Mixed-mode surveys

Day 1: Advanced survey design

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With thanks to Vera Toepoel for the materials

Overview of mixed-mode surveys

1. Why?
2. Typology
3. Does it work?
4. How do modes differ (bonus)?
5. Evaluation (bonus)

The Norm!

"In general, data collection systems do not consist of one mode only, since mixed-mode surveys are the norm these days."

Biemer & Lyberg, 2003

"Mixed-Mode: The only fitness regime."

Blyth, 2008

"Online Surveys are mixed-device surveys

Toepoel & Lugtig, 2016

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

Why Mixed-Mode?

- Choosing the Optimal Data Collection Method!

- Best data collection procedure given
  - Research question
  - Population
- Reduce Total Survey Error (TSE)
  - Respect survey ethics/privacy
  - Within available time
- Within available *budget*

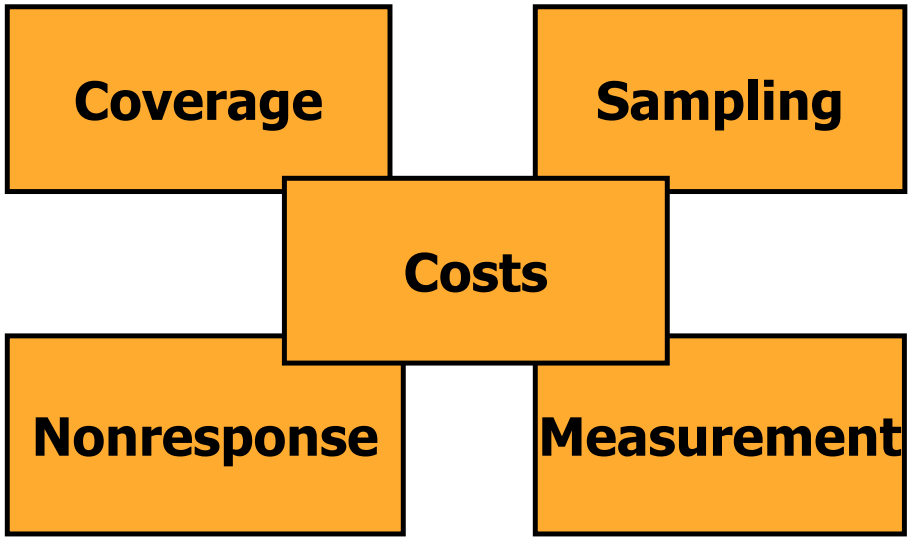
We Need to Mix

- Increase in International Surveys
  - Different survey traditions in countries
  - Different coverage patterns
- Increase in Online Surveys and desire to exploit new technologies
  - Coverage problems
  - Implementation problems
- Nonresponse increase
  - Need more effort to increase response
- Increase in survey costs
  - Optimal costs ratio
- Measurement

Best *Affordable!*

- Mixed-mode explicit trade-off
  - Survey Errors
  - Costs
- Contemporary important issues
  - Coverage problems
  - Nonresponse problems

Some Background: Costs & Errors



Groves, 1989

Goal: Building for Quality = Reducing Errors

At Affordable Costs

Coverage: Every member of **intended** population has chance of selection Quality= Reducing Coverage Error	Sampling: Sample vs total population **sample size** & **statistics** adequate methods Quality=Reducing Sampling Error
Response: Respondents are like Nonrespondents on **key vars**. Quality= Reducing Nonresponse Bias	Measurement: Respondents understands questions and answers correctly + recorded correctly Quality= Reducing Measurement error

2. Typology of mixed-mode surveys

“So, how do we do mixed-mode surveys?”

Depends: Goal of Mix

- Mixed-mode is combining
- What is purpose/goal of mix?

