BRADMAN'S TEST AVERAGE IS 99.94: FACT OR FICTION?

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Introduction

Due mainly to the popularity of the one-day game and increased television coverage, cricket followers have been introduced to a range of very useful statistics in recent years. A player's performance, for example, can now be measured by 'strike rates' (runs scored or wickets taken by balls bowled) to demonstrate attacking batting and bowling, and runs conceded per over to demonstrate defensive bowling. As the array of worthwhile statistics is extended, it is difficult to fathom why cricket publications continue to place such great stress on batting average. As this paper shows, it is a contrived average and is seriously flawed as an accurate measure of individual performance.

The Shortcomings of Batting Average

A major weakness of batting average was ruthlessly exposed in press reports following the 1999 Cricket World Cup. Tom Moody of Australia was listed second in the batting averages with 117 from five innings in a tournament in which his aggregate of runs was also 117. South African Lance Klusener had a batting average of 140.5 and yet his highest score was only 52. Another example can be seen in the latest *Wisden.* In its list of the leading batsman in an English season by batting average, Neil Harvey had the highest average of 65.8 in 1953. Relegated to a footnote is the statement that Bill Johnston (from the same Australian team) scored a total of 102 runs for an average of 102 from seventeen innings in the same year. These examples – and there are others – do raise a number of irritating concerns. How is it possible to have a batting average almost three times greater than one's highest score? How is it possible over a series of innings to have a batting average equal to one's aggregate of runs?

The reason for these statistical absurdities is the long-standing convention that batting average is calculated on the basis of counting only completed innings. Although the actual score for a not-out innings is added to the total of runs, the innings itself is not counted when dividing the number of innings into the total number of runs to determine batting average. Therefore, batting averages are calculated by including only one innings in the denominator for Moody and Johnston, only two innings for Klusener, and all other innings were completely ignored. It follows from this that a not-out innings will exaggerate and inflate an average and undermine its usefulness as a genuine measure of a player's performance. This is unlikely to be an isolated occurrence and hardly a minor matter; it is normal over a cricket career for a batsman to accumulate a large number of not-out innings. In their

first-class careers, for example, Wilfred Rhodes had 237 not outs in 1,528 innings, Trevor Bailey had 215 from 1,072 innings and W.G. Quaife had 185 from 1,023 innings.

It is apparent that the established procedure used to calculate a batting average often gives results that are quite bizarre. Moreover, it is not at all clear what sort of batting average is really being calculated. It is certainly not a batting average for *all innings* because not-out innings are excluded from the denominator. Neither is it a batting average for *completed innings* because not-out innings are included in the numerator. It is definitely not a batting average for not-out *innings* because completed innings are included in the numerator and not-out innings are excluded from the denominator. If the essential purpose of an average 'is to represent a group of individual values in a simple and concise manner', it is not self-evident what form of average is being calculated and for which group of individual values does the current batting average act as a representative. For too long, cricket publications have presented us with a figure which is nothing but an impostor dressed up in the robes of a batting average.

It is time to replace the conventional batting average. If the customary distinction between completed innings and not-out innings is removed, batting average can be determined merely by dividing a player's total of runs by his total number of innings [call it 'real' batting average]. This offers a number of important advantages. One, the 'real' batting average follows the statistical rule that average, or arithmetic mean, is calculated by totalling the items in a set and dividing by the number of items in that set and, therefore, is simple and unambiguous. Two, by treating a not-out innings in the same way as a completed innings, it removes once and for all the possibility of inflated batting averages. Three, the 'real' batting average, by eliminating an inflated batting average, provides a more accurate measure for comparing and ranking individual batting performances. Four, the 'real' batting average more accurately reflects the contribution of batting to overall team performance than does the bloated batting average and makes it a more appropriate research tool for continuing work into aspects of selection and cricket strategy started in England and recently followed in New Zealand. Despite these advantages, the call for a change in calculating batting average has been strangely muted. Perhaps many think there is something sacrilegious in dissenting in any way with statistics produced for so long and with so much devotion by *Wisden* and other cricket almanacs.

