

An Analysis of the Effects of Age on Professional Golfers

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Abstract

We examine statistics from professional golf, and find which statistics influence scoring average and success on tour. We develop an efficient practice routine that tailors to the age and the most important components of a golfer's game. We find a routine that suits a younger, middle aged, and older golfer. These routines provide a golfer the ability to practice the most important parts of their game, therefore giving them an advantage over their competitors.

1 Introduction

Professional golfers' careers commonly last twenty to thirty years for a motivated player with a good practice regimen. With so many aspects to the game of golf, and such a long period of time, the aging process requires that golfers utilize different skill sets as they move through their careers. In this analysis we look at key statistics and determine what aspects of a professional golfer's game separate them from other tour players in the same age group. We compare different age groups of golfers over time and establish which statistics are crucial to each age group to continue to perform at a high level throughout a career. We evaluate ten golfers that have maintained a high level of play for the last ten years and determine which statistics have become more or less important as the golfers have aged. Lastly, we compare all of the statistics to scoring average for the top ten golfers and each age group of golfers to see which statistic correlates strongly to scoring average for each different part of a golfer's career.

Players that compete as professional golfers, such as Tiger Woods, practice up to fourteen hours a day trying to perfect their individual games. Professional golfers devote a certain amount of time to each part of their game: driving, putting, chipping, etc. Each and every day a professional golfer's goal is to practice in a way that will allow them to use their time in the most efficient and effective way possible. To practice in the most effective way it would prove beneficial to know which parts of their game would be most valuable to them if improved. For example, younger golfers can naturally hit the ball further than older golfers. Therefore, a younger player devoting half of their time to increasing driving distance will not be the most efficient use of time. The younger golfer looks to improve driving accuracy, putting, and chipping to separate themselves from other younger players. On the contrary, older golfers focus more time on their driving distance to keep up with younger golfers and also to keep up with the increase in length of golf courses over the past decade. How golfers decide to utilize each hour of practice time can be the difference between having a long and successful career on tour and being off the tour and looking for another job. With all the statistical data available we will find which aspects of a golfer's game contribute to success as a golfer ages. We will also find a method of practicing that will pinpoint certain aspects of a golfer's game that they need to improve upon and that correlate to success at each specific point or age group in their career. With this information we can determine a better way to allocate practice time and a more effective way to produce a successful professional golfing career.

2 Definitions and Development

There is a remarkable amount of data kept by the various professional golf tours around the world. The largest tour, the Professional Golfers' Association (PGA Tour), is based in the United States. They maintain a database with hundreds of statistics, but for the purposes of this study it was best to look at a select few that we deemed to be extremely important. We picked six key statistics: driving distance, driving accuracy, greens in regulation, putts per round, scrambling, and scoring average. **Driving distance** is the average number of yards per drive measured at the point which the ball comes to rest regardless of whether it lies in the fairway or not. **Driving accuracy** is the percentage of time a tee shot comes to rest in a fairway regardless of the club used off the tee. **Greens in regulation** is taken as a percentage, and a green in regulation is deemed hit if any portion of the ball is touching the putting surface after the green in regulation stroke has been taken. The green in regulation stroke is determined by subtracting two from par on each hole; in other words, after the first stroke on a par three, second on a par four, and third on a par five. **Putts per round** is the average total number of putts for each individual round played. **Scrambling** is the percent of time a player misses the green in regulation, but still makes par or better. **Scoring average** is the average amount of strokes per round that a player takes. These statistics are essential to lower scores and breed a better all around golfer. If a professional learns to maximize their ability in these statistics at the optimal time in their career it could provide a long lasting and successful career as a professional golfer.

3 Results

We first conducted an ANOVA single factor test over three age groups. These age groups are composed of the top 25 golfers in the world in each of three age groups: ages 20-30, ages 30-40, and ages 40-50. We tested to see if there is a significant correlation between our six key statistics over the three age groups. We used a 10% level of significance due to the small variation among golf statistics between professional golfers. We reject the null hypothesis in favor of the research hypothesis if the *P-value* is less than .10.

