



Quantitative Analysis of Forced Carry Hitting Distances: Golfer Behavior (Decision Making) and Success Rates

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1. Summary

A quantitative analysis of forced carry distance data was conducted by the USGA during the 2021 season. Decision to Attempt to Carry frequency and success rates were measured, calculated and compared to show recreational golfers' decision making and performance while navigating forced carries. This study looks at tendencies by gender and golfer skill level for forced carry situations. Not surprising, shorter hitting golfers face a greater challenge with forced carries. They have lower success rates of clearing the hazard and choose to play it safe more frequently. These data and results should be valuable to professionals in the golf industry who are designing or setting up golf courses for daily play or competitions.

2. Introduction

During the Fall of 2021, the USGA conducted a research study at Cedarbrook Country Club on holes with forced carries in front the green in play. Using a laser range finder, the USGA was able to measure the golfers' distance from the flagstick, observe and judge whether each golfer laid up or attempted to carry the hazard, and record the result of each shot. Over the course of three weeks, 1350 shots were observed across three different holes with forced carries on the shot into the green (one par 3, one par 4 and one par 5 hole). The hole layouts and critical dimensions are depicted in the Appendix in Figures 7-9. Because the only demographic information that was available for the golfers was their observed gender, as many shots as possible were measured to attempt to represent the overall population of golfers.

3. The Sample

In addition to gender, three distinct skill groups of golfers were observed during the data collection period. First, the “Hogan” is a one-day event for highly skilled male golfers. Most of the golfers in the event had near scratch or better Handicap Index®. “Outings” refer to measurements made during three Monday outings. These outings included generally less experienced golfers that were not typically members of the club. Lastly, “Regular” refers to play by members and guests of Cedarbrook Country Club. Most of the golfers from this group will be very familiar with the course.

4. Methodology

As each golfer played through the holes of interest, the USGA recorded their distance from the flagstick using a laser range finder mounted on a tripod. The laser range finder first uses the flagstick location as its reference target. Upon acquiring the target golfer over the ball by aiming the laser, each shot was measured to obtain the distance from the flagstick (reference point). In this way, the USGA was able to collect extremely accurate measurements for each shot.

Because the flagstick was used as reference point and typically changes daily, calculations were made using hole location sheets to determine the distance from each shot to the *center* of the green. These adjustments make the day-to-day measurements directly comparable.

In addition to distance, the USGA also recorded the golfers’ gender and judged the shot intention of the golfer. Golfers could either choose to attempt to carry the hazard, layup, or carry to the island on the par-5 hole #12. The outcome of each shot was recorded as a success or a failure after the attempt. A success refers to if the golfer accomplished their objective surrounding the forced carry. For example, if the golfer attempts a carry and the shot lands in the hazard, it is recorded as a failure. Alternatively, if the golfer attempts a layup and the shot lays up to the front of the hazard, it is recorded as a success.

5. Attempted Carry Frequency by Distance

This section demonstrates how frequently golfers attempt to carry from varying distances versus deciding to lay up. This measures their decision making and playing strategy.

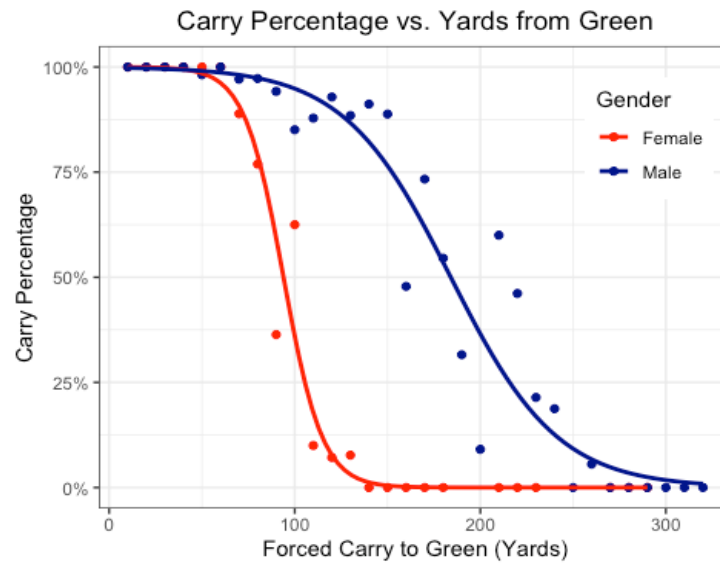
By Gender

There is a clear difference between how each gender approaches a forced carry situation. In Figure 1, it can be seen that females generally layup at closer distances than males. For instance, at 125 yards away from the Green, 5% of females will go for the carry compared to about 88% of males.