Trying to Defend the indefensible

The main argument in defence of the traditional approach to batting average is that not-out innings simply cannot be treated as completed innings: a not-out innings is clearly not a completed innings and, as the argument goes, a not-out batsman might very well have gone on to add to his score. This view, however, runs counter to the Laws of Cricket. These Laws specify three situations in the normal course of a game where a batsman can be not out: when a team loses all its wickets and one player is left not out; when a

captain declares a team innings closed leaving one or two players not out; when a team exceeds the other's score or total of runs and the game ends usually leaving two players not out. As an adjunct to normal playing rules, it is also the case that one or two batsmen would be left as not out if a game that has started is abandoned at some time because of bad weather. In each of these examples, a team's innings formally ends and it is quite impossible for a not-out batsman to continue and, for that matter, to score more runs. It seems reasonable, therefore, to suggest that there is no difference whatsoever between a not-out innings and a completed innings, and just as reasonable to calculate the 'real' batting average by counting every innings as completed. In this case, it would mean that cricket follows the normal concept of average routinely adopted in so many other sports.

Another popular argument for maintaining the statistical *status quo* is that nothing changes by adopting the 'real' batting average. Those with the best batting averages will still remain the best, comparative rankings will hardly change, and to introduce this new type of average would be pointless, This is true, but only for Sir Donald Bradman. Although his first-class average would change from 95.14 to 88.03 and his test average would drop to 87.45 from 99.94 on the basis of 'real' batting average, nobody comes close to challenging his top ranking in both forms of the game. For others, however, the 'real' batting average does make a difference and averages and rankings can change dramatically. An excellent example of this is given in Table 1 where rankings based on the batting averages in the last Cricket World Cup are compared with rankings based on the 'real' batting averages. From the table, two things deserve comment. First, all batting averages, except in the case of Ganguly, are obviously reduced when converted to 'real' batting averages and after the 'inflationary' effect of not-out innings is removed. Although the reduction in batting average is severe in the case of Klusener and Moody (a reduction of 70 per cent and 80 per cent respectively), it is important to note that there are seven others whose batting average is reduced by between 40 and 55 percent and another two where the reduction is just over 37 percent. Secondly, there are significant shifts in rankings: the promotion of Johnson, Jadeja and Ganguly and the demotion of Moody, Klusener and Chanderpaul are the most obvious.

In fact, only two batsmen retain their previous rankings; six batsmen who were ranked in the top ten end up being ranked in the bottom ten. Contrary to those who defend the statistical *status quo,* those with the best batting averages certainly do not remain the best when adjusted to 'real' batting average and comparative rankings do change considerably. As a result of removing the perverse effect of not-out innings, the overall impact of the 'real' batting average is not likely to be minimal or inconsequential.

It might be argued, of course, that shifting to a 'real' batting average will have a greater impact on averages the fewer the number of innings. This shows in the 1999 Cricket World Cup where the number of innings was limited by the nature of the tournament and where a restricted total of innings was likely to include a number of not-out innings.

However, it is apparent in Table 2 that changes in players' averages after substituting a 'real' batting average for the conventional batting average are not negligible even when applied to performances over extended careers in first-class and test cricket. The table shows that for those 57 players with an average of at least 50 and an aggregate of not less than 10,000 runs, batting averages fall by 10 percent or more for 45 of them. Indeed, for 21 percent of them, batting averages fall by fifteen percent or more. Since the 'real' batting average reduces an inflated batting average, it is not surprising either that nearly 83 percent of this elite group fail to maintain a career batting average of 50. Although changes are less extreme at the test level, it is still the case that the majority of players' averages fall by ten percent or more, one by 21.4 percent. It is also the case that the 'real' batting average pushes 15 of the 28 test players below the coveted career average of 50.

