Analysis

of

Amateur Driving Data

1996 to 2018

Important Note: Report Status

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Executive Summary

Driving data for amateur club-level golfers have been collected by The R&A on the same 6 courses for men since 1996, with the courses visited annually and at the same time of year where possible, and at the same course for women since 2013.

The average driving distance measured for men in 2018 was 215 yards, an increase of 2 yards since the last publication of this report in 2016, and an increase of 15 yards on the average measured in 1996. Annual averages range from a low of 194 yards in 1997 to 217 yards measured in 2005. Typically, this comprises around 2,000 shots per year although in 2018, data were only collected at four of the six venues due to inclement weather, so the dataset only comprised 1368 shots.

There has been an increase in driver usage recorded, particularly by high handicap players. Although there has been a trend towards lower percentages of fairways hit over the years, the values in 1996 and 2018 are similar at 49%.

Experimental Method

On each course, 2 holes are selected to conduct drive measuring. The following criteria are considered when selecting holes:

- The two holes should be parallel and running in opposite directions to reduce the impact of wind.
- The holes should be straight and have flat landing areas where possible to remove the effect of bounce and roll.
- The holes chosen should be long, to encourage a high percentage of driver usage.

Laser measuring equipment is used to record the position of the tee at the beginning of the day, and the following are recorded for each tee shot hit:

- Final location of the shot (Fairway/Rough etc). Since 2006, exact final locations have been measured, allowing the dispersion of shots to be calculated.
- Club used by the player.
- Handicap of the player.

A similar study has been conducted by an independent research group in the USA at the World Amateur Handicap Championship over a 6 year period between 2006 and 2011. This provides a useful point of comparison for the data collected.

Men

Handicap Distribution

The ability of players is measured by recording their Congress of National Golf Unions (CONGU) handicap. Throughout this report we will refer to each handicap band as follows:

- Category 1 - Handicaps lower than 6
- Category 2 – Handicaps between 6 and 12 inclusive
- Category 3 – Handicaps between 13 and 20 inclusive
- Category 4 – Handicaps of 21 and over.

Figure 1 shows the percentage of players within each handicap category by year.

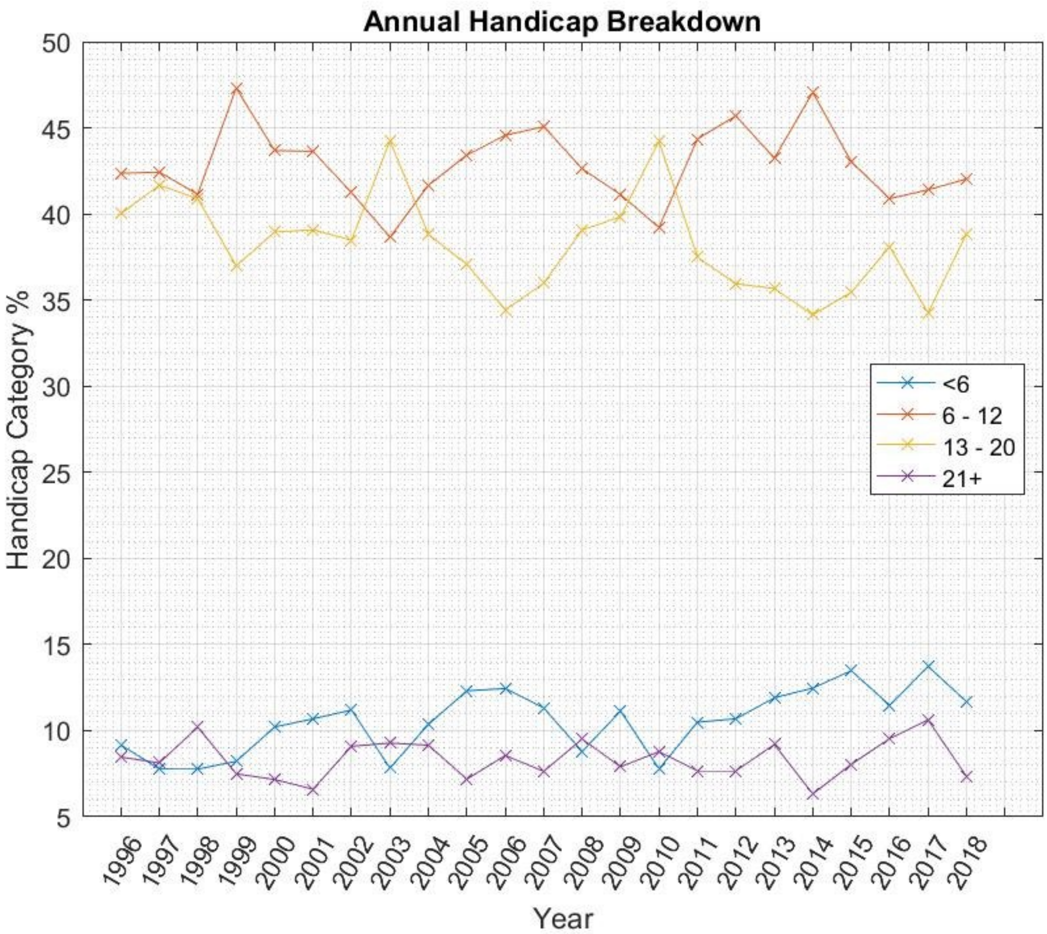

Figure 1: Percentage of drives hit by players in each handicap category since 1996.

It can be seen that these percentages have remained fairly steady since 1996, with around 80% of players falling within Categories 2 and 3, and the rest falling into Categories 1 and 4.

Players in the middle handicap range are almost equally distributed between groups 2 and 3, and likewise for players in groups 1 and 4.

Club Usage

Driver usage has steadily increased over time since 1996. The overall percentage of drivers hit has increased from 73% in 1996 to 87% in 2018. The largest increase in driver usage has been by high handicap golfers, with Category 4 golfer's driver usage increasing from 54% in 1996 to 91% in 2018. For Category 3 golfers the percentage has increased from 64% to 87%, for Category 2 it has increased from 80% to 87%, whereas for Category 1 it has decreased from 92% to 86%. Figure 2 shows the development of driver usage for each handicap category since 1996.

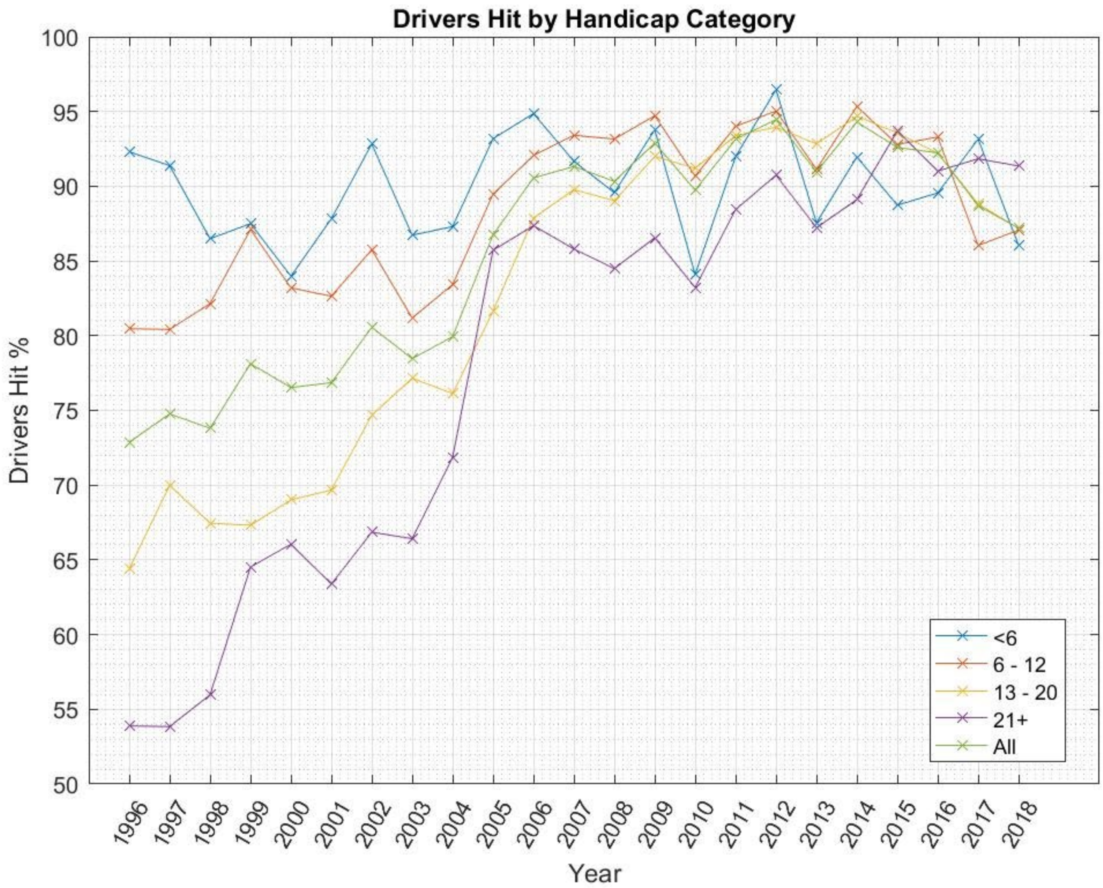

Figure 2: Percentage of drivers hit by each handicap category since 1996.

This illustrates that driver usage has been increasing steadily since 1996 for players in Categories 2,3 and 4. Although it has decreased in 2018 for the players in Category 1, there is a fair amount of volatility annually in this statistic, and there is no consistent trend towards this value decreasing, although as noted previously there were fewer datapoints collected in 2018 which may be a contributing factor to this decrease.

