

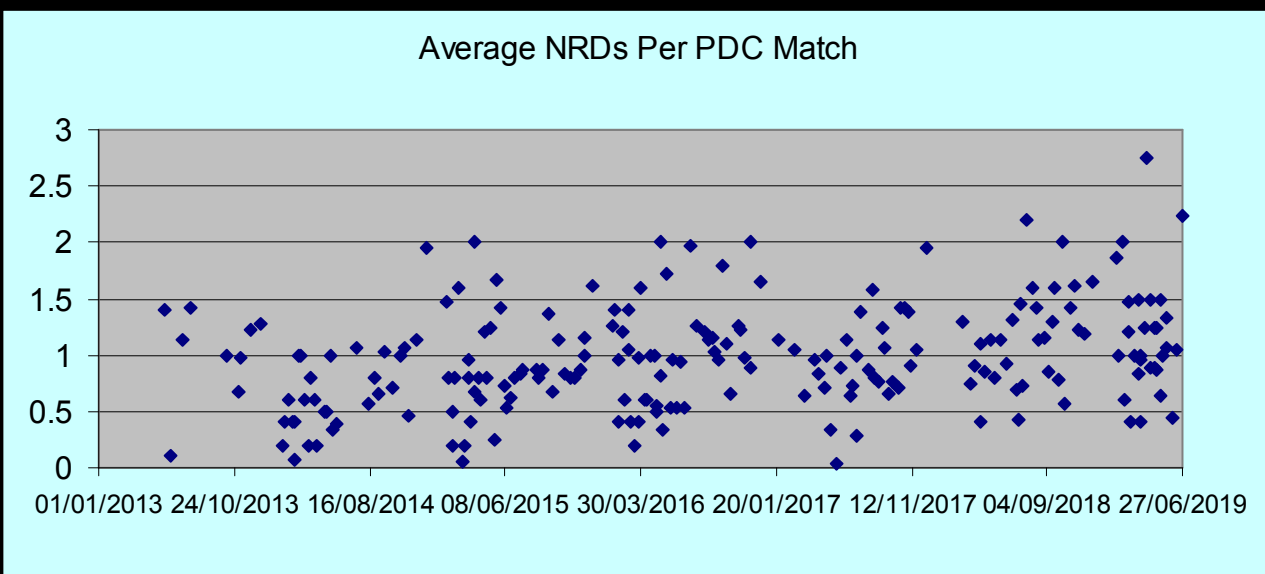
# Board to Tears



Having completed my 8-blog refresher course on dart flight dynamics, I was happily resting on my laurels (well, a Swiss hotel sofa) when a call came on my red Unicorn hotline. The Big Boss, who has a frankly rather scary determination that his family’s company should produce only the very best equipment, wanted an unbiased scientific eye to look at why some players suffer more than their fair share of bounceouts (or, as I’m calling them, NRDs, “Non-Retained Darts”) and are understandably not happy about it. Back in Blighty, I thus leapt (not easy at my age) into action.

Now top-quality boards are made from a natural material, sisal fibre, which means that some board-to-board variations in hardness and durability are inevitable. All the top manufacturers are thus constantly trying to improve both production and quality assurance techniques to ensure that their products are of a consistently high standard. It must nonetheless be conceded that even the most diligent manufacturer may produce the odd sub-standard board, or maybe just one that becomes so after storage. This can be witnessed by the occasional request to change a board (due to it being perceived as too hard, too soft, or whatever) in both PDC and BDO events.

That said, in both codes the actual occurrence of NRDs is lower than even I expected, less than one per match for the majority of players. I personally verified this by going through hours of match videos (as the title of this blog hints, not the most exciting task!). Fortunately, I was also helped by the PDC providing some historical data on NRDs per match. Although that’s not a great metric as match lengths vary considerably, the below graph plots it, in events where NRDs were recorded, from 2013 to the end of June this year. The average is 0.977, with a slight upward trend detectable. My hypothesis is that this trend is partly down to ever-improving accuracy and hence dart-on-dart and treble 20 or bull wire impacts. It may also be due to the type of dart increasingly (although in my view not always justifiably) popular with professionals. More on that later!



Also coming to my aid on the NRD data front was that hero of PDC statistics, Ochepedia, otherwise known as Chris Kempf. Chris has analysed NRD data for all the individual PDC players and his end of 2018 table for the top 32 is on the right. The average here is about 3.5 per 1000 darts, or 0.35%, whereas across all players it was 0.341% in 2018 and is 0.351% so far this year, figures broadly in line with the per match average of 0.977 quoted previously.

