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After reviewing several articles on the mechanics and techniques employed in the development of high jumpers, one primary trend became evident. It is not uncommon for writers (especially coaches) who are writing and describing the principles of training for the flop high jump to conclude that the practices of a gifted athlete (his/her behaviors) explain the proper or correct variables and absolutes for everyone participating in the event to model themselves after. The error in this assertion lies in the fact that conclusions are being drawn from the specific at the expense of the general. Another way of saying this is that these authors, who are expressly impressed with a particular athlete's performance, are guilty of focusing on the individual differences that exist between persons and attributing some underlying truth or value to a difference while overlooking the applied laws of our environment that are the universal causatives for a particular effort.

God or natural law explains what occurs in our universe, not the actions, behaviors, or compensations of any individual entity.

With this in mind, consider two conclusions that may apply to the training modes one would likely employ in the process of teaching young men and women to become competent high jumpers.

## CAUSE AND EFFECT

In nature we are aware of the maxim that Mr. Newton forwarded to us: "For each action, there will be an equal and opposite reaction." A precise force imparted by an athlete's body striking the ground and extending and flexing the major muscles of the appendages with the take-off foot will result in a precise raising or lifting of the individual's center of mass (COM). This is observable and measurable. The greater the force against the earth's surface, the greater the displacement of the COM in the opposite direction of that force. The direction and amount of change in the COM will be determined by the direction and magnitude of the force as it is imparted to the take-off surface.

Therefore, an important component of the training plan would be to condition each athlete so as to increase the amount of explosive force (power) that each would be capable of applying and releasing into the take-off surface. This strategy is a simple result of the critical thinking process, but it is essential to utilize the occasion to train the athlete's awareness and understanding of this concept as well as his/her body in the principle. It will open the door to the understanding and awareness of the necessity for sound progressions in their training. It will explain and give meaning to such variables as the length of run necessary for best performance at each individual's specific stage of development. Not every athlete is going to use the ten step approach. Some will not benefit from this quantity. However, as the individual gains strength and control, they may benefit by increasing the quantity of potential force by lengthening the run up. As an individual becomes stronger and more in control, they may need to go beyond that which is the norm for experienced jumpers. But those individual differences are specific to each individual's personal characteristics and abilities.

## SUMMATION OF FORCES

Where there is more than one vector of force being generated in a particular effort, the forces created by each cause will be added to one another so as to impact the center of mass of the athlete cumulatively. With this understanding in mind, it is clear why the coach must spend time teaching the athlete not only that he/she must run in a curvilinear path, but why this must be the case. Force generated in a linear pathway is expressed with a specific measurable amount of potential work depending upon the variables of velocity, mass of the individual and the distance of the described path. In the high jump, this potential work force will be translated into the vertical moment when the athlete performs the take-off movements. If the athlete's run up is ten steps in length, then the amount of force will be cumulatively developed by the nature and characteristics of linear momentum. If the quality of this straight or linear approach is modified with the addition of a portion of the run up being performed on a curved pathway, then the value of work is affected positively. This is because the curved pathway must be executed in such a way that a greater force will be exerted (a result of countering centrifugal force). When the take-off is performed with these two vectors or work potentials functioning and reacting together, the result is greater than the forces exerted by either one. What this means is that the athlete who performs the run up correctly will be able to realize greater energy into the act of lifting the COM vertically and, in addition, the collective or summative nature of the run up will supply the necessary force and direction to carry his/her body in the optimum direction for bar clearance.

The simple purpose of this article is to argue, again, the necessity for coaches and athletes to return to the basic fundamentals of technique and training that will reinforce truth and sound performance. The basic study and application of sound biomechanical principles will result in sound training plans. The result of this sound and defensible method will give greater and continuing confidence to the athlete during difficult and stressful training, problem solving and competition.

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