

MIMOD**Mixed Mode Designs for Social Surveys**

Questionnaire design for web-surveys and smartphones and challenge from multi-device sensors for social surveys

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Mixed mode in the digital era

- Web surveys and Mobile web surveys
- Questionnaire design in mobile web: decisions, challenges and «rule of thumb»
- Surveys and passive data collection: challenges



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Why to add web mode?

- Coverage
- Costs
- Timeliness
- Paradata collection
- Self-administered
 - Sensitive questions have better response quality when self administered. Web and mail better than interviewer modes, indications that web is better than mail.
 - Less underreporting of undesirable behaviours and less overreporting of desirable behaviours.
- Respondent burden



Why to add web mode?

Internet penetration is high and increasing.

Eurobarometer report (European Commission, 2014):

- significant growth in mobile and only-mobile Internet access across Europe;
- % of household with at-home Internet connection and mobile Internet access increased from 29% in 2011 to 41% in 2014

Pew tracking report: 10% of the adults in USA have «no broadband service at home other than a smartphone data plan»

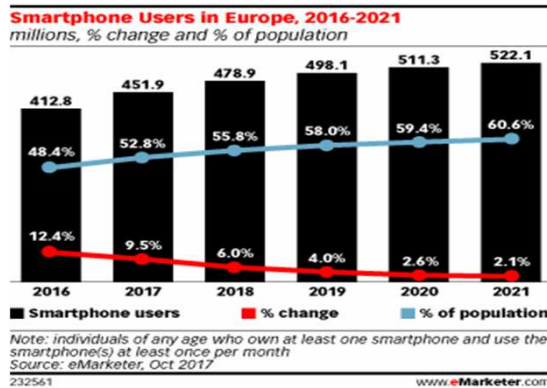
Why to add web mode?

But

- Web only surveys: coverage problems
- Mixed mode with web component



Smartphones data



Why to add web mode?

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Mode choice on multiple devices

- Computer (desktops and laptops)
- Smartphone (and Phablet)
- Tablet
- Feature phone (devices still technically otherwise smartphones, besides their lack of highly advanced hardware and capabilities of modern ones)
- Other devices (Smart TV,..)



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Mode choice on multiple devices

Mobile web

In the literature, two categories

- **PCs** (desktop and laptop computers)
- **mobile devices** (including tablets, feature phones, and smartphones).

Some researchers **combine tablets with PCs**, while others group them with smartphones. characteristics or features of the devices that have implications for sources of errors.

PC's and tablets tend to generate comparable respondent experiences (e.g. breakoff of rates, completion time) : Sarraf et al. 2014, Peterson 2012, Poggio et al. 2015)



Mode choice on multiple devices

Mobile web

Key dimension: **size of the device**, and particularly the **size of the display screen**.

An approach that considers the various dimensions (e.g., screen size, **transmission speed**, input controls) of the devices provides a more nuanced understanding of how these dimensions contribute to survey errors.

While tablets and smartphones differ in size, they have other features in common.



Mode choice on multiple devices

Mobile web

Key dimension: *size of the device*, and particularly the *size of the display screen*.

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While tablets and smartphones differ in size, they have other features in common.

Other dimensions of the technology features of the devices: *operating system, processing power, connectivity (both speed and reliability; cellular vs. Wi-Fi connections)*, and data entry interface (*touchscreen, onscreen keyboard, etc.*).

Some of these *affect the designer's ability to deliver a consistent survey experience* across systems.

Others, like transmission time and reliability, may *affect survey completion and survey length*. (Couper et al. 2017)



Mode choice on multiple devices

Mobile web

Simple dichotomy , e.g., mobile vs. nonmobile, PC vs. smartphone or even smartphones versus other devices is potentially limiting.

However, much can be learned from contrasting smartphones with other devices (Peterson, 2017).

Devices trend and complexity changes fast : Continuum rather than a dichotomy.



Mode effect in mixed mode including web or mobile mode

Four options to reduce mode method effects, right from the introduction:

- Prevent through questionnaire design
- Avoid through data collection design (potentially adaptive)
- Adjust through estimation design
- Stabilize through mode calibration

Note that:

- Web surveys are self administered
- No benefit on interviewer presence: Motivating respondent, Probing, Clarifying

Instrument itself must serve these functions



Designing questions for mixed mode settings with mode mobile web

Questionnaire structure in each mode??

- Unimode versus «best practices» approach
- Unimode: design questions to minimize mode differences
- Best practices approach: design questions to minimize errors.

