with 3 regular field interviewers, 6 homes, 9 residents
- Revision data collection procedure and questionnaires
- Pilot with 537 residents
  - Data analyses
  - Observation of sampling procedures (11) and interviews (12)
- Evaluations with interviewers

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Toolkit for testing and evaluation

- Literature review
- Informal tests
- Small scale, qualitative methods using e.g. expert reviews, focus group interviews, cognitive interviews
- Functionality and technical testing
- Quantitative analyses of experiments, pilots and regular fieldwork (both survey data and para data)

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Literature review

- **Sources**
  - Internal reports about same or similar questionnaires (theses, reports of survey organisations)
  - Scientific literature on survey topic and methodologies used
- **Stages typically used**
  - First stages of questionnaire design
- **Tips**
  - Ask internal and external experts for relevant reports
  - Document experiences for future use
  - Questionbank: http://surveynet.ac.uk/sqb

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Informal tests

- Simple but effective way to detect some obvious problems
  - Complete questionnaire seriously and completely for yourself and some other fictitious people (e.g. How would a student answer these questions? And an unemployed person?)
  - Read out loud all questions that interviewers must read out
  - Try questionnaire on your mother, neighbour or colleague
- Stages typically used
  - First drafts of questionnaire
- Tip: All researchers involved in questionnaire design should at least once complete their own questionnaire

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Expert reviews

- Get feed-back on questionnaire and/or design from experts
- Possible experts

  Survey content matter specialists, methodologists, interviewers, help desk staff
- Methods

  More or less formal methods possible. Recommended for review of concept questionnaire: systematic review using a checklist followed by focus group interview
- Used in all stages

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Focus group interviews

- Group interview to collect qualitative information on how a specific group feels about a pre-defined topic (e.g. questionnaire, field method)
  - Efficient way to collect qualitative information
  - Group dynamic can stimulate respondents to express opinions and experiences more specifically
  - Topic list needed
  - Moderator must monitor focus on topic list
  - Participants need clear instruction on their role
  - Usually about 5-7 participants
  - Have observer and/or video taping
- Used in all stages

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One-on-one open interviews

- Interviews to collect qualitative information about quality of questionnaire and/or procedure
  - With potential respondents or experts
  - Use topic list
  - Brief respondents of what to expect
  - Have observer and/or audio/video taping of interviews
- Used at every stage
- Usually more appropriate for sensitive issues and interviews with business respondents than focus groups.

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Cognitive interviewing

- Aimed at gaining insight in cognitive processes while answering survey questions
- Often uses "think aloud" and probing.
- Will be discussed in more detail later on
- Typically for pre-testing; but can also be used for exploring causes of problems found after evaluation of field work.

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Vignettes

- Descriptions of various situations
- Useful for testing how potential respondents define various situations, can also be used as input for focus group or individual interview
- Example: "What do people consider "a change of job"?
  - Vignettes describe several situations that might be considered change of job
  - Test respondents are asked to decide for each vignette if this is a change of job

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Use of case descriptions / persona's

- Description of case (e.g. business, household) that test respondents use to complete a set of questions or complete questionnaire
- Example: Test usability of new electronic version of questionnaire on employees
  - Provide fictive (but realistic) records of employees
  - Ask test respondents to compete the questionnaire using information from the case study.

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Observation of respondents and interviewers

- Systematic registration of specific behaviours in question-answer process
  - Can be qualitative or quantitative
  - Different methods used:
    - Conversation analysis
    - Eye tracking
    - Log files

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Example of frequently used coding scheme

Interviewer question reading codes	
E	Exact
S	Slight change
M	Major change
Respondent behaviour codes	
I	Interruption with answer
C	Asks for clarification
Q	Qualified answer
IA	Inadequate answer
DK	Don't Know
RF	Refusal

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Functionality and technical testing

- Test if questionnaire works as specified
  - Routing
  - Screen appearance at different platforms
  - Appearance on paper if printed in normal production environment
  - Pre-loading of data
  - Calculations and fills
  - Function keys
  - Etc…
- Try to check all materials as they will be used in the field

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Experiments

- Compare alternative questionnaires and/or strategies in experiment
  - Define problem / research question
  - Define alternatives that are to be compared
  - State hypotheses
  - Define study design (e.g. sample sizes)
  - Conduct experiments
  - Tests hypotheses and interpret results
  - Draw conclusions
- Efficient to include experiments in on-going data collections

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Analyses of process/para data

- Use data about data collection and processing as indicators for quality of data collection
  - Response: level, timing, cost per response
  - Remarks/ questions /complaints of interviewers and respondents
  - Include meta-question in regular survey
  - Response Analysis Surveys
  - Information from data editing
  - …

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Analyses of survey data

- Use of survey data to find indication of questionnaire problems
  - Missing values
  - Response patterns
  - Plausibility of responses
  - …
- Caution: data quality is result of complete process of data collection, may be difficult to relate findings to specific characteristics of questionnaires

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Which method to use when?

