

# Social mobility and child development.

Regression to the mean. What mean?

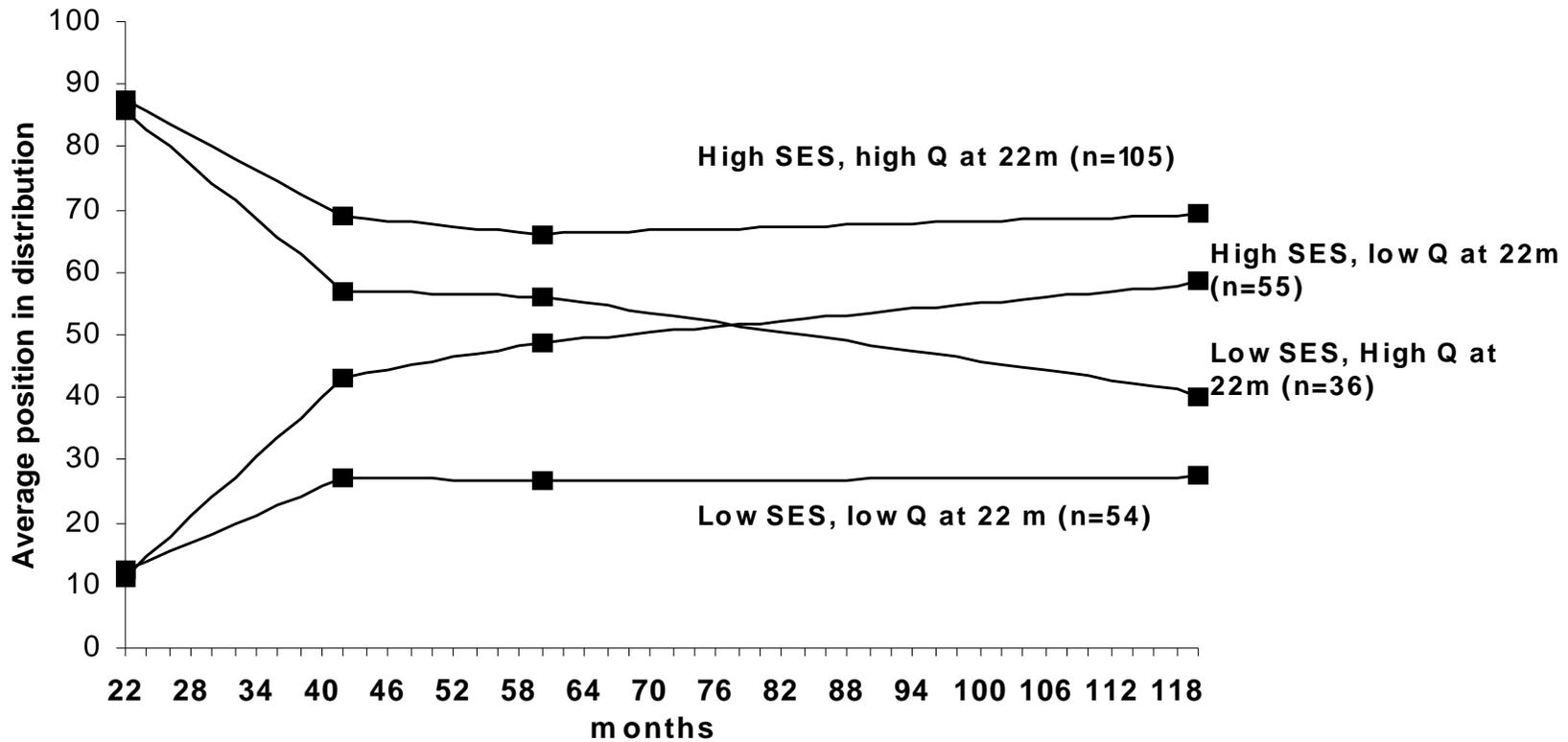
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# Context

- **Social mobility strategy (Opening Doors, breaking barriers, 2011)**
- **Read (Press Release, More or less)**
- **Jerrim & Vignoles (The use and misuse of statistics, IOE, 2011)**
- **Saunders (Social Mobility Delusions. Civitas, 2012)**
  
- **Ermisch, Jantii, Smeeding (From parents to children, 2012)**
- **Duncan, Mernane (Whither Opportunity, 2011)**
- **Bjorklund, Lindahl, Plug (QJE, 2006)**

# EXHIBIT A

**Figure 2: Average rank of test scores at 22, 42, 60 & 120 months, by SES of parents and early rank position**



# Regression to the mean in general

- Galton, “*Regression towards mediocrity in hereditary stature*” (Anthropological Miscellanea, 1886)
- Applies to all group forecasts (rich/poor)
- A result of both measurement errors and instability, both inadequately understood, eg:
  - Welfare as insurance against penury
  - Exams, tests and qualifications as imperfect measures
  - Reward systems