Task: **functional equivalency**

meaning that we might need different kind of question format to different modes in order to produce similar results.



Designing questions for mixed mode settings with mode mobile web

«Given the rapid rise of this new “mode” of data collection and the variety of devices that can be used to answer online surveys, we need to understand the implications of these design

options from a **total survey error perspective**» (Couper et al. 2017)

(Mobile Web Surveys.A Total Survey Error Perspective,Mick P. Couper,Christopher Antoun, and Aigul Mavletova)



Designing questions for mixed mode settings with mode mobile web

Similar to traditional surveys, but some specificities



Mobile web questionnaire: attention/decisions points

- **Should web questionnaire be allowed to mobile?** And possible methods. Take decisions about the usage of smartphone for questionnaire completion.
- **Mobile web questionnaire:**
 - Contact and introduction
 - Questionnaire format; questions, and answers, visualization, progress bar ,...
- **Enhanced challenges of mobile devices and of other digital sources**



DECISIONS about the usage of smartphone for questionnaire completion

DECISION (Peterson et al., 2017):

- a) actively disallow smartphone participation,
- b) discourage (but allow) smartphone participation,
- c) allow smartphone participation without discouraging participation

De Bruijne and Nijman (2014):

Taking into account an analysis of usage of devices conclude:

Much to gain by adding mobile users, conversely much to lose by excluding them

DECISION CONDITIONAL TO a) or b) i.e. conditional on smartphone participation (whether discouraged or not),

- decide whether or not to optimize the design of the instrument for use on mobile devices.

Like most survey design decisions, these participation and instrument design decisions are associated with tradeoffs between survey errors and survey costs (effort).



Reasons for decisions and errors

Disallow (block): reasons

- Ensure standardization of the instrument display
- Reduce break offs
- Accommodate long or complex survey instruments that are not suited to smartphones.

Example. Task : determine the the efficacy of a web self-completion in Understanding Society Innovation Panel (Wave 5); the respondent were informed that the instrument was not suitable for completion on a small mobile device (Jackle et al., 2015). Respondents accessing the survey from a smartphone were redirected to log on from a computer.

Disallow (block): errors

Coverage and unit nonresponse



Reasons for the decisions and errors

Allow: reasons

- Merely discouraging better option? (Peterson, 2012);
- Encouraging (Callegaro, 2010)

Findings suggest that efforts to influence the device used to participation might not be useful.

Allow: errors

No direct impact to errors, indirect impact to measurement error, i.e. error depends on subsequent decisions about **the instrument**.



Reasons for the decisions and errors

Allow: errors

With mobile device penetration rising along with increases in Internet activity on mobile increases in email opening activity on mobile.



Rises in **unintentional mobile survey respondents**, i.e. respondents who use their mobile devices such as smartphones or tablets to access and participate in surveys that were originally designed to be taken on PCs or laptops (de Bruijne & Wijnant, 2014b; Peterson, 2012; Toepoel & Lugtig, 2014; Wells, Bailey, & Link, 2014) or that open the questionnaire on their smartphone



DECISION CONDITIONAL TO a) or b) i.e. conditional on smartphone participation (whether discouraged or not).

Decide whether or not to optimize.

Not to optimize, i.e. online surveys completed via smartphone

Passive-Mobile Browser Surveys (P-MBS) (Burskirk and Andrus ,2012) .

Advantages: not required additional formatting of the questionnaire, programming **costs** are similar to those of web surveys and the number of the contacted interviewees that can participate can be larger.

Disadvantages: the questionnaire may not be viewable without additional effort of **scrolling or zooming**.

Example,

multiple choice question may require zooming in order to select desired response.

Answering questions becomes boring and longer. Higher survey drop-off is registered.

Long surveys may be difficult to process due to long time in adapting the format, before the questionnaire is ready to use for the respondents.



DECISION CONDITIONAL TO a) or b) i.e. conditional on smartphone participation (whether discouraged or not),

Decide whether or not to optimize Optimization

Active-Mobile Browser Surveys (A-MBS), (Burskirk and Andrus (2012))

Advantages:

limited horizontal scrolling, navigational tools clearly visible, graphical format adequate to mobile screen and other user-friendly format aspects.

Disadvantages and limitation:

GPS and other data capture are not working, implementation **costs are a bit higher**, constant Internet connection is necessary and the speed of the connection can be somewhere long or difficult.



