THE EFFECT OF PRE-SHOT ROUTINE ON PERFORMANCE OF A DRIVE IN GOLF

A THESIS
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BY

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CHAPTER ONE

Introduction

Golf is a sport in which a player, using many types of clubs including a driver, a putter, and irons, hits a ball into each hole on a golf course in the lowest possible number of strokes. The modern game of golf spread from Scotland to England and has now become a worldwide game, with golf courses in the majority of affluent countries. Golf competition is generally played as stroke play, in which the individual with the lowest number of strokes is declared the winner, or as match play with the winner determined by whichever individual or team posts the lower score on the most individual holes during a complete round. Golf as a spectator sport has become increasingly popular, with several different levels of professional and amateur tours in many regions of the world. Sponsorship has also become a huge part of the game and players often earn more from their sponsorship contracts than they do from the game itself.

Golf is one of the most popular sports in the world, and many amateur golfers enjoy both playing and watching the sport. Amateur golfers want to improve their golfing skills but only work on the mechanical aspects of their game. Professional golfers work on both the swing mechanics and mental aspects of the game. Improvements in the mechanical part of the game are the result of practice and often times golf coaches. The
mental part of the game comes from establishing a pre-shot routine. Professional golfers have their own pre-shot routine whenever they make a shot but most of amateur golfers do not maintain a set pre-shot routine. The pre-shot routine helps the golfer’s performance because it keeps their swing mechanics consistent. (Crews & Boutcher, 1986b; 1987) Therefore, practicing a pre-shot routine should improve a golfer’s performance if done consistently.

Statement of the Problem

This study focuses on how the use of a pre-shot routine affects performance of a drive from the tee. There are numerous studies on pre-shot routine golfers use with putting and chipping but there are no studies on how it influences driving performance. This study will determine if amateur golfers utilize a set pre-shot routine prior to the drive and what effect that routine has on performance.

Purpose of the study

The purpose of this study was to examine the pre-shot routine usage pattern of amateur golfers using the driver and to correlate that pattern to their effectiveness off the tee.

Hypotheses

1. The following hypothesis was tested: Driving performance is linked to a consistent set pre-shot routine that involves a simple review of the swing mechanics.
Definition of Terms

Pre-shot Routine: A set pattern of cue thoughts, actions, and images consistently carried out before performance of the skill (Crews & Boutcher, 1986a).

Slice shot: A slice shot is when the ball curves hard right. A slice is the most common mistake of amateur golfers, by hitting the ball with an open club face and causing the ball to slice hard right. A slice is caused by moving the lower body quicker than the upper body.

Hook shot: A hook shot is when the ball curves hard left. A hook can be from a hitting the ball with a closed club face, or bringing golfer’s upper body around too quickly.

Fat shot: Fat shot is a shot in which the golfer's club hits the ground before making contact with the ball. This usually results in digging up a lot of turf and a shot that travels far shorter than desired.

Thin shot: Thin shot is a shot in which the club head strikes the ball too high (near its midpoint or slightly lower), often resulting in a low, sometimes slicing shot that can travel a long distance. A thin shot also often produces much more vibration that is felt in the golfer's hands.

Open fairway: Open fairways do not have obstacles or hazards. Golfers could have a good view for the next shot even they have hit a bad tee shot.

Tree-lined fairway: Tree-lined fairway have trees along the fairway. The golfers have to hit a straight tee shot to have a good chance for the next shot. If the ball goes in to the trees, the golfers might have to lose one stroke because they cannot get out of the trees.

Water fairway: Water fairway is a fairway which golfers have to make a tee shot over the water or if there is water along the fairway.
Audience fairway: Audience fairway means golfers playing together with someone else.

Assumptions

The following assumptions were made:

1. The participants correctly understood the directions of the study.
2. The participants were able to understand the terminology used in the questionnaire.
3. Participants answered interview questionnaires accurately and honestly.
4. All participants wanted to improve their driver shot performance to get better scores.

Limitations

The following limitations were found in this study:

1. The participants consisted of volunteers who agreed to participate in the study.
2. There were only 48 participants who participated in this study.
3. There were few female participants who participated in this study.
4. The participants’ age ranged from 20 to 60 years of age.

Delimitations

The following delimitations were found in this study:

1. The participants consisted of amateur golfers playing near Midwestern city.
Significance of the Study

Of all the golf shots required in a round of golf using the drive from the tee box is the most difficult, and sets how each hole will be played. The driver is the longest club a player is required to hit and the most difficult to hit correctly. Therefore, the average player feels more pressure on the tee than any other shot they are required to make outside of putting. Hours of practice and a dedication to learning how to use the club are keys to a good performance, but can be enhanced with the usage of a set pre-shot routine. The routine reduces the pressure and helps you concentrate on executing what you have practiced. The pre-shot routine of most amateur golfers is to take multiple practice swings. While this might help in some cases it is not a good method of preparing for the shot. If we can provide a solid connection between a pre-shot routine that involves a simple review of mechanics, and enhanced performance the data will provide amateur golfers with an effective way to reduce their scores.
CHAPTER TWO

Review of Literature

The following review of literature discusses pre-shot routines, pre-shot routines in sport, pre-shot routines in golf, and a summary.

Pre-shot Routine

Pre-shot routine can be found in several sports including golf, basketball, tennis, and baseball. The most common example is the free throw shot in basketball. Free throw shooters employ a pre-performance routine that involves bouncing the ball a certain number of times and using a specific form as they shoot. Service in tennis or table tennis can be also followed by pre-shot routines. Many athletes, especially under severe competitive stress, may handicap themselves with self-doubt; too much tension and distraction; or a fear of failing, looking bad, or letting others down. The pre-performance routine is an enabler, in that it allows individuals to become immersed in the act with the belief that their performance will be successful (Lidor & Singer, 2000).

Crews and Boutcher (1986a) defined a pre-shot routine as a set pattern of cue thoughts, actions, and images which are performed prior to the execution of a skilled behavior. The most effective pre-performance routines are usually employed with a high
degree of consistency. The general purpose of a pre-performance routine is to put oneself in an optimally aroused, confident, and focused state immediately before as well as during execution. (Lidor & Singer, 2000). By blocking out negative thoughts and external distractions (Moran, 1996) and developing personalized and meaningful self-regulatory techniques, performers can direct their emotions, thoughts, and movements in a way that creates ideal inner harmony (Anderson, 1997; Cohn, 1990; Weinberg & Gould, 1999).