- No easy answers…
- Qualitative methods
  - explore new topics
  - give insight in causes of problems
  - find indications for solutions
  - flexible and can be conducted quickly
- Quantitative methods
  - can provide estimates of frequency of problems
  - can provide strong evidence of effects
  - sometimes very costly and difficult to organise

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Use of test and evaluation methods in questionnaire development process

- From exploratory to confirmatory (and back again if needed).
- Use less expensive methods (e.g. internal experts, literature review) to prepare for more expensive methods (test with respondents, large scale pilots, experiments).
- Try to use quantitative methods to support costly and far reaching decisions
- Develop methods for standard monitoring of on-going field work

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Recommended strategy for planning tests and evaluations

- Assess risks: what seem to be most important risks to test for?
- Assess resources and time frame
- Choose mixture of methods that suits best: be practical and creative
- Eurostat recommendations
  - Do at least some systematic testing with real respondents
  - Test questionnaires in all modes that will be used
- See Table 7.1 in Brancato at al. with summary of testing methods, stating strengths, weaknesses and costs.

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Cognitive testing theory and practice

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Cognitive interviewing theory and practice

- Introduction
- What is Cognitive interviewing?
- Cognitive interviewing techniques
- Practicing with cognitive interviewing
- Cognitive interviewing as a process
- Cognitive interviewing and Business Surveys
- Cognitive interviewing and Mixed Mode Surveys
- FAQ's and answers

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Main reason for choosing Cognitive interviewing

- "To gain qualitative information on how questions are understood and answered" (Brancato et al., 2006)
- "We study the cognitive processes that respondents use to answer survey questions; in particular, their *comprehension, recall, decisions and judgement*, and *response processes*. However, our goal is to detect a wide range of problems in survey questions." (Willis, 2005)

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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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What is Cognitive interviewing?

Different techniques:

- Think-aloud
  Respondents are explicitly instructed to "think aloud" as they answer the survey questions. The interviewer reads each question to the respondent, and then records the processes that respondents use in arriving at an answer to the question.

- Verbal probing
  After the interviewer asks the survey question, and the respondent answers, the interviewer then asks for other, specific information relevant to the question, or to the specific answer given. In general, the interviewer "probes" further into the basis for the response.

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Think aloud

- Advantages
  - No bias from interviewer
  - Minimal training for interviewer
  - "Open-ended format"

- Disadvantages
  - Dependent on willingness and ability of respondent
  - Burden on respondent & artificial : can interfere with normal Q-A process and thus lead both to false negatives and false positives
  - Danger of straying from the task.

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Verbal probing (1/3)

1. Comprehension probe
2. Paraphrase
3. Confidence judgement
4. Recall probe
5. Specific probe
6. 'General' probe

1. *What does this term mean to you?*
2. *Can you repeat the question in your own words?*
3. *How sure are you…?*
4. *How do you remember that you went to the doctor five times in the past 12 months?*
5. *Why do you think that cancer is the most serious health problem?*
6. *How did you arrive at that answer?*
   Was that easy or hard to answer?
   I noticed that you hesitated - tell me what you were thinking?

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Verbal probing (2/3)

- Concurrent probing
  The probes are asked immediately after a survey question.
- Retrospective probing
  After the complete questionnaire or block of survey questions is asked, the probes are asked.
- Scripted probing (meta questions)
  Developed prior to the interview. Standardized for all interviewers.
- Spontaneous probing
  Thought up during the interview. Dependant on answer or behaviour of respondent. Used by a specific interviewer during one specific interview.

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Verbal probing (3/3)

- Advantages
  - Interviewer is in control of the interview
  - Less difficult for respondents
  - Standardization of probing
- Disadvantages
  - Concurrent probing: can influence normal Q-A process
  - Retrospective probing: less accurate info available
  - Compared to think aloud: less room for unexpected findings (focus is on potential problems expected by researcher).

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Practicing with cognitive interviewing (role play)

Make groups of 3: 1 respondent, 1 interviewer and 1 observer

Instructions for the **respondent**:
- Try to be a 'real' respondent
- Think aloud as much as possible

Instructions for the **interviewer**:
- Read out question texts literally
- Read out all question texts until the question mark
- Probe spontaneously if you feel need for more info

Instructions for the **observer:**
- Write down respondent's remarks and questions

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Q 1: How many hours did you work last week?

Q 1: How many hours did you work last week?

..... hours

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Q 1: How many hours did you work last week?

Last week is:

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

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Q 1: How many hours did you work last week?

