SELECTED AND ANNOTATED BIBLIOGRAPHY

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No. 66

Javelin throw

by Jürgen Schiffer

Introduction

The following is the second bibliography in NSA dealing exclusively with all aspects of the javelin throw. There was a bibliography about the throws in issue 1/1988 which also included a chapter presenting 15 javelin publications. The first bibliography about only the javelin throw appeared in issue 1/1998.

The present offering contains 591 publications about the javelin throw from the years 1946 to the present. This means that also an attempt has been made at filling the gaps in the bibliographies already published.

The bibliography is subdivided into seventeen chapters:

1 Technique of the javelin throw (95 documents)
2 Biomechanics of the javelin throw (90 documents)
3 The "new" javelin (25 documents)
4 Photo sequences and kinegrams of the javelin throw (33 documents)
5 Videos of the javelin throw (7 documents)
6 Training, conditioning and coaching aspects of the javelin throw (94 documents)
7 Teaching and learning the javelin throw (including novice technique, training, and related problems) (49 documents)
8 Talent identification, selection, and development – statistics of the javelin throw (5 documents)
9 History of the javelin throw and performance development (13 documents)
10 Social and psychological aspects of the javelin throw (1 document)
11 Medical (i.e., physiological, traumatological, nutritional, and anthropometric) aspects of the javelin throw (43 documents)
12 Women's javelin throw (20 documents)
13 The javelin throw in the combined events (7 documents)
14 Javelin equipment and safety (14 documents)
15 Interviews with and profiles of prominent javelin throwers (32 documents)
16 Comprehensive and general articles about the javelin throw (62 documents)
17 Bibliographies on the javelin throw (1 document).

The division between some of these chapters is only approximate because there are fluent transitions between them. This applies particularly to chapters (1) (2) and (4). As it was not possible to get hold of all the articles listed (the absence of an abstract being an indication of this) it is possible that some of the articles included in chapter 16 actually ought to be allocated to one of the specific chapters.

This bibliography has been compiled by using

◆ SPOLIT, the sports literature database of the Federal Institute of Sport Science (BISp) in Cologne, Germany (www.bisp.de, free but limited access), and

◆ SPORTdiscus, the database of the Sport Research and Information Centre in Ottawa, Canada (www.sirc.ca, no free access).

However, many articles were found by "free search" in the Central Library of Sports Science of the German Sports University in Cologne and some are from the private library of the author. Readers who are interested in obtaining articles should contact Dr. Jürgen Schiffer, Email: j.schiffer@dshs-koeln.de.

Although this bibliography is rather expansive it does not claim to be complete. Publications from before the seventies have not been searched systematically because they are not documented by the available sports literature databases.

Bibliography

1 Technique of the javelin throw

Attig, R.
Velocity conversion in the javelin
Scholastic Coach, New York, 48 (April 1979), 9, pp. 80, 82
To properly convert the approach velocity into the throw, the athlete must align his body and limbs in a position that will afford the best conversion. This preparation takes place during the withdrawal of the javelin and the cross-over.

Attig, R.
Converting approach velocity into throwing velocity – javelin
Track and Field Quarterly Review, Kalamazoo (Mich.) 81 (1981), 1, pp. 34-35
The author gives a detailed step by step analysis of the sequences involved when an athlete converts linear velocity into rotary velocity for the javelin throw.

Baert, J. P.
Major errors in javelin throwing
Thrower, Solihull (Engl.) (August 1986), 36, p. 32

Bankhead, W. H. & Thorsen, M. A.
A comparison of four grips used in throwing the javelin
Research Quarterly for Exercise and Sport, Reston (Va.), 35 (October 1964), suppl., pp. 438-442
Measurement of the force and velocity produced by the extensor muscles of the forearm and the flexor muscles of the wrist and hand was utilized to compare the effectiveness of the American, Finnish, Hungarian, and Waddell grips. Testing apparatus was designed which permitted these measurements to be taken as the javelin was thrown at the recommended projection angle of 45° while the subject's body, except for the dominant arm and hand, was held constant. Comparison of these measurements, expressed as foot pounds of power per second, revealed no statistically significant difference in the power resulting from these four grips.