Hypothesis	<i>F-value</i>	<i>F-critical</i>	<i>P-value</i>
H0: Driving Distance ≥ 0 as golfers age H1: Driving Distance < 0 as golfers age	6.5033	2.3778	.0025
H0: Driving Accuracy ≤ 0 as golfers age H1: Driving Accuracy > 0 as golfers age	.3062	2.3778	.7372
H0: Greens in Regulation ≥ 0 as golfers age H1: Greens in Regulation < 0 as golfers age	1.8496	2.3778	.1647
H0: Putts Per Round ≥ 0 as golfers age H1: Putts Per Round < 0 as golfers age	2.2814	2.3778	.1095
H0: Scrambling ≤ 0 as golfers age H1: Scrambling > 0 as golfers age	1.3	2.3778	.2788
H0: Scoring Average ≤ 0 as golfers age H1: Scoring Average > 0 as golfers age	8.3705	2.3778	.0005

Figure 3.1

The results in Figure 3.1 show that driving distance and scoring average are the two statistics from our sample of the top 25 golfers in the world from each age group that are significant. This means that as a golfer ages, their driving distance decreases, and their scoring

average increases, thus giving substantial evidence to reject our null hypotheses and accept our research hypotheses in driving distance and scoring average. In the other four key statistics, including driving accuracy, greens in regulation, putts per round, and scrambling our *P-value* was not significant. This in turn gives no substantial evidence to accept the research hypotheses and thus we accept the null hypotheses. It is important to note that although not significant, driving accuracy increased over the three age groups and greens in regulation decreased over the three age groups.

Next we conducted a paired two sample for means t-Test using the top ten golfers. The top ten golfers are composed of ten golfers who have been successful in the game of golf over the past ten years. From our collection of ten years of data on these players, we analyze what factors have led to long term success by testing for a significant correlation from the first three years to the last three years of data. We use a 10% significance level due to the small variation among golf statistics between professional golfers. We reject the null hypothesis in favor of the research hypothesis if the *P-value* is less than .10.

Hypothesis	T-Stat	T-Critical	P-value
H0: Driving Distance ≥ 0 as golfers age H1: Driving Distance < 0 as golfers age	3.189	1.311	.0034
H0: Driving Accuracy ≤ 0 as golfers age H1: Driving Accuracy > 0 as golfers age	1.469	1.311	.0762
H0: Greens in Regulation ≥ 0 as golfers age H1: Greens in Regulation < 0 as golfers age	1.204	1.311	.1190
H0: Putts Per Round ≥ 0 as golfers age H1: Putts Per Round < 0 as golfers age	2.754	1.311	.0050
H0: Scrambling ≤ 0 as golfers age H1: Scrambling > 0 as golfers age	.3608	1.311	.3604
H0: Scoring Average ≤ 0 as golfers age H1: Scoring Average > 0 as golfers age	1.390	1.311	.0874

Figure 3.2

The results in Figure 3.2 show that driving distance, driving accuracy, putts per round, and scoring are significant. This means that as a golfer ages, both their driving distance and putts per round decrease, and both their driving accuracy and scoring average increase, thus giving substantial evidence to reject our null hypotheses and accept our research hypotheses in these four key statistics. On the other hand, for greens in regulation and scrambling the *P-value* was not significant. Thus, with no significant evidence to accept the research hypotheses we accept the null hypotheses. It is important to note that even though there was not a significant decrease in greens in regulation it was trending toward significance.

Next we conducted a regression analysis over three age groups. These age groups are composed of the top 25 golfers in the world in each of three age groups: ages 20-30, ages 30-40, and ages 40-50. We tested to identify the relationship between our key statistics and their scoring average. We use a 10% significance level due to the small variation among golf statistics between professionals. We reject the null hypothesis in favor of the research hypothesis if the *P-value* is less than .10.

Hypotheses	Age Group	F-Value	Significance F
H0: Driving Distance $r \leq 0$ Scoring Average H1: Driving distance $r > 0$ Scoring Average			
	20-30	.3117	.5819
	30-40	.9119	.3495
	40-50	1.318	.2626
H0: Driving Accuracy $r \leq 0$ Scoring Average H1: Driving accuracy $r > 0$ Scoring Average			
	20-30	2.840	.1054
	30-40	4.945	.0362
	40-50	.1618	.6911
H0: Greens In Regulation $r \leq 0$ Scoring Average H1: Greens in Regulation $r > 0$ Scoring Average			
	20-30	.0791	.7810
	30-40	.3965	.5351
	40-50	.7339	.4004
H0: Putts Per round $r \geq 0$ Scoring Average H1: Putts Per round $r < 0$ Scoring Average			
	20-30	9.785	.0047
	30-40	.1566	.6959
	40-50	6.471	.018
H0: Scrambling $r \leq 0$ Scoring Average H1: Scrambling $r > 0$ Scoring Average			
	20-30	18.29	.0002
	30-40	4.117	.0541
	40-50	4.599	.0427

