

Inter-mode comparability in telephone surveys via landline and mobile phones

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Introduction

Mobile phone technology poses a serious challenge to survey research (Steeh and Piekarski, 2008; Häder and Häder, 2009). A growing number of mobile phone users have substituted their residential landline telephones for mobile phones. Recent studies assume that the number of these “mobile-only” households is rapidly growing worldwide. In the United States, these households constitute more than 22 percent of households overall (Blumberg and Luke, 2009). In Europe, this number ranges from 3 percent in Sweden to 64 percent in the Czech Republic (Häder et al., 2009, p. 23; European Commission, 2008, p. 31). The group of “mobile-onlys” can be described relatively well on the basis of socio-demographic variables: they are young, male, single and have a professional education (Graeske and Kunz, 2009, p. 60).

The continuing shift away from traditional landline usage in the general population strongly encourages survey-based research in the social sciences to employ sampling strategies that combine both landline and mobile phone sampling designs (Häder and Häder, 2009; Boyle and Lewis, 2009; Hunsicker and Schroth, 2007). However, only a few studies have systematically examined possible variations in response behavior in these “dual frame” telephone surveys. Two surveys that cover the same statistical population and use the same questions can be significantly affected by even small differences in response patterns when different modes of data collection are being used. In other words, conflating two modes of data collection can reduce the inter-mode comparability of the data sets. This is because

different modes provide access to different types of people, attract different types of participants and elicit different kinds of responses (*mode effects*).

In order to examine the effects of dual frame designs on data quality, we use previous findings and theoretical backgrounds of methodological research on mixed mode data collection as a point of departure (Dillman et al., 2008; de Leeuw, 2005). We have subsequently identified three crucial sources of response inconsistency future mixed mode surveys will have to deal with: (a) the presence of others, (b) social environments and (c) technical aspects of the medium.¹

Theoretical background

Explaining mode effects with cognitive models of response processing

In order to assess the comparability of landline and mobile phone interviews, previous methods research has mostly dealt with the fundamentals of survey design: coverage, sampling, (non)response and measurement (de Leeuw et al., 2008). In this article, we focus on a neglected aspect of inter-mode comparability: the response behavior. While mixed mode methodologies can reduce coverage, sampling and nonresponse bias (de Leeuw, 2005; de Leeuw and Hox, 2008; Häder et al., 2009), measurement error can occur if the mode of data collection itself has an impact on the response process (Voogt and Saris, 2005).

Cognitive models of response processing and dual path theories in particular (Krosnick and Alwin, 1987; Strack and Martin, 1987) have provided the theoretical framework to explain pivotal aspects of response behavior in interview situations. However, due to the complexity of the response process, it seems questionable whether or not the respondents actually follow through the complete process of reasoning as described in the cognitive models. On the contrary, more recent evidence suggests that respondents tend to use “heuristics” and “satisficing strategies” in the cognitive process while mentally assessing the necessary information and formulating their answer (Sudman et al., 1996; Tourangeau et al., 2005). The context of the interview can make the participant more prone to these cognitive “shortcuts”.

When interview situations are less favorable, participants tend to answer merely *somewhat* satisfactory, instead of providing the best answer that they actually could. This means in a two modes survey that the increased risk of unfavorable interview conditions in one of the two modes will undermine the comparability of the two data sets and thus produce lower data quality in the entire survey.

Approaches for measuring the degree of comparability

There are several indicators that help identifying the magnitude of measurement errors in data collected with different interview strategies. In our survey, we have evaluated data quality on three levels:

- We measured the response behavior consistency (quantity of item nonresponse, pseudo opinions, response stability).
- We used experimental designs and split ballots in order to measure known effects related to the questionnaire (especially question order effects, response order effects, recency effects, question wording effects).
- We used survey paradata (quantity of drop-outs, response latency).

This means that if differences between landline and mobile phone interviews can be discerned, the degree to which they differ indicates data quality and, hence, the comparability of the two data sets.

Methodology and problem statement

Similarities and differences between mobile and landline phone interviews

In order to be able to focus on the differences caused by the two survey modes, we have kept all other factors consistent across both modes:

- The same CATI survey center conducted the survey.
- The same interviewers conducted the interviews via landline and mobile phone. This prevented a systematic bias in interviewer behavior.
- We used the same questionnaire.
- Both modes followed the same supervision principles.
- The same “conversion strategies” (such as callbacks) have been used in order to deal with initial nonresponse.
- A dual frame design was used as the sampling procedure. Nevertheless, we were able to ensure an equal probability of selection.
- The field time was almost the same.

