STEVE BACKLEY AND VIKTOR ZAITSEV THROW THE JAVELIN

By O. Dimitrusenko and V. Papanov

An analysis of Steve Backley's and Viktor Zaitsev's javelin throwing techniques, concentrating on the throwing strides and based on picture frames taken from cinematograms, filmed at 24 frames a second. The article is a slightly edited translation from Legkaya Atletika, Moscow, No. 3, March 1991. Reprinted with permission from Modern Athlete and Coach.

INTRODUCTION

An analysis of the technique of high performance level athletes is always a complex task because the idiosyncrasies of such athletes are so closely tied with their movement biomechanics that it is easy to be misguided to evaluate certain movements as errors. The task becomes doubly complicated when you are looking at the cinematograms of a world record holder Steve Backley of Gr. Britain and European Championships silver medalist Victor Zaitsev.

We chose biomechanical suitability for the reference point, underlining at the same time the individual peculiarities of each athlete. In other words, the whole cinematogram will not be completely studied but only the key technical points that decide the effectiveness of the throw.

THE ANALYSIS

Because most Soviet coaches have to be satisfied with only cinematograms, in which the dynamics of the throw are hidden behind static postures, the following analysis is constructed so that each examined frame is clarified by its preceding and succeeding movements.

So, why did Backley throw 85.78m and Zaitsev 83.30m? Let's start with the technical basis of any throw — the effectiveness of the leg work. The proper run-up and the throwing strides influence strongly the position of the athlete in the final phase of the throw, during which the main acceleration of the implement takes place. Traditionally we begin to take into account the throwing strides from the moment the javelin is withdrawn. Backley begins this element with his left leg and executes eight throwing strides. Zaitsev starts with his right leg and completes the throw on his ninth stride. This difference has no major significance.

For convenience the run-up observations are first restricted to the preliminary throwing strides, eliminating the last three, the pre-cross, the cross and the final

strides. At first glance, both athletes perform the first part of the run-up freely, carrying out the tasks to gather speed and to bring the implement in the position required in the final part of the throw.

We will focus on some details that are characteristic for the dynamics of the system thrower-implement. Attention is here drawn on three phases of a stride — the entry phase, the equilibrium phase and the exit phase. From a biomechanical viewpoint it is essential to minimize the amortization time in the entry phase and to continue the acceleration of the system thrower-implement in the equilibrium phase by timely exploiting the strongest muscle groups.

BACKLEY AND ZAITSEV IN ACTION
Frames 1 to 10/11

Backley (frames 1-6) executes this element much better than Zaitsev (frames 1-7). This is shown in the athletes' body positions at the moment when the support

leg's heel is lifted, as well as the flight phase prior to the plant of the free leg (Backley frames 2, 5, 8; Zaitsev 2, 4, 6). Backley performs the drive "into himself", which strongly influences the execution of the following elements of the throwing technique. Further, he drives and moves forward more effectively in his throwing strides by turning the pelvis and shoulders to the direction of the run-up.

Zaitsev, from his first strides, positions his pelvis in the direction of the run-up and rigidly maintains the half turned position of his shoulders, thus creating a "falling" running style behind the shoulders (frames 2, 4, 7), surely experiencing internal tension. Also, his head leaning toward the javelin presses the shoulder of the arm holding the implement (frame 3).

A positive aspect of both athletes is the exemplary position of the javelin in all phases of the preliminary run-up. It can only be stated that both athletes appear to lack clearly expressed accents: stride length and stride frequency remains essentially unchanged, although the preliminary evaluation indicates that the general speed of Backley's throwing strides appears to be faster.