- Two important distinctions
  - Different Modes used for **Contacting**
    - But data collection in single mode
  - Different modes used for **Data Collection**

Mix for Contact

- Different ***contact*** methods are used in different phases of the survey
- Examples:
  - Screening for special groups by telephone
  - Convincing or reminding in different mode
    - E.g., Prenotification letter telephone survey
    - Reminder letter
    - Good example Nielsen media study

Multiple Modes of Communication

- Nielsen media research
- **Actual data collection is uni-mode (diaries)**
  - **Multiple modes of contact** in 7 steps
    1. Pre-recruitment postcard
    2. Recruitment phone call
    3. Advance postcard announcing diary
    4. Diary survey package
    5. Reminder postcard
    6. Reminder phone call
    7. Reminder postcard

Bennett & Trussel, 2001
Trussell & Lavrakas, 2004

Advance Notification/Screening/Reminder Different Mode from Data Collection

Contact Phase

- Rationale

- Correct sampling frame
- Raise response rate
- Enhance legitimacy and trust
- Send incentive in advance

- Effect on Quality

- Reduce coverage and nonresponse error
- No threats to measurement if data collection itself is in **single-mode** (= data are collected with one method only)

Mixing Modes

- Combine two or more modes during **data collection:**
  - Different modes for different parts of survey
    - But all persons get same mode for same part
    - Example: self-administered mode for section of questionnaire with sensitive questions in interview
    - Win-win: optimal data quality
  - Different modes for same task
    - The same questionnaire is offered in different modes
    - Risk of differential measurement error

Sequential vs. Concurrent Data Collection Phase:

- **Concurrent**
  - Multiple modes are used simultaneously for data collection: implemented at **same time**
    - Example: Asthma awareness study
      - Invitation postcard offering choice of modes
      - Establishment and business surveys (e.g., fax, mail, web)
      - International surveys
- **Sequential**
  - Different modes in sequence during data collection phase
    - Example: American Community Survey
      - Mail, telephone, face-to-face

Data Collection Phase: Concurrent Mixed Mode 1

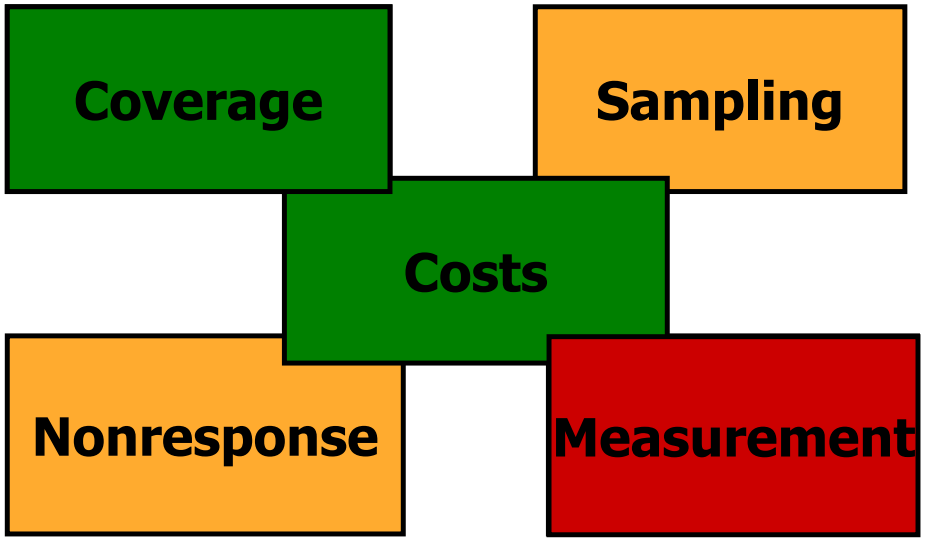
- Sensitive questions example
- Multiple modes implemented at same time
  - For **sub set** of questions only
- Reduce Social Desirability Bias
  - Sensitive questions in more 'private' mode
    - CAPI - (A)CASI mix
    - Telephone - IVR (or T-CASI) mix
    - Face-to-face – paper SAQ mix
  - Example: US National Survey on Drug Use and Health (NSDUH)
- Win-win situation ☺

- **Warning:** Beware of concurrent mixed mode for **total** questionnaires when sensitive topics are studied!!!
  - Different groups get different modes

Data Collection Phase: Concurrent Mixed Mode 2

- Multiple modes implemented at same time
  - For **all questions**, full questionnaire, **one population**
- Reducing Coverage Error at reasonable costs
  - E.g., Dual frame sampling (more than one frame)
- Dangers concurrent mixed-mode
  - Measurement differences
    - E.g., social desirability, recency effects
    - Difficult to entangle as (self-)selection and mode effect are confounded
- Reduced coverage error at the price of increased measurement error

