

### The Javelin Throw— the past, present and future

by Peter Lawler

#### 1 Introduction

The introduction of the aerodynamic metal javelin in the 1950s by Bud Held (US) led to the era of the 'floating' javelin. This led to increasingly long distances being achieved and was a judge's nightmare. On landing, few javelins actually planted in the ground and most just skidded making it difficult to determine whether, as the rules required, the point had landed first.

It was Uwe Hohn's 104.8m throw in 1984 that was to signal the end of this era. With the safety of spectators in mind, the new specifications for men's javelin were introduced in 1986. The objective was a javelin that would not fly as far and would land point downwards.

When the new implement was introduced, many believed the event would alter drastically.

In particular, it was predicted that:

- 1) physiques of javelin throwers would come to resemble those of shot putters.
- 2) the event would lose its appeal, its theatrical command of the stadium.
- 3) javelin technique would be thrown back to the pre-aerodynamic era of Matti Järvinen and Tapio Rautavaara.

Those who made these predictions, admired for their courage at the time, have been proved wrong. The physical build of javelin throwers has not changed, the event is still as spectacular as ever and the technique of the Javelin Throw has not been thrown back to the 1930s-40s.

*Peter Lawler, a former national champion in the Javelin Throw, is currently the Australian Track and Field Coaches Association National Coach for the Javelin Throw. He coaches several of Australia's leading javelin throwers.*

This article looks at how javelin technique has evolved since the new specification javelins were introduced. Although the article is relevant to both men and women's events, it concentrates on the men's event because that is where the greatest change took place. This is reflected in the fact that a host of male javelin throwers disappeared after 1986.

The main aim of this article is to compare the technique required to throw 'new' and 'old' implements and, in particular, to describe in detail the technique needed for success in today's event.

It will also be shown that there is no dogma in the 'new' javelin events, but rather a need to obey fundamentals. How relatively small or physically weak athletes have interpreted these fundamentals will emerge as an essential point of this article.

## 2 Comparing old and new

### 2.1 Classical renaissance?

In 1986 the new javelin seemed heavier somehow. It took some time for many to realize that the weight was the same. Another belief was that a technique could be developed to prevent the javelin from pitching over

before landing. This was because the new javelin was thought to parallel the models of the pre-aerodynamic era. Indeed, US biomechanist Richard Ganslen tested antique models and advised release angles of  $50^\circ$  for the new javelins.

The new men's javelin has proved not to be a resurrection of the pre-aerodynamic implement, although it does require a renaissance of some elements of 'classical' technique with modifications to suit today's synthetic approach surfaces. It is ironic that yesterday's javelin throwers had the float spears but archaic surfaces of grass or cinders while today's throwers possess an ideal surface but an 'inferior' implement.

The old javelin floated. Correctly cast, the old spear gave the thrower bonus metres for free. In contrast, the new spear has to be driven. Today's successful throwers have returned to 'pure' technique and have accepted full responsibility for the throw.

The best throwers to study are those who first succeeded with the current model after April 1, 1986. With Uwe Hohn retired, it fell to Klaus Tafelmeier to set the records. His simplified technique, the high awkward withdrawal and the straight line strike against and over the left leg brace brought him new records of over 85m. His technique was portentous. He ran straight, he withdrew straight, he hit straight. Tafelmeier was the blueprint. We were so busy watching the flight of the javelin, we failed to notice his simplicity, his light foot strike and fast stride pattern.

The great survivor from 'the old days' is Tom Petranoff. In the last international championships with the old spear – the World Cup in Canberra in 1985, Petranoff's technique was typical of the times. His run was superfluous: short, slow, fluent and relaxed, with a final spurt and, in his typical tangential fashion, a slider down the right sector line. Two years later in Rome, Petranoff was an invigorated athlete. His approach was faster and more earnest as he attempted to generate speed from the start. His delivery was the same as in Canberra. No American has enjoyed as long a career or been as successful with the new