Bartonietz, K.
Die Wurfdisziplinen bei der WM '99: Teil 3 [The throwing events at the '99 World Championships]
Leichtathletiktraining, Münster, 11 (2000), 6, pp. 24-27
The author analyzes the javelin technique of the following medallists at the athletics World Championships in Sevilla, 1999: Aki Parviainen (winning performance: 89.52 m), Kostas Gatsioudis (silver medal with 89.18 m), Jan Zelezny (bronze medal with 87.67 m), Mirela Manjani-Tzelili (winning performance: 55.56 m), Tatjana Shikolenko (silver medal with 66,37 m), Trine Solberg-Hattestad (bronze medal with 66,06 m).

Bartonietz, K.
Für den Übungsleiter – Die aerodynamischen Eigenschaften von Speer und Diskus besser nutzen: Ein Beitrag zur Unterstützung des Technik-Trainings [For the exercise leader – Making better use of the aerodynamic characteristics of the javelin and discus: A contribution to the support of technique training]
Leichtathlet, Berlin (1984), 7, pp. 7-10; 8, pp. 8-10

Bartonietz, K.
So warfen die Weltbesten bei der WM in Rom: Zur sportlichen Technik in den Wurf- und Stoßdisziplinen bei den 2. Leichtathletik-Welttitelkämpfen 1987 [This is how the world-best threw at the World Championships in Rome: About the technique of the throwing events at the second World Championships in Athletics, 1987]
Leichtathlet, Berlin (1988), 5, pp. 6-8

Bartonietz, K.
Vergleich von Boris Henry mit Nachwuchsathleten [A comparison of Boris Henry with young athletes]
Leichtathletiktraining, Münster, 10 (1999), 8, pp. 18-21
The comparative analysis of the javelin technique shows that the focus of technique training with both young athletes and top-level athletes should be on the release: Movements of the pressure and bracing leg, delay of the release, tension build-up.

Borgstrom, A.

Javelin throwing – the Swedish way

Thrower, West Midlands (Engl.), 29 (May 1984), pp. 24-26

Börner, P.

Die Wurfverzögerung beim Speerwerfen: Das charakteristische Merkmal höchster sporttechnischer Meisterschaft [Release delay in the javelin: The characteristic feature of the highest level of technical mastership]

Leichtathlet, Berlin (1990), 34, 36, 37, pp. 6-10

Bosen, K. A.

Javelin throw coaching

Track and Field Quarterly Review, Kalamazoo (Mich.), 85 (1985), 1, pp. 29-30

This is a list of nine common faults in the javelin throw, their reason and correction.

Bosen, K. O.

Variations in throwing techniques

Track and Field Quarterly Review, Kalamazoo (Mich.), 81 (Spring 1981), 1, pp. 5-6

In an attempt to extract some information from the mass of data available today on throwing events from researchers, and through the use of subjective film analysis and observation, the author has come to the conclusion that there are today in each of the four throwing events two basic techniques in use by the top throwers of the world. In addition to this information, the author believes that these two basic methods suit two separate type of individuals. First, there is the big, strong, but very explosive thrower and, second, there is the big, strong, but not so fast moving thrower. As a result of size and their speed qualities, technique therefore seems to have fallen into two categories. In the javelin throw, the two techniques are as follows: (1) There is the technique of withdrawing the implement to a point where the grip is lowèr than the shoulder and the hand itself directly in line with the hip or even slightly behind the hip line. This method of aligning the javelin causes the point to face away from the direction of delivery slightly. The thrower then sinks down into a low-long delivery stride. The wide spread delivery stance results in a deep bow tension which involves the whole chest and upper abdomen area. In this technique, the front leg breaks at the knee before the body is brought into the delivery in a body-unbowing snap. The total positioning of the thrower is one in which great range is developed by a long-low delivery stride and an all-body unarching as the arm strike takes place. (2) With greater emphasis these days in the speed of approach, javelin throwers are resorting to a technique which aims at the preservation and conversion of this approach speed, with a minimum break, right up into the delivery of the implement. Such a technique is associated with a javelin withdrawal directly back and at shoulder height, with the javelin itself in a low angle, so that the point (tip) is about ear or head level, and the hand straight back and slightly away from the rear. The delivery stride is much shorter in this technique so as to preserve the speed of the approach. The front leg blocks the forward action of the body effectively as it is not flexed very much at the knee as compared to the previously mentioned technique. The bow tension is high in the chest and shoulder region so that the center of percussion works in a very fast whip-out as the arm strikes. In comparison, those using such a technique appear to be more upright in the delivery stride.

