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NEW STUDIES IN ATHLETICS

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- Technical Research,
- Development Information,
- Bibliographic Documentation.

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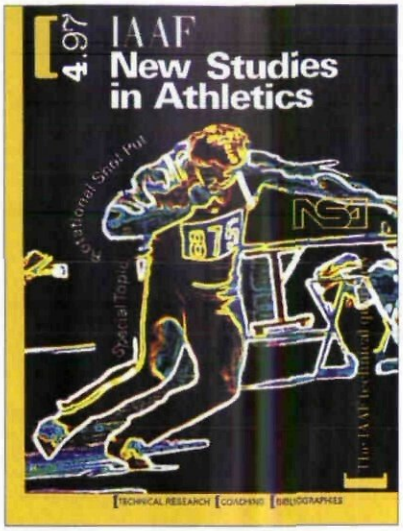

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EDITORIAL

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EDITORIAL

With this issue, we bring volume 12 to a close. 1997 was a very successful year for this publication with a growing number of subscribers and a proposition by Meyer and Meyer (the biggest publisher of sport literature in Europe) to become our partner in 1998.

This issue's special theme is the rotational shot put, and begins with a Viewpoint by Elio Locatelli, a member of the NSA Executive Editorial Board, concerning specific movements made by some rotational shot putters which contravene existing rules, but are very difficult for judges to control due to the speed of the rotational movement. Locatelli's solution is simple but effective.

This edition's Round Table focuses on the shot, with special reference to the rotational technique. As you will see, we have enlisted a group of international experts and would like to take this opportunity to thank them for their very professional approach.

As mentioned in the Editorial of the last NSA, 1998 has been designated The Year of Women in Athletics by the IAAF. At the time of writing there have already been two seminars at IAAF Regional Development Centres in Cairo and Santa Fe and a Conference in Mauritius attended by the project's Main Patron: Merlene Ottey and Nawal El Moutawakel, IAAF Council Member and the first Islamic woman to win a gold medal at the Olympic Games.

In order to celebrate The Year of Women in Athletics, NSA will devote a complete issue (2/1998) to this topic, and devote special attention to:

- *Women as Coaches*
- *Woman as Managers*
- *Women as Technical Officials*
- *Women as Administration leaders*
- *Social and Lifestyle aspects of women in sport.*

The calendar of activities related to women continues with a workshop to coincide with the IAAF Grand Prix II Meeting in Doha on May 7. With women competing in this international meeting for the first time, this is a historically significant occasion for our Movement. For this reason, a select group of women athletes, journalists, administrators and managers will gather to discuss "The developing role of women in society and sport." Among the many activities planned by the IAAF and its Member Federations, an interesting conference is planned for the RDC Moscow on April 25-26, this will be the first official activity of this newly opened centre.

Returning to the issue, there are three significant articles dealing with subjects outside the special theme. All are written by authors who will be familiar to regular readers of NSA. The first is by Lyle Sanderson and considers sprint relay racing from a Canadian perspective, as you probably know Canada's men have won the last three major titles at 4x100m... The second is an investigation into special high jump training by Dr Wolfgang Killing. Dr Killing is a former European indoor record holder as

well as an expert in high jumping theory and coaching. Finally, we have a study by the renowned physiologist Dr David E Martin on heat stress at the 1996 Olympic Games (as well as other athletics events in Atlanta). Dr Martin's article continues his ground breaking research from the 1992 Olympics in Barcelona (which appeared in NSA) – the conclusions of which have been noted by meeting organisers anxious to protect athletes from the negative effects of heat stress and giving organisers and teams hints for future competitions in extreme hot climatic conditions.

NSA Executive Editorial Board

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Difficulties in judging rotational shot put technique

by Elio Locatelli

"Video shots prove that rotational shot putters during the preliminary phase of the throw very often touch the top of the iron rim of the circle. This is against the rule 181,1 and thus a foul. As it is very difficult and sometimes even impossible for judges to detect this foul, the only solution seems to be having the top of the rim and the interior of the circle at the same level. In this case athletes would certainly abstain from pushing off the top of the rim with the foot because it would be no advantage for them."

It is evident that the rotational technique in the shot put is becoming more and more popular; in the last World Championships in Athens, among the 12 finalists, 7 utilised the rotational put.

