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1991-92 NCAA Division II College Wrestling

How To Be Explosive

1991-92 Underclassmen All-Stars

Coach, I Wanna Be Explosive!

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I wish I had a buck for every time I've heard an athlete make that statement. Indeed, athletes (and coaches) are always looking for ways to increase speed, power and explosiveness. The search for these valuable athletic components has led to one of the most hotly debated subjects in strength training. The debate concerns the speed at which an exercise or movement should be performed. Essentially, there are two schools of thought: Some strength and fitness professionals advocate high velocity/explosive movements that are ballistic in nature, whereas others recommend deliberate movements that are performed in a controlled manner.

FIBER RECRUITMENT

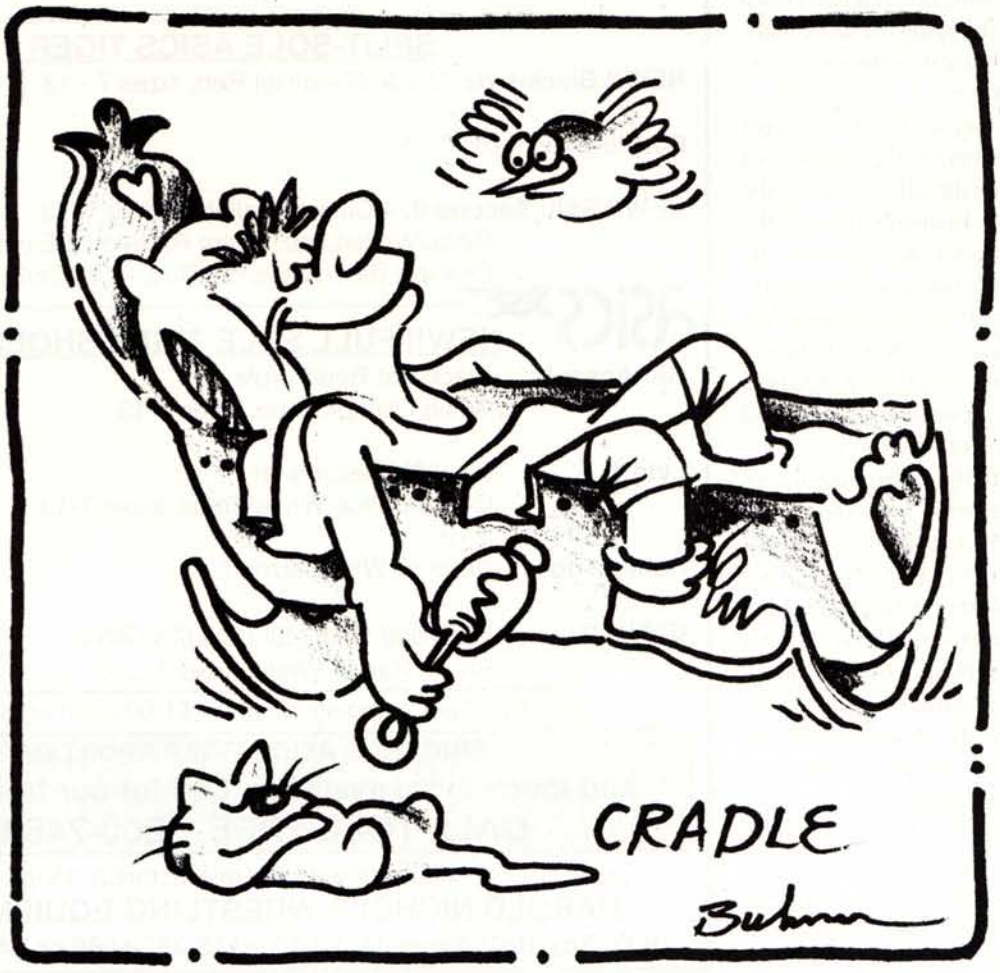
Most of the controversy pertains to the recruitment of muscle fibers. Proponents of high velocity movements argue that in order to become "explosive," you must train "explosive." Their assumption is that by lifting explosively in the weight room, the fast speed of movement will somehow change the chemical composition of the slow twitch (ST) fibers and/or preferentially recruit the fast twitch (FT) fibers.