Work is: .....<link> .....

- Paid work
- Unpaid work
- Voluntary work
- Including hours of overwork, working at home?
- Hours of contract? Extra hours?
- .....

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Q 2: For how many years have you been unemployed since the age of 15?

- Less than a year
- 1 - 4 years
- 5 - 9 years
- 10 - 19 years
- More than 20 years

(From: Labour Force Survey, 2010)

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Q 2: For how many years have you been unemployed since the age of 15?

R: "He's still going to school" or "[Name] is going to school the whole week"

R: "Children of 15 years who worked?"

R: "[Name] is a student, his work is only a little job on the side"

R: "Asking questions about having a job and unemployment of children who are going fulltime to school is quit acquit"

(From: Labour Force Survey, Evaluation Web Survey, 2011)

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Q 3: In the last five years have you or anyone else in your household had a bicycle stolen?

- Yes
- No
- Don't know / cannot remember

(From: Crime Victimization Survey, 2011)

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Q 3: In the last five years have you or anyone else in your household had a bicycle stolen?

R: "Well, the bicycle of my daughter was stolen, but she isn't living here anymore for years"

R: "Nobody in our household owns a bicycle"

(From: Crime Victimization Survey, Pre-test 2012)

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Q 4: Does your General Practitioner (GP) have a nurse practitioner?

- Yes
- No
- Don't know

(From: European Health Interview Survey (EHIS))

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Q 4: Does your General Practitioner (GP) have a nurse practitioner?

R: "What do you mean, the medical assistant?"

R: "Well, at my GP there are working some nice girls, but what they do and how they call their job, I don't know"

(From: European Health Interview Survey (EHIS), Pre-test 2010)

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Cognitive interviewing as a Process

1) Reviews
2) Defining research questions
3) Designing the pre-test
4) Executing the pre-test
5) Analyses
6) Reporting

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Step 1 Reviews

- Review of previous versions of the questionnaire.
- Review of previous evaluations.
- Desk review by methodologist identifying potential problems.
- Review of 'common knowledge'.
- Review of translation procedure.
- Review of survey design, one mode or mix of modes.

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Step 2 Research questions/test goals

- Based on outcomes of step 1.
- Combine research questions of clients:
  - *National:* Statistical department, Research Institutes, Governmental Departments, University
  - *International:* Eurostat, other NSI's
- Define general and specific research questions for the pre-test:
  - comprehensibility and validity
  - mode specific issues
  - flow of the interview

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Step 3.1 Design of the pre-test

- Define test population and recruitment strategy.
- Choose test methods (cognitive interview techniques, observation, conversation analyses, small scale experiments, pilots).
- Choose (mixed of) mode(s) for pre-test.
- Design or compile the test questionnaire, i.e. scripted probes, alternative question texts, additional evaluation questions etc.
- Write test plan and protocol
- Organisation

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Step 3.2 Design of the pre-test (test plan & protocol)

- Test plan includes:
  - Purpose of test
  - Test design
  - Target group(s)
  - Strategy on recruiting test respondents (specific population, number)
  - Time schedule
  - Protocol
- Protocol contains:
  - Structured outline of interview (including background info you want to collect)
  - Questions to be tested
  - Probes
  - Behaviours that must be observed
  - Reporting template (practical to combine protocol and template)
- Allow time for testing & adapting protocol after first tests!

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Step 3.3 Design of the pre-test (organisation)

- Define project planning with strict time schedule.
- Choose project team members, include client, interviewers, field agents, methodologists, content specialists, IT-specialists, etc.
- Define plan for analyses and reporting, crucial for international projects or projects with several testing partners.

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Step 4 Execution of pre-test

- Recruit test respondents
- Plan appointments, keep in mind project schedule, availability of test interviewers, burden of test interviewers.
- Instruction for test interviewers. Explanation of protocol.
- Execution of test interviews.
- Reporting on individual test interviews.
- Evaluation meeting with test interviewers, first impression and the preliminary results.

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Recruitment of test respondents (1/3)

- Identifying the profile of the respondents:
  - not representative for target population, but for possible problems in the questionnaire!
  - try to make sure all relevant routings in the questionnaire are covered
  - for households typically try to get variations in age groups, levels of education, working status, household situation
  - not only variation in general demographics but also special situation (healthy vs. not healthy, levels of computer experience)
  - for business surveys typically include businesses from different
  - size classes and industries, internal and external reporters, experienced and new respondents

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Recruitment of test respondents (2/3)

- How many test respondents are enough?

No hard rules but…

- Usually 3-5 respondents for each major subgroup
- Usually better to use resources to allow iterative approach: better 10 tests-revise-10 tests than 1 test of 20
- If possible; keep testing and revising until no major new problems are found any more (saturation)
- Remember: even a small number of test interviews is better than nothing!