Figure 3.3

The results in Figure 3.3 show the relationship between our five key statistics and scoring average. Although we may not find significance in all of the tests, there is more value in the trends of each key statistic. The trends show that over time, some statistics become more important to overall performance. This is represented in the scoring averages.

Driving distance and greens in regulation, in relation to scoring average, are not critical in any of the age groups tested. However, we can see a dramatic increase in the relevance of

driving distance and greens in regulation over the years based on the decrease in the significance of F . With no substantial evidence to support our research hypothesis we accept our null hypothesis in all three age groups.

Driving accuracy in relation to scoring average is critical among the 30-40 age group and trending toward significance in the 20-30 age group but shows no significance in the 40-50 age group. This shows that older golfers must not rely as much on how accurate they are off the tee, but for younger golfers it is crucial to hit the fairway. With substantial evidence to reject the null hypothesis for our youngest age group we can accept our research hypothesis, but in the case of the two other age groups we must accept our null hypotheses.

Putts per round, in relation to scoring average, is critical. In fact, the data shows it to be very significant in the 20-30 and 40-50 age groups. Surprisingly, it is not even close to significant for the 30-40 age group. In other words, to the younger and older golfers putting has a dramatic impact on scoring average, but in the middle aged player it makes almost no difference. This allows us to accept our research hypothesis for the 20-30 and 40-50 age groups but to reject our research hypothesis and accept the null for the 30-40 age group. Scrambling in relation to scoring average is critical for all age groups. This means that how well a player scrambles affects their scoring average dramatically over all years of their career. With extensive evidence to reject our null hypothesis in all three age groups, we accept our research hypothesis on all accounts.

Lastly we conducted a regression analysis over the top ten golfers. The top ten golfers are composed of ten golfers who have been successful in the game of golf over the past ten years. From our collection of ten years of data on these players, we analyze what factors have led to long term success by testing to identify the relationship between our key statistics and their effect on scoring average from the first three years to the last three years of data. We use a 10% level of significance due to the small variation among golf statistics between professionals. We reject the null hypothesis in favor of the research hypothesis if the P -value is less than .10.

The results in Figure 3.4 show the relation between five key statistics and scoring average among the top ten golfers over a ten year period. Driving distance, driving accuracy, and greens in regulation, in relation to scoring average, are critical over the first three years. This shows that it is more critical for younger players to hit the ball longer, straighter, and hit the green in regulation. Therefore, with evidence to reject the null hypothesis, we must accept the research hypothesis for the first three years and reject it for the last three years due to an F -value that is not significant. Putts per round in relation to scoring average is critical over the last three years but not in the first three years. This shows that it is more critical for older players to practice and make more putts. Therefore, with a substantial significance we can reject our null hypothesis and accept our research hypothesis for the last three years. In the first three years, there is not enough evidence to prove significance, and we must accept our null hypothesis. Scrambling in relation to scoring average is critical over both periods in the top ten golfers that we looked at. This shows that it is very important for golfers to be able to scramble throughout their entire career in order to maintain a low scoring average. Therefore, this gives substantial evidence to reject the null hypothesis and accept the research hypothesis.

4 Conclusion and Directions for Further Research

To help answer our research questions we will first make conclusions linked to the data in the results sections in regard to overall findings. In Figure 3.1 of the results section we see that driving distance decreases over the three age groups. We also see that scoring average decreases over the three age groups. This leads us to believe that golfers must focus their practice time as they get older on increasing driving distance and lowering scoring average because that is where their games tend to fall off. In Figure 3.2 of the results section it is confirmed that driving distance decreases and scoring average increases over time. Both lead to the downfall of an older player's game. Some new findings from this section are that as a golfer ages putts per round decrease and driving accuracy increase. These conclusions lead us to believe that as golfers age they tend to hit the ball shorter and more accurately. Older golfers also learn the importance of putting and devote more practice time to this aspect of their game as they age.

