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ATHALONZ

ATHALONZ BLOG

ATHALONZ SHOES – LEVERAGING THE LAWS OF PHYSICS

Athalonz shoes are designed to help you leverage the laws of physics to increase your power. Yes, it sounds like a marketing slogan and it is, but it's also 100% true. Our shoes increase your power based on scientific laws and scientific facts. In the science community, scientific laws and scientific facts have very specific meanings, which are:

- A scientific fact is based on observation that always holds true. For example, if an apple is dropped to the earth, it will always fall in the direction of the ground; it never floats upwards.
- A scientific law is typically a mathematical model that accurately predicts a result of a fact pattern, without exception. For the falling apple, scientific laws accurately predict the velocity of the apple as it falls, the time it takes to reach the ground, the force at which it impacts the ground, and its energy at impact based on the height from which it is dropped, the earth's gravitational field, distance traveled at impact to rest, and the mass of the apple.

A key component of a scientific law and a scientific fact is that they are always true. There are no known exceptions. Thus, when we say our shoes leverage the laws of physics to improve power, they have to work for everyone, without exception. And they do! Now, what an athlete does with the increase in power is another matter and will be discussed in subsequent blogs.

The following are the scientific laws and facts embodied in our shoes:

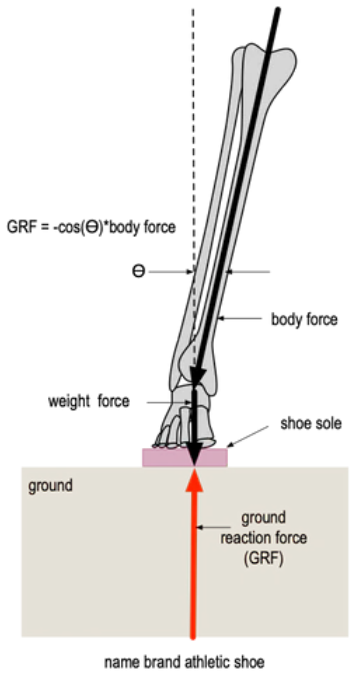
- The scientific law of motion (Newton's first law of motion) states that a body (e.g., the athlete) at rest will remain at rest unless acted upon by an external force (e.g., ground reaction force).

Under Armour Exhibit 1030
Under Armour v. Athalonz, IPR2024-00636
Markison Ex. 2

- The scientific law of power (P) states that power is the result of a force (F) applied over a distance (d) in a given time frame (t). In equation form, P = F*d/t.
- The scientific law of ground reaction force states that it is equal to and opposite of the force a body applies on the ground.
- The scientific fact that forces are vectors, meaning they have a magnitude and a direction.

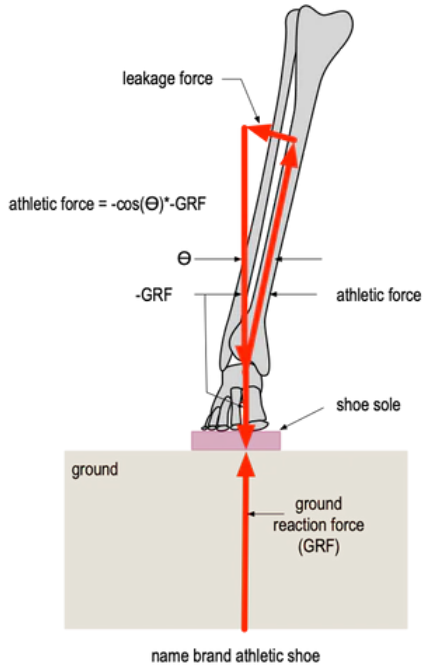
If you're still reading, thanks. I know that's a lot of scientific jargon; but it's necessary to set the foundation for how our shoes will increase your power. As discussed in our blog entitled, "*Ground-Body Connection is Your Power Source*", our power comes from the ground applying a force (ground reaction force) on our body. Positioning our feet in an optimal manner will increase ground reaction force and thus increase our power.

Figure 1 illustrates how the foot engages the ground in a name brand shoe with a flat sole from lateral to medial side (i.e., from outside to inside of shoe) on flat ground. In an athletic stance, we get on the balls of our feet, with our weight equally distributed throughout the balls of the feet. The weight of our body and the contraction of our leg muscles create a body force that is aligned with the legs. Our ankles change the direction of the body force to be perpendicular to the ground. We call this our weight force that is applied to the ground. As per scientific facts, the ground provides an equal and opposite force (ground reaction force) on our bodies. Since our weight force is perpendicular to the ground, the ground reaction force is also perpendicular to the ground.



