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# A Case “Fore” Buffer Zones

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## Abstract

Golf tournaments are fun and exciting events because they allow for up-close interaction with players, but they also present a risk management concern. Professional golfers are not immune to hitting errant golf shots and a lack of buffer zones often results in spectator injury. The purpose of this paper is to examine how buffer zones can be enhanced or developed to protect patrons. Utilizing data from the PGA Tour, a model was developed to aid in predicting errant tee shots to enhance buffer zones.

**Keywords:** *Buffer zone, golf, patrons, risk management*

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## Introduction

The 2018 Waste Management Phoenix Open hosted at TPC Scottsdale in Phoenix, Arizona, set tournament and single-day records for the Professional Golfers' Association (PGA) Tour: 719,179 fans attended the event, of which 216,818 attended Saturday's round—displaying increases of nearly 10% and 6%, respectively from 2017 (Berhow, 2018). The increase in excitement focused on professional golf is music to the ears of Tournament Directors, the PGA Tour, and corporate sponsors, but care must be taken to ensure patron safety at professional golf events.

On the opening day of the 2018 Ryder Cup, Brooks Koepka hit an errant tee shot that struck a patron in the head causing the person to lose sight in their eye (Herrington, 2018). This spectator injury aided in illuminating the need for research-based guidance to minimize spectator risk at sporting events. Indeed, after increased publicity of spectator injuries caused by balls and bats entering the stands and injuring spectators, Major League Baseball (MLB) announced that all 30 clubs would increase netting for the 2018 season (Cassavell, 2018). However, MLB was reluctant to develop a formalized policy due to the chance of creating legal jeopardy from the “Baseball Rule.”

According to the “Baseball Rule,” “stadium owners and operators are not responsible for injuries sustained by foul balls or pieces of shattered bats, so long as netted or screened seats are in place for a reasonable number of spectators” (Ransom, 2015, para. 2). The “Baseball Rule” has brought extensive debate with respect to the duty owed to spectators, but little has been discussed for golf tournament patrons who are at a higher risk of getting hurt than the players (Fried & Ammon Jr., 2002; Ludden, 2013). Though Kastenburg (1996) discussed the important role of *Duffy v. Midlothian Country Club* (1980) in determining assumption of risk for injuries sustained by spectators at golf tournaments, the courts have not established precedent on the subject, and a deciding factor in most cases comes down to a spectators knowledge of the game of golf (Kastenburg, 1996).

A golf tournament presents a wide variety of variables that cannot be fully considered on each golf shot, leading to the question “Can you control the uncontrollable?” Spectators must assume some of the risk associated with viewing the tournament, but is getting hit by a golf ball an inherent risk of attending a golf tournament? The PGA Tour (2018) provides the following statement on the back of each ticket:

By entering onto the grounds of the tournament using this ticket, you acknowledge and agree to the following for yourself and on behalf of any accompanying minor (who shall also be deemed to be “you” for purposes of the following): YOU ASSUME ALL RISK AND DANGER ARISING OUT OF YOUR ATTENDANCE INCLUDING LOSS OF YOUR PERSONAL PROPERTY, INJURY, OR DEATH FROM A GOLF SHOT OR BY OTHER SPECTATORS OR PLAYERS, AND YOU HEREBY RELEASE

TOUR, THE HOST ORGANIZATION, THE HOST SITE, TELEVISION BROADCASTERS, SPONSORS, VENDORS AND THEIR RESPECTIVE AFFILIATES, EMPLOYEES AND AGENTS, AND ALL VOLUNTEERS, PARTICIPATING PLAYERS AND CADDIES, FROM ANY AND ALL LIABILITIES ARISING OUT OF SUCH LOSSES, INJURIES OR DEATH (para. 1).

Despite this statement, tournament directors still have the duty to provide a safe environment for spectators. The purpose of this paper is to examine how buffer zones can be applied to golf tournaments to improve patron safety through a data-driven approach.

### **Buffer Zones in Sport and Recreation**

Seidler (2006) defines buffer zones as “a certain amount of space between the activity area and any obstructions... to enhance the safety of the participants” (p. 33). Practitioners have the duty to provide reasonably safe conditions for participants and spectators. Dougherty and Seidler (2007) explain “activity providers bear a legal obligation to take reasonable precautions to prevent harm to participants, spectators, and paid or volunteer staff” (p. 4). Insufficient buffer zones breach that duty and may result in serious injury that could have been prevented.