The evidence in Table 3 confirms that very few of the established rankings remain unchanged. However, since all batting averages are reduced, interest centres not only on the degree by which rankings change but also the extent to which these changes are divided between rankings that improve and those that worsen. After substituting 'real' batting average for the conventional batting average at the first-class level, only seven players retain their present career rankings. Of the others, 40 per cent change rankings by ten or more places and six of these change by more than twenty places. Although it is evident from Table 2 that all batting averages are reduced, some are reduced much more than others. This means that some existing rankings will decline whilst others will improve. Table 3 confirms this: 27 rankings move downwards and 23 move upwards. For some players, the results are quite startling. Brian Lara, for example, moves upwards by 33 places, C.B. Fry by 28 places and Jack Hobbs by 24 places. At the other extreme, Michael Bevan moves downwards by 24 places, Steve Waugh by 19 places and Javed Miandad by 17 places, Changes at the test level are more moderate. There are players whose rankings change by between seven and nine places, but changes for the vast majority are less than this, with seven players changing by only one place and four not changing at all. Again, some rankings decline and others improve: Eddie Paynter and C.A. Davies move downwards nine places and Lara and V.G. Kambli move upwards seven places. Without doubt, injecting honesty into the traditional batting average is not a pointless and trivial exercise and outcomes can be quite different from those constantly presented in established cricket almanacs.

A Plea for Fairness

Though hardly discussed in public, the fact of the matter is that cricket statistics blatantly favour batsmen. Career batting averages will always be inflated by the number of not-out innings. As the discussion on Table 2 reveals, top batsmen remain listed in that elite group with batting averages of 50 or more but whose real performances fall short of meeting that necessary statistical requirement. Batsmen have the advantage of performance being evaluated and judged by statisticians using a measuring-rod made of elastic.

This is not the case with bowlers. Published data reports the exact number of balls bowled (even balls bowled in an uncompleted over), the number of maiden overs, runs scored from balls bowled, the number of wickets taken and the bowling average (from simply dividing runs conceded by wickets taken). This comprehensive mix of information allows actual bowling performance to be assessed on three fronts: the ratio of wickets to balls bowled is the 'strike rate' and measures attacking bowling; runs conceded per over measures defensive bowling; runs per wicket is the conventional bowling average. Unlike batting average, the three bowling measures honestly and precisely reflect on-field performance without being obscured by definitional flimflam. It is difficult to understand why a puffed up batting average has persisted for so long. The 'real' batting average, amongst other advantages, would inject that element of fairness that has been missing in procedures for judging cricket performance.

Conclusion

The idea of an average would seem to be so convenient and helpful that it is not surprising that spurious averages offering meaningless figures are calculated with almost gay abandon. To test the effectiveness of any average, people should ask themselves three questions. Is this an average of a set of figures which in a real sense constitutes a single 'family'? Will the average create a false impression? Is it possible to make reliable deductions from it? The traditional batting average fails to satisfy these three criteria. Fortunately, the 'real' batting average is available as a simple and useful alternative.

NOTES

1. *Wisden Cricketers' Almanack* (Guildford, Surrey: John Wisden & Co. Ltd.) has been published each year since 1864. As the primary source of international cricket statistics, it uses batting average (with supporting information on the number of innings, the aggregate of runs, the highest score and the total of hundreds) as the sole indicator of individual batting performance. Somewhat pedantically, the same format is consistently applied to first-class games, test matches and one-day internationals.

2. *Wisden,* 1999, pp. 198-199.

3. *Wisden,* 1999, pp. 199-201. No player with more than 25,000 runs in first-class cricket has failed to accumulate not-out innings, Gilbert Jessop had the least number with 37, followed by Peter Richardson with 41 and Sir Donald Bradman with 43. In test cricket, with fewer games, the same pattern prevails. All those scoring 2,500 or more runs in test cricket have not-out innings in their career records. About 36 percent of them had over 10 percent of their innings as not-out innings; Imran Khan had 19.8 percent, S.M.H. Kirmani had 17.7 percent and Allan Border had 16.6 percent as not-out innings (see *Wisden,* 1999, pp. 233-236).

