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Mathematical Scheme for Selecting All-Time Alphabet Test Cricket Teams

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Abstract :

A common theme in Cricket literature has been to select all-time cricket teams of various cricketing nations, or even of the world. In this paper, we select all-time alphabet teams from Test cricketers who had retired by 2021. This selection is aided by the 100 cricketers who have been inducted into cricket's Hall-of-Fame at this time. It is found that there are 11 Hall-of-Famers with surname beginning with M, followed by 10 with surname beginning with G, and 9 each with surnames beginning with B and H. Mathematical schemes to rank the batting and bowling strength of a team are developed; and an all-round index reflecting their overall strength is defined. It was found that as for batting strength, the B-team came first, followed by the H-team, G-team and M-team in that order. In the bowling department, the M-team came first, followed by the H-team, B-team and G-team in that order. In overall strength, it was B-team in the first place followed by the H-team, G-team and M-team respectively. Much of the B-team's strength is traced to Don Bradman, the most improbable athlete in all sports, who is situated at 4.4 standard deviations above the mean in the normal distribution curve.

Introduction :

The ***game of Cricket*** is unsurpassed in terms of statistical categories recorded and easily leads all sports in terms of books and articles published on it. A common theme in cricket literature has been to select all-time cricket teams of various cricketing nations, or even of the world. A few years ago, the author of this paper ventured to select the ***All-time Alphabet cricket teams*** from the greatest players in history who had retired by then [1]. The selections were largely made from the 50 original cricketers who were inducted into Cricket's ***Hall of Fame*** (HOF) [2]. With 8 HOF inductees each to choose from, the ***All-time B-team*** and the ***All-time H-team*** were easily assembled and determined to be the best [1]. The 8 Hall-of-Famers were picked first, and then the remaining 3 players were chosen on merit (based on player statistics easily accessible on the internet, e.g., [3]) to complete an alphabet team. It was found that the B-team was superior in batting whereas the H-team was stronger in the bowling department. It was argued that since great batting alone can ensure a draw but cannot ensure victory whereas great bowling can ensure the latter, the H-team was deemed to have a slight advantage over the B-team [1]. Since the original study, the HOF has now grown to over 100 players due to the addition of new inductees every year [2]. Thus, it is time to re-examine the question if the original B- and H-teams are still the greatest or if there are other alphabet teams to mount challenge to them. In this paper, we will identify the new alphabet-team contenders and develop mathematical schemes to rank them in order.

The Alphabet-Team Contenders :

As is the customary practice, a team XI consists of the following: (1) **2 opening batsmen**; (2) **3 middle-order specialist batsmen**; (3) **1 all rounder** who excels with both bat and ball; (4) **1 wicketkeeper** or **wicketkeeper-batsman** (denoted by †) and (5) **4 specialist bowlers**, of whom at least **2 are fast bowlers**, and at least **1 is a spinner**. Finally, a **captain** (denoted by *) is selected from the XI to lead the team. The original B-team consisted of: Boycott, Barlow, Bradman*, Border, Barrington, Botham, Bailey, Benaud, Bari†, Bedser and Barnes; and the H-team comprised Hobbs, Hutton*, Hammond, Headley, Harvey, Hazare, Healy†, Hadlee, Hall, Holding and Heine [1]. As of 2021, the number of Hall-of-Famers for both the B- and H-teams has risen from 8 to 9 [2], which require potential

modifications for both teams. But more importantly, the number of HOF players whose surnames begin with the letter M now stands at 11 and those whose surnames begin with G stands at 10, surpassing those of the B- and H-teams [2]. So, will the All-time G- and M-teams challenge the supremacies of the H- and B-teams? To answer this question, we search for modifications to the H- and B-teams, if any, in light of the new retirees or inductees to the HOF and also assemble the G- and M-teams.

The Revised B-Team : The new Hall-of-Famer Bedi is unable to unseat Benaud as the specialist spinner because of the latter's better batting and bowling figures. However, Boucher, a great wicketkeeper batsman, who is retired but not inducted into the HOF yet, easily replaces Bari at the wicketkeeper position. The revised B-team with relevant batting and bowling statistics appears in Table I. Axiomatically; Don Bradman is the captain of this team.

The Revised H-Team : The new Hall-of-Famer Haynes unable to replace either Hobbs or Hutton as an opener. However, Hussey, a certain future Hall-of-Famer, who has retired is able to replace Hazare from the batting order. Also, Herath, another future Hall-of-Famer candidate is chosen at the expense of Heine to include a spinning option to the H-team. The new H-team with relevant batting and bowling statistics appears in Table II. Len Hutton is chosen to lead this team.

The New G-Team : Out of the 10 Hall-of-Famers with surnames beginning with G, 8 walk into the team uncontested. With 3 openers in the list, Gooch becomes the first casualty. WG Grace, the greatest batsman of his time is the other. Even though his batting average (32.29) may well have been worth much more under today's playing conditions, his inclusion becomes mathematically problematic. Ganguly, Greig and Gillespie round up the 3 remaining positions. The G-team with the batting and bowling figures of the players are shown in Table III. Sunil Gavaskar gets the captain's duties.

