

15 One move to better ball flight

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Abstract

The aim of this study was to find out whether one particular swing change—widening of the on-plane backswing arc of the right arm during takeaway—can produce significant improvements in distance, direction and trajectory. Seventeen right-handed amateur golfers, 13 male and 4 female, of ages ranging from 10 to 62 years, and handicaps from -6 to -20 participated in this study. They attended 3 consecutive one hour sessions and used their 5 irons, off a tee. Subjects were divided into two groups depending upon their swing Type - A or B, and specific instructions were given to each group. The clearance angle, a measure of the first wide position of the right arm as it passed the right side of the body was noted, and compared with increase in distance. Results for swing Type A showed an average distance increase of 8.5 yards and accuracy increase of 0.8 yards. For swings of Type B, the average distance increase was 2.8 yards with an accuracy increase of 0.8 yards. From the results of this short-term study it was concluded that the one particular simple instruction imparted yielded an overall average distance increase of 6.16 yards with a marginal increase in accuracy of 0.76 yards.

Keywords : Widening Swing Arc, Swing Plane, Takeaway, Clearance Angle.

1 Introduction

Ever since the days of Harry Vardon, when golf instruction was first imparted in a formal manner, the same swing fundamentals are being taught to all golfers.

Instruction today incorporates club positions as required by the Ball Flight Laws and body positions chosen from the Principles & Preferences of Wren's (1990) Teaching Model. Additionally instructors may or may not follow what the Centinela Hospital Research Centre's study (Jobe & Moynes, 1986) shows about the big muscles producing power. Specifically, that the left side, particularly the left hip pulls the clubhead through impact, a fact which has been corroborated by Williams (1969).

All this makes golf instruction simply too diverse and complex for the average golfer desiring quick improvement, especially in distance, and without much practise. Could there be one backswing change which would simultaneously improve impact and follow all scientific findings? The objective of this study is to prove that widening of the on-plane backswing arc of the right arm during takeaway is one swing change, which is in itself sufficient to improve ball-flight in every case.

Science and Golf II: Proceedings of the World Scientific Congress of Golf. Edited by A.J. Cochran and M.R. Farrally. Published in 1994 by E & FN Spon, London. ISBN 0 419 18790 1

2 Materials and Methods

2.1 Subjects

Seventeen right-handed, amateur golfers, thirteen male and four female, of ages ranging from 10 to 62 years, and handicaps ranging from -6 to -20 participated in the study. Twenty was the cut-off handicap to ensure consistency of starting swing.

The swings of all subjects were broadly classified into two basic types. Swing Type A is one having mostly an arms pick-up during takeaway. Swing Type B is one with mostly body rotation (i.e. an early withdrawal of right shoulder, arm and hip away from target line) during takeaway. There were 10 cases of swing Type A and 7 of swing Type B.

2.2 Equipment

- (a) The camera used was a National NV - M7EN at a shutter speed of 1/1000 second. It was placed at a distance of 15 feet from the ball. All swings were recorded from the face-on angle.
- (b) Each subject used only his/her 5-iron off a tee.
- (c) One set of 10 two-piece, 100-compression golf balls was used throughout the experiment.

2.3 Procedure

All subjects attended three consecutive one-hour sessions. During the first session, after a few warm-up shots, the golfer was asked to tee up the ball as close as possible to a wooden 2 X 4 board placed on the ground (Fig. 1). The board was aimed at the target and helped ensure consistent alignment. He/she then proceeded to hit a set of 10 shots which was recorded. To allow for human-error factors such as camera-shyness the subject could hit further recorded sets of 10, until satisfied that a set was typical of his/her existing ball-striking pattern. The criteria for selecting the best set of 10 required that at least 6/10 shots were good. The selected set comprised the 'before' results. Exclusion criteria for individual shots of a set were (a) complete mishits, such as shanked and badly topped shots, (b) any shots landing less than 50% of a subject's usual distance away and (c) shots more than 30 yards left or right of target. Such shots were omitted from all calculations.

Next, instruction was imparted depending upon the subject's basic swing type. A 12'' stake was placed on the target line 3 feet away from the ball. A subject of swing Type A was told to either keep the club-head moving low and wide until it passed the stake, or feel as if he/she was trying to hit the top of the stake (Fig. 1). Most importantly, he/she had to feel that the right arm, not just the left, moved away from the right side of the body. This prevented early elbow and/or wrist fold.

For Swings of Type B, the same stake described above was used. In addition, three lines were drawn on the ground. The body line along the toes, the right elbow line parallel to it, and the target line parallel to both the others (Fig. 2).

