

THE PRE-JUMP

by Alan Launder, Australia

The following article originally appeared in the July 1989 issue of Modern Athlete and Coach. In it Australian national pole vault coach Alan Launder explores the Soviet school of vaulting as practiced by Vitaly Petrov, coach of Sergey Bubka. The focus of Launder's article is "the pre-jump," in which takeoff precedes plant. Following the article is a rebuttal of Launder's viewpoint by fellow Australian Nick Linthorne and Launder's response to Linthorne's letter, which appeared in the October 1989 issue of Modern Athlete and Coach.

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In January 1985 at the XIII Congress of the European Coaches Association in Birmingham, England, Vitaly Petrov of the Soviet Union presented a paper titled simply, "Pole Vaulting Technique." Later that year, I, like many others, had the chance to read the paper but it is now clear that few, if any, people at the conference or those like myself who read the paper had any idea of the revolutionary nature of the concepts which Petrov was presenting. Revolutionary, of course, only to non-Soviet coaches because it is obvious now that Petrov was presenting a practical approach to vaulting in common use in the Soviet Union.

What then were the hidden pearls in his paper? As it happens they were concealed in the following quotes:

"In no circumstances should the pole be put into the box before the end of the takeoff."

"And only on concluding the takeoff should the pole smoothly transfer into support. . ."

"The coach need not watch the vaulter's action in the takeoff but he can hear the correct takeoff. . ."

"The plant is a key element in transferring from the runup to the vault and the plant ends in a swift body extension which must take place before the pole touches the back wall of the box."

SIGNIFICANCE

Certainly as I read those words I had no idea of their real significance. Fortunately, Petrov came to Canberra for the World Cup in 1985 and I had the chance to spend a day talking to him. Even more fortunate was the fact that one of my vaulters spoke fluent

Russian and there was therefore no chance of any misunderstanding. That day Petrov's concept of the "free" takeoff in which the vaulter drives up into the takeoff and clears the ground BEFORE the pole plug hits the back of the box became clear to me, along with some idea of its significance.

We immediately began to try to implement his ideas in South Australia and some idea of the impact of the changes we made can be gained from the fact that in October 1985 our State record was 4.90m; by March 1986 it was 5.25m and we had three other vaulters over the Commonwealth Games qualifying standard of 5.05m. Here it must be stressed that not many of our athletes have really mastered the pre jump takeoff, yet they have all improved for reasons which will be discussed later.

To clarify the concept for our vaulters we have coined the term "pre-jump" as a shorthand or cue word for the action Petrov described. In a sense the vault takeoff becomes a long JUMP takeoff in which a pole vault pole is punched high above the head with both hands as the athlete leaves the ground.

The pre-jump takeoff has these major advantages:

1. Because it is a "free" takeoff the vaulter can attack the plant much more aggressively allowing the vaulter to merge the horizontal runup phase much more fluently into the pole support (vertical) phase. This, of course, means greater impulse at the takeoff, allowing the vaulter to grip higher and use a stiffer pole, thus making a significant change in his vault potential.

2. Because of the pre-jump—or even an attempt at the pre-jump—the vaulter can force the pole higher at

takeoff and thus maximize the angle between the pole and the horizontal. This also enables a higher grip and stiffer pole to be used.

3. The pre-jump or jump/plant takeoff takes a great deal of pressure off the vaulter's back at the instant the pole is planted, compared to the orthodox plant/jump method. Back injuries are therefore minimized.

4. The strict emphasis on taking off from directly beneath the top hand eliminates the problem of being "under" at the plant. This, in turn, solves a whole range of problems in the conversion of horizontal velocity into vertical velocity and in fact makes the whole rockback process much simpler to understand and to execute. As Petrov states:

"When you look at Bubka's vault you will never see the swing/rock-back and flight upwards, and all phases of the swing and turn seem to occur unnoticed."

Certainly when I spoke to him in Canberra he made it very clear that for him the rock-back was simply a natural consequence of an effective takeoff and the redirection of the forces generated at that point.

PRINCIPLES

To understand how this new approach to the takeoff has dramatically improved the performance of athletes who have mastered it, we need only consider the following principles which have always determined effective technique with the fiberglass pole.

1. From the start to finish the pole vault is one continuous whole movement where each element interrelates with every other to produce the end result. Thus, even the hand spread an athlete chooses before he begins to run can have an enormous effect on the vault.