Driving Distance

The total average driving distance measured in 2018 was 215 yards, an increase of 15 yards from 1996. Further, it is an increase of 2 yards from 2016, the last time this report was published. Although there has been an increase across all handicap categories, there has been a larger increase for golfers with higher handicaps. For instance, Category 1 golfer's average distance has increased 7 yards from 233 yards in 1996 to 240 yards in 2018, whereas for Category 4 golfers this increase has been 22 yards, from 165 yards in 1996 to 187 yards in 2018. For Category 2 the distance has increased 7 yards from 213 yards to 220 yards and Category 3 golfers average has increased 18 yards from 186 yards in 1996 to 204 yards in 2018. Figure 3 shows the development of average driving distance since 1996 for each handicap category.

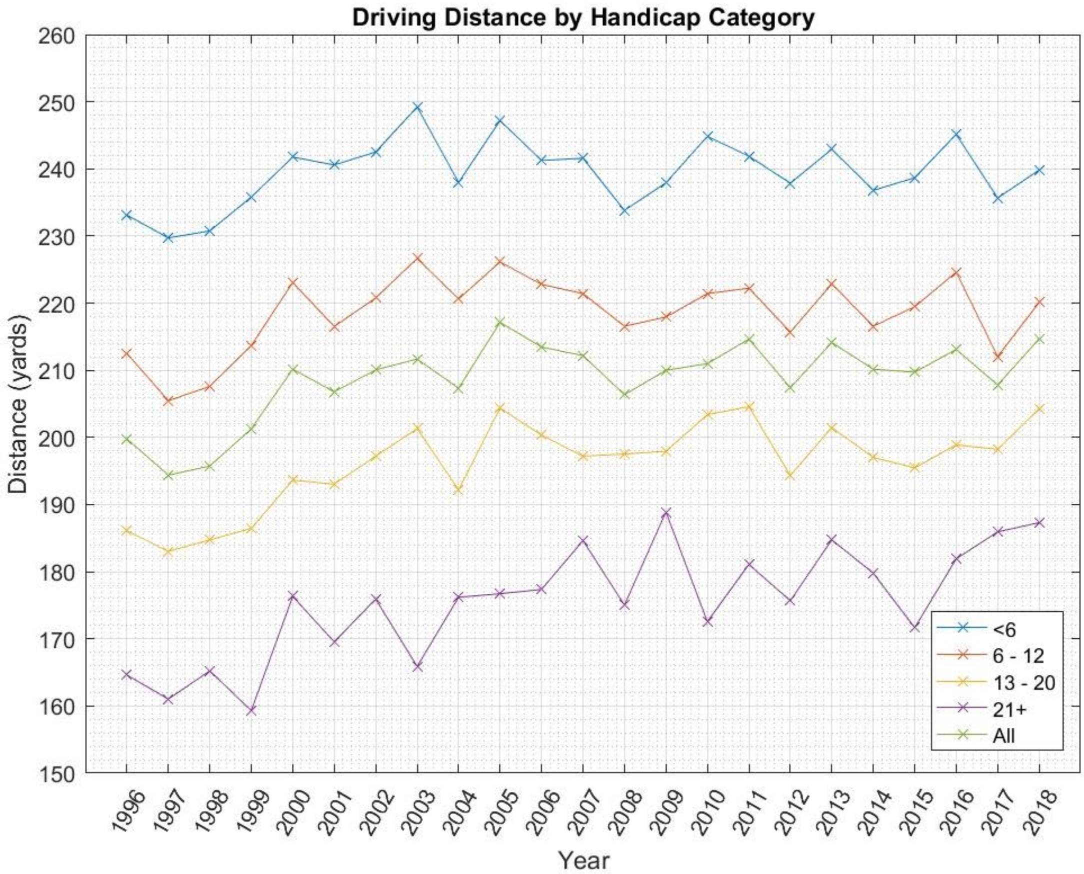

Figure 3: Average driving distances recorded for each handicap category since 1996.

This highlights the increasing average distances since 1996. Further, it can be seen that there is considerable year to year volatility in these measurements. Table 1 compares the values from 1996 and 2018 to the maximum and minimum values measured over this period.

Handicap Category	**2018**	**1996**	**Maximum Mean Distance (year)**	**Minimum Mean Distance (year)**
1	240	233	249 (2003)	230 (1997)
2	220	213	227 (2003)	205 (1997)
3	204	186	205 (2011)	183 (1997)
4	187	165	189 (2009)	159 (1999)
All	215	200	217 (2005)	194 (1997)

Table 1: Mean distances from 2018 and 1996 compared against the maximum and minimum values.

This shows that the overall average of 215 yards measured in 2018 is 2 yards shorter than the longest year on record, 2005, and 11 yards longer than the shortest year, 1997. We can see that the values measured in 2018 are closer to the largest values in each handicap category than the lowest.

Figure 4 shows the percentile breakdown of the driving data for drives hit by all clubs.

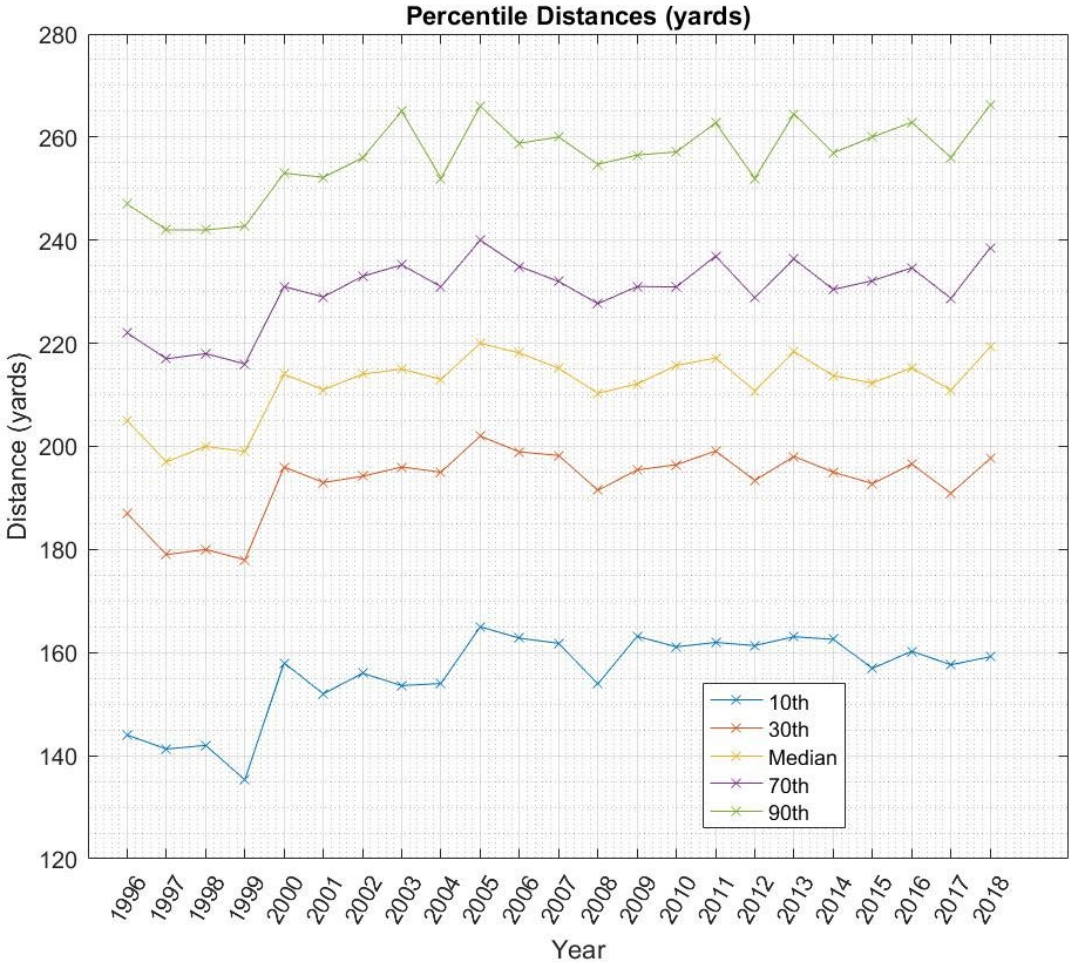

Figure 4: Driving distances broken down by percentiles.

It can be seen that 10% of drives measured in 2018 were longer than 266 yards. This is an increase of 19 yards from the value of 247 yards in 1996. In the same timeframe there has been less of an increase in the median, 14 yards from 205 yards in 1996 to 219 yards in 2018. Similar to the median, the 10th percentile has increased 15 yards from 144 yards in 1996 to 159 yards in 2018.

To remove the impact of club usage, which has increased at different rates in different handicap categories, drive distances with only shots hit by driver included have also been considered, Figure 5.