Mobile web: Questionnaire challenges Invitation, presentation

- **Invitation mode** (text message or SMS): higher for email, spam risk
- **Targeted letters** improve participation and data quality
- **Survey link soon** for avoid scrolling
- Email invitation. Simple and straightforward; possibly designed responsively for easy reading and navigation on smartphone and tablets.
- Key information at the beginning (sponsor, incentives)
- Minimize the number of special characters in the survey web address. Avoid aliases web addresses.
- Use relevant emails (rather than generic emails): givefeedback(a)companv.com. This reduces potentially autospam



Mobile web: Questionnaire challenges

General structure

- Welcome page and layout very important
- Make the start of the questionnaire pleasant
- Present specific core questions at the beginning
- Give more information about goal of some questions
- **Short questionnaire**
- Smartphone surveys should be designed to be as short as possible, but not necessarily abbreviated versions of longer online surveys.
- **Minimize unpleasant surprises like:**
 - Unexpectedly slow progress
 - Longer than promised questionnaires
 - Harder than expected questions



Mobile web: Questionnaire challenges

Questions content and wording

- Different questionnaires, but **similar content**
- Functional equivalence principle
- Not necessary same words
- **Short questions**



Mobile web: Questionnaire challenges Format

- minimize the need for scrolling (either horizontally or vertically) to the extent possible
- minimize scrolling (implied scrolling) : Answer choice layout may create need for scrolling on some devices
- minimize the need for pinching/zooming (Some devices don't support zooming)



Mobile web: Questionnaire challenges Question format

In web surveys a distinction is made between check box and radio button.

If a mobile web survey is run, the size of the radio button becomes very small. Errors arise. To avoid these errors,

- use **button boxes** instead of radio buttons
- **radio buttons, but resize them to make them more userfriendly.**
- **set entire row ad selectable, not just the radio button.**

These options pass the threshold of an easy-to-read, easy-to-use touch input design.



Mobile web: Questionnaire challenges

Definitions

- Offer definitions and make it VERY **easy** to access them.
- If possible, **incorporate** definitions in the question.
- Differences in handling definitions are major **source of mode effects**.



Mobile web: Questionnaire challenges

Don't know Next button

- Let «don't know» appear after tentives to skip it.
- Present a «next» button
- Present a «previous» button, but reduce its visual prominence. Best option: «next» on left side, «previous» to the right of it.



Mobile web: Questionnaire challenges: Grids or matrix questions

Simplify grids

- Reduce the number of items (the rows)
- Split questions (the columns)
- Give visual feedback by alternating colours or fading out of filled in answers.
- No grids (McGenney, 2015, Tips for creating web surveys for completion on a mobile device)

Have a **negative effect** on:

- Survey break off
- Item missing data
- Respondent satisfaction



Mobile web: Questionnaire challenges Open ended questions

- The mode of input may affect responses to questions requiring open-ended responses.
- If **Multiple choice**/select all that apply require a long list of alternatives, consider converting question into free response with as many single-text fields.
- Process open-ended questions using statistical **techniques for analyzing text** (use for classification, to decide closed answer question)



Mobile web: Questionnaire challenges

Visual aspects

➤ **Images:** powerful contextual stimuli.

Use them carefully or avoid them  a significantly lower completion rate, longer time

➤ Visual clues must be consistent with intended use of rating scales:

- The middle option should be the neutral point
- The conceptual and visual midpoint must coincide.

➤ Avoid displaying non-substantive answers. If they are needed, separate them visually.

- Don't use colours, numbers or other features that can lead to unwanted inferences.
- Provide labels for every scale point.



Mobile web: Questionnaire challenges

Visual aspects

➤ Enhance human interaction using visualization

Example: **input styles such as sliding scales** that lend themselves to more touch centric input devices such as smartphones or tablets.

Question:

optimal starting position and whether these touch centric input styles are equally preferred by respondents using less touch capable devices.

An outside starting position seems optimal for slider questions completed via a desktop computer, this solution may not be optimal for completion via mobile devices.



Mobile web: Questionnaire challenges

Visual aspects

➤ Enhance human interaction using visualization

Example: input styles such as sliding scales that lend themselves to more touch centric input devices such as smartphones or tablets.

Sliders and radio button scales explored in the online survey context for computers (Couper et al., 2006) explored for both computers and mobile devices (Toepoel & Funke, 2014), Sikkel et al. (2014) explored the relative merits of dragging and clicking operations for category sliders, in the context of online surveys completed by PC and find that dragging operations increase user engagement with the survey but only when they are used sparingly.