Remember Web Coverage
Concurrent Mixed Mode



Sequential Mixed Mode 1: Nonresponse Reduction

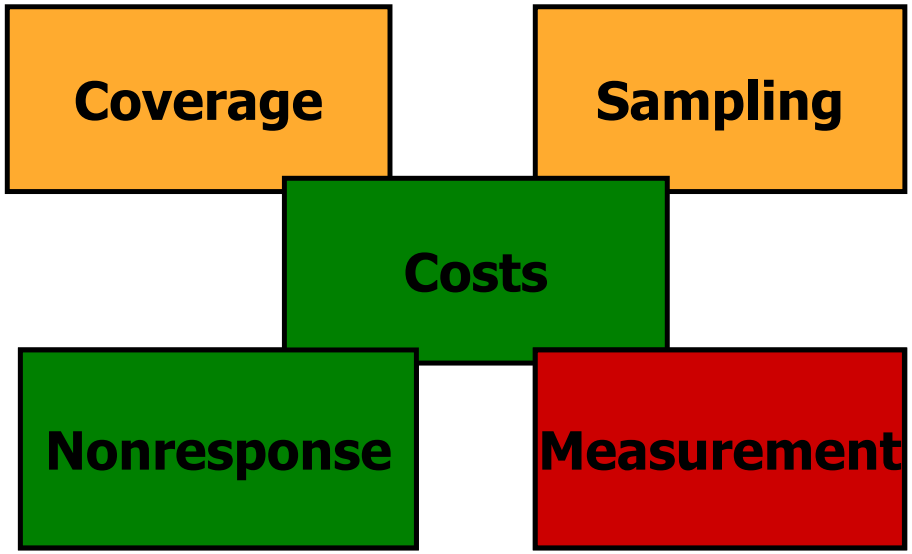
- Different modes implemented in sequence during data collection phase
- Successful for nonresponse reduction
  - Inexpensive mode first main mode
  - More expensive mode as follow-up
- Example: American Community Survey
  - Mail, telephone, face-to-face
- Example: US census
  - Mail, face-to-face (since 1969)
- Example: Canadian Census
  - Mail/Internet, face-to-face

Full Example ACS

- American Community Survey
  - Sponsor: U.S. Census Bureau, compulsory survey
- Target population: Households in U.S.
  - 2.9M addresses sampled
- Focus: social, housing, & economic characteristics
- Frame: Census Master Address File
- **Sequential mixed-mode design**:
  - Mail
  - CATI Telephone follow-up
  - CAPI In-person follow-up
- Field period: 3 months
- Response rates: 97.3% (for 2005)
  - 1.9M interviews completed

Frankel & Link, 2007

Solution Nonresponse
Sequential Mixed Mode



Sequential: One method after another

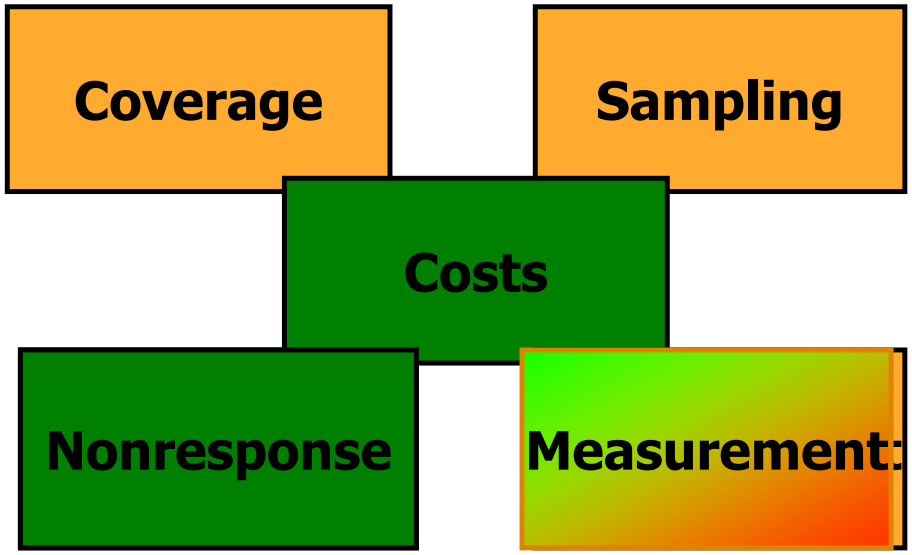
Sequential Mixed Mode 2: Longitudinal Studies