Buzek, F. & Szpakowska, B.

Lancer de javelot et de balle [The javelin and the ball throw]

Révue de l'Amicale des Entraîneurs Français d'Athlétisme, Paris (mars/avril 1986), 95, p. 17

Didier, P.

Double appui au lancer du javelot [Double support in the javelin throw]

Révue de l'Amicale des Entraîneurs Français d'Athlétisme, 66 (1980), 1, pp. 19-23

Dmitrusenko, O.

The contemporary javelin technique

Modern Athlete and Coach, Athelstone (Aust.), 25 (April 1987), 2, pp. 3-6; also in: Thrower, Solihull (Engl.) (December 1986), 37, pp. 44-55

The author discusses in detail the run-up and the delivery in the javelin throw, emphasizing the rhythm, the maintenance of the run-up velocity and the movement amplitude. It should be noted that the term "contemporary" does not apply to the new javelin.

Dmitrusenko, O. & Lusis, J.

Today's javelin technique

Modern Athlete and Coach, Adelaide, 21 (1983), 3, pp. 17-20; also in: J. Jarver (ed.), The throws: contemporary theory, technique and training (3rd ed.), Los Altos, Calif.: Tafnews Press, 1985, pp. 143-146, ISBN: 0-911521-17-8; Russian original in: Legkaja atletika, Moscow (1986), 6, pp. 16-19

The authors present their views on what they have titled as today's javelin throwing technique, covering in detail the grip technique, the run-up, the release technique, the flight and the movement rhythm of the javelin throw.

Doolittle, J. H.

A new look at European javelin technique

Athletic Journal, Chicago (Ill.), 45 (February 1965), 6, pp. 22, 24, 51-52

Erickson, M.

Javelin: Keep it simple

Athletic Journal, Chicago (Ill.), 62 (February 1982), 6, pp. 38, 68-69

Javelin terminology and concepts should be kept as simple and clear as possible. Unlike other throwing

events, the javelin is easily understood, though not easily mastered, by the beginner. Because the javelin throwing motion generally is the same as throwing a ball, Americans have no problem understanding the event. The following concepts should be emphasized to the javelin thrower: straight line approach, grip, run-up, arm position, delivery, checkmarks.

FitzSimmons, J.

Javelin lessons from Budapest

Track Technique, Los Altos (Calif.) (June 1968), 32, p. 1007

The "Hungarian points" to note are: (1) The landing of the right foot with the body well back. (2) The position of the left arm (the left elbow is swung outward viciously, thus opening the chest). (3) The action of the heel and left arm (the left leg lands heel first with the toe pointing slightly to the right; the arm comes in – very, very fast). (4) The left leg braces firmly and the javelin is released with a firm, straight leg.

Ganslen, R V.

Tips for the throwing events

Athletic Journal, Chicago (Ill.), 59 (January 1979), 5, pp. 54, 56-57, 66-69

The author's discussion focuses on various technical form flaws frequently observed in the field events, the cause of these flaws, and some unique methods used to solve these problems. Almost two pages of this article deal with the javelin throw.

Ganslen, R. V. & Jarvinen, M.

Finnish javelin throwing

Scholastic Coach, New York, 19 (February 1950), p. 36

Giles, K.

Rotation in javelin throwing

Athletics Coach, Halesowen, 13 (September 1979), 3, 2-3; also in: Track and Field Quarterly Review, Kalamazoo (Mich.), 80 (1980), 1, pp. 21

The author describes the javelin throwing technique with a marked wound up position of the upper body. However, the basic aims of the thrower using this technique remain the same as in the more conventional ‚on-line' technical model: (a) to give the hips and shoulders a range to be effective in and (b) to create torque between hips and shoulders.

