

How have students' understandings of mathematics changed over time?

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The "standards" debate

- "School leaving exam" (GCE/GCSE) A*-C:
23% (early 1980s) → 58% (2012)
BUT considerable slippage in standards
(Coe, 2008)
- TIMSS: Significant increase since 1995
484 → 541 (Grade 4)
498 → 513 (Grade 8)
BUT fall in PISA (since 2003)

Sample (Y9)

	Algebra	Number	Ratio
1976/7	1647	1661	1595
2008/9	961	247	767

Methods

CSMS (1970s)

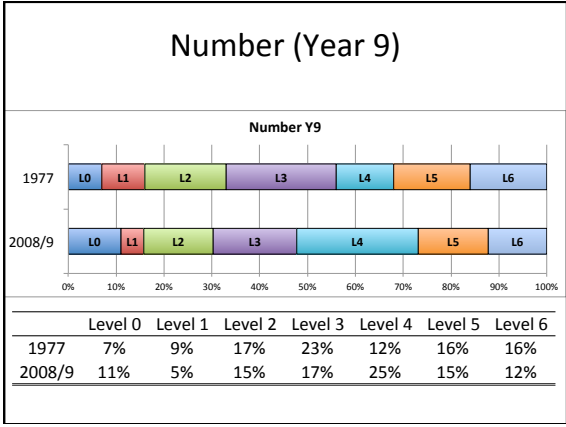
- Items: Diagnostic interviews / theory
- Levels 0 → 4:
 - Empirically derived (Rasch-like process)
 - Based on “best-performing” items

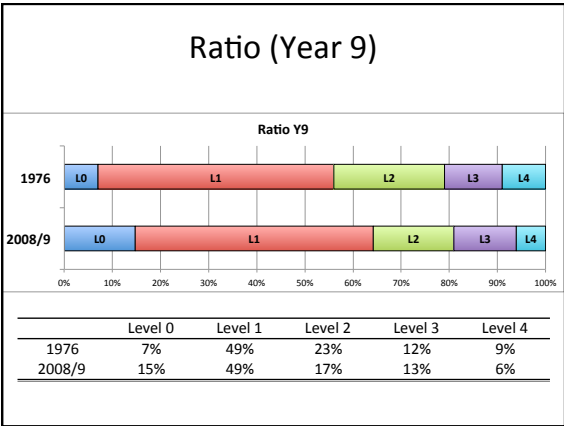
ICCAMS

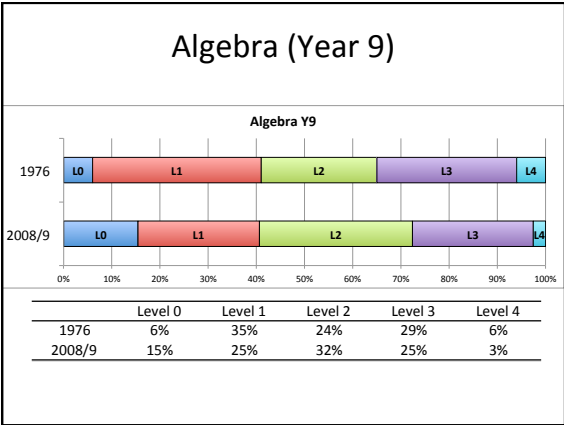
- Levels & items: Reality check / Rasch
- Differences: Bootstrap & Simulation

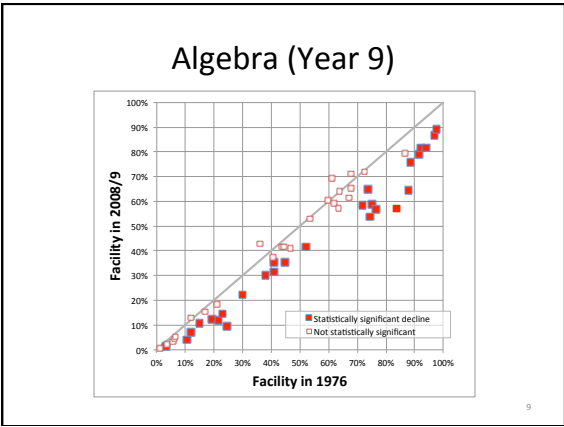
Are the samples comparable?

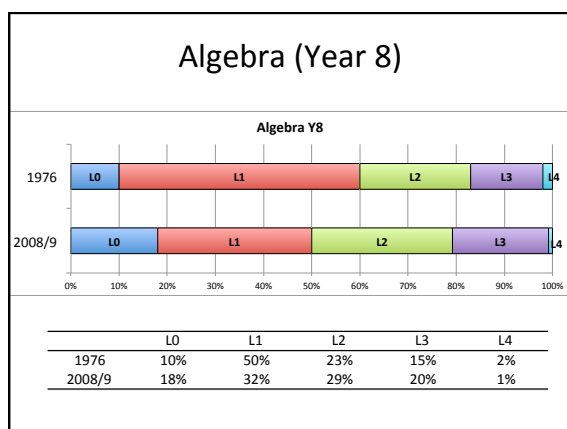
- Sampling *per se* does not guarantee this
 - Non-response / opportunity sampling
 - Small number of schools
- Representativeness claims rest on matched ability scores on a nationally normed test
- Issues:
 - How good are the norms (at both times)?
 - Is the relationship between ability scores and ICCAMS scores strong enough to ‘anchor’ the sample (at both pupil- and school-level)?
- Bootstrapping provides an estimate of precision











Change in attainment since 1970s

- Algebra, ratio & fractions
 - No improvement
- Number
 - Slight improvement a middle of attainment range
- All
 - Decrease in proportion of highest attainers
 - Increase in proportion of lowest attainers
- Similar picture at Year 8
