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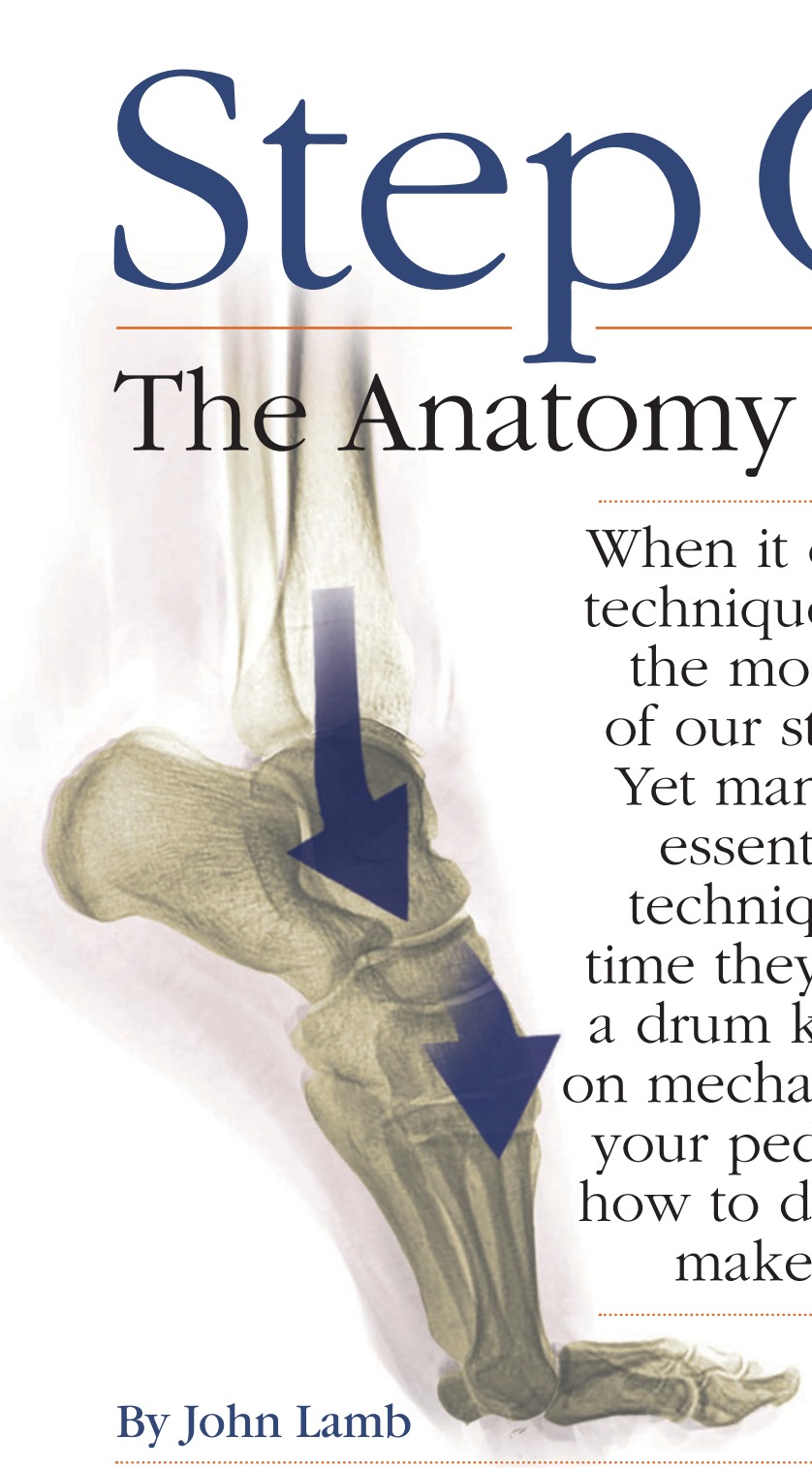
Step On It

The Anatomy Of Pedaling



When it comes to refining hand technique, we love to scrutinize the most microscopic details of our stick grips ad infinitum. Yet many drummers settle for essentially the same pedal technique they used the first time they ever sat down behind a drum kit. So here's what goes on mechanically when you pump your pedals, how to do it right, how to do it wrong, and how to make it easier and faster.

By John Lamb

The only way to operate a pedal is to push down on the pedalboard. And the only way do that with your feet is to employ your bones to deliver the force created by gravity or your muscles into the pedals. Weight travels through the leg, through the ankle, and into the foot where it moves backward into the heel and/or forward into the ball of the foot and area behind the pinky toe.

