Survey data quality in different countries

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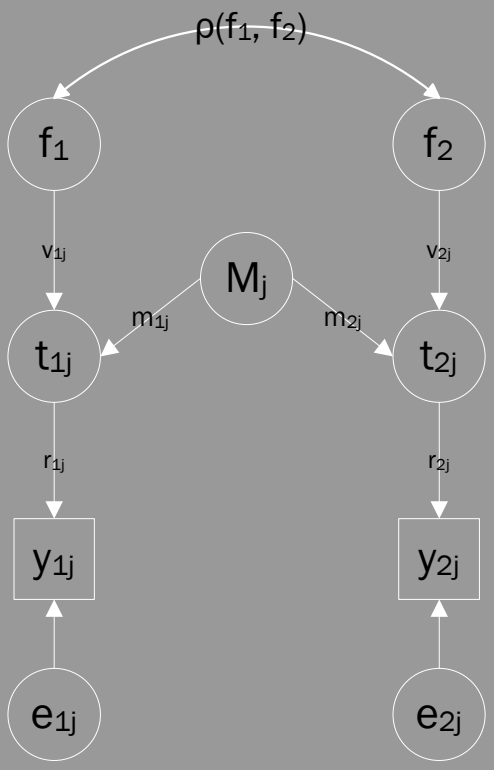
Overview

The basic response model



f_1,f_2 = variables of interest

v_{ij} = validity coefficient for variable i

M_j = method factor for both variables

m_{ij} = method effect on variable i

t_{ij} = true score for y_{ij}

r_{ij} = reliability coefficient

y_{ij} = the observed variable

e_{ij} = the random error in variable y_{ij}

The basic response model

- The quality coefficient q is the product of the reliability and validity coefficients:
- $q = vr$
- The square q^2 is called the 'total quality' of a measure.
- It is the percentage of variance in the observed variable that can be explained by the latent variable of interest.

First trait measured with three methods

CARD 73 Using this card, please tell me how true each of the following statements is about your current job.

		Not at all true	A little true	Quite true	Very true	(Don't know)
G64	There is a lot of variety in my work.	1	2	3	4	8

iS19 The next 3 questions are about your current job. Please choose one of the following to describe how varied your work is.

Please tick one box.

- ☐ 1 Not at all varied
- ☐ 2 A little varied
- ☐ 3 Quite varied
- ☐ 4 Very varied

iS32 Please indicate, on a scale of 0 to 10, how varied your work is, where 0 is not at all varied and 10 is very varied.

Please tick the box that is closest to your opinion

Not at all varied										**Very varied**
0	1	2	3	4	5	6	7	8	9	10
☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

Three traits measured with first method

CARD 73 Using this card, please tell me how true each of the following statements is about your current job.

		Not at all true	A little true	Quite true	Very true	(Don't know)
G64	There is a lot of variety in my work.	1	2	3	4	8
...						
G66	My job is secure	1	2	3	4	8
...						
G70	My health or safety is at risk because of my work.	1	2	3	4	8

Three traits measured with second method

iS19 The next 3 questions are about your current job. Please choose one of the following to describe how varied your work is.
Please tick one box.

- Not at all varied ☐ 1
- A little varied ☐ 2
- Quite varied ☐ 3
- Very varied ☐ 4

iS20 Please choose one of the following to describe how secure your job is.
Please tick one box.

- Not at all secure ☐ 1
- A little secure ☐ 2
- Quite secure ☐ 3
- Very secure ☐ 4

iS21 Please choose one of the following to say how much, if at all, your work puts your health and safety at risk.
Please tick one box.

- Not at all at risk ☐ 1
- A little at risk ☐ 2
- Quite a lot at risk ☐ 3
- Very much at risk ☐ 4

Three traits measured with third method

Skip details of the model

iS32 Please indicate, on a scale of 0 to 10, how varied your work is, where 0 is not at all varied and 10 is very varied.
Please tick the box that is closest to your opinion

Not at all varied ... ***Very varied***

0 ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐

iS33 Now please indicate, on a scale of 0 to 10, how secure your job is, where 0 is not at all secure and 10 is very secure.
Please tick the box that is closest to your opinion

Not at all secure ... ***Very secure***

0 ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐

iS34 Please indicate, on a scale of 0 to 10, how much your health and safety is at risk from your work, where 0 is not at all at risk and 10 is very much at risk.
Please tick the box that is closest to your opinion

