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Full Length Article

Response: Issues surrounding Effectively Maintained Inequality and educational transitions

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In my SSR paper, I argue that Lucas's theory of Effectively Maintained Inequality (EMI) provides an inadequate account of school and post-school transitions in Australia (Marks, 2013). It is inadequate for several reasons. First, it focuses almost exclusively on socioeconomic background which has only weak effects on within school transitions and only a moderate impact on the post-school transition. Second, it ignores of the role of cognitive ability which clearly has a stronger impact than socioeconomic background for these transitions. Finally, EMI ignores other factors that are relevant to within-school educational differentiation (subject choice or curriculum placement) most notably student interests. Let's be clear what my paper is not arguing. I do not deny that that there are effects of socioeconomic background on school and post-school transitions. I demonstrate that its impact is not strong as EMI suggests.

Lucas's (2014) response is that cognitive ability cannot be measured; test scores are not measures of cognitive ability. They are only included in his analyses to provide statistical leverage and they have no theoretical status in EMI. Although EMI is a theory about education transitions, EMI is "silent" on the relative magnitude of factors that affect these transitions.[1] The effects of other factors are "irrelevant". Finally, my evaluation of EMI was "incorrect" since there are correct and incorrect tests of EMI. I must point out that nowhere in his response does Lucas criticize the statistical procedures or measures I use; or argues that the parameter estimates are incorrect.

1. Cognitive ability

It is well established that cognitive ability is an important human trait, well measured by cognitive tests, basically unidimensional, normally distributed, very stable over the life-course and has a sizable genetic component. In my book *Education, Social Background and Cognitive Ability*, I review the extensive literature on its conceptualization and measurement and its relationships with a variety of educational outcomes (Marks, 2014, pp. 50–67).

Mainstream psychology accepts the concept and its measurement. Examples are Gottfredson's (1997) "Mainstream Science on Intelligence" response outlining "conclusions regarded as mainstream among researchers on intelligence" which was co-signed with 52 prominent signatories from academia. Similarly, Neisser et al.'s (1996) "Intelligence: Knowns and Unknowns", published in the *American Psychologist*, had 11 co-authors. Subsequent research generally reiterates the conclusions and summary statements contained in these two publications (Deary, 2012; Gottfredson, 2008, 2016; Jensen, 1998, pp. 105–136). For well-reasoned discussions about cognitive ability by sociologists see Kingston's (2006) *How Meritocratic is the United States?* and Nielsen's (1995a, 1995b) reviews relating to responses to *The Bell Curve*.

There is no way that psychology supports Lucas's assertion that "ability is unmeasurable". High correlations between test scores and standard psychometric measures of ability *are* evidence that test scores in achievement tests are a manifestation of students' cognitive ability. The logic of modern test theory is that the probability of a student correctly answering a particular test item is a function of student *ability* and the difficulty of the item. Nobody claims that test scores are perfect measures of ability and like height and weight, which have larger genetic components, the environment can and does play a role. There is no reason to reject the concept because there are measurement issues. There are also measurement issues with income, wealth, social class, marital satisfaction, happiness, etc. Gottfredson (2008, p. 554) points out that no other concept in the

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[1] Lucas mentions the 'horse race' (i.e. the relative importance of cognitive ability and socioeconomic background) several times. I reiterate the point I made in the original article that the relative magnitude of influences is important theoretically and for policy. The "horse race" issue is discussed more extensively in my book (Marks, 2014, pp. 70–71).

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social and behavioral sciences is as well-established in terms of construct and predictive validity as cognitive ability. In a critique of *The Bell Curve*, Heckman (1996, p. 1011) points out that psychometrics is not a fraud and cognitive testing (and *g* derived from such tests) predict productivity in schools and society at large. Extensive research has concluded that are not substantial biases in mental testing (Brown et al., 1999; Reynolds and Ramsay, 2003). Test scores predict outcomes equally well for different social groups and social group differences are larger for fluid intelligence (which has minimal content knowledge) than crystallized intelligence. Brown et al. (1999, p. 208) conclude that "empirical research to date consistently finds that standardized cognitive tests are not biased in terms of predictive and construct validity" It is Lucas, not me who ignores the pertinent academic literature.

