Mixed Mode Data Collection in Surveys

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Terminology

- Mixed Mode
- Multi Mode
- Multiple Mode
  - Often used interchangeably
- Mixed Mode
  - Any combination of survey data collection methods (modes)
  - In any part of the data collection process

Note: Term mixed methods used in qualitative studies

Modes of Data Collection

- Interviewer-administered Modes
  - Face-to-face interviews (PAPI or CAPI)
  - Telephone Interviews (PAPI or CATI)

- Self-administered
  - Postal or mail survey
  - Self-administered with interviewer present
    - PAPI or CASI
  - Web or Internet Survey
  - IVR (Interactive Voice Response)

Types of Mixed Mode Surveys

- Two major distinctions:
  - Different contact methods are used in different survey phases (e.g., recruitment, screening, questionnaire administration, etc.)
    - Mostly win-win situation, no threat to measurement if data collection is done in one single mode
  - Different methods used for data collection
    - Concurrent mixed mode:
      - Offer two or more modes at same time
    - Sequential mixed mode
      - Assign modes sequentially during life of the survey

Why Mixed-Mode?

Choosing the Optimal Data Collection Method

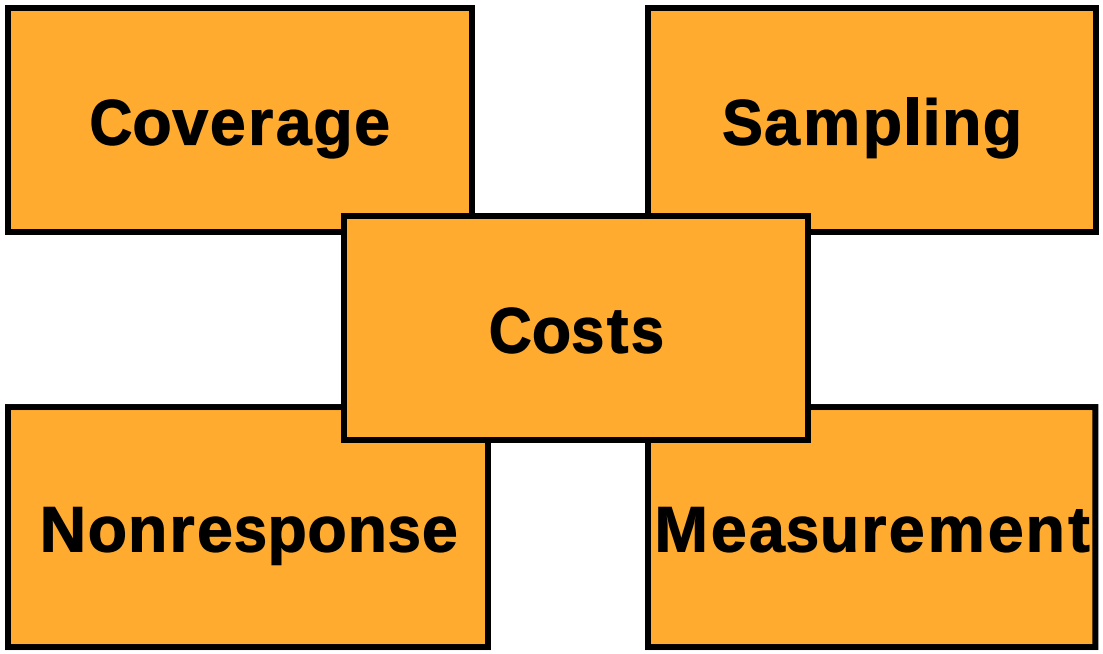
- Best data collection procedure given
  - Research question
  - Population
- Reduce total survey error
- Respect survey ethics/privacy
- Within available time
- Within available *budget*

Biemer & Lyberg, 2003

Best *Affordable* Method

- Mixed-mode explicit trade-off
  - Survey Errors
  - Costs
- Example: Nonresponse follow-up
  - Mail survey
  - Telephone follow-up
  - Face-to-face for sub-sample of remaining nonrespondents