**Pre-shot Routines in Sport**

One study (Jackson, 2003) examined the consistency of pre-performance routines in international rugby union goal kickers on kicks of varying difficulty and under different amounts of situational pressure. Concentration times and physical preparation times were calculated from video recordings of the 572 place kicks taken during the 1999 Rugby Union World Cup. In contrast to the view that performers should seek consistent pre-performance routine times, the results revealed a strong positive relationship between kick difficulty and concentration time. Analysis of the effect of situational pressure, determined by the difference in score before the kick, revealed that players tended to have longer concentration times and shorter physical preparation times when the scores were close. There were no differences between the best and worst kickers in the tournament on routine time, consistency or rhythmicity. The view that increasing the temporal consistency of a routine will result in improved performance was challenged.

Another study (Foster, Weigand, & Baines, 2006) examined the effect of removing superstitious behavior and introducing a pre-performance routine on basketball free-throw performance. The use of superstitious behavior (SB) in sport is a widespread
phenomenon and has become increasingly popular at an elite level. SB has been defined as a behavior which does not have a clear technical function in the execution of skill, yet which is believed to control luck and/or other external factors. Superstitions have similarities to pre-performance routines (PPRs) in that they involve formal, repetitive, and sequential behavior, but are different in respect of function. A total of 22 English male basketball players took part in the experiment and all had been playing for at least four years. Players were members of either a university or a local basketball club and were selected on the criteria of being at least 18 years of age and that they engaged in any kind of SB when taking free-throws. SBs were classified as those that do not have a clear technical function in the execution of the skill. The superstitious control group scored consistently across all three trials. The experimental group obtained a slightly lower mean score than the control group in their SB trial. Performance in this group deteriorated when SB was removed and improved to a level slightly below the original SB trial when a PPR was introduced. The players used bouncing the ball, look at the rim and thinking of the ball line to the rim as their PPR. Contrary to what was hypothesized, there was very little performance difference when using either a PPR or SB, and intriguingly performance was worst when neither were used. Furthermore, the use of a PPR only returned performance to approximately baseline as indicated by the recovery of performance after three weeks practice of a pre-shot routine. Interestingly, although not significantly different, performance influenced by SB was higher than performance preceded by PPR in both conditions.

Lobmeyer and Wasserman (1986) studied the effects of a pre-shot routine on free throw shooting in basketball. There were a total of 43 participants in this study and they
were to make 40 free throw shots. Twenty shots were under regular condition (in which the free throw and preliminaries were performed as usual) and the next twenty shots were without condition (where the athlete attempted the free throw minus any preliminary response pattern). The researchers found that shooting accuracy was significantly higher when players attempted free-throw shots with their own pre-shot routine than without, although the difference in shooting accuracy between the routine and no-routine conditions was in the order of only 7%.

In the follow up study, Gayton, et al. (1989) they examined the effect of prohibiting the use of a pre-shot routine on free-throw shooting in competitive situations. To make the situation competitive, subjects were run in groups of five and their performance was recorded on a large easel placed to the side of the free-throw line. A significantly larger number of baskets were made in the pre-shot routine condition than without the routine. A competitive situation led to a greater decrement in baskets than had been reported in 1986 by Lobmeyer and Wasserman during non-competitive free-throw shooting. The researchers confirmed Lobmeyer and Wasserman’s speculation that the difference between the two conditions might be greater under competitive stress. Shooting accuracy was about 23% higher with the pre-shot routine.

Predebon and Docker (1992) also studied the effectiveness of pre-shot routines on free-throw shooting behavior of 30 male experienced basketball players. The researchers divided the subjects into 3 groups; no routine, standardized physical routine, and imagery/physical routine conditions, with 10 subjects in each condition. The subjects made 20 baseline free throw shots before the start of the study. For the routine group, they were instructed to sight the basket, bounce the ball three times in succession while
sighting the basket, and shoot the ball. The imagery/physical group was told to imagine
the shot sequence without the ball first, and they were to do this by going through the
actions of bouncing the ball while sighting the basket and shooting the ball” after which
they were to shoot the ball in the same way as the imaged rehearsal. The no routine group
was instructed not to perform a pre-shot routine: when given the ball they were required
simply to take aim and shoot. Subjects attended three practice sessions a week for six
weeks and were tested three times. Each test consisted of performing 20 free throws
following the instructions of their group. The results show that imagery/physical group
made the only increase as it enhanced performance from baseline (M=14.6) to test three
(M=15.2). The researchers concluded that the use of pre-shot routine in free throw
shooting is effective to individual’s performance. M represents the shots participants
have made out of 20 free throws.

Pre-shot Routines in Golf

Crews and Boutcher (1986a) did an exploratory observational behavior analysis
of professional golfers during competition. The behavior analysis was completed on 12
tour players of the Ladies Professional Golf Association (LPGA) during competition.
Trained observers recorded pre-shot routine behavior for the full swing and putt. Total
times, partial times, and different components of the routines were assessed. Post-shot
behaviors, 1983 rank on tour, 1983 scoring average, playing performance, and years on
tour were also analyzed. The results indicated that all golfers were remarkably consistent
with regard to time and behavioral actions such as waggles and glances at the hole.
Golfers were divided into two groups based on 1983 rank. There were significant
differences between the two groups with the lower rated players (more successful) having longer total times for the full shot and putting routines and a lower score over the 12 observed holes. The longer pre-shot routine times of the successful tour players may reflect more developed preparation strategies. Consistent pre-shot routines appear to be associated with elite golf performance and may be a necessary skill for performing in discontinuous sports which take place over many hours. Crews and Boutcher (1986a) observed the pre-shot behavior of tour players (n=12) of the LPGA during competition. They assessed the components of the routines and the total time involved. Results indicated that these elite golfers possessed very consistent pre-shot routines. They found that the more successful players exhibited longer routines and expressed more positive emotional states than the less successful players, possibly reflecting more highly developed preparation strategies.