2. With (1) above in mind, the elite vaulter will strive for the greatest possible grip height.

3. He will try to arrive at the takeoff point at the optimum (greatest possible controlled) speed.

4. The pole bend will be the result of the vaulter's impulse (velocity x body weight) and a planting technique which maximize the angle between the pole and the ground.

5. The vaulter must get into a position to best exploit the recoil of the pole and thus maximize the vertical distance he can be projected above his grip height.

6. With (5) above in mind, the vaulter will try to use the stiffest possible pole to maximize the speed of recoil/extension and thus the vertical distance will be projected.

It can be readily seen that the pre-jump or free takeoff gives the vaulter the best possible chance of optimizing every one of these elements and in the case of a very talented vaulter, like Bubka, enables him to grip very high on immensely stiff poles. As Petrov states, "but the work to improve the planting of the pole—is worth it when you sense that you can take at once a 15 to 20cm higher grip

and use a pole 5 to 6kg heavier in weight."

Accepting the pre-jump concept means that athletes must be prepared to use a narrow grip of between 48 to 52cm because only with a narrower grip can the vaulter first punch the hands as high as possible to maximize pole height at the takeoff and then make a swift and powerful turn on the pole later on. In turn, a narrow grip on a long pole forces the vaulter to modify the pole carry. At the start it is held vertically so it has virtually no "weight" at all and is gradually lowered during the approach so that it appears to pull the vaulter forward into the plant. This phase appears to be the most difficult to master because it requires both skill and strength to run with a very long pole held almost horizontal in the last few strides before the plant. However, as Petrov states, "A pole vaulter is born in the last steps of the runup; ability to perform the concluding part of the runup determines the ability of a vaulter to perform vaults.

DRILLS

It is clear that while this approach to the vault simplifies it conceptually, it does not make it simpler in practice, particularly for athletes who have been used to a plant/jump concept and who now have to retrain themselves to jump/plant. However it is possible to modify all but the most hardened techniques through suitable drills and, of course, it is relatively easy for beginners to use this method.

The following drills will help athletes learn the pre-jump:

- Using a stiff pole on grass or sand take a 5 to 9-stride approach, jump high, as in the long jump pop up drill, and then plant the pole while the body is in the air. In this drill it is also possible to stress correct hang/swing position. (Fig. 1).
- Using a Lerc or similar pole off a 5-to-9-strides drive up into the pre-jump, plant, force the hands forward while maintaining a vertical body position, wait for the pole recoil and allow it to drive you backwards into a landing. Repeat this 3 or 4 times.
- Using a stiff pole repeat the first drill into the plant box and ride through or to the pad. Gradually grip

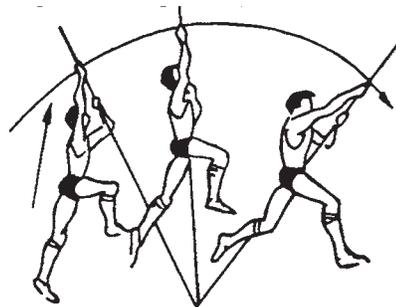


FIGURE 1

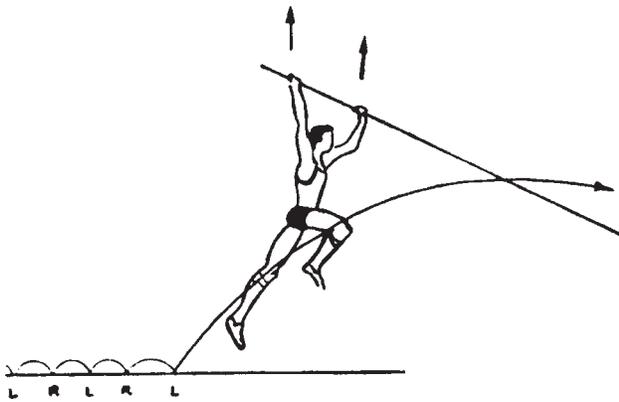


FIGURE 2

higher until the pole begins to bend; combine longer runs with a higher grip while emphasizing the pre-jump (Fig. 2).

RECOMMENDED DRILLS TO DEVELOP THE PRE-JUMP

As these drills are being emphasized, considerable time must be given to improving the run and pole carry and particular attention must be given to the lowering of the pole prior to the plant.

The object of this article is not to restate Petrov's paper which all coaches should read very carefully. Rather it is an attempt to clarify certain aspects of the paper and to convince others of the validity and effectiveness of the changes in technique. I use the word "convince" because in my earlier attempts I encountered considerable resistance to the ideas outlined above and even skeptical amusement from New Zealand coaches. In fact the reception these ideas initially received was such that I have delayed writing this paper for four years until such a time as I have had the practical evidence to support the theory.

