Statistics and the DRS

by Charles Davis

The idea of harnessing video resources to assist international cricket umpires has been around for many years, and would often be raised whenever an umpiring blunder changed the course of a Test match. The basic concept is a surprisingly old one. In 1974, Test umpire Bill Alley recalled a conversation with Syd Buller (who died in 1970), where Buller had proposed assisting umpires with television replays, which had only come into regular use in the 1960s; Alley even mentioned the use of red and green lights. There were other similar suggestions over the years.

Video assistance with run outs and stumpings was introduced in 1992, but assistance with the more contentious lbw and caught behind decisions had to await improvements in detection technology and computing power. From time to time, controversy provoked calls to extend the reach of decision review. At the SCG in 2008, Andrew Symonds was given not out in error on 30 and went on to 162; Australia won the match with seven balls to spare and took the series 2-1. Pressure for a way to correct such 'howlers' increased.

In July 2008 a new Decision Review System (DRS) was tested experimentally, for a series in Sri Lanka against India. Opinions on the success of that experiment depended on who you talked to. Of the 12 decisions that were overturned under DRS in that series, only one favoured India, which set the scene for years of resistance from India. The wider cricket world, however, was satisfied that DRS would be a helpful innovation and the system was introduced officially in Tests in November 2009.

The concept has remained fairly stable since then. In September 2013, the rules were tweaked to allow teams to 'reset' their review counts after 80 overs. In September 2016, the decision criteria were changed to widen the frame of contact between ball and stump in lbw 'OUT'

decisions. At the same time, India agreed to start using the system. (Zimbabwe has made little use of it, perhaps for financial reasons.

There have now been more than two thousand reviews in Tests. This article uses information in notes attached to ESPNCrincinfo online scorecards (up to mid-March 2017), which list all instances of DRS use. Once you get used to the terminology – ESPNcricinfo uses the word upheld to indicate that the review has been successful, i.e. the umpire's decision has been overturned – this is a most useful resource. I have used these lists, crosschecked against ball-by-ball texts, to compile a database of DRS in Tests. The ESPNcricinfo scorecards do not name the bowlers involved, but these can be looked up in the texts.

The statistics do not capture the occasional instances of teams failing to challenge a decision, when perhaps they should have, or cases of a review being needed when none were available.

With the DRS now bedded down and in use for eight years, it is worth looking for any historical changes:

DRS Year-by-Year

	matches	% over-turn	Referrals/match	overturn/match
2009	23	27%	9.0	2.4
2010	18	30%	7.4	2.2
2011	29	25%	9.7	2.4
2012	23	28%	9.3	2.7
2013	25	24%	10.4	2.5
2014	34	21%	9.2	1.9
2015	31	24%	9.7	2.3
2016	32	32%	12.6	4.0

Years indicate 12 months beginning in September, to August the following year.

Other salient points in the data:

- Of the more than 2,100 reviews, 26.2 per cent have resulted in onfield decisions being overturned.
- About 41 percent of reviews were by the batsman (that is, the initial decision was out) and 59 per cent by the bowling team.
- Batsmen do better at getting decisions overturned, with 34 per cent success, while bowling teams average about 20 percent success.
- Looking at it another way, 34 per cent of 'out' decisions are overturned if reviewed, while only 20 per cent of reviewed 'not outs' get changed.
- The main reason for this difference is the reviews of wicket-keeper catches: batsmen generally well know if they have hit the ball or not, and are likely to win when they choose to review. LBW reviews tend to be more speculative.

This all boils down to about 1.4 batting overturns, plus 1.2 bowling overturns per match, in matches where DRS has been used. These roughly balance out; fears that the system would bring a surge in the frequency of dismissals have not been borne out.

The 2013 change, allowing challenges to be reset after 80 over, had some effect. The number of challenges increased slightly, and the success rate dropped by 10-15 per cent; the number of decisions over-turned per match changed slightly (about 5 per cent). In September 2016, the decision criteria were changed to widen the frame of contact between ball and stump in lbw 'OUT' decisions. There have now been more than 30 Tests with this change, and it would appear, so far, that the effect has been to increase both the number of referrals per match and the number of decisions overturned.

Patterns in the DRS

- About 74 per cent of referrals are for lbw, and 18 per cent for catches behind. The rest are for catches elsewhere, notably at

short leg, while a small number are indeterminate (from the text descriptions).

- The overturn rate is only 22 per cent for lbws, as against 40 per cent for caught behind, which reflects the complexity of the lbw law. It is interesting to consider how uncertain, and very often wrong, bowlers can be about lbw, even for vociferous appeals.