Not at all at risk ... ***Very much at risk***

0 ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐

Different models for MTMM experiments

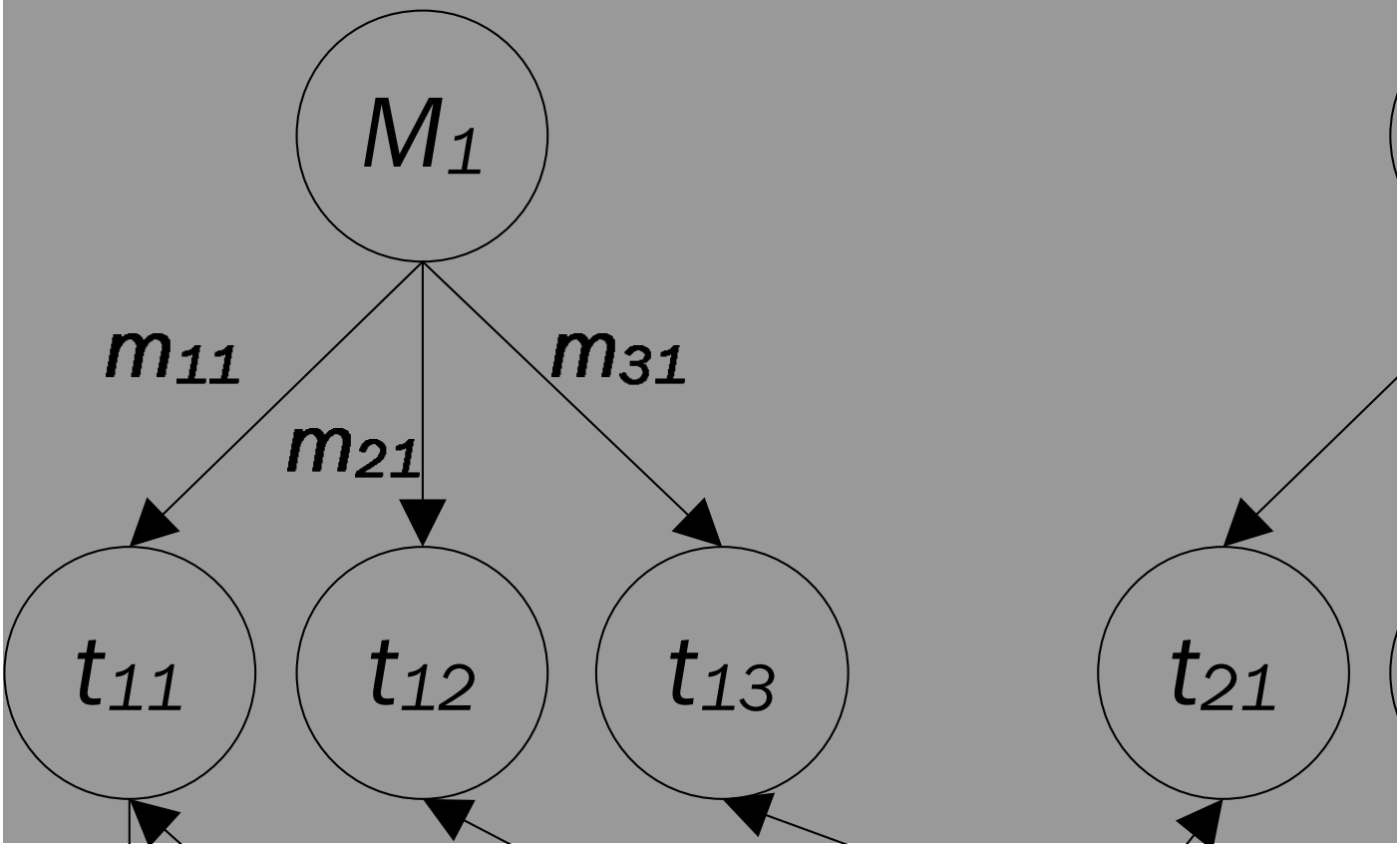
- Classic MTMM model
- Correlated uniqueness (Kenny & Judd)
- Direct product (Browne)
- True score model
- MTM-1 (Eid 2000)

Survey data quality in different countries
└Multitrait-multimethod experiments
└Models

Different models for MTMM experiments

- We use the true score model
- Equivalent to the classic MTMM model
- Sometimes necessary to remove one method factor
- In that case our model is the equivalent to Eid's MTM-1 model.

