DYNAMIC LAWS OF THE GOLF STROKE

More Pegs on Which to Hang Your Golf Thoughts

To dispatch the ball the greatest possible distance, we should use every source of driving power we have. There are four sources of driving power:

1. HIP POWER
2. SHOULDER POWER
3. ARM POWER
4. WRIST POWER

In each there is a climax; and it is by co-ordinating these four sources of power into one united effort and concentrating that effort on and transmitting it to the ball, that the greatest driving power of which we are capable is produced.
FUNDAMENTAL 6

*Hip Power Momentum Producer.* Lateral hip action adds momentum to the blow, and backs up the speed generated by the shoulders, arms and wrists. Momentum is necessary to overcome resistance and to get the benefit of the resiliency of the ball, since the ball’s initial velocity should be greater than the velocity of the club head. The hip action is called “lateral” because the action is precisely what the word implies.

The player’s body has two distinctly different motions to make: (1) the rotary shoulder action and (2) the lateral hip action. One is done for one purpose, while the other is done for an entirely different purpose.

The hips do rotate somewhat but their rotary action is done to assist the shoulder rotary action. The real work to be done by the hips is to move sidewise from one side to the other, thereby shifting the bulk of the player’s weight from one foot to the other. This must be done without moving the player’s head. This shifting of the player’s weight is the all-important essential and source of the power of the follow thru.

*An illustration of the difference between speed and momentum. Suppose there was a window pane and a fly flying towards it at 60 miles an hour. When the fly struck the window it would not break it. Why? Because there is no great weight behind its speed.

On the other hand suppose we take a locomotive crawling along at 1 mile an hour and in its path there is not a pane of glass but a brick wall. In spite of the greater strength of the brick wall over the pane of glass and the slow speed of the locomotive as compared with the great speed of the fly, yet the locomotive would go thru the wall as easily as if it were not there, and why? Because of its great weight. This is momentum—weight behind motion. In the golf swing we need a happy medium, a sort of swat the fly, don’t pulverize the rock. Strike the ball a stinging smack coming out of the wrists and put just enough hip power behind the wrists to carry their speed thru the ball, thereby overcoming its resistance and getting the full benefit of the resiliency of the ball.*

FUNDAMENTAL 6
Put Your Hips into it, i. e. Shift Your Weight from Hip to Hip by a Sidewise Action of the Hips.
Every boxing man knows the value of following up his blow with the weight of his body by shifting his body weight forward as he strikes out. No very great motion of the body is necessary. The slightest shifting of the body weight has tremendous effect if done at the crucial moment. The golfer should do the same thing, i.e. shift his weight, and this shifting of the body weight must be so timed as to deliver the climax of this power at the instant of impact.

The golfer, however, must not move his head till after the impact, and therefore is free to move only the middle portion of his body which centers in the hips. A study of the motion pictures on pages 105 and 109 shows that the right hip has a lateral action 18 inches from the top of the swing to the finish. This lateral hip action is plainly discernible in every long stroke illustrated, and I would emphasize the point that this is the all-important essential and source of the power of the follow thru.

To shift the weight the wrong way, i.e. from left foot to right during the stroke instead of right to left, is a very common fault. Therefore every player should look into this matter to see if he is really on the right track.

The hip action is called the parallel hip action because it is an action of the hips that is parallel with the line of play, and to differentiate it clearly from all action of a rotary character.

Illustrations 59, 60 and 61, page 87, are for the purpose of showing extent of hip action and weight shifting.

It is impossible to get a photograph of a player at the top of the swing in a position that conveys the right idea
to a beginner of just what the hips really do during the golf swing, because strange as it may seem the hips start to react forward before the upswing of the club is completed. The reason for this is because the hip action is so slow and the rest of the moving parts of the swing such as the shoulders, arms, wrists and club, so fast that the hips have to work ahead of the other parts or they would be late in taking care of the shifting body weight. So for instruction purposes an instructor must have certain standards and ideals by which to ultimately get his pupils on the right track.

Standardization of the Golf swing is not possible, but standardization of a method by which instructors train their pupils is.

