Report: Bye Selection Method for the 2006 EIWA Wrestling Tournament

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Summary

The new method for selecting byes worked well. There were no difficulties in implementation, and the method distributed byes in a reasonable manner among the teams. In contrast, the old method would have produced a very unbalanced draw.

Seed and Bye Data

Table 1 summarizes the seed and bye data for the 2006 tournament. Except for the 'byes expected' column, the entries are self-explanatory. Lehigh's expected number of byes was 4.125. This means that if a very large number of random draws were conducted, then the average number of byes for Lehigh would be 4.125. The actual number of byes received by Lehigh (5) is thus entirely reasonable. In fact, for 11 teams the number of byes actually received differed by less than 1.00 from the number expected. This is the type of situation the new bye selection method strives to achieve.

byes received	byes expected	team	seeds
5	4.125	Lehigh	10
4	4.125	Navy	10
4	3.75	Penn	9
3	3.75	Cornell	9
3	3.625	Army	9
5	2.875	American	7
3	2.125	Harvard	5
1	2.125	Columbia	5
2	2.125	ESU	5
2	2.000	Brown	5
1	1.625	Rutgers	4
0	0.375	F&M	1
0	0.375	Princeton	1
33 total	33.000	EIWA	80

Table 1: Seeds and bye data for the 2006 EIWA tournament

[1]This report summarizes the results of the author's own investigations; no endorsement by the Navy wrestling program or coaches is implied or intended.

What Would Have Happened if ...?

What would have happened if we had used the old bye selection method instead? Recall that the new method makes a complete random draw and then uses a mathematical formula to compute a penalty for the draw. The penalty measures the overall imbalance of the bye distribution among all the teams. Larger penalties are undesirable. If the penalty of the draw exceeds a pre-determined cut-off, then that draw is rejected, and an entirely new random draw is selected. This year, four complete complete draws were rejected before an acceptable one was produced—the one actually used in the tournament. The old method would have simply accepted the first random draw. Table 2 summarizes the data for that rejected draw.

byes received	byes expected	team	seeds
1	4.125	Lehigh	10
5	4.125	Navy	10
6	3.75	Penn	9
5	3.75	Cornell	9
7	3.625	Army	9
1	2.875	American	7
1	2.125	Harvard	5
1	2.125	Columbia	5
3	2.125	ESU	5
2	2.000	Brown	5
0	1.625	Rutgers	4
0	0.375	F&M	1
1	0.375	Princeton	1
33 total	33.000	EIWA	80

Table 2: The first rejected draw for the 2006 tournament

It is clear from Table 2 that the new method averted a very unbalanced draw. The discrepancies between the byes received and byes expected are striking; the discrepancies are greater than 1.0 for 8 of the 13 teams. Table 2 represents the type of draw we want to avoid. The other three rejected draws had similar but less pronounced imbalances. Data for those three rejected draws are available on request.

Why Couldn't We Just ...?

Why couldn't we simply decree that the five teams with 9 or 10 seeds each get 4 byes—to guarantee bye-parity among the top teams? Such quota methods are unacceptable because they are unfair to individual wrestlers; in some weight classes the probability of a getting bye would rise above 40% for some seeds and dip below 35% for other seeds. (The exact values are difficult to compute mathematically.) However, the seeded wrestlers within each weight class deserve the same chance of receiving byes since they are competing with one another for tournament placements and NCAA berths. The new method of selecting byes shifts the bye probabilities negligibly from the ideal (37.5% = 3-out-of-8 for 3-bye weight classes) while greatly improving the balance of byes among the teams.