Seated balance is the most important aspect of pedal technique. Ideally, the weight of your torso, hips, arms, and head is delivered into the throne, leaving only the weight of your legs going into the pedals. However, when you aren't balanced on the seat, your legs must press against the ground to maintain balance instead of simply operating the pedals. This is terrible for pedal technique, since it effectively increases the weight of the legs and greatly limits what they can do. Most pedal techniques are extremely difficult or impossible with poor seated posture.

The second most important aspect of pedal technique is to know how to rest your legs on the pedals without interfering with technique. Suspending your legs in the air is not a sustainable technique — it creates a great deal of tension and costs

a lot of energy to maintain. As Bernard Purdie says: "You can't keep it up forever. Mother Nature won't let you!"

Constantly pressing against the pedalboard isn't sustainable either. Some drummers (pre- to mid-'85 Dave Weckl comes to mind) constantly push against the pedal to provide postural support for the body. Instead, you should try to develop a technique that allows the entire leg to come to complete rest at times during normal play. When leg muscles are required to keep you from falling over, they are unavailable to operate the pedal. It's better to let the pedal accept the leg's weight without waving it in the air or constantly pressing back against the pedal.

Most pedals have a heelplate, and this can be useful as a place to sink the weight of the leg when it's at rest between strokes. However, letting the weight travel backward into the heel doesn't help you operate the pedal, since you must use the ball of the foot and the fifth metatarsal (the flat part behind the pinky toe) to operate the pedal.

Structurally speaking, the foot is a tripod with toes (Fig. 1). Look around your drum set and you'll see that cymbal stands, your music stand, and throne all have three legs (tri = three, pod = foot). This is for a reason. If only one point of contact is made with the ground, a structure may fall in any direction. With two points of contact the structure may fall forward or backward. But three contact points create a plane, so the structure is stable and cannot fall.

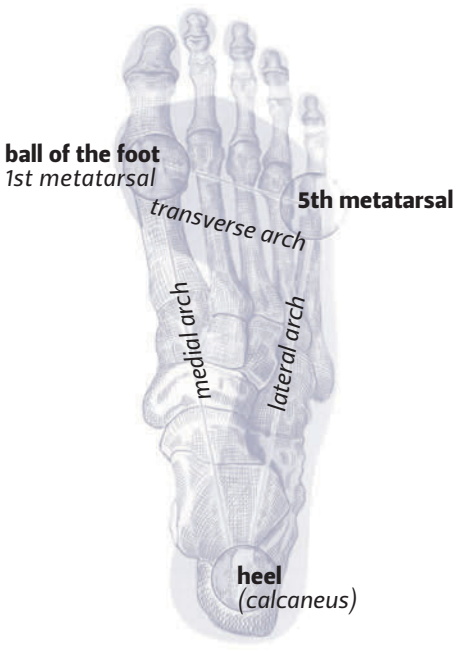


Fig. 1 The three places the skeleton uses to deliver the weight of the body into the floor

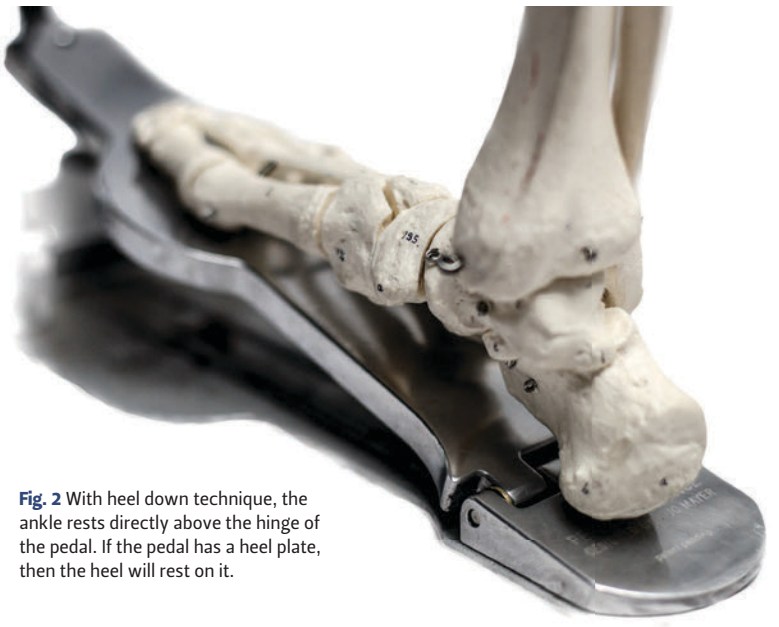


Fig. 2 With heel down technique, the ankle rests directly above the hinge of the pedal. If the pedal has a heel plate, then the heel will rest on it.