There are, however, three features of the interview situation that cannot be controlled by the researcher, but seem likely to have an effect on the participant's response behavior:

a) The presence of others

Observers usually cannot hear the questions asked on the phone, but they can hear the answers. What consequences does it have if others are present during the time of the interview? How do mobile phone and landline interviews differ in this regard? Respondents may not mind revealing thoughts to interviewers but may still have concerns about disclosures to third parties (Tourangeau et al., 2005, p. 280).

Although the presence of others is, in principle, less relevant in telephone interviews than in face-to-face interviews, it can significantly influence the response behavior. There are several problems if one attempts to examine the effect of the presence of others. Past research has shown that the presence of unfamiliar third parties may increase the likeliness of socially desirable answers. The presence of others, however, may also have the opposite effect on the respondent (Hartmann 1991). In a situation of privacy, where the attending third parties are family or friends who know the opinion and behavior of the respondent, he or she can perceive the third person as a "supervisor", who could notice unusual answering behavior. In that case, the presence of a third person can lead to fewer socially desirable responses and thus to higher data quality in the survey (van den Bulck, 1999).

There is, nevertheless, a downside of both effects when it comes to the comparability of data sets in mixed mode surveys. If the perceived *probability* of the presence of unfamiliar others during the interview situation increases, the respondent will be more inclined to use heuristics, answer in socially-desirable ways and contemplate the questions merely on a superficial level. Obviously, the probability of the presence of unfamiliar others at the time the respondent answers the mobile phone is much higher than in the case of conventional landline calling. Therefore, as our first hypothesis, we expect lower data quality in this interview mode.

b) Social environments

Respondents can be reached in numerous social environments and situations. The range of possible social settings is clearly higher in mobile phone interviews than it is in interviews conducted at home. In addition, the likelihood of disturbing environmental influences such as traffic noise, unfavorable weather conditions, or other stress factors are higher, if the interviews are conducted via mobile phone. Therefore, outside his or her home, the participant is more likely to shortcut the thought process by using heuristics, or may tend to answer in a

careless and volatile manner. Therefore, as our second hypothesis, we expect lower data quality in mobile phone interviews.

c) Technical aspects

Furthermore, the two survey modes are affected by the technological features of the devices through which the interviews are being conducted. While the usage of landline phones should not pose any severe technical problems to the respondent, the situation changes when the person answers a mobile phone. Those interviews could be disturbed and interrupted due to a lack of network coverage, especially during car or train rides. Another source of involuntary connection breakups are low-running batteries. Low voice quality may cause the participant to hang up or misunderstand the question. Thus, in our third hypothesis, we assume that the data quality is lower during mobile phone interviews, due to a higher drop-out risk.

Key findings and conclusion

We have looked for mode effects while statistically controlling other background variables (level of education, age, sex and income). We have, furthermore, used nine distinct indicators of data quality to test our hypotheses. There was no significant influence of the dual mode recognizable, except for diverging drop-out rates. The quantity of drop-outs in mobile phone interviews is somewhat higher. The participants may drop out due to technical difficulties or because they purposefully decide to hang up. This phenomenon could not be empirically clarified with the data available. For the other eight indicators, we have not been able to find any mode effects.ⁱⁱ

The data of our survey is well suited to make profound statements about the data quality in mixed mode designs using both mobile and landline telephone interviews. In contrast to the initial expectations stated, the impact of the medium-related differences (the presence of others, social environments and technical aspects) seem relatively insignificant. What we can at least infer from our analysis is that the influence of the interview mode is very low with regard to the data quality. This is good news for coming mobile phone surveys. However, a more sophisticated and precise operationalization of the used indicators may still further open up the door for new insights in this relatively new field of methods research.