Gilles, J. & Lejeune, T.

Javelot: La phase finale du lancer [The release phase of the javelin throw]

E.P.S.: Education physique et Sport, Paris, 46 (1997), 267, pp. 17-19

Gluschtschenko, W.

Der Schleif- oder Gleitkontakt beim Speerabwurf [The glide contact in the javelin throw]

Die Lehre der Leichtathletik, Berlin, 22 (1971), 12, pp. 451-452

Gorski, J. P.

Developing the javelin soft-step

Track Technique, Los Altos (Calif.) (Fall 1980), 81, pp. 2581-2582

This is a close look at how the Europeans apply understanding of the function of each body part for the most effective throwing technique, with emphasis on the "soft step" concept in the throwing stride, which allows maximum speed and momentum.

Gorski, J. P.

Development of the soft-step javelin technique

Coaching Clinic, 19 (May 1981), 5, pp. 2-7; 20 (March 1982), 3, pp. 27-32

This paper examines the actual mechanics of the javelin throw. Particular emphasis is placed on the European or soft-step technique in javelin throwing. The soft step provides a powerful throwing position and allows use of large muscle groups of the body without sacrificing momentum. A yearly training program for javelin throwers is included.

Gorski, J.

Analysis of linear and rotational javelin technique

Track Technique Annual '83, Los Altos (Calif.): Tafnews, 1983, pp. 70-73

An in-depth comparison of the technical components and physiological requirements inherent to each style of throwing. The author also presents specific training ideas for increasing strength, power and throwing ability.

Gorski, J.

Javelin observations

Track Coach, Mountain View (Calif.) (Spring 1998), 143, pp. 4553-4557; also in: J. Jarver (ed.), The throws: Contemporary theory, technique and training (5th ed.), Mountain View, Calif.: Tafnews Press, 2000, pp. 150-154

Ideas and observations of a sound javelin throwing technique based on the author's personal experiences and insights as to what is required to secure a balanced development in technical and physical areas of the event.

Hanin, Y., Korjus, T., Jouste, P. & Baxter, P.

Rapid technique correction using old way/new way: Two case studies with Olympic athletes

Sport Psychologist, Champaign (Ill.), 16 (March 2002), 1, pp. 79-99

Exploratory studies examine the effectiveness of old way/new way, an innovative meta-cognitive learning strategy initially developed in education settings, in the rapid and permanent correction of established technique difficulties experienced by two Olympic athletes in javelin and sprinting. Individualized interventions included video-assisted error analysis, step-

wise enhancement of kinesthetic awareness, reactivation of the error memory, discrimination, and generalization of the correct movement pattern. Self-reports, coach's ratings, and video recordings were used as measures of technique improvement. A single learning trial produced immediate and permanent technique improvement (80% or higher correct action) and full transfer of learning, without the need for the customary adaptation period. Findings are consistent with the performance enhancement effects of old way/new way demonstrated experimentally in non-sport settings.

Harnes, E.

Javelin technique

In: F. Wilt (Ed.), The throws: Contemporary theory, technique and training, Los Altos, Calif.: Tafnews Press, 1974, pp. 118-121; original German version in: Die Lehre der Leichtathletik, Berlin, 24 (1973), 22, pp. 773-776; 23, pp. 809-812

This is a description of the technique of the throwing phase, the plant, linear and angular relationships, the length of the accelerative pathway, and the release angle.

Housden, F.

Throwing the javelin

Track Technique, Mountain View (Calif.) (1969), 38, pp. 1203-1204

Based on film analyses, the author argues that the javelin thrower should concentrate on giving speed to his throwing shoulder so that when the arm strikes, it works from a fast-moving base, the elbow rising to keep the hand moving along a straight line.

Johnson, C.

A reappraisal of the javelin grip

Athletics Coach, Halesowen, 20 (September 1986), 3, pp. 12

For many years now it has been the British tradition to start beginner javelin throwers off using the 'V' grip, or 'Claw' grip. On of the primary tasks in teaching javelin is to 'get across' the 'supporting' role of the throwing hand. This the 'V' grip style does to great effect. However, once that concept is firmly understood by the learner, and mastered, the advantages of the grip no longer apply. No top class javelin thrower employs it. The other two grips, the 'Thumb and Forefinger' or 'Darts' grip, and 'Thumb and 2nd Finger' or 'Finnish' grip, bring the 2nd finger into greater prominence, increasing grip, improving control, and increasing the rifling effect at release which gives the implement greater stability in flight.