The New M-Team : Quite accidentally, there is no conflict in the regular batting orders amongst the 11 Hall-of-Famers whose surnames begin with the letter M. Thus, they all walk into the M-team uncontested. Additionally, they have the luxury of having 2 all-rounders in the team. The M-Team with the relevant statistics appears in Table IV. It is led by Javed Miandad.

Mathematical Scheme for Merits of Alphabet Teams :

The game cricket is primarily a struggle between the batsmen and bowlers of the opposite teams. In order to quantify the merits of a cricket team, one needs to determine the batting and bowling strengths of that team. For that, the batting and bowling strengths of the individual players have to be determined first. The common attributes to the quality of a batsman are the **total runs scored, centuries made** and the **batting average**. Amongst these, the first two are **extensive quantities** which depend upon the number of innings batted. The batting average, on the other hand, is an **intensive quantity**, which is independent of the number of innings batted. It is therefore a better indicator of quality of the batsman. If R is the total runs scored by a batsman in say Test cricket and D is the number of times dismissed, then the batting average of the batsman α is defined as:

$$\alpha = \frac{R}{D} \tag{1}$$

On the other hand, the quality of a bowler is commonly measured by the **total wickets captured** by the bowler in Test cricket and the **bowling average**. Here, the total wicket captured depends upon the number of overs bowled in say Test cricket, which therefore is an extensive quantity. The bowling average, on the other hand, is an intensive quantity which better reflects the quality of the bowler. If r is the total runs conceded by a bowler and W is the total number of wickets captured, then the bowling average of a bowler β is defined as:

$$\beta = \frac{r}{W} \tag{2}$$

In order to determine the batting strengths of a team, the **weighted mean batting average** A was defined as the total number of Test runs made by all batsmen ΣR divided by the total number of dismissals ΣD [1]:

$$A = \frac{\Sigma R}{\Sigma D} \tag{3}$$

where the summations run from 1 to 11.

Likewise, bowling strength of a team was determined by the **weighted mean bowling average** B, which was the total number of Test runs conceded by the main bowlers of the team Σr divided by the total number of wickets captured ΣW [1]:

$$B = \frac{\Sigma r}{\Sigma W} \tag{4}$$

where the summations pertain to the specialist bowlers and all-rounder(s) of the team.

It must be emphasized that the batting average is a **direct quantity**: the greater its value, the better the batsman is deemed to be. The bowling average, on the other hand, is an **inverse quantity**: the smaller its value, the greater is the bowler. However, the **reciprocal of the bowling average** is a direct quantity. Therefore, the product of the batting average and the reciprocal of the bowling average is another direct quantity. This quantity has been used as an indicator of the greatness of an all-rounder in cricket [4-5]:

$$\gamma = (\alpha)\left(\frac{1}{\beta}\right) = \frac{\alpha}{\beta} \tag{5}$$

One can use the same principle to quantify the overall greatness of an alphabet-team. Using the weighted mean batting (A) and bowling averages (B) of an alphabet-team, we can define the product Γ [vide Eqs. (3) and (4)] as follows:

$$\Gamma = (A)\left(\frac{1}{B}\right) = \frac{A}{B} = \frac{\Sigma R \Sigma W}{\Sigma D \Sigma r} \tag{6}$$

This product, now named the **all-round index**, can be used as an indicator of the overall greatness of the alphabet-teams under consideration. Being dimensionless, it is a pure number.

Results and Discussion :

The batting and bowling averages of the individual players are calculated using Eqs. (1) and (2) and entered in Tables I - IV. Next, the weighted mean batting

and bowling averages of the alphabet-teams are computed using Eqs. (3) and (4) and entered in the tables. Finally, the all-round indices for our alphabet-teams are evaluated from Eq. (6) and entered in Table V.

It was found that as for batting strength, the B-team came first, followed by the H-team, G-team and M-team in that order. In the bowling department, the M-team came first, followed by the H-team, B-team and G-team in that order. Finally, in overall strength, it was the B-team (1st in batting & 3rd in bowling) in the first place followed by the H-team (2nd in both batting & bowling), G-team (3rd in batting & 4th in bowling) and M-team (4th in batting & 1st in bowling) respectively. The original B- and H-teams maintained their superiority. The newcomer G- and M-teams with more Hall-of-Famers (10 and 11 respectively) than the B- and G-teams (9 each) failed to dislodge the latter teams from their positions.

Much of the batting and overall superiority of the B-alphabet-team is traced to **Don Bradman**, who has been labelled as the most unlikely phenomenon in all of sports. His batting average of 99.94 is estimated to be 4.4 standard deviations above the mean in a normal distribution curve [6]. It is nearly double the batting averages of the batting greats like Compton (50.06) and Richards (50.23). In other words, Bradman was nearly the equivalent of two top-notch middle-order batsmen, which makes the batting order of the B-team nearly 12 players deep!

