



Interviewer Variance and its Effects on Estimates and Analyses

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Outline

- Introduction
 - Two approaches to evaluate interviewer effects
- The basic models
 - A two and a three level random intercept model
- Presentation of two Cases
 - Evaluation of interviewer effects on the measurement of alcohol consumption in European countries
 - Evaluation of interviewer effects on attitudinal variables
- Discussion

Introduction

- Evaluation of interviewer effects is part of survey data quality assessment
- Two approaches
 - Interaction analysis of question-answer sequences
 - Deviances of the 'straightforward' interaction
 - Interviewer behavior and related measurement errors
 - Interviewer variance analysis
 - Dep Var= substantive variable; Indep Var= Interviewers
 - Intra class correlation: proportion of explained variance
 - Only one type of interviewer effect:
 - differences between interviewers in the systematic effects of each interviewer on the answers

basic models

- Two level hierarchical data structure:
 - Respondents are nested within interviewers
 - Two level random intercept (null) model

$$Y_{ij} = \beta_{0j} + \varepsilon_{ij}$$

$$\beta_{0j} = \gamma_{00} + \mu_{0j}$$

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- β_{0j} intercept for interviewer j
- ε_{ij} residual error term for respondent i; variance σ_e^2
- μ_{0j} an interviewer-specific part of the intercept ;variance σ_u^2

- Interviewer effects= intra class correlation coefficient:

$$\rho_{\text{int}} = \frac{\sigma_u^2}{\sigma_u^2 + \sigma_e^2}$$

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- Expression of the homogeneity of the responses obtained by the same interviewer
- Interviewers create additional clustering in the data
- Impact on the interviewer design effect:

$$deff_{\text{int}} = 1 + (\bar{m} - 1)\rho_{\text{int}}$$

or

$$deff'_{\text{int}} = \frac{Var(\bar{y})_{\text{clusint}}}{Var(\bar{y})_{\text{srs}}}$$

- Variance inflation due to interviewer effects

- Three level hierarchical data structure:
 - Repeated measurements at the lowest level nested within respondents and respondents are nested within interviewers
 - Three level random intercept (null) model

$$m_{mij} = \gamma_{000} + k_{0j} + u_{0ij} + e_{mij}$$

- With k_{0j}, u_{0ij}, e_{mij} ; unique part of the intercept at the interviewer level the respondent level and the error at the measurement level

- Intra class correlation coefficient at respondent and interviewer level:

$$\rho_{resp} = \frac{\sigma_{u0}^2}{\sigma_{k0}^2 + \sigma_{u0}^2 + \sigma_e^2} \quad \rho_{int} = \frac{\sigma_{k0}^2}{\sigma_{k0}^2 + \sigma_{u0}^2 + \sigma_e^2}$$

Cases 1: Evaluation of interviewer effects on the measurement of alcohol consumption in European countries

- Survey are used to collect data about alcohol consumption
- Data: Seventh round of European Social Survey (2014)
 - Questions about frequency and amount of consumption
 - Combination of standardization and local adaptation
 - Difficult concepts: 'typical frequency' and 'standard drinks'
 - Long recall period: last twelve months
 - Sensitive topic
- Difficult questions about a sensitive topic → risk for interviewer effects

- Variables
 - One year abstinence:
 - 1= no alcohol consumption during the last 12 months
 - Frequent drinking:
 - 1 = non-abstaining respondents answering 'daily' or 'Several times a week' to the frequency of alcohol consumption (last 12 months)
 - Amount of alcohol consumed on weekdays
 - The amount of beverage-quantity combinations (e.g. glass of wine) during the last weekday respondents were drinking
 - Unit: gram alcohol
 - For non-abstaining respondents
 - Amount of alcohol consumed on a weekend day