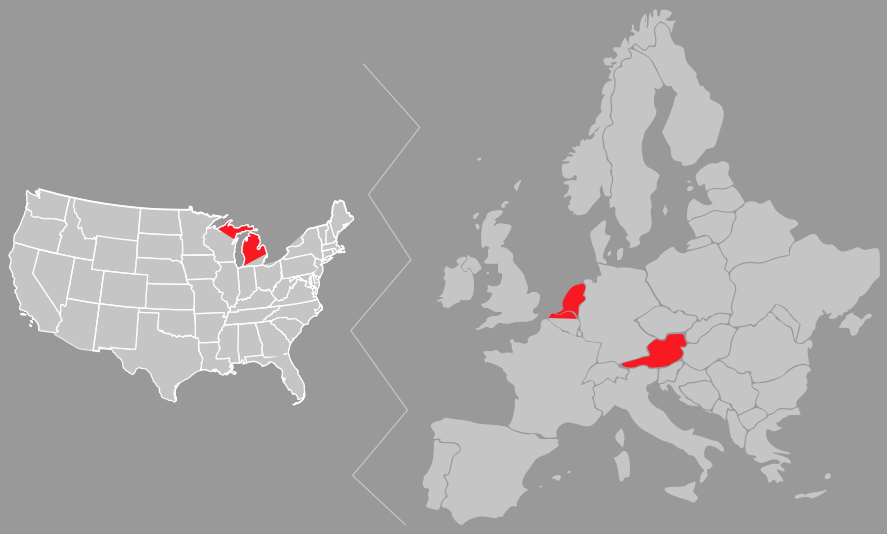
True score model



True score model assumptions

- No correlations among methods
- No correlations between traits and methods
- Equal method effects
- Linear and additive effects
- Normal errors, independent of all unobserved variables
- All variables are continuous

Countries in the international survey project 1984–1996 that have been included in SQP



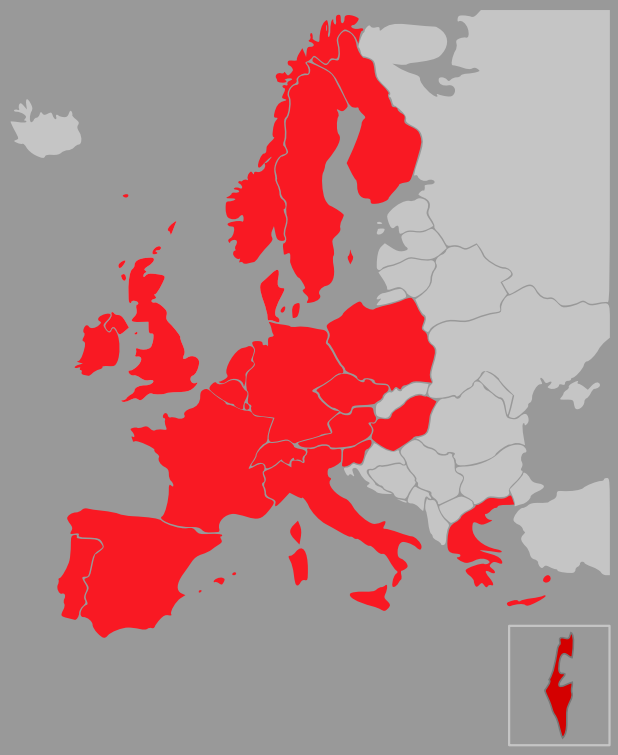
1. Austria
2. Belgium: Flanders
3. Netherlands
4. United States: Michigan

The European Social Survey (ESS)

European Social Survey

- Three rounds, 4th coming up
- Six experiment in each round
- `http://www.europeansocialsurvey.org`

Countries in round 1 of the ESS – 2002



1. Austria
2. Belgium
3. Czech Republic
4. Denmark
5. Finland
6. France
7. Germany
8. Greece
9. Hungary
10. Ireland
11. Israel
12. Italy
13. Luxembourg
14. Netherlands
15. Norway
16. Poland
17. Portugal
18. Slovenia
19. Spain
20. Sweden
21. Switzerland
22. United Kingdom

Survey data quality in different countries
└What has been done before
└Experiments in the European Social Survey