Hand writing in children's school books is standardized in form and all the pupils try to copy it. How could they learn to write and understand one another's writing if there were no standard form of writing. We must have standards and ideals in golf too even tho the golf champions do not follow them any closer than the school children follow the standard form of writing. The children who follow the standard form of writing closest win the prizes. So it is with the golfer. Those who follow correct form generally win in the end.
PUTTING THE HIPS INTO IT
Showing the extent of the hip action and how the body weight is shifted from right to left.
Shoulder Power

Momentum and speed producer. As the wrists swing the club the shoulders swing the arms.

The shoulders by their rotary action maintain and add to the speed generated by the arms and wrists and they are capable of generating tremendous driving power. This shoulder power should be used to the extent of the player’s ability to transmit it to the ball. Caution, however, must be exercised; the shoulders are many times stronger than the wrists, and therefore are likely to cause the wrists to collapse.

At the top of the swing the right shoulder is considerably higher than the left and in the downswing the power of the right shoulder is extended down and thru under the player’s head, not out and around which is a common cause of topping with the heel of the club head. If the shoulders do not work in their proper oblique plane of action they will not only throw the player’s head out of position, but also unset the oblique plane of the club’s swing.

Illustration 62, page 89, shows clearly the extent to which the shoulders enter into the stroke—the right shoulder has fairly punched the ball out. The position as a finish is decidedly too long to be orthodox. I happened to be defending a reputation for long driving in a competition against two of the longest drivers in the country and it was a case of neck or nothing. I excuse myself only on the ground that I won the contest. This
particular drive was 287 yards. The carry was over 250 and I am satisfied the shoulders played a big part. This is by no means the longest drive I ever made. At Wykagyl Country Club, New Rochelle, N. Y., at the old 11th hole, I once carried the brook at a point 302 yards from the tee. I have several times driven onto the first green at Wykagyl which was 375 yards then (1907). I have also many times driven onto the first green at Lake Placid Club, Old Course, which is 376 yards. Once I drove a ball beyond this green into the Wilmington road, 408 yards from the point where I hit it. That was in the days when I used long clubs with light heads. I gave them up because I never knew which way the ball would go. Less distance and better direction is worth more.

62 784 yards was the total for 3 drives. That was nothing extraordinary but it was good enough to win. All balls had to be kept within certain narrow limits on the fairway, or the total distance of the drive was lost
**Fundamental 8**

*Arm Power* Speed producer. The left arm unites club with player’s body and is therefore the master arm. The right arm merely guides and drives club and left arm thru.

The arm action is chiefly an up-and-down action like driving a peg into the ground. It should be vigorous but limited in the upward extent for the sake of swing control.

In the upswing the club should be swept away from the ball *along the ground* by the turn of the left shoulder. Meanwhile the wrists should be so loose that they saggingly twist, leaving the club head somewhat behind. When the club head has been dragged about one foot, this wrist sag should end in a reaction of the wrists wherein they twistingly sweep the club head round to the player’s right and the wrists into proper position to bend upward, thus raising the club head in the manner of raising a hammer to strike a blow, i. e., head leading. When the club has reached a vertical position (See Illustration 117, page 105) the arms commence to bring up the club handle, raising the whole club now as if *shoving* or *sliding* the club, head foremost, over the right shoulder. See Illustrations 118, 119, 120 and 121, page 105.

In the down swing, the left arm gently and slowly starts the club handle down, while the left shoulder gradually starts to unwind. Soon after the left shoulder is started, it begins to speed up. Meanwhile the left arm and club drag sidewise behind. Study Illustrations 97, 98, and 99, page 102. These illustrations give a good idea of what is meant by the lateral curve of the golf swing, i. e. the round-about motion.
This drag action of the arm wherein the left shoulder speeds ahead while the left arm drags behind, results in a reaction which generates greater force than would be the case if there were no such drag. The left shoulder, by getting ahead of the left arm, has to make a race to catch up with it, but before it makes this race to recover from its sidewise drag, it pulls downward as if the player were going to drive a peg into the ground, as in the opposite illustration.

The left arm in its downward action drags the club down handle foremost, the club head meanwhile dragging behind. As the left arm has about completed its downward pull, the reaction of its sidewise drag comes into play just before the left wrist begins its downward striking action. Now the left forearm absorbs the arm drag by twisting to the right so that the club head still drags behind. See Illustration 100, page 102.