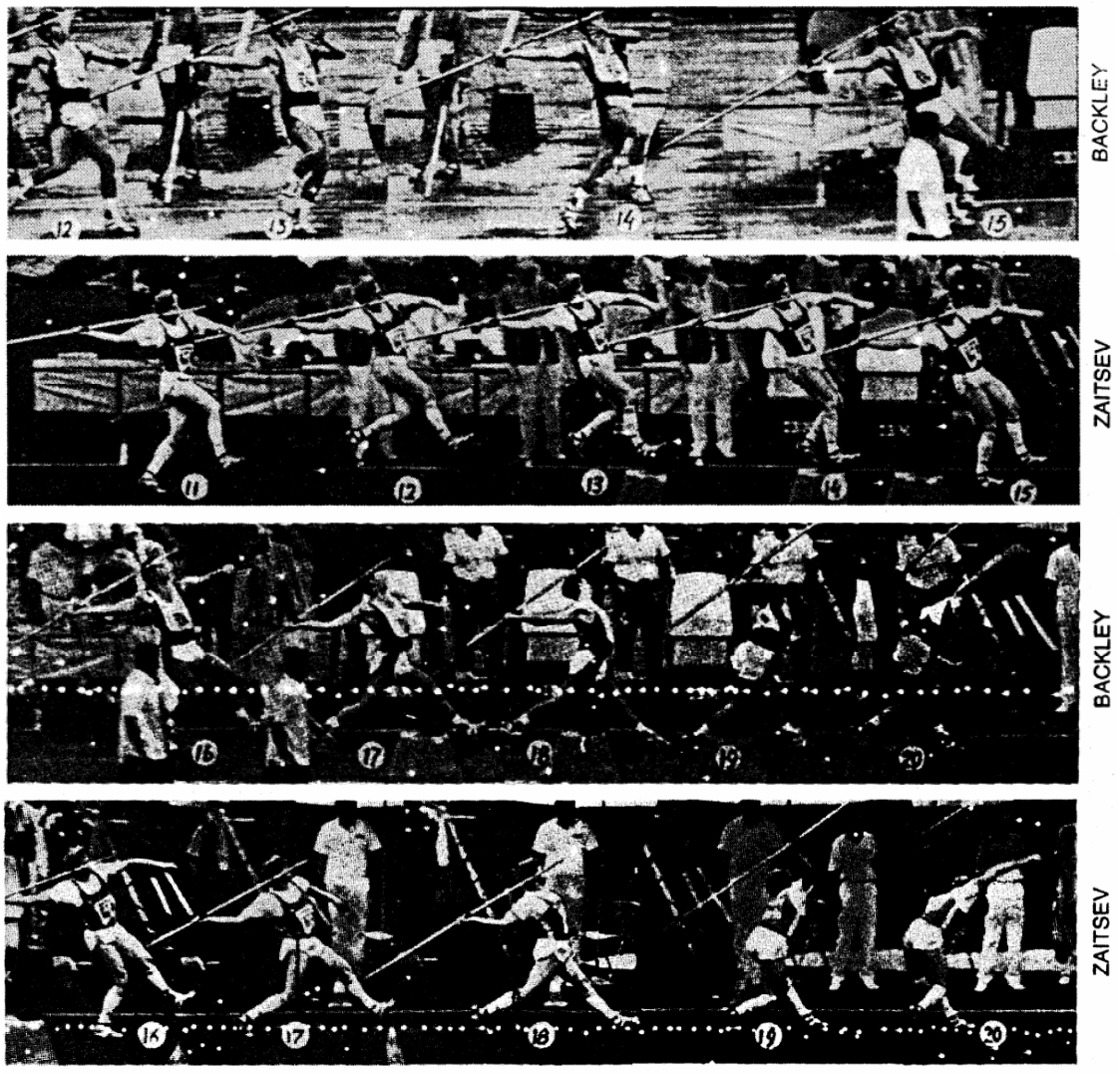
We will now focus on the pre-cross stride (Backley frames 11-12, Zaitsev 8-10). Many foreign and Soviet experts have noted that the pre-cross stride must be sufficiently active and optimally short in comparison to the previous stride. However, neither athlete confirms this, as both maintain their previous running rhythm. This appears to be a technical shortcoming, although both took a different way to arrive at the same end result.

Both Backley (frame 12) and Zaitsev (frame 9) performed this stride as an extension of the run, stretching the amortization phase and remaining longer on the support leg. By a too active hip movement the world record holder could not shorten his stride and with it increase the speed of the forward movement. Even more, he began to "prepare" for the throw (frame 12 - elevated shoulders) by drawing his body too far back from the vertical and from the support. Zaitsev, on the other hand, failed to "catch-up" with his pelvis over the support leg due to a wide leg split (frames 9, 10 - note the position of the left section of the hip joint).

The cross stride begins from the moment the left foot is planted, Zaitsev (frame 11), despite his previous error, succeeded to "apprehend" the support and his position is preferable to Backley's (frame 12-14), who "lost" the connection between his legs and the shoulder girdle through the trunk. Nevertheless, Zaitsev again created a wide leg split from the right leg (frames 11-13). Because of this, his cross stride is nearly twice as long as Backley's.

Now, after Backley has landed on his right leg (frame 15), his position is advantageous for a rational continuation of the throw. The world record holder passes brilliantly through the equilibrium phase (frames 15-16), having created all the prerequisites for an active advance of his pelvis and fully restoring the connection lost in the cross stride. Perhaps the only aspect to be desired is that

his left leg (frame 16) would be more prepared for the plant (extended and ready for the plant).



BACKLEY AND ZAITSEV IN ACTION
Frames: 11/12 to 20

Because of his unsuccessful cross stride, Zaitsev has to counter his excessive lean (frame 16) and loses time for the right leg to advance the body forward. He succeeds in this only after the trunk has passed the vertical of the support (frame 17). Now in the dual support phase, where the main acceleration takes place (frames 18-20), he has considerably less time to influence the javelin actively.

Backley, because he was not able to extend his left leg after the cross stride, has to stretch toward his left leg in the second half of the stride (frame 17). This forces him to drive with his right leg, which advances the shoulder excessively forward and naturally shortens the throwing amplitude (frames 18-19).

Let’s evaluate another important technical element in the final stride. This is the position of the shoulders during the transition from the right to the left leg (frames 15-18). It can’t be said that the athletes concerned perform this perfectly. Athletes in their best throws succeed in holding the left shoulder longer in the throwing direction, which provides more “twist” between the shoulders and the hip to create muscular pre-stretch. Backley is more accurate in this element. Notice left elbow position of both throwers (frame 17).

Evaluating the throwers’ action in the final phase of the throw (the double support phase), it must be said that Zaitsev succeeded in performing it better (frames 18-19). However, he failed partly by moving his point of support (pelvis) from under the javelin (frame 19), resulting in what seems to be a slight “hang” on the javelin. Backley, although he continued to perform the throw “on the run”, succeeded in fixing a more rigid final position (frames 18-19), which allowed each successive movement link to have the support of the previous one, confirming with the biomechanical “whip cracking” principle.

Finally, after adding up the pluses and minuses of both throwers’ technical skills in the evaluated throws, the vote must go to Backley.