It can also be seen where a forced carry starts to impact golfers by gender. Female golfers are impacted starting about 50 – 60 yards from the hole. By 90 – 95 yards, nearly half of

female golfers are laying up and by 150 yards, virtually all female golfers lay-up. Contrast this to men, who begin to be impacted at 60 – 70 yards. By about 180 yards, nearly half of male golfers are laying up and it is not until over 250 yards, that virtually all male golfers lay-up.

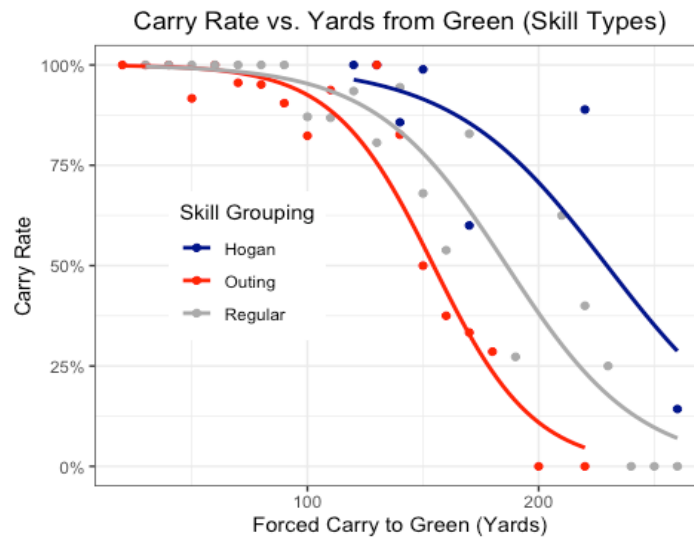
Figure 1: Carry Percentage vs. Yards from Green (Gender)



By Skill

Furthermore, trends in forced carry behavior are a function of the skill of male golfers. The “Hogan” event refers to the highest skilled players while “Outings” refer to lower skilled players. In Figure 2, it can be seen that lower skilled golfers generally layup at shorter distances compared to highly skilled golfers. For instance, at 150 yards away from the Green, 55% of low skilled golfers attempt to carry, 77% of mid-skill golfers attempt to carry, and over 90% of the most skilled golfers attempt to carry.

Figure 2: Carry Percentage vs. Yards from Green (By Skill)

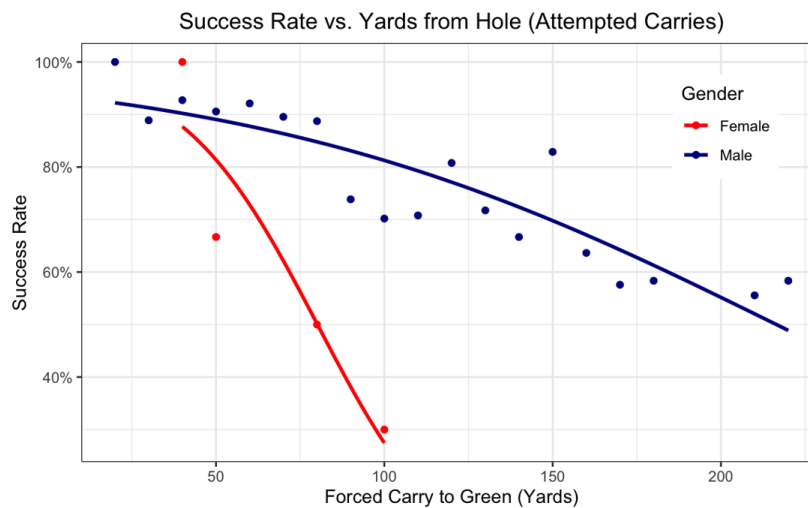


6. Success Rates on Carries by Distance

By Gender

Figure 3 demonstrates gender differences in success rate on carries. There is a sharper decline in success rate for females compared to males as distance from the green increases. At 75 yards, females have a 55% success rate on carries compared to an 85% success rate for males. By 100 yards, female success rate drops to 30% versus males of over 80%, again reinforcing the disproportionate effect of forced carries on shorter hitting golfers.