As the shoulder rotary action is about to reach its climax opposite the ball and the left arm has recovered from its sidewise drag, the left wrist strikes downward and then the left forearm lets loose a twist which recovers it from its drag. Now all these actions and reactions come to a culmination in a terrific snap on the ball.

The left wrist, being quicker in its action than the left arm, must not expend its effort till the left arm has had a chance to get a good start ahead of it. If this is not done the wrist action will be expended at the wrong point in the swing, or its effect simply squandered throughout the downward stroke instead of concentrated on the ball. A good thought to be remembered is to drag the club down to the right of you but don't start with a jerky motion. Slash the club handle down with the left arm and slap the club head thru with the right forearm.

Study carefully Illustrations 121, 122, 123, 124, and 125 on page 105, and Illustrations 141, 142 143, 144,
Note position of peg in ground, to player's right. This shows direction in which initial effort should be made from the top of the swing.

Merely to illustrate the idea of—start the club down to the right of you.
and 145, page 109. Note the left arm started downward first, wrists coming into action later.

Arm action *drags* the club downward, handle foremost. Wrist action *breaks* the club shaft downwardly away from the player’s shoulder.

*To delay the time of expending the wrist action, do not let the club shaft break away from the shoulder till the arm action has dragged the handle end of the club well downward.* It will be seen that the arm action has pulled the club handle downward about 24 inches before the club shaft has broken away from the shoulder to any considerable extent.

Some players are apt to exert *too much* effort with their right shoulder. The arms and wrists then get *too far* behind and the swing is thrown out of the arc. Co-ordination of swing becomes completely disorganized and slice results. To them I would say, let the impetus gained by the downward arm and wrist action unwind the shoulders, because even then they will in all probability exert sufficient effort with the shoulders to convert the *arm-and-wrist-downward-hammering stroke* into a golf swing. Experiment will show that you cannot prevent the shoulders from unwinding. The very impetus of the club’s swing will unwind them in spite of your effort to check them. Of course the shoulders should not be entirely checked. They must start first and get ahead of the club, and the correct thing to do in the case of too much effort of the shoulders is to modify it. This, however, in most cases would not effect a quick cure. Defects of the *golf swing* have to be dealt with severely at times, and an instructor frequently must ask a pupil to do something he does not ultimately want at all. He will do this to tear his pupil loose from the defect contracted. For example, the best way to teach a pupil to drive a straight ball when troubled with a persistent slice is to teach the
pupil to hook. When the counter-irritants are beginning to take effect, I modify the dose and tell my pupil just what is wanted.

The function of the left arm is perhaps best explained by the following simple example: recall to mind a large farm fence gate. We will say the golf club is like the gate; the player's left arm is like the post which holds the gate; the player's left wrist is like the iron hinge on which the gate swings; the fingers of the left hand are like the steel bolts which fasten the gate to the hinge; the player's right hand is like the farmer who comes along and swings the gate. The farmer does not have to take a tight grip of the gate in order to push it open, but the steel bolts which hold the gate to the hinge must have a very firm grip of the gate. The post which the gate is fastened to must be very firm and solid or when the farmer pushes the gate to open it the whole structure would fall down.

In the golfer the player's left arm is like the gate post, only it is a swinging gate post. It nevertheless holds the gate or rather the club and therefore it must be very firm and rigid, also the left hand grip must be quite firm and secure. It is not so with the right hand; it is not necessary to grip tight with the right hand, in fact, it would be quite fatal; it would destroy wrist action; it would be like putting a hinge at both ends of the gate—you could not swing it. Of course, I do not mean that the right hand should be too loosely gripped, but there should be no more tightness of grip than is necessary to control and guide the club.
Wrist Power  Greatest speed producer. The left wrist should be the axis of all wrist action. Therefore, the right hand must work about the left, and, because the left wrist is a fulcrum of the wrist action, the grip with the left hand must be firmer than with the right.