References

- Blumberg, Steven J. and Julian V. Luke. "Wireless Substitution: Early Release of Estimates From the National Health Interview Survey, July-December 2008." Division of Health Interview Statistics, National Center for Health Statistics (2009): 27 May 2010 (<http://www.cdc.gov/nchs/nhis.htm>).
- Boyle, John M. and Faith Lewis. "Cell Phone Mainly Households: Coverage and Reach for Telephone Surveys Using RDD Landline Samples." Survey Practice (2009): 27 May 2010 (<http://surveypractice.org/2009/12/09/cell-phone-and-landlines>).
- van den Bulck, Jan. "Does the Presence of a Third Person Affect Estimates of TV Viewing and Other Media Use?" Communications 24.1 (1999): 105-116.
- Dillman, Don A., Jolene Smyth, and Leah Melanie Christian. Mail and Internet Surveys. The Tailored Design Method: New Jersey: Wiley, 2008.
- European Commission. "E-Communications Household Survey" Eurobarometer Spezial 293 (2008): 27 May 2010 (http://ec.europa.eu/public_opinion/archives/ebs/ebs_293_full_de.pdf).
- Graeske, Jennifer and Tanja Kunz. "Stichprobenqualität der CELLA-Studie unter besonderer Berücksichtigung der Mobile-onlys." Telefonbefragungen über das Mobilfunknetz, Ed. Häder, Michael and Sabine Häder. Wiesbaden: VS Verlag für Sozialwissenschaften. 2009. 57-70.
- Häder, Michael and Sabine Häder. Telefonbefragungen über das Mobilfunknetz. Wiesbaden: VS Verlag für Sozialwissenschaften, 2009.
- Häder, Sabine, Siegfried Gabler, and Christiane Heckel. "Stichprobenziehung" Telefonbefragungen über das Mobilfunknetz. Ed. Häder, Michael and Sabine Häder. Wiesbaden: VS Verlag für Sozialwissenschaften. 2009. 21-45.
- Hartmann, Petra. Wunsch und Wirklichkeit: Theorie und Empirie sozialer Erwünschtheit. Wiesbaden: Deutscher Universitäts-Verlag, 1991.
- Hunsicker, Stefan and Yvonne Schroth. "Combining mobile phone and landline phone samples. A practical application of the dual frame approach." MDA - Zeitschrift für Empirische Sozialforschung 1.2 (2007): 161-182.
- Krosnick, Jon A. and Duane F. Alwin. "An Evaluation of a Cognitive Theory of Response-Order Effects in Survey Measurement." Public Opinion Quarterly 51.2 (1987): 201-219.
- de Leeuw, Edith D. "To mix or not to mix data collection modes in surveys." Journal of Official Statistics 21.5 (2005): 233-255.

- de Leeuw, Edith D. and Jopp J. Hox. “Self-administered questionnaires: mail surveys and other applications.” *International Handbook of Survey Methodology*. Ed. de Leeuw, Edith D., Joop J. Hox, and Don A. Dillman. New York: Lawrence Erlbaum Associates. 2008. 239-263.
- Steeh, Charlotte G. and Linda Piekarski. “Accommodating New Technologies: Mobile and VoIP Communication.” *Advances in Telephone Survey Methodology*. Ed. Lepkowski, James M., Clyde Tucker, J. Michael Brick, Edith D. De Leeuw, Lilli Japac, Paul J. Lavrakas, Michael W. Link, and Roberta L. Sangster. New York: Wiley. 2007. 423-448.
- Strack, Fritz and Leonhard L. Martin. “Thinking, judging, and communicating: A process account of context effects in attitude surveys.” *Social Information Processing and Survey Methodology*. Ed. Hippler, Hans-Jürgen, Norbert Schwarz, and Seymour Sudman. New York: Springer. 1987. 123-148.
- Sudman, Seymour, Norman M. Bradburn, and Norbert Schwarz. *Thinking about Answers. The Application of Cognitive Processes to Survey Methodology*. San Francisco: Jossey-Bass. 1996.
- Tourangeau, Roger, Lance J. Rips, and Kenneth A. Rasinski. *The Psychology of Survey Response*. New York: Cambridge University Press. 2005.
- Voogt, Robert J. and Willem E. Saris. “Mixed mode designs: Finding the balance between nonresponse bias and mode effects.” *Journal of Official Statistics* 21 (2005): 367-387.

ⁱ Our data has been collected in a project financed by the German Research Foundation. The telephone interviews have been conducted simultaneously via landline and mobile phone. For the random sampling, we employed a dual frame design. Our interviewers have been able to realize 2.171 interviews altogether (1009 via mobile and 1162 via landline, cf. Häder et al., 2009).

ⁱⁱ Due to the limited space, we cannot provide more detailed charts and figures in this short paper. For the in-depth analysis, confer Häder et al., 2009.