WC seed	Player	Bounceouts	Darts thrown	Bounceouts per 1000 darts thrown	One bounceout per X darts	WC seed	Player	Bounceouts	Darts thrown	Bounceouts per 1000 darts thrown	One bounceout per X darts
15	Jonny Clayton	7	5538	1.26	791	22	John Henderson	9	3070	2.93	341
32	Max Hopp	8	6272	1.28	784	1	Michael van Gerwen	62	20707	2.99	334
13	Darren Webster	9	6621	1.36	736	5	Daryl Gurney	38	12136	3.13	319
11	Ian White	9	5901	1.53	656	21	Kim Huybrechts	11	3310	3.32	301
7	Mensur Suljović	20	13048	1.53	652	24	Jelle Klaasen	12	3305	3.63	275
3	Peter Wright	26	16264	1.60	626	14	Joe Cullen	29	7554	3.84	260
2	Rob Cross	28	16481	1.70	589	20	Steve Beaton	15	3902	3.84	260
31	Cristo Reyes	7	3166	2.21	452	4	Gary Anderson	59	15260	3.87	259
29	Jermaine Wattimena	11	4501	2.44	409	27	Kyle Anderson	22	4891	4.50	222
8	Simon Whitlock	34	13394	2.54	394	18	Stephen Bunting	23	4795	4.80	208
9	James Wade	26	10195	2.55	392	10	Michael Smith	61	11826	5.16	194
28	Jamie Lewis	10	3624	2.76	362	16	Adrian Lewis	27	5195	5.20	192
19	Mervyn King	13	4702	2.76	362	6	Gerwyn Price	80	12519	6.39	156
12	Dave Chisnall	17	6089	2.79	358	22	Steve West	39	5831	6.69	150
17	Raymond van Barneveld	26	9277	2.80	357	26	James Wilson	33	4352	7.58	132
23	Alan Norris	4	1414	2.83	354	30	Benito van de Pas	12	1102	10.89	92

What the above list shows is that some players consistently get far more NRDs than others, sometimes by a factor of 4 or even 5. The dynamicist in me suspects this may be to do with the angle a player's darts land in the board and simply how long they are. A dart that lands sharply point-down can more easily rebound off even the modern low-profile "blade" wires at the top and bottom of, say, treble 20, especially if it has a high transverse moment of inertia and thus perhaps significant overturning momentum. Moreover, longer darts are simply more likely to get in each other's way. It's significant that Ochepedia's analysis also revealed that a player's second dart is around 7 times as likely to be an NRD as their first, with the third nearly twice as likely again.

With all that in mind, for a bit of homework take a look at how the darts land of those who are near the foot of the above list, like poor Benito van de Pas, compared to those near the top of it.

Long darts with big flights are a modern trend with professionals, though, and another player who likes them is the Team Unicorn star Michael Smith. Guess who is not only one of those near the bottom of the above list but who has also suffered from a high NRD rate in some recent matches? I thus grabbed the opportunity presented by the televising of the recent PDC World Series event in Las Vegas to see if I could work out what was going on with Bully Boy's darts.

Sure enough, in his first match, Michael suffered an incredible 6 NRDs. Even Nathan Aspinall, a player who has also suffered from the bounceout blues, only had one, straight off the bull wire, in his match against Shawn Brenneman - who, like Michael's opponent Jim Long, had none at all from his flatter-landing darts. When I took a closer look at Michael's NRDs it appeared that, apart from his last (which, like Nathan's, hit the bull wire), all the other 5 hit on or very near the treble 20 wire. I suspect the first impacts may even have fractionally blunted his darts and further embedded the wire slightly, making subsequent NRDs rather more likely.



Left is a shot of Michael's first Vegas NRD, which happened at the start of his second game against Jim Long. On close inspection the ghostly shadow of his third dart heading toward the treble 20 wire can just be made out (unfortunately I couldn't get a better image). In his next match and the semi, Michael had 3 and then 2 NRDs in beating ricochet-free MvG and Gerwyn Price respectively. Meanwhile, in the other semi, there was just one, by Peter Wright, which just seemed to hit the back of a previous dart.

So that little bit of research certainly reinforces the idea that a high occurrence of NRDs can be far more a function of the player than the board. That does not, however, imply that there is necessarily anything untoward in the technique of professionals who customarily experience high NRD rates. Indeed, it might be argued that not only could it mean they may have great consistency and accuracy, but also that that their throw allows their darts smoothly to follow the downward arc of the trajectory at impact - the point of a dart which is at a slight angle to its direction of travel may deflect away from a wire more easily than one which is travelling straight.

As Ochepedia's dart-by-dart data indicates, many NRDs, are, as was Snakebite's, not due to wires but previous darts. Here is a classic example from the 2015 PDC World Final when Gary Anderson had a 180 drop out on his way to victory. Harsh to blame the board when 3 darts try to fit down the same hole! And just as one wouldn't advise Gary to avoid such misfortune by being less accurate, I don't think Michael Smith or anyone should change their throw just because of NRDs. A set-up tweak could help in time, but, as frustrating as darts on the floor may be, best advice is to keep technique and mind solid.



On which note, well done to Michael for doing just that and reaching the Vegas final, in which he gave a good performance against an inspired Nathan Aspinall, to whom congrats! Both players suffered one NRD in the final, which means that, in the 9 matches I analysed, there were 19 in total, averaging just over 2 per match, in this case an occurrence rate of 0.59%. Take Michael Smith's 4 games out of the equation, though, and that reduces to 7 NRDs in 5 matches and 0.39%.

So, if many bounceout bonanzas may in fact be less a result of sub-standard boards than a conflict between standard modern board construction and the specific entry characteristics of some players' darts, what to do about it? Well, as stated before, all the top manufacturers are always researching yet further improvements in quality assurance and board construction techniques, whether of, eg, the spider or the sisal "biscuits" which are compressed together to form the main structure. A major problem, though, is that some players' attempted solution to NRDs is to use highly aggressive points, which will tear (blog title - see what I did there?) fibres from any sisal board during removal. That topic alone deserves another blog, so watch this space!