Nevertheless, this new technique caused some difficulty to the judges, because, during the preliminary phase of the throw, as the athlete was turning on his supporting leg (the left one for a right footed thrower), he very often touched the top of the iron rim of the circle, accidentally or deliberately.

The IAAF decided to film the final of the men's shot put, in order to analyse the complete movement of the best athletes.

Unfortunately, the doubts and the complaints expressed by coaches and athletes to the IAAF were justified and the video film showed very clearly that, in some cases, athletes were using the shot circle unfairly as a support to improve their acceleration.

This action is against rule 181.8 that says:

> "It shall be a foul if the competitor, after he has stepped into the circle and begun to make a put, touches with any part of his body the ground outside the circle, the top of the iron band, the top of the stop board or improperly releases the shot in making any attempt."

The real problem, however, is that even the best observers (the judges), find it very difficult, and sometimes impossible, to detect a foul of this kind. Therefore, we must look for some solution in order to facilitate the work of the judges.

Proposals:

In my opinion, the only solution is to have the top of the iron rim of the shot circle and the interior of the circle at the same level. In this case, athletes will find it of no advantage to touch the top of the rim of the circle with any part of the foot.

Dr Elio Locatelli is the IAAF Development Department Co-Director and a member of the NSA Executive Editorial Board.

Invalid attempt

Valid attempt

Other solutions (electronic devices, sensors, etc.) will be too expensive for world-wide use. However, we would welcome any other suggestions from our readers. This is an invitation for all of you who are concerned with this matter to write to the NSA Editorial Board, Elio Locatelli or Helmar Hommel (addresses see page 1 or e-mail: Elio@IAAF.org or HHommel@aol.com), giving your ideas about any other possible solutions to this problem.

Conclusion:

With the progress of Athletics in the year 2000 in mind, it is the duty of the IAAF to utilise technologies and suggestions to improve their organisation and guarantee one of the most important principles of sport:

> "All the participants must compete in the same conditions and be judged in the same way".

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SHOT PUT – ROTATIONAL TECHNIQUE

Yuriy Bakarynov (Russia) is the head coach for throwing events of the All-Russian Athletic Federation. With Anatoliy Bondarchuk he was responsible for creating the so-called Soviet School of Hammer throwing in the 1970's. A former high-level Hammer thrower himself, who in the past has coached Y. Sedykh, S. Litvinov and I. Nikulin, among others.

Werner Goldmann (Germany) is the national coach for men's shot put, coaching throws since 25 years. Among his athletes were 1988 Olympic Champion and former world record holder Ulf Timmermann (23.06m 1988), Heike Hartwig (21.31m 1988), Irina Meszynski (73.36m 1984) and Michael Mertens (20.20m 1997) and rotational shot putter Oliver Dück (19.74m 1996).

Aleksej Ivanov (Russia) is a throwing coach. Among his athletes are A. Dumtschev, world record holder in discus throwing: 71.86m; shot put (straight) 18.72m; rotation 19.30m, A. Ivanova, shot put 19.34m (1971) and B. Zaitschuk, hammer 76.34m (1976).

Anatoli Kvitkov is a coach of the Ukraine Athletic Federation with 44 years experience coaching the throwing events.

Janne Palokangas (Finland) has been one of the most successful throws coaches in Finland during recent years. Since 1984 he has been the coach of Mika Halvari (shot put; 21.50m 1995, WCh 2nd, WChi, 1st). He has also collaborated with female shot putter, Karolina Lundahl (18.23m 1996) and male discus thower Heikki Holmen (63.98m 1992).

Vladimir Sherstyuk (Ukraine) is a full time athletics coach for the thowing events at the High Level Sports School in Zaporizhzhia. He has coached for over 35 years on a national and international level and has specialised in the rotational shot put.

Dr h.c. **Peter Tschiene** (Germany) was national coach for the hammer throw (1967-71), and an IAAF lecturer, specializing in training programmes and technology in general, and especially in the throws (1968-83). He works at the Technische Universität Darmstadt in the department of sports science. He was the co-coach of the Italian Paolo Dal Soglio (21.23m), 4th in the Olympic Games of Atlanta, 1996.

Mike Winch is a former British International shot putter and now a British Federation master coach in the shot put. He coached Great Britain's best ever woman shot putter, Judy Oakes (19.36m, 4th in the Olympic Games of Seoul, 1988), throughout her very long international career.