Hypothesis	Years	F-Value	Significance F
H ₀ : Driving Distance $r \leq 0$ Scoring Average H ₁ : Driving distance $r > 0$ Scoring Average			
	First 3	9.759	.0041
	Last 3	.4998	.4854
H ₀ : Driving Accuracy $r \leq 0$ Scoring Average H ₁ : Driving accuracy $r > 0$ Scoring Average			
	First 3	6.815	.0143
	Last 3	1.234	.2759
H ₀ : Greens In Regulation $r \leq 0$ Scoring Average H ₁ : Greens in Regulation $r > 0$ Scoring Average			
	First 3	14.138	.0007
	Last 3	1.197	.2832
H ₀ : Putts Per round $r \geq 0$ Scoring Average H ₁ : Putts Per round $r < 0$ Scoring Average			
	First 3	.5178	.4777
	Last 3	12.18	.0016
H ₀ : Scrambling $r \leq 0$ Scoring Average H ₁ : Scrambling $r > 0$ Scoring Average			
	First 3	6.597	.0158
	Last 3	26.16	.00002

Figure 3.4

Our next study related our statistics to scoring average over the age groups. Our results for Figure 3.3 show that although driving distance and greens in regulation are not significant, as a golfer ages, they become increasingly important. This is due to the fact that as golfers age they don't hit as many greens in regulation or hit the ball as far as younger golfers. Due to this fact the older players that can continue to hit the ball far and hit greens in regulation will have a major competitive advantage over other players within their age group. We can also see that driving accuracy is far more important to a younger golfer's game because they tend to hit the ball a long way. Since they are all similar in distance, what separates one player from another in the younger age group is who can hit the ball straighter. It is also important to notice that putts per round and scrambling are the two statistics that most dramatically affect a golfer's game and sets them apart from others. In the golfing world it is commonly thought that players who have great chipping and putting skills will dramatically outscore the player who is better off the tee and on his approach to the green. This statistic proves a fact that is commonly believed in the golfing world to be true. It should be noted that there is one outlier within the putting statistic, and that is the 30-40 age group. In this group the effect of putting on a player's scoring average is negligible compared to all the other statistics.

Figure 3.4 relates our statistics to scoring average over the top ten golfers. We see that all of the statistics outside of putting are extremely important in relation to scoring average in the first three years. This is when most of the players were in their thirties. As we move to the last three years we see that nearly all the numbers flip, with the only constant being that scrambling strongly relates to scoring average. This is interesting because as these top ten golfers move into their early and mid forties their putting and chipping proves to be the most significant factors in relation to scoring average. This relates to our last study in showing that, to golfers in their thirties, putting well would give them nearly no competitive advantage on the course.

In answering the question of what aspects of a golfer's game contributes to success at certain points of their career, it would be easiest to explain a model golfer at each age group and a practice regimen that would prove most efficient. For the younger golfer, in the 20-30 age group, it is important to have somebody who uses a majority of their practice time to focus on scrambling and putting, as well as working at driving accuracy to set themselves apart from the field. For the middle aged golfer, in the 30-40 age group, it is important that they work on driving distance and accuracy as well as hitting greens in regulation. Scrambling is also important to the middle aged golfer, but surprisingly the statistic that proves least relevant to giving the middle aged golfer a competitive advantage is putting. Thus, if the middle aged golfer can excel at driving the ball, hitting greens, or scrambling they will have an edge on their competitors. Lastly, for the older golfer, in the 40-50 age group, the most important parts of their game to practice are scrambling and putting because they have the most dramatic impact on scoring average. Driving distance and greens in regulation also become increasingly important for the older player to be able to keep pace with the younger players that naturally excel in these parts of the game.

The preceding research has shaped other questions for future research. One could be to use the same top ten golfers that we used for this study, but instead of running tests on their data from the past ten years to the present date, we could observe the golfers in a ten year span when they are all of the same age. For example, if Phil Mickelson is 40 years of age in 2012 and Tiger Woods is 35 we could choose to run our tests when each of them were 25-35 to see how this would affect our statistics. Another question for future research is looking further into the statistics provided by the various tours around the world in order to find out more about what aspects of a golfer's game lead to success at specific point in their career. Another

question for future research is trying to determine why putting in the 30-40 age group is nearly irrelevant in relation to scoring average.

References

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