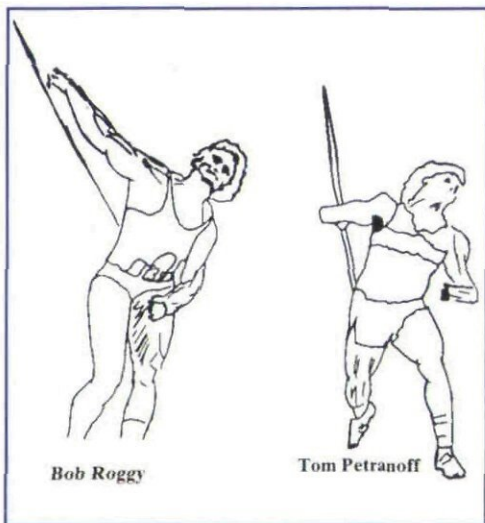


Figure 1

spear as Petranoff who threw 89.16m in 1991 when he was 33 years-old. The aerodynamic era javelins were highly suited to the American baseball slide technique and men like Bob Roggy were internationally respected. However, slide technique and shoulder immobility are not suitable for today's event.

## 2.2 *No room for dogma*

As all coaches know, there is no dogma in Javelin Throw theory. There is as much diversity, as many mannerisms and quirks with the new model as there were with the old. Fatima Whitbread, had she not retired, would still take eleven steps in very intense fashion. Seppo Rätty still attempts a total block on delivery that barely requires a recovery step. Former Soviet athletes like Heino Puuste, Lev Shatilo and Natalya Shikolonko would still release and recover via several trot steps to the foul line. The runs are long (Kimmo Kinnunen) or short (Rätty), fast or slow. The Hungarian style of Miklos Nemeth and Ferenc Paragi, with the 2 o'clock wrap, is still evident in the likes of Jan Zelezny, but the clock runs a little slower these days, more like 1 o'clock.

## 2.3 *A faster approach*

Technique in the new javelin era has renewed emphasis on the speed of the approach run. The indolent stroll on the runway of many in the aerodynamic era has given way to vigour and a percussive style. Naturally, if the javelin is not to be wrapped, the feet can follow a straighter course and therefore move faster. For those who use the block technique, the extra speed of the run has not led to a proportionate increase in recovery distance. Blockers aim to have horizontal speed totally absorbed by the throw itself and their recovery steps are merely cursory.

This total stop technique should be avoided because it places an enormous strain on the body. The level of physical preparedness necessary to absorb the shock is, thankfully, beyond most mortals.

If the aim during the delivery is to drive the javelin with little lateral deviation and thus prevent unwanted oscillations during the flight, the technique of the following athletes, as recorded on film by the IAAF Biomechanics Project at the 1987 World Championships in Athletics, should be studied: Whitbread (lateral deviation of 0.14) Tina Lillak (0.13), Tessa Sanderson (0.23) and Rätty (0.19).

## 2.4 *Straight line throwing*

The merit of the British interpretation of Javelin Throw coaching, as exemplified by Margaret Whitbread (who coached Whitbread) and John Trower (who coaches Steve Backley and Mick Hill), is its insistence on straight line throwing. Wilf Paish, former coach of Sanderson would agree. The British 'school' is worthy of emulation. What the modern spear demands is a complete turning on to the spear to complete a straight line pull and avoid oscillations. The alignments of Whitbread and Hill are as straight as a cricket text book's bat. Whitbread perfected the turning on to the shaft while Sanderson often sagged through the delivery. Hill, as yet, has not mastered more than a superb linear drive of the legs. He has a deficient hipline during his strike reminiscent of Dainis Kula, the 1980 Olympic Champion. Because of this, Hill has yet to capitalise fully on his exemplary leg drive.