# Weak form

- Measurement error and mis-classification bias in 22 month scores generate “regression to the mean” in 42 month scores.
- Washes out after one period (random noise), unless it has ramifications (state dependence)

## Strong form

- Rushton, J. P., & Jensen, A. R. (2005). [Thirty years of research on race differences in cognitive ability](#). *Psychology, Public Policy, and Law*, 11, 235-294.
- **For any trait, scores should move toward the average for that population.** So in the United States, genetic theory predicts that the children of Black parents of IQ 115 will regress toward the Black IQ average of 85, whereas children of White parents of IQ 115 will regress toward the White IQ average of 100.
- This hypothesis has been tested and the predictions confirmed. Regression would explain why Black children born to high IQ, wealthy Black parents have test scores 2 to 4 points lower than do White children born to low IQ, poor White parents (Jensen, 1998b, p. 358).
- Culture-only theory cannot predict these results but must argue that cultural factors somehow imitate the effect theoretically predicted by genetic theory, which have also been demonstrated in studies of physical traits and in animals.

# The Read, JV Hypothesis

1. The changes between 22m and 42m are regression to the mean
2. The differences in trend 22m to 42m between ses groups is *socially stratified regression to the mean*
3. The chart is explained by regression to the mean.

## Saunders

Hereditarianism. The adult differences in test scores represent structural genetic differences in populations.

## Fig 2, Methods

- Sample
  - 1970, GB
  - sub-sample of contactable April births
  - Sub-sample at 22m and 42 m that were at risk of foetal malnutrition + control group
- Definition and measurement of family of origin
  - SES/Social class (economics, culture, history and identity, not biology)
  - Occupation rated. Averaged over childhood
- Definition and measurement of cognitive development
  - Change of meaning because of qualitative shifts in development and context
  - Use all age appropriate, independently-rated data
  - Relative scores
  - Maximise signal (latent construct=g, to some, Spearman, 1904)
- Validity testing

*Table 2: Raw correlation of individual test scores with scores at 120 months*

	<b>120 months</b>	
	<b>Reading</b>	<b>Maths</b>
<b><u>22 month scores</u></b>		
<b>Cube stacking</b>	0.20	0.11
<b>Language use</b>	0.22	0.12
<b>Personal dev.</b>	0.20	0.13
<b>Drawing</b>	0.15	0.14
<b><u>42 month scores</u></b>		
<b>Counting</b>	0.29	0.13
<b>Speaking</b>	0.28	0.17
<b>Copying designs I</b>	0.32	0.16
<b>Copying designs II</b>	0.27	0.14
<b><u>60 month scores</u></b>		
<b>Copying designs</b>	0.40	0.19
<b>Vocabulary</b>	0.40	0.18
<b>Human Figure Drawing</b>	0.31	0.13