Countries in round 2 of the ESS – 2004

1. Austria
2. Belgium
3. Czech Republic
4. Denmark
5. Estonia
6. Finland
7. France
8. Germany
9. Greece
10. Hungary
11. Iceland
12. Ireland
13. Italy
14. Luxembourg
15. Netherlands
16. Norway
17. Poland
18. Portugal
19. Slovakia
20. Slovenia
21. Spain
22. Sweden
23. Switzerland
24. Turkey
25. Ukraine
26. United Kingdom

Countries in round 3 of the ESS – 2006

1 Austria
2 Belgium
3 Bulgaria
4 Cyprus
5 Denmark
6 Estonia
7 Finland
8 France
9 Germany
10 Hungary
11 Ireland
12 Latvia
13. Netherlands
14. Norway
15. Poland
16. Portugal
17. Romania
18. Russian Federation
19. Slovakia
20. Slovenia
21. Spain
22. Sweden
23. Switzerland
24. Ukraine
25. United Kingdom

Survey data quality in different countries
└What has been done before
└Experiments in the European Social Survey

Some results from rounds 1 and 2

Country	Mean	Median	Minimum	Maximum
Portugal	0.79	0.81	0.63	0.91
Switzerland	0.79	0.84	0.56	0.90
Greece	0.78	0.79	0.64	0.90
Estonia	0.78	0.85	0.58	0.90
Poland	0.73	0.85	0.51	0.90
Luxembourg	0.72	0.73	0.53	0.88
United Kingdom	0.70	0.71	0.56	0.82
Denmark	0.70	0.70	0.52	0.80
Belgium	0.70	0.73	0.46	0.90
Germany	0.69	0.70	0.53	0.83
Spain	0.69	0.64	0.54	0.90
Austria	0.68	0.68	0.51	0.85
Czech Republic	0.65	0.60	0.52	0.87
Slovenia	0.63	0.60	0.46	0.82
Norway	0.59	0.59	0.35	0.83
Sweden	0.58	0.58	0.43	0.68
Finland	0.57	0.54	0.42	0.78

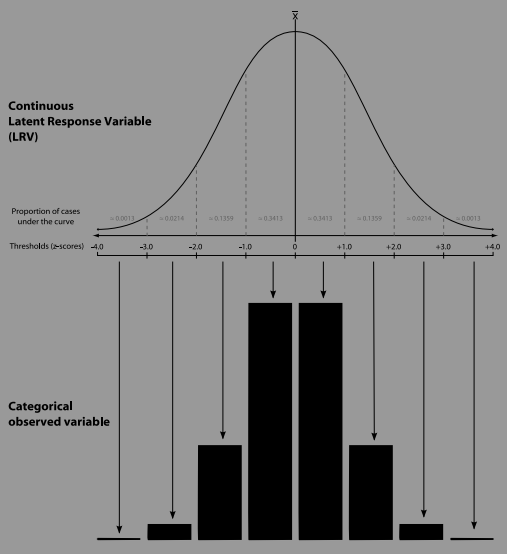
Differences between countries?

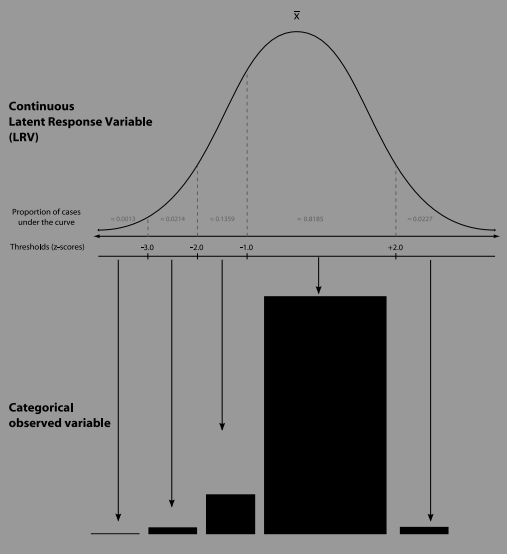
What we studied already:

- Differences in complexity of language?
  - Not found
- Artifacts due to sending in the questionnaire later?
  - Only Sweden, Norway, Finland
- Artifacts due to mistakes in translation?
  - Two cases found for two experiments
- None of these findings suffice to explain the large differences we found!
- Differences in use of the scale?

Categorisation of continuous variables

Our model assumes that there are *unobserved* continuous latent response variables (LRV) that have been categorised into the *observed* categorical variables.