Joseph, G. & Lejeune, T.

Javelot: La phase finale du lancer [Javelin throw: The final stage of the throw]

E.P.S.: Education physique et Sport, Paris, 47 (septembre/octobre 1997), 268, pp. 17-19

Kelly, K.

Javelin 1986 style

Thrower, Solihull (Engl.) (May 1986), 35, pp. 32-35

Kerssenbrock, C.

Noch einmal zur Geradlinigkeit des Speerabwurfs [The "rectilinearity" of the javelin delivery revisited]

Die Lehre der Leichtathletik, Berlin, 23 (1972), 13, p. 488

Koltai, J.

Problems and techniques in the javelin throw

Track and Field Quarterly Review, Kalamazoo (Mich.), 84 (Spring 1984), 1, pp. 32-35

Kozlov, V.; Babnin, V.

Final effort in the javelin throw

Yessis Review, Fullerton (Calif.), 7 (June 1972), 2, pp. 36-38

The aim of this research was to find possible means of increasing the length of the final momentum of the javelin with effective realization of the speed-strength qualities of the thrower. The experiments carried out with a group of highly qualified javelin throwers showed significant oscillation of the length of the final effort pathway which was dependent upon the variability of the executed trials and likewise on the weight of the used resistance.

Kuznetsov, V. L.

Mastery of javelin throwing techniques

Track Technique, Los Altos (Calif.) (December 1960), 2, pp. 46-52

It is good if the javelin teacher is able to demonstrate a standard throw placing special emphasis on the thrust, on the position before the thrust, the direction of the thrust, and the fine points of the final effort. Consequently, the problems posed by these aspects of the javelin throw may be rectified and solved by the exercises presented in this article.

Lawler, P.

Developments in the javelin technique

Modern Athlete and Coach, Adelaide, 34 (1996), 2, pp. 12-17; also in: J. Jarver (ed.), The throws: Contemporary theory, technique and training (5th ed.), Mountain View, Calif.: Tafnews Press, 2000, pp. 174-179

The author takes a close look at the developments that have taken place in the javelin throwing technique since the introduction of the aerodynamic javelin in the 1950s and how the various approaches influence the technique needed for success in today's event.

Lawler, P.

The javelin – A unique throw

Modern Athlete and Coach, Adelaide, 22 (1984), 4, pp. 19-22; also in: J. Jarver (ed.), The throws (3rd ed.), Los Altos (Cal.): Tafnews Press, 1985, pp. 147-150, ISBN: 0-911521-17-8

The author looks at the technique fundamentals of the event, discussing various deviations that exist among world-class throwers and the views of internationally noted coaches.

Le Masurier, J. & Watts, D.

The javelin

In: J. Le Masurier & D. Watts, Athletics – field events, London: Black, 1977, pp. 78-87

A short description of the technique of javelin throwing including the holding of the javelin, the standing throw, the approach, and the throwing action.

Lee, S. S.

Probe on the effect for action observation upon javelin skills acquirement

In: S. S. Lee (ed.), Proceedings FISU/CESU Conference: The 18th Universiade 1995 Fukuoka, Japan – Sport and man: creating a new vision, 24, 25, 26 August 1995, Fukuoka, Organizing Committee for the Universiade 1995, 1995, pp. 394-395

Markov, D.

Javelin technique

Track Technique, Los Altos (Calif.) (March 1965), 19, pp. 603-607

The author examines rudimentary positions, which are characteristic for contemporary techniques of the javelin throw.

Matveyev, E.

Technique analysis of Miklos Nemeth in the javelin throw

Soviet Sports Review, Laguna Beach (Calif.), 15 (September 1980), 3, pp. 146-147

Maximov, R.

Attention: Error in the javelin throw

Soviet Sports Review, Laguna Beach (Calif.), 14 (March 1979), 1, pp. 8-10

Maximov, R.