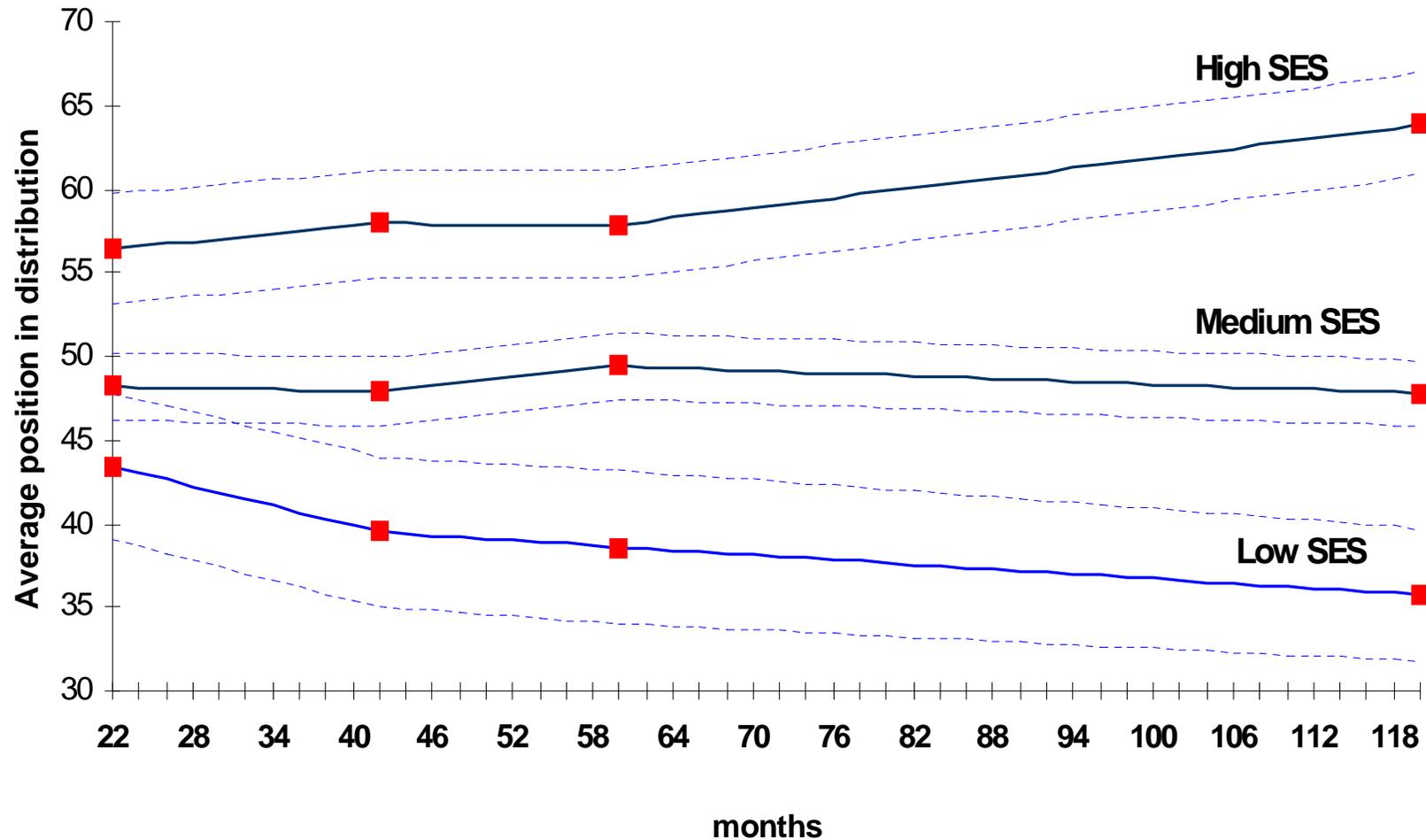
# “Extreme quartiles”

**Table 5: Selected cells from quartile transition matrices**

22 month “extreme Quartiles”	42 month extreme Quartiles		10 year extreme Qs	
	Low	High	Low	High
	Low	39.9	13.7	41.5
High	10.8	43.5	13.4	34.6