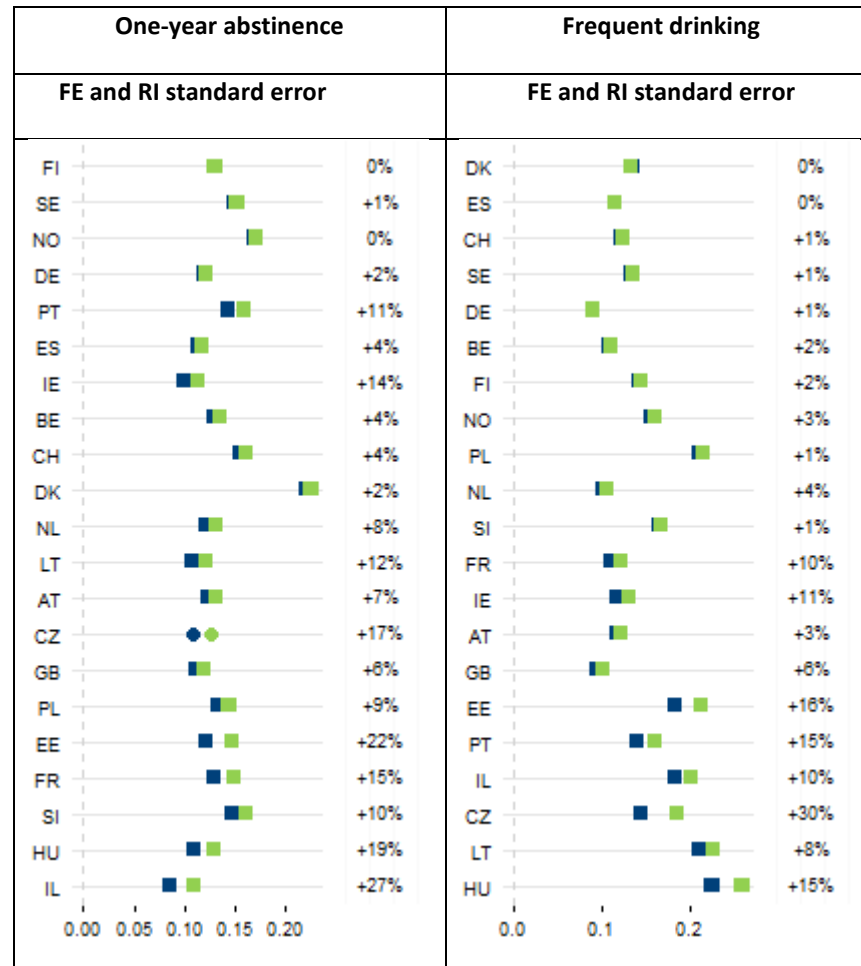
ICC's for the alcohol variables

Country	One-year abstinence	Frequent drinking	Amount consumed weekday	Amount consumed weekend
AT	0.16	0.08	0.16	0.15
BE	0.11	0.02	0.02	0.02
CH	0.12	0.01	0.08	0.10
CZ	0.17	0.28	0.22	0.24
DE	0.08	0.02	0.03	0.09
DK	0.14	0.00	0.04	0.03
EE	0.20	0.11	0.11	0.22
ES	0.09	0.01	0.08	0.10
FI	0.00	0.03	0.01	0.00
FR	0.22	0.06	0.06	0.13
GB	0.17	0.09	0.07	0.07
HU	0.24	0.32	0.19	0.14
IE	0.11	0.07	0.18	0.10
IL	0.46	0.24	0.14	0.24
LT	0.15	0.30	0.19	0.21
NL	0.15	0.05	0.06	0.05
NO	0.06	0.04	0.08	0.10
PL	0.17	0.05	0.13	0.13
PT	0.09	0.12	0.14	0.14
SE	0.04	0.02	0.10	0.09
SI	0.22	0.05	0.09	0.05

The impact of interviewer effects on the evaluation of the effect of gender on alcohol consumption

- Effect of gender on alcohol consumption
- The fixed effect model
 - In all countries: women's alcohol consumption is substantially lower in both frequency and quantity
- A random intercept model:
 - Interviewer effects are taken into account
 - Gender effects do not change in direction and significant status

Estimated standard errors for the effect of gender in the fixed (blue) and random intercept model (green)



The impact of interviewer effects on the evaluation of the effect of education on alcohol consumption