Letters And Opinions The Pre-jump Pole Vault

The Editor,

Alan Launder's article "The Pre-jump—A Revolution in the Pole Vault" (*Modern Athlete and Coach*, July 1989) requires some comment. The article concerns the "pre-jump", that is, a takeoff in which the vaulter drives up off the ground *before* the pole strikes the back of the takeoff box.

The pre-jump concept was proposed by Soviet coach, Vitaly Petrov, and has been mastered, according to Petrov, by the world record holder, Sergey Bubka. However, video and film sequences clearly show that Bubka, along with all other elite vaulters, grounds the

pole in the back of the box well before the takeoff foot leaves the ground. Petrov's description of his takeoff technique is inaccurate!

I have no disagreement with Petrov's technique as practiced by Bubka, but for coaches and athletes wishing to adopt the technique, there is a danger in strict adherence to Petrov's inaccurate description, and of being misled by the term "pre-jump."

Petrov advances the concept of a jump/plant as opposed to the orthodox plant/jump technique. The key features of Petrov's technique are in pressing the pole overhead with both arms and in the *delayed* grounding of the pole in the back of the box. With Bubka, the pole is grounded at the start of the leg extension phase of the takeoff. Therefore Petrov should modify his description to ". . . the plant ends in a swift body extension which must occur as the pole touches the back of the takeoff box." The term "simultaneous takeoff" is a more appropriate cue-word than "pre-jump."

Some proponents of Petrov's takeoff concept may need to be convinced of the pre-jump fallacy. Using film sequences or video, the determination of the instant that the pole is first grounded in the back of the takeoff box is straightforward. In most film sequences, the takeoff box is obscured by the landing pit, so indirect observations must be used. The two features to look for are (a) the amount of deflection of the pole, and (b) the position of the vaulter's upper arm relative to his head.

Obviously, if the film or video frame shows the pole to have a bend (beyond the manufacturer's pre-bend), then the pole must be grounded in the back of the box.

The second feature, the position of the vaulter's upper arm, is a more accurate test. During the final stride of the pole plant, almost all elite vaulters extend the upper arm directly above the head. When the pole is grounded in the back of the box, the pole forces the vaulter's arm back behind his head. The vaulter is unable to completely counteract the force exerted on his arms by the pole. The instant of pole grounding is therefore the time when the vaulter's upper arm begins to move back behind the vaulter's head.

From my own observations of videos and films, Sergey Bubka grounds the pole one half to three quarters of the way through the takeoff—certainly not after the takeoff foot has left the ground. In biomechanical studies of elite U.S. vaulters, Peter McGinnis found that, on average, the pole struck the back of the takeoff box just before midway through the takeoff, i.e., at about 0.05 seconds after the takeoff foot first touched the ground. The average total duration of foot contact was 0.11 seconds. The timing of the pole grounding for Bubka is not substantially different from that of some U.S. vaulters. The latest pole grounding in

McGinnis's studies was that of Mike Tully, who grounded the pole about three quarters of the way through the takeoff. Both Tully and Bubka use a "simultaneous takeoff," that is, they ground the pole at the start of the leg extension phase of the takeoff.

The reader who is still unconvinced that the term "pre-jump" is inaccurate, need look no further than the photograph of Sergey Bubka which accompanies Alan Launder's article. The shadow of the takeoff foot indicates that the photo was taken at the instant of takeoff. Using a ruler to check the straightness of the pole, we see that the pole is already bent by about 10cm.

Also, Bubka's top arm is bent behind his head. In this photo, he has run forward some 20-30cm since the pole first struck the back of the box. Bubka's speed during the takeoff is about 9 m/s, therefore the photo must have been taken about 0.03 seconds after the pole was first grounded in the back of the takeoff box.

The evidence is clear: Bubka does not pre-jump!

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Alan Launder's Response

First let me congratulate Nick on his critical but enthusiastic analysis of the pre-jump question in the vault. It confirms his commitment to the event as a thinking athlete and reassures the editorial committee that they have readers prepared to take part in the dialogue essential if coaches and athletes wish to find better solutions to the problems our sport poses.

Having said that, I would have been happier with Nick's analysis if he had not stated dogmatically that Bubka does not pre-jump. I believe that a more reasonable position for Nick to take would be that on the evidence he has Bubka does not appear to pre-jump. There is little pictorial or research evidence to guide us which was one of the reasons I did not rush into print after my initial meeting with Petrov in 1985.