## 2.5 *Finnish examples*

Finnish throwers Lillak and Rätty are interesting studies. They seem to fall into the slider category but study of throws filmed from the rear at the 1987 World Championships in Athletics tells a different story. Both very cleverly adopt the Hungarian wrap on withdrawal, but the spear, for both of them, adopts a near linear alignment prior to the landing of the left foot in the bracing stride. Both have a very fruitful and adventurous impulse stride. The floating right foot has been coaxed to perform demanding tasks during the impulse stride. In the case of Lillak, the right foot duplicates that

of the great Hannu Sittonen on completion of the impulse step. Lillak's foot lands at 90° to the approach run and her toes absorb the entire load. Then, via the toes, Lillak rotates on to the full left foot and delivers. Rätty, on the other hand, counters the wrap. His right foot straightens progressively during the impulse stride, seemingly pigeon toed. He lands full footed and throws. Anyone who wraps the shoulders to 1 o'clock and can maintain a straight right foot deserves success!

### 2.6 Range of movement

Does the new spear need the same range of movement as the old? Of course it does. But if the attempt to obtain the range (Pugh calculated 14 feet) interferes with the speed of the delivery strike, a compromise has to be reached. In the sequence of Lillak (Figure 2) Pugh would be ecstatic but her range of movement is contortionist: she took too much time to complete her rotation under the spear and to make contact with the ground, and her delivery stride is too long. The resultant sag of the right knee and the collapse of the pelvis prevented her ever reaching her full potential. Admittedly, Lillak is probably well satisfied with her records and Championship victories but if she had the delivery dynamism of Whitbread, she would have been the first to reach 80 metres. If Lillak were to be 'born again' she would be well advised to reduce her delivery stride and consult Whitbread on dynamism.

### 2.7 Impulse and delivery stride

IAAF analysis of the Javelin Throw in the 1987 World Championships in Rome concluded that the perfect ratio of impulse to delivery stride was 1.64:1. I would advocate a revision of this. If the modern concept of throws in general is that maximum force should be exerted quicker, I would suggest that range has to be sacrificed for speed. Many throwers cannot complete the rotation of the pelvis satisfactorily because they cannot cope with the stress of landing after the impulse stride. The

right foot distorts on landing, the toes usually turn away from the direction of the throw and this induces a far from ideal delivery. Three things normally happen. Firstly, the heel rotates inwards, which can cause groin strain and force the right hip to drop. This induces, in turn, a loss of linear strike through the longitudinal axis of the javelin and its corollary, lateral deviation. Thirdly, there may be a premature loss of contact with the ground by the right foot, thereby diminishing the potential of the strike.

### 2.8 Scissors step

I believe today's javelin, in particular the men's model, is ideally suited to the scissors step discussed in the *The Throws Manual* (Dunn and McGill 1991). There are two interpretations of this step. As demonstrated by Ivon Leal (CUB) and Dag Wennlund (SWE) in the 1987 World Championships in Athletics, the right foot, on landing after the impulse step, is actually behind the spot where the continuation of the long axis of the trunk meets the ground. The traditional landing is made well ahead of this spot. The foot does not make full contact with the ground at any stage after landing. It strikes backwards during its flight path in a pawing action. The vigour of the back-strike determines the landing position.

The variant is a less active pawing with a contact point directly under the right hip. Either way, the right foot is capable of staying straight and full rotation is attained easily, which keeps the hips and chest square throughout the delivery process.

The speed potential of the scissors step is considerable. The left foot makes contact quicker, resulting in a shorter delivery stride than in traditional models. Range is sacrificed for speed. Throwers must decide which paw variants they find most effective. Although Dunn suspects this technique could lead to back problems his sample was too small to confirm this. Despite this, the scissors step has several advantages:

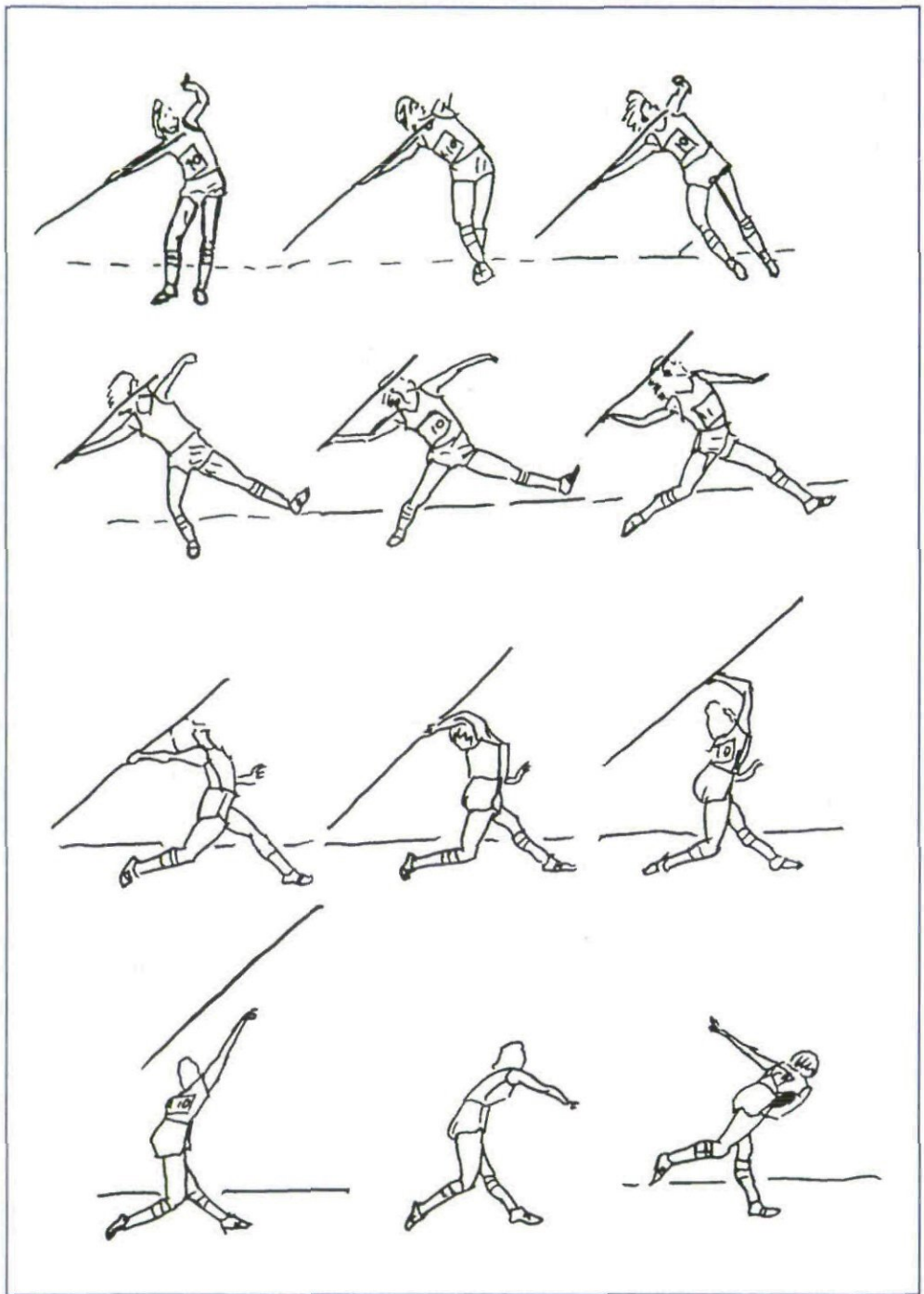


Figure 2: Tina Lillak

1 It does not require maximum speed on the approach run to activate the step. The step is self activating.

2 It facilitates the rotation of the body on to and through the spear.

3 This should diminish lateral deviation which is anathema to the new spear, and reward the fast arm by activating the 'thrash.' This is what the event is all about.

4 It requires less leg strength because the ratio of impulse to delivery strides is closer to 1:1 rather than the 'ideal' 1.64:1. This means less loading of the right leg.

5 If conventional impulse steps have full foot contact, heel first, it is true to say that the majority of throwers can only respond with an interior drag of the right foot (Petranoff, Kazuhiro Mizoguchi, Hill) followed by a rollover on the top of the toes. There are exceptions: Rätty lands flat-footed and has superb rotation of the foot into the delivery. Viewed from the throwing side, the conventional landing off the impulse step appears to be a full leg drive. It should be interpreted as a drag stretch as the proponents strive for a long delivery stride and classical delivery. Today's javelin throwers have to re-evaluate the drag stretch convention, if the spear is to be best hit!