Balance Costs & Errors



Groves, 1989

Cornerstones of Data Quality

- Frame Coverage Errors
  - Sampling frame must include *all* units of population of interest (once), if not coverage error
- Sampling Error
  - Occurs because only a sample of the population is invited to participate in a survey in stead of the total population:
    - Statistic of interest is computed on sample

De Leeuw, Hox, Dillman, 2008

Cornerstones of Data Quality

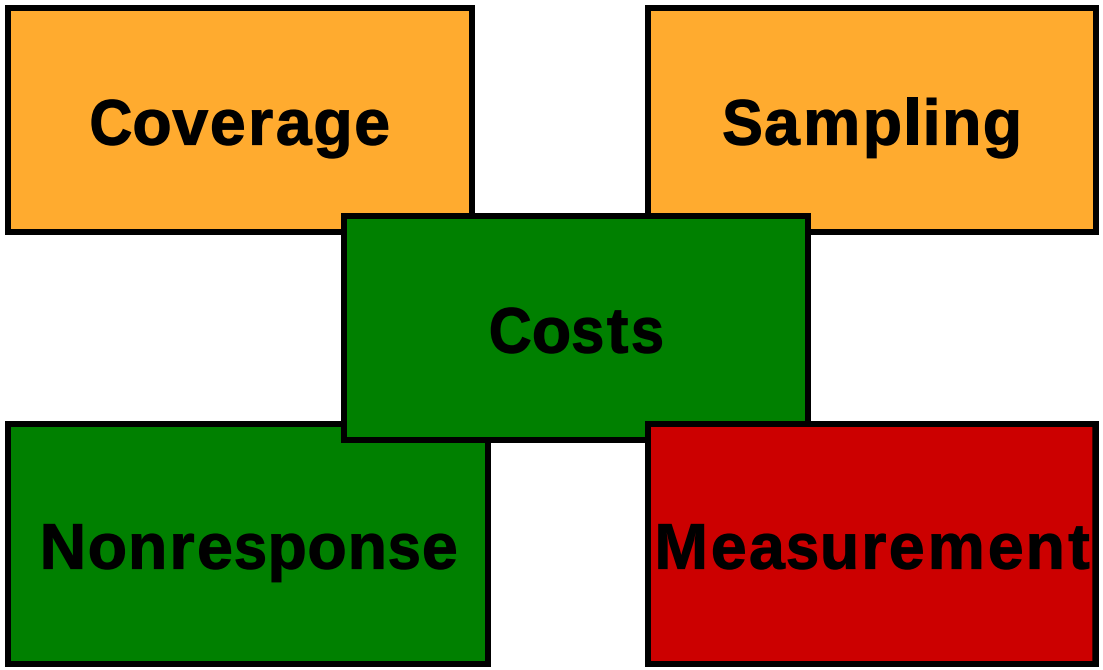
continued

- Nonresponse error
  - I. Nonresponse occurs
  - II. Respondents and non-respondents differ on variable of interest (key variable study)
- Measurement Error:
  - Lack of reliability and validity
    - Will come back to this

