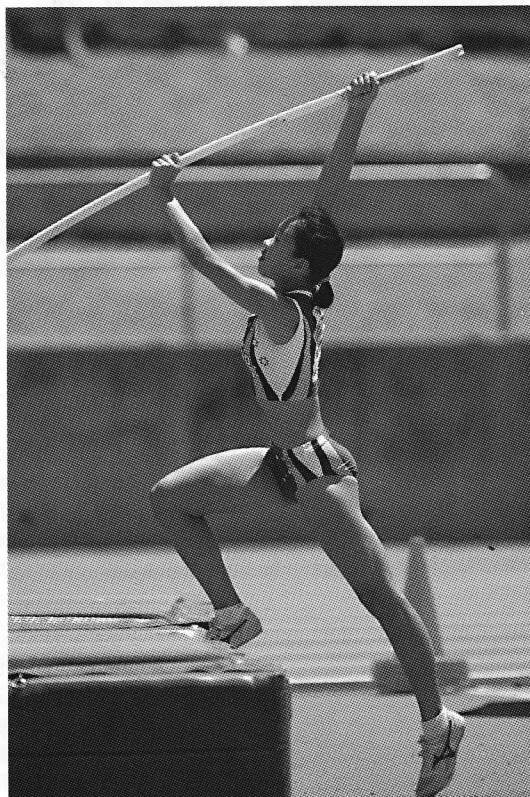


# BUBKA, UNIQUE, A ONE OFF, OR DID HE REPRESENT A GENERIC "TECHNICAL MODEL"

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*The author has written extensively in track and field, especially in the pole vault. He argues that this article should settle once and for all the question of whether Bubka's great performances were the result of his unique personal characteristics or reflected a superior, biomechanically based technical model.*



## INTRODUCTION

Sergey Bubka first appeared on the international stage at the age of twenty when he came from obscurity to win the first ever World Championship in the pole vault in Helsinki in 1983. Given the immense success he enjoyed during his career it is astonishing that few if any sports scientists in the English-speaking world have attempted to establish the real bases for his outstanding performances. As a result, more than ten years after he set the present world record, there is an ongoing debate over whether or not his success was primarily due to his unique personal qualities or could be attributed to the biomechanical advantages of the technical model he employed.

The first point to be made is that Sergey Bubka is an exceptional individual. There is little doubt that he can progress to the highest levels in the administration of

track and field and indeed the Olympic movement. Clearly he brought high intelligence, a steely determination and outstanding physical ability to the challenge of pole vaulting. Unfortunately this has given many coaches around the world, and especially in the USA, the excuse they needed to reject the notion that the primary reason for his success was the technical model he employed, which had been developed by the great coach, Vitaly Petrov.

So what is special about the technical model he used and why is it superior to the technique that many vaulters, including many of world class, employ at the present time? To fully understand the answer to that question it is necessary to examine the evolution of pole vault technique when the flexible pole was first introduced.

## THE PETROV-BUBKA TECHNICAL MODEL

I would ask readers to liken the old fashioned approach to flexible pole vaulting with a cannon. Just as a cannon puts all of its energy into the projectile in one enormous explosion, many vaulters still try to hit the pole as hard as possible at take off to create an enormous bend in the pole even before they leave the ground. All of their energy is put into the pole at take off and they then swing passively on the pole as they try to move into position to exploit the recoil. They miss the chance to put energy smoothly and continuously into the pole throughout the vault and so are limited in both the grip height and pole stiffness they can employ effectively. In fact the vaulter often puts so much strain energy into the pole, even before they leave the ground, that it begins to recoil early and the athlete is punched vertically upwards or even backwards with no chance of clearing the bar or reaching the safety of the pad. Dangerous stuff!

Now think of the Petrov-Bubka technical model as a multi stage rocket, in which each stage fires in the correct sequence to accelerate the vaulter into the space above the bar. As with the rocket, energy is put into the pole in a smooth continuous flow with each stage melding smoothly into the next until the vaulter drives off the top of the pole. Roman suggested that this should occur in an unbroken chain, but it may be easier for coaches to understand the concept if they think of four distinct phases, just like a rocket.