The subject was asked to start the backswing with the arms-triangle, whilst keeping the right-shoulder and -elbow along their respective lines, and the clubhead along the target line, for as long during takeaway as possible.

Every subject was asked to make no intentional/extraneous movements of shoulders, hips, knees or ankles, during takeaway. The right shoulder was not to tense-up in trying to widen the arc. After takeaway, the rest of the backswing to the top could continue as usual.

During the second and third sessions, the subject tried to implement the above instructions, for 30 - 45 minutes, under supervision. At the end of each session he/she was asked to hit one or two rounds of 10 shots, which were recorded. The best of the recorded sets requiring at least 6/10 good shots was selected and comprised the 'after' results. Exclusion criteria for individual shots of a set were the same as before.



Fig.1 Starting the recommended move

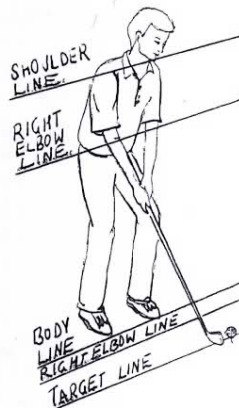


Fig.2 Body-, right elbow-, target-lines

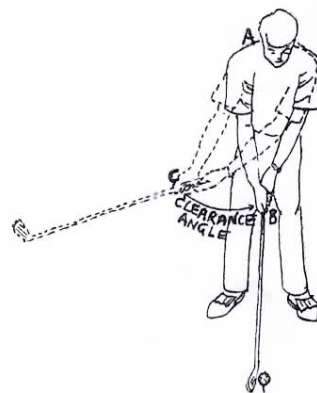


Fig.3 Clearance angle

2.4 Measurement of 'Clearance Angle'

The clearance angle measures the first wide position of the right-arm as it clears the right side of the body. 'Wide' means (a) before right elbow and/or wrist fold take place, or (b) before abrupt withdrawal away from the target line of the right arm and shoulder. This latter move manifests itself as the beginning of a 'reverse-pivot' with the chest not moving towards its desired position over the right leg. It is accompanied by an early disappearance of the right shoulder, when seen from the face-on angle.

To calculate clearance angle each recorded swing was replayed. The swing action was paused when the clubhead was grounded at address. A line (AB) was drawn on the video screen, through the right arm in its address position (Fig.3). The swing was then advanced frame by frame, to catch the player's first wide move away from the right side of the body. This position was used in all cases, although many swings continued to be wide well past this point. A second line (AC) was drawn through the right arm at the above point. (Fig.3). The angle between AB and AC was measured using a protractor. This angle was termed the 'clearance angle'.

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3 Results

The subjects selected were divided into two Swing Types - A and B. Tables 1 & 2 show their original mean distance (OMD), increase in distance (ID) - (α), original mean clearance angle (OMCA), increase in clearance angle (ICA) - (β°), correlation between increase in clearance angle and increase in distance ($\alpha\beta$), standard deviation of original spray (SD-OS) and standard deviation of final spray (SD-FS). The correlation monitors the variation of one parameter (α) relative to another (β). Spray is the root-mean square deviation from target of each set of 10 shots. Subjects are listed in descending order of distance improvement.

Table 1. Swing Type A

Sr. No.	H'cap	OMD (yds.)	ID(α) (yds.)	OMCA (deg.)	ICA (β°)	Correlation ($\alpha\beta$)	SD-OS (yds.)	SD-FS (yds.)
1	20	118.0	15.6	23.6	6.6	102.96	13.9	10.9
2	12	159.4	12.85	15.55	12.575	161.58	13.3	12.8
3	17	142.1	12.6	25.5	8.92	112.392	8.8	8.0
4	7	186.9	12.4	20.0	9.55	118.42	10.7	10.7
5	20	175.8	8.4	22.57	16.715	140.406	14.2	13.7
6	10	174.2	6.6	27.5	6.5	42.9	11.1	7.9
7	12	121.5	5.5	20.8	7.7	42.35	8.4	7.5
8	18	99.4	4.4	24.3	8.5	37.4	5.3	5.1
9	11	155.4	3.9	15.28	6.92	26.988	9.4	10.4
10	9	118.2	2.8	12.3	6.075	17.01	7.9	8.9
Average		145.0	8.5		9.0	80.24		0.8