De Leeuw, Hox, Dillman, 2008

Sequential Mixed Mode

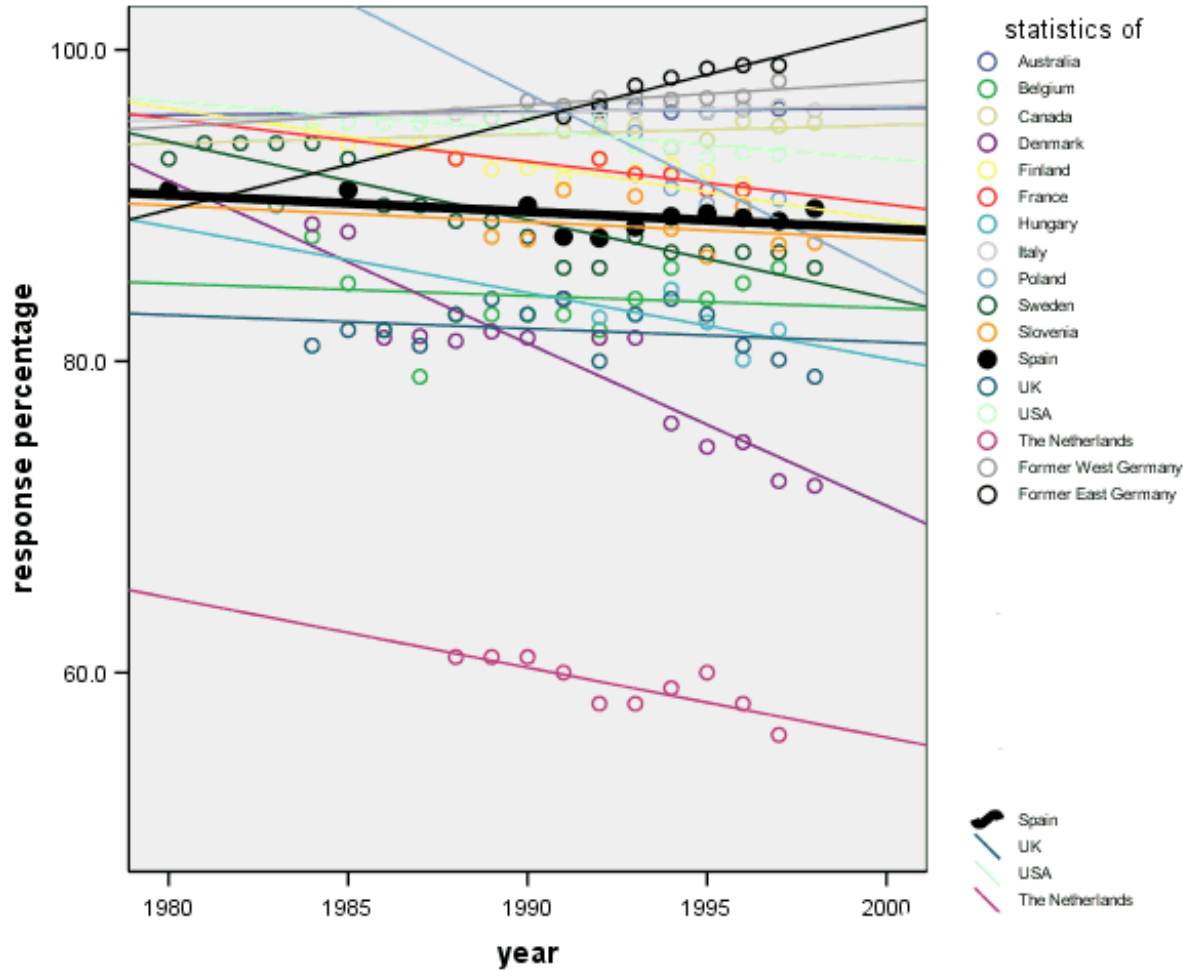
Nonresponse Study



Nonresponse in Spain

- International Comparison Official Statistics
  - Longitudinal data statistical offices around the world
  - Internationally nonresponse increased over time, both noncontact and refusal
  - Countries differ in overall response rate
  - In general a negative trend over time
  - Speed of increasing nonresponse differ from country to country
    - Source De Leeuw & De Heer (2002)
- Spanish Labour Force Survey?