Two common javelin technique faults

Track Technique, Los Altos (Calif.) (December 1976), 66, p. 2101

Using a special "tensometric" javelin and film data, the author, along with others at the Lenin Institute of Physical Culture, was able to determine the main technical shortcomings of some of the Soviet Union's best throwers. The two major flaws found were the absence of "rectilinear" (straight line – relative to the axis of the javelin) effort application, and the presence of "transverse" exertion during the final part of the throw.

Maximov, R.

Two mistakes: Javelin throw

Yessis Review, Fullerton (Calif.), 10 (June 1975), 2, pp. 39-41

Cinematographic data, along with analysis of a great number of throws utilizing a "tensometric" javelin conducted in the track and field department of the Lenin Inistitute of Physical Culture, has unveiled the main technical shortcomings – the absence of rectilinear (straight line – relative to the axis of the javelin) effort application, and the presence of "transverse" exertion during the final part of the throw.

Mazzalitis, V.

How to improve javelin throwing

In: J. Jarver, The throws, Los Altos, Calif.: Tafnews Press, 1980, pp. 135-138

The author looks into methods of improving the javelin throwing technique and lists several common faults, their causes and remedies.

McGill, K.

Analysis chart for the javelin throw

Track and Field Quarterly Review, Kalamazoo (Mich.) 82 (1982), 1, pp. 39-42

One sheet suffices to outline every major aspect of the throw. The author presents an extended rationale for the selection of words on the chart. The chart can be used for either live or film analysis.

Monneret, R. J.

Athlétisme – Lancer de javelot: Rebond du bras sur l'épaule [Track and field – The javelin throw: Rebound from the arm on to the shoulder]

E.P.S.: Education physique et Sport, Paris, 44 (mai/juin 1994), 247, pp. 38-40

Monneret, R. J.

Le javelot: Analyse du face avant le "temps d'épaule" [The javelin throw ...]

Révue de l'Amicale des Entraîneurs Français d'Athlétisme, Paris (janvier/mars 1998), 149, pp. 27-33

Morris, C.

Differences in throwing style between competitors at the 1994 European Championships men's javelin final

Thrower, Solihull (Engl.) (April 1996), 69, pp. 19-24

Morriss, C. & Jones, B.

Some thoughts on the development of technique. Part 3

Thrower, Stanmore (Engl.) (April 1999), 81, pp. 12-15

Moss, D.

Field events: Coaching cue for generating shoulder torque in the javelin

Physical Education Digest, Sudbury (Ont.), 18 (March 2002), 3, pp. 13-14

Provides coaching cue for timely release of the throwing arm in javelin.

No author

Javelot [The javelin]

Révue de l'Amicale des Entraîneurs Français d'Athlétisme, Paris (novembre/décembre 1981), 75, pp. 59-64, 65-70

This is a description of the technique of javelin throwing including a kinegram of a throw by Paragi (Hungary) and a chart showing typical trajectory faults, their causes and corrections.

Ogiolda, P.

Azyklische Aktionsschnelligkeit [Acyclic action velocity]

In: Württembergischer Leichtathletik-Verband (ed.), Seminarbericht Trainerseminar Schnelligkeit 3.-5. April 1993, Stuttgart, 1993, pp. 24-35

The author describes the javelin throw as a characteristic example of an acyclic movement exercise at a high level of velocity.

Ogiolda, P.

The javelin throw and the role of speed in throwing events

New Studies in Athletics, London, 8 (1993), 3, pp. 7-13; also in: Modern Athlete and Coach, Adelaide, 35 (1997), 4, pp. 13-17

The author presents an analysis of the different phases of the javelin technique and examines the importance of velocity in the final phase of the javelin throw.

Paish, W.

Analysis of European javelin throwers

Track Technique, Los Altos (March 1967), 27, pp. 848-849

This is a chart which includes the characteristic aspects of the throws performed by twelve world-class javelin throwers. The following technical points are covered: Length of run-up, position of carry, withdrawal strides from throw, type of withdrawal, hips during transition, type of cross-over, position of free arm, angle of right foot to throw on landing from X over, lean back, javelin alignment angle to horizontal, point of contact on landing from X over, position of body on landing from X over, angle of front leg to horizontal, position of release, recovery, time taken from center spot to release.