1. What type of athlete do you consider most suitable for the rotational shot put technique?

Bakarinov:

According to V.N. Tutyovitsch, the traditional shot put technique is called the linear throw, because of the shape of the acceleration path of the shot. The ratio of the amount of force exerted to the distance over which the force is applied is defined as the 'cost' of the acceleration path. This feature which describes the structure of the kinetic and dynamic movement, separates the traditional technique from all other track and field throwing events.

The linear shot put has the shortest acceleration path, thus having the highest 'cost' of the acceleration path.

V.I. Alexejov (Leningrad) developed the rotational technique for the shot put. This technique was used successfully by A. Baryschnikov, when he set his world record of 22 metres in 1976. The rotational technique allows an elongation of the shot's path of acceleration, but at the same time makes it harder to transmit force efficiently to the shot.

1. What type of athlete do you consider most suitable for the rotational shot put technique?

Because of this, a highly developed co-ordination is essential for successful performance with the rotational technique.

Among the elite rotation putters, there are many tall and well conditioned athletes: e.g. B. Oldfield (1.92m - 124kg - 22.19m), R. Barnes (1.94m - 137kg - 23.12m. Nevertheless, the American coach Art Venegas quoted other examples, such as M. Spiritoso (1.76m - 105kg - 20.83m), whose strength test measurements (210kg squats, 145kg bench press) did not match up with his shot performances. On comparing this example with J. Brenner (1.92m - 132kg - 21.92m: 325kg squat and 220kg bench press), Venegas concluded that the rotation technique allows the athlete's speed strength potential to be exploited much more efficiently.

The results of many years research into the conditional preparation of elite male and female shot putters are shown in the tables below. The test results show a high level of physical condition among athletes using the rotation technique. On the other hand, it becomes obvious that this technique can be employed by both males and females of any build, including those of medium height, because it allows a better exploitation of their speed/strength potential. However, a high level of movement co-ordination is required.

Table 1: Statistical mean of the factors of physical condition of male shot putters

Factor	M	±m	min	max
Competition performance [m]	19.55	0.09	16.24	22.05
Bench press [kg]	173.9	2.61	70.0	300.0
Dead lift [kg]	141.5	2.08	80.0	180.0
Squat [kg]	216.0	2.66	130.0	320.0
Snatch [kg]	115.0	1.59	50.0	150.0
Long jump (standing) [cm]	318	2.01	232	374
Triple jump (standing) [cm]	939	7.92	740	1096
Backward throw over the head [m]	19.79	0.23	14.80	24.0

Table 2: Statistical mean of the factors of physical condition of female shot putters

Factor	M	±m	min	max
Competition performance [m]	19.42	0.14	13.88	21.73
Bench press [kg]	115.7	8.96	75.0	150.0
Dead lift [kg]	102.3	1.02	60.0	130.0
Squat [kg]	138.7	1.96	65.0	180.0
Snatch [kg]	74.8	1.51	45.0	95.0
Long jump (standing) [cm]	275	1.02	236	300
Triple jump (standing) [cm]	801	6.16	702	845
Backward throw over the head [m]	19.67	0.18	16.06	21.86

GOLDMANN:

In general the selection of athletes for the rotational technique is based on the same criteria as the selection of glide shot putters. Very tall athletes, like Aleksandr Baryshnikov (world record of 22.00m, 1976) or Oliver Dück, who is 2.14m tall, are as suitable for the rotational technique as somewhat shorter athletes like Jim Doering or Greg Tafralis. In my opinion, very good co-ordination and speed-strength, a good feeling for orientation and rotation and a well-developed sense of balance are very important.

As roughly identical performances can be achieved with both techniques by high-performance athletes, the 'natural' type of release demonstrated by athletes at the initial stage of development is, apart from the basic prerequisites, the decisive criterion for the choice of the shot put technique.

Athletes with a very straight release should practise the glide technique, while those with an instinctive rotational type of release could well start learning the rotational technique.

1. What type of athlete do you consider most suitable for the rotational shot put technique?

IVANOV:

All types of athlete can employ the rotational technique in the shotput; in my opinion it is more 'universal', than the traditional linear technique. Furthermore, it allows athletes of medium height (men: 1.80-1.90m; women 1.65-1.70m) to achieve better performances.

KVITKOV:

Athletes with a well developed muscular system. However, there can be a considerable range of height and weight: both big, tall athletes and those of medium build can become champions and record holders.

