Over the course of this mini series I have introduced the basics of biomechanics as the study relates to athletic movement in the golf swing. Specifically, we have explored the management of weight shift within the action of swinging and unwind the body, optimising what we term ‘dynamic balance’ for the efficient delivery of clubhead speed and power. When a coach talks about the importance of building a swing ‘from the ground up’, he or she is referring to the unassailable fact that we play this game with both feet on the ground – at least that’s the theory!

There is simply no escaping the fact that the quality of our footwork, our interaction with the turf, is vital to the chain of movement we enjoy. It is often observed that a talented golfer has ‘good hands’. The inference, of course, is that the player in question has an enviable ability to swing the clubhead and strike a ball with a natural affinity for the technique required to hit a good shot – an intuitive sense of timing, ‘feel’, and so on.

As a biomechanist, I would extend that observation to suggest that it is also possible to identify players who have ‘good feet’. In fact, golfers who enjoy and exhibit a good hand action, more often than not, also tend to display good footwork. That natural athletic ability is not only evident in the way a player holds and swing the golf club but in the way he or she maintains balance with complementary footwork.

So the two physical elements are related – as you’d expect when you stop to consider that the hands hold the club and the feet provide that all-important traction with the ground. If a player were to be suspended in limbo, with his feet dangling a few inches off the floor, he would not be able to generate anything like the dynamics required to create coil and clubhead speed. As the only points of contact you have with the turf, the feet play a vital role in anchoring and stabilising the body, providing the physical conditions required to wind up the muscles in the body in the process of creating an effective coil.

Over the last few years I have been fortunate to work alongside coach David Leadbetter to further my research into the way in which the chain of movement that we can identify in the swing is related to the athleticism in the lower body – and specifically, the feet. And it’s fair to say the findings have influenced David’s philosophy on the swing every bit as much as they have enabled me to relate biomechanical principles to golf. Quite simply, the way in which a golfer uses his feet and ankles determines his or her ability to achieve and maintain good posture and dynamic balance, while at the same time facilitating the chain reaction we are looking for in the muscular connection up through the body. The correct positioning of the feet allows the ankles to work in harmony with the respective calf and thigh muscles to maintain the posture in a stable position; that foundation provides the platform over which the upper body is able to wind and unwind to create the core momentum of the swing.

Why understanding principles of weight shift and improving your footwork in the quickest route to a more dynamic golf swing

By Jean-Jacques Rivet
HEAD OF SPORTS PERFORMANCE & BIOMECHANICS FOR ENSP & UNDER ARMOUR INNOVATION CENTRE FOR SPORT
PHOTOGRAPHY BY MARK NEWCOMBE
WWW.BIOMECASWING.COM
SHOOT LOCATION AT TERRE BLANCHE HOTEL SPA & GOLF RESORT

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In French, we have an expression for sports where you need to use the feet – sport ‘d’appui’. We tend to talk about the golf swing as an entity in its own right, and yet in order to wind up your body and swing the club with real force you need resistance to that rotation… which brings us back to the feet: a dynamic swing is all about the body acting and reacting with the ground, drawing energy up from it. There is an inevitable connection between what the feet are doing and what the hands and arms are able to achieve in order to manage the aspect, the behaviour and the acceleration of the golf club.

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Athleticism from the ground up: the traction you enjoy with the turf upon which you are standing is key to your ability to draw energy from the ground and thus coil up your body effectively. Body EQUILIBRIUM. The kinematic sequence is translated into speed as you swing the arms and release the clubhead.
THE IMPORTANCE OF BEING ‘GROUNDED’

Those of you who read parts 1 and 2 of this series (both of which can be accessed via back issues of the magazine at iTunes) may recall the concept of weight shift from heel-to-toe along what is known as the ‘Hendrix bar’, an anatomical term relating to the axis of the foot running from the second toe towards the centre of the heel. When a golfer plants his feet correctly at set-up he enjoys a sense of engagement with the turf upon which he is standing (good players will often describe to me the sensation of ‘grappling the turf through their feet’), while at the same time rooting the ankles and the calf muscles in readiness to make an athletic movement. I want you to have a real awareness of the feel that you get when you step up to hit the ball.

