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Plyo Step

A Series of Sports Performance Guides by Lee Taft

# **Plyo Step**

**By**

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## Introduction

The purpose of this Plyo Step guide is to give coaches a quick resource in which they can use to educate themselves on a different way of teaching first step acceleration.

This book is not to say that this is the only way to teach first step acceleration. I think you will find the logic and the scientific basis of biomechanics and physics will offer enough backing to see the purpose for allowing the Plyo Step to be the way the athlete moves during a reactive setting and from a non-track stance that already offers the appropriate force application angles.

Keep an open mind and allow yourself to see the movement as it is, an innate human ability wired in us for the purpose of escape or attack.

Please spread this information to others that may have an interest in this topic.

**Thank you,**

*Lee Taft*

## Plyo Step

I am a big fan of innovation and creativity to help expand and develop human movement, especially as it relates to sports performance. I can honestly say we missed the boat big time by trying to change something the body wasn't capable of doing well. In the following sections, I will explain why I believe the natural movement, which I call the Plyo Step, should not be discourage.

The Plyo Step is an action that naturally occurs during a quick movement of the lower body to align itself for greater force application into the ground. It normally occurs when the athlete is in some form of parallel stance or athletic stance. The reason the Plyo Step occurs at all is because the body realizes it cannot manage the weight of the body effectively from its current positioning. In other words, the body doesn't have optimal angles to efficiently push the body in its intended direction.

How does the body know this? It all comes down to biomechanics, physics, and using the correct muscles in their most efficient positions.

When an athlete is in a typical athletic stance, feet slightly wider than shoulder width, hips back, shoulders over knees, knees equal to toes, and knees to the inside of the feet, they have the ability to move in any direction with slight adjustment. The key is slight adjustments. Because the feet are nearly aligned vertical with the center of gravity it makes sense the muscles are not optimally going to be recruited to push the body forward. There would be more of a pulling of the feet and a rolling forward of the body to gain the vital force application angles needed to move horizontally.

Although the athletic stance allows the athlete to move quickest in any direction, it must be adjusted quickly to have optimal push off angles. This is when the Plyo Step comes in. It is the body's natural way of positioning itself so it can move quickly with greater speeds.

The most convincing factor for me the Plyo Step is a correct response of the body is when the body is in its most still states, then suddenly stimulated with a random signal the body kicks into the "fight or flight mode". Either

due to being frightened or excited to chase or flee, the body naturally assumes a position of quick and forceful movement. This doesn't need to be taught, it is inborn. It is our survival mode.

Translated into the athletic venue, it is the ability to avoid or attack during competition. You can't teach the instinct, you can only weaken it by taking away the innate ability. You can improve the mechanics by which it takes place.

### **Can It Be Helped?**

There is no doubting the fact the Plyo Step is a naturally occurring phenomenon. But does that mean there is nothing we can do to improve its properties? No! There are ways to improve how the Plyo Step is executed.

First of all, the role of the Plyo Step is to quickly align the body so maximal force can be applied quickly to move the body in its intended direction. Because the force is going to come from the ground up, it makes sense that the lower body will align itself first with the upper body following. Most of the mistakes come when the upper body gets out of alignment with the lower body and thus results in a lower force output due to power leaks. Power leaks are when the energy used to move the body escape out a poorly aligned body segment. The segment could be the hips or the upper body, as directed by the head and shoulders.

When looking to make corrections, which allow the force of the Plyo Step to realize its true potential, the upper body should be a focal point. There can be poor foot planting as an issue, but this is not usually the primary issue, just be aware of it.

### **Here are a couple things to look at:**

- When the shoulders drop below the line of force created by the back foot (Diving down), this tends to cause the athlete to bend at the waist. This will of course cause an energy leak
- If the athlete pushes off quickly and the shoulders and head lift up (Rearing up), this will also cause an energy leak.



An example of a good power line



An example of “Rearing up”

The role of the coach with regards to the Plyo Step is to leave it alone if it is done well and the athlete can move quickly out of their stance. Don't over coach something that is done well. Simply correct the mistakes which can make it better.

### **It's Detractors**

For as long as I can remember, and I am sure decades before that, coaches have been calling the movement a “False Step”. The concerns were it was a wasted step and it took longer to move forward. They felt the “False Step” was actually a step backwards and in doing so, it slowed the athletes' ability to accelerate. I can certainly see how this interpretation of the movement can be popular. Further investigation into the movement will dispel all that was traditionally thought.

All that was thought just isn't the case on many levels. We already discussed the natural innate ability of the body to properly align thus the muscles can be optimally used to produce force quickly. Also, the fact that coaches call it a step back just isn't true. If it were a step back, then the hips would have to travel back as well. This clearly doesn't happen. Look at this picture of the

Plyo Step and notice the position of the hips just prior to the Plyo Step and when the Plyo Step occurs:



It can be clearly seen that the center of mass only moves forward. The fallacy the movement brings the athlete backward first just isn't true.

Next, the old timers use to say, "It takes longer to get moving forward". Wrong again. The reason I named this movement a Plyo Step is because of the stretch shortening action that occurs when the foot aggressively contacts the ground. There is a quick response (action reaction) that occurs from the ground which helps to move the athlete forward much quicker.

### **The "Other Method"**

What many coaches and trainers had advocated for years was to simply step forward out of the athletic stance. It sure seems easy enough on the surface.

