

THE BENEFITS OF MAINTAINING HEEL CONTACT DURING FORWARD AND BACKWARD LOCOMOTION

By Ron Hruska

Recently I read an article on the benefits of moving in reverse. A biomechanist and researcher was quoted saying “Instead of landing heel first, you strike the forefoot first, often quite gently, and *often the heel does not contact the ground.*”

“This reduces of the range of motion in the knee joint, which allows for activity without stressing the knee joint.”

“Backward walking also stretches the hamstring muscles, the group of muscles at the back of the thigh.”
(*Wade S. Walk it Back, Associated Press article published in the Lincoln Journal Star, Nov 2, 2025*)

While all of this makes sense, an opportunity to improve components of forward locomotor movement may be lost if heel contact is lost as the foot is placed behind the other foot when moving backwards, or when early heel rise is encountered during ‘push off’ when moving forwards.

Normal forward walking starts with the heel striking the ground, followed by stages of early midstance, midstance, late midstance, prior to pushing oneself off the ground as the body is moving forward, and at ‘push off’ as the other lower extremity is simultaneously striking the ground for balanced, controlled transition of weight to the other side.

Heel contact, sense, support and proprioception are important for vestibular and thalamic upright function both at the beginning of human locomotion and at the end, because of the double support phase of support offered by the rear foot at heel strike and the simultaneous contraction of rear foot stabilizers, the plantar flexors, at early push off.

By heel striking at initial contact with the ground, the foot is allowed to go into pronation, required for upcoming midstance, only to supinate at late reach, as the other rear foot or heel is loaded and beginning to supinate for leg swing. The longer the heel remains on the ground at this early push off stage, the more pronation of the support foot and internal rotation of the ipsilateral hip, thus the more likely the musculature responsible for each stage of locomotion will have the sufficient and required period of time for appropriate sequenced smooth cadence.

Delaying heel lift at ‘late midstance’ and at ‘early push off’ allows the same lower extremity to complete pushing one forward with good ground awareness, and prepares for upcoming controlled ‘swing’ and ‘late reach’.

Heel strike is an important stage of forward locomotion and is responsible for the initial contact from rear foot ground supportive structure, so one can load the ground to acquire the sense of safe support for upcoming stance and swing phases.

Heel strike also serves as a platform for the gluteus maximus muscle to generate enough force to accept body weight through a lower extremity that is extended at the knee and sandwiched between the downward force of the hip and the upward force from the ground.

The muscle that follows the initiation of the gluteus maximus at heel strike are as follows, the quadriceps, the tibialis posterior, the triceps surae, the plantar flexors, the iliopsoas, the anterior tibialis and finally the hamstrings. All which are weight support muscles or lower extremity positional muscles.

The three most important events of this cycle to keep all of these muscles functioning at the correct time, are initial contact or 'heel strike', early 'push off' as the heel lift is delayed prior to 'early pick up', and 'late reach' of the same lower extremity as 'heel strike' is about to reoccur, and rear foot or heel contact from the other foot is maintained.

Striking the ground with the heel during forward locomotion and delaying heel lift at late push off generates correct timing of each lower extremity event, period of function, and muscle contraction for stable, secure controlled sense of support. This is why race walking is so much more beneficial than running for those with poor heel contact and delayed heel lift.

Maintaining rearfoot contact on the ground as the opposite extremity is moving backward for toe strike, followed by immediate heel or rear foot contact, allows increased security to occur from musculature that keeps humans upright.

Hamstrings, all gluteus musculature and abdominals are empowered with backward bipedal locomotion and become better 'feed-forward' muscles in forward bipedal locomotor movement when the heel and rearfoot contact exists. Thus, upright forward locomotor movement phases and accompanying hamstring and hamstring strength and support, at late reach (contralateral rear foot contact) and late push off, are reinforced and developed through the following PRI non-manual techniques:

Retro Stairs

Retro Walking

Decline Retro Walking

Heel Stair Descents

Propulsive Stair Ascension

Propulsive Stair Descension