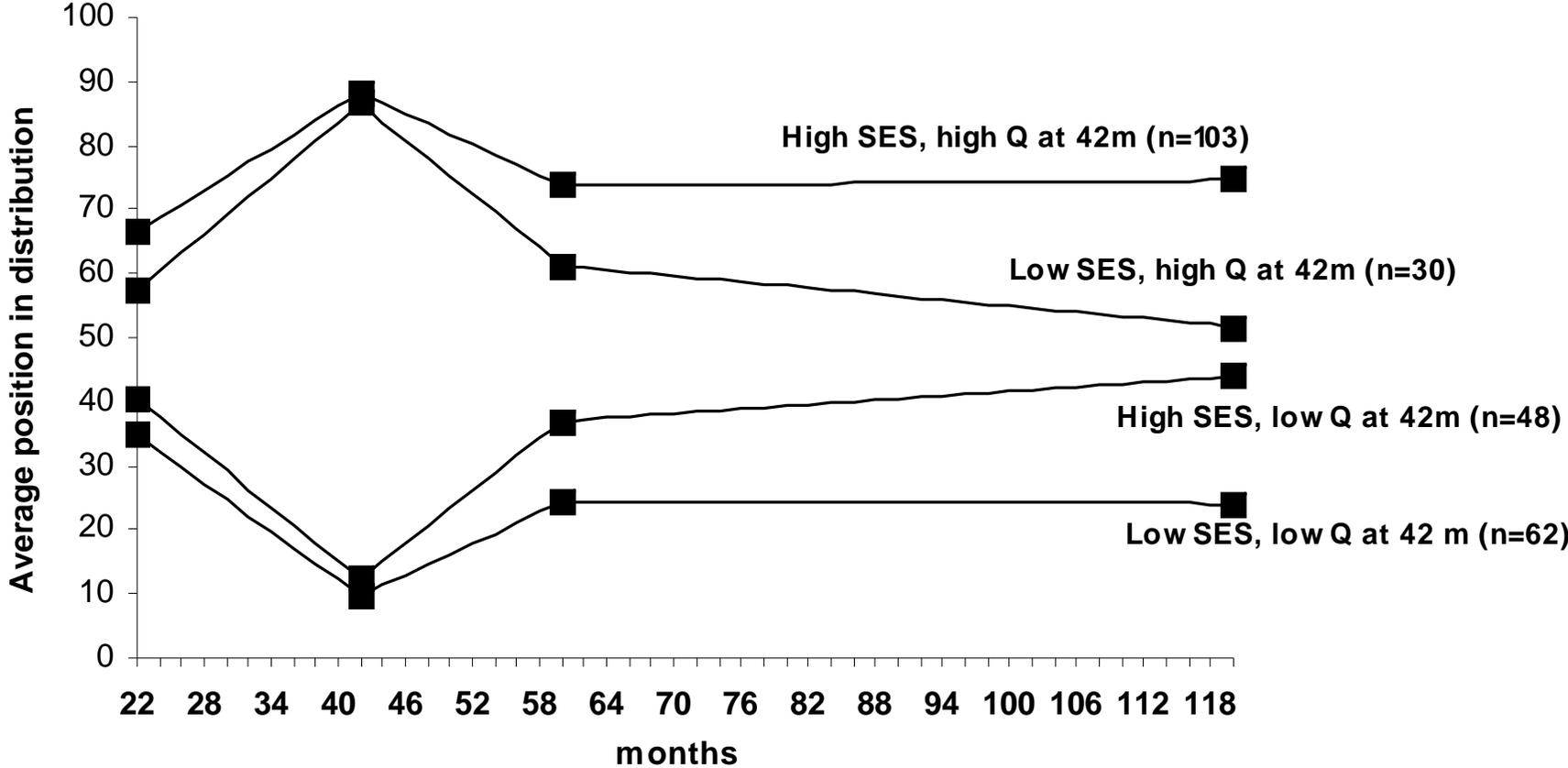
**Note: 50% omitted**

**Figure 1: Average rank of test scores at 22, 42, 60 & 120 months, by SES of parents**



UNCLASSIFIED

Figure 3: Average rank of test scores at 22, 42, 60 & 120 months, by SES of parents and 42 month rank



# **1. The instability of groups between 22m and 42m in Fig 2 is evidence of regression to the mean between those ages**

- Measurement error and mis-classification bias generate “regression to the mean” between 22m and 42m
- Developmental emergence (Sameroff, Vygotsky, Erikson, Cunha) is also occurring.
- 22m and 42m data in the form of Fig 2 is not robust for analysis of differences in subsequent “trajectories” of social groups.
- But r2m cannot explain changes between 42 months and age 10.

2. a) Able, academically successful children from working class families with ambition to do so have very good chances of maintaining their relative cognitive ability.

Jerrim & Vignoles (2011)

b) There are strong social class gradients in the UK

Cassen and Kingdon (2009); JRF (2010); Soc mob strategy stats (2011); Feinstein (OxRev, 2004)

c) The greater the wealth of the family and the greater the income inequality in the country the greater the relative, average advancement of wealthy children

Ermisch (2012) OECD (2012)

**Depends on age but all regression to the mean?**

### 3. Children cannot be classified to fixed ranks of ability

- IQ heritability grows through adulthood into old age (Neisser et al, Am Psych 1996)
- The degree of heritability will be strongly moderated by time and place (Turkheimer; Bjorklund)
- Plasticity and critical periods (Cunha & Heckman, 2009)
- These are averages and structural parameters not people!

#### 4. Ability, to the extent that it can be said to be innate, is not very socially stratified.

- Cognitive ability for the individual will include both genetic and cultural inheritance as well as person and context specific dynamic interactions of child with family, neighbourhood, culture and schooling (Cook; Duncan; Phillips; Ramey; Collins; Huston,...).
- The innate socially stratified component is even less substantial (Gintis, Bowles, Osborne estimate=0.28; Saunders=1).
- Ability is related to biology only at the level of the individual or kinship groups, not strongly for social structures like class or even race or continuous metrics like income

## 5. Early gaps in the UK in the 1970s were not big.

- The 22 month gap was small relative to that at age 10 (Fig 1). Changes between 5 and 10 had critical implications in the high stakes testing of the era.
- The gap was small relative to that in the Millennium cohort (Longview)
- Important gender differences

## Conclusions. 1. Stats police warning

- Able, successful working class children do thrive
- There is considerable error in the early years data and in all test scores
- Avoid the strong, literal over-interpretation of Fig 2. Remember these are averages!

# Conclusions. 2. Re new work

- Incredible new data coming in the Birth Cohort Study
- Links to 22m and 42m coding
  - Importance of addressing sample selection of 22/42m data in any further work on 1970 cohort
  - The crossover is not fundamentally about extreme groups. The effect runs right through the distribution
  - Moderation of pathways to achievement by SES and gender
  - Correlation of 2<sup>nd</sup> factor and adult social exclusion
  - Use of mother report and age of interview as instruments
- Meta-analytic, multi-level, comparative approach required.