Well, that sounds great except for the fact that there is no conclusive evidence in the literature to firmly establish the belief that muscle fibers can be changed from one type to another. It is also important to note that muscle fibers are recruited in an orderly fashion according to the intensity or force requirements and not by the speed of movement. Demands of low muscular intensity are met by the ST fibers. Intermediate fibers are recruited once the ST fibers are no longer able to continue the task. The FT fibers are finally recruited only when the other fibers cannot meet the force requirements. All fibers are working when the FT fibers are being used. In short, there is absolutely no definitive evidence in the literature to imply that movements performed in an explosive or ballistic manner will bypass the ST and intermediate fibers in order to specifically recruit the FT fibers.

MOMENTUM

Besides the fact that high velocity movements do not selectively recruit the FT fibers or alter the composition of the ST fibers, this method of training is not recommended for reasons that are much more serious. Whenever you lift explosively, momentum is introduced to overcome inertia and provide impetus to the weight or resistance. After the initial explosive movement, little or no resistance is encountered by the muscles throughout the remaining range of motion. In simple terms, the weight is practically moving under its own power.

To illustrate the effects of momentum on muscular tension, imagine that you pushed a 100 pound cart a distance of 50 yards at a deliberate, steady pace. In this instance, you maintained a constant tension on your muscles for the entire 50 yards. Now, suppose that you were to push the same cart another 50 yards. This time, however, you accelerated your pace to the point where you were running as fast as possible. If you were to stop pushing the cart after 35 yards, the cart would continue to move by itself because you gave it momentum. So, your muscles had resistance for the first 35 yards . . . but not for the final 15 yards. The same effect occurs in the weight room. When weights are lifted explosively, there is tension on the muscles for the initial part of the movement . . . but not for the last part. In effect, the requirement for muscular force is lessened and the potential strength gains are reduced accordingly.



More importantly, using momentum to lift a weight increases the internal forces encountered by a given joint; the faster a weight is lifted, the greater these forces are amplified. These high forces are created at the point of explosion. When the forces exceed the structural limits of a joint, an injury occurs in the muscles, bones or connective tissue. Quick question: Do you know what the exact tensile

strength of ligaments and tendons is at any given moment? Well, I sure don't — and neither does anyone else. In fact, the only way we can ascertain tensile strength is when the structural limits are surpassed. Then, of course, it's too late. Therefore, we must be concerned with an exercise's speed of movement because we simply do not know the structural limitations of the human body's various connective tissues.

The potentially damaging effects of high-speed movements can be demonstrated rather easily using an ordinary 16 ounce hammer. Suppose you were to take the hammer and lay it across your hand. It's doubtful that this action would elicit any feelings of pain or discomfort. Next, imagine that you lifted the hammer and allowed it to drop on your hand from a height of about a foot. There is no doubt that this action would tend to hurt a bit. But why would dropping a hammer on your hand cause significantly more pain (and damage) than resting it on your hand? After all, in both cases the weight of the hammer remains unchanged. The answer has to do with velocity. A hammer resting on your hand has a velocity of zero; by dropping the same hammer, you would increase its velocity and, in effect, magnify its force.

Assuming that an object's mass (or weight) does not change, the amount of potential force is then directly related to the object's acceleration. In other words, as the speed of movement increases, so does its potential force. This is not merely my opinion or observation — it's a fundamental law of physics. Something new? Nope. In fact, it was first proposed about 300 years ago by a fellow named Isaac Newton and is referred to as his Second Law of Motion.