(Figure 1)

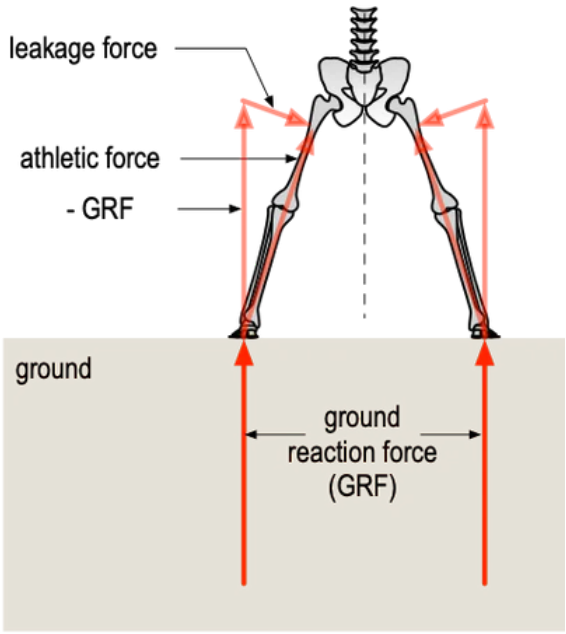
Figure 2 illustrates the ground reaction force being exerted on the body in the name brand shoes of Figure 1. Our bodies convert the ground reaction force into an athletic force and a leakage force based on the angle (Θ) between the direction of the ground reaction force and the direction of the athletic force. The athletic force is the force we have available for an athletic movement and the leakage force is wasted force for the athletic movement. The larger Θ is, the less athletic force we will have, which suggests reducing the angle to increase force. For baseball, softball, tennis, and golf, we convert the linear athletic forces of our legs into rotational forces in our upper body and arms. Because of this, we need our legs wider than our shoulders for an effective transfer of the forces. We will discuss this in greater detail in another blog.



(Figure 2)

Figure 3 illustrates an athletic stance at set up for hitting or throwing a ball wearing the same name brand shoes of Figure 1. Our body generates a body force based on our weight and muscle activation. Our body forces traverse through our ankles to our legs to produce the weight forces. The ground exerts equal and opposite forces on our feet based on scientific facts of forces. The body converts the ground reaction force into an athletic force and leakage force as shown in Figure 2.

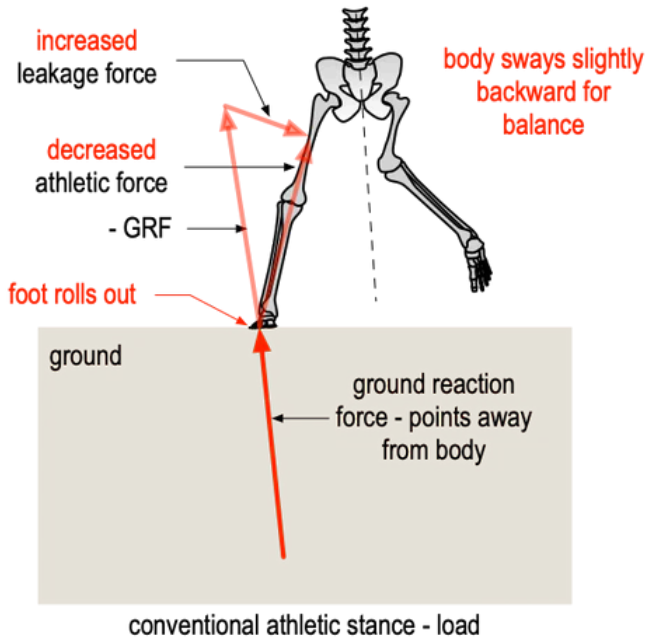
Our resulting athletic force is equal to our body force times the square of the cosine of the angle between the ground reaction force and the athletic force. The leakage force, which is wasted force for the athletic movement, is equal to the ground reaction force times the sine of the angle between the ground reaction force and the athletic force.



conventional athletic stance

(Figure 3)

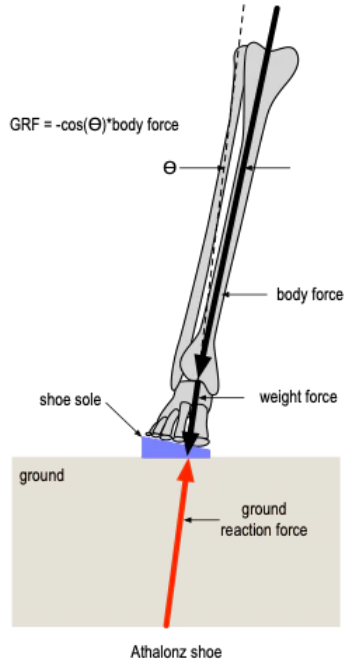
Figure 4 illustrates a load position for hitting or throwing a ball. In general, the load position shifts a majority of our weight to the back leg and ideally has a slight rotational component around the back hip, which we'll discuss in another blog.
When we load, we rock a bit on our back leg to maintain balance. The amount of rocking is athlete dependent, but we all do it to some degree when in a conventional athletic stance.
As a result of the rocking, the angle at which our back foot engages the ground changes, shifting the ground reaction force to point away from our body. This decreases the athletic force and increases leakage force.