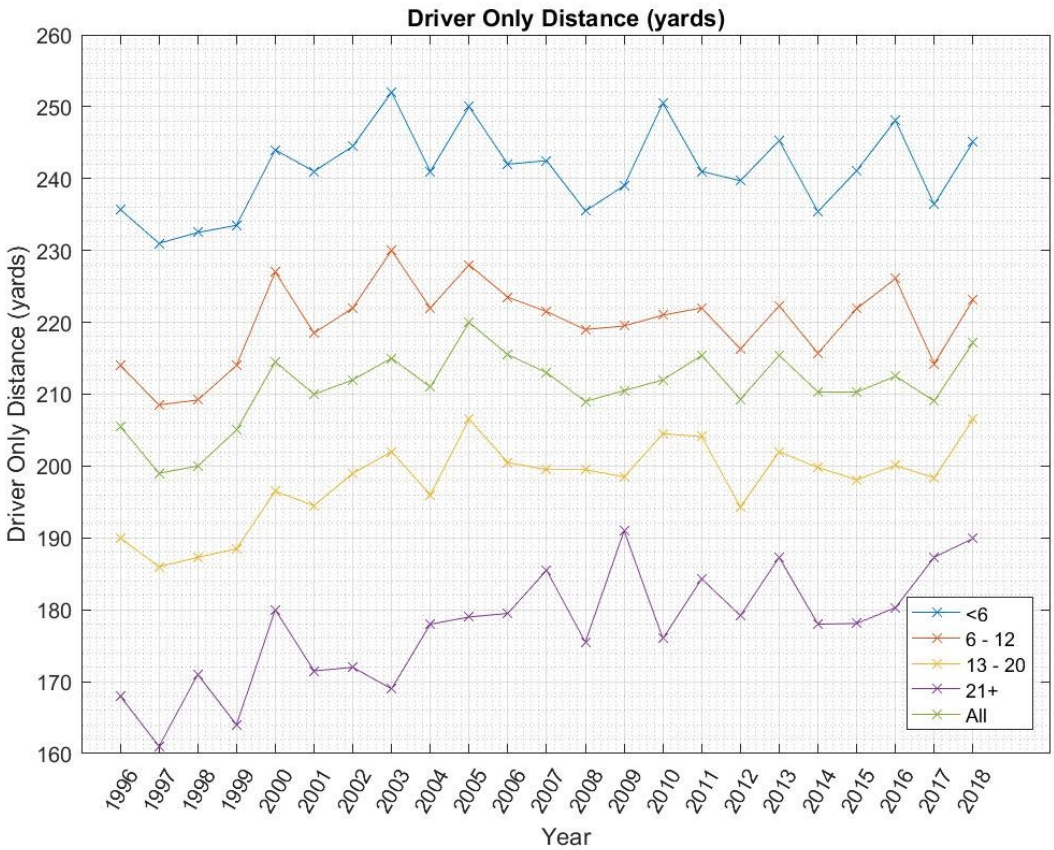

Figure 5: Average driving distances recorded for each handicap category, driver only.

There has been an increase across all handicap categories, with the largest increase in Category 4 golfers, like the statistics when all clubs are considered. However, the magnitude of the overall change is smaller, with an increase of 11 yards from 206 yards in 1996 to 217 yards in 2018 for drivers only, compared to a 15 yard increase for all clubs. Table 2 shows the maximum and minimum driver only averages measured along with the values from 1996 and 2018 for each handicap category.

Handicap Category	**2018**	**1996**	**Maximum Mean Driver Only Distance (year)**	**Minimum Mean Driver Only Distance (year)**
1	245	236	252 (2003)	231 (1997)
2	223	214	230 (2003)	209 (1997)
3	207	190	207 (2018)	186 (1997)
4	190	168	191 (2009)	161 (1997)
All	217	206	220 (2005)	199 (1997)

Table 2: Mean distances from 2018 and 1996 compared against the maximum and minimum values, driver only.

The overall average driver only distance of 217 yards from 2018 is 3 yards shorter than the longest year, 220 yards in 2005, and 18 yards longer than the shortest year, 199 yards in 1997.

Again, the percentile breakdown of the driver only distances, is considered and presented in Figure 6.

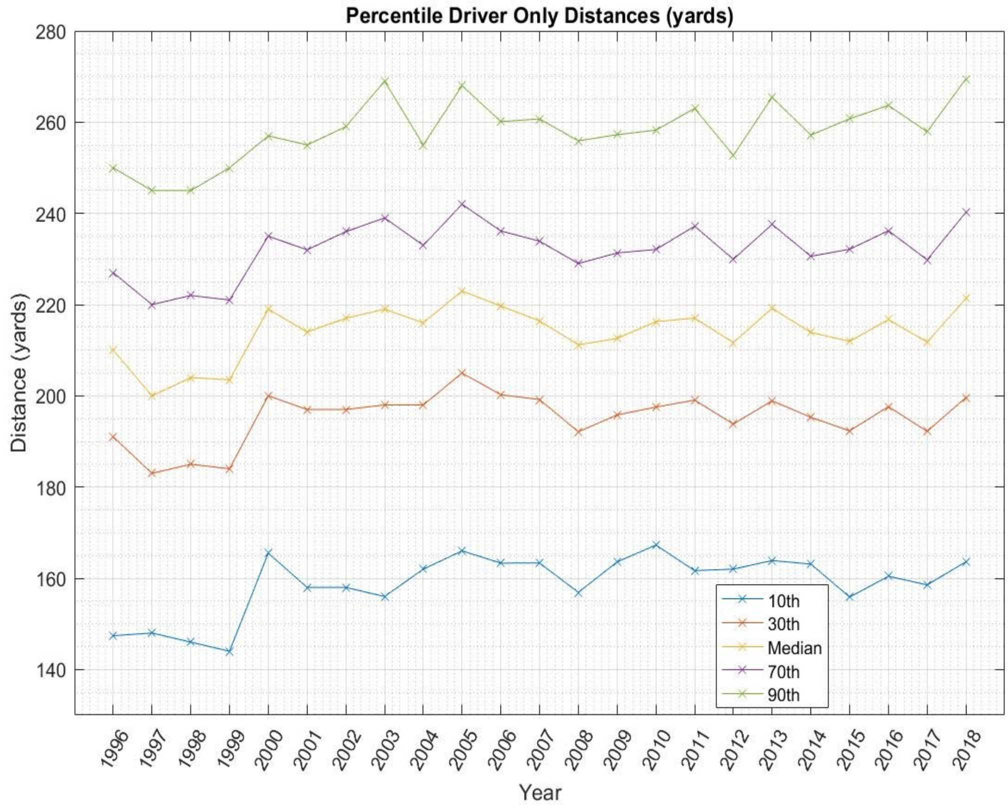

Figure 6: Driving distances broken down by percentiles, driver only.

There has been a similar increase in the 90th percentile value as for all clubs, with an increase of 9 yards from 250 yards in 1996 to 269 yards in 2018. This again is a larger increase than for the median, which has increased 11 yards from 210 yards in 1996 to 221 yards in 2018.

Figure 7 shows the difference between driver only yearly average distances and that for all clubs. Including all shots measured since 1996, the overall average drive measured with drivers is 211 yards, whereas with all clubs it is 208 yards, an overall increase of 3 yards.

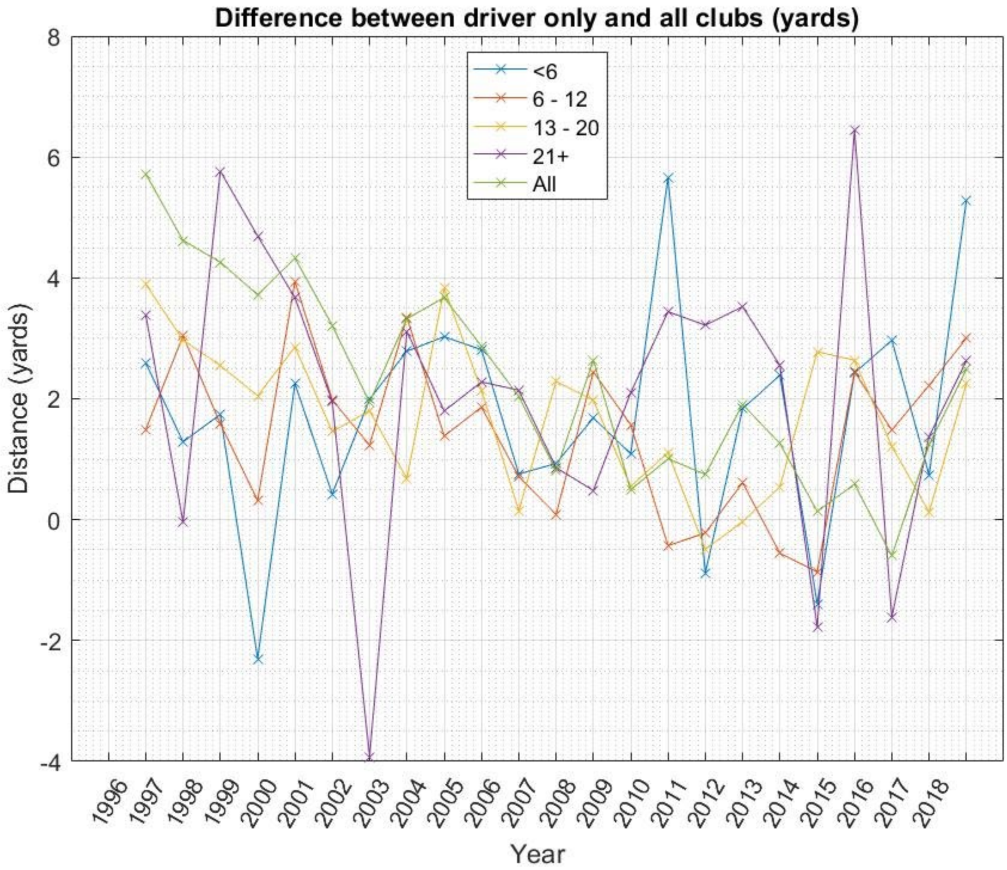

Figure 7: Difference between driver only average and all club average for each handicap category since 1996.

Driving Accuracy

Fairways Hit Percentage

Since 1996, the final location of shots has been recorded, allowing the calculation of the percentage of fairways hit by handicap category. Although there has been a steady decrease in fairways hit percentages since 1996, in 2018 the overall percentage increased 7% from 43% the last time this report was published to 49%. In 2018 the fairways hit percentage for Category 1 golfers was 37%, which is 5% lower than the previous lowest value of 42% measured in 2008, despite the overall increase. A possible reason for this sudden drop is that two courses not measured this year historically have high fairways hit percentages for Category 1 golfers. The absence of these courses also reduces the number of total datapoints studied, thus potentially increasing volatility. Figure 8 shows these percentages for each handicap category since 1996.