- Different modes implemented in sequence at multiple time points in longitudinal study
  - Cost reduction and practical considerations
    - More expensive mode
      - Selection and screening for panel
      - Base-line study
    - Next waves less expensive study
- Example: Swedish Labour Force Survey
  - First wave (including recruitment) face-to-face
  - Next waves: telephone interviews
- Example: US Current Population Survey
  - Face-to-face in wave 1 & 5; Telephone in wave 2-4 & 6-9
- Example: NESTOR study, longitidinal survey of elderly
  - Face-to-face but in between mail surveys

Sequential Mixed Mode 3:
Panels Studies

- Online Panels special case
  - Nonprobaility vs probability based.
- To build probability based panels
  - Sampling frame, probability based sample
- First approach & recruitment
  - Face-to-face, based on household sample
    - E.g. Liss panel Netherlands
  - Telephone surveys: RDD
    - E.g., GESIS panel
- Most expensive mode
  - Selection and screening and recruiting for panel
  - Recruitment questionnaire + initial data collection

Longitudinal Study Panels
Sequential Mixed Mode



Longitudinal: Different and expensive first mode!

In Sum: Common Mixed-Mode Designs

- Cross-sectional
  - Offer two or more modes at same time
    - To overcome coverage problems
- Cross-national
  - Different countries have different traditions main modes
- Cross-sectional
  - Start with cheapest and follow-up with more expensive to reduce nonrespons
- Longitudinal mixed-mode or panel
  - Start with expensive high response mode

Concurrent Mixed Mode

Sequential Mixed Mode

Literature

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- De Leeuw, E.D., Dillman, D.A., & Hox, J.J. (2008). Mixed mode surveys: When and why. Pp.299-316. In Edith D. de Leeuw, Joop J. Hox, & Don A. Dillman. *International Handbook Of Survey Methodology* (2008) New York: Lawrence Erlbaum Associates, Taylor & Francis Group, EAM series (European Association of Methodology Series)
- Millar M.M. & Dillman, D.A. (2011).Improving response to web and mixed-mode surveys. POQ, 75, 2, 249-269.
- Tourangeau, R. Confronting the challenges of household surveys by mixing modes. Keynote at the 3013 Federal Committee at the SMRC

3. TSE and mixed-modes

"How can we decide what design works for our question and population?"

Implications Mixed Mode in Data Collection Phase

- Goal Mixed-Mode Surveys
  - Reduction of Coverage and Nonresponse Error
  - Costs reduction
  - Comparable measurements
    - Want to have similar data in all modes
- Do we reach our goals?
- What do we know empirically?

Reducing Coverage Error

- Few empirical studies:
  - Kappelhof: Study of immigrants at Dutch Socio cultural planning office (under review)
    - Single mode CAPI vs sequential mixed-mode (Web, CATI/CAPI) survey among ethnic minorities
    - Socio-demographic different respondents participate in different modes
      - Younger & second generation ethnic minorities more in web
      - Older, and first generation immigrants CAPI/CATI
    - But, single mode CAPI best reflection of immigrants

Reducing Coverage Error 2

- Second study:
  - Klausch et al: Statistics Netherlands, general population (2013)
    - Three sequential mixed-mode surveys implemented
    - First three random groups: telephone, mail, and web. All three were followed by F2F
      - For socio-demographics the F2F follow up increased overall R-indicators of mail and telephone single-mode response. After the follow up they had representativeness similar to a single-mode F2F survey.
      - Representativeness of single-mode web was already at the level of single-mode F2F and could not be increased any further by F2F follow-up.