The right hand has a great deal of work to do, but its work is entirely different from that of the left hand. The right hand guides the club head, controls the club face and delivers the blow. At first thought this might seem all there is to be done, but there is something else and of far greater importance—which has to be done by the left hand—Unite the Chain of Levers. At the moment of impact the left arm and club are like one solid lever from the left shoulder down to the club head. The left hand is the connecting link between the player and the club; it is a part of the lever. The strength of the lever must be greater than the power that operates it.

The right hand does not have to grip hard in order to guide or push the club thru. The left must, because the right hand delivers its blow against the left. I do not mean to underestimate the work of the right hand. On the contrary the right hand has much work to do, but that work is not to grip the club tightly. To do so would not only spoil its own work, but it would spoil the looseness and freedom of the wrists and possibly render the left wrist incapable of functioning as a fulcrum and all wrist action would be destroyed.
Now rest the hammer on a table and roll it, twist it over on its right side, then on its left side, and you will get the right idea of the *twisting* action of the wrist. When we strike at a golf ball our wrists bend downward, twist over, and then after impact bend upward.

In order to make the club travel in the proper course of the swing, and bend the wrists in the manner described, at each end of the swing, we must twist (or turn) the wrists over. See Illustrations 65, 66, and 67, page 97. These illustrations show an exercise that is excellent for developing a powerful, concentrated wrist action. It will be observed that the left arm is kept pointing at the ball throughout the motion.

The object of this exercise is three-fold:

1. To develop the maximum of wrist action.
2. To concentrate it, i.e. expend it all at one point.
3. To concentrate it at the right point in the swing, i.e. right at the ball.

The illustrations show the exercise being done with the left hand only, because, (1) that is exactly where we want the action, *in the left wrist*. The right hand works about the left wrist. (2) The left wrist is the weak link in every golfer. This exercise strengthens it.
The Speed Sector of the Golf Swing

Ability to get distance is a matter of hitting thru the ball, striking at it with a stinging smack. This smack is produced with the wrists, and the wrists if properly used are capable of swinging the club head thru the ball with terrific speed, their action however must be (1) correct in form, (2) be extensive, (3) be concentrated and (4) perfectly timed.

Correct form of wrist action: the initial movement of the back swing is made by the player's body, the hips by their sidewise action start the body over on the right leg, also the shoulders turn to pivot the body round to the right, the two movements being actuated by the left leg. The left knee turns in and the left heel comes off the ground. The movement is a very easy, gentle one and the wrists should be so loose that under the gentle movement of the body they sag or bend so that the club is dragged away, the club handle making a slight movement to the right before the club head is started. The movement of the player's body is transmitted to the club handle thru the left arm. The club is started back by the left hand pushing the club handle to the right till the club head must of necessity follow. The body continues its action and now the left wrist becomes active and by a pronation twist sweeps the club head along the ground and round to the player's right to what is termed the low horizontal position of the club. See illustration 74. Next the wrists by their bending action raise the club head to the position shown in illustration 76. Next the left arm raises the club handle till the club reaches the position shown in illustration 79.

Many players do not know how to time the stroke correctly, and because of this there is no concentration of power at impact. They are therefore unable to hit
through the ball. Study the hip, arm, shoulder, and wrist action in Illustrations 68 to 87. In the start of the downswing, (Illustration 78), the hips start forward first, shifting the body forward. Then the shoulders begin to unwind very slowly and gradually; next note in particular in Illustrations 79, 80, and 81 how the arms strike downward, dragging the club handle down first while the wrists remain bent, thus allowing the club head to drag behind. This trick many players have not learned. The beginner will naturally expend the downward wrist action with the downward arm action, but you cannot get the snap into the ball in this way. The wrists having more speed than the arms, must be taught to wait until the arms have almost reached the climax of their downward action before the wrists, with their terrific speed let loose this snap. If the wrists expend their action during the upper part of the down swing the snap will be spent before the club reaches the ball, or if the action be spread throughout the down swing the force is squandered.