Crews and Boutcher (1986b) continued their study on the effects of structured pre-shot behaviors on beginning golf performance. Their results showed that a pre-shot routine lead to a significant improvement in performance. The population for the study consisted of 17 male and 13 female students who were just beginning golf. The participants were divided into two groups. One group of 8 men and 7 women learned and practiced a specific routine of actions prior to performing a full swing while another group of 9 men and 6 women practiced only the swing. The researchers taught basics of a full swing to all students for the first 8 weeks. Then they taught them a structured pre-shot routine and instructed them to follow it before every shot for the second 8 weeks. The subjects performed an objective test of hitting 7-iron shots into a 50 yard target for the last week of the class. Significant improvements were found for the males on the
objective test 5 in the experimental group. The women in the experimental group also showed improvement but the improvement was not significant.

Boutcher and Crews (1987) continued to study the effect of a pre-shot routine by examining an attentional routine on a well-learned skill. They found pre-shot routines to significantly increase performance on putting in more experienced golfers. The participants for the study consisted of 6 male collegiate golfers and 6 female collegiate golfers and they were divided into four groups randomly. The four groups were male routine, female routine, male control, and female control. The routine groups were taught a pre-putt routine which consisted of focusing on specific cues and actions. The control groups used their own putting protocols for the same number of practice sessions. The researchers recorded the putting performance, length of time, and consistency of putt before and after the 6 week period. Results indicated that both men and women routine groups significantly increased time but decreased variability on the putting task. The female routine group significantly improved putting performance while other groups showed a decrement. These results suggest that focusing attention on specific words and thoughts and learning a set pattern of actions produced more consistent putting with regard to time.

Cohn, Rotella and Lloyd (1990) focused their study on the effects of a cognitive-behavioral intervention on the pre-shot routine and performance in golf. Three male golfers served as subjects for the assessment of percent of mental and behavioral pre-shot routines completed for nine holes during baseline and treatment conditions. The intervention taught each golfer how to consistently align to the target, make a good decision on each shot, and be totally committed to each shot. After intervention, all
subjects reported feeling much more relaxed and confident than before testing. The result shows that the intervention was effective in improving players’ adherence to both mental and behavioral pre-shot routine. The researchers did not see an immediate increase in overall round performance from the subjects. Post treatment interviews showed that the golfers felt the intervention had a positive effect upon performance.

Rohdy (2006) studied the effect of mental rehearsal and pre-shot routine on putting performance. In the study, the researcher had 2 participants and they practiced their mental rehearsal and pre-shot routine for 6 weeks. The results indicated a moderate increase in putting performance. Participants did increase their pre-shot routine completion times. However, pre-shot routine completion times did not become more consistent from baseline to treatment.

In another study Witt, Linkenauger, Bakdash, and Proffitt (2008) examined the influence of golf performance on the player’s perception of hole size on the green. The researchers questioned player’s at the end of the 18 holes of play and asked them to indicate the green hole size. The participants were shown a poster board with various circles and were asked to pick the circle that they thought best corresponded to size of the hole. Then the researchers collected the score for 18 holes of each participant. The results showed that better scoring golfers chose bigger circles. The results have shown that golf performance relates to perceived size and perception is influenced by the perceiver’s current ability to act effectively in the environment. They have found that golfers who played better judged the hole to be bigger than did golfers who did not play as well. They also found that the golfers who putt closer to the hole chose bigger circles.
Summary

A consistent pre-shot routine has been shown to increase sport performance including golf and basketball. Consistent pre-shot routine can block negative thoughts and help the performer to feel positive and confident. This study was to examine whether there are improvements when the pre-shot routines are used.
CHAPTER THREE

Methodology

Introduction

This study was designed to determine the effect of pre-shot routine on performance of a drive. The limited research in this area has shown that the usage of a consistent pre-shot routine by professional golfers is an important mental preparation for hitting the ball. All amateur golfers use some type of pre-shot routine but no one has examined its usage. Therefore, the purpose of this study is to determine what type of pre-shot routine amateur golfers use, and see if it correlates to performance.

Subjects

A total of 48 subjects were recruited; 42 male amateur golfers and 6 female amateur golfers. The participants were recruited from public golf courses in a Midwestern city and the faculty and student population of a Midwestern University. The mean of the participants' age was 34.6. The research involved people who had an average score for 18 holes of play between 85 and 100. Golfers with scores below 85 or above 100 were excluded so that the skill level and playing time of the participants is more uniform.
Recruitment

The participants were recruited with flyers (Appendix A) placed in academic buildings at a Ball State University and the pro shops of local golf courses in Muncie, IN. Permission to post the flyers at the local courses was obtained via a letter (Appendix B) asking them to participate. All campus e-mails (Appendix C) were also used to recruit faculty and students at Ball State University. There were no inducements/incentives to participate in this study. After the respondents to the various forms of study advertisement contacted the principal investigator (P.I.) he either met with them in person or discussed the study via the telephone. Once they agreed to participant they were asked to sign the Informed Consent (Appendix D) of this study that was approved on October 1, 2008 (Appendix E), and the P.I. then reviewed the study questionnaire with them to insure that they fully understand its purpose and to answer any questions they might have about it.

Experimental Design

Once the subjects fully understood the purpose of the study and what was expected of them they were asked to read and sign the Informed Consent form for this research project. Upon receipt of the Informed Consent form the subjects were given or mailed the study questionnaire (Appendix F), and its contents were reviewed with the P.I.. The questionnaire they were asked to complete covered the participants golfing experience, pre-shot routine, and driving performance. They were given a two-week period to fill it out and return it to the P.I.. The participants were given the option of filling out a paper version of the questionnaire or an electronic version. If they choose
the paper version they received an addressed envelope with adequate postage for returning the questionnaire. If they chose the electronic version they were required to supply their email address to the P.I. The data from the questionnaires was tabulated on an excel spread sheet and entered into a statistical package to determine significance.

Questionnaire

The questionnaire was developed to collect basic background on golfing experience, pre-shot routine and driving performance. The questionnaire consisted of four sections. The first section dealt with the subjects’ basic demographic information. The second section and third section asked them about their playing experience and ability. The final section required them to rank their performance in certain situations.