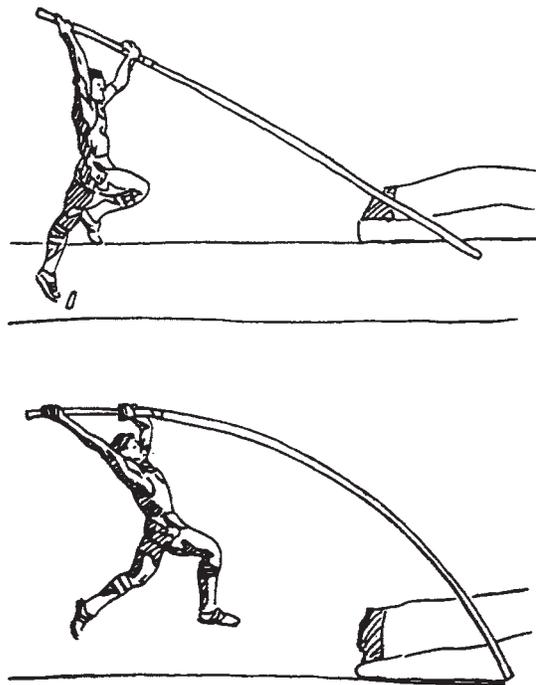
I would like to point out that my article was not about Bubka per se but about Petrov's analysis of the

Russian approach to vaulting athletes. Petrov ' who claimed to coach ten athletes over 5.55m, was adamant that the best way to use stiffer poles and bigger grip heights was to use the "free" takeoff or what we in South Australia have termed the pre-jump.

My support of the pre-jump concept is not based on the relative success of our athletes who are attempting to use it. Rather it is based on a simple principle of science. That is the idea, and of course its corollary, that new "facts," no matter what the provenance, should not be accepted unless they fit into a previously verified frame of reference. I believe that the pre-jump does fit comfortably into the framework of principles which determine successful vaulting and which I re-stated in my article.

Simply put, if we wish to grip high on big poles, we must maximize both the impulse into the pole and the angle between the pole and ground at the takeoff. If we accept this then it is but a small step to accept the idea of a "free" up-jumping takeoff which achieves both of these objectives and which is completed before the pole touches the back of the box.

With regard to Nicks "critical" evidence of the slight bend in the pole, I would make the following observations. The original photograph clearly shows Bubka's toe an inch off the ground and even the poor copy in the article shows Bubka's right arm and hand exactly where they should be, i.e., covering the ear and directly above the takeoff point. There is no evidence of the arms being driven back by a bending, but still resisting, pole as Nick claims, indeed using a ruler one



SERGEY BUBKA'S TAKEOFF
Drawing from film sequence

might come to the conclusion that if anything the right hand is marginally ahead of the toe of the left foot.

I believe that this small bend at the top of the pole, not in the middle, is caused by the powerful upward drive of the vaulter in the free takeoff and specifically by the vicious upward punch of the arms at the same instant. Compare this with the pole bend and arm position shown in the next photograph in the series.

Finally, may I include an extract from "Perrin on Pole Vaulting," published in the "Around the World" section in Vol. 27, No. 2 issue of *Modern Athlete and Coach*. It reads:

"Jean Claude Perrin, the French national pole vault coach and personal coach of 1984 Olympic champion Thierry Vigneron, conducted last year an interesting and informative coaching clinic at the University of Toronto, Canada, to explain the dramatic changes that have taken place in Europe.

The major difference, according to Perrin, is in the takeoff. The European vaulters are actually jumping into the takeoff in much the same fashion as long

jumpers. They are also taking off about 30cm further back of what has been regarded as the ideal spot vertically below the top hand.

As the result of the changed takeoff action the vaulters are actually in the air, or off the ground, before the pole hits the back of the box. During this phase the shoulders are ahead of the hips, accomplished by a short last stride.

So, two of the world's leading coaches emphasize the pre-jump. A third, Maurice Houvion, shows pre-jump drills in his video, while the fourth, Andre Krysinski, prefers the simultaneous idea that Nick supports.

There you have it. On the basis of the evidence I have, I believe the pre-jump is an important revolution in the technique of the vault and I would recommend any vaulter try to master it. Nick and I can continue to disagree and out of the ensuing dialogue may come the "Australian approach to vaulting" and the higher levels of performance we all seek.