LFS Response in Spain

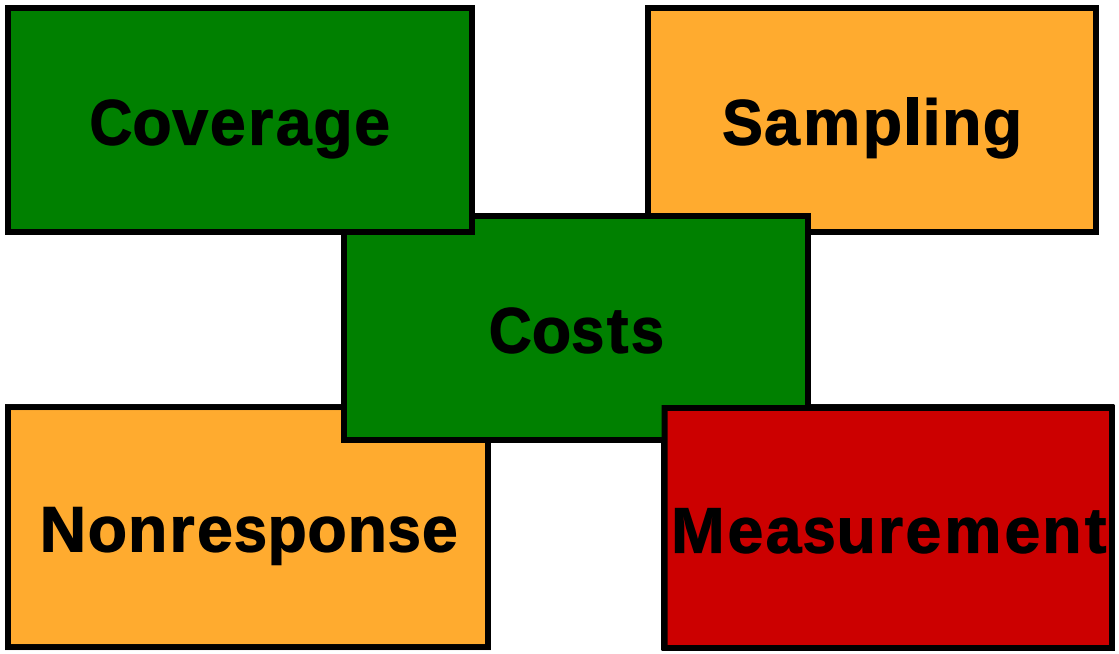


Nonresponse in Spain

- European Social Survey round 1 2003
  - Response Rate Spain: 53.2%
    - Country with Highest Response Rate in ESS 80%, Country with Lowest RR 34%
  - Noncontact Rate Spain: 11%
    - Highest NCR 15%, Lowest 2%
  - Refusal Rate Spain: 32%
    - Highest RefR 55%, Lowest 14%

Source Stoop, 2005

Web & Coverage Concurrent Mixed Mode



Coverage in Spain

- Telephone surveys often used because of lower costs
- Spain in general low percentage no phone
  - No Phone 2%, but
- Telephone coverage (adult access to):
  - Fixed landline phone 75%
  - Mobile phone 79%
  - Both 56%
  - Mobile only 23%

Source Blyth, 2008

Coverage in Spain

continued

- Web surveys often used because of visual aids and very low costs
  - International surveys, market research
- Spain in general relative low coverage
  - Adults aged 15 and over who have at home access to Internet: 32%
  - Sweden 81%, France 46%, Portugal 19%

Blyth, 2008

To Mix or Not to Mix

- Mixing data collection modes has advantages in reducing noncoverage and nonresponse errors, but
- How about measurement errors?
  - Will the answers provided by respondents differ by mode?
  - Can data that are collected through different modes be combined in one study?
  - Can data that are collected through different modes be compared over studies or countries?

Naively Mixing Enhances Measurement Errors

- Different modes have tradition of different formats
  - Question format has effect on response distribution
- Consequence: Designers may routinely enhance unwanted mode effects in mixed-mode survey
  - E.g. unfolding in one mode, full presentation of all response options in other mode
- What to do?

Design for Mix

- Two Situations:
  - One main method that accommodates the survey situation best
    - Main method is used to maximum potential
    - Other methods auxiliary
      - Example: Nonresponse follow-up, Non-covered groups
  - Truly multiple mode design
    - Modes equally important
      - Example: International surveys, Longitudinal studies, Respondent is offered choice

One Main Mode
Design for Optimal Mix

- One Main Method, other methods auxiliary
- Identify main method
  - Use main method optimal and to its maximum potential
  - Auxiliary methods are designed ***equivalent***
    - To avoid measurement error
    - May be perhaps sub-optimal for aux. method
      - Example less response categories

- **Preferred-mode-specific design**
  - Designing a mixed-mode study where one mode is the primary or preferred mode, and other modes are seen as auxiliary. In this design the questionnaire is optimized for the primary mode and the questionnaires for the other (auxiliary) modes are adapted to the optimal design for the main mode.

Example LFS

(Biemer & Lyberg, 2003)

- Longitudinal face-to-face & telephone
- Identify main method
  - Main method not necessary first method
    - Main method **telephone**
    - **Face-to-face** auxiliary from longitudinal point of view
  - Main design for telephone interview

- Design **longitudinal** questions for telephone use
    - Not full potential *face-to-face* used in face-to-face interview
      - Examples: No visuals, no show cards, shorter scales
  - Ensure data integrity for longitudinal use!

