

## Fairness, and the entrance examinations

In a previous letter<sup>1</sup>, I had argued that ‘merit’ is multidimensional and cannot be measured by a single exam as this often favours privileged groups. We are now in a regime that is moving away from a single examination (as the Joint Entrance Examination (JEE) to the Indian Institutes of Technology (IITs), or the AIEEE exams used to be) to one where a mix of entrance examination and class XII board marks will be used. This year (JEE 2013), the NIT system will prepare a merit list that uses a formula that combines 40% weightage for performance in class XII board marks normalized on percentile basis and the remainder based on a 60% weightage for performance from the actual all-India JEE main examination. Board examinations are different in character from the highly competitive and often speeded-up entrance tests in that the former usually

assesses long-term scholastic preparation, achievement and application, while the latter tends to end up as a measure of intrinsic ability and aptitude. This year, the entrance test will be conducted by CBSE, presumably on the CBSE syllabus, and will therefore doubly benefit CBSE students (and boards like the CISCE which are closest to CBSE standards). In this sense, fairness cannot be assured for candidates from other boards, many of them less fortunate as their syllabi will be less ambitious and school teaching facilities and teaching standards found wanting in comparison to CBSE schools.

We can quantitatively test this by developing an indicator for fairness and using it on raw data from the Engineering Entrance Examination (EEE) conducted by Kerala in 2009. Table 1 shows that 96,648 candidates appeared for the

entrance examination. We also see a board-wise disaggregation. We focus attention on the top 1000 ranks. The CBSE stream, which had 18.7% of the candidates, accounted for 54.0% of the top ranks. The ISCE stream (CISCE board) actually did better – with 1.6% of the candidates, they collected 6.2% of the top 1000 ranks. In comparison, the Higher Secondary (HSE) and Vocational Higher Secondary (VHSE) streams for Kerala and outside Kerala were considerably disadvantaged.

We shall now try to quantify the degree of fairness (or unfairness) using the quantity–quality–quasity and energy–exergy–entropy paradigm<sup>2,3</sup>. Table 2 shows a spread-sheet which reveals that a CBSE/CISCE student is six times more likely to get a top rank in the entrance test than a non-CBSE/CISCE student. The ratio  $\eta = X/E$  serves as an indicator for fairness (0 for absolute unfairness, where all top ranks go to one board, to 1 for absolute fairness, where all positions are equitably distributed across boards).

I have always believed that the ‘best’ in any one socially cohesive group cannot be significantly cleverer than the corresponding cohort from another group. The Kerala EEE 2009 clearly shows that the CBSE and like-minded boards have a huge advantage and an unintended consequence is that this favours a privileged group. It is time that we moved away from this narrow definition of ‘merit’, to a more inclusive one based on ‘fairness’.

**Table 1.** Results of the Engineering Entrance Examination (EEE) of Kerala in 2009

Board	Raw	
	Top 1000	Total
VHSE – Kerala	0	1,086
Others	11	2,837
HSC – Kerala	381	72,475
HSC/VHSC – non-Kerala	6	678
AISSE (CBSE)	540	18,032
ISCE (CISCE)	62	1,540
Total	1,000	96,648

**Table 2.** Processing the results of the EEE of Kerala in 2009 using the quantity–quality–quasity and energy–exergy–entropy paradigm

Board	Raw		Processed			
	Top 1000	Total	Top 1000	Total	$q$	$X$
	Quasity	Quantity	Quasity	Quantity	Quality	Exergy
CBSE + CSICE	602	19,572	0.602	0.203	2.973	1.7896
REST	398	77,076	0.398	0.797	0.499	0.1986
Total	1,000	96,648	1.000	1.000	1.000	1.0000
					$X =$	1.0000
					$E =$	1.9882
					$\eta =$	0.5030

1. Prathap, G., *Curr. Sci.*, 2012, **103**, 869–870.
2. Prathap, G., *Scientometrics*, 2011, **87**, 515–524.
3. Prathap, G., *Scientometrics*, 2011, **88**, 555–562.

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