Statistical Treatment

The data were collected and coded by the researcher and analyzed using the SPSS statistical program of the computer center to determine correlations between the subject's average score, performance and the usage of a pre-shot routine. Once the researcher collected all the questionnaires the researcher coded the data into the SPSS program. The correlations for the total population was run first, and then the data was separated by tee box usage and re-run.
CHAPTER FOUR

RESULTS

Introduction

The purpose of this study was to determine the effect of pre-shot routine on performance of a drive and to establish the pre-shot routine usage pattern of amateur golfers using the driver and to correlate that pattern to their effectiveness off the tee. This chapter presents the results of the study. It will cover subject characteristics, performance characteristics of total population, and confidence characteristics of total population. This chapter also includes the performance characteristics, the confidence level, and the pre-shot routine that subjects use by each tee box.

Total Subject Characteristics

The participants of this study were amateur golfers from city public and private Midwestern golf courses. Forty eight subjects, including 42 males and 6 females, completed and returned a pre-shot routine questionnaire. The combined data for this population plus the gender differences are given in Table 1. The mean age of the total population was 34.6 and ranged from 20 to 60 years of age.

Breaking the data down by gender indicates that there were no age differences (males were 33.4 and females were 38.8 years of age). The average playing and practice
times of the male and female participants were also similar, with the females playing 10% more than the males, and the males practicing 24% more than females. The major difference between the males and females was the experience (males having on average 3.5 yrs more experience than the females) and their performance. The males had a lower handicap (20.7±8.3 compared to 25.5±7.6) and a lower average score for 18 holes of golf (90.9±8.3 compared to 97.5±7.6) than the females.

The participants played golf at 10 different area golf courses: Albany golf course, Cardinal hills golf course, Crestview golf course, Delaware country club, Killbuck golf course, Maplewood golf course, Player’s club golf course, Walnut Creek golf course, Wildcat golf course, and Yule golf course. There were 11 participants who played golf at more than two courses.

The type of golf club the participants used varied and included 19 different driver brands. The brands used were Adams golf, Callaway, Cleveland, Cobra, Dunlop, Homemade, MacGregor, McHenry, Nike, Pinemeadow, Ping, PRGR, Ram, Taylormade, Titleist, Tour Edge, Walter Hagen, Wilson, and XP. The most frequent driver brands were Taylor Made which were use by 10 participants, Titleist which were used by 7 participants came next, Callaway was used by 5 participants, Nike by 3 participants, and Adams Golf, Cobra and Ping which were used by 2 participants each.
Table 1 Subject Characteristics

<table>
<thead>
<tr>
<th></th>
<th>Total</th>
<th>Male,</th>
<th>Female,</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>34.6 ± 12.4</td>
<td>33.4 ± 12.1</td>
<td>38.8 ± 16.1</td>
</tr>
<tr>
<td>Experience, mo</td>
<td>132.0 ± 136.9</td>
<td>136.1 ± 144.4</td>
<td>93.7 ± 80.1</td>
</tr>
<tr>
<td>Play Time, /yr</td>
<td>25.5 ± 20.2</td>
<td>24.1 ± 19.3</td>
<td>26.8 ± 26.9</td>
</tr>
<tr>
<td>Practice Time, /yr</td>
<td>29.4 ± 35.9</td>
<td>27.4 ± 31.9</td>
<td>23.7 ± 47.5</td>
</tr>
<tr>
<td>Handicap</td>
<td>21.6 ± 8.3</td>
<td>20.7 ± 8.3</td>
<td>25.5 ± 7.6</td>
</tr>
<tr>
<td>Average Score</td>
<td>93.6 ± 8.3</td>
<td>90.9 ± 8.3</td>
<td>97.5 ± 7.6</td>
</tr>
</tbody>
</table>

Total data given as mean ± SD. Male and female data is given as the percent of total number of subjects. The total number of subjects was 48, with 6 females and 42 males.

Total Population Comparisons

Performance Characteristics

Taken as a whole the participants indicated that slicing was the biggest problem (see Table 2). The results show that 37.4% of the participants sliced the ball 50% of the time or more. Of those individuals 4.2% sliced the ball 100% of the time. Hooking the ball was less of a problem with only 18.8% hooking 50% or more of the time. Hitting the ball fat (taking too much turf) and hitting the ball too thin (no turf taken) gave similar results, with 16.7% of the subjects hitting fat shots 50% of the time or more, and 12.5%
of them hitting thin shots 50% of the time or more. The biggest difference being that none of the respondents hit fat or thin shot 100% of the time.

Confidence Characteristics

Table 3 shows the confidence of the golfers when they are taking shots in different environments or circumstances: at the open fairways, at the tree-lined fairways, at the water fairways or in front of the people. The higher the percentage is, the higher the confidence level of the golfer.

If you combine the 100% and 80% confidence ratings of these participants you find that a majority of the participants (66.6%) have a great deal of confidence that they would hit a good tee shot from an open fairway. However, that confidence level drops to only 27.1% when the fairway is tree lined and only 4.2% of our participants feel confidence 100% of the time. If the tee shot has to be made over water only 35.5% of the respondents feel confidence off the tee with 18.8% in the 100% category. The last factor we asked them to rate was whether or not they had confidence if someone was playing with them. Only 35.4% of the respondents felt confident 80% of the time or more, with only 12.5% being confident all of the time.
Table 2 Performance Characteristics of Total Population

<table>
<thead>
<tr>
<th>Percentage of Shots Made</th>
<th>Slice</th>
<th>Hook</th>
<th>Fat</th>
<th>Thin</th>
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<tbody>
<tr>
<td>100-90%</td>
<td>4.2</td>
<td>0</td>
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<tr>
<td>80%</td>
<td>6.2</td>
<td>2.1</td>
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<td>0</td>
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<tr>
<td>70%</td>
<td>14.6</td>
<td>4.2</td>
<td>6.2</td>
<td>2.1</td>
</tr>
<tr>
<td>60%</td>
<td>6.2</td>
<td>8.3</td>
<td>4.2</td>
<td>4.2</td>
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<tr>
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<td>6.2</td>
<td>4.2</td>
<td>4.2</td>
<td>6.2</td>
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<tr>
<td>40%</td>
<td>12.5</td>
<td>10.4</td>
<td>12.5</td>
<td>16.7</td>
</tr>
<tr>
<td>30% Or less</td>
<td>50</td>
<td>70.8</td>
<td>70.8</td>
<td>72.9</td>
</tr>
</tbody>
</table>

Total data given as mean ± SD. There were 48 subjects and the data given here represents the percent of total.
Table 3 Confidence Characteristics of Total Population