The key to good footwork is to maintain balance in motion as you wind up and unwind your body to create a sound, repeating swing. This is why hitting balls barefoot is such a great exercise for golfers – it’s something I urge my students to do as part of their warm-up routine, to get them feeling the turf and the resistance it offers, while at the same time being truly ‘grounded’, really feeling the stability of the ground through the feet.

So, this brings us to the next stage in the process of being grounded. As you walk away from the tee with the club in hand, you take a step or two to get the feel of your weight being moved through the movement. As you do this, you will notice a change in your weight distribution, a feeling of balance and stability as you move. This is the key to being grounded, and it’s something I urge my students to do as part of their warm-up routine.

As the arms/hands swing into position, your weight centre moves towards the toes of the left foot, high up on the right.

One of the keys to solid impact is that your plant foot remains securely in position to slip or roll out from underneath you, helping you to feel the ground against the toes of your left foot, while at the same time supporting the movement of your right foot.

At the set-up, your weight should be more relaxed and the ankles should be more flexible, allowing you to feel the ground through the toes of your left foot.

HALFWAY BACK: As you work your arms and club with the rotation of the body to the halfway back position (the shoulders turning over the resistance of the lower body to create a stable axis of rotation), you should be feeling the weight shift moving into the right foot, while at the same time supporting the movement of your right foot.

AT THE TOP: Completing the backswing, your weight should be now towards the front of the left foot and deep into the heel of the right. You are fully rotated and ‘loaded up’. The knees and thighs act as shock absorbers, creating that essential resistance to the rotation of the upper half while at the same time providing a balanced, stable platform. A lot of amateur golfers struggle to maintain that resistance in the lower body as they reach the top of their swing. We see players who roll into the inside of the left foot and/or who lose the flex in the right knee – either way the containment of weight shift is lost. When you suffer this action you disorient the coil – the kinematic sequence is damaged from the ground up.

STARTING DOWN: The quality of the delivery

THE KEY STAGES THROUGH THE SWING

So far, tonight foot: let me present a basic understanding of where your weight should be at each of the following distinct phases in the golf swing. The muscular chain starts to change the feet, and interlocking this information will go a long way to helping you feel it when you go out to practice and rehearse your movement.

Justin Rose is a useful model.

As you set-up and during the swing, the more consistent your weight distribution is, the more consistent your swing path. When your weight is allowed to change for the slightest moment your swing is deconstructed.

Justin Rose is a helpful model.

In conclusion, the main reason why your golf game is not as good as you want it to be is that you are using your hands, while your feet are not moving. When you optimise your body alignment, the weight shift, the feel of the ground, and the muscular coiling and uncoiling, you will be in tune with your centre of gravity – and that’s a giant step in the right direction when it comes to efficiency of movement.

THE ORIGIN OF COIL: IT ALL COMES DOWN TO FOOTWORK & DYNAMIC BALANCE

2010 US Open champ Justin Rose has one of the most compact & efficient swings in world golf, and this manifests itself as a wonderful example of the way in which the ground controls the swing. Both the quality and consistency of the ground movement are absolutely critical in creating the center of gravity. Pay particular attention to the way Justin negotiates the transition – you can almost feel the pressure of his feet being off the ground after he has got into his loading phase, and as he springs into the downswing you can see that Justin’s left foot is fully engaged and the weight moves towards the left foot. The right foot slides, the sensation of pressure just a little too insistent as he releases the energy back into the finish, where we feel him perfectly balanced, hips and spine facing left of target, supported on the toes of the right foot. (Footwork stuff)

Note the position of Justin’s right foot as he shifts into the downswing – while his weight is clearly shifting to the target, his right foot remains planted for a split second, giving him critical moment in ‘set-up’ and allowing the arms and club to fall into position. The left foot, meanwhile, remains planted right up to impact when the torso and momentum cause it to lift as he shifts into the follow-through on route to the finish through impact is determined through the transition period – the critical moments as you reverse your momentum from backswing to downswing. And the key here is that you ‘settle’ into the downswing in readiness to shift through the gears for impact.