Sport activities “have inherent risks associated with them that cannot be eliminated without altering the integrity of the activity” state Martin and Seidler (2009, p. 9). Buffer zones are not created to fundamentally change an activity to make it safer, but rather to create a space around the activity area to prevent players and spectators from avoidable injury. Because every sport has its own inherent risks due to elements such as rules, equipment, physical demands, and number of participants, buffer zones are not a one-size-fits all solution used to mitigate participant injury. Some sports have standard recommendations regarding buffer zones, but many governing bodies provide either no or inconsistent suggestions to practitioners (Martin & Seidler, 2009). Professionals who do not understand the risks associated with inadequate buffer zones put their participants at risk and create opportunities for litigation. “In short, one can drastically reduce the likelihood of participant injuries and subsequent lawsuits in many sports and activities simply by providing ample buffer zones” (Dougherty & Seidler, 2007, p. 5).

### **Research Problem**

The Koepka incident is not the only time a patron has been struck with a ball during play; multiple instances were reported on social media outlets from fans at other tournaments throughout the PGA tour schedule. The United States Golf Association (USGA) in 2017 released its distance report noting significant increases in driving distance in all professional golf tours, including significant increases in overall launch conditions (ball speed, swing speed, launch angle, etc.). Strokes Gained is another measurement to consider as it “gives the number of strokes a golfer gains or loses relative to an average PGA Tour tournament field” (Broadie,

2011, p. 27). The infusion of data into golf along with the Strokes Gained metric has led golfers to seek distance over accuracy, especially off the tee (Broadie, 2014). Broadie expressed a desire for golfers to get closer to the green in a quicker manner, because data shows accuracy increases, and scores decrease with shorter clubs in the hands of a player on approach shots. Accordingly, we propose the following research questions:

**RQ<sub>1</sub>:** What is the relationship between Average Carry Distance (ACD) and Distance from Edge of Fairway (EOF)?

**RQ<sub>2</sub>:** How can the relationship between Average Carry Distance and Distance from Edge of Fairway guide the development of buffer zones for golf tournaments?

## Method

### Consulting the Industry

In order to maintain an applied focus to this study, personal industry connections were leveraged to speak with executive directors of professional golf events. The present study was discussed with a director from a PGA Tour tournament, Korn Ferry Tour tournament, and a Pro-Am Celebrity Golf Tournament. The discussions yielded two key themes. First, spectators are increasingly becoming more distracted at tournaments due to their personal electronic devices, limiting the effectiveness of any risk management strategy. Second, the tournament staff sets up the course (i.e. placing spectator rope lines), but Tour officials have the final say in where ropes are placed. Insight gained from the Tournament Directors will be integrated in a mixed-method approach to developing guidance for golf tournament event managers.

### Data Model

Data was collected from the PGA Tour website for the 2017-18 PGA Tour season. The PGA Tour was selected for this study because it is the premier professional golf tour in the world and led the USGA's distance study in multiple measurable categories (USGA, 2017). A player ( $N = 193$ ) was reported in the tour dataset if they recorded 50 or more rounds in PGA Tour tournaments. The PGA Tour records data using their ShotLink system, a combination of laser measurement and radar systems used to measure the distance of a shot and launch conditions (swing speed, launch angle, ball speed, etc.). "Off the Tee" conditions were utilized because in theory accuracy decreases with longer clubs (i.e., driver) than with a wedge, and ball speeds are at their greatest with a driver.

Data on the total amount of errant drives that struck patrons and the frequency of occurrence was sought, but this information either is not tracked by the PGA Tour, or is not publicly available through the ShotLink system. The ShotLink system measures all drives from a golfer during the PGA Tour season. Edge of Fairway (EOF) is defined by the PGA Tour as the average distance in feet and

inches from the edge of the fairway when the player misses the fairway, calculated on tee shots of all par 5 holes and par 4 holes where a player did not go for the green ( $N = 61,910$ ) (PGA Tour, 2019b).

Average Carry Distance (ACD) is defined by the PGA Tour as distance from tee to the point of ground impact on par four and par five tee shots where a valid radar measurement was taken ( $N = 9,978$ ) (PGA Tour, 2019a). The nearly 10,000 measured attempts on tour are less than the 61,910 measured shots for the EOF statistics because not every hole during a tournament has a radar measurement system to measure carry distance. Carry distance cannot be measured accurately using the ShotLink system because it involves estimation from the measurement team in determining where the ball first struck the earth. Driving Distance (total distance) is measured by the PGA Tour on two holes during a tournament that go in the opposite direction to aid in neutralizing the effects of weather elements (i.e. wind) on the golf ball (PGA Tour, 2019c).