<table>
<thead>
<tr>
<th>Percentage Of Confidence</th>
<th>Open Fairway</th>
<th>Tree-lined Fairway</th>
<th>Water Fairway</th>
<th>Audience Fairway</th>
</tr>
</thead>
<tbody>
<tr>
<td>100-90%</td>
<td>45.8</td>
<td>4.2</td>
<td>18.8</td>
<td>12.5</td>
</tr>
<tr>
<td>80%</td>
<td>20.8</td>
<td>22.9</td>
<td>16.7</td>
<td>22.9</td>
</tr>
<tr>
<td>70%</td>
<td>14.6</td>
<td>18.8</td>
<td>25.0</td>
<td>14.6</td>
</tr>
<tr>
<td>60%</td>
<td>4.2</td>
<td>10.4</td>
<td>12.5</td>
<td>18.8</td>
</tr>
<tr>
<td>50%</td>
<td>10.4</td>
<td>12.5</td>
<td>6.2</td>
<td>10.4</td>
</tr>
<tr>
<td>40%</td>
<td>2.1</td>
<td>18.8</td>
<td>10.4</td>
<td>10.4</td>
</tr>
<tr>
<td>30% Or less</td>
<td>2.1</td>
<td>12.5</td>
<td>10.4</td>
<td>10.4</td>
</tr>
</tbody>
</table>

Total data given as mean ± SD. There were 48 subjects and the data given here represents the percent of total.
Tee Box Comparisons

Subject Characteristics

The mean age of the red tee box users (42.2±15.5) was higher compared to other three tee boxes (white 32.3±11.5, blue 35.8±12.3, gold 32.8±13.5). There was a big difference between the red tee box, white tee box and the blue, gold tee box in experience. Participants using the blue and gold tee box had two times more experience than the red and white tee box. Participants using the white tee box played slightly less than the other three tee boxes and the participants using the red tee box practiced the least among the four. There were also big differences in handicap and average score. The participants using the blue and gold tee box had a lower handicap (15.1±3.3, 16.3±4.8 compared to 28±5.0, 24.0±8.7) and a lower average score for 18 holes of golf (87.1±3.3, 88.3±4.8 compared to 100±5.0, 96.0±8.7).
Table 4 Subject Characteristics based on tee box selection

<table>
<thead>
<tr>
<th></th>
<th>Red</th>
<th>White</th>
<th>Blue</th>
<th>Gold</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>42.2±15.5</td>
<td>32.3±11.5</td>
<td>35.8±12.3</td>
<td>32.8±13.5</td>
</tr>
<tr>
<td>Experience, Months played</td>
<td>107.6±81.0</td>
<td>88.8±129.3</td>
<td>212.4±122.2</td>
<td>203.1±151.8</td>
</tr>
<tr>
<td>Play Time,/yr</td>
<td>31.2±27.7</td>
<td>18.1±11.4</td>
<td>31.4±23.3</td>
<td>35.7±30.6</td>
</tr>
<tr>
<td>Practice Time,/yr</td>
<td>4.4±6.3</td>
<td>35.2±41.6</td>
<td>14.0±8.5</td>
<td>30.2±13.5</td>
</tr>
<tr>
<td>Handicap</td>
<td>28±5.0</td>
<td>24.0±8.7</td>
<td>15.1±3.3</td>
<td>16.3±4.8</td>
</tr>
<tr>
<td>Average Score</td>
<td>100±5.0</td>
<td>96.0±8.7</td>
<td>87.1±3.3</td>
<td>88.3±4.8</td>
</tr>
</tbody>
</table>

Total data given as mean ± SD. There were 48 participants and the data given here represents the subject characteristics by each tee box.

Performance Characteristics

The low number of female participants in this study made it difficult to compare gender differences so an analysis based on tee box selection of the subjects was used instead. It still brings in the gender differences (all but one female used the red tee box) and adds another dimension to the study. Forty eight subjects, including 42 males and 6 females participated in this study. Only 1 female used white tee boxes and the other female participants use red tee boxes, which is the nearest tee to the hole. Twenty six males and 1 female used white tee box, 10 males use blue tee boxes, and 6 males use gold tee boxes which is the farthest tee from the hole. Which tee box a player chooses can be
an indication of how confident the player is but often times is a better indication of their driving distance.

In order to understand what figure 1 represents, one must understand what the color assigned to each of the tee boxes represent. The Red tee box is located at the closest distance from the hole. Usually women, older golfers or beginners take the tee shots at this place. And then, with the following order, white, blue, gold, the tee box location becomes further from the hole. Therefore, the Gold tee box is located the farthest distance away from the hole and most advanced golfers usually make their tee shot at this place.

Figure 1 shows that participants who used the blue and gold tee box made better shots than participants using red and white tee box. This is substantiated by the mean handicap and score (Table 4) of these subjects. Participants using the blue tee box made a lower percentage of slices, hooks, fat, and thin shots than any of the other tee boxes used with hooks, fat and thin shots being almost identical. Although the gold box players made more slices than the blue box participants the number of slices was almost the same as their tendency to hook. However, the low N for this group might explain why they did not perform as well as the blue box participants.
Confidence Level

The confidence level from the various tee box locations is given in Figure 2 and is an indication of how confident they are taking tee shots from open fairways, tree fairways, water fairways, and in front of the people that they know and strangers.

The confidence level of the participants using the gold tee box is higher than the other tee boxes but they are still less confident when trees or water come into play. Participants using the red tee box are the least confident when you have to hit over water or if water lines the hole, whereas the white and blue tee box players are equally confident. Ironically it is the blue tee box players that are the most effected by a tree lined fairway, in that their confidence is well below the other players.

The confidence at the open fairway is higher than the tree-lined fairway and the water fairway. Golfers might feel pressure by the obstacles and the hazards. Also the confidence of hitting in front of friends is higher than the confidence hitting in front of
strangers. This shows that golfers also feel pressure if someone they do not know is watching them hitting the ball.

Figure 2 Confidence based on tee box
Pre-shot Routine Comparisons

Figure 3 shows that participants using the white, blue and gold tee box stand behind the ball and pick a target but the participants using the red tee box do not. It is interesting to note that the players with the best handicap and lowest average score use this technique 100% of the time, whereas less than half of the white and blue tee box players use it. It shows that standing behind the ball and picking a target may be more useful for the golfers than just lining up as they address the ball.

