WHY BAND TRAINING?

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The following article is an excerpt from JC Santana's ESSENCE OF BAND AND PULLEY TRAINIGN

The hottest phrase in the strength and conditioning industry today is *functional training*. This training methodology focuses on the development of movement strength, not just muscle strength. Approaching strength development from a movement and skill perspective rather than the perspective of isolated muscle hypertrophy develops what we call neuromuscular efficiency—the body's ability to move efficiently as an integrated unit. This enhanced functioning reduces injuries and improves performance. To optimally enhance movement motor patterns, two major things are required: Practice of the movement and progressive overload during the movement. Since functional training trains movements, the repetitions positively influence gross motor patterns.

To progressively overload a movement, we must figure out what forces need to be overcome. Then we overload those forces in order to elicit movement strength. We call this *vector training*. Vectors are directional forces that we have to overcome in order to move effectively. For example, we always deal with gravity's vertical vector that points down, and to overload this vector, we use weight. However, what happens when we start to move or need to change direction? To begin movement or change direction, we have to overcome inertia, or a body's tendency to maintain its state until a force acts on it. If movement has already taken place, eventually we will need to slow it down, stop it, or change its direction. This is possible by overcoming inertia or manipulating momentum. We can strengthen the movements needed to overcome inertia and manipulate momentum by progressively overloading the resultant vector with bands and pulleys.

Machine training can certainly strengthen the body and improve functional movement. However, standard machine training cannot provide the specificity of movement that free-weight and vector training can. Although their current use has been limited, bands and pulleys are perfect to overload the vectors that must be overcome in order to move efficiently and effectively.

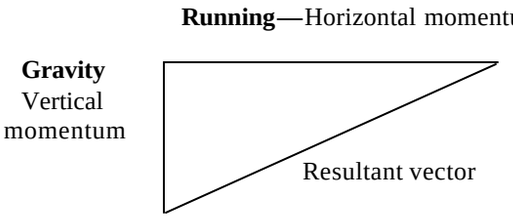
When looking at the characteristics of band and pulley training, most fitness and conditioning professionals quickly observe the key advantage provided by band and pulley training (BPT): the ability to load nonvertical vectors (N2V). Although all resistance training involves force vectors, we coined the phrase *N2V training* when referring to BPT because of the ability to load any vector quickly and easily. This is especially true when it comes to loading the net resultant vector associated with a specific movement.

When the body moves, every body segment creates a momentum vector. In many cases, the movement is rotational, thus creating angular momentum. Most movements in life and sport are a combination of both linear momentum and angular momentum. Regardless of the combination of movements, running and other functional movements deal with horizontal forces, especially when decelerating. Since many functional activities have a horizontal component, it is advantageous to load this component in order to enhance the ability to neutralize and overcome it. Let's take a look at an example.

A third baseman running down a ground ball hit hard along the third base line will need to slow down after catching the ball, plant, and turn to throw the runner out at first base. Although many vectors are at work in this sequence of movements, one of the key factors involved in the success of this athlete will be his ability to quickly decelerate after catching the ball. As the player is

deceleration, he lowers his center of mass and begins to overstride so that braking forces can be applied against the ground.

A third baseman running toward the line must eventually decelerate forces that are not vertical. These nonvertical forces are difficult to load with free weight.



This figure illustrates the relationship between the horizontal momentum vector produced by the running motion and the constant gravitational force of gravity. Notice the direction of the resultant vector of motion. Loading the resultant vector can closely mimic the force this athletes encounters on the field.

The deceleration of this third baseman involves overcoming two primary vectors: the horizontal momentum vector and the vertical force vector provided by the body's mass and the earth's gravitational pull (Force = body's mass × gravitational pull). These two vectors can be combined to provide a resultant vector of force that must be neutralized in order to bring the player to a stop. This resultant vector can be approximated and trained using BPT. By progressively overloading this resultant vector, we can get stronger at overcoming it. Exactly what angle and load to use is a matter of factors such as speed, stance width, location of the player's center of mass, and so on. Multiple speeds, angles, and loads can be trained to simulate different sporting situations and daily activities.

This resisted reaching exercise is an example of the BPT approach to train the deceleration needed by the third baseman. The Versa Pulley provides a great training stimulus for this application.

As in the case of the third baseman, many functional movements can be loaded in BPT. Any movement, from pulling weeds out of the ground to throwing a ball, has a major resultant vector that can be approximated and resisted. Determining the major vector of focus can be fun and adds to the specificity and effectiveness of the training. Don't get caught in the heavy physics of the training. There is some room for error and a few degrees in any direction are not going to kill anyone. One key factor to keep in mind when loading any functional movement is to avoid using

too much resistance. Too much resistance significantly changes the motor pattern of the movement and can lead to the development of inefficient movement patterns. If it smells, walks, and talks like the move you are trying to enhance, then chances are you are pretty close to where you need to be. Be conservative, experiment, and have some fun with your training—it's only training, not brain surgery.

Equipment manufacturers within the strength and conditioning industry have become increasingly aware of the effectiveness and diversity of vector training. Band and pulley products are starting to make a comeback. Manufacturers are now quick to get on the pulley craze following Free Motion's lead in 1999.

The advantages of pulleys over bands are a source of great debate among strength and conditioning professionals. Many coaches see the variable resistance of the band as a disadvantage. However, variable resistance provided by bands can be seen in the same positive light as other variable resistance training equipment, such as Nautilus and Universal. Variable resistance can somewhat accommodate the increasing biomechanical leverage of many movements, such as pressing. Additionally, many conditioning professionals see the ability to perform explosive movements without flying weight stacks as an advantage.

Band punching is one of those exercises that do not require deceleration at the end of the concentric movement. It is great for power development.

Pulleys are seen as nonfunctional by some fitness experts due to their constant resistance and inability to accommodate fast movements with light loads due to flying weight stacks. Yet, the ability to quantify the resistance is looked at as a positive characteristic of traditional pulley training by other fitness professionals. We might want to consider that the concept of constant resistance is a misnomer. Although the mass being lifted by a pulley system is constant, the resistance a muscle sees changes with the lever arm and the speed of the movement. Therefore, standard pulleys do not offer constant resistance, they offer constant mass.

Regardless of brand or characteristic, bands and pulleys can be effectively employed to train nonvertical movement vectors. Although there are advantages and disadvantages to all resistance training equipment, bands and pulleys remain effective tools in performance enhancement training. A wise integration of different resistance training equipment will provide the best results. Using the right tool for the right application is the determining factor in the success of any training modality.