PALOKANGAS:

I think that the somatotype of the Scandinavian people, long trunk and not so long legs, is very suitable for shot putters who use the rotational technique. In addition the top class rotator should have good basic strength, agility, flexibility and sense of rhythm.

SHERSTYUK:

With the rotational technique taller all as well as shorter athletes (1.85-2.06m) are able to perform shot put. The major abilities for this are speed and strength like in the linear (traditional) technique.

TSCHIENE:

Only athletes very gifted in making rotational body movements, i.e. in accelerating their bodies by means of turning movements of their lower limbs, especially of the right foot, which plays the major role in the propulsion of the hip. They may well show good ability in mastering discus throwing technique; this always serves as a reliable indicator of suitability for the rotational technique.

WINCH:

This event has only two requisites; first to be able to put the shot well from a standing position (which is applicable to any shot technique), and second to be able to turn fast and on balance. Size seems to be irrelevant. There are very few putters who cannot perform a reasonable rotational put; those who find it most difficult are tall and less mobile athletes who tend to be linear in their movements.

2. At what age would you introduce the rotational technique to boys/girls and what are the prerequisites?

BAKARINOV:

The main training of children of the age of 9 to 11 should be many sided. Basic training, from the age of 12 to 15, should be focused on general movement skills, which are then stabilized (13-15 years), as a complete movement of the chosen throwing event.

Nowadays, it is accepted that it is always more effective to learn the correct movements (i.e. technique) right from the start. Therefore, if the coach decides on the rotational technique for the athlete, then the complete training regime, both technical and physical, will have to be specifically adapted to it.

GOLDMANN:

The rotational technique does not depend on strength as much as the gliding technique. Therefore, even young children who are still at the stage of talent identification training, can learn elements of the rotational technique.

Furthermore, the start of the rotational put is more 'natural' than that of the backward glide.

2. At what age would you introduce the rotational technique to boys/girls and what are the prerequisites?

The rotational technique is based on the same principle as all technical events: The earlier a high degree of technical perfection is achieved, the more promising are the athlete's prospects.

IVANOV:

The optimum age for learning the rotational technique is between 13 and 15 years. Prerequisites are: height, natural explosive strength, speed and good co-ordination.

KVITKOV:

The best age to develop the motor skills of the rotational technique is 6-11 years.

PALOKANGAS:

To my mind the best age for young girls is 10-12 years and boys 12-14 years. The primary factor in the motor learning phase is extent of leg and hip movements. If the young athlete has a versatile background of sports requiring agility and body co-ordination, it is much easier for him/her to learn quite difficult rotational movements. In addition, a previous training in the discus, javelin and hammer throw will have a positive transfer to the rotational technique of the shot put.

SHERSTYUK:

Like in other throwing events boys and girls should specialize in shot put at 13-15 years but also learn other throwing events that favour a faster mastery of the rotational technique.

TSCHIENE:

From my own experience, I would prefer to start with the linear technique and then introduce the rotational technique at the age of 15-17 years. The reasons for this are: 1st, to teach/learn the block/front support in the final phase of the throw; 2nd, to determine the aptitude of very young athletes for one or the other of the two techniques by frequent testing (needed for both of them).

WINCH:

I would introduce the technique to the athlete from the very start. The age of the athlete is not particularly relevant, although children in the ten to twelve bracket seem to be able to pick up the movement with little difficulty. The prerequisites are that the athlete has a reasonable basic physical fitness and skill learning ability. Such a complex movement cannot easily be taught to anyone who does not have good co-ordination. Less general strength is needed for the rotational shot, which makes it a good technique for youngsters.

3. What sort of leading-up stages would you use to introduce the rotational technique?

BAKARINOV:

A technique is learnt by the fashioning of movement skills; its perfection is based on imprinting the sequence (programme) of movements as a whole, and also on increasing the number of necessary skills.

It should be remembered that the development of a movement skill does not imply the imprinting/learning of a constant formula of motor impulses as such. When a movement is being formed, the process of solving movement tasks is completed by changing methods or technique. Three strategies can be distinguished:

- becoming accustomed to the problem and the way to solve it,
- acquiring the basic strategies,
- efficient application of this strategy.