- Binary variable: with and without a degree of higher education
- The fixed effect model
 - Educational level is differently related to the different dimensions of alcohol consumption
 - In all countries: higher educational level: less likely to have abstained from alcohol
 - In most countries: higher educational level: more likely to drink several times a week but smaller amounts
- A random intercept model:
 - A few of the observed effects change in statistical significance status

Cases 2 : Evaluation of interviewer effects on attitudinal variables

- Data
 - ESS round 7
 - Four list of items (11 point scales) about different substantive topics:
 - A1: Trust in political institutions (7 items)
 - A2: Satisfaction with... (6 items, e.g. present state of economy)
 - A3: Importance of qualifications for foreigners (6 items)
 - A4: Apprecation for the political system (6 items)

Mean ICC for four list of attitudinal items

	A1	A2	A3	A4
Austria	0.21	0.18	0.15	0.14
Belgium	0.04	0.04	0.05	0.04
Switzerland	0.10	0.02	0.02	0.03
Czech Republic	0.20	0.26	0.25	0.12
Germany	0.07	0.07	0.08	0.07
Denmark	0.05	0.03	0.02	0.03
Estonia	0.11	0.09	0.12	0.11
Spain	0.11	0.05	0.07	0.06
Finland	0.03	0.01	0.01	0.03
France	0.02	0.03	0.03	0.02
United Kingdom	0.04	0.03	0.03	0.02
Hungary	0.29	0.35	0.33	0.32
Ireland	0.17	0.11	0.12	0.11
Israel	0.26	0.09	0.10	0.12
Lithuania	0.37	0.36	0.34	0.29
the Netherlands	0.04	0.02	0.02	0.03
Norway	0.04	0.02	0.01	0.04
Poland	0.14	0.06	0.06	0.09
Portugal	0.09	0.07	0.09	0.06
Sweden	0.04	0.01	0.02	0.03
Slovenia	0.04	0.03	0.03	0.06

Evaluation of interviewer effects on (non)-differentiation

- Assumption: response differentiation on 11 point scales
- Response style of non-differentiation or straightlining
- Can interviewers influence this response style and how can we disentangle interviewer effects and respondent effects?
- Measurement of non-differentiation:
 - Average deviation between the current answer of a respondent as compared to the answer on the question that precisely precedes it
 - E.g. 6,7,8,6,6,6,4; deviations are: NA,1,1,2,0,0,2 – average deviations $6/6=1$

- How can we separately evaluate interviewer effects and respondent effects ?
- Repeated measurement model
 - Three repeated measurements of non-differentiation
 - Lists: A1, A2 and A3
 - Three level model: repeated measurement are nested within respondents and respondents within interviewers
 - Variance component for interviewers and respondents
 - proportion of explained variance by respondents (ICC_Resp) and by interviewers (ICC_int)