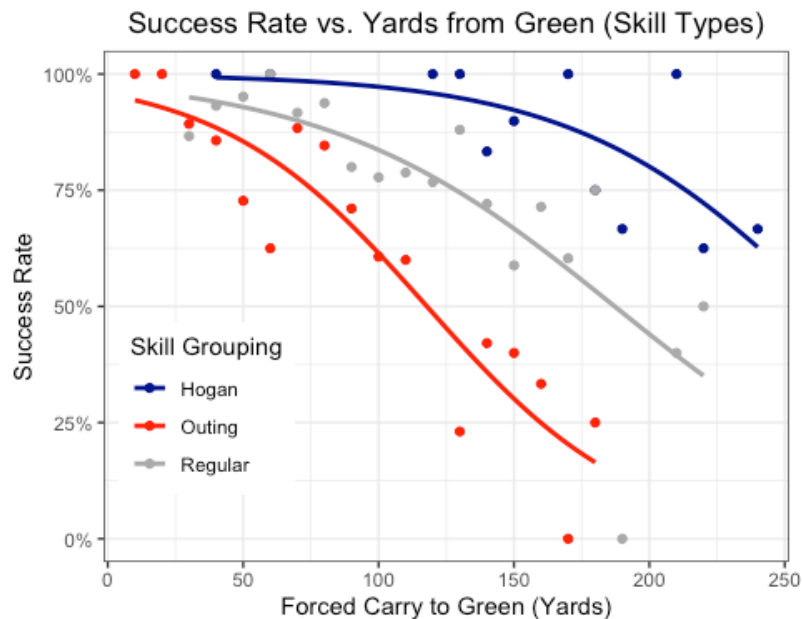
Figure 3: Success Rate on Carries vs. Yards from Green (By Gender)



By Skill

Analogous trends can be seen when looking at the skill level of male golfers. Figure 4 shows that the highest skilled golfers have higher success rates on carries compared to that of lower skilled golfers. At 150 yards away from the green, 90% of high skilled golfers succeed on carries compared to 70% success of regular golfers and only 31% success rate of low skilled golfers.

Figure 4: Success Rate on Carries vs. Yards from Green (By Skill)

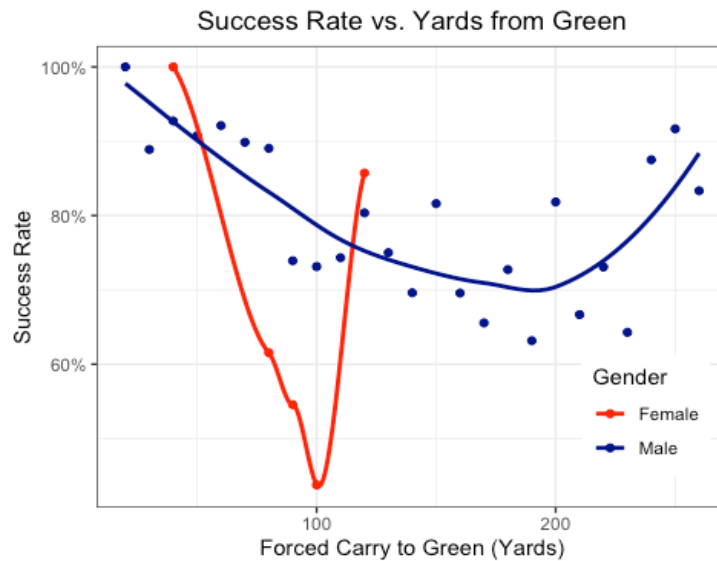


7. Success Rates on All Shots

By Gender

Figure 5 shows gender differences in success rate on *all* shots by distance from the hole. The curves rebound at farther distances as more players from each gender start to successfully lay-up instead of attempting to carry. Females see a sharp increase in success rate after 100 yards as they more frequently lay-up at 100 yards or more. Males experience a success rate increase at 200 yards when they tend to lay up more frequently and successfully.

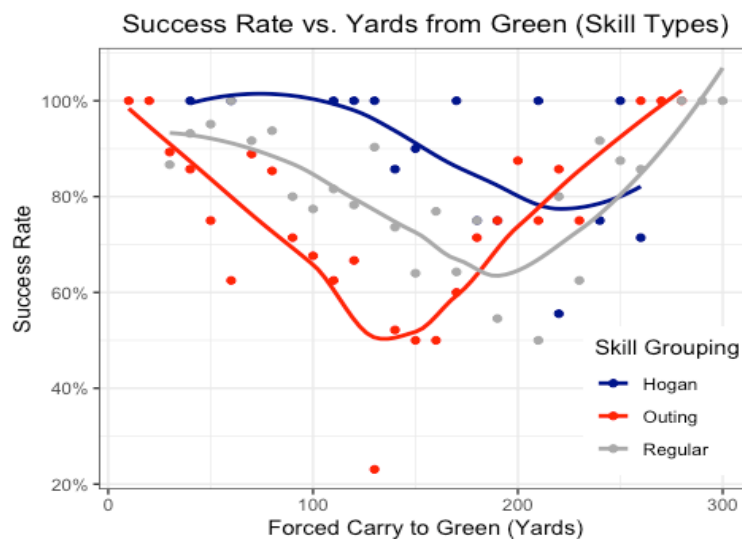
Figure 5: Success Rate on All Shots vs. Yards from Green (By Gender)



