

THE POLE VAULT – VITALLY PETROV'S ORIGINAL PRESENTATION, EUROPEAN COACHES CONGRESS, BIRMINGHAM, ENGLAND. SEPTEMBER 1985.

Readers should note that Vitaly's presentation was in Russian. The following is a translation from that language and it may be that a few sentences will be slightly confusing because of this. Equally important, there are many pearls of wisdom which the reader will have to search for initially. However over the next few months we intend to identify and clarify the critical issues this paper addresses.

Note also the reference only to male vaulters. At the time of this presentation there was no formal competition for female vaulters.

Finally although no words have been changed, the structure has been altered to include more paragraphs.

Vitaly Petrov

Elements of movement form the basis of pole vaulting. They begin from the first steps of the run up and continue smoothly with the lowering of the pole, the swing, pull up, take off and landing.

All the major aspects of pole vaulting technique have been examined or tested in perfecting the technique with poles of limited flexibility (bamboo or metal) and high flexibility (fibreglass of various forms and modifications). We would like here to specify certain details of what we have tested. Various opinions have been voiced on diverse nuances of technique, people have shifted their ground and views on one movement or another (where the hands grip the pole, where exactly take off takes place, the principles of left hand work during entry, whether to drop the free (swing) leg or not to drop it on entry, when is best to begin the turn), but two aspects – constant increase in grip on the pole and an increase in the difference between the vaulter's weight and the pole strength (the weight at which the pole is calculated) have shown a tendency constantly to improve.

Modern vaulters take a grip at 5 m or higher, and the difference in the weight of the vaulter and the strength of the pole is now more than 10kg /22 lbs and in some cases 20kg/44lbs.

I shall talk of certain general principles which have been derived from work with a group in which the world champion and record holder Sergei Bubka trains.

1. Holding the pole.

The position of the athlete holding the pole depends on several factors, but the overriding ones are; pole weight, means of placing the pole in the take off position, speed of run up (this is something new which has forced us to review our opinion of carrying the pole) and grip on the pole. The principle criterion, however, is convenience in holding the pole. Slow lowering of the pole as the vaulter approaches the box is a common rule for all vaulters.

With the raising of the grip, and it will continue to rise in the future, and so will pole weight correspondingly, some experts have suggested widening the distance between the hands for ease. We determine the width of the grip on the pole in the following way. We proposed to the athlete that he performs the following exercise on the horizontal bar; to swing up and over, with push off. The vaulter, not suspecting anything, decides himself the width of the grip on the pole equivalent to his handgrip on the horizontal bar. That is, he has felt it comfortable to hang and do the exercise on the bar; naturally that has dependend on his shoulder width and the mobility of his shoulder joints. Having proposed the same grip on the pole and having raised the end of the pole almost vertically, the vaulter has not felt any discomfort with any weight of the pole (we run easily with poles whose weight is 3-3 times greater that the pole normally used in competitions).

With such a pole position and handgrip during the initial position at the start of the run up, the right hand is located on the right hip and slightly touches it, while the left hand is at the height of the left side of the chest at a distance of 10cm – 4" from the trunk. This position is natural and is regard as such throughout their run by sprinters and long jumpers. Freedom of holding the pole enabled us at the start to control the vaulter's posture from the very beginning of the run up.

2. Run up and pole plant

The run up and pole plant in the box should be seen as a single integral movement; one must not think that the vaulter's plant begins directly before the box. The run up distance depends on the vaulters ability to gather maximum speed bearing in mind that run up smoothness dempends on the ever lengthening of each subsequent step. When attaining top speed the step length must be constant.

Therefore. The rhythm of the run up has not been a bone of contention with us (how to start the run up, quickly or from a few steps, where to pick up speed – in the middle or at the end); the rhythm of the run up has been based on uniformly increasing speed throughout the length of the run up. The relationship that determines the smooth run up continues throughout the run up length and the lowering of the pole – i.e. the speed of lowering the pole must be synchronised with the vaulter's speed in run up. One may easily control that rhythm when the vaulter's speed in running with the pole is within 10 m/sec or is about the speed of a body falling freely.

At the start of the run up the pole and the vaulter merge into a single whole. A slight swinging of the pole forward at the start of the run up gives us a standard thrust and, correspondingly, produces standard steps; further, when increasing speed and the gradual lowering of the pole there appears an additional thrust that forces us to run more quickly with an increased stride rate. This is very important when passing to the take off.

In the run up we use only one check mark which is placed at the beginning of the run up. The whole rhythm of run is subordinate to the smoothness of picking up speed and lowering the pole. While at the start of the run up, the pole being in a vertical position, presses its weight mainly on the right hand only, during the run up and lowering of the pole, the pole's weight steadily switches from the right to the left hand. The left hand moves away from the trunk and now holds the pole, guiding it into the box. From the first step, the right arm is constantly bending at the elbow and guiding the lowering of the pole.