If by expending such wrist action you start the club head first at the top of the swing and do so with a snap, this wrist snap strikes the air above your head, the ball getting no benefit therefrom. Since the wrist snap cannot be expended twice in the same stroke, if it is to be expended on the ball at all, it must be kept in reserve till the hands are brought to a point nearly in line with the ball. Illustration 81 shows the wrists just commencing to let loose their power. It will be seen that while the hands have yet to travel about twelve inches in order to come into line with the ball, the wrists must make the club head travel about twelve feet to reach it. In Illustration 82 the left hand has but one inch to go to come into line with the ball, while the wrist action must make the club head travel fully four feet before it will reach it.
THE WRIST ACTION in Motion Picture Series

This was an actual drive in which the ball was driven 250 yards
Notice also how comparatively placid the body is as compared with the energy of the wrists
OVERHEAD VIEW OF GOLF SWING in Motion Picture Series

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At impact, club head, hands and player's head will all be in line. Illustration 83 shows the club at low horizontal on the way up to the finish of the swing, the club head is now fully six feet past where the ball set; during the time the left hand traveled barely twelve inches. In illustration 84 the club cannot be seen, but it has reached a position corresponding with that shown in illustration 81, therefore, that part of the arc traversed by the club head between those points, illustrated in 81 and 84, is what I would term “the speed sector of the swing.” This is produced by the right hand striking forward while the left hand resists backward.

There is no speed sector in the swing of many players. At the top of the swing many start the club head first by wrist action instead of starting the club down by dragging it down handle foremost. If you start the club head first all the wrist action will be squandered before the club head gets anywhere near the ball, and consequently there will be no snap in the stroke. To remedy this do not let the club break away from the shoulder till the arms have swung the club handle well down; also practice the following exercise; set up two, high, flat-sided sand tees, six to eight inches apart and directly in the line of play, with flat side of tees square to club face. Address the first tee as you would the ball. Now swing and smack both tees. Do not be deceived by the flying particles of the first tee demolishing the second, but make quite certain that you are smacking both tees. You can tell when you are smacking both. The sound and feel of smacking a single tee is quite different compared with smacking two tees.

When you hit through both tees there is a distinct feeling and sound of a double impact. If you fail to hit through, the flying particles of the first tee will reach and demolish the second before the club reaches it and there
will be no second impact. The club face must strike through with an increasing speed or the sand particles of the first tee will not adhere to it, but they will fly off and demolish the second tee before the club reaches it. Work at this until you can produce the double smack, then practice smacking double tees till hitting through becomes an unconscious automatic process. When you produce a double smack you have hit through. Continue at this double tee smacking till you find you are getting satisfactory distance with the ball.

It may be that your hand strength is not what it should be for long driving, in which case get a grip developer and develop your hand strength. A golfer is no stronger than his hands. I would also call special attention to "sag of the wrists" and the snapping through of the club head by the sudden reversing of the position of the hands as they come opposite the ball. It is important to cultivate this sag of the wrists and develop the force of the snap by the sudden reversing of the position of the hands. Compare the relative position of the hands shown in illustration 81 and 82 with their position shown in illustration 84.

THE SAG OF THE WRISTS

In the full-swing stroke the rotary shoulder movement performs all the lateral action necessary to the swing. Nevertheless the wrists must twist in a sag because of the great difference of speed between the club head and shoulders.

We could not rotate our shoulders at a speed corresponding with the speed of the club head, and therefore in the downward stroke the shoulders are allowed to get a big start ahead of the club. Wrists and arms absorb this loose motion, and by reaction speed the club so that it catches up with the shoulders at the point of impact. See aerial view illustrations of the swing, page 102.
There is a looseness, i.e. a sag action in the wrists which occurs in the form of a twist. There is also a reaction from this sagging twist which occurs in both the upswing and the downswing, and while only very slight in the upswing is most pronounced in the downswing—due, of course, to the great difference of speed in the upswing as compared to the speed of the downswing.

Illustration 68 shows a concave outline down the back of the right hand, while 69, 70 and 71 show a convex outline. This is the wrist sag sometimes called “drag” because due to the wrist sag, the club head drags somewhat behind the hands. This sag ends in a reaction. See Illustrations 72, 73 and 74. Then follows the vertical wrist action shown in 75 and 76 and finally the vertical arm action shown in 77 and 78.