Other elements like practice swing, mental rehearsal, and movement do not seem to have much correlation to the players ability in that they showed a great deal of variation. We can say that these elements are affected by personal habit or routine more than their playing ability. Although the forward push is highly recommended by professional players and instructors very few participants in this study used this technique.

The pre-shot routine of these participants was quite varied but was consistently used by all of the players except those who choose the blue tee box. Players who tee off from the red, white and gold tee boxes indicated that they used the same routine 70-80% of the time, whereas blue box players only use the same routine 50% of the time.

Although the subjects reported that they used the same pre-shot routine 76.3% of the time the statistical correlation between using the same routine and the players average score was poor, with the r-value being 0.107. The main reason for the lack of significance is due to the variation of pre-shot routine these players employed.
Figure 3 Pre-shot routine: Tee box

![Pre-Shot Routine: Tee Box]

- **Red**
- **White**
- **Blue**
- **Gold**

Variables:
- Target
- Line-up
- PSwingRehearse
- Move
- Push
- Usage

Bar chart showing the percent of usage for different activities and colors.
CHAPTER FIVE

Discussion

The purpose of this study was to examine the pre-shot routine usage pattern of amateur golfers using the driver and to correlate that pattern to their effectiveness off the tee. This chapter includes a discussion on the results, conclusions, and suggestions for future research.

This research was based on the hypothesis that a golfer’s driving performance improves with a consistent set pre-shot routine that involves a simple review of the swing mechanics. There were no age, average playing time, and practice times differences between the genders, but the males did have 3.5 yrs more experience than the females.

When the participants of this study are examined as a whole slicing is the biggest problem they face off the tee. The results showed that 37.4% of the participants sliced the ball 50% of the time or more, with 4.2% slicing the ball 100% of the time. Hooking the ball was less of a problem with only 18.8% hooking 50% or more of the time, and was comparable to hitting the ball fat (16.7%) and hitting the ball too thin 50% of the time or more. The biggest difference being that none of the respondents hit fat or thin shot 100% of the time.

A majority of the participants (66.6%) had a great deal of confidence that they would hit a good tee shot from an open fairway. However, that confidence level dropped
to only 27.1% when the fairway is tree lined and only 4.2% of our participants felt confidence 100% of the time. If the tee shot has to be made over water only 35.5% of the respondents feel confidence off the tee with 18.8% in the 100% category. The last factor we asked them to rate was whether or not they had confidence if someone was playing with them. Only 35.4% of the respondents felt confident 80% of the time or more, with only 12.5% being confident all of the time. The purpose of a pre-performance routine is to put oneself in an optimally aroused, confident, and focused state immediately before as well as during execution. (Lidor & Singer, 2000), (Moran, 1996), and (Anderson, 1997; Cohn, 1990; Weinberg & Gould, 1999). By blocking out negative thoughts and external distractions and developing personalized and meaningful self-regulatory techniques, performers should be able to direct their emotions, thoughts, and movements in a way that creates ideal inner harmony. Therefore, usage of a consistent pre-shot routine should make golfers feel comfortable with obstacles or hazards that would allow them to block out negative thoughts and external distraction as they go through an organized pre-shot routine. Taken as a whole the golfers who participated in this study were not able to block out distractions, even though they used a pre-shot routine. However, when you examine their adherence to a pre-routine you find that they are extremely inconsistent in its usage, and the type of routine used varied.

In order to determine a better relationship between performance, confidence, and pre-shot routine the participants were separated into tee box groups. Analyzing the data via this method negated the need to do a gender comparison due to the fact that women routinely use the red tee box. Separating the data by tee box preference also gave us an indicator of how playing ability influences pre-routine usage. As a rule better players
who are good drivers use the blue and gold tee boxes. Golf courses usually have 4 different tee boxes for players to tee off from. The red box is the closest to the hole and is used by women, children, and seniors. It is meant to compensate for their inability to hit long tee shots. The tee box that most players use is white and is usually 30-50 yards farther from the hole than the red boxes. The blue tee box is for more advanced players and is normally set 10-20 yards behind the white box. The gold box is the design for the best players and is the farthest away from the hole. The mean age of the red tee box users in this study was 42.2±15.5 which is higher than the mean age of the other three tee boxes (white 32.3±11.5, blue 35.8±12.3, gold 32.8±13.5). There was a big difference between the red tee box, white tee box and the blue, gold tee box in experience.

Participants using the blue and gold tee box had two times more experience than the red and white tee box. Participants using the white tee box played slightly less than the other three tee boxes and the participants using the red tee box practiced the least among the four.

Participants who used the blue and gold tee box made better shots than participants using red and white tee box. This is substantiated by the mean handicap and score of these subjects. Participants using the blue tee box made a lower percentage of slices, hooks, fat, and thin shots than any of the other tee boxes used with hooks, fat and thin shots being almost identical. Although the gold box players made more slices than the blue box participants the number of slices was almost the same as their tendency to hook. However, the low N for this group might explain why they did not perform as well as the blue box participants. The confidence level of the participants using the gold tee box is higher than the other tee boxes but they are still less confident when trees or water
come into play. Participants using the red tee box are the least confident when you have to hit over water or if water lines the hole, whereas the white and blue tee box players are equally confident. These results support Witt, Linkenauger, Bakdash, and Proffitt’s (2008) study showing that golf performance relates to perceived size and perception is influenced by the perceiver’s current ability to act effectively in the environment. They have found that golfers who played better judged the hole to be bigger than did golfers who did not play as well. In support, better score participants’ confidence is much higher than the lower score participants. We can see that the confidence at the open fairway is higher than the tree-lined fairway and the water fairway. Golfers might feel pressure by the obstacles and the hazards. Also the confidence of hitting in front of friends is higher than the confidence hitting in front of strangers. This shows that golfers also feel pressure if someone they do not know is watching them hitting the ball.

A majority of the participants using the white, blue and gold tee box stand behind the ball and pick a target, whereas the participants using the red tee box never used this technique. This could be due to the experience level of the men and women or the difference in driving distance. With a shorter drive there is less tendency to miss the fairway. It is interesting to note that the players with the best handicap and lowest average score use this technique 100% of the time, whereas less than half of the white and blue tee box players use it. It suggests that standing behind the ball and picking a target may be more useful for the golfers than just lining up as they address the ball. To test this concept we ran a correlation between the percent of time a pre-shot routine was followed and the players average 18 hole score. The results indicate that using the same routine helped the red tee box players more than the other players (Table 5), with a
consistent routine being the least effective with gold tee box users and having a negative influence on white tee box users. When driving distance is correlated to pre-shot routine it has a negative effect on the red and gold tee box players and a slight but non-significant positive effect with white and blue box users.