Modes Are Equivalent

- Three schools of thought
  - Mode Specific Design
    - Optimize each mode separately
  - Unified Mode Design or Uni-mode design
    - Provide the same stimulus (question format) in each mode, same ***offered*** stimulus
  - Generalized Mode Design
    - Purposively constructing questions to be different to achieve cognitive equivalence, same ***perceived*** stimulus

1. Mode Specific Design or Method Optimization

- Optimize each method individually
  - If one method has an extra use it
- Rationale
  - Reduces overall error
  - Best of all possible worlds
- Assumption
  - Same concept is measured in both modes but with different accuracy
  - Differences between methods only affect random error! (*no systematic bias*)

Method Optimization continued

- Optimize each method individually
- Beware of Assumptions:
  - Differences between methods only affect random error!
  - M_1: $T+e_1$ $\quad e_1 \neq e_2$
  - M_2: $T+e_2$ $\quad e_1, e_2$ *random*
- But is this feasible?
- How about systematic error, bias?
  - Danger of question format effects
    - Example: check al that apply vs.. yes/no
    - Example: offer all response categories vs unfolding
- Burden of proof on designer

2. Unified Mode Design

- To minimize data integrity problems Dillman (2000) proposes UNI-mode design for all modes
  - **Uni-mode design.** From **unified** mode design; designing questions and questionnaires to ***provide the same stimulus*** in all survey modes in order to reduce differences in the way respondents respond to the survey questions in the different modes.
  - Same offered stimulus in each mode

- How to do this
  - Dillman (2000, 2006)

Uni Mode Design continued

- Unified or UNI-mode design for All Modes
  - Avoid inadvertently changing the basic question structure across modes in ways that change the stimulus.
  - Make all response options the same across modes and incorporate them into the stem of the survey question.
  - Reduce the number of response categories to achieve mode similarity.
  - Etc

(Dillman 2000,2006, Chapter 6)

Uni-mode Design in Sum

- Designing for Mixed modes
  - Unified (uni-) mode questions to reduce mode effects
    - Question format
    - Response format
    - Instruction
- Uni-mode design for Mixed modes also implies
  - Besides questionnaire development
  - Questionnaire lay-out
  - Implementation procedures

Example UNI Mode Design

Mail, Telephone and Face-to-face interview

- Early attempt De Leeuw 1992, chap 4, p 37
  - http://www.xs4all.nl/~edithl/pubs/disseddl.pdf
- Response options the same across modes
- Same descriptive labels for response categories
- Reduced number of response categories
  - Maximum 7 pushing the limit for phone
  - But, used show cards in face-to-face
    - Equivalent with visual presentation mail
- Used simple open questions
- Interviewer instructions and instructions in mail questionnaire equivalent

3. Generalized Mode Design

- From unified (uni) mode design to an integrated, generalized mode design?

- **Generalized mode design.**
  - Purposively constructing questions and questionnaires to be different in different modes with the goal of achieving cognitive equivalence of the perceived stimuli, thereby resulting in equivalent answers across modes.

Generalized Mode Design continued

- Prerequisites generalized mode design
  - Designer understands
    - How differences between modes affect the question-answer process
    - How they affect the way respondents *perceive* the question, process the information and select and communicate the response
  - Designer does not think in traditions

  - Burden on the researcher to demonstrate that different questions elicit equivalent responses.

Understand What Happens

- To reach cognitive equivalence
  - Check, because Medium May Change Meaning
  - Same worded question can be perceived differently in different modes
    - Wording may be adequate in one medium and awkward in another
- Example Pierzchala et al, 2003
  - CATI: Are you {name}?
  - Web: Is your name {name}?