By the end of the run up the pole is taking a horizontal position in relation to the track, and in raising the upper end of the pole BOTH ARMS at once play an active part, which ensures a smooth sliding of the lower end of the pole into the box. It is now very important not to lose the smoothness of raising the top of the pole and to finish with a powerful and swift take off. One gains the impression that the vaulter is not planting the pole in the final two steps of the run up, but somehow 'runs into' a position where the pole drops naturally. By that device we have removed certain losses in speed associated with the pole plant, but the main thing is that we have maintained the smoothness of gathering speed up to the end of the run up.

We have thereby simplified one of the most intricate elements of pole vaulting – the planting of the pole – by combining the speed of lowering the pole and the speed of the vaulter's run up into a single movement.

That requires a great deal of work, but the work is worth it when you sense that you can take at once 15 – 20 cm higher grip and use a pole of 5 – 6 kg heavier weight. The time has come when a precise and correct execution of lowering of the pole and take off is determining a vaulter's class and potential. Not matter what the talent of your athlete, if he does not master the element of lowering and planting the pole he will never become a top class vaulter. A pole vaulter, is in fact, born in the last steps of the run up; the ability of perform the concluding part of the run up determines the ability of a vualter to perform vaults.

The final steps are of crucial importance for a pole vaulter generally. If a vaulter performs the final steps correctly – i.e. with a steady acceleration, the pole (Plant?) and take off occur very quickly and therefore create the necessary conditions for a good vault.

3. Poole plant into the box.

The plant is the key element in transferring from run up to vault, and the plant ends in a swift body extension which must take place before the pole touches the back wall of the box. In order to perform a proper take off (including forcing the pole upwards), the position of take off must be strictly beneath the grip of the upper hand.

The question of where one should take off – before, after the vertical – should not be a matter for discussion, in so far as the vaulter can raise the pole to the maximum above the track only standing on the vertical beneath the grip.

We have one more test for checking the grip on the competition pole. The vaulter stands on the vertical, holds the pole in the competitive grip where the pole is touching the back wall of the box. Marking on the track the point of take off, he puts the pole on the track and places his right hand on the pole at the point of take off; if he runs from six steps (the run up should start from a standing position) and makes the vertical position in the direction of the landing area, his grip may be considered optimum for him, but if he does not reach the vertical or may take a higher grip and pass through, then he has selected his grip wrongly.

With Sergei Bubka that grip 4.25m, which corresponds to the distance to the distance from the back wall of the box to the tale off position using competitive grip. What is more, that test should tell us whether you possess “a set of criteria” for the plant.

4. Take off

No matter what happens in the course of the take off, everything must be directed towards a smooth transfer of the body weight onto the pole and to the speed of movement at the start of the swing; that will depend on how well one combines the plant and take off, and on whether you are able to hit the back of the box correctly. In no circumstances should the pole be put into the box before the end of the take off. And only on concluding the take off should the pole smoothly transfer into support, which also depends on a good movement of the pole into the vertical. The coach need not watch the vaulter's actions in the take off, but he can hear the correct take off and can tell what mistake the vaulter has made in the plant and take off.

We do not share the view of those who say that the take off in vaulting is distinct in that there is no free take off. Straightening the drive leg, pressing the pole perpendicularly, and that this helps in this initial bending. We approach this differently.

The vaulter's task is to drive the pole at take off as much as possible and to give himself a free take off with transfer at the end into a smooth take off, but the vaulter should not feel for a smooth support, only a smooth plant. The vaulter should feel the pole during the swing/rock back as a firm support, while in the latter part of the vault he should be able to control that force. That is why, when you look at Bubka's vault you will see the swing/rock back and flight upwards, and all phases of the swing and turn seem to occur unnoticed. By using the speed of run up and take off he swiftly and adroitly he transfer from hang, while the pole bends beneath him of itself, and not by pressure of the left hand in the take off. The pole behaves roughly like the drive leg at take off.

The vaulter tries to place his leg straight and rigid but under pressure of speed and body mass the leg bends, and then throws the vaulter up. During the plant the pole becomes straight, but it bends under the effect of the vaulter's speed and body mass (the vaulter senses its resilience and may make exercise on it). Then it transfers its kinetic energy to the vaulter, throwing him upwards, and it is here that he may succeed, before discarding it, in taking up a suitable position before the throw –i.e. to cover the bent pole with his hips and legs to the maximum.