In the human foot, the three points of contact are the heel, the ball of the foot (first metatarsal and sesamoid bones), and the fifth metatarsal. When standing, you should be able to feel the weight of your body press into the floor through each of these points. It's possible to stand and walk in such a way that doesn't distribute your weight evenly through these points of contact. People who stand and walk in this way probably wear out the soles of their shoes unevenly.

Many people have an index toe that is longer than their big toe — a condition called Morton's Toe. If this is how your toes look it might change the way weight is distributed through your foot, and lead to hip, ankle, or foot problems. Be sure to see a foot specialist if any of this sounds familiar.

Heel-Down Technique

In this technique, the foot rests on the pedalboard and creates the force needed to operate the pedal by essentially pointing the foot (a miniature version of going up on your tiptoes) as the heel rests on the pedal without lifting off (Fig. 2). The major advantage of this technique is stability. The heel creates a solid point of contact with the floor that you can use to anchor yourself. This is extremely useful for drummers with bad posture, but of limited use to those with more effective seated balance.

Located in the space between the tibia, fibula, and the talus bone of the foot, the ankle is a hinge joint like the knee and allows the foot to point up and down (Fig. 3). Although straightforward, the ankle is widely misunderstood. A common comparison you'll hear — even from highly respected drummers — is that the heel is like the wrist. While they share some similarities, functionally they're very different. This comparison misunderstands the basic location of the ankle and the structure of the foot.

Rather than being at the back corner of the foot, where the heel is, the ankle is on top. When the ankle bends, the front of the

Fig. 3 The ankle is located in the space between the tibia, fibula, and the talus bone.

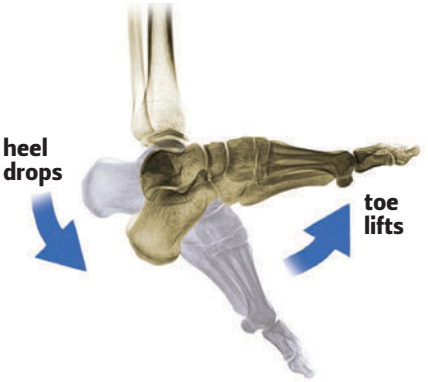


Fig. 4 The ankle is essentially a hinge. When you point your toe down, the heel rises. When you point your toe up, the heel lowers.

foot and the back of the foot move in opposition. When you point your toe down, the heel rises. When you point your toe up, the heel lowers (Fig. 4).

If you have a normally constructed pedal, resting the heel on the heelplate is very inefficient. The hinge nature of the ankle means that lifting the forward part (ball of the foot) up pushes the back (heel) down, and vice versa. If the back part is already pressed against the heelplate, then your foot compresses and tightens. The heel cannot move down, and the rest of the leg must move up. The muscles in the shin are called upon to push the entire leg out of the way, and this often results in painful, overworked muscles. Some drummers even actively exercise these muscles so they can play faster, not knowing that those muscles are almost useless in effective techniques (Fig. 5).

Fig. 5 The tibialis anterior is one of the muscles used to pull up the foot. These muscles may get very sore if you misuse heel-down technique.

While pinning the heel to the floor isn't very useful with a normal pedal, heel-down can still be an effective technique if you play lightly, especially if the drum is miked. Allowing the heel to lift off the pedal relieves this pressure, but so does a pedal that places the hinge underneath the pedalboard instead of behind it, such as the DW 5000ADS solid footboard pedal that Joe Morello used. By placing the pedal's hinge directly underneath the ankle, while having a solid footboard with no heelplate, these pedals relieve the downward pressure at the heel created by lifting the front of the foot. Even better, the position of the hinge also allows the pedal to accept the weight of the leg without interfering with the action of the pedal or leg. The forward position of the hinge on these pedals makes heel-up technique less efficient, however. Moving the hinge forward reduces the effective length of the pedalboard, giving the player less leverage when playing the pedal.

Heel-Up Technique

Heel-up techniques let the heel rise off the pedal (Fig. 6), which directs the entire weight of the leg forward through the ankle and into the front of the foot and the pedalboard.