Slider scales and these choices can individually and collectively impact data quality Derham (2011)



Mobile web: Questionnaire challenges

Visual aspects

➤ Enhance human interaction using visualization

Example: sliders

(Buskirk, Saunders, and Michaud, 2015)

Results:

more **weaknesses** than strengths for using slider scales to collect survey data using mobile devices and a preference for these touch centric input styles **varies across devices** and may not be as high as the preference for the more traditional radio button style.

➤ Enhance human interaction using visualization

Example: **optimal starting position**

left starting position (see Toepoel & Funke, 2014; Roster et al., 2015; Funke et al., 2011; Sikkel et al., 2014; Buskirk & Andrus, 2014).

Petersen et al. (2013) examined sliders with a left start for scale items with no natural neutral position and a middle start for those with a neutral position but these two starting places were not compared to other possible positions



Mobile web: Questionnaire challenges

Progress indicator

- Can reduce break offs, but only if the news is encouraging
- Progress indicators that wildly jump back and forth due to route instructions do not help in increasing participation
- No indicator is often better



Mobile web: Questionnaire challenges

Progress indicator

- No indicator is often better

Several studies to test hypotheses concerning the effect of progress indicators on survey participation in web surveys.

- Prevailing conclusion is that constant (moving linearly) progress indicator is not significantly increasing participation.
- When progress seems to surpass the expectations of the respondent, feedback can significantly improve completion rates.
- When progress seems to lag behind what they expect, feedback reduces engagement and completion rates.
- The speed of the indicator itself varies the effectiveness Fast- to-slow indicators reduced drop offs, whereas Slow-to-fast indicators increased drop offs ((Vilar A., Callegaro M. & Yang Y.,2013, Conrad et al. ,2005).



Mobile web: Questionnaire challenges Paradata

- software include comprehensive **device detection functionality**: device type, size and browser size. . Device detection is needed to automatically identify the type and brand of each respondent's device,
- display the survey according to that device's specifications.

➤ Example

If you are concerned about tracking mode effects (especially primacy or recency effects) knowing the type device/operating system may not be enough. The way the device translates the survey programming (Html Markup etc) is determined by: browser in use, features of the browser, feature of the device



Go beyond the traditional measurement tools of questions and answers

Digital devices offer opportunities that bring to extend and enhance measurement (AAPOR, 2014).

These include the promise of "anytime, anywhere" or "in-the moment" measurement, in which respondents can be prompted to provide survey responses at set times or based on location.



Go beyond the traditional measurement tools of questions and answers

The enhanced capabilities of smartphones allow respondents to capture and transmit pictures.

Barcode and **quick response (QR) code scanners** also allow respondents to provide detailed information on actions

Similarly, global positioning systems (**GPS**) give researchers the opportunity to record respondents' locations and movements.

Accelerometers and battery facilitate the measurement of physical activity. Barometers.

They enable access to useful information regarding the mode of transport.

(Link et al., 2014; for a use case example, see Sugie, 2018)



Go beyond the traditional measurement tools of questions and answers

Role of participant

Control over what data are shared

Active • e.g., mobile survey, taking pictures •

Passive • e.g., location tracking, call logs, app use, activity data • Little or no control during data collection other than turning off measurement



Go beyond the traditional measurement tools of questions and answers

Methodological challenges.

App-based/administered surveys

i.e. collect survey data using a specific app installed on the sampled user's smartphone
or collect passive data using a sensor

Problems

respondent consent

privacy

measurement bias (these technologies are extended beyond small-scale feasibility studies among volunteers; outliers,....)

quality of the data



Go beyond the traditional measurement tools of questions and answers

- Survey and app for a survey
- Survey and app for sensors
- Just sensors and IoT as a data source



Go beyond the traditional measurement tools of questions and answers

Methodological challenges.

Think different

- ❑ Redesign surveys for mobile web (shorter questionnaire), for different sampling units and possible use of passive data
- ❑ Integrate or use digital sources in MM : Integrated or Multisource Mixed Mode (IMM or MMM)
- ❑ New approach:
 - What are the question or data we need to answer or to collect to provide insights into the phenomena we want to investigate?
 - How to use technology?
 - What about the respondent burden in this new landscape? Can we collect data passively?



Take away messages

- ✓ Design questionnaire as mobile web survey, taking into account implications of your decisions
- ✓ Conduct research on research to stay ahead of new trends. Enhancement and optimization will be dynamic as devices and operating systems evolve.
- ✓ Need of a framework for Integrated (or Multi source) Mixed Mode
- ✓ Think different