### 2.9 The Trower method

British male javelin throwers, particularly Steve Backley and Mick Hill, are currently attracting great attention. Their coach John Trower has a philosophy that is tailored to the modern javelin (See interview on page 41). He believes that:

- speed should be retained by a perfectly balanced upright torso throughout the run with no pre-strike layback;
- the carriage of the left shoulder after the withdrawal should be lower than the right;
- the javelin should be preset very early on the approach;

- the thrower should 'run tall'.

All these views deserve examination.

Because Backley prefers to withdraw the javelin very early in his approach, he cannot retain speed by any other way than 'running tall' Running tall means upright, so Backley's series of cross steps are an awkward demand. But he comes through them very well and runs against his block.

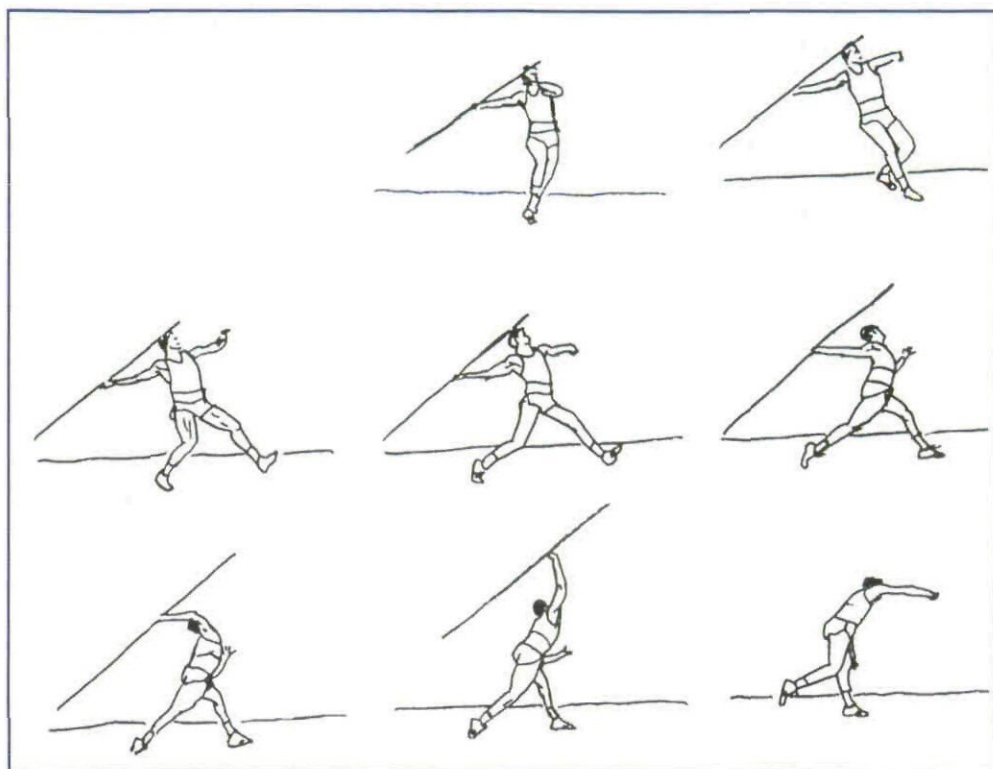
What Trower has done is to simplify the mechanics of the run. For too long the pretentiously described cyclic and acyclic phases of the approach have seen throwers attempt ballet like manoeuvres in the transition phase of withdrawing the javelin. Why have throwers in the past changed their pattern, their rhythm of steps after the withdrawal? They stretched, bounded, soared and many slowed. Yet there is no need to change the pattern of the steps.

### 2.10 Approach models

If Kimmo Kinnunen (FIN) could ever master the approach of his father Jorma, he would be the best in the world. Instead, today's Javelin Throw scene is dominated by the slim Jan Zelezny whose approach run is exemplary.