4. M.J. Moroney, *Facts from Figures* (London: Penguin Books, 1956) pp. 34-35

5. See, for example, J.A. Schofield, 'Production Functions in the Sport Industry: An Empirical Analysis of Professional Cricket', *Applied Economics* 20 (1988), 177-193;

E.I. Bairam, J.M. Howells and G.M. Turner, 'Production Functions in Cricket: The Australian and New Zealand Experience', *Applied Economics* 22 (1990), 871-879; E. I. Bairam, J.M. Howells and G.M. Turner, 'Production Functions and the Strategy Implications for Cricket in New Zealand', *Sporting Traditions* 6 (1990), 202-217.

6. It can be taken for granted that when a game takes up its allocated time, one or two batsmen will be left as not out. The rough equivalent of this would be a team playing out its quota of 50 overs in a one-day game. Injury to a batsman is a special case. An Injured batsman might leave the field for treatment and return later to continue his innings. If serious injury means that a batsman is unable to continue, he is recorded as retired hurt. Christopher Martin-Jenkins (ed.), *The Cricketer Book of Cricket Eccentrics and Eccentric Behaviour* (Luton, Bedfordshire: Lennard Publishing, 1988), p. 45, gives the example of Abdul Aziz in the Quad-I-Azam Trophy final in the 1958-59 season who was recorded as 'retired hurt .... 0' in the first innings and as 'did not bat, dead .... 0' in the second innings.

7. Compared with players ranked second, Bradman's test average is nearly 64 percent higher than R.G. Pollock of South Africa and his first-class average is 33.6 percent higher than V.M. Merchant of India (from *Wisden,* 1999, p. 201 and p. 237). Counting not-out innings as completed innings, the 'real' batting average shows that Bradman's average is nearly 59 percent higher than Pollock and 43.2 percent higher than Merchant.

8. In the Cricket World Cup, the two finalists played the maximum of 10 innings; other teams played less. For players at the first-class level in Tables 2 and 3, the number of innings played ranged from 216 to 1,315. In test matches, the range was from 20 to 265.

9. Bradman's test average is 99.94. As it is often reported, he needed only four runs in his last innings to have scored (on average) 100 runs every time he batted for Australia. Not so. For him to have scored (on average) 100 runs every time he batted for Australia, he would have needed to score 1,004 runs in his last innings.

10. See the reported statistics in *Wisden,* 1999, pp. 369-371

Table 1: Batting Performance in the Cricket World Cup, 1999

Batsmen	Batting average & ranking		'Real' batting average & ranking	
Klusener	140.5	1	35.1	13
Moody	117.0	2	23.4	20
Jacobs	102.5	3	51.3	3
Waugh, S.	79.6	4	49.8	4
Twose	79.5	5	35.3	12
Abedin	70.0	6	35.0	14
Chanderpaul	67.0	7	33.5	15
Dravid	65.9	8	57.6	1
Hussain	64.7	9	38.8	10
Hamilton	54.3	10	43.4	6
Ganguly	54.1	11	54.1	2
Youhana	53.7	12	40.3	8
Hick	53.0	13	31.8	17
Bevan	52.8	14	33.0	16
Johnson	52.4	15	45.9	5
Kallis	50.0	16	39.0	9
Jadeja	47.5	17	40.7	7
Vadher	47.0	18	28.2	19
Tendulkar	42.2	19	36.1	11

Source: *Otago Daily Times,* 7 July 1999

Table 2: Percentage Change in Average after a Career Batting Average of 50 or more is adjusted to 'Real' Batting Average

Level	Number of Players	Percentage Change				
		0-4	5 - 9	10 - 14	15-19	20+
First Class*	57	2	10	33	11	1
Tests**	28	2	10	11	4	1

*At least 10,000 runs
** At least 20 innings
Source: *Wisden,* 1999, pp. 201-2 and p. 237.

Table 3: Change in Ranking after a Career Batting Average of 50 or more is Adjusted to 'Real' Batting Average

Level	Number of players	Direction of change	Number of places by which ranking changes							
			1-3	4-6	7-9	10-10-	13-13-	16-16-	19+	Unchanged
First Class*	57	Downwards	6	7	2	5	3	2	2	7
		Upwards	7	6	2	1	-	2	5	
Tests**	28	Downwards	8	3	2	-	-		-	4
		Upwards	4	4	3	-	-	-	-	