Paish, W.

Have techniques really changed?

Athletics Coach, Peterborough (Engl.), 30 (Spring 1997), 5, pp. 6-7

Paish, W.

Is the world record holder's technique necessarily the best?

Thrower, Solihull (Engl.) (December 1997), 76, pp. 20-23

Paish, W.

Javelin techniques of world-class performers

Track Technique, Los Altos (June 1966), 24, pp. 747-749

This study is not aimed at the conditioning methods for producing the "super athlete" but more a review of the techniques employed by world-class performers. Much of the information in this article has been obtained from questionnaires sent out to leading javelin throwers in Great Britain and Germany.

Paish, W.

Javelin throwing

In: W. Paish, Track and field athletics, London: Lepus Books, 1976, pp. 208-225, ISBN: 860-19-005-6

In technical terms the javelin thrower is concerned with three fundamental mechanical principles. They are: (1) The speed of release, (2) the angle of release, and (3) an aerodynamics factor mainly associated with flight stability. Far and away the most important single factor is the speed of release. Varying the angle of release and the angle of incidence of the javelin, several degrees, only brings about marginal differences in flight range. However, an increase in release speed of one foot per second can bring about a six feet improvement in flight range.

Paish, W.

Modern, yet not so modern, approach to javelin technique

Track Coach, Mountain View (Calif.) (2000), 152, pp. 4855-4856

This contribution questions the value of a rigidly locked front leg in javelin throwing.

Paraanen, A. & Pusa, L.

Javelin throwers in Helsinki

Modern Athlete and Coach, Athelstone (Aust.), 22 (July 1984), 3, pp. 38-40

The Finnish Athletic Federation appointed two coaches for every event to observe outstanding selected competitors prior to and during the world track and field championships in Helsinki in 1983. This article is a summary of the men's javelin observations, translated from the throwing section of the final report by the Finnish athletic Federation.

Pearce, H.

Javelin throwing in Canada

Track and Field Journal, Vanier City (Ont.), 14 (April 1982), p. 11

Piasenta, J.

Technique javelot [Technique of the javelin throw]

Révue de l'Amicale des Entraîneurs Français d'Athlétisme, Paris (Paris), 89 (octobre/novembre/décembre 1984), pp. 32-33

Pushkin, M. H.

Javelin: A practical approach

Athletic Journal, Chicago (Ill.), 60 (April 1980), 8, pp. 42, 68-69

The author holds that many of the recent articles on javelin throwing have failed to emphasize the aspect of practicality. The scientific approach is a necessary and integral part of coaching; however, many of the coaches who read track and field articles have neither the research background nor the available time that would allow them to grasp the concepts being purported in these articles. It is the author's goal to bridge the gap between researcher and practitioner.

Therefore, this article pursues a practical approach while discussing the major problems associated with coaching the javelin, and concentrates on the most basic and necessary techniques associated with the grip, the carry, the approach run, and the transition phase including the throw and follow-through.

Ranson, R.

A technique analysis of Scandinavian and Russian world class javelin throwers

Track and Field Quarterly Review, Kalamazoo (Mich.), 72 (1972), pp. 30-42

Rieder, H.

Zur Speerwurftechnik

In: M. Letzelter & N. Müller, Sport und Sportwissenschaft: Festschrift zum 65. Geburtstag von Prof. Dr. Berno Wischmann, Berlin: Bartels & Wernitz, 1976, pp. 71-80

Ruderman, G.

A fast arm – An advantage or shortcoming?

Modern Athlete and Coach, Adelaide, 38 (2000), 3, pp. 33-34

The author uses the old misconception of a "fast arm" in throwing events to discuss the importance of the release velocity of an implement achieved by a fast stretching and powerful recoiling of large muscle groups.

Salomon, H. & Hommel, H.

Speerwurf und Schlagball – ein Technikvergleich [The javelin and ball throw – a technical comparison]

Leichtathletiktraining, Münster, 10 (1999), 12, pp. 18, 19-23

Salomon, H.

