

# Estimating systematic response errors using the multitrait-multierror model

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# Systematic errors can bias answers



# Why estimate and separate systematic measurement errors?

Correct substantial analyses;

Inform survey design;

Use in further analyses.

# Why estimate measurement error in longitudinal data?

Estimates of change  
can be confounded by change in ME;

Understanding change in ME can prevent bias.

## Current issues with estimating measurement errors:

One type of error at a time,

Mean **or** variance of error,

Don't consider change in error.

# The multitrait-multierror (MTME) can estimate multiple sources of bias

Using MTME we can estimate:

- method,
- social desirability,
- acquiescence,
- random error.

Requirements:

- within experimental design,
- no memory effects.

# Illustration using the Understanding Society Innovation Panel

Using waves 7-9 of UKHLS-IP:

- household panel,
- UK representative,
- 2310 sample size.

MTME experiment measuring:

- attitudes towards immigrants,
- 56 experimental groups,
- 2 time points per respondent/wave.

# Measuring attitudes towards immigrants

The UK should allow more people *of the same race or ethnic group* as most British people to come and live here.

*...of a different race or ethnic group...*

*...from the poorer countries outside Europe...*

It is generally *good for UK's economy* that people come to live here from other countries.

*UK's cultural life is generally enriched...*

*UK is made a better place to live...*



# Designing the MTME experiment:

Social desirability x 2:

“allow **more** people” vs. “allow **fewer** people”,

Acquiescence x 2:

Agree-disagree vs. Disagree-agree scale,

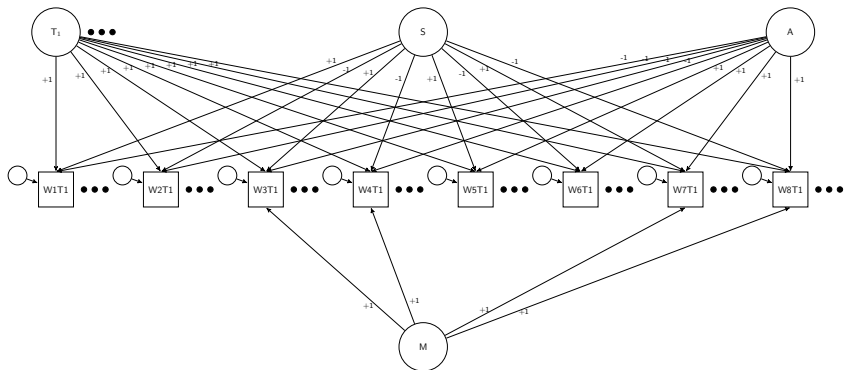
Method x 2:

2 point vs. 11 point scale,

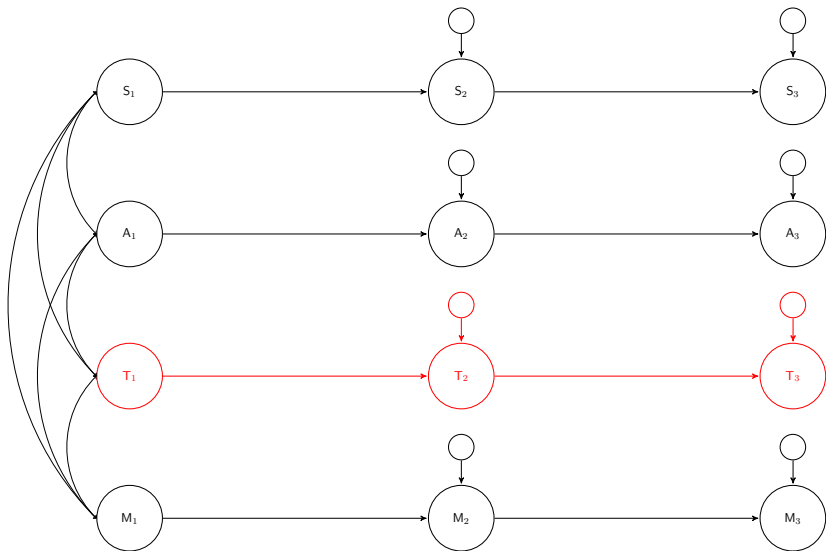
# Answering forms

Wording number	Social desirability	Number of scale points	Agree or Disagree	Required direction	Item formulation (using trait 1 as an example)
W1	Higher	2	AD	Negative	The UK should allow <b>fewer</b> people of the same race or ethnic group as most British people to come and live here
W2	Lower	2	AD	Positive	The UK should allow <b>more</b> people of the same race or ethnic group as most British people to come and live here
W3	Higher	11	AD	Negative	The UK should allow <b>fewer</b> people of the same race or ethnic group as most British people to come and live here
W4	Lower	11	AD	Positive	The UK should allow <b>more</b> people of the same race or ethnic group as most British people to come and live here
W5	Higher	2	DA	Positive	The UK should allow <b>more</b> people of the same race or ethnic group as most British people to come and live here
W6	Lower	2	DA	Negative	The UK should allow <b>fewer</b> people of the same race or ethnic group as most British people to come and live here
W7	Higher	11	DA	Positive	The UK should allow <b>more</b> people of the same race or ethnic group as most British people to come and live here
W8	Lower	11	DA	Negative	The UK should allow <b>fewer</b> people of the same race or ethnic group as most British people to come and live here

# Estimating the MTME



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# Results

# Mean bias estimates based on the MTME

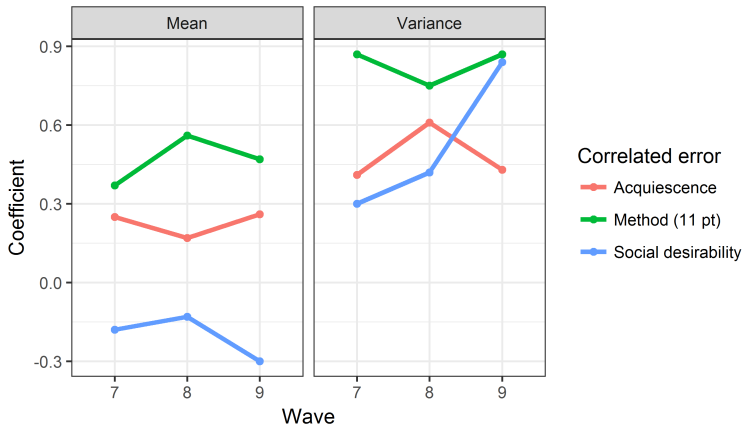
Acquiescence: 0.25 (0.19 : 0.31);

Social desirability: -0.18 (-0.40 : -0.09);

Method: 0.37 (0.28 : 0.46).

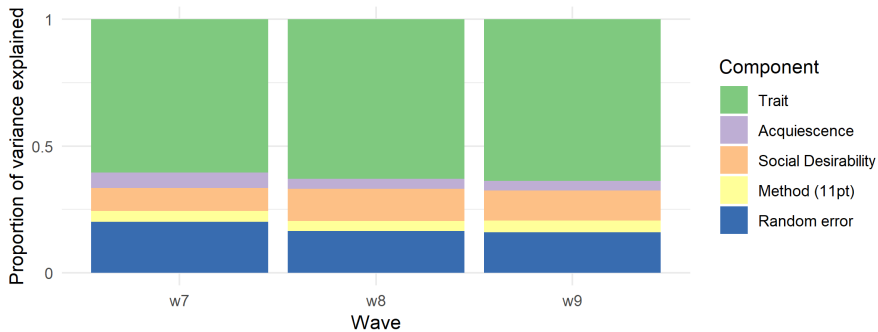
Change in time of correlated errors

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# Measurement error variance



# Stability of measurement error

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Measurement error	Wave	Measurement error at t + 1		
		Point est.	Lower CI	Upper CI
Acquiescence	7	0.43	0.29	0.57
	8	0.45	0.29	0.59
Social desirability	7	0.97	0.95	0.98
	8	0.87	0.83	0.95
Methods (11 point)	7	0.00	-0.13	0.13
	8	0.04	-0.08	0.16

# Conclusions

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- Overall size of measurement error are stable in time
- At the individual level method effects show no stability while social desirability is very stable

# The multitrait-multierror approach to estimating measurement errors

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