By Skill

Figure 6 shows skill level differences in success rate on *all* shots by distance from the hole. Again, there is an increase in success rate at farther distances for all skill levels. Interestingly, the low skilled players have higher success rates on shots farther than 200 yards away from the green than other skill groupings. This suggests that high skilled golfers would rather take on some extra risk to carry instead of laying up and taking an extra stroke.

Figure 6: Success Rate on All Shots vs. Yards from Green (By Skill)



8. Conclusions

The overall goal of this study was to explore the forced carry data that was recorded by the USGA during the 2021 season. The main objective was to analyze golfers' strategy and success rates when faced with forced carries at varying distances away from a green.

The analysis shows that male golfers attempt forced carries and succeed more often at farther distances compared to female golfers. Additionally, higher skilled golfers attempt forced carries and succeed at farther distances compared to lower skilled golfers.

All golfers have a decreasing success rate as the length of forced carries increases. Females have a sharper decrease in success rate compared to males. Higher skilled golfers have higher success rates at farther distances compared to lower skilled golfers.

Finally, success rates on all shots for all types of golfers tend to increase at relatively long distances as more golfers decide to lay up instead of attempting to carry.

These data and results should be valuable to professionals in the golf industry who are designing or setting up golf courses for daily play or competitions.

9. Appendix

Figure 7: Hole 4 (Par 4)

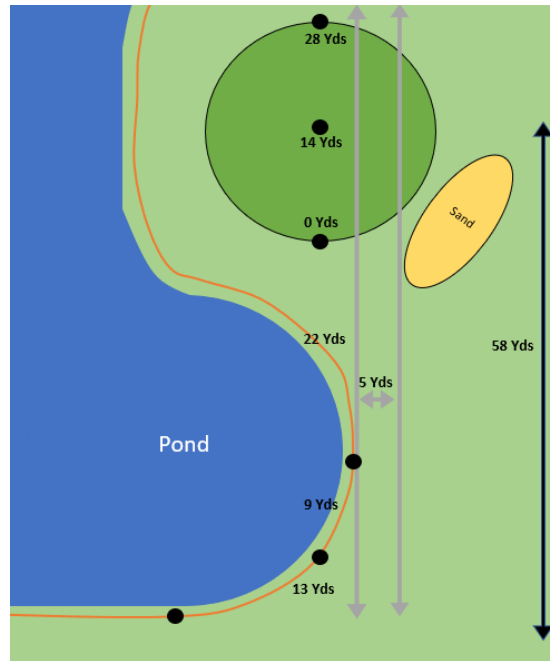


Figure 8: Hole 12 (Par 5)

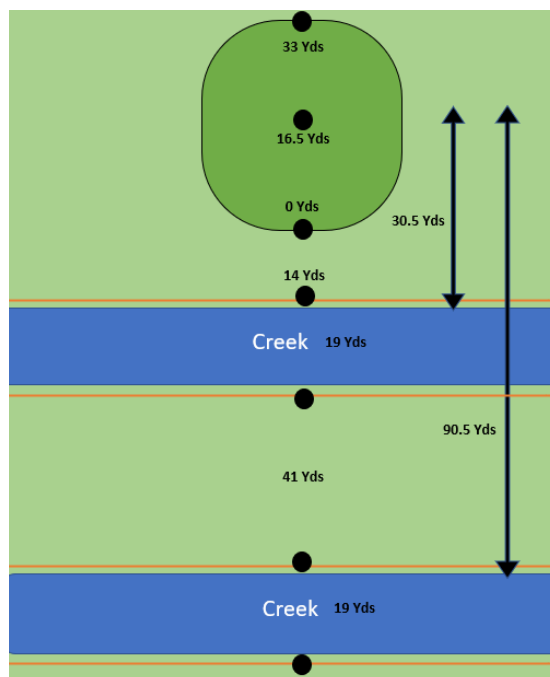


Figure 9: Hole 13 (Par 3)