Reducing Coverage Error

- Third study:
  - Messer & Dillman (2011) Washington State University, General population using address-based sampling of paper postal addresses.
    - Web only exclude important segments of population.
    - Web plus mail better representation

Reducing Nonresponse

- General conclusion:
  - Danger offer a choice can lower response rates
  - Do not give a concurrent choice
- Fulton & Medway (2012). Meta-analysis of 19 experimental comparisons of concurrent choice option of web in mail surveys
  - Choice significantly reduces response rates.
- However, if you give people their preferred mode (based on answer in first survey), they respond better (Olson et al, 2012).

Why not Offering A Choice?

- Concurrent Multiple modes implemented at same time
  - Usually one mode less costly
    - E.g., web vs mail, asthma awareness study
  - Respondent is offered choice of mode
- Researcher's viewpoint
  - Client centered to reduce nonresponse
  - Respondent friendly, establish good-will
  - (and reduce costs)

Respondents Viewpoint:
Offering A Choice Makes Life More Difficult

- BUT Respondent's viewpoint is different
  - More information to read and process
    - Higher 'costs' in social exchange
  - Increased cognitive burden
    - Two decisions to make in stead of one
      - From "will I participate" to "will I participate and what method do I want to use"
      - Harder task so simplest thing is opt-out
    - May concentrate on choice, not on survey
      - Distracts from message and arguments on why to cooperate
        - Weakens saliency
      - Respondents postpone, procrastinate, and finally ….

Mixed mode Surveys: Coverage and Nonresponse Reduction

- Sequential mixed-mode approach may be more effective than giving respondents a choice
- Sequential for nonresponse reduction better than concurrent
- Also can be used for coverage problems
- If you know the mode preference of respondents (e.g., previous study), giving the preferred mode helps!

Some extra materials

Not covered in class

4. Why and How Modes Differ

Self-Administered vs. Interviewer-Guided

Visual vs. Aural

Media-related customs

Modes & Measurement

- Measurement error occurs when a respondent's answer to a question is inaccurate (departs from the "true" value)

- Modes vary in terms of:
  - Interviewer versus self-administered questionnaires
  - Stimuli / manner in which survey question is conveyed to respondent (and response is recorded)

Why modes differ:

- Interviewer Impact
  - Face-to-face>Telephone>S.A.Q
- Media-related Factors
  - Social customs differ
  - Knowledge, use
- Information Transmission
  - Presentation stimuli, etc

Interviewer Impact +

Self-Administered vs. Interviewer guided

- Interviewer administered questions help to:
  - Motivate respondent
  - Guide through complex questionnaire
  - Facilitate Question-Answer process
    - Clarify questions, instructions
  - Probe for detailed answers
  - Accurate recording
    - Trained interviewer notes down answers
- Face-to-face interviewer has more cues and opportunities than telephone interviewer
  - Nonverbal, visual

Self-Administered +/-

Interviewer absence helps to:

- Ensure privacy
- Makes interview respondent-paced in stead of interviewer- paced (media related)
  - Conduct survey at time and place convenient to respondent

- Interviewer absence limits:
  - Ensuring that intended (correct) respondent completes survey
  - Requesting assistance by respondent
  - Correct stray/out-of-range responses (PAPI only)
  - Means to assess cognitive engagement of respondent

How Modes Differ

Overviews: De Leeuw 1992, 2005; Dillman & Christian, 2005

- Empirical Evidence Interviewer Impact
  - More social-desirability in interview
    - E.g., drinking, fraud
    - More open in self-administered modes
  - More positive in interview
    - Less lonely, better health in interview
  - More acquiescence in interview
    - Tendency to agree
    - Easier to agree than disagree with another person
  - Less missing data/more detailed answers open questions in interview
    - In general interviewer probes help

Social convention/customs

- Socio-cultural but influence cognitive processing in question-answer process
  - Use of medium
    - Customs, associations, familiarity
      - Personal conversation, Spam/selling, web-use
  - Pace/locus of control
    - Interviewer vs. respondent
      - Initiative
  - Single vs. Multi-task oriented
  - Convey legitimacy, sincerity of purpose
    - Fears, spam, identity-theft