3. What sort of leading-up stages would you use to introduce the rotational technique?

One of the main features of a movement is the phase structure. The phase is a part of the whole movement which can be distinguished from preceding or later ones by its characteristic features. The most important characteristics of throwing are the changes of support and the directions of motion.

When making a phase analysis of the linear (traditional) technique, 5 phases can be defined:

(1) starting position (bent or slightly bent legs, with the upper body leaning forward)
(2) initial acceleration phase
(3) non-support phase
(4) single-support end phase (interval between touch down of the right and left foot)
(5) double-support end phase.

As in discus throwing, the rotational technique distinguishes between the double-support entry into rotation, the single support entry, the jump or the non-support phase, the single- and then the double-support end-phase (final acceleration).

GOLDMANN:

Apart from a good background of general athletic training, good co-ordination is an essential prerequisite for learning the rotational technique.

Therefore, the training of young athletes should include exercises of a game-like character, with different co-ordinative movement tasks for the development of the feeling for rotation and balance.

Since important basic aspects of the rotational shot put are identical with the rotation in the discus throw, previous training for the discus facilitates the learning of the rotational shot put technique.

- Throwing and putting exercises, with or without implements, from a standing position, from walking or from a rotation (light implements, light medicine balls), as preliminary exercises;
- modified standing put (with light shots, medicine balls and other implements)
  - narrow power position, preliminary swinging movement contrary to the putting direction around the longitudinal axis of the body,
  - rotational release from a stable support and with a jump release,
  - backward walking start,
  - simulation exercises and throws with light implements,
  - starting position: back to the putting direction, parallel feet (right-hand putters) first step with the right leg backward, second step with the left leg backward, followed by 'fixed' and jump releases;
- changing technique from the standing position and from the 'glide' (specific preliminary stage for learning the rotational technique);
- simulation exercises and puts with a half rotation (in the learning phase from the 'fixed' support, later with a jump release);
- simulation exercises and puts with one or one and a quarter rotation (with a fixed and with a jump release);
- simulation exercises and puts with the whole movement (at the beginning with a fixed and later with a jump release).

IVANOV:

The major phases of movement which have to be paid attention to in technical training are: a) the starting position, b) the entry into the rotation, c) the push-off phase.

3. What sort of leading-up stages would you use to introduce the rotational technique?

KVITKOV:

The education of the rotational technique must proceed side by side with the development of the physical abilities.

PALOKANGAS:

A general development of throwing should be encouraged by the use of numerous sorts of light throwing exercises with medicine balls and light shots).

The complete movement can be modified by means of drills, both with and without the use of the implement. Simulation exercises of the complete performance also work well. With adult athletes I would start the correction or improvement of technique using the whole method of teaching.

SHERSTYUK:

Very important are the following stages of the preparation: Speed, jumping strength, sprint and the education of discus throw and shot put in the traditional way.

TSCHIENE:

I would use drills consisting of parts of the total movement or technique, moving on to the complete movement. The athlete's attention should be focused on a turning inwards of the right foot on the toes immediately after landing, as much as (thought to be) possible; the coaches' attention should be paid to the same, and also to the effect upon hip propulsion.

WINCH:

In common with my work in the discus event, I initially teach the rotational shot as a whole movement. I have found that the less breakdown of the whole technique taught early on, the less problems there are in progressively improving the technique. Naturally, I teach the standing put first and then move on to the spin, but I do not break down the movement into small drills until a basic complete movement has been learnt. The drills come in once the athlete has an overall concept of the skill.

4. If you have had any experience in teaching both the linear and the rotational techniques, what guidelines would you offer to less experienced coaches?

BAKARINOV:

The recognized teaching method is based on a series of exercises with increasing difficulty, leading to the final movement, i.e. it should be based on each of the phases of the particular movement. The question is whether the 'whole' or 'part' method of learning is the more effective. In my view, the latter has the advantage. The teaching of technique does not necessarily have to be according to the logical sequence of the contents of the particular technique within the movement as a whole, nor does it necessarily have to go from 'easy' to 'difficult': quite often it is better to go the other way around – from difficult to easy.

In each individual case certain movement characteristics will be developed in training, according to a certain minimum input of energy and the requirements of consistency.

GOLDMANN:

Assuming the presence of good anthropometric prerequisites and corresponding co-ordinative and speed-strength abilities, the individual technique is the decisive performance-determining factor in the athletic development from beginner to advanced athlete. The technique used