(Figure 4)

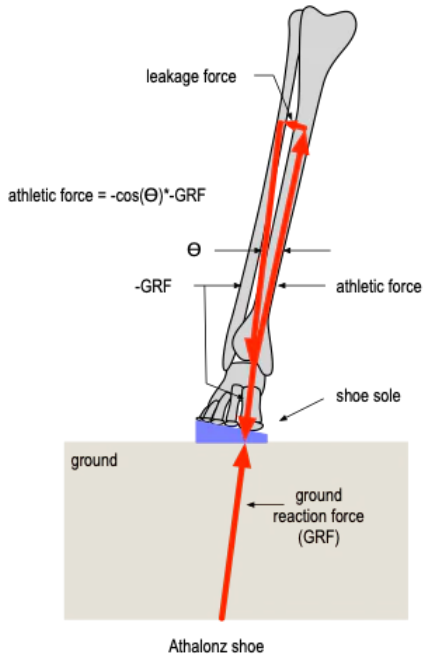
Accordingly, when we load in a conventional athletic stance in name brand shoes, we increase our leakage force, reduce our athletic force, and thus reduce our power to hit or throw a ball.

Figure 5 illustrates how the foot engages the ground in an Athalonz shoe, which includes a gradient forefoot section sloping downward from lateral to medial side (i.e., from outside to inside of shoe) on flat ground. In an athletic stance, our weight shifts to the insides of the balls of our feet, with our weight force at an angle to the ground. This creates the force our body applies on the ground. The ground provides an equal and opposite force (ground reaction force) on our body. Since the force we apply is angular to the ground, the ground reaction force is also at angle to the ground, which points towards our body.



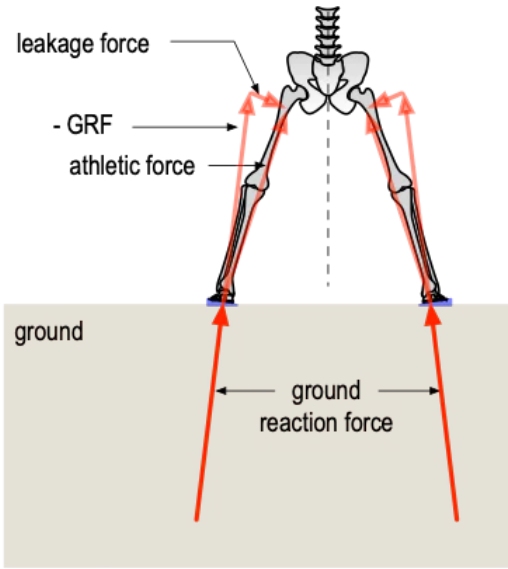
(Figure 5)

Figure 6 illustrates the ground reaction force being exerted on our body in Athalonz shoes. Our bodies convert the ground reaction force into an athletic force and a leakage force based on the angle (Θ) between the direction of the ground reaction force and the direction of the athletic force. The athletic force is the force we have available for an athletic movement and the leakage force is wasted force for the athletic movement. In comparison with Figure 2, the angle Θ in Athalonz shoes is much less than in the name brand shoes. With a decreased angle, athletic force is increased and leakage force is decreased.



(Figure 6)