In addition, prominent studies in both sociology and education have used test scores as measures of ability. The Wisconsin model used test scores to measure ability (Duncan et al., 1972; Hauser, 2010; Hauser and Daymont, 1977; Sewell and Hauser, 1975). Jencks et al. (1979, 1972) had no hesitation in focusing on test scores in chapters entitled "Inequality in Cognitive Skills" and "The Effects of Academic Ability". In the UK birth cohort studies, test scores are frequently used as measures of ability (Breen and Goldthorpe, 2001; Bukodi et al., 2014; Connelly, 2012; Saunders, 2010).

Finally, if students' tests scores is not a manifestation of cognitive ability, what are they? They are clearly not simply a reflection of socioeconomic status and social background, nor do they emerge *de novo* for each cohort of school students. Lucas's admits that grades and test scores matter for transitions, but are only used to identify the model. Surely, their importance to transitions requires a theoretical rationale which is absent from EMI. In one publication, Lucas (2009, p. 507) contends that the task of theory is to understand how high-origin, middle achieving youths "deploy non-meritocratic resources to secure opportunity, and thus may crowd deserving middle origin youth out of advantageous curricula". Assuming that deserving youth have enough merit to pursue higher-level educational pathways, how can EMI address this question if the main component of merit, cognitive ability, is rejected both theoretically and conceptually *a priori*?[2]

2. Evaluating EMI

It seems that according to Lucas the only relevant test of EMI (for analyses of single datasets) is diverting trajectories for socioeconomically advantaged and disadvantaged socioeconomic groups. If there are diverting trajectories then EMI is confirmed. I have no hesitation in agreeing that socioeconomic background has a small impact on educational trajectories, net of ability and other influences. (How to interpret its impact, is another matter.) The impact of socioeconomic background on curricula placement, school track, streaming, dropping out of school and educational transitions is well-established (Alexander et al., 1978; Mare, 1980; Rumberger, 1995). However, ability is usually found to be much more important in a range of countries (Alexander and Cook, 1982, p. 631; Davies et al., 2008, p. 241; Jæger, 2009, p. 1960; Jones et al., 1995; Resh, 1998, pp. 416,425; Thomas et al., 1979; Vrooman and Dronkers, 1986). Mare (1980, p. 303) included a measure of ability in his initial paper on educational transitions. It had powerful effects on the early school career transitions. Recently, Korthals and Dronkers's (2016) study of 185,000 students in 31 countries concluded that equality of opportunity is best provided for in a system with a high number of tracks combined with schools which always consider prior performance which they authors define as an important measure of observed student ability.

The reader is informed by Lucas that testing EMI involves the calculation of predicted values to uncover divergent trajectories. This is exactly what I did. I even made the same point that Lucas makes, that interpreting the coefficients directly can be misleading for middle categories. And yes, I did calculate predicted probabilities on central values.[3] I did not choose the predicted values for the most desirable results as Lucas implies. As the reader can see from Table 9 in the original paper (Marks, 2013), I calculated predicted values based on a matrix of high, middle and low values for socioeconomic background and ability. I did not simply ignore the main results as Lucas claimed.

The calculation of predicted values confirms that the influence of socioeconomic background is not large. The predicted probabilities for the within-school transitions which Lucas criticizes me for not presenting show much smaller gaps than for the post-school transition (Table A in his response). Controlling for test scores, Lucas calculated a 6 percentage point difference (in probabilities) between high and low socioeconomic background students taking the higher level mathematics courses for the transition to Year 11 (0.49, 0.43) and a 7 and 4 percentage difference in the transition to Year 12 for the higher level mathematics (0.32, 0.25) and for not higher level math but still at school category (0.57, 0.61).There are differences in trajectories by socioeconomic background but these differences in predicted probabilities are not particularly large given that the comparisons are between students two standard deviations apart on the socioeconomic background measure. They are much smaller than comparable differences on the ability measure. For the post-school transition, there are only very minimal socioeconomic background differences when controlling for university entrance performance (Cardak and Ryan, 2009; Marks and McMillan, 2007).

[2] The classic measure of merit as ability plus effort is from Young (2004, p. xiii) in his meritocracy fable. Also see Saunders (2010) who includes measures of effort in his discussions.

[3] I tend to disagree with Lucas that predicted probabilities should be calculated on central values. Decisions on what values to use to calculate predicted probabilities are essentially arbitrary. The number of possible combinations of values on the predictor variables used to calculate predicted probabilities is almost limitless. What is important is to ensure that the predicted probabilities are based on actually observed and realistic values. For example, very few students with mean test scores gained entry to elite university courses. The predicted values Lucas and I calculate tend to be over-estimates compared with the actual probabilities.

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