ICC-resp and ICC_int for non-differentiation

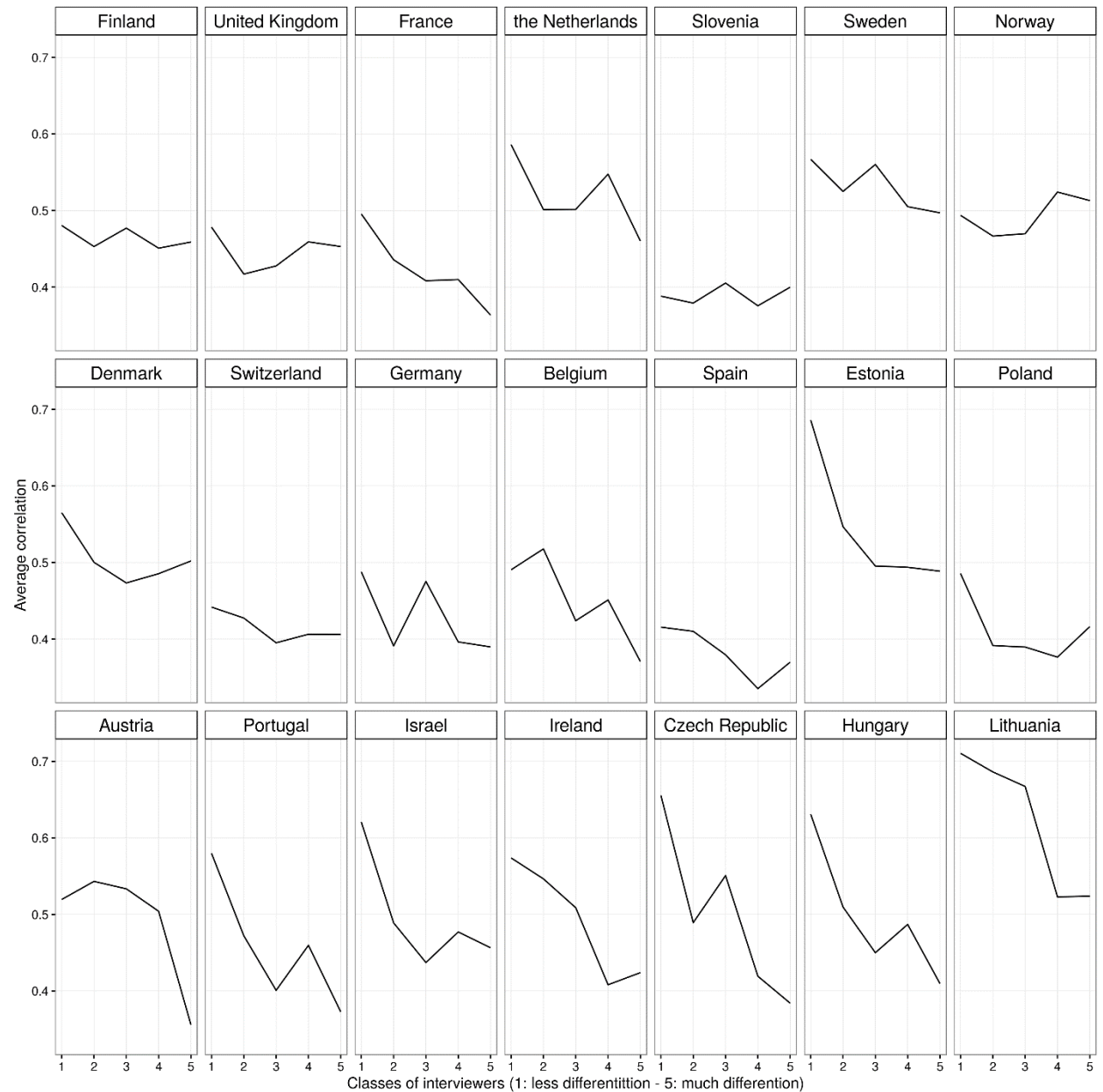
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Evaluation of interviewers' impact on non-differentiation on the correlation between attitudinal variables

- Interviewer effects on non-differentiation of responses
- Non differentiated answers that remain at the same side of the mean of the items will force higher correlations
- Question:
 - What's the impact of the interviewer tendency to obtain more or less differentiated answers on the correlation between items of another list
- Expectation:
 - Higher correlations for interviewers with respondents that differentiate less

- Analysis:
 - Mean score of non-differentiation for each interviewer based on the three sets of items (A1,A2,and A3)
 - Quintiles of the distribution of mean scores → 5 group of interviewers:
 - Group 1: 20% of interviewers with respondents with the lowest mean score for non differentiation
 - ...
 - Group 5: 20% of interviewers with respondents with the highest mean score for non differentiation
 - Average correlation between any two items of 6 items of A4 for the five groups of interviewers

Mean correlations between 6 items for 5 groups of interviewers



Discussion

- High intra class correlations for behavioral and attitudinal questions
- Large differences between countries
 - Part of data quality assessment in a cross national surveys
 - Detection of good and bad practices of interviewer training and fieldwork monitoring
 - Results underline the importance of training and fieldwork monitoring

Discussion

- Interviewer effects have an influence on:
 - effect parameters and standard errors → influence on substantial conclusions
 - Response style: (non)-differentiation → not only a matter of response behavior
 - Correlations between items → results of statistical procedures using correlation and covariance matrices
- To reduce non-differentiation and the interviewer's impact:
 - Scatter the items of one construct over the questionnaire?

Thank you.