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Recruitment of test respondents (3/3)

- Methods for recruiting test respondents:

- "Regular" test respondents
- flyers
- snowball method
- specific using network of organisations
- respondents of regular NSI surveys
- Other….

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Step 5 Analyses

- Triangulation: Based on the individual test reports and the findings from the reviews (history, evaluations, common knowledge, translation procedure, design) a spread sheet is composed.
- To get an overview of the most prevalent and significant problems a draft list of main findings was composed.
- Preferably two researchers analyse data
- Discuss preliminary findings with team
- Example of template of an international pre-test (ICT survey).

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Step 6 Reporting

- Based on the analyses of the template a report is written for the client including recommendations.

- The Cognitive Interviewing Reporting Framework (CIRF) can be used as a standardised form to report on pre-tests to achieve completeness and comparability.

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Cognitive Interviewing Reporting Format (CIRF)

Cognitive Interviewing Reporting Format (CIRF): towards the harmonization of cognitive testing reports. *Methodology (2013) special issue*

1. Research Objectives
2. Research Design
3. Ethics
4. Participant Selection
5. Data Collection
6. Data Analysis
7. Findings
8. Conclusion, Implications, and Discussion
9. Strengths and Limitations
10. Appendix Materials, or Internet Links

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Cognitive interviewing and Business surveys

- Can you conduct Cognitive interviews in a business survey situation?

→YES!

- Specific points of attention:
  - Recruitment
  - Test questionnaire
  - Business interviewer / field officer
  - Multiple respondents for 1 questionnaire
  - On location, because difficult in laboratory

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Cognitive interviewing and Mixed Mode Surveys

- The most obvious mode for a cognitive interview is personal interview either with a computer assisted or a paper questionnaire.
- Is it possible to conduct a cognitive interview in another mode?

→Yes, but…

- Not possible to react to nonverbal behaviour
- In web only scripted probes possible
- Conduct the questionnaire in any mode and do a face-to-face retrospective cognitive interview

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FAQ's (1/4)

1. How long should a cognitive interview be?
   - Most interviews take between 1 and 1,5 hours.
   - From experience we can say that interviews can maximally 2 hours. Longer than that is not efficient, because of the burdensome task both the interviewer and respondent will get tired. Or the respondent will get restless because he/she has other appointments.
   - Interviews of less than 30 minutes are also not efficient. Because the respondent takes the effort to come to the office and expects to be interviewed for some time.
2. How long a questionnaire can be tested in a 1-hour cognitive interview?
   - Very dependant on subject of survey and type of respondent.
   - Willis gives the rule of thumb of a 2:1 ratio between "CI time" and "fieldwork time".
   - Be pragmatic.

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FAQ's (2/4)

3. How many interviews should an interviewer do in one day?
   - Advisable not to do more than 3 on one day. CI is very taxing activity.
   - But also: be pragmatic.
4. What is an appropriate subject payment (remuneration)?
   - Probably country-specific. At Statistics Netherlands we give either 15 or 20 euro for an interview at the office. Sometimes related gifts like statistical year book, Book on ICT, USB stick…
5. How much time is required for the various activities? How many hours does a complete test take?
   - As a rule of thumb we ask 20 hours per test respondent, for the total test including recruitment and reporting etc.

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FAQ's (3/4)

7. What kind of skills do you need to be a good cognitive interviewer?
   - Good listener
   - Good observer
   - Empathic
   - Be able to translate laboratory finding into realistic and practical solutions
8. Is it necessary to have multiple interviewers?
   - Yes, in order to avoid (at least the appearance of) bias.
   - Dependant on total number of test interviews.
   - Each interviewer should do at least 2 test interviews.

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FAQ's (4/4)

9. Can you quantify qualitative results?
   - This is a difficult question. This is qualitative research and thus by definition not quantitative.
   - One solution is to triangulate findings, i.e. back up qualitative findings with quantitative findings from a different source.

10. How should/can clients and sponsors be integrated in the process?
   - Involving the client in the test will improve the understanding and the impact of some problems.
   - Have meetings before, after and during the test.
   - Let them participate in the test as observers

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Recommended websites

Eurostat Handbook Questionnaire Design & Testing
http://epp.eurostat.ec.europa.eu/portal/page/portal/research_methodology/documents/Handbook_questionnaire_development_2006.pdf

Papers on testing and many practical examples of test materials from Pam Campanelli
http://edithl.home.xs4all.nl/surveyhandbook/ch10campanelliadditional.htm

European Social Survey website with data, questionnaires and methodological reserach http://www.europeansocialsurvey.org

UK variable and question bank http://discover.ukdataservice.ac.uk/variables

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