Start of the downswing is shown in 79. The hips have already started forward. Next in 80 the shoulders commence to unwind. In 81 the arms have struck downward leaving the club head dragging behind in a wrist sagging twist; 82 shows wrists recovering from their sagging twist; 83 shows shoulders, arms, wrists and club head in simultaneous climax just after the ball has been hit. In Illustration 84 it will be seen that the right forearm has rolled over the left forearm and the right wrist action has snapped the club head up. Now the arm and the body muscles tighten up to start to bring the swing to a finish. (See Illustration 85). 86 and 87 show the complete relaxation of all muscles. To the student of the game Illustration 85 should be regarded as the true finish of the swing. What happens after the true finish of the swing (Illustration 85) is of no great consequence and various players end their swings in many different ways.
Order of Dynamics of Stroke

**Upswing** Start the parallel hip action and shoulder rotary action simultaneously and therewith start the club back. This should cause a slight sagging twist in the wrists, in which the club head is left somewhat behind. See Illustrations 68, 69, 70, and 71, page 101. When the club has been dragged along the ground about one foot this sag ends in a reaction in which the wrists slowly flick the club head around to the right in order to catch up with the hands.

When the club head has been swept backward along and close to the ground about four feet by the continued turning of the shoulders and the reaction of the wrist sag, they then start to raise the club head by wrist bending action.

When the club shaft has reached the vertical position (see Illustration 117, page 105) start to raise the handle end of the club by the upward arm action. Continue the body pivoting and upward arm action till the upswing is completed.

**Downswing**
1. First the hips shift the body weight forward but this action has already been started before the up-swing of the club was entirely finished.
2. Now the shoulders begin to unwind, meanwhile the arms and the club drag behind.
3. When the shoulders have unwound about quarter way the arms begin to deliver their downward blow to the player’s right, dragging the club handle down.
4. When the arms have dragged the club down to a vertical position (see Illustration 123), the wrists let loose their downward bending action, cutting the club downward to the right of the player.
5. Meanwhile the arms begin to recover from their drag, the shoulders and wrists absorbing the arm sag by themselves sagging into a twist, and thus the club head is still allowed to drag behind.

6. When the club has reached the low horizontal position (see Illustration 124), the wrists begin to recover from their twisted sag. Then round comes the club head with the speed of lightning, snap-bang on the ball—everything on time. A close study of Illustrations 124, 125 and 126 will reveal the fact that while the left hand travels one and one-half feet, the wrists cause the club head to travel twelve feet. The speed of the club head is many times greater than the speed of the hands, thanks largely to the reaction of the wrist sag.
REAR VIEW, THE FULL-SWING STROKE
Action Pictures in Motion Picture Series

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LEFT SIDE VIEW, THE FULL-SWING STROKE
Action Pictures in Motion Picture Series
From now on the wrist twist action makes the club head take the lead. This is followed by the arms, while the body muscles now tighten up till finally reaction sets in, coming from the left leg into the left hip, thence thru the shoulders and arms to the club—and the stroke is finished.

In the upswing and in starting down don't be in a hurry to hit the ball. Also, don't try to hit the ball till you get to it.

These two expressions have a world of meaning. In the downswing the reason why one motion should be started ahead of another is because of the time required by each before it can reach its climax.

The hips, being slower than the shoulders, must be started first so that they can get ahead. Likewise the shoulders are slower than the arms and therefore must be allowed a very considerable start ahead of the arms. Finally the arms must be allowed to get almost to the climax of their action before the wrists with their terrific speed are finally let loose. Thus by their different rates of speed each comes to its climax at one and the same time, i.e. the moment of impact.

If wrists were allowed to start at the top of the swing and were expended in a concentrated form, the climax of their effort would be expended before the club reached the ball and therefore lost.

FUNDAMENTAL 10
CO-ORDINATE:
1. Hip action
2. Shoulder action
3. Arm action
4. Wrist action
5. Arm reaction
6. Wrist reaction
The flat sloping canvas shown in the above illustration is for the purpose of teaching a pupil what is meant by the oblique plane of the swing. It is also used to correct players who have too flat or too upright a swing, and also correct those who's swing is out of line.

A player swinging in this canvas cannot cut across the ball because the canvas will not permit it. Persistent practice in this forms the right habit.