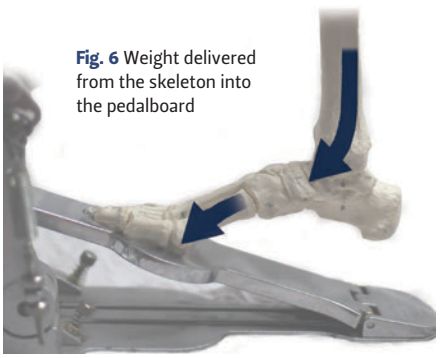


Fig. 6 Weight delivered from the skeleton into the pedalboard

There are many ways to deliver the weight of the leg into the pedal in heel-up technique. The basic stroke is essentially a "walking in place" kind of movement. If you step on the pedal as if it wasn't there, then weight is delivered efficiently through the forward arches of the foot and into the pedalboard. Smaller steps are more efficient.

The arch is a powerful tool in weight delivery because it's able to support a massive amount of weight without collapsing. Ancient architects knew the strength of arches and used them frequently.

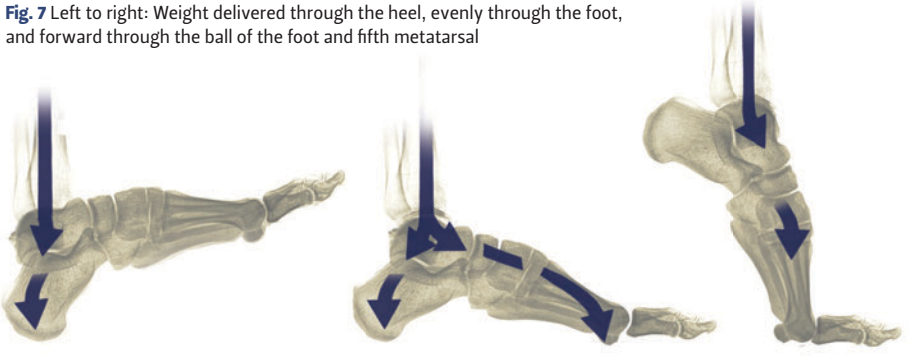
You've probably heard about the arch in your foot before, but may not know that there are three big arches that connect the three points of contact. The biggest arch connects the ball of the foot to the heel. Another connects the area behind the pinky toe to the heel. And the last connects the ball of the foot to the fifth metatarsal. Really, there are many more arches in the foot, but these three are the most important.

The shape of the arch allows the foot to propel the weight of the body forward effectively. Because the ankle is placed a little off center toward the back, the foot has extra leverage with which to propel the body forward. The toes also help with forward momentum while walking, but contribute very little to drumming (Fig. 7).

The full-stroke version of heel-up technique allows the heel to come to rest at the bottom of the stroke. While this wastes energy by delivering the weight into the heelplate instead of the pedalboard, it also allows the pedal to support the weight of the leg and allows the leg muscles to rest until the next stroke is initiated. Over time, you can gain additional control over this by simply not lifting the foot as high, and thus not using a lot of extra energy in the first place.

In heel-up technique it's possible to point the foot, just like in heel-down technique. Like Moeller technique, this "going up on tiptoes" type of movement allows a combination stroke of two or

Fig. 7 Left to right: Weight delivered through the heel, evenly through the foot, and forward through the ball of the foot and fifth metatarsal



more strokes in a row, with the basic step movement for the downstroke and the "going up on tiptoes" movement for the upstroke. These two movements complement each other very nicely and form the basis for heel-toe technique and sliding technique.

Swivel technique uses a side-to-side movement to operate the pedal (Fig. 8). By rocking the leg from side to side, you can deliver weight into the pedal alternately through the ball of the foot and the fifth metacarpal. This side-to-side motion is generated mostly by the hip joint, and the entire leg will rock as the hip rotates quickly from one side to the other. You can complement the hip rotation with movement at the subtalar joints (Fig. 9).

The ankle functions only as a hinge. The subtalar and talocalcaneonavicular joints, where the talus meets the calcaneus and navicular bones, accomplish any side-to-side movement. The subtalar joint connects the heel bone with the talus: the bone in the foot that also connects to the leg. It's located directly under the talus, hence the name. The subtalar joint lets the foot roll to the right and left.

One reason we associate these joints with the ankle is that every muscle that acts on the ankle also acts on the subtalar joint. Since everything you use the ankle for will also use the subtalar joints, the muscles that power the pointing of the toe also produce rotation in the foot. You can move the ankle without also moving the subtalar joint, but it requires tightening of muscles to fix the subtalar joint in place. This is usually unnecessary and unwanted. Many other smaller muscles inside the foot also act on the subtalar joint.