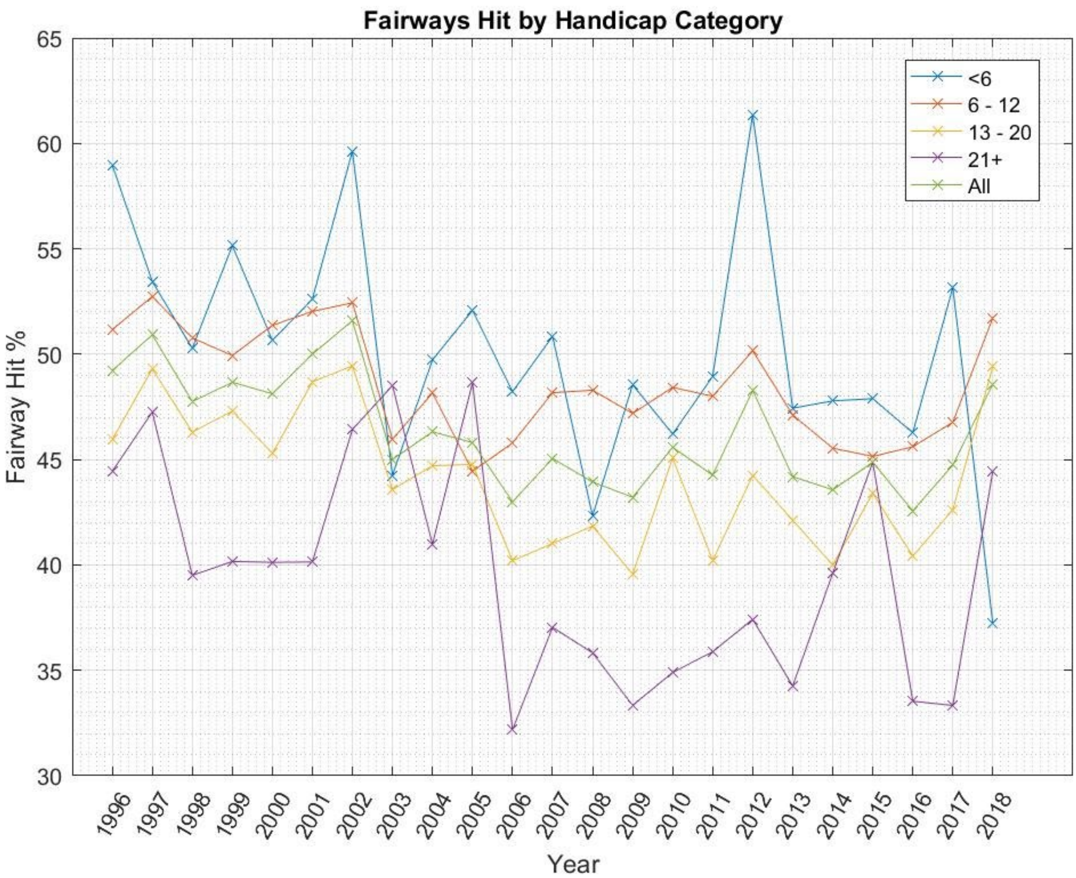

Figure 8: Percentage of fairways hit by each handicap category since 1996.

This illustrates that since 1996, fairways hit percentages have been decreasing. This could be linked to the higher driver usage percentages, with the strategies played by amateur golfers on particular holes changing, leading to more missed fairways.

Dispersion

Since 2006, data has been collected allowing the dispersion of shots from the centre of the fairway. Figure 9 shows the results of a typical day's drive measuring, with the final locations broken down by handicap category.

Figure 9: Final locations of drives on a 300-yard Par 4 in 2018 by handicap category. White = Category 1, Blue = Category 2, Red = Category 3 and Yellow = Category 4.

The final location of shots can be further analysed by the dispersion distance of the shots - the perpendicular distance from the final location of the shot to the line connecting the tee to the median shot. Percentile values of these data for each year were calculated and are presented in Figure 10. In the figure, negative values represent drives that are to the left of the median direction looking from tee to green, whilst positive values are to the right.

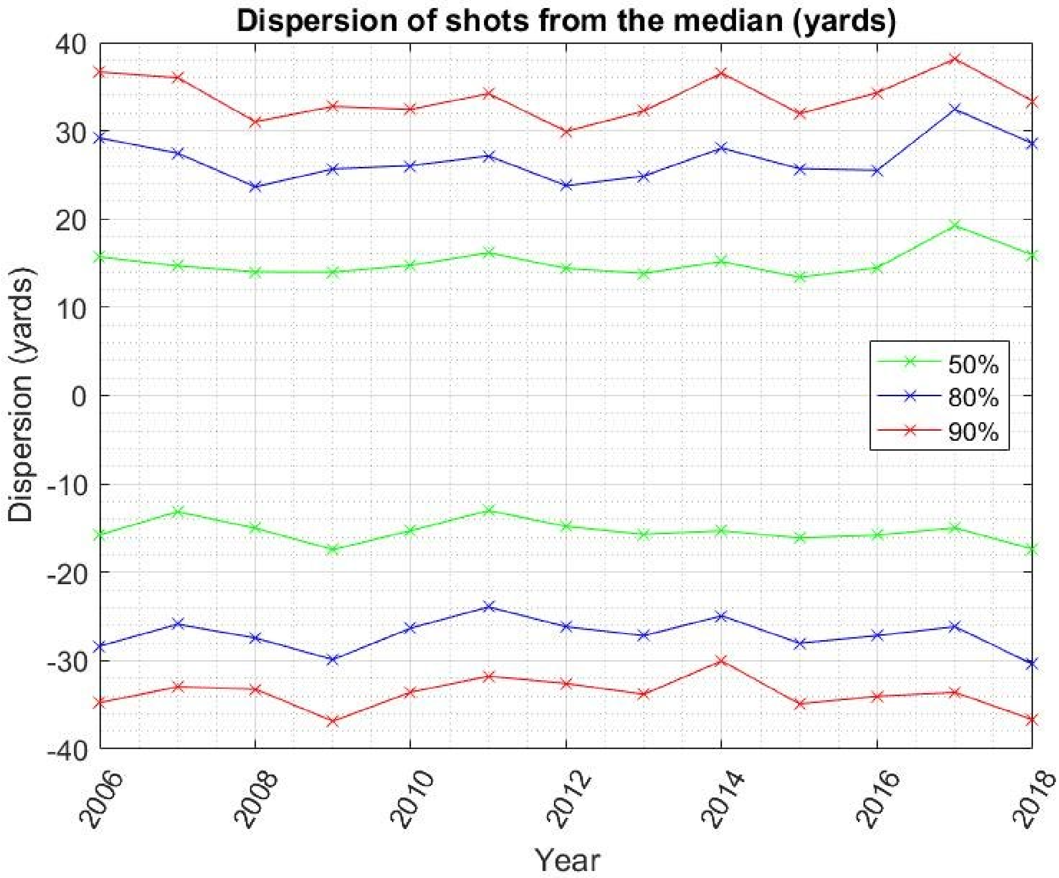

Figure 10: Dispersion in yards of each shot from the median for the day on each hole.

This shows that in each year since 2006, 50% of shots have been within ± 10 – 20 yards of the median drive, and 90% of shots are within ± 30 – 40 yards of the median. Viewed another way, only 5% of shots are more than 30-40 yards to the left of the median line and 5% of shots are more than 30-40 yards to the right. It can be seen that there are small year to year fluctuations in these values.

Similar analysis can be conducted by considering the angle of the final location of the shot relative to the median drive and the tee. These percentiles are presented in Figure 11.

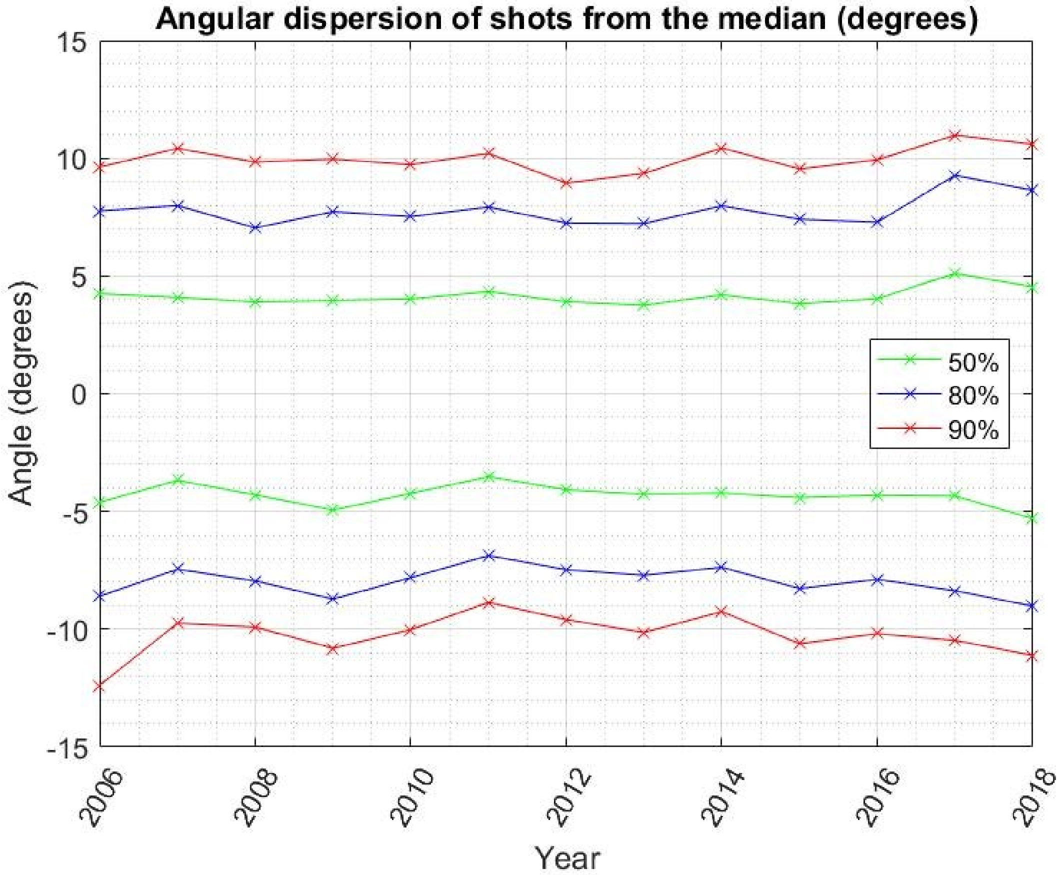

Figure 11: Angular dispersion of shots from the median for the day on each hole.