## Results and Analysis

### Model

A regression model was utilized in this study. The variables ACD and EOF for the 2017-2018 PGA Tour season were utilized to best answer the two established research questions for this study. A golf ball has the potential to do the greatest harm to a patron on the initial return to the ground, measured by ACD. EOF was utilized because it is important to understand where the viewing ropes should be established. The independent variable in this study was ACD and EOF was the dependent variable.

ACD and EOF figures from the database were used to build a new dataset for the study. Individual player data for each variable was matched using player names. Due to the original structure of the data from the PGA Tour, the season average for a player was utilized, hoping to minimize the impact of wind and course design on the two variables used in the study. Native formatting for the measurement of the variables, ACD (yards) and EOF (feet). The decision to utilize ACD over other potential variables such as ball speed, smash factor, etc. was done in order to maintain a pragmatic focus for practitioners who can use this study to inform their decision making.

ACD explained 20.8% of the variance in EOF in this study. ACD has a positive relationship with EOF; a 1-yard increase in ACD means EOF increases by 3.062 feet. The first research question that guided this study was answered through the model explaining the variance in EOF through ACD. While 79% of variance in EOF was explained through other variables not included in this study, the model potentially adds value to industry professionals who execute golf tournaments. Table 1 provides the descriptive statistics for the two variables and Table 2 provides the results of the study.

**Table 1***ACD and EOF Descriptive Statistics*

	Mean	Standard Deviation	Minimum	Maximum
Average Carry Distance (Yards)	296.61	8.163	278.4	319.8
Edge of Fairway (Feet)	8.859	1.216	6.179	12.025

**Table 2***Research Findings*

	<i>B</i>	Standard Error	<i>p</i> – value
Average Carry Distance	0.061	0.007	0.001

Notes.  $R^2=.266$  ( $p < .0001$ )

Golfers want conditions to be calm, enabling them to take advantage of a course and subsequently post low scores. The two primary variables impacting a golfer's performance are the course design and weather conditions. Broadie's (2014) Strokes Gained metric is an attempt to summarize a golf round in a couple metrics, making it easier for a golfer to determine their performance relative to their peers, taking into account as many variables as possible. While this model was only able to predict 20.8% of the variance in EOF by ACD, it is sizable when viewing the multitude of variables at play with any given swing of a club. The average tour pro hits the ball one sixth of a mile with over nine seconds of hangtime off the tee. We believe having the ability to understand close to one fifth of the variability is a powerful tool for tournament event managers.

**Post-Hoc Analysis**

The results of the model made us curious to explore other possible variables that could be better predictors for EOF. Smash factor, ball speed, and swing speed were explored during the post-hoc analysis. Swing speed is the speed at which the golfer swings their club, with speed being the greatest with a driver due to the length of the club and the ability to get the greatest angular velocity. Ball speed is the speed of the ball immediately after impact with a club. It is greatest on shots where the golfer uses their driver. Smash factor is a relatively new metric that was developed along with advances in radar tracking systems. It assesses the relationship between ball speed and swing speed at the time of impact.

Our post-hoc analysis confirmed our selection of ACD as an exemplar predicting variable. Multi-collinearity issues existed with the other variables each predicting themselves when placed into a model. As a matter of practicality, the use of ACD and EOF are meaningful to industry professionals who are able to objectively see the two variables. The advanced metrics that are being utilized provided by Trackman and other sources for the PGA Tour to enhance broadcast and player development/training are not applicable to from an event managers perspective. The use of ACD as the independent variable was supported by overall model strength when the other variables were used as independent variables to EOF.

### Discussion and Implications

Buffer zones are critical to keeping participants safe in competition, but they must keep patrons safe from the competitor’s gameplay (Cotten & Wolohan, 2013; Seidler, 2006). Golf is a traditional and conservative sport and is often reluctant to implement new changes that could possibly hinder the spectator experience at their events. Patrons enjoy the opportunity to interact with the players they idolize, hoping to get a high five or autograph to enhance the overall experience on tournament grounds (Lambrecht et al., 2009). The lack of buffer zone standards presents a possible risk management hazard for the game of golf. In the next sections, the discussion of how to keep spectators safe at tournaments is a combination of golf course design and event management difficulties.

#### Course Design

One would assume professional golf buffer zone standards would have been developed over time, especially considering the game of golf is over 200 years old (Goodner et al., 2017). Dr. Alister MacKenzie’s 1920 book, *Golf Architecture: Economy in Course Construction and Green-Keeping* is one of the first publications in golf course design. Most of the points made in this work focus on creating the best experience for the player, sprinkled with vague statements such as “there should be a minimum of blindness for the approach shots” that are unclear in context (2015, p. 5). Surprisingly, resources available today are not much different. There are presently no professional standards in golf course design and buffer zone implementation, nor is there a governing body designated to create, implement, and enforce safety standards.