Information Transmission

- Presentation Stimuli
  - Visual vs. Aural
    - Visual may lead to primacy effects, aural to recency effects
    - Visual more response categories (longer list) possible
- Delivering answer
  - Spoken vs. written vs. typed
    - Difference in ease dependent on subgroup (e.g. elderly spoken)
- Channels of communication
  - Verbal, nonverbal, paralinguistic
    - Graphical language
- Questionnaire and Segmentation
  - Question by question vs Blocks of questions (page) at once
  - Freedom to go back

How Modes Differ

- Some evidence recency effect in telephone surveys
  - More often last offered answer category is chosen
- Context and order effects less likely in self-administered (paper) than interview
  - Overview / segmentation
    - No empirical studies including web surveys, segmentataion depends on implementation (e.g., potential to go back and forth)
- Visual presentation & design & quality
  - Growing body of evidence that respondents use all information including visual cues to decide what answer they are going to report.
    - Cf Dillman, 2007; Toepoel, 2008
  - Beware of using pictures in web surveys
    - Cf Couper et al 2004; Das, 2009

Evaluation of mixed-mode designs

"How can we design mixed-mode surveys so we can study effects better?"

Evaluation of mixed-mode survey

- Total Survey Error
- Decompose
  - Selection error
  - Measurement error

Missing data pattern (Klausch, 2016)

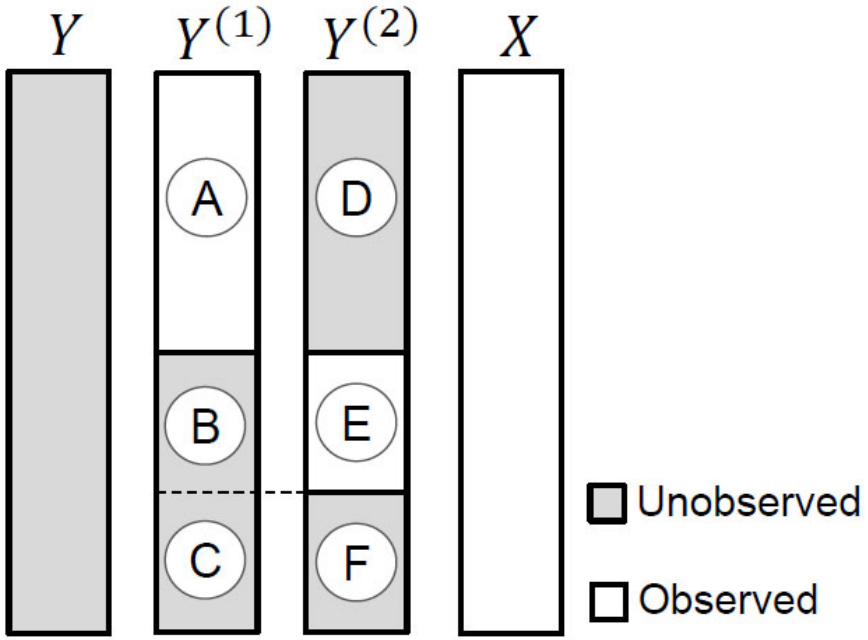

Figure 2 Illustration of the missing data pattern of a sequential design with two modes. The true score vector Y is unobserved and instead measurements $Y^{(1)}$ and $Y^{(2)}$ are observed from respondents to the survey. Some institutes, like Statistics Netherlands, have available sampling frame information (X) on all units.

A Potential Design for Diagnosis and Estimation Effects

Build in overlap	**Method 1**	**Method 2**
Country X	**Main Data Collection**	**Some Data**
Country Y	**Some Data**	**Main Data Collection**

Klausch (2014):

- Basic estimation techniques for causal effects
  - ANCOVA estimation
  - Regression estimation
  - Propensity score weighting
  - Propensity score stratification
- More advanced estimation techniques
  - Matching
  - Double-Robust Regression Estimation
  - Multiple Imputation

Recommended reading

- Klausch, T., Schouten, B., & Hox, J. J. (2014). The Use of Within-Subject Experiments for Estimating Measurement Effects in Mixed-Mode Surveys (Discussion Paper No. 2014-06). The Hague, The Netherlands: Statistics Netherlands. Retrieved from http://www.cbs.nl/NR/rdonlyres/181793AC-94B8-4748-9C2B-E541DCF9CFB7/0/201406x10pub.pdf
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