A feature of lbw reviews is the 'umpire's call'; in cases where DRS tracking is considered marginal, with only part of the ball striking the stumps, the decision reverts to the onfield umpire and his original call. Normally, if the various other conditions are met, you would think that a ball shown to be striking the stumps should be called out, but in such cases a margin for error in the ball tracking comes into play. Since 2012, approximately one-third of lbw reviews have come down to umpire's call (relying on Cricinfo's text descriptions here, so there may be some uncertainty), which means that the decision would have been upheld even if the opposite decision had been made. When umpire's call is not invoked, the overturn rate for lbw decisions rises to 27 per cent.

There is a pattern to the use of DRS in longer innings (more than 100 overs). Through the first 60 overs, the rate of use is fairly constant, but then the incidence rises by about one-third between overs 70 and 80 (as teams begin to anticipate the reset of the count), and rises sharply again after the 80-over mark, when new reviews become available. The use of DRS between overs 80 and 90 is near double that seen before over 70. After over 90, the rate declines again to some extent, but remains elevated; by this stage, many innings are into the tailend and potential DRS incidents increase.

A popular topic among commentators and in chat rooms is the strategy and effectiveness of various teams in using the DRS. The following table compares the overall success of the teams: remember that a high percentage of overturns indicates better use of the system.

DRS Success Rates by Team: % Umpire's Decisions Overturned (2009-2017)

	Overall	Batting	Bowling
*Zimbabwe**	*34%*	*37%*	*29%*
*India**	*30%*	*60%*	*18%*
Australia	29%	36%	24%
South Africa	28%	36%	23%
England	27%	34%	23%
*Bangladesh**	*27%*	*43%*	*16%*
Sri Lanka	25%	36%	19%
New Zealand	25%	36%	18%
Pakistan	23%	29%	19%
West Indies	23%	30%	17%

These teams have made limited use of DRS to date. Sample size is small and possibly unreliable.

The success rates of teams, by this measure, have been broadly consistent through the history of DRS. When I first did this analysis in 2013, Australia was top and West Indies was last, but the spread of results was greater. West Indies is still last, but has improved their success from 21 per cent to 23 per cent since 2013, while Australia, while still leading among the nations that have used DRS widely, has come down from 31 per cent to 29 per cent. England has fallen from 29.5 per cent to 27 per cent. South Africa has improved while New Zealand has declined, both by about two percentage points.

Individual Batsmen
The batsman who has been subject to the most reviews is Misbah-ul-Haq with 41, followed by Alastair Cook with 39 and Younis Khan on 37. Some players acquire, fairly or otherwise, a reputation for overuse of the review system. Some – often the same players – seem to attract lots of reviews; perhaps it is more interesting to look at reviews initiated by the batsmen themselves.

Most Reviews by Batsmen

	Batting reviews	Success
Misbah-ul-Haq	18	28%
Younis Khan	17	41%
AN Cook	15	47%
BB McCullum	15	27%
SPD Smith	13	38%
SCJ Broad	13	31%
Azhar Ali	13	46%
HMRKB Herath	13	38%
JE Root	12	33%
AB de Villiers	12	50%
SR Watson	12	33%

Bear in mind that the average success rate for batting reviews is 34 per cent, so anyone with a higher percentage is making good use of the system. One player with a 'reputation' was Shane Watson, but he did manage to get four out of twelve decisions overturned, and his success rate was almost exactly average. In the long run, he did not overuse the system.

When it comes to batsmen subjected to bowling reviews, Cook (24) and Misbah (23) were again the most reviewed batsmen, followed by Younis Khan and Joe Root on 20. Younis is notable in that only two out of his 20 bowling reviews were overturned; that is, he was out only 10 per cent of the time. Similarly, AB de Villiers has faced many unsuccessful bowling reviews, with only two overturns out of 17. The average rate is 21%. Being given out after a decision is overturned must be a rotten experience: the most for any batsman is five, to Joe Root, Steve Smith, Graeme Smith, Mike Hussey, and Jimmy Anderson. At the other end of the scale, Dimuth Karunaratne was subjected to eleven bowling reviews, but none were overturned.

Younis Khan could be considered a leading batting beneficiary of DRS. Seven decisions have been overturned in his favour, with only two against, a balance of +5. There is one other batsman with a similar balance: Marlon Samuels has been successful in five out of eight batting reviews, and has never lost out in the eight bowling reviews against him.