Making or encouraging the vaulter to force bending the pole as much as possible in penetration means allowing him to make a crude error. He bends the pole and may even pass through the vertical, but his vault will not be dynamic fading away in rhythm; the hanging above the bar or the throwing up of the legs will be ensured. A good lead in exercise for

planting the pole after forcing the pole upwards will be to perform the run up along the track with full body extension, after which the vaulter may smoothly place the pole on the track. If the pole falls to or touches the track before full body extension it is a very serious mistake and stems from incorrect work with the hands in lowering and planting the pole.

As we have already mentioned, the left hand does not lower the pole in the run up, moving it slightly forward (to the length of the forearm) and taking the pole as support through which the pole is smoothly lowered to the horizontal (approximately on the level of the right shoulder), and then comes the straightening of both arms with the right hand, which ends with the take off, giving the body an extended position in all joints except the lead leg which is bent at right angles to the trunk.

This is where the narrow grip on the pole (48 – 52cm/ 12 – 13") plays a decisive role. A wide grip would not provide the simultaneous and high pole plant with both hands, and would not produce a swift and powerful turn on the pole. Only with a full extension of the body after the forward and upward take off can one very swiftly make the swing and turn on the pole. Moreover, a narrow grip on the pole forces one, however paradoxical it may sound, more quickly to bend the pole after the take off and safeguards the shoulders from injuries which are more frequently suffered by vaulters using a wide grip.

A good extended position at the end of the take off is a key feature both in a fast rock back/upswing on the pole and for maximum bending of the pole. The rock back and upswing must be completed before the pole begins to straighten or the conclusion of the swing up must mark the start of the pole straightening: the rock back and upswing on the pole is considered complete when the vaulter has managed to cover the arc of the pole with his hips and legs, while the legs somehow serve as a continuation of the upper end of the pole.

5. Swing/Rock back

The swing/rock back should be performed as quickly and powerfully as possible. And the vaulters should not try to bend his legs at the knees and the hip joints, which makes the grouping faster, but he would bend the pole less, and it will be a problem to turn the shoulders downwards. It is better to encourage an athlete to project his hips as gymnasts do on the rings with simultaneously throwing back of the shoulders. The rock back should be done by simultaneously shifting the body parts – legs up and shoulders down. Movement of the shoulders, and their precise

acceleration in the swing and rock back, is something new in pole vaulting with large grips and heavy poles.

It is particularly important to maintain to shoulders movement when you have covered the pole with your hips and legs. If at that movement you begin the movement with bending the right arm, which is frequently seen even with experienced vaulters, your pole will begin straightaway to straighten and will throw you from a high trajectory which you could attain by moving the shoulders down towards the pole.

This shoulder movement will enable you to hold the pole in a bent position longer and to gain the power of the straightening pole from the shoulders to the body, and not from the arms to the legs and, what is very important, not to hamper the pole turning at the point of support (important for the athlete turning on the pole).

Evidently this innovation in vaulting technique will enable the vaulter to interact with the pole with great effect. On the one hand he can continue to interact with it, moving the pole/vaulter system forward, and on the other he can successfully move upwards while maintaining a big vertical speed of up to 6 m/sec. A powerful bending of the pole throws the vaulter upwards and if the efforts of the bending pole come from the shoulders through the vaulters entire longitudinal axial line, the vault may be considered a success. The overall centre of gravity has a high position and is close to the top arm. The vaulter is in good balance and he does not have to expend much effort in clearing the bar.

At the moment of maximising bending of the pole, the bending forces and the elastic forces attain equilibrium, but since acceleration of the entire centre of mass becomes negative, pressure on the pole diminishes and it begins to straighten. A further rise in the body occurs with the pole straightening. The main task of the vaulter at this moment is to bring the centre of mass closer to the axis of the straightening pole, the athlete also straightens upwards along the pole and commences at the end of that movement a body turn around the pole.

The moving forces of the vaulter's body rise are as follows –

1. Kinetic energy of the straightening pole.
2. The power boost of the athlete's muscle effort

Further, the main force is energy of straightening the pole. The power boost of muscle contraction may only maintain the speed of movement and keep the body at the axis bending.

However, even with a reduction in vertical speed in Segei's Bubka's best vaults in letting go of the pole there remains sufficient speed for the rise in the centre of mass to continue without support. The speed reaches 2 m/sec.

Having analysed all that has been said we conclude that the principal criterion in attaining record heights will be development of speed of run up and power of take off. In combining that into an integral vault, modern vaulters will be able to increase their grip on the pole to 5.20 m and the flight away from the pole to 1.20 m. (relative to the grip and height of the bar). We are confident that by 1990 the record in pole vaulting will be between 6.15 m. and 6.20.