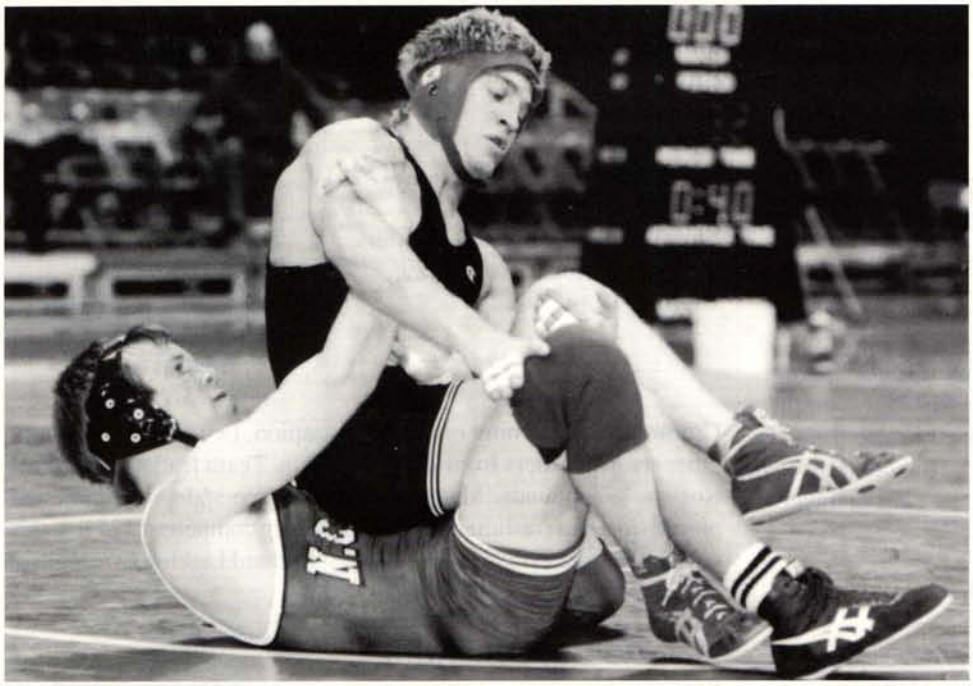
The potentially destructive forces created by high velocity movements are violently illustrated every minute on our nation's highways. Literally. Of course, not all automobile accidents can be attributed to high speeds of movement. However, it's true that a slower velocity would certainly lessen the risk and potential for injury. Indeed, if slower speeds of movement are safer, doesn't it follow that faster speeds of movement are more dangerous?

Proponents of explosive training sometimes counter these facts by saying, "So what? Sports are dangerous — just look at football and wrestling. Maybe we should stop playing sports." Arguments like this miss the point entirely. It is true that sports are inherently dangerous. However, that does not justify using potentially dangerous techniques in the weight room in search of "explosiveness." Indeed, encouraging anyone to explode with a weight is suggesting musculo-skeletal trauma. The only thing that might explode is your biological tissue from its point of insertion.

Dr. Fred Allman, a past president of the American College of Sports Medicine, takes this point one step further, stating, "It is even possible that many injuries . . . may be the result of weakened connective tissue caused by explosive training in the weight room."

A Safer Way

It's rather obvious that explosive movements are unproductive and potentially destructive. Anyone who doesn't believe that an injury can occur from a ballistic movement has apparently never heard of



Pennsylvania Penn State's Bob Truby (126) majors Mike Norton, North Carolina State 16-5. Photo by Dr. Marshall L. Goldstein

whiplash.

Absolutely no one knows exactly how fast an exercise should be performed, nor do I think that anyone will ever know. It must certainly differ from one individual to another and probably even varies within the same person from one week to the next depending upon that person's current level of strength and conditioning. At any rate, one thing is certain — it's much safer and more efficient to lift weights under control. Athletes should be required to raise the weight without any jerking or explosive movements and to lower it under control. Raising the weight in about 1-2 seconds and lowering it in about 3-4 seconds will ensure that speeds of movement are not ballistic in nature and that momentum does not play a significant role in the efficiency of the exercise.

IMPROVING EXPLOSIVENESS

When someone is described as being "explosive" on an athletic field, essentially what we are saying is that the athlete performs, moves or reacts quickly and forcefully. This is primarily due to the fact that the athlete's movement patterns for a particular skill are so firmly ingrained in his "motor memory" that there is little or no wasted effort. In other words, the athlete is highly efficient at performing the intended sports skill.

In order for you (or your wrestlers) to become more explosive, there are two things that you must do. First of all, you must literally practice the motor skills for thousands and thousands of task-specific repetitions. Each repetition must be done with perfect technique so that its specific movement pattern becomes firmly established in your motor memory. It is important to remember that the skill must be practiced perfectly and exactly as you would use it in competition. Remember, practice makes perfect only if you practice perfect.

Secondly, you must strengthen the major muscle groups that are used during the performance of that skill. However, this should not be done in a manner that mimics a particular skill so as not to confuse or inhibit the intended movement pattern. A stronger muscle can produce more force; if you can produce more force, you will require less effort and be able to perform the skill more quickly, more efficiently and more explosively. But again, this is provided that you've practiced enough in a correct manner so that you'll be more skillful in applying that force. So, if your goal is to become more explosive, you must become proficient at your wrestling techniques and you must strengthen the muscles of your hips, legs, upper torso and arms. ●

Pennsylvania-Penn State's Jeff Prescott (118) WTF 21-5 (5:34) over Ricky Strausbaugh. Photo by Dr. Marshall Goldstein