Again, there have been small year to year fluctuations in these values since 2006. About 50% of shots fall within ± 5 degrees of the median and only around 10% of shots fall outwith ± 10 degrees of the median.

In order to understand the connection between total distance and dispersion, changes to these percentiles for drives in different percentile bands can be considered. All drives since 2006 are considered here. This is shown in Figure 12. It can be seen that as total distance increases, dispersion from the median drive decreases. This can be explained by the fact that for a drive to be long enough to be in the upper quartile of shots, it would generally need to hit the fairway to get more bounce and roll, and hence is going to be straighter. Figure 13 shows the equivalent data for angular dispersion. The decrease in angular dispersion for longer drives is even more pronounced, as would be expected.

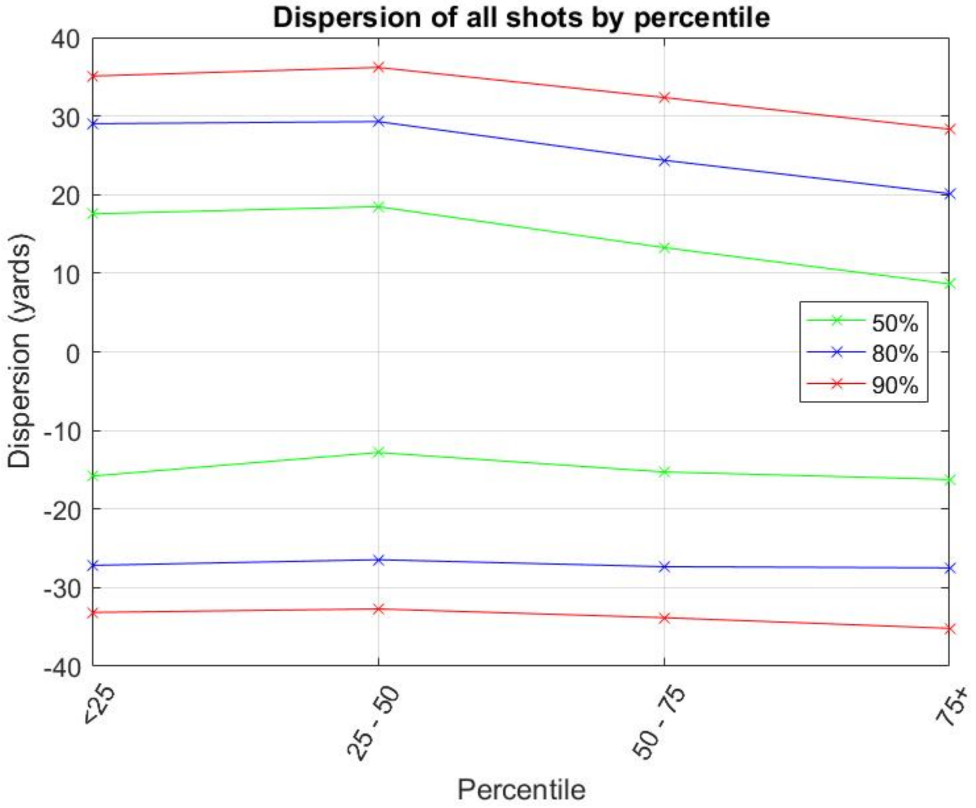

Figure 12: Dispersion by driving distance percentile. The 25th percentile is 189.92 yards; the median is 214.40 yards and the 75th percentile is 237.58 yards.

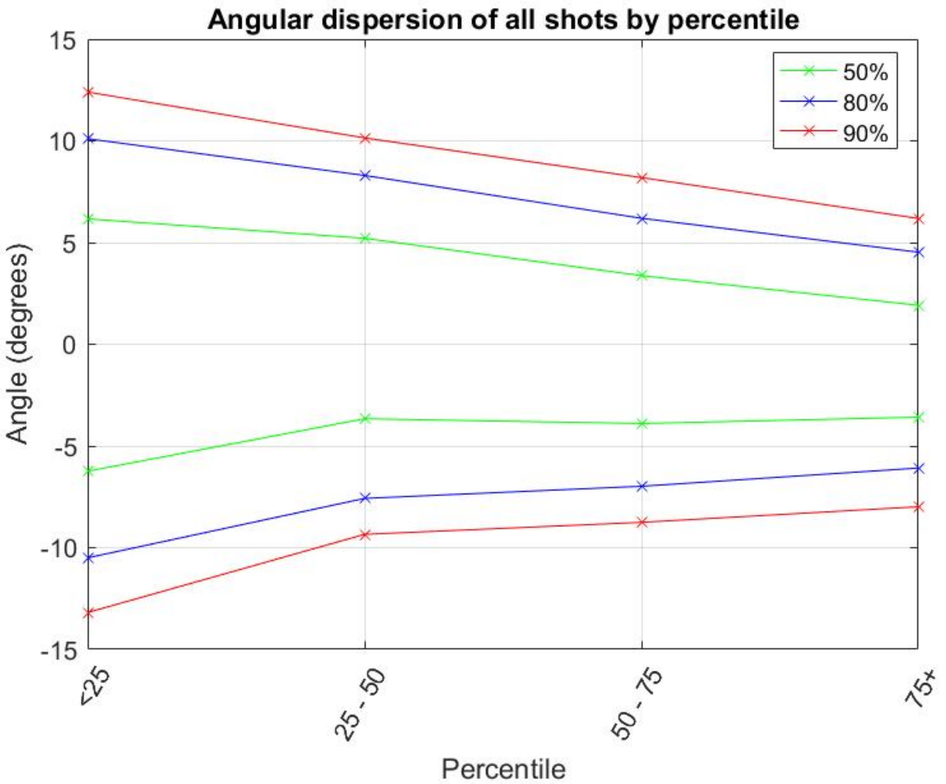

Figure 13: Angular dispersion by driving distance percentile. The 25th percentile is 189.92 yards; the median is 214.40 yards and the 75th percentile is 237.58 yards.

Women

The R&A have also collected drive measuring data for amateur women club golfers since 2013. In 2013 5 courses were visited, and since then the same course has been visited annually. In total, 2262 drives have been measured to date. Since there are considerably fewer drives on record for women than for men, it is harder to come to definitive conclusions at this time.

Players are broken down into the same handicap categories as men, with category 5 also included for players with handicaps 29 or above. These are shown again below.

- Category 1 - Handicaps lower than 6
- Category 2 – Handicaps between 6 and 12 inclusive
- Category 3 – Handicaps between 13 and 20 inclusive
- Category 4 – Handicaps of 21 to 28.
- Category 5 – Handicaps 29 and over.

Handicap Breakdown

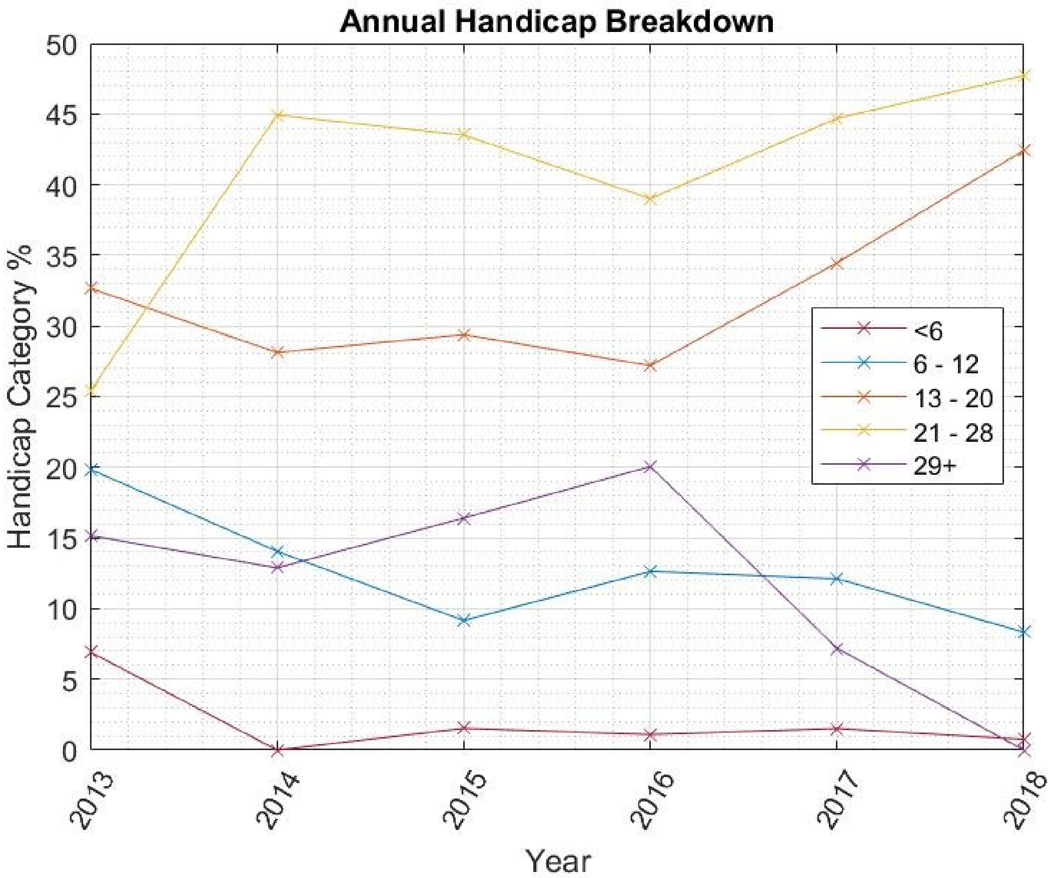

Figure 14: Percentage of drives hit by women in each handicap category since 2013.