Table 1: All-Time B-Team

Player	HOF	Team	$R, \boldsymbol{R}$	$D, \boldsymbol{D}$	$\alpha, \boldsymbol{A}$	$W, \boldsymbol{W}$	$r, \boldsymbol{r}$	$\beta, \boldsymbol{B}$
Boycott	Yes	E	8,114	170	47.73			
Barlow	No	SA	2,516	55	45.75			
Bradman*	Yes	A	6,996	70	99.94			
Barrington	Yes	E	6,806	116	58.67			
Border	Yes	A	11,174	221	50.56			
Botham	Yes	E	5,200	155	33.55	383	10,877	28.40
Boucher†	No	SA	5,515	182	30.30			
Bailey	No	E	2,290	77	29.74	132	3,856	29.21
Benaud	Yes	A	2,201	90	24.46	248	6,703	27.03
Bedser	Yes	E	714	56	12.75	236	5,874	24.89
Barnes	Yes	E	242	30	8.07	189	3,105	16.43
Total			**51,768**	**1,222**	**42.36**	**1,222**	**30,415**	**25.60**

* Captain; † Wicket-keeper: 532 ct; 23 st.

Table 2: All-Time G-Team								
Player	HOF	Team	*R*, ***R***	*D*, ***D***	α, ***A***	*W*, ***W***	*r*, ***r***	β, ***B***
Gavaskar*	Yes	I	10,122	198	51.12			
Greenidge	Yes	WI	7,558	169	44.72			
Graveney	Yes	E	4,882	110	44.38			
Gower	Yes	E	8,231	186	44.25			
Ganguly	No	I	7,212	171	42.18			
Greig	No	E	3,599	89	40.44	141	4,541	32.21
Gilchrist†	Yes	A	5,570	117	47.61			
Gillespie	No	A	1,218	65	18.74	259	6,770	26.14
Garner	Yes	WI	672	54	12.44	259	5,433	20.98
Grimmett	Yes	A	557	40	13.92	216	5,231	24.22
Gibbs	Yes	WI	488	70	6.97	309	8,989	29.09
Total			**50,109**	**1,269**	**39.49**	**1,184**	**30,964**	**26.15**
* Captain; † Wicket-keeper: 379 ct; 37 st.								

Table 3: All-Time H-Team								
Player	HOF	Team	*R*, ***R***	*D*, ***D***	α, ***A***	*W*, ***W***	*r*, ***r***	β, ***B***
Hobbs	Yes	E	5,410	95	56.95			
Hutton*	Yes	E	6,971	123	56.67			
Hammond	Yes	E	7,249	124	58.46			
Headley	Yes	WI	2,190	36	60.83			
Hussey	No	A	6,235	121	51.53			
Harvey	Yes	A	6,149	127	48.42			
Healy†	No	A	4,356	159	27.40			
Hadlee	Yes	NZ	3,124	115	27.17	431	9,607	22.29
Hall	Yes	WI	818	52	15.73	192	5,066	26.39
Herath	No	SL	1,699	117	14.52	433	12,157	28.08
Holding	Yes	WI	910	66	13.79	249	5,896	23.68
Total			**45,111**	**1,135**	**39.75**	**1,305**	**32,726**	**25.08**
* Captain; † Wicket-keeper: 366ct; 29st.								

Table 4: All-Time M-Team								
Player	HOF	Team	$R, \boldsymbol{R}$	$D, \boldsymbol{D}$	$\alpha, \boldsymbol{A}$	$W, \boldsymbol{W}$	$r, \boldsymbol{r}$	$\beta, \boldsymbol{B}$
Morris	Yes	A	3,533	76	46.49			
Hanif Md.	Yes	P	3,915	89	43.99			
May	Yes	E	4,537	97	46.77			
Miandad*	Yes	P	8,832	168	52.57			
McCabe	Yes	A	2,748	57	48.21			
Miller	Yes	A	2,958	80	36.98	170	3,906	22.98
Mankad	Yes	I	2,109	67	31.48	162	5,236	32.32
Marsh†	Yes	A	3,633	137	26.52			
Marshall	Yes	WI	1,810	96	18.85	376	7,876	20.95
Muralitharan	Yes	SL	1,261	108	11.68	800	18,180	22.72
McGrath	Yes	A	641	87	7.37	563	12,186	21.64
Total			**35,977**	**1,062**	**33.88**	**2,071**	**47,384**	**22.88**
* Captain; † Wicket-keeper: 343 ct; 12 st.								

Table 5: Relative Strengths of Alphabet Teams						
Alphabet Team	Batting Strength		Bowling Strength		Overall Strength	
	$\boldsymbol{A}$	Rank	$\boldsymbol{B}$	Rank	Γ	Rank
B-Team	**42.36**	**1**	25.60	3	**1.65**	**1**
H-Team	39.75	2	25.08	2	1.58	2
G-Team	39.49	3	26.15	4	1.51	3
M-Team	33.88	4	**22.88**	**1**	1.48	4

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