- These continuous latent response variables are related to each other according to the MTMM model.
- Method effects, quality coefficients, and thresholds can be estimated.
- Equivalent to a 2 parameter graded response model in IRT (Muthén & Asparouhov 2002).
- We call the ratio of the quality coefficient $q = v.r$ from the categorical model to the same coefficient from the continuous model the 'categorisation factor'.

Consequences of categorisation for the correlations between observed variables

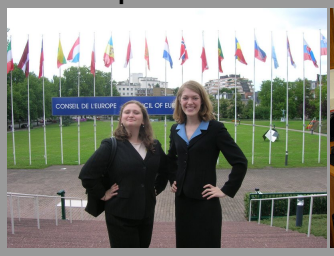
- The fewer categories, the smaller the Pearson correlation;
- The more skew in observed variables, the smaller the Pearson correlation;
- The corrected ('polychoric') correlations are always higher than the Pearson correlations, but not necessarily equally so for all variables.

Therefore,

- If the skewness of observed variables is higher for variables measured by one particular method, then the corrected correlations between those variables will go up more than the others, and the method effects in the categorical model will be higher;
- As method-induced correlation goes up, the estimates of the quality will go down;
- If this differs across countries, the process can explain differences in the quality.

Analysis of the experiments

- We analysed the 4 experiments from the ESS which involved variables with 5 categories or less
- The topics: role of women, GP's, political efficacy, job.




- Compare the country with the highest quality to the country with the lowest quality for that experiment

Quality (q^2)and method effects (m) in the efficacy experiment

Continuous MTMM model, main questionnaire (first method)

		'Efficacy'		
		Complex	Active	Mind
q^2	Denmark	0.77	0.83	0.79
	Switzerland	0.49	0.81	0.50
m	Denmark	0.00	0.00	0.00
	Switzerland	0.00	0.00	0.00

Efficacy experiment: Denmark

Polychoric correlations

		Method 1			Method 2		
Method 1	Complex	1.00					
	Active	-0.44	1.00				
	Mind	-0.51	0.47	1.00			
Method 2	Complex	0.66	-0.45	-0.51	1.00		
	Active	-0.44	0.74	0.46	-0.51	1.00	
	Mind	-0.52	0.51	0.67	-0.56	0.56	1.00

Pearson correlations

		Method 1			Method 2		
Method 1	Complex	1.00					
	Active	-0.38	1.00				
	Mind	-0.46	0.41	1.00			
Method 2	Complex	0.60	-0.37	-0.44	1.00		
	Active	-0.39	0.67	0.40	-0.43	1.00	
	Mind	-0.46	0.43	0.62	-0.49	0.48	1.00

$n \approx 916$

Efficacy experiment: Switzerland

Polychoric correlations

		Method 1			Method 2		
Method 1	Complex	1.00					
	Active	-0.37	1.00				
	Mind	-0.46	0.42	1.00			
Method 2	Complex	0.57	-0.36	-0.46	1.00		
	Active	-0.32	0.83	0.36	-0.39	1.00	
	Mind	-0.36	0.44	0.69	-0.49	0.43	1.00

Pearson correlations

		Method 1			Method 2		
Method 1	Complex	1.00					
	Active	-0.33	1.00				
	Mind	-0.43	0.36	1.00			
Method 2	Complex	0.55	-0.35	-0.45	1.00		
	Active	-0.30	0.82	0.33	-0.34	1.00	
	Mind	-0.35	0.41	0.62	-0.48	0.39	1.00

$n \approx 779$

% Increase in the correlations after correction for categorisation

Efficacy experiment: Denmark

		Method 1			Method 2	
Method 1	Complex					
	Active	**16**%				
	Mind	**11**%	**15**%			
Method 2	Complex	10%	22%	16%		
	Active	13%	10%	15%	**19**%	
	Mind	13%	19%	8%	**14**%	**17**%

Mean percentage increase of the polychoric correlations: 14.5%

% Increase in the correlations after correction for categorisation

Efficacy experiment: Switzerland

		Method 1			Method 2	
Method 1	Complex					
	Active	**12**%				
	Mind	**8**%	**17**%			
Method 2	Complex	4%	3%	3%		
	Active	6%	1%	1%	**16**%	
	Mind	2%	7%	12%	**3**%	**1**%

Mean percentage increase of the polychoric correlations: 7.6%

Consequences of correction for categorisation

- In both Denmark and Switzerland, the monomethod correlations increase more than the other correlations;
- In the continuous analysis, no significant method factor was found for the first method in either country;
- In **Denmark** the monomethod correlations were already relatively high, however, leading to a significant method factor in the categorical model;
- This leads to a lower quality estimate than in the continuous model in Denmark.
- In **Switzerland** the monomethod correlations were lower;
- No significant method factor is found there, and the 'upwards push' can therefore increase the quality coefficients.