It can be seen that there are more high handicap players, and very few Category 1 golfers. Because of this, Category 1 golfers have been removed from the graphs in the upcoming sections, to avoid conclusions being drawn from such a small dataset. Further, in 2018 there were no drives measured for Category 5 golfers, with this value as high as 20% of the players in 2016.

Club Usage

Figure 15 shows the percentage of shots hit by driver each year by players in each handicap category.

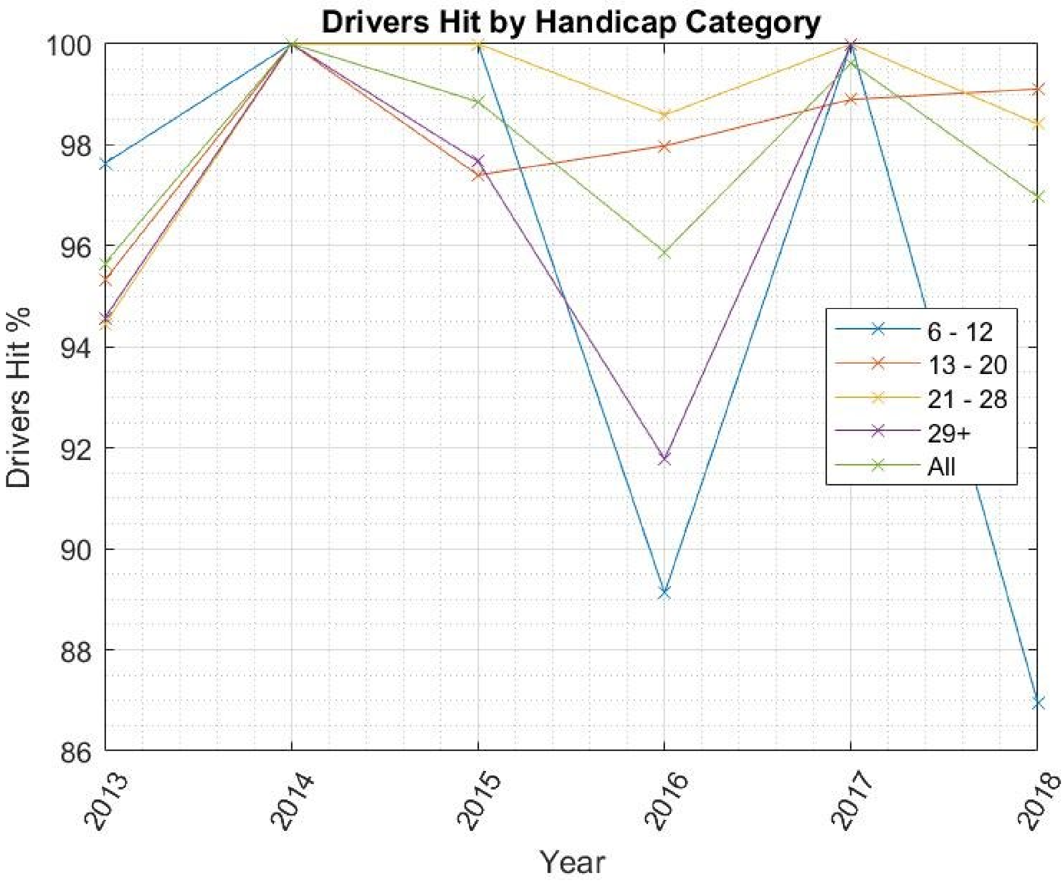

Figure 15: Driver use % by handicap category for women since 2013.

It can be seen that these values are generally much higher than the equivalent percentages for men, with the overall percentage never having dropped below 95%. Due to this large driver use percentage, it is not necessary to break down the women's data into all clubs and driver, since these values will be almost identical.

Driving Distance

Figure 16 shows driving distances measured for women since 2013. The mean distance measured in 2018, 161 yards, is the longest annual mean distance to date, and is 17 yards longer than 144 yards in 2013. Similar to the case for men, the higher handicap categories have seen the largest increase in distance, with Category 4 golfers increasing 31 yards from 119 yards in 2013 to 150 yards in 2018. It is important to reiterate that with less data available, it is important not to put too much emphasis on one year's results.

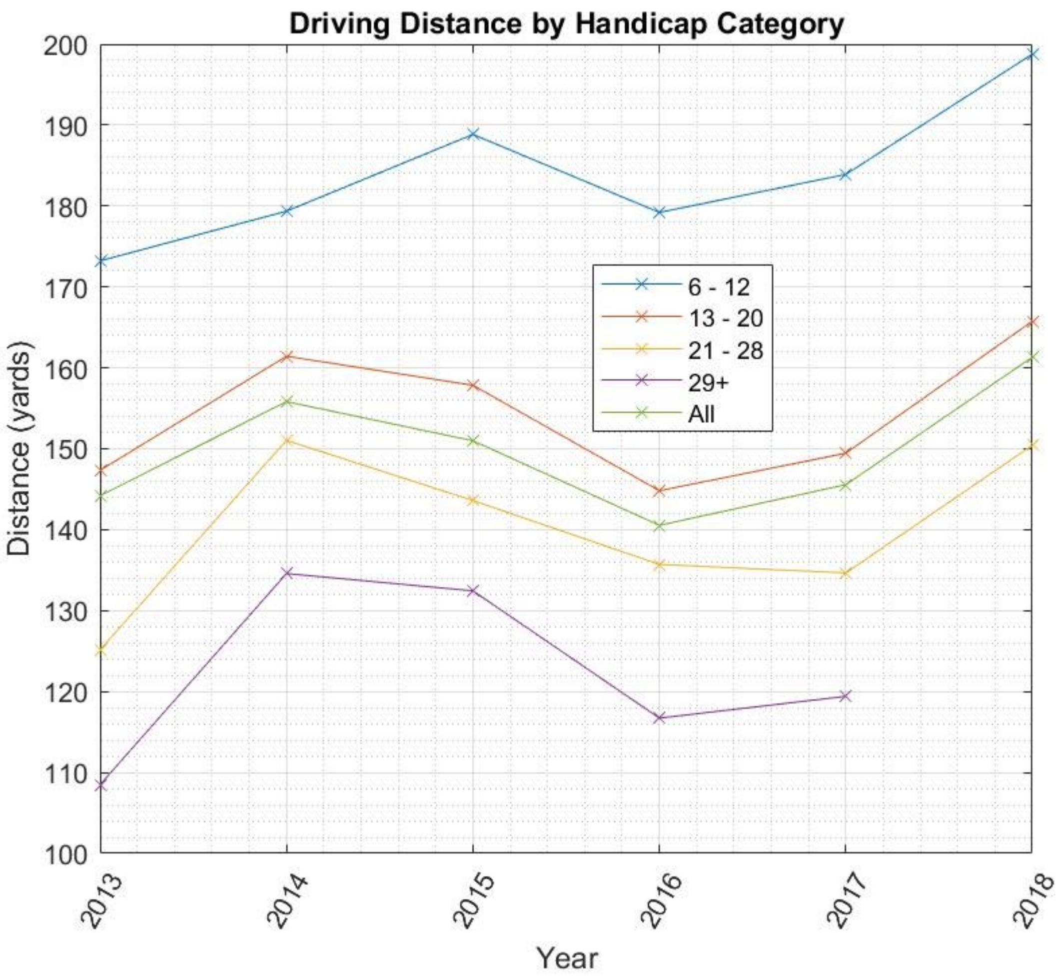

Figure 16: Average driving distances recorded for women in each handicap category since 2013.

Accuracy

Figure 17 shows the percentage of fairways hit for players in each handicap category.

