Does DRS really give the benefit of the doubt to umpires over batsmen when judging LBWs?

"Unless it's plumb, just give it not out."

In the lower levels of cricket where self-umpired games are common, it's almost certain anyone undertaking their first umpiring stint has been blessed - like me - with advice along these lines by their captain. At it's core, it merely reflects an unwritten rule of our game - the benefit of the doubt goes to the batsman. The philosophy exists because of a fundamental asymmetry. A batsman's innings can end in failure as the result of just one ball, where as success requires many deliveries. On the other hand, a bowler's innings can be successful as a result of only a few deliveries where as the occasional bad ball is relatively inconsequential. A bowler denied a wicket by a bad decision can still get the batsman out next ball; a batsman incorrectly given out cannot make amends. Therefore, it seems only fair batsman receive the benefit of the doubt.

Since the advent of DRS slightly more than a decade ago, no aspect of the process has been pilloried more often than umpire's call when judging LBWs. Innumerable commentators have told us umpire's call desecrates the tradition of batsmen benefiting from any doubt and instead aims to protect the match officials. Upon much reflection, I have come to the view that umpire's call does nothing of the sort. Instead, as I will illustrate, the present implementation actually takes an unwritten law, and systematically enshrines it in the highest levels of the game.

The umpire's call feature exists because of two uncertainties. First, the ball's future trajectory cannot be predicted precisely - hence making "hitting" difficult to adjudge. Second, both "pitching" and "impact" are uncertain because any measurement is imprecise - e.g. the exact impact point may be between frames, the ball tracking may have limitations etc. The accepted standard - presumably based on many scientific experiments - is that in either case, the uncertainty is half a ball width. I'll pursue the implications of this uncertainty with a series of examples. I'll consider only "hitting" - "impact" and "pitching" are completely analogous.

First, the simple example - a ball classed as "red" on "hitting," like figure 1.
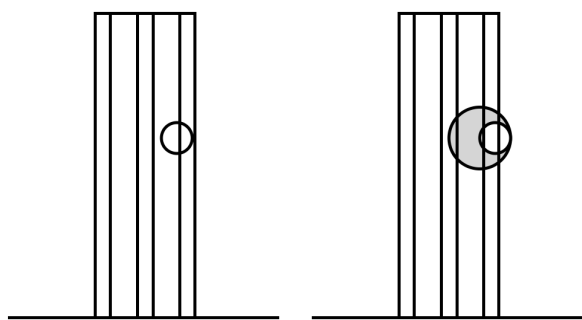
In each of the figures I present, the image on the left represents the predicted trajectory we see on TV. However, there is a half a ball width uncertainty. Therefore the ball's actual trajectory can take it up to half a ball width in any direction away from projected location we see on TV. The grey circle on the right image of each figure represents the full range of possible trajectories (I have placed the ball somewhere within the grey circle as per the point I wish to illustrate in that figure). Although not shown on TV, it is really the right image we should

Figure 1: Hitting

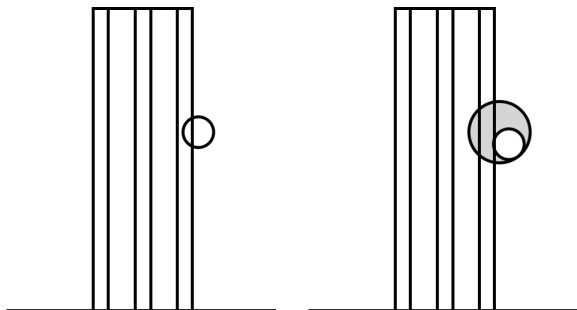have in mind[1]. In this case no matter where in the grey circle the ball actually ends up, the ball hits the stumps. That's why the umpire's call is irrelevant in this case; even if the umpire gives the batsman

not out, he/she is out by DRS.

Figure 2: Typical umpire's call

Next consider the classic "umpire's call" case - figure 2. Again, we see the left image on TV, where as it's the right image which gives a more holistic view of what hawk-eye is actually predicting. Unless the actual trajectory is on the very right hand edge of the grey circle in figure 2, the ball does hit the stumps, i.e. there is a very high chance (much greater than 50%) the batsman is out. If LBWs were decided purely by hawk-eye, the batsman would be given out. But there is doubt - there is a small chance the ball is actually missing the stumps. The umpire then serves as a second opinion. If the umpire gives the batsman out, then he/she is effectively saying there isn't any doubt - the low percentage missing case is not the one occurring. However the umpire can rule not out. Then, the low percentage option is favoured to the high percentage one. Commentators often bemoan inconsistency in the umpire's call. The same ball can be out one over and not out the next. However, that's only the case if one looks at the left image. There are many trajectories compatible with the grey circle in the right image and it's perfectly reasonable for the umpire to rule differently based on where in that grey circle they believe the ball is really headed.
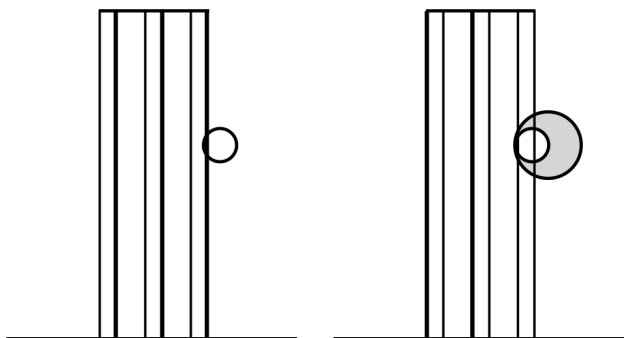