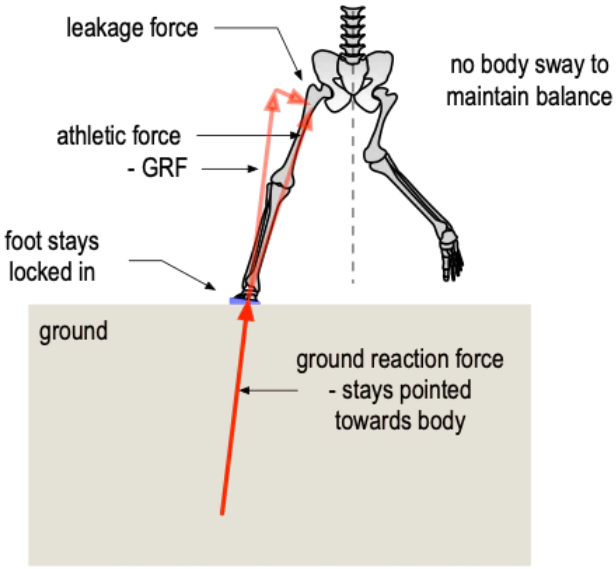
Figure 7 (below) illustrates an optimal athletic stance provided by Athalonz shoes. In the set up for hitting or throwing a ball, our weight bearing forces engage the ground at an angle via the Athalonz shoes. This angle causes the ground reaction force to also be angled, which points towards the body. With an inward angled ground reaction force, the athletic force is angled inward and is increased. So, for the same amount of body force as with a conventional pair of shoes with a flat sole, the Athalonz shoes increase the ground reaction force, which increases the athletic force and reduces the leakage force. Thus, we are set up to produce more power.



Athalonz shoes - best athletic stance

(Figure 7)

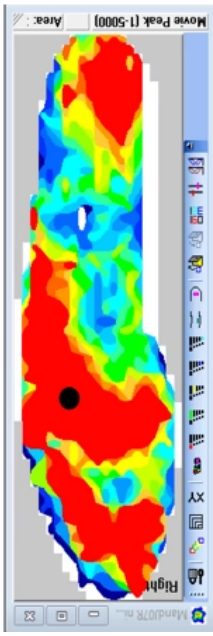
Figure 8 illustrates the best athletic stance provided by Athalonz shoes during the load phase of hitting or throwing a ball. With the ground reaction force angled inward, when the weight shifts to the back leg during the load, the body sways very little, if at all, towards the back leg to maintain balance. As such, the ground reaction force stays angled inward, which keeps the athletic force angled inward and keeps the leakage force at a minimum. This allows us to use the increase in athletic force to produce more power.



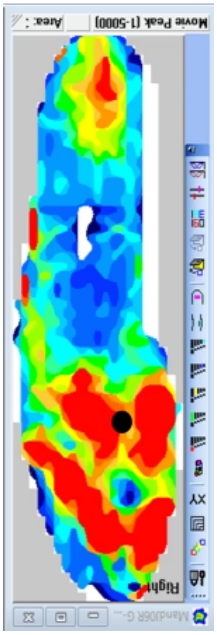
Athalonz shoes - best athletic stance during load

(Figure 8)

Figures 9 and 10 (below) are measures of the ground reaction force of the back foot of a baseball player hitting baseballs off of a batting. In Figure 9, the player is wearing a name brand pair of turfs shoes and in Figure 10 the same player is wearing Athalonz GF1 turf shoes. In these measurements, red corresponds to more force and blue corresponds to a less or no force.



(Figure 9)



(Figure 10)

Comparing the two images, Figure 9 (name brand shoe) has much more red areas that are spread out over a much larger area than in Figure 10 (Athalonz shoe). The larger red areas of the name brand shoe of Figure 9 represent the ground reaction force shifting as discussed with reference to Figures 3 and 4. The black dot corresponds to an approximate center of the ground reaction force during load,

which is on the lateral (outside) of the foot. This corresponds with the ground reaction force pointing away from the body as shown in Figure 4.

In Figure 10, the ground reaction force is much more concentrated on the medial (inside) side of the foot, which indicates that the ground reaction force does not move (or moves very little) when loading. The black dot corresponds to an approximate center of the ground reaction force during loading. This corresponds with the ground reaction force pointing towards the body as shown in Figure 8.

The beauty of working with scientific facts and laws is the precision and repeatability of their effects. By leveraging the physics of motion and power, Athalonz shoes place the body in an optimum position to increase ground reaction force, which increases power for an athletic movement. And it will work for everyone! What will vary is how each athlete uses the extra power. If an athlete's mechanics are sound, they will feel and notice an immediate increase in power using Athalonz shoes. The less sound an athlete's mechanics, the less likely they are to feel and notice the increase power.

The more you know how Athalonz shoes work and how to use them, the more effective they will be for you. Please see our blog entitled, "Getting the Most Out of Your Athalonz Shoes" to learn more about how to use Athalonz shoes.

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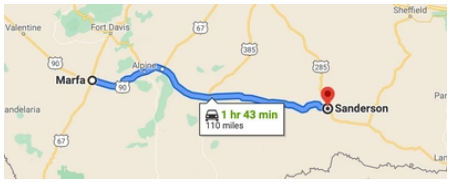

THE RIDE: DAYS 10-12

Today was a good bit of climbing. A little over 2,000 feet of elevation gain. Not as much as day 1 or day 2, but not trivial. I am really enjoying traveling through the small

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