

Multi-level Models

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Outline

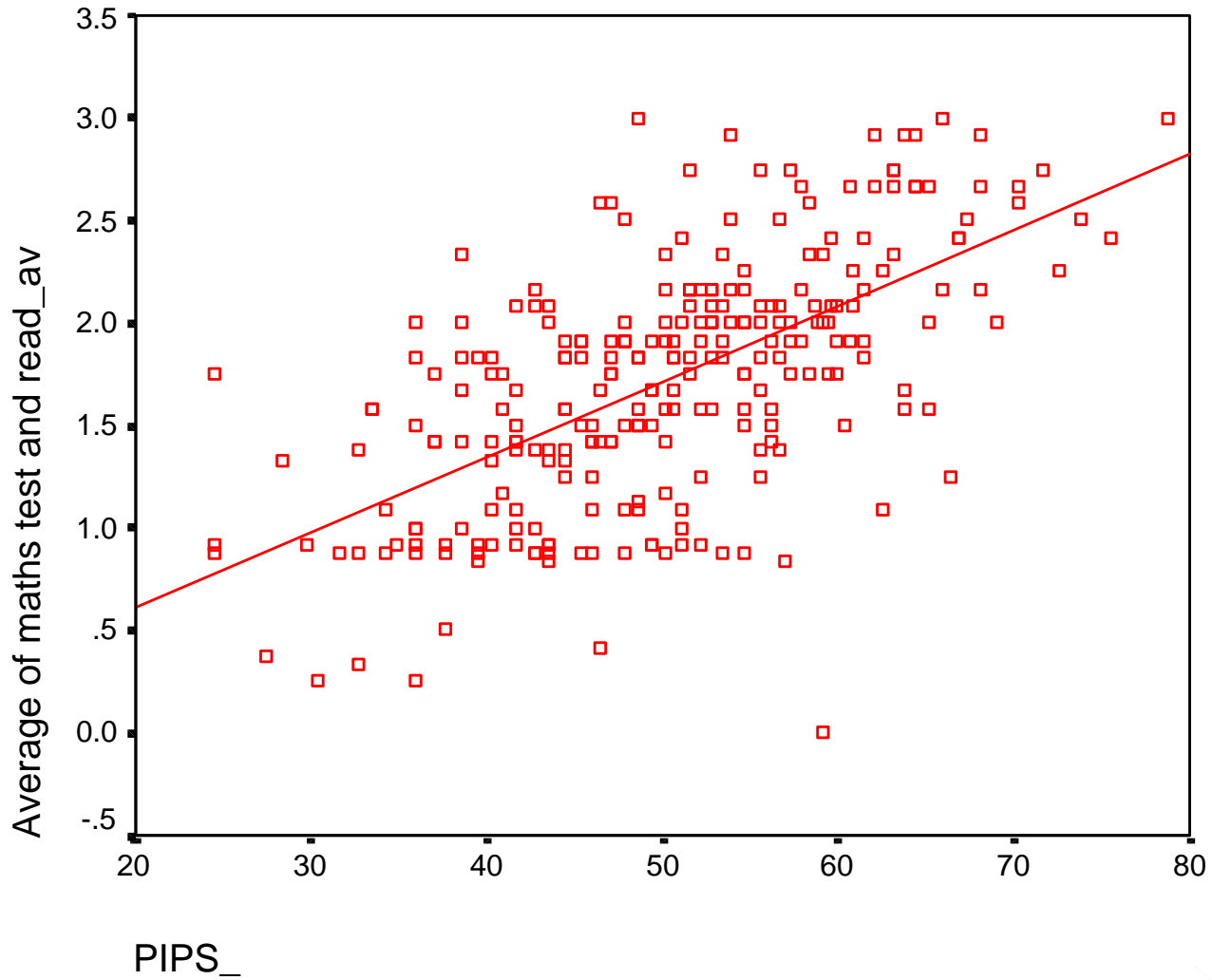
- Background
 - School effectiveness
 - MLMs
- A simple model
- The compositional effect
 - Explanations
 - The phantom effect
- Conclusions