Here (and the research is conclusive) we are looking for a moment of calm that allows the gears to engage, the centre of mass to reach its peak position. (Rocking ‘halfway back’ adds energy to the finish, where we find him perfectly balanced, hips and spine facing left of target supported on the toes of the right foot. (Footwork stuff)

When you learn to swing the hands and arms on a logical path that follows the rotation of the body and the shifting of weight along the Hendricks bar towards the right heel, so you will be in tune with your centre of gravity – and that’s a giant step in the right direction when it comes to efficiency of movement.

With the benefit of a force plate, the data tells us...
that as they unwind to what you might term the pre-delivery position, the best players in the world still have 50% of their weight on the right side, 50% on the left at mid-downswing. In stark contrast, amateurs are inclined to rush onto their left side to such an extent they could have as much as 70% of their weight on the left foot at this point. (And, as a result, they are not able to maintain their acceleration through impact – in fact, they can often be observed to fall backwards as they release the club, which is actually slowing them down as it meets the ball!)

Working with and studying the best players in the world, the capacity to maintain this right foot position as they initiate the downswing sequence is a shared momentum characteristic. The accompanying images of Justin Rose perfectly illustrate the ‘grounding’ and the calming presence of this calm display in the process of swinging and unwinding their swing. Just look at the way the right foot remains planted as he settles and gathers his momentum for the return journey – world class. (The less physically strong you are, the better it is to work on this discipline as you negotiate the transition – the longer you can stay on your right side, and keep that right foot planted, the more time you will have to unwind and maximize your energy in the recoil, accelerating the club for impact.)

THROUGH IMPACT: Golf’s moment of truth – and the figures don’t lie: when we analyze top players on the money list, looks like some action at the ET79 here at Turnberry, we discern a receding pattern – the weight is now traveling from the front to the back of the left foot (facilitating the rotation and clearance of the hips) with as much as 80% of the player’s weight on the left side as they make contact with the ball.

Again, for many amateurs, the big problem is that the urge to move forward sees the weight move to the toe of the left foot, which makes it impossible to rotate and clear the hips correctly. We like to see the right foot work gently inside as the momentum now travels from heel to toes into the toe, where it will ultimately finish at the conclusion of the swing.

HOW TO IMPROVE YOUR GROUNDING SIMPLE DRILLS TO ENHANCE BALANCE, TRACTION, ROTATION & STABILITY

In previous articles I have talked about my time working alongside David Leadbetter, and the insights that experience gave me when looking at the mechanics of the swing. Time and again his lessons would come back to the fundamental rule of the feet, the ankles, call muscles and thighs as he impressed upon a player the chain of musculature that determines the quality of the body motion – and its repeatability.

With David’s help we have devised a number of simple drills and exercises that can help grafters of all ages and abilities change the timing and synchronization of their swing simply by working on their grounding – and, specifically, on that discipline of hanging back at the top of the swing, resisting the temptation to throw yourself into the downswing, waiting for your moment. Where the accomplished player gave himself all the time in the world to negotiate the transition, the amateur is generally way too fast – and in a flash he loses his timing.

Holding that planted right foot position for a split-second as you negotiate the transition rewards you with the time to effectively prepare to release the club through the hitting area – a point I’m impressing here on Morgan. Creating a resistance to the left shoulder has the effect of allowing the weight shift in the lower body to be achieved before the bigger muscles in the torso unwind. Remember, the key to a powerful and sequenced downswing is that you unwind from the ground up...