Table 5 Pre-shot routine comparisons based on tee box selection.

<table>
<thead>
<tr>
<th></th>
<th>Red</th>
<th>White</th>
<th>Blue</th>
<th>Gold</th>
</tr>
</thead>
<tbody>
<tr>
<td>Score</td>
<td>0.564</td>
<td>-0.645</td>
<td>0.412</td>
<td>0.238</td>
</tr>
<tr>
<td>Driving Distance</td>
<td>-0.398</td>
<td>0.283</td>
<td>0.130</td>
<td>-0.507</td>
</tr>
</tbody>
</table>

Values represent the R-values for correlations between score and percent usage of a pre-shot routine and between driving distance and percent usage of a pre-shot routine.

These results support Crews and Boutcher’s (1986a) hypothesis that the lower rated players (more successful) having longer total times for the full shot and putting routines and a lower score over the 12 observed holes. The longer pre-shot routine times of the successful tour players may reflect more developed preparation strategies. Unfortunately we did not measure pre-shot routine time or the exact routine these players used. Consistent pre-shot routines appear to be associated with elite golf performance and may be a necessary skill for performing in discontinuous sport such as golf, which takes place over many hours. Longer pre-shot routines may suggest individuals have a more developed mental preparation strategy and this may result in the athlete being more relaxed, thus improving performance (Crews and Boutcher). In support participants using
the gold tee box spent more time standing behind the ball and picking a target while the participants using the red tee box did not.

Other elements like practice swing, mental rehearsal, and movement do not seem to have much correlation to the players ability in that they showed a great deal of variation. We can say that these elements are affected by personal habit or routine more than their playing ability. Although the forward push is highly recommended by professional players and instructors very few participants in this study used this technique.

Conclusions

This study was designed to investigate the pre-shot routine usage pattern of amateur golfers using the driver and to correlate that pattern to their effectiveness off the tee. To study this problem, pre-shot routine questionnaires were used. The participants of this study were 48 amateur golfers around a Midwestern city. The participants completed the 5 section questionnaire consisting of subject demographics, playing experience, playing ability, driving ability from the tee box, and pre-shot routine on the tee. The results of this study show that a consistent pre-shot routine do not help amateur golfers. The inconsistency of the pre-shot routine these subjects used makes it impossible to make recommendations concerning the effectiveness of a pre-shot routine. What the data does do is provide the framework for additional research in which subjects are required to use a single pre-shot routine that is designed by professionals.
Suggestions for Future Research

Future research should be conducted to further examine the effectiveness and general application of this study. The following recommendations are suggested for future research:

1. Future research could replicate the current study with a larger sample size. This would allow the findings to be generalized to a larger population of golfers than the fifty participants in the current study.

2. Future research could examine whether learning and practicing pre-shot routine improves golfer’s score.

The study could be replicated and conducted with iron shots, chip shots, and putting.
References


Appendix A

Flyer
Research Study
"The effect of pre-shot routine on performance of a drive".

The purpose of the study, the criteria for participation and your time commitment are given below

Study Purpose: To examine the pre-shot routine of amateur golfers with an average score of 85 and above per round of golf.

Subject Criteria: Looking for male and female golfers between the ages of 20-60yrs with average scores at 85 and above.

Participation involves the completion of a questionnaire.

For more information contact:
Dongbin Lee
3784 N. Tillotson Ave. Apt. 115
Muncie, IN 47304
Tel: 765-717-1218
Email: dblee@bsu.edu
Appendix B

Golf Course Letter
Cardinal Hills Golf Course  
3900 S Whitney Rd, Selma  
765-288-2731  
Crestview Golf Course  
3325 S. Walnut, Muncie  
765-289-6952  
Delaware Country Club  
Country Club Rd, Muncie  
765-282-3301  
Players Club Golf Course  
6610 W. River Rd, Yorktown  
765-759-8536

Contact Letter

Dear "Owner of the course"

You are being contacted to determine if you would be willing to post the attached flyer in your pro-shop. The research study described in this flyer involves the collection of data by having participants fill out a "Pre-shot routine" questionnaire that will enable me to determine what type of pre-swing set up higher scoring amateur golfers use prior to hitting the golf ball. My contact information is listed on the flyer and I will be responsible for distributing and collecting the questionnaires so that your only obligation will be to allow me to post the flyer. The flyer would be posted from the date that you approve the posting of the flyer until November 1, 2008.

If you are willing to help me in this research study please sign and return this letter in the envelope provided. If you have any questions or wish to speak to me prior to making a decision please contact me by phone or email.

Dongbin Lee
3784 N. Tillotson Ave. Apt. 115
Muncie, IN 47304
Tel: 765-717-1218
Email: dblee@bsu.edu

Dr. Bruce W. Craig
Faculty Mentor
bcraig@bsu.edu

I agree to support this research study by allowing you to post the attached flyer in our pro-shop.

____________________________________________________Date__________

I will not be able to support this research study.

____________________________________________________Date__________
Appendix C

Campus E-mail
We are seeking participants for a research study entitled "The effect of pre-shot routine on performance of a drive".

The purpose of the study, the criteria for participation and your time commitment are given below

Study Purpose: To examine the pre-shot routine of amateur golfers with an average score of 85 and above per round of golf.

Subject Criteria: Looking for male and female golfers between the ages of 20-60yrs with average scores at 85 and above.

Participation involves the completion of a questionnaire.

For more information contact:
Dongbin Lee
3784 N. Tillotson Ave. Apt. 115
Muncie, IN 47304
Tel: 765-717-1218
Email: dblee@bsu.edu
Appendix D

Consent Form
The Effect of Pre-shot Routine on Performance of a Drive

The purpose of this study is to determine what type of pre-shot routine amateur golfers use, and to determine how it correlates to performance. Your participation in this study will require you to complete a five part pre-shot routine questionnaire that will cover the following areas: your demographics (age, gender etc.), playing experience, playing ability, driving ability, and your pre-shot routine. The questionnaire should take you about 20 minutes to complete and all data will be maintained as confidential. Data will be stored in computer files and copies that only have access to the researcher and the faculty advisor.