Quality (q^2)and method effects (m) according to the continuous and categorical models, with categorisation factors

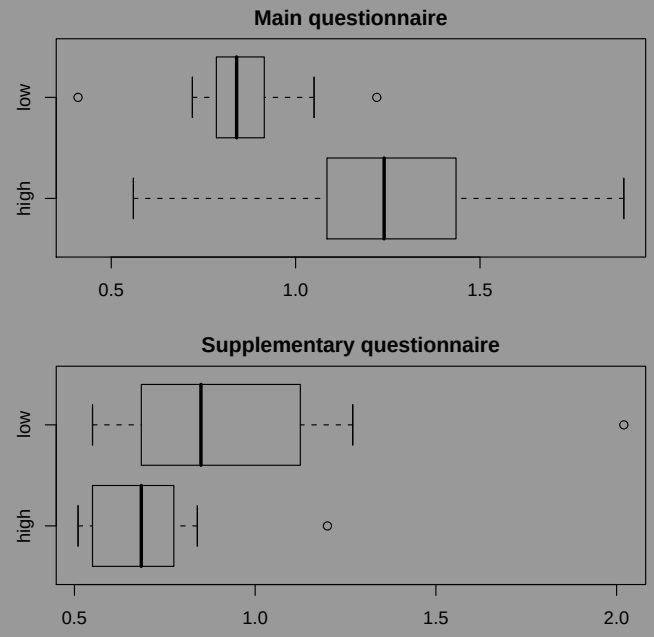
			'Efficacy'	
		Complex	Active	Mind
Continuous analysis				
q^2	Denmark	0.77	0.83	0.79
	Switzerland	0.49	0.81	0.50
m	Denmark	0.00	0.00	0.00
	Switzerland	0.00	0.00	0.00
Categorical analysis				
q^2	Denmark	0.63	0.70	0.63
	Switzerland	0.62	0.94	0.62
m	Denmark	0.11	0.08	0.11
	Switzerland	0.00	0.00	0.00
Categorisation factor				
	Denmark	1.23	1.18	1.25
	Switzerland	0.79	0.86	0.81

Correction for categorisation: conclusions

- The general 'push' of correcting for categorisation is that all coefficients go up, because the polychoric correlations are always higher than the Pearson correlations;
- But when method factors are taken into account, the coefficients can also go down;
- Particularly, if one method produces more categorisation errors than another, the quality coefficients can go down;
- If this happens more in some countries than others, we can find differences;
- Would then expect countries with high quality to have a lower quality after correction for categorisation and vice versa.

A meta-analysis of the categorisation error studies

The categorisation factor, q_{cat}/q_{cont}:



How general are the findings?

			95% C.I	
		Estimate	S.E.	lower	upper
	(Intercept)	1.04	0.36	0.31	1.77
Topic					
	Doctors	(reference category)			
	Efficacy	0.06	0.10	-0.14	0.27
	Job	0.04	0.40	-0.71	0.78
	Women	0.38	0.26	-0.14	0.90
Scale					
	Direct	(reference category)			
	Agree-disagree	-0.11	0.35	-0.81	0.59
	True-false	0.17	0.32	-0.48	0.81
	Negative	-0.50	0.23	-0.96	-0.02
	Main questionnaire	-0.30	0.29	-0.88	0.29
	Highest quality	-0.19	0.09	-0.37	-0.01
	Highest quality × main	0.66	0.15	0.35	0.96

Multiple R-Squared: 0.45; Adjusted R-squared: 0.35

Conclusions

- Differences in data quality between countries are reduced after the categorisation is taken into account.
- Differences in use of the scale play a large role in causing differences between countries.

Recommendations

- One way to prevent categorisation errors is to use continuous or near-continuous scales;
- Don't use categories which are difficult to choose in some countries but not in others (e.g. disagree that 'Men should take as much responsibility as women for the home and children.' in Slovenia vs. Greece.)

Further study, problems

- Investigate normality assumption (tests indicate possible issues), linearity;
- Unobserved heterogeneity;
- Prediction of the data quality based on characteristics of the question.

Survey data quality in different countries
└Conclusion

That's it for now. Moltes gràcies per a la seva atenció!