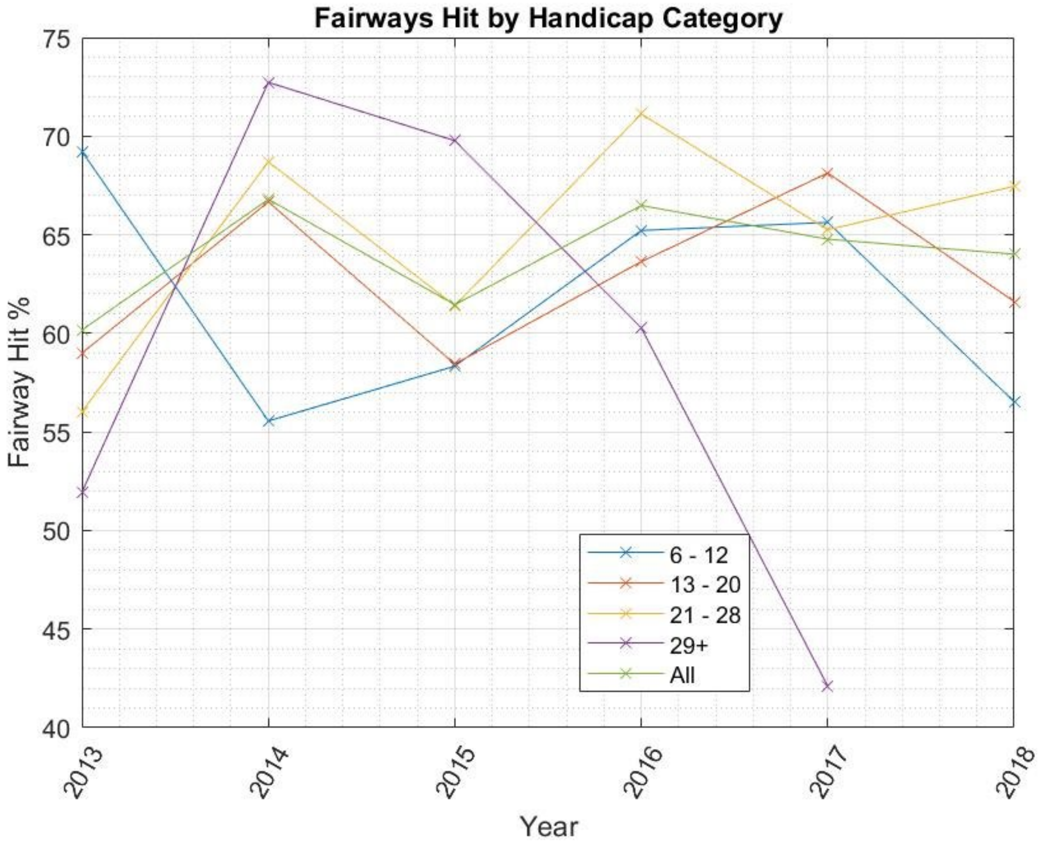

Figure 17: Percentage of fairways hit by women in each handicap category since 2013.

It can be seen that there is large year to year variability in these statistics. However, these values appear to be higher than the equivalent values for men, whose overall average in 2018 was 49%. Figure 18 shows the final locations of drives for a typical day's drive measuring for women.

Figure 18: Final locations of drives on a 444-yard Par 4 in 2018 by handicap category. White = Category 1, Blue = Category 2, Red = Category 3 and Yellow = Category 4.

Conclusions

Overall, the average driving distance for men has increased by 15 yards to 215 yards since 1996. In this time driver usage has increased, particularly for high handicap players. There has been a small decrease in driving accuracy in this time in terms of fairways hit percentage, however dispersion ranges have remained fairly constant over this time, with around 50% of drives finishing within 15 yards of the median drive, and 90% finishing within 35 yards of the median.

A comparison of the study to equivalent data collected in the USA (Appendix A) indicates that differences in average driving distance with handicap range from 8.5 yards for a scratch golfer to less than 1 foot for a 28 handicap player. The R&A study generally yields longer average drives which are less accurate although the topographies of the holes measured have not been recorded so the potential contribution of factors such as relative fairway width cannot be considered.

There has also been an increase in the driving average measured for women between 2013 and 2018, however the lower number of datapoints means it is difficult to make any firm judgements on these results. Women do however have a much higher driver usage and fairways hit percentages than men, with driver usage consistently above 95% for women, and fairways hit around 15% higher than men at 64%.

Appendix A: A Comparison of Amateur Driving Statistics between the UK and the USA

Data have been collected as part of a collaborative study between the Pelz Golf Institute and the PGA Tour comprising an independent study of American amateur golfers at the World Amateur Handicap Championship (WAHC), a tournament played over many golf courses, held annually in Myrtle Beach, South Carolina, USA. The study utilises the PGA Tour Shotlink system of laser measuring devices to collect driving statistics on three holes of one course over the four days of the Championship. This study was first conducted in 2006 and was repeated in 2007, 2008, 2010 and 2011 providing a total of nearly 3850 drives for comparison to the amateur driving distance data collected annually by The R&A. Table 3 compares the testing set up for the WAHC study to the R&A study over the same timeframe.

	R&A	WAHC
Number of courses used each year)	6	1
Driving holes used per course	2	3
Days for data collection each year	7	4
No. of drives recorded **(2006, 2007, 2008, 2010 & 2011 combined)**	9846	3847
Handicap range	+2 – 28	+4 – 39.1

Table 3: Test set up for both studies.

The WAHC is played over many golf courses but is configured such that approximately two ‘flights’ of up to 50 golfers play each course each day. Each flight has a specific and usually narrow handicap range (for example flights measured for the study in 2010 included 4.1-5.6, 10.2-10.9, 18.9-21.5 and a higher range flight of 21.6-36.4). These have led to a good range of handicaps being measured over the five years of the study as demonstrated by plotting the number of shots measured by handicap for each study, Figure 19. However, it should also be noted that whilst the WAHC study comprises a good range of handicaps, there are also handicaps for which there are very few datapoints which make assessment of the two datasets through comparison of data categorised by CONGU handicap bands inappropriate.

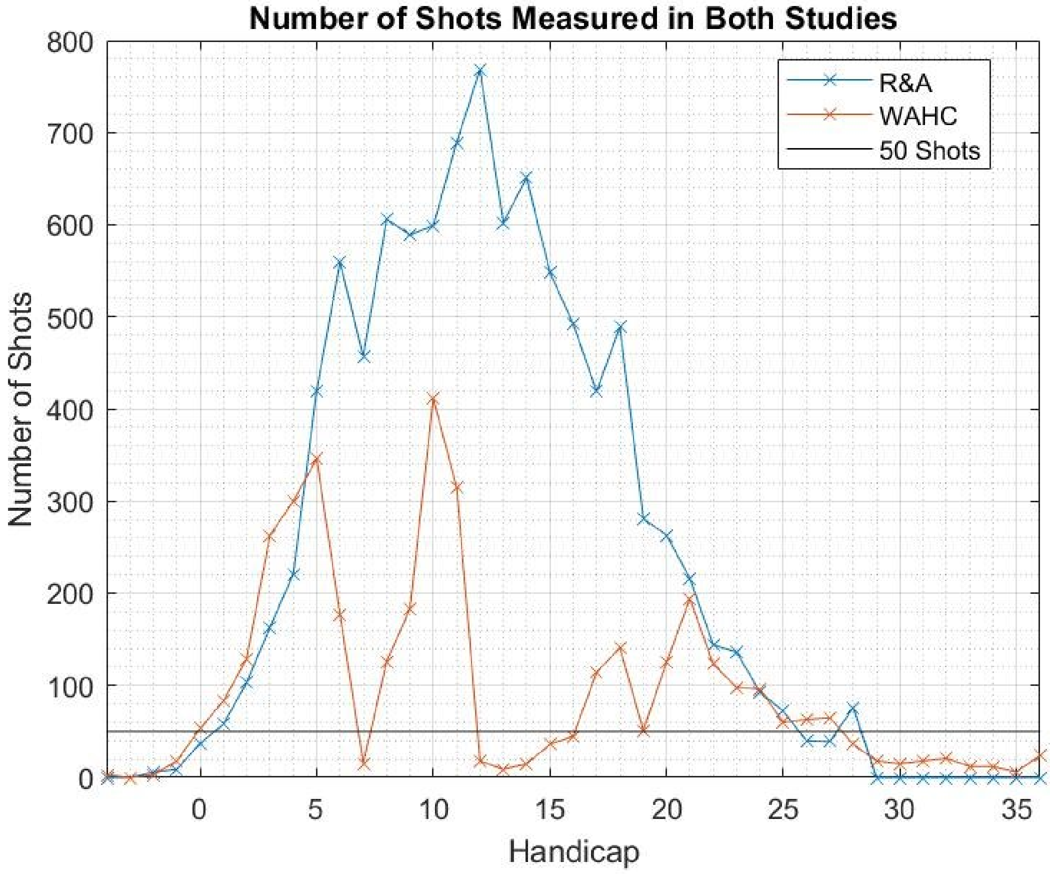

Figure 19. The number of shots attained for each handicap for both studies.

It can be seen by comparing the raw distance data by handicap for both studies, Figure 20, that throughout the complete handicap range the data from both studies generally overlay each other. It is noteworthy that one difference in the handicap distribution between the studies is due to The R&A study only recording playing handicap whilst the WAHC study records exact handicap. However, it can also be seen that as previously highlighted, there are areas within the handicap range which are sparsely populated with data from the WAHC study – namely for 7 handicap golfers and those with handicaps between 12 and 16. In the former case, this absence may not have too significant an effect on the average distance of the 5.5-12.5 handicap category since it falls in the middle of that range with a multitude of data points being available at the extremes of that handicap range. However in the case of the 12-16 range, this sees very little data in the lower handicap range of the 12.5-20.5 handicap category with the majority of the data in that category being contributed by the higher handicap golfers. Given that driving distance is proportional to handicap, the lack of data in the lower half of a handicap category will likely cause the resultant average driving distance for that category to be lower than had the category been uniformly populated.