Figure 3: Umpire's call when just clipping

Note that all this applies even in "marginal" umpire's call decisions - i.e. situations like figure 3 where hawk-eye predicts the ball to be clipping the stumps by the barest of margins. We regularly hear commentators say a batsman is unlucky to be given out in such a situation or even that umpires should not be giving such deliveries out. I find that ludicrous. Remember that the half ball uncertainty applies in any direction. Therefore the ball is actually still more likely to be hitting the stumps than not[2]. This fact is most clearly seen in the right image of figure 3 where much of the grey circle overlaps the stumps. In short, in both figures 2 and 3, the batsman is more likely to be out than not out.

Yet they can be reprieved on the weight of the umpire's word.

To fully see the asymmetry between batsmen and bowlers, consider figure 4 where - as per the left image - hawk-eye predicts the ball to be narrowly missing the stumps. With the DRS's current implementation, the umpire's call is not considered in this scenario; the ball is simply deemed to be missing the stumps and an umpire who gives the delivery out is deemed to have made a mistake.

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[1]There is a subtlety in that the ball is not equally likely to anywhere in the grey circle; it is more likely to be towards the centre of the circle. I'll ignore this nuance to avoid complicated statistical analysis.

[2]The exception is when the ball is clipping the corner, rather than the edge of the stumps

However, as the right image of figure 4 makes clear, the ball might actually still be hitting the stumps. The umpire might really have been correct.
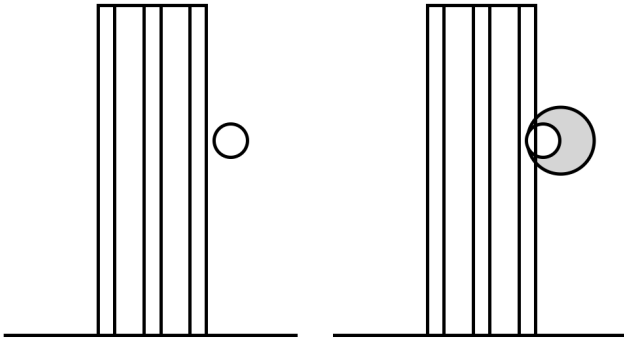

Figure 4: Missing by a small margin

concluded the ball is hitting the stumps. The batsman gets no benefit because there is no doubt to benefit from.

Yet, the bowler doesn't get to keep their wicket based on the umpire's decision. A low percentage decision in favour of a batsman - e.g. if the umpire rules not out in figures 2 or 3 - is upheld by the DRS, where as a low percentage decision in favour of a bowler - e.g. if the umpire rules out in figure 4 - is not upheld. To be out, both hawk-eye and the umpire need to believe the ball is hitting the stumps. To be not out, only one of the hawk-eye and umpire need to believe the ball is missing the stumps. The batsman is indeed getting the benefit of the doubt. One just has to bear in mind that in cases like figure 2, if the umpire decides out, then there is essentially no doubt. Both hawk-eye and the umpire have

Finally, I'll consider the implication of the benefit of the doubt actually going to the umpire. There is doubt in the hawk-eye's prediction whenever the half ball uncertainty allows the decision to be changed. Hence, any ball predicted to be fully contained in the grey region of figure 5 has some element of doubt. By moving the predicted position by half a ball width, it is possible to change a ball from clipping to missing and vice versa. If the benefit of the doubt really went to the umpire, any such ball would have to decided by umpire's call. The fact DRS is not implemented this way is testament to the fair method in which the benefit of the doubt really is given to batsmen.
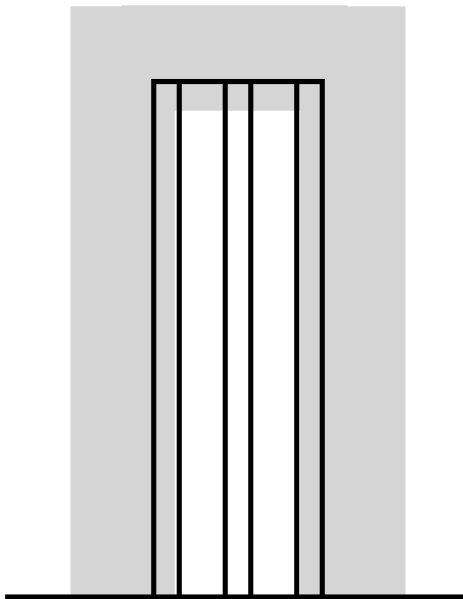

Figure 5: If the benefit of the doubt truly went to the umpire, then the umpire's call would have to prevail for any ball predicted by hawk-eye to be fully within the grey area (which strictly speaking should be rounded around the corners).