Do Not Think in Traditions

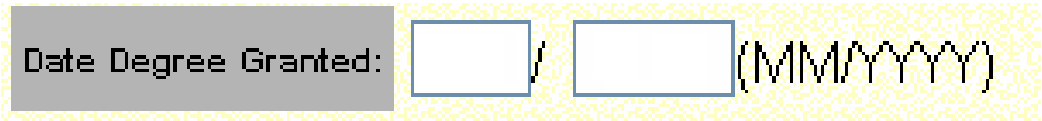
- Example
  - Question about employment
    - In CATI split up in two questions
      - Were you working for either pay or profit during the week of XXX?
      - If ‘no’ follow-up question: Were you not working for any of the following reasons: you were a student on paid work study, you were self-employed and did not get paid that week, you were on vacation from work or travelling while employed, you were on paid sick leave, personal leave or other temporary leave, or you were on a job that did not pay but had other benefits
      - Follow-up question was to make sure the respondent counted these experiences as employment

Do Not Think in Traditions continued

- Question about employment
  - To improve understanding CATI split up in two questions
    - Were you working for either pay or profit during the week of XXX? + follow-up question
    - Follow-up question was to make sure the respondent counted these experiences as employment
- Paper/Web traditionally no follow-up question
    - Paper/Web often incorporate the definition of employed in an instruction
  - But people do not read instructions and definitions carefully
  - Follow-up questions perhaps be better solution?

Example
Generalized Mode Design

- Christian, Dillman & Smyth (2005)
  - CATI
    - When did you start attending WSU
    - Interviewer probed for desired format
  - First Web-design
    - Same question text “When did you start attending WSU”
    - With write in standard programming: mmyyyy



    - Too many errors

Example continued Generalized Mode Design

- In CATI
  - Interviewer probed for desired format
  - Interviewer is intelligent system
- Web Can Be Intelligent System too!
  - Try to emulate interviewer
- Christian, Dillman & Smyth (2005)
  - http://survey.sesrc.wsu.edu/dillman/papers/Month%20Year%20Technical%20Report.pdf
  - Redesigned size boxes, graphical language, symbols
    - Equivalence needed more than the same question wording!

Question Design and Measurement in Mixed Mode Research

- Survey research history of changes
  - Forced by changes in society and technology
  - Increased knowledge
- Remember first face-to-face interviews
  - Short & simple questions
  - Later one of the most flexible methods ☺
- Mixed mode has many challenges
  - We will meet those and learn ☺ ☺ ☺

Meeting the Challenge of Mixed-Mode Surveys

- How to ensure high quality mixed-mode surveys:
  - Designing for Mixed modes
    - Questionnaire construction
    - Sampling
  - Embedding small experiments / mode comparisons
    - Provide data to estimate mode effect
  - Use data for empirically based adjustment
    - Weighting
    - Propensity score adjustment

Helpful websites

- Homepage Edith de Leeuw
  - http://www.xs4all.nl/~edithl/
    - PDF book on mode comparison
    - PDF booklet EUSTAT on new technologies in data collection: questionnaire design and quality
    - Summary International Handbook of survey methodology: introduction, chapter summary, glossary, additional material
- Don Dillman website available papers
  - http://survey.sesrc.wsu.edu/dillman/
- US Bureau of the Census
  - http:/www.census.gov/srd/mode-guidelines.pdf
    - Guidelines on developing demographic questions for administration in different modes

Suggested Literature

- Overviews:
  - Edith de Leeuw, To mix or not to mix data collection modes in surveys. Journal of Official Statistics, 2005, 223-255, Freely available at www.jos.nu
  - Edith D. de Leeuw, Joop J. Hox, Don A. Dillman (2008) Mixed-mode Surveys: When and Why.
    - In De Leeuw, Hox & Dillman. International Handbook of survey Methodology. New York: Lawrence Erlbaum/Psychology Press, Taylor and Francis Group
- Designing questionnaires for mixed-mode
  - Don A. Dillman (2006). Mail and Internet surveys, New York: Wiley (chap 6)
  - Dillman in International Handbook of Survey Methodology
- Very good introduction to all types of probability sampling including how to analyse
  - Sharon Lohr (2008) in International Handbook of Survey Methodology
- Introduction to issues in nonresponse
  - Mick Couper & Edith de Leeuw (2003). Nonresponse in cross-cultural and cross-national surveys. In Harkness et al. Cross-cultural survey methods. New York: Wiley/ Peter Lynn (2008) Nonresponse. In De Leeuw, Hox & Dillman (eds). International Handbook of Survey Methodology