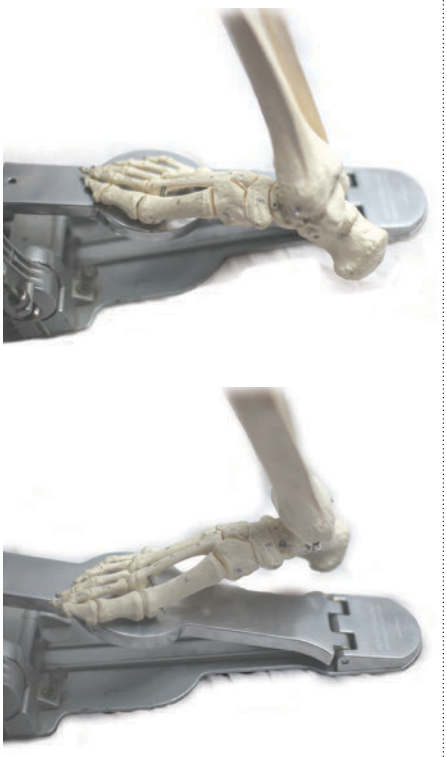


Fig. 8 Swivel technique shifts weight from the ball of the foot to the fifth metatarsal, using hip rotation with a little help from the subtalar joints.

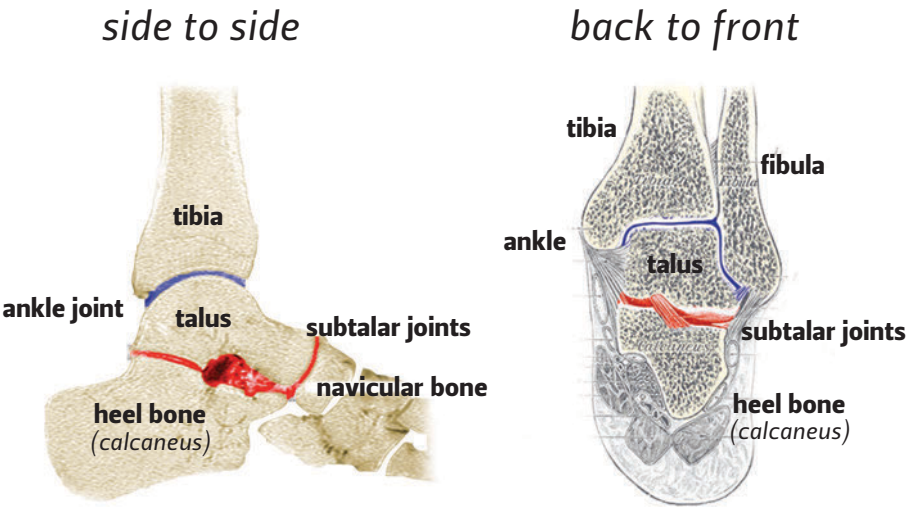


Fig 9 The subtalar joints are highlighted in red.

The Whole Leg

Now that we've surveyed the parts of the leg, it is time to look at the leg as a whole unit. When standing, weight is delivered into the ground through the hips, femurs, knees, shins, ankles, and finally through the arches in the feet and into the floor. When sitting, only the weight of the leg travels through the legs as the weight from the rest of the body travels through the spine, through the sit bones, and into the seat.

The path of weight delivery when standing is important for percussionists and other drummers who spend time standing. Drum set players need to understand sitting balance both to free up and support the arm muscles but also to free up the legs to operate the pedals. Either way, getting to know how this works and what it feels like lets you use your skeleton to support your movements more effectively, freeing muscles to do what they are supposed to do — move.

Standing with support is not a static, unchanging position. It is a process that constantly updates to support each action. When you reach forward to hit a crash or to the left to play a low A on a marimba, the skeleton must move to support the weight of the body as it carries out these movements.

Rooting

One sensation helps more than any other when it comes to improving the support from your skeleton: the feeling of contact with the floor. The sensation of your body weight pushing into the floor and the floor pushing back gives you most of what you need to know to effectively support movement. It also gives you something concrete to do. You can choose to focus your attention on this feeling, and in doing so, automatically give your body permission to make the adjustments it thinks are best.

Many martial arts traditions call this "rooting" because it can feel as if you have grown roots. As weight is delivered more effectively into the ground, your feeling of connection to the ground grows stronger, and your roots get bigger and deeper. If you are rooted, someone can push you, and you can deliver the weight from this push into the ground, through your strong roots. Conversely, if you are effectively rooted, you can push off from the ground, delivering more force than you would without roots.

When you aren't rooted behind the drums, you have no support from the ground, and must use your muscles to make up the difference. However, when you are rooted behind the drums, you can draw on support from the ground to fuel each and every movement you make, making everything you do more effective and easier.

Excerpted from the book Anatomy Of Drumming: Move Better, Feel Better, Play Better, *which is available on amazon.com.*

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