

Separating Interviewer and Sampling-Point Effects

Rainer Schnell, Frauke Kreuter, University of Konstanz, Germany
 Universität Konstanz Postfach D-92 D-78434 Konstanz (rainer.schnell@uni-konstanz.de)
http://www.uni-konstanz.de/FuF/Verwiss/Schnell/DETECT_home.html

Keywords: Complex Surveys, Design Effect, Interviewer Behavior, Survey Sampling

Abstract:

The data used in empirical social-science research, especially in face-to-face surveys, are often collected in multistage cluster samples. The relative homogeneity of the clusters selected in this could lead to design effects at the sampling stage. Interviewers tend to further homogenize answers within the sampling points. The study presented here was designed to separate the two sources. Multilevel models had been used to separate interviewer effects and sampling-point effects. Even though one would assume that a design effect in questions of “fear of crime in the neighborhood” should be due to spatial homogeneity it turned out that, for most of the items, the interviewer takes a far greater share of the homogenized effect than the spatial clustering does.

1. Survey Problem

How safe do you feel walking alone in your area after dark? Do you feel very safe, fairly safe, a bit unsafe, or very unsafe? (International Crime and Victimization Survey 1996)

Fear of crime is frequently compared among different areas, points in time, or social groups. In such studies, political policymakers are often interested in precise estimates of the level of fear of crime, that is, in small confidence intervals. However, the designs of many large-scale nationwide face-to-face surveys do not permit exact interpretations of their results.

2. Design Effects

Most nationwide face-to-face surveys are conducted using multistage clustered samples where respondents are clustered within small areas (sampling points). Those sampling points are often relatively

Thanks to Elisabeth Coutts and Daniela Thume, who were also part of the defect project group. The defect project is supported financially by Deutsche Forschungsgemeinschaft (DFG) under grant SCHN586/2-1

homogeneous, for example with respect to sociodemographic characteristics. The relative homogeneity might lead to so called design effects at the sampling stage [1][2][3][4].

As a consequence, the confidence intervals are increased by a factor of *deft*, the ratio of the variance of an estimator for the given sample design to the estimator of a simple random sample (SRS). Figure 1 displays the increase of the confidence intervals for “fear of crime” in East and West Germany.

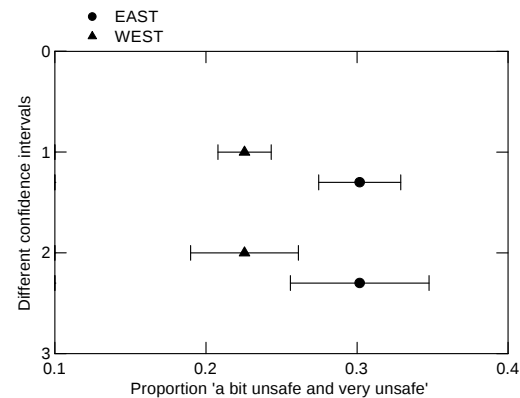


Figure 1: Confidence intervals for “fear of crime”

3. Research Question

If the homogeneity is due entirely to the spatial clustering of similar people living next to each other, one would have to increase the sample size in order to come up with an estimate as precise as one would get with simple random sampling. However, as soon as there are interviewers involved in the data-gathering process, especially in face-to-face surveys, they become an additional potential source of homogeneity.

Fear-of-crime questions are area dependent. Respondents are exposed to similar signs of incivility, similar crime rates, etc. Therefore, the design effect for fear-of-crime items can reasonably be expected to be greater than 1:

$$\text{deft}_{\text{fear}} > 1 \quad (1)$$

This design effect should, in an ideal case, be due only to area and not to the interviewer. If there is any effect due to the interviewer, one would expect it to be smaller than the sampling-point effect:

$$\text{deft}_{(\text{fear, point})} > \text{deft}_{(\text{fear, interviewer})} \quad (2)$$

If the observed homogeneity is due to interviewer effects rather than spatial clustering of similar people, the survey implementation can be improved to reduce the design effect.

4. The Defect Project

The data presented are part of a study on sampling errors and nonsampling errors in complex surveys [6][7]. It is the first nationwide study with an interpenetrated design.

	FtF I	FtF II
PSU points	160	160
Addresses	3658	3423
Valid addresses	3426	3193
Interviews	1345	1326
Response rate	39.3	41.5

Both surveys were conducted in each of the 160 sampling points. For each of the two surveys, only one interviewer was active in each sampling point and no interviewer worked in more than one sampling point. This design allows for the statistical separation of interviewer and sampling-point effects.

5. Analysis

An iterative generalized least-squares algorithm was employed using MLwiN [5] to compute the hierarchical models used to decompose the variance of the items from the combined face-to-face surveys. The overall design effect for each of the face-to-face surveys has a mean of 1.4 and a median of 1.3. Figure 2 shows the design effects for all of the items used in the defect study plotted against the interviewer variance as a fraction of the total variance due to interviewer and sampling point. Most items show a bigger relative share of the interviewer variance, especially for the fear-of-crime item discussed above.

6. Conclusions

One might reasonably assume that design effects for items on “fear of crime in the neighborhood” should be due mostly to the homogeneity of those neighborhoods but, for most of our items, the interviewer makes a much greater contribution to the homogenizing effect of the selection process than does the

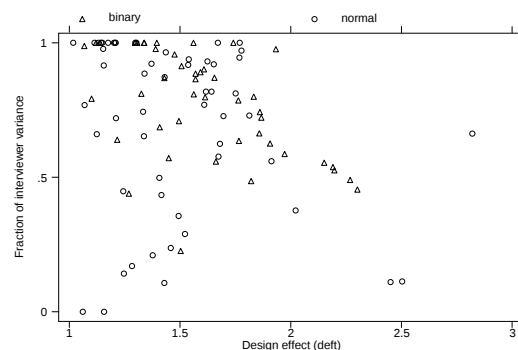


Figure 2: Design effects for all of the items and the fraction of interviewer variance

spatial clustering. There is reason to argue that the design effects commonly observed in face-to-face surveys are not unavoidable. Rewriting certain questions to reduce the interviewer’s influence on the respondent and rethinking interviewer assignments might be worthwhile improvements. However variance estimation should be corrected by using the interviewer and not the sampling point as the cluster-defining element.

References

- [1] Groves, R. M. (1989): *Survey Errors and Survey Costs*. New York.
- [2] Groves, R. M. / Magilavy, L. J. (1986): Measuring and explaining interviewer effects in centralized telephone surveys. *Public Opinion Quarterly*, 50, 251-266.
- [3] Kish, L. (1965): *Survey Sampling*. New York.
- [4] O’Muircheartaigh, C. / Campanelli, P. (1998): The relative impact of interviewer effects and sample design effects on survey precision. *Journal of the Royal Statistical Society, A*, 161, 63-77.
- [5] Rasbash, J. et al. (2000): A user’s guide to MLwiN. University of London: Institute of Education, Multi-level Models Project.
- [6] Schnell, R. / Kreuter, F. (2000): Das DEFECT-Projekt: Sampling-Errors und Nonsampling-Errors in komplexen Bevölkerungsstichproben, *ZUMA-Nachrichten*, 47, 89–101. (In German.) Full text available at: http://www.gesis.org/Publikationen/Zeitschriften/ZUMA_Nachrichten/documents/pdfs/zn47.10-mitteilungen.pdf
- [7] Schnell, R. / Kreuter, F. / Thume, D. / Coutts, E. (2002): *Das DEFECT Projekt. Sampling-Errors und Nonsampling-Errors in komplexen Bevölkerungsstichproben. Ein Methodenbericht*. Opladen. In press. (In German.)