Background

- Coleman (1966): “Schools don’t matter”
- 15, 000 hours (Rutter 1979)
- Criticism of statistical approaches
- Multi-level models
 - HLM, MLwin + others
 - Late 1980’s CES runs course with Steve Raudenbush
 - Aitkin and Longford (1986)

The data

- Children start school aged 4-5
- Baseline assessment (PIPS)
- Three years later assessed on
 - Maths, reading, vocabulary, non-verbal ability
- Pupils nested in schools.



Null model

$$\text{Outcome} = \beta_0 + r_{ij}$$

$$\beta_0 = \gamma_{00} + v_{0j}$$

First model

$$\text{Outcome} = \beta_0 + \beta_1 \text{ prior} + r_{ij}$$

$$\beta_0 = \gamma_{00} + \gamma_{01} \text{ avprior} + v_{0j}$$

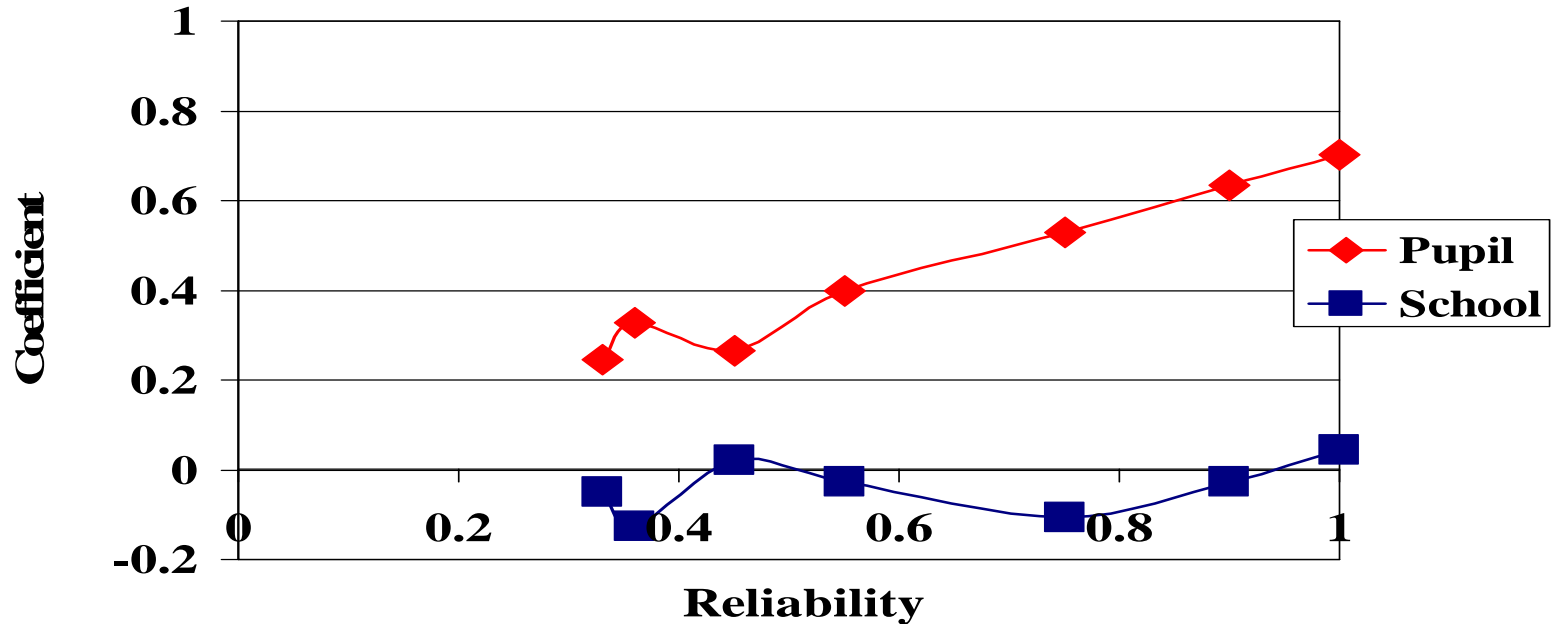
Results

	Null	First model
Fixed		
Cons	-0.071 (0.052)	-0.044 (0.034)
BLA		0.753 (0.16)
Average BLA		0.117 (0.051)
Random		
Pupil	0.738 (0.021)	0.392 (0.011)
School	0.275 (0.043)	0.111 (0.018)

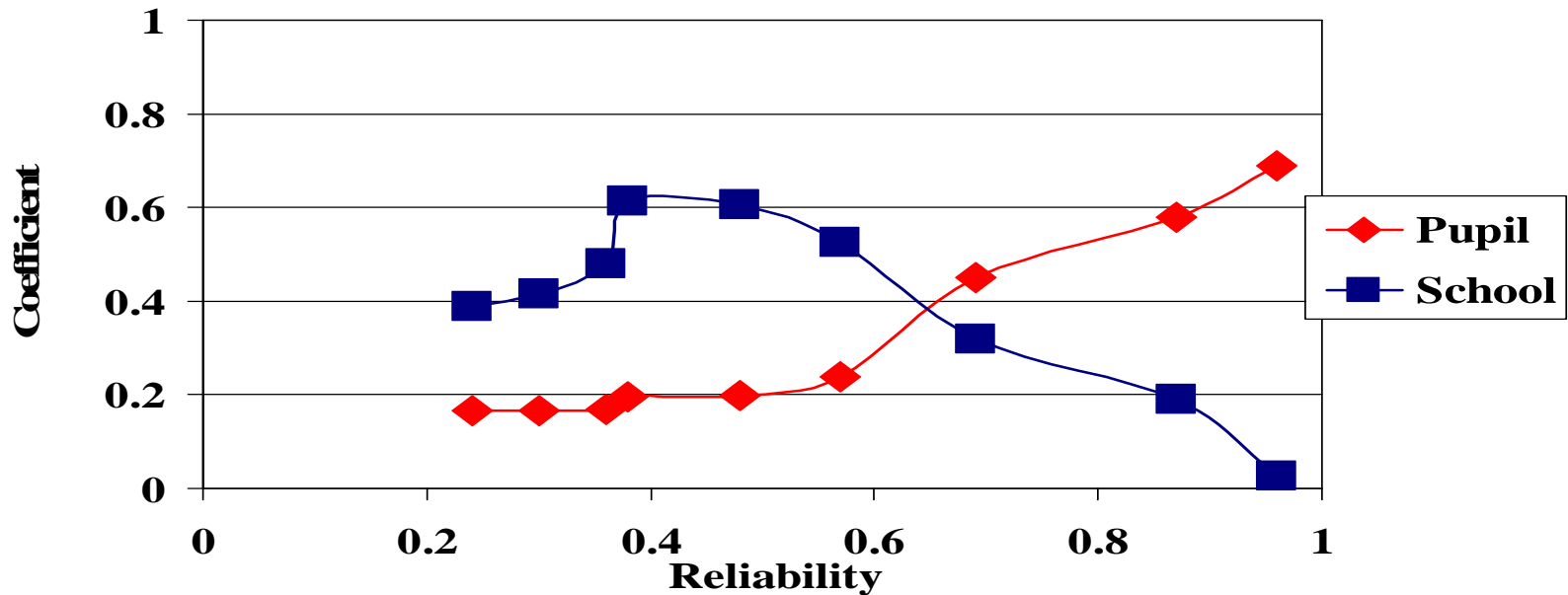
Reliability of baseline

- The compositional effect may be the result of unreliable measurement
- The baseline was made increasingly unreliable.
- Coefficients at the pupil and school levels were calculated

Outcome Becoming Unreliable



Predictor Becoming Unreliable



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