You have three options for completing the Pre-shot Routine questionnaire. The first option will be to fill out the questionnaire while the study P.I. waits and you return it to him after you sign this consent form. The second option will be to take the questionnaire with you. If you choose to take it with you please return it within two-weeks. You will be given a postage paid envelope addressed to the study P.I. along with the questionnaire. The third option will be to fill out an electronic version (word document) of the questionnaire and return it as an email attachment. If you choose this option you will be required to supply your email address to the P.I.

The foreseeable risks or ill effects from participating in this study are minimal. It will require you to give up some time but should represent no other risk.

Benefits you may gain from your participation in this study will be to gain insight on how a set pre-shot routine might improve your accuracy from the tee box.

Your participation in this study is completely voluntary and you are free to withdraw from the study at anytime for any reason without penalty or prejudice from the investigator. Please feel free to ask any questions of the investigator before signing the Informed Consent form and beginning the study, and at any time during the study.

For one’s rights as a research subject, the following person may be contacted: Coordinator of Research Compliance, Office of Academic Research and Sponsored Programs, Ball State University, Muncie, IN 47306, (765) 285-5070.

***************

I, ________________________, agree to participate in this research project entitled, “The Effect of Pre-shot Routine on Performance of a Drive.” I have had the study explained to me and my questions have been answered to my satisfaction. I have read the description of this project and give my consent to participate. I understand that I will receive a copy of this informed consent form to keep for future reference.

__________________________  ______________________
Participant’s Signature      Date

__________________________  ______________________
Principal Investigator’s Signature   Faculty Supervisor
Dongbin Lee, Graduate Student     Dr. Bruce Craig
Physical Education, Sport,       Physical Education, Sport,
and Exercise Science             and Exercise Science
Ball State University            Ball State University
Appendix E

IRB Approval Letter
The Institutional Review Board reviewed your protocol on October 1, 2008 and has determined the procedures you have proposed are appropriate for exemption under the federal regulations. As such, there will be no further review of your protocol, and you are cleared to proceed with the procedures outlined in your protocol. As an exempt study, there is no requirement for continuing review. Your protocol will remain on file with the IRB as a matter of record.

Editorial notes:

1. As your study has been determined to be exempt, you may revise the Informed Consent document into an introductory letter to your participants to inform them of the nature of the study. An introductory letter should contain all relevant information from an informed consent document but without the signature block for the participant. Therefore, you are not required to retain signed informed consent documents from each participant unless you choose to do so.

While your project does not require continuing review, it is the responsibility of the P.I. (and, if applicable, faculty supervisor) to inform the IRB if the procedures presented in this protocol are to be modified or if problems related to human research participants arise in connection with this project. Any procedural modifications must be evaluated by the IRB before being implemented, as some modifications may change the review status of this project. Please contact Amy Boos at (765) 285-5034 or atboos@bsu.edu if you are unsure whether your proposed modification requires review or have any questions. Proposed modifications should be addressed in writing and submitted electronically to the IRB (http://www.bsu.edu/irb) for review. Please reference the above IRB protocol number in any communication to the IRB regarding this project.

Reminder: Even though your study is exempt from the relevant federal regulations of the Common Rule (45 CFR 46, subpart A), you and your research team are not exempt from ethical research practices and should therefore employ all protections for your participants and their data which are appropriate to your project.
Appendix F

Questionnaire
SECTION I - Subject Demographics

1. Subject ID #

2. Name______________________________

3. Gender □Male □Female

4. Age________________________

Contact Information:

SECTION II – Playing Experience

1. How long have you been playing golf? _____ Years _____ Months

2. Highest level of golf played:

□ High School
□ College
□ Amateur
□ Professional
□ does not apply

3. What is your frequency of play? (mark one of the following)

I play _____ times per week on average.
I play _____ times per month on average
I play _____ times per year.

4. How often do you of practice?

I practice _____ times per week on average.
I practice _____ times per month on average
I practice _____times per year.

5. Have you taken any lessons? Yes____ No____
   How many have you taken? __________
   When were they taken (Approximate date)? ________________
   Who gave the lessons (Pro or other professional)? ___________

Section III – Playing Ability

1. Current handicap_________

2. Ave score for 18 holes_____________

3. Area course(s) you normally play?
   __________________________________________________________

4. What is the make, model, and year of your driver?
   _________________________________________________________

5. How long have you used it? ______________

6. What tee box do you play from normally? ______________

Section IV - Driving Ability from the tee box

1. Average distance off the tee_______ yards

2. Rate your shots

<table>
<thead>
<tr>
<th></th>
<th>90-100%</th>
<th>80%</th>
<th>70%</th>
<th>60%</th>
<th>50%</th>
<th>40%</th>
<th>other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency of a hook or fade</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Frequency of a slice or draw</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shots you hit fat</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shots you hit thin</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
3. How many holes do you perceive as bad ones – I always hit a bad tee shot off of hole number?
   □ Par 3’s
   □ Par 4’s
   □ Par 5’s

4. Rate your confidence with the driver under these circumstances

<table>
<thead>
<tr>
<th>Circumstance</th>
<th>90-100%</th>
<th>80%</th>
<th>70%</th>
<th>60%</th>
<th>50%</th>
<th>40%</th>
<th>other</th>
</tr>
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<td>Hitting over water</td>
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<tr>
<td>Hitting in front of friends</td>
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<tr>
<td>Hitting in front of strangers</td>
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</tbody>
</table>

Section V - Pre-shot Routine on the tee.

1. Lining up the shot.
   □ I stand behind the ball and pick a target
   □ I line up as I address the ball
   □ Other

2. Practice swings
   I take ___partial swings
   I take ___full swings
   □ I take no practice swings
3. Addressing the ball

- I line up the club head with a pre-determined target
- I stand parallel to the ball
- I mentally rehearse the movement pattern at address

4. Movement at address

- I do not move once I have set up the shot.
- I waggle the club prior to hitting.
- I keep my feet moving slightly prior to hitting.

5. Forward push

- I use a forward push.
- I do not use a forward push.

6. Frequency of usage

   I use the same routine

- 90-100%
- 80%
- 70%
- 60%
- 50%
- 40%
- Other