The method of this "stepping forward" is to be performed by pivoting forward at the axis of the ankle. One foot would push off and the opposite foot would step out. Let's break this down and see why it makes little sense to teach athletes to do this and not allow the natural action of the body to occur:

1. When rolling forward, the body is relying somewhat on gravity. This certainly isn't the fastest way to get the body into an acceleration position. Also, the athletes are told to push with the contact foot into the ground. Because the center of mass is basically starting over the feet, any real quick aggressive pressure into the ground will cause most of the effort to translate the body vertically, with much less horizontal translation. Basically, the muscles and levers are not ideally positioned to apply force horizontally.
2. Many coaches rationalize the reason for having the athlete step forward out of the athletic stance is because they can move forward

- quicker when the play is in front of them. Well, we already dispelled the fact that this isn't the case from a physics and biomechanical standpoint. The most commonly missed component of this entire argument is; who says the athlete will have to move forward? Maybe the athlete will need to react and move laterally or backwards. The reason I make this point is because many coaches will teach their athletes to start leaning forward or the rolling forward technique during training. It makes no sense in most sports since you don't know what is going to happen and when it is going to happen. Even in sports like baseball when you know just about when the ball is going to be hit, you still have little clue as to where it will travel until it travels there. Justifying the rolling forward technique can be made better by allowing the athlete to start pivoting forward at the ankles just prior to the play is just not practical. You can potentially be putting an athlete in a bad situation.
3. The argument that the Plyo Step shouldn't be used in sports like track and field or in some cases with wide receivers is correct. When and athlete has an ideal alignment of the body to push off with- Great! That is what the goal is. The purpose of the Plyo Step is to give the athlete a quick and forceful push off angle to meet the task at hand.

**Let's not forget. The Plyo Step is totally ruled by the reaction to a stimulus. It is not a pre-determined thought process. The athlete doesn't say "Ok, I am going to perform the Plyo Step on this play". They simply react to the play and the body takes over from there.**

This is another reason I think trying to teach an athlete not to take this step is messing up natural neurological systems.

### **Research on This Topic**

There was a fairly recent study published in the Journal of Biomechanics 34 (2001) 211-215 titled Starting from Standing, Why Step Back? By G.A. kraan, J. Van Veen, C.J. Snijders, and J. Storm.

Basically, the study took ten subjects and asked them to perform a sprint or acceleration forward from 3 different stances. The use of a force plate was included to measure forces from different angles and time factors to produce the force.

The 3 stances were

1. Starting in a standing position just in front of the force plate and starting on their own initiative.
2. Starting on the platform in a standing position; however the subjects were instructed not to take a step back (Plyo Step).
3. Starting with one foot in front of the force plate and the back foot on force plate.

It was reported that in 95% of all starts, regardless of if subjects were told not to step back (Plyo Step) or not, had a step back action during the take off. Subjects taking the Plyo Step reported it was difficult to repress the urge to not take the step back. *This in and of itself, should make it clear that the body knows best when it comes to this form of movement.*

Basically, the study showed that the step back (Plyo Step) had a quicker push off time and higher force output than other starting scenarios.

Not to sound redundant, but I can't overemphasize the point of not suppressing the body's natural tendencies to move quickly. This ability is innate and allows the body to protect itself in harms way. When applied in a sporting situation, these tendencies allow the athlete to attack or avoid opponents or situation during play.

### **Reinforcing with Drills**

Performing drills will naturally require the Plyo Step action are some of the most fun and competitive drills you can do with athletes on accelerations.

Below is a list of drills you can implement into your daily training. When watching an athlete perform the Plyo Step, the key is to only teach what needs to be taught. The Plyo Step will occur naturally. If it doesn't, it usually is due to a balance issue at the time of a reaction. For example; if the athlete was leaning to a side or not able to perform a Plyo Step in favor of maintain balance during an awkward movement. For the most part the corrections to look for are poor shoulder position when beginning to accelerate and inadequate leg drive.

## Individual Drills:

1. Athletic stance acceleration on the signal- The athlete will be asked to stand in a basic parallel stance and prepare to move only on the signal. Once the signal is heard the athlete will race for 10 yards.
2. Athletic stance partner chase- The first partner lies on the ground, roughly 8-10 feet in front depending on speed. When the signal is giving the partner is back must come out of his athletic stance and catch the partner getting up before 10 yards.
3. Ball drop- Two athletes line up side by side facing the coach or third partner who is holding 2 tennis balls (one on each side) at shoulder height. When the coach drops the balls the athletes will come out of the athletic stance and catch the ball before it bounces twice.
4. “GO”- Two athletes will stand side by side in an athletic stance. One is the leader and one is the follower. When the leader decides to take off He yells go and takes off. The partner must react and stay with or beat him to the 10 yard mark.
5. One foot balance starts- This forces the athlete to orient to a greater push off position immediately upon the signal. Each athlete must stand on one foot holding the opposite foot 6 inches or more off the ground.
6. Shuffle and “GO”- Each partner will shuffle away from each other on a straight line. When the leader says go they must both accelerate straight ahead for 10 yards.
7. Jumping jacks and “Go”- This can be done with any kind of jumping. One athlete will say go and they must race for 10 yards.

There are literally tons of different drills you can implement to reinforce the proper alignment during the initial stages of acceleration from an athletic stance. Have fun creating new ones.

While watching the athletes take off from the stance or other movements, observe how well they get into the correct lean. Make sure the shoulders don't "Rear up" or "Dive".

### Important note on acceleration:

**The lean the athlete gets into during acceleration is a result of the power and speed of the acceleration. The lean, by itself, doesn't dictate**

**acceleration. If the athlete leans more than the acceleration can handle the athlete will stumble.**

I hope this guide sheds some light on the function of the Plyo Step and why I believe it is important to not discourage.

There may be certain sports or situations in a sport where the plyo step is not needed or doesn't add an advantage. More than likely the athlete or situation will uncover these times.

Finally, we all were given certain natural abilities. It is important to let those abilities shine and attempt to improve them when needed. Don't take away something good when you are not really sure why you are doing it. Let the body teach us.

Good luck and have fun watching your athletes become faster!

*Lee Taft*