Individual Bowlers

When it comes to bowlers, three names crop up well ahead of the rest. Rangana Herath is on 104 reviews, Jimmy Anderson is on 77 reviews, and Graham Swann on 68. Stuart Broad is next on 56. In this case it is probably more interesting to focus on bowling team reviews. It should be borne in mind that bowling reviews are usually group decisions, involving captains, wicketkeepers and others, and should not always be blamed solely on the bowler if unsuccessful.

Most Bowling Reviews

Bowler	Bowling reviews	Success
HMRKB Herath	60	20%
JM Anderson	46	20%
TA Boult	35	26%
M Morkel	34	18%
VD Philander	32	22%
SCJ Broad	31	29%
GP Swann	30	30%
NM Lyon	30	10%
TG Southee	29	21%
Saeed Ajmal	27	19%
MM Ali	27	15%
PM Siddle	23	30%
Yasir Shah	22	9%
MG Johnson	20	15%
KAJ Roach	20	25%

DW Steyn	18	39%
Zulfiqar Babar	18	28%

The typical success rate is 20 per cent; anyone with a higher percentage is picking their reviews well. Stuart Broad is evidently more selective about his challenges than Jimmy Anderson. Both bowlers have managed nine overturned decisions, but Anderson has made 37 failed challenges to Broad's 22.

Anderson leads in an unwanted stat: 20 times he has seen a batsman given out, only to have the decision overturned. Herath is next on 14, with Swann on 11. Anderson's nine successful bowling reviews gives him a net loss of eleven wickets. He is the only bowler in double figures.

Some notable figures in the table are the low success rate for Nathan Lyon (10 percent) and the very high success rate for Dale Steyn (39%). Lyon had only one decision overturned out of his first 25 challenges – he has since had two more. Steyn, in addition to being arguably the best bowler of recent times, is also the most clear-eyed, with a success rate much higher than anyone else in the Top 20. Not only does he get wickets with a high proportions of his challenges, but Steyn also sees 46 per cent of his appeals given out (mostly without challenge), the highest success rate among bowlers this century (shared with Glen McGrath).

Looking at bowlers further down the list, the bowler with best review success – perhaps ironically – is the sometimes-maligned Shane Watson, who made only eight challenges as a bowler but had five decisions overturned. Less successful is Taijul Islam, with no decisions overturned out of nine challenges to date.

The Umpires
It may not be fair to dwell on this subject too much, but the data does say something about the number of decisions from individual umpires

that are being overturned. Perhaps the most striking thing about the following table is how closely spaced the rankings of the umpires are. Most of the elite panel umpires are very close.

Decisions Overturned: Individual Umpires

	Reviews/Test	% over-turned
Asad Rauf	3.95	22.8%
RA Kettleborough	4.82	23.0%
NJ Llong	4.83	23.0%
BNJ Oxenford	5.78	23.3%
Aleem Dar	4.07	23.5%
BF Bowden	5.80	25.0%
IJ Gould	4.29	25.0%
M Erasmus	4.79	25.2%
RJ Tucker	3.97	25.2%
SJ Davis	4.43	25.5%
HDPK Dharmasena	5.39	25.8%
S Ravi	6.53	25.8%

A year or two ago, Richard Kettleborough led this table. He has come back to the field, but is still one of the top performers. A couple of other current umpires (Gaffaney and Reiffel) are closer to 30%. Asad Rauf attracts fewer reviews per Test (3.95) than the others, possibly a sign of the respect from the players that his decisions attract.

Conclusions
For all the statistics, the larger question of whether DRS enhances the game remains, I suppose, a matter of opinion. A much-quoted rationale for its use is to eliminate the 'howler', the blatantly poor decisions that could change the course of a match. This can be judged a success, although one thing suggested by examining thousands of reviews is that true howlers are rather rare (and probably have been

since the introduction of neutral umpires). In practice, a great many decisions that are overturned come down to a matter of millimetres, or single frames of video, or barely visible blips on the snickometer. Some are so close that different reviewers would come to opposite decisions: that's cricket, I suppose.

Still, it is worth remembering the fury that those old howlers generated, and be glad that they are past.

Some suggested improvements, such as not debiting available reviews when a decision is 'umpire's call', are worth considering in the future. Personally, I often find the reviews tedious: what would happen if a limit of, say, 90 seconds was placed on the third umpire (in absence of technical faults) to come up with a decision? If it is so close that it takes longer than that, then it should revert to the onfield decision, with no loss of challenges.

If onfield umpires, not players, initiated review, we would have to be prepared for virtually *every* lbw appeal to be reviewed ad nauseam. Actual onfield decisions would become unusual (already the case with run outs), and the umpire's authority would be diminished.

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Use of DRS by Over Number