All coaches have role models. For me the model is Jorma Kinnunen, with his throw of 88.58m at the 1968 Olympic Games in Mexico City. In this delivery he flows across the ground with wonderful speed. He withdraws, crosses and drives against his block without any bounds, leaps or pirouettes. His left knee lock is as good as Zelezny's. This technique enabled him in 1969 to become the smallest thrower to reach 92 metres.

The secret of all the technically great javelin throwers, is the rhythm of their running stride. Their steps always appear natural, never too long. 1972 Olympic champion Klaus Wolfermann was another small man who came out on top. He even set a world record of 94.08m. Following the withdrawal, Wolfermann's steps would increase in length, but the lengthening would be evolutionary, never acyclic, and very smooth and natural.

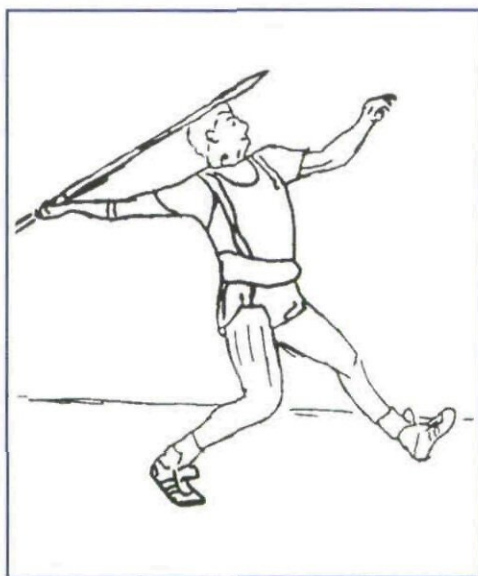


Traditional coaching theory stressed the need for layback. On landing at the end of the cross step, men were told to have a back lean of 15-20° and women one of 20-30°. What Backley shows us is that there is no need to prepare for this prior to the impulse step (see Figure 3A). At this stage Backley lowers his right shoulder, drops the withdrawn hand from ear height to level with the throwing shoulder and seems to tuck his left shoulder under his chin. He appears balanced and comfortable for the throw (see Figure 3B).

The pull of the left shoulder has to be very disciplined to prevent the often mentioned lateral deviation. Many throwers have fallen away during the delivery. Some do so deliberately, in the mistaken belief that falling away will 'put more work' on the javelin by allowing it to be pulled further on a straight line.

The perfect delivery posture would be one of square shoulders and hips with the throwing hand directly over the top of the throwing