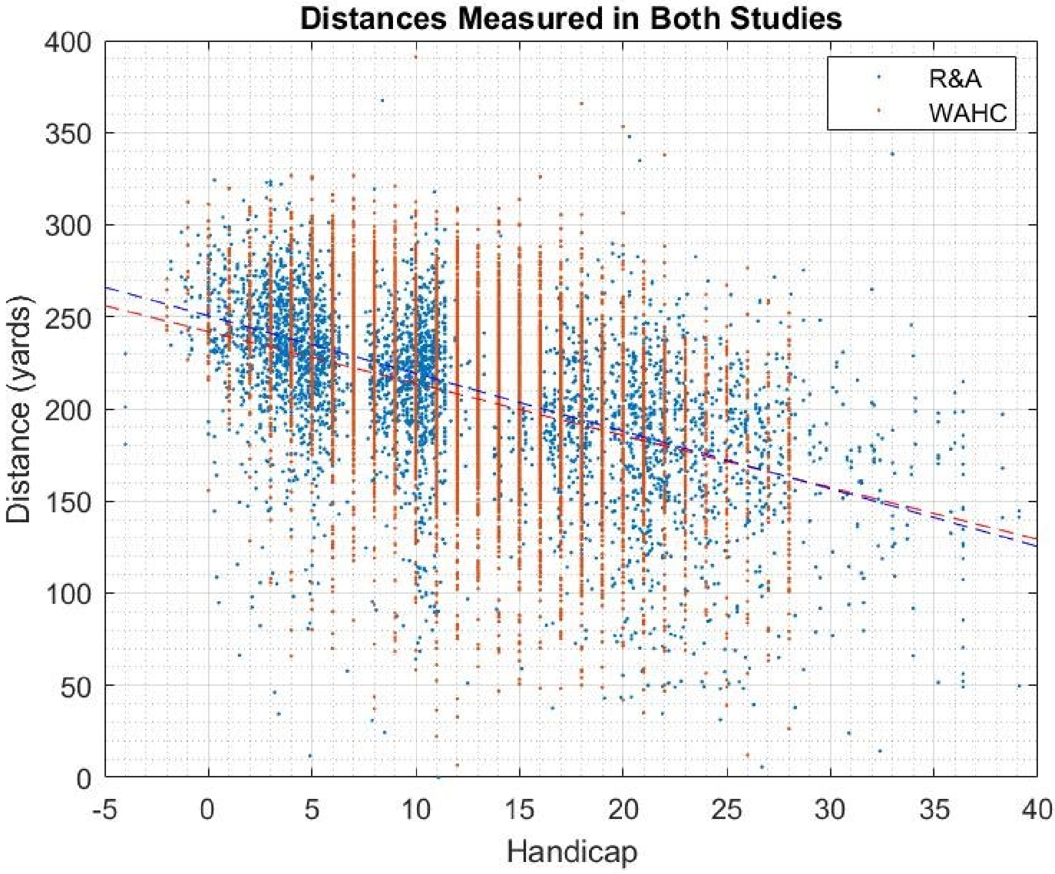

Figure 20. Distance vs. Handicap data for both the WAHC and R&A studies.

Furthermore, it can be seen from Figure 20 that when linear trend lines are fitted through both sets of data, the relationship between driving distance and handicap for each set of data are generally similar with the distance from the R&A study being slightly higher than that of the WAHC study. The coefficients of these trend lines (of the form Distance = Handicap x M + Y_0) along with what the typical distances for scratch, 14 and 28 handicap golfers based on these trends are presented in Table 4.

Study	**Y_0**	**M**	**R^2**	**Distance (0 Hcap)**	**Distance (14 Hcap)**	**Distance (28 HCap)**

WAHC	242.0	-2.819	0.27	242.0 Y	202.5 Y	163.1 Y
R&A	250.5	-3.127	0.18	250.5 Y	206.7 Y	162.9 Y

Table 4: Coefficients of the trend lines from Figure 20.

It can be seen that the handicap dependency of distance (M) for both studies are generally similar whilst a difference of 8.5 yards between studies for a scratch golfer has decreased to less than 1 foot for a 28 handicap golfer.

The difference between the populations by handicap is better illustrated by plotting the average distance for each 'playing handicap', Figure 21. Only handicaps for which there are 50 shots or greater are included but it can be seen from these that whilst there generally appears to be a systematic offset between the two studies with the R&A study golfers generally being longer than their WAHC counterparts, this offset is generally small.

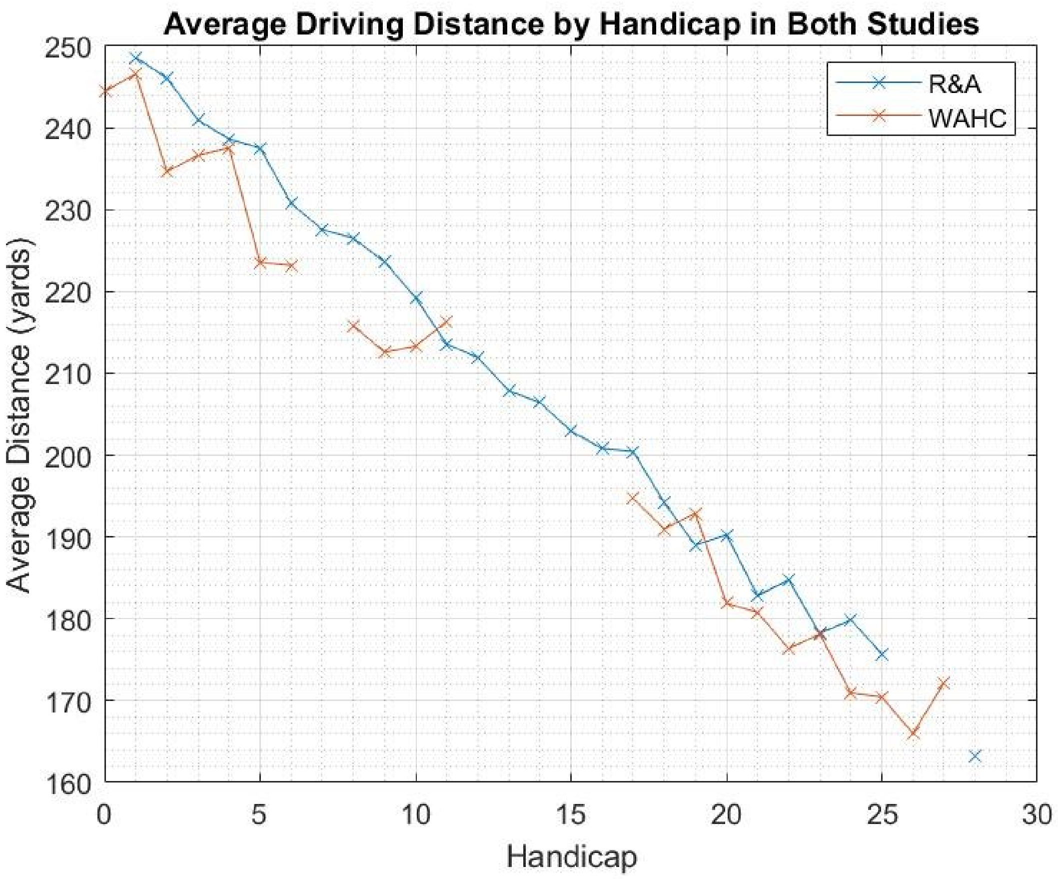

Figure 21. Average driving distance by 'playing' handicap for both studies. Only handicaps for which there are 50 shots or greater are included.

When considering driving accuracy as a function of handicap (for handicaps which contain at least 50 shots), Figure 22, it can be seen that the R&A study golfers appear to consistently hit fewer fairways than their WAHC counterparts, particularly for the lower handicap categories where there is more consistent data. However, it is important to note that the relative widths of the fairways between the studies are not known which could serve as a contributing source of the difference in accuracy.

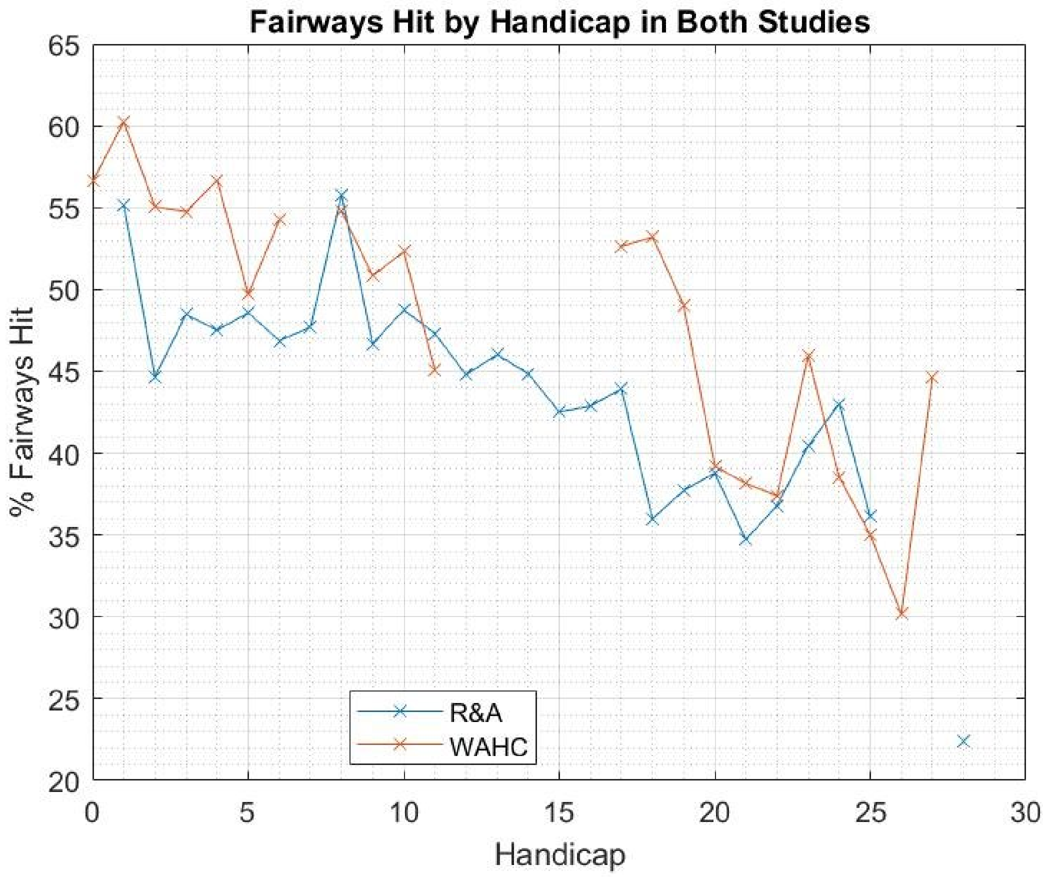

Figure 22. Average driving accuracy by 'playing' handicap for both studies. Only handicaps for which there are 50 shots or greater are included.