The single most important lesson you can take away from this article is that, having drawn up energy from the ground, centering your body effectively, the discipline of holding that right foot for a split-second as you shift into the downswing is vital to synchronizing the arms and body in the change of direction. In so doing, you are in balance with the rotation of the body as you use your ‘length’ and let it all go in the release truth!

This is precisely the lesson I am giving to Morgan (picked left), holding his left shoulder so to create a resistance to his body that encourages the transition to work from the ground up, thus maximizing the recoil effect. Think of the racing driver building up momentum with a fast lead, waiting for the moment to press the accelerator and single shot on exit – this is exactly the response in a good golf swing. It’s the secret to effortless speed.

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For those of you with access to a gym, this exercise is a great all-rounder for developing not only the strength of your core rotary muscles, remaining grounded, but the sensation of planting the feet and creating resistance in the hips (while at the same time staying in balance!). Keep your feet flat on the ground and you provide a terrific work-out that will massively help your golf swing.

Stand in such a way that you get the centre of each foot pressing down on the noodle so that you engage the muscles in your ankles, thighs and hips.

Brace yourself! Dynamic balance in the lower body enables you to react the tension in the band – neither toes nor heels should touch the floor!

Use your noodle! Your lower body is a suspension unit in the golf swing – and the better your balance and stability, the better your swing will be...

In good posture, hold a weighted training ball in the palms of your hands while finding your balance – again, neither toes nor heels should touch the floor.

Working hands, arms and torso together, your goal is to improve your core stability, to rotate, your arm swing following the direction of your CoG.

In the exercise given you the body’s movement which synchronises the muscles’ chain, while at the same time galvanising the correct relationship between arms and body.

Screening process involves asking a student to stand up as straight as possible, weight evenly distributed – and the results would surprise you!

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Insoles are created specifically to help align posture and thus allow the kinematic chain to work correctly in the swing.

THE INSIDE STORY...

...insoles align the feet for better posture & stability

The importance of our interaction with the ground is reflected in the widespread use of insoles in the many different sportsmen and women I work with. From football and rugby to cricket and, yes, golf, a properly fitted insole provides a ‘glove’ that aligns and positions the foot in the optimal position, thus guiding the proper action of the avoidance during the swing. Good posture activates the tibialis anterior – the sensation you experience if you try to curl your toes up inside your shoes. (another good exercise is to make swings barefoot, your toes curled up as far as you can get them – as you see Morgan doing above. That engages the muscles you need to provide optimum support in the ankle and thigh.)

In my business, the key word is ‘athletic’: the importance of our interaction with the ground is reflected in the widespread use of insoles in the many different sportsmen and women I work with. From football and rugby to cricket and, yes, golf, a properly fitted insole provides a ‘glove’ that aligns and positions the foot in the optimal position, thus guiding the proper action of the avoidance during the swing. Good posture activates the tibialis anterior – the sensation you experience if you try to curl your toes up inside your shoes. (another good exercise is to make swings barefoot, your toes curled up as far as you can get them – as you see Morgan doing above. That engages the muscles you need to provide optimum support in the ankle and thigh.)

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The key when it comes to golf shoes is that...
CASE STUDY
Matteo Manessero (Behold the elasticity of youth!)

Here’s a great sequence for all you young players out there looking to emulate the best in the world. Matteo Manessero, the 2013 BMW PGA Champion, encapsulates the exuberance of youth—a truly athletic golf swing that is rooted over a wonderful foot and leg action (reminiscent of a young Severiano Ballesteros).

Manessero, 21, has been a regular visitor to my Albatross Academy at Terre Blanche and, along with his coach Alberta Binaghi, is keen to learn about the biomechanical principles that underpin athletic motion in golf. We work extensively on the force plate with a view to optimise the centre of gravity and have it working in harmony with the direction of his swing.

Chain reaction: a good posture provides the basis for a swing that features, at its heart, a repeating body action—the rotation-generating centrifugal forces that accelerate the arms and the clubhead through the ball.