**Figure 3A (above) and Figure 3B (below): Steve Backley**



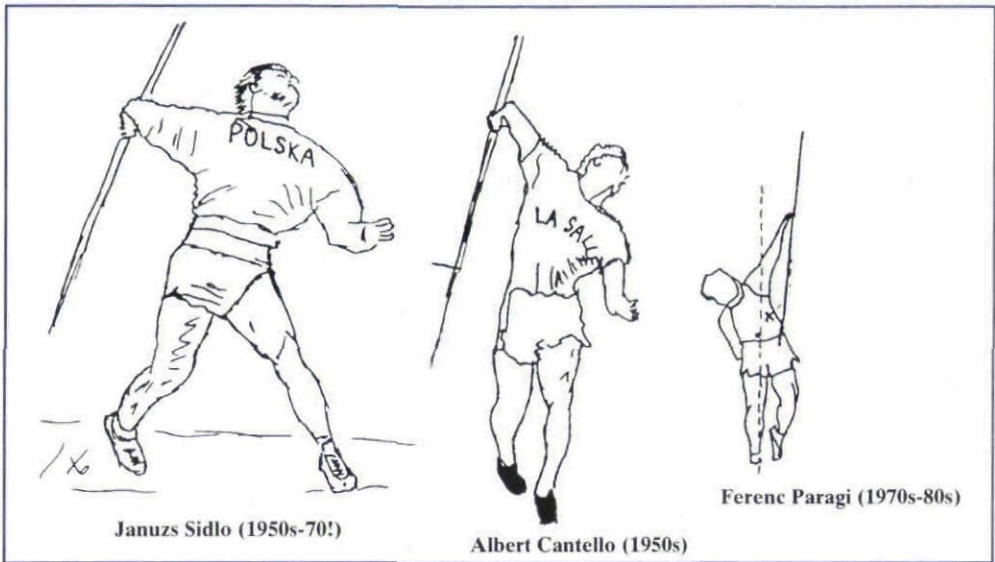


Figure 4

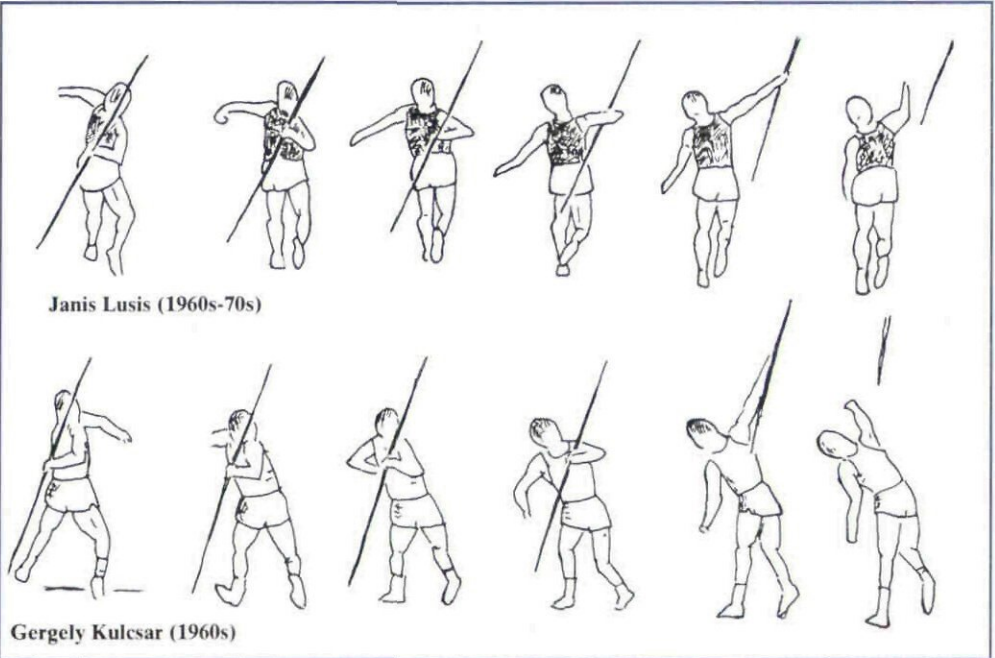


Figure 5



shoulder. But because the shoulder does drop on the left side no one has achieved this, although as Figure 4 demonstrates, the throwing hand can be close to vertical.

Of course the attainment of square shoulders during the delivery does not necessarily result in the desired model technique. As Figure 5 demonstrates, Janis Lusic (URS) stays square but his arm slides away from the vertical line of support and thrust. Gergely Kulcsar's (HUN) superior flexibility through the pelvis enabled him to throw later, to keep ground contact longer with the rear foot, but even he cannot prevent the fall away of the left shoulder.

Because of his disciplined left side, Backley demonstrates technical mastery. In the past, technical perfection occurred if the drive of the right leg was completed before the left foot touched down for the block, yet Backley continues the drive of the right leg after the impulse stride touch down. He throws later and his brace holds for the complete throw. He strikes against the brace, his hips do not retract like Lillak or Viktor Zaitsev (URS) and there is no buckle or sag.

That is why he is such a great javelin thrower.

### 3 New javelin essentials

In general, the 'new' Javelin Throw event calls for renewed athleticism. To me the essentials today are:

- a natural run;
- diminished layback;
- a run rather than a leap against the block;
- a straight strike.

This strike will require the flexibility of a backstroke swimmer to be successful and will be achieved with alignment discipline, an alignment that, for simplicity's sake, should be straight.

The Javelin Throw, for men and women alike, has regained its place as a legitimate event. It now has a purity that will remain as long as the IAAF does not weaken against the assaults of the lateral thinking Miklos Nemeth. I, for one, do not want to return to the era of 'flukey' floats.

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