Table 2. Swing Type B

Sr. No.	H'cap	OMD (yds.)	ID(α) (yds.)	OMCA (deg.)	ICA (β°)	Correlation ($\alpha\beta$)	SD-OS (yds.)	SD-FS (yds.)
1	20	74.5	12.1	30.75	4.375	52.937	4.5	7.5
2	20	116.7	5.3	22.4	5.04	26.712	5.8	6.9
3	14	163.5	4.0	19.0	7.5	30.0	11.5	10.2
4	18	154.8	3.5	14.7	14.051	49.175	12.4	10.0
5	8	172.7	0.6	18.3	4.57	2.742	9.1	9.0
6	12	133.0	-1.6	26.6	4.4	-7.04	4.8	4.2
7	6	191.3	-4.2	20.0	5.125	-21.525	12.0	6.4
Average		143.7	2.8		6.4	19.0		0.8

4 Discussion

Great technological advances have taken place in equipment design and golf ball manufacture. However, golf swing instruction is still mostly imparted in terms of the tried and tested methods of famous golfers

rather than in terms of scientific validity. This study is aimed at proving that one simple yet scientifically valid instruction is sufficient to improve ball flight in every case.

The one simple instruction of widening the right arm backswing arc resulted in distance improvement in almost every case. There was an average distance improvement of 8.5 yards for swings of Type A and 2.8 yards for swings of Type B. This is a significant improvement for the average golfer because 5 - 10 yards represent a half to whole increase in the number of iron to be used. No distance improvement took place for subjects 6 and 7 of Swing Type B because they were still unable to keep the right shoulder and arm from withdrawing too early from the target line.

Observation made during the study showed that the right arm moving away from the right side of the body, forced the left arm to move too. This forced the entire left side (shoulder, hip, knee, ankle) to move, in a synchronised manner and about the central spine, producing correct pivot. This observation is substantiated by Leadbetter's (1990) definition of pivot which takes place when (a) the chest turns until it is over the right leg (b) the left shoulder is under the chin and turned well behind a vertical line drawn up from the left hip. A good pivot and weight-shift during the backswing should allow the left hip to pull the clubhead through impact more efficiently. This was found to be so, especially with subjects who showed marked improvement.

Distance improvement was impressive in spite of the short duration of the study. However, accuracy also improved marginally in 13/17 cases. In 4/17 cases (9 and 10 of Type A and 1 and 2 of Type B) accuracy reduced slightly. This reduction of approximately one yard in accuracy was not a particular sacrifice for the average golfer considering the size of most greens and the distance improvement made. Accuracy improvement took place because the subject was required to keep the clubhead low to the ground and square to the target line longer during takeaway. This bettered chances of the Ball Flight Laws (7) governing direction (club face angle, club path and centredness) being obeyed.

Although this study did not measure trajectory, it was seen to improve dramatically because the recommended backswing allowed a lower angle of attack in the through swing, as desired by the Ball Flight Laws (7).

There was an increase in mean clearance angle of 9.0° for swings of Type A and 6.4° for swings of Type B, with Type A swings continuing to remain wide well past this point. Maximum distance improvement took place with swings of Type A, because these swings already incorporate more elements of the recommended procedure, that is, arms starting takeaway and swing on plane. Type B did not show commensurate distance improvement because a too early shoulder rotation prevented proper weight-shift and an on-plane swing. Although many golf teachers such as Hebron (1984) require a shoulder turn to start the backswing, this study showed that shoulder turn should be the effect and not the cause of a correct backswing.

When the two different parameters clearance angle and distance, were correlated it was found that cases 6, 7, 8, 9 and 10 of swing Type A and 2, 3 and 4 of swing Type B represent the median, with an average correlation of 36.163. The first five cases of swing Type A (1, 2, 3, 4 and 5) however, are in a league of their own with a correlation greater

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than 100. This can be attributed to the fact that the first five subjects continued to swing wide for at least another 15 degrees past the first clearance angle. They also exhibited the least amount of extraneous lateral/vertical body movements during takeaway.

It was noticed that widening of the swing arc eliminated relative movements of arm joints (wrist-cock, elbow fold, pronation-supination of forearms), during most of the backswing, so that the arms had less movements to reverse, while approaching the ball. This obviated the need for grip improvement changes, which many feel is a vital key to better impact.

5 Conclusion

A short-term study has been made of one particular swing change and its effect on distance and accuracy. The swing change made was to move the right arm as much away from the right side of the body as possible before it folded at elbow or wrist. It was found that this simple instruction yielded an average distance increase of 6.16 yards, with marginal increase in accuracy of 0.76 yards. Better and more consistent results would certainly follow for the average golfer continuing with this technique.

6 Acknowledgements

The authors wish to thank Dr. M.R. Press for all his help, particularly in data analysis.

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