As with a Saturn rocket, the first stage is the most powerful as the vaulter hits the pole with the kinetic energy generated by the fast controlled run up and upspringing take-off (see Figures 1a, 1b, and 1c). To ensure that no energy is lost in bending the pole before they leave the ground the 'Petrov' vaulter uses a 'free' take off. Here the vaulter concentrates on driving the pole up and towards the pit and not on bending it. This

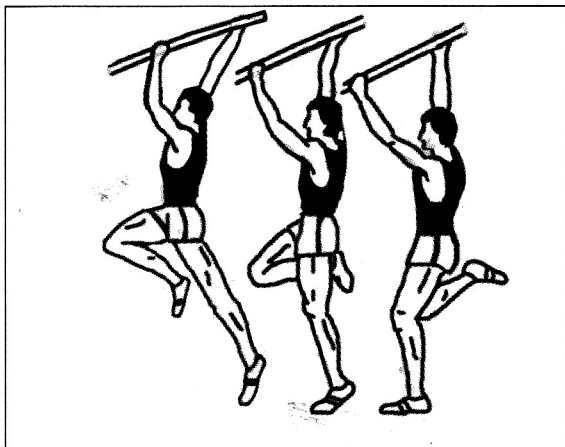


Figure 1 a, b, c

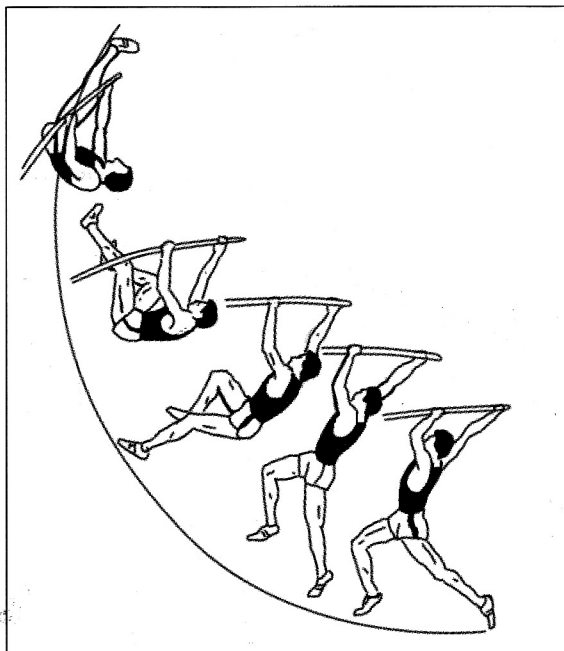


Figure 2 a-e

means that the athlete loses no speed and therefore no kinetic energy before they leave the ground; this not only puts immense energy into the pole in a way which causes it to begin to flex rapidly and easily, it puts the vaulter in the best possible position to fully exploit the second stage.

The second phase begins immediately after the vaulter drives off the ground with a complete extension of the take off leg and ankle. This vital action ensures every last unit of energy is driven into the pole but also leaves the take off foot well behind the body with a slight flexion at the knee. Figure 2a. This puts them into position to execute a long whipping swing of the extended body around the top hand. Figures 2b, 2c, 2d. This whip is initiated by a vicious kicking action of the lower leg, but is then continued and accelerated by the elastic contraction of pre stretched muscles from the sternum to the knee of the take off leg. One only has to consider the way children can drive a swing to the horizontal to understand the potential energy input from this kicking/whipping action. Coaches who do not understand the contribution it can make to energy input and, who are content to see their athletes consistently take off 'under', often neglect this vital phase. Unfortunately athletes who take off 'under' and are ripped off the ground, will find it difficult if not impossible to exploit this second stage because they can never drive the foot back far enough after take off to set up the whipping action.

Properly executed, this stage also enables athletes to rapidly swing up to 'cover the pole' (see Figure 2e) and