The ASGCA has multiple resources available on its website, such as a publication titled “Building a Practical Golf Facility” by Dr. Michael Hurdzan (2005). This document explores the entire course building process and only mentions trees as “good safety buffers” that provide shade and aesthetic value (p. 9). The resource actually confirms the argument of this paper: “There are no safety standards for design of a golf facility, so each designer must apply prudent criteria, and then be prepared to defend those criteria if necessary” (p. 29) and reiterates there are “no constraints or guidelines on making golf holes” (p. 16). Golf courses are rarely designed with the purpose of providing a great spectator venue for a tournament,



contrary to the way most facilities are constructed in the sport industry; outside of usually one week per year on a select handful of courses there are no spectators watching golfers play (American Society of Golf Course Architects, 2018, 2005). TPC Sawgrass in Ponte Vedra Beach, Florida is one vivid example of a course designed with both the golfer and spectator in mind. An architect will always default to designing a course to challenge the player rather than favor the spectator experience. This creates challenges for event managers to provide the greatest access while keeping spectators safe.

### **Event Management Guidance**

Leveraging the input provided from industry professionals and the results from the model, it's logical to believe the insight can be used to increase spectator safety at golf tournaments. Trees are commonly thought of as a means to keep people safe from errant shots on a course, but this does not always hold true; professional tournament venues regularly remove trees to increase hole length, often allowing patrons to get closer to the fairway than where trees provide safety (Hurdzan, 2005). Little thought has been given to keeping patrons safe at tournaments beyond the customary ticket-back language that often goes unread. In our discussions with PGA Tour Tournament Directors, they said they “do their best to set patron viewing ropes in spaces in accordance with possible clubs hit off tees, prevailing winds, etc.; but the Tour has the ultimate say in where the ropes are placed.” One director passed along the operations manual for the event, which only includes a paragraph discussing the responsibility of the tournament to place ropes and cover that expense.

### **Roping Standards**

The average for EOF in the 2017-18 PGA Tour season was 26.6 feet, with a maximum of 36 feet. Taking these results into consideration, our second research question sought to apply the relationship between average carry distance and EOF as a guide to developing buffer zones for golf tournaments. Using the model produced in this paper, it's suggested the ropes expand from an average of 8 yards along the fairway until 280 yards from the tee, where they expand gradually to 15 yards from the edge of the fairway at 300 yards and then gradually go back to 8 yards from the fairway after 320 yards. The decision for the 280–320 yard range for the expanded rope range is based on the ACD variable figures presented in Table 1.

### **Driving Distance and Accuracy**

A common perception is that as driving distance increases driving accuracy will decrease. Logically, this makes sense due to the wide variety of variables that can impact a golf ball during flight (wind, humidity, collision with a foreign object, etc.). Driving distance is a favorite topic of conversation amongst the USGA, not for driving accuracy but golfers are hitting the ball too far and ruining the integrity of the game.

Professional golfers today are physically fit and focused on their athletic abilities. A cursory review of their social media sites displays a focus on their craft from physical fitness to equipment fitting to enhance their game. Professional golfers are advanced athletes when compared to their predecessors and it shows in the performance on the course in driving distance and other variables. While it may seem logical from personal experience that as driving distance increases, accuracy decreases, professional golfers are proving on a weekly basis that they can consistently, on-demand drive a golf ball over 300 yards and maintain accuracy.

## Conclusion

The desire to grant access to spectators while keeping them safe is one of the oldest concerns for event managers. In order to provide more courtside seats for fans, National Basketball Association (NBA) franchises have restructured where team benches are positioned, bringing fans closer to the players and giving the ability to charge more for the access (Tinsley, 2017). MLB and National Hockey League (NHL) have expanded netting to keep spectators safe, changes only made after catastrophic injuries occurred to spectators during games.

Golf tournaments can provide spectators a fun experience, but they pose an elevated risk to patrons that does not traditionally exist at other professional sports. Tournament directors and their staff may take a group of variables into consideration when deciding where they place rope lines for spectator safety, and balancing access to the players with spectator safety is always challenging. It is not practical for a golf course or tournament organizers to construct temporary netting along the fairways in landing zones because it would alter the nature of the game, reducing hazards for the golfer and making the game easier. Implementing our proposed roping guidelines will keep patrons safe without affecting the spectator experience, enabling a tournament to still provide access to fans while ensuring they are safer in the typical landing zone of tee shots.

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