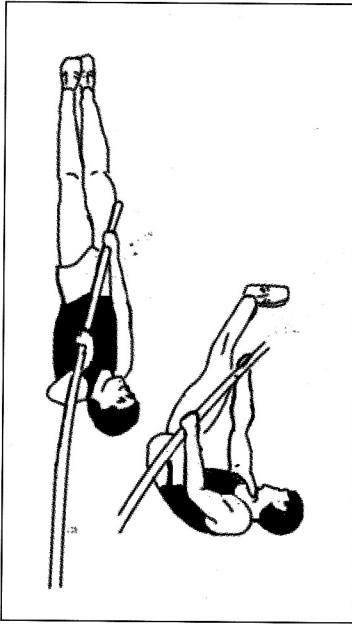


Figure 3 a-b

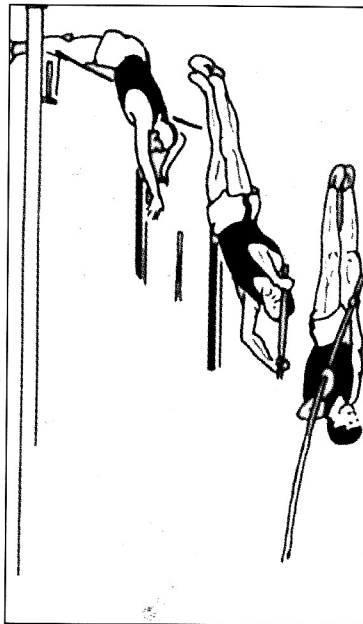


Figure 4 a-c

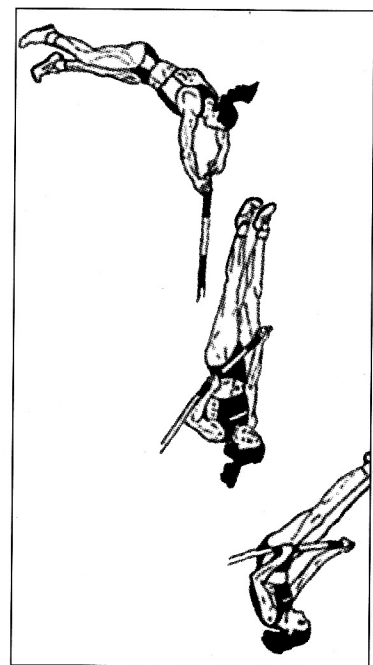


Figure 5 a-c

so position themselves to exploit the potential of the third stage. It is here that Petrov's genius becomes evident. While traditional approaches to technique often leave the athlete struggling to exploit the energy of recoil, Petrov devised an approach that not only put the athlete into the perfect position to exploit the recoil, but enabled them to put energy into the pole while they were doing so!

Then the magic! From the position 'covering the pole', Bubka punched the hips upwards as his back drives back and down towards the pad (see Figures 3a and 3b). This action puts even more energy into the pole so that it remains flexed for milliseconds longer and, most importantly, positions the athlete tight with the pole so they can be projected in a vertical upwards spiral along its axis as it straightens.

Note here that because they have not exploited the potential of the long whipping swing to put energy into the pole during this phase, the vaulter-pole system of athletes using traditional methods begins to run out of energy. As a result they have to shorten the axis of rotation and execute a tight tuck in which the legs are bent at the hips and the knees. They cannot put energy into the pole while they are doing this, and can only wait passively for the pole to shoot them forwards and upward towards the bar.

'Petrovites' on the other hand have sufficient energy in the system to swing back to cover the pole with almost straight legs and only a slight flexion in the hips.

Finally, because they have stayed tight with the pole as it recoiled, athletes using this approach are in an excellent position to finish the vault with a powerful pull-push action, which culminates in a complete and powerful extension of the top arm. At the present time Yelena Isinbyeva is a perfect example of this approach

Complex as all of this may seem, our experience suggests that young athletes of average ability can start to master these elements of technique and so begin to vault like Bubka. This is the most important thesis of this paper because for too long, many coaches have argued that Bubka was unique, a one off who achieved great performances because of his personal attributes. We believe that this is a myth and that once coaches have a clear understanding of the key elements of his technical model it is possible for them to teach many athletes 'to jump like Bubka'.

If we accept the notion of a continuous chain of energy input achieved through the sequential 'firing' of four 'stages' as outlined above, it becomes much easier to help young athletes master each stage as suggested below.

#### Stage 1.

We can begin to introduce the elements of an effective run up and an upspringing take off combined with a strong body in the very first session in a sand pit. Here the simple activity of long jumping along with very basic running drills can help the young athlete improve this first stage.



### *Stage 2*

The long whipping swing of a long body around the top arm immediately after take off can be introduced as soon as youngsters begin to run from eight steps and swing up to vault over a soft bar using a stiff pole. Naturally the learning process will be speeded up by practice of this movement on a high bar.

### *Stage 3*

The movement into inversion, in which the vaulter continues to put energy into the pole, even while moving into position to exploit the energy of recoil is more difficult to teach. This is because it depends on the effective performance of the two preceding elements on a flexible pole. This means that it will take up to two years for the athlete to get into good enough positions covering the pole before they can begin to develop the shoulder drop/hip drive on the pole. However when they are ready, the execution of this movement on a low bar will speed up progress. It is possible for young athletes to master even this, perhaps the most difficult of the four stages, within a relatively short period of training and so begin to jump like Bubka.

### *Stage 4*

The push off from the top of the pole - While this is the culminating energy stage it can in fact be introduced as soon as young athletes begin to swing close to the vertical when they jump over a bar using a stiff pole - while there is no energy from a recoiling pole at this

point they can still begin to get a feeling for the push off.

Clearly this will take time and the process is one of patiently 'shaping the movement pattern' from the very rough attempts in the early days to a gradually more refined approximation over time. We believe that coaches who accept the ideas put forward here are likely to see their athlete/s progress more rapidly.

## **CONCLUSION**

There may be some who will continue to argue that it is far more complex than this or that there is no one best way to vault or to teach the vault. We would be happy to see their opinions in print so that, like the ideas expressed above, they can add to the dialogue needed if we are to move forward. That said, it is worth noting that Sergey has publicly stated that his success was primarily due to his technique and that he cannot understand why all modern vaulters are not employing it.

## **REFERENCE**

Launder A. (2005). From Beginner to Bubka: An Australian approach to developing pole vaulters. Adelaide: Altius Sports.