Anlaufgestaltung beim Speerwurf [The run-up in the javelin throw]

Leichtathletiktraining, Münster, 10 (1999), 2/3, pp. 37-39

The importance of a technically sound run-up is demonstrated by the fact that the throwing distance is determined by the standing throw performance by two thirds and on the run-up by one third. Klaus Wolfermann, Olympic champion in 1972 and world-record holderin 1973, for example, could throw 60 m from the standing position and more than 90 m with an excellent run-up.

Schenk, H.

A disagreement with Harnes' theories

In: F. Wilt (Ed.), The throws: Contemporary theory, technique and training, Los Altos, Calif.: Tafnews Press, 1974, pp. 122-123; original German version in: Die Lehre der Leichtathletik, Berlin, 24 (1973), 23, p. 812

Harnes wrote that a good action by the left leg requires a long last step. From the author's observations, throwers get the best results when they do not use a long last step.

Shannon, K.

Javelin analysis

Track and Field Quarterly Review, Kalamazoo (Mich.), 73 (March 1973), pp. 34-40

Shannon, K., Brown, C. H. & Donins, J.

Javelin throw

In: V. Gambetta (ed.), Track and field coaching manual, West Point, N.Y.: Leisure Press, 1981, pp. 132-141

The javelin throw is one of the most complex events in track and field. It requires tremendous speed, agility, coordination and explosiveness. Due to the aerodynamic nature of the implement and its relative light weight, the event does not require great strength. The event does require flawless technique in order to achieve high level results. Contrary to what it appears to be, the javelin is not thrown with the arm. It is a total body action with the summation of the forces of the body resulting in a final whip-like fling of the throwing arm. The main goal of the javelin throw is to achieve maximum distance. This is accomplished through awareness of the fundamentals of the biomechanics of the throw, refined technique, and proper training methods. This chapter focuses on these components.

Simonyi, G.

Tailing the javelin

Track Technique, Los Altos (Calif.), 72 (June 1978), pp. 2281-2282

The high jump has its flop, the long jump its flip. Here, in a major revision in javelin technique, the author contends that a more efficient carry can be achieved if the javelin is not carried over the shoulder but tucked under the arm.

Sprecher, B.

Javelot: G. Kulcsar et M. Nemeth à l'I.N.S. et au C.R.E.P.S. de Strasbourg [Javelin: G. Kulcsar and M. Nemeth at the I.N.S. and the C.R.E.P.S. of Strasbourg]

Révue de l'Amicale des Entraîneurs Français d'Athlétisme, Paris (1977), 55, pp. 27-32

Sprecher, B.

Javelot: Les 100 m sont-ils possibles? [The javelin: Are 100 m possible ?]

Révue de l'Amicale des Entraîneurs Français d'Athlétisme, Paris (1983), 83, pp. 21-25

Sprecher, B.

Javelot: Travail technique en U. R. S. S. Stages à Leselidse, Georgie [Javelin technique training in the U. S. S. R.]

Révue de l'Amicale des Entraîneurs Français d'Athlétisme, Paris (1973), 39, pp. 31-33

Sprecher, B.

Le coude et l'avant-bras du lanceur de javelot [The elbow and lower arm of the

javelin thrower]

Révue de l'Amicale des Entraîneurs Français d'Athlétisme, Paris (1986), 95, pp. 11-15

Sprecher, B.

Les points fondamentaux au lancement du javelot [Fundamental points of javelin throwing]

Révue de l'Amicale des Entraîneurs Français d'Athlétisme, Paris (1985), 91, pp. 29-30

Sprecher, B.

Opération javelot: Le geste de base [Operation javelin: The basics]

Révue de l'Amicale des Entraîneurs Français d'Athlétisme, Paris (1972), 36, pp. 49-53

Sprecher, B.

Peut-il y avoir, encore, problème en technique du lancer de javelot? [Can there still be technical problems in the javelin throw ?]

Révue de l'Amicale des Entraîneurs Français d'Athlétisme, Paris (1985), 90, pp. 55-56

Sprecher, B.

Position desaxée du javelot [Unbalanced position of the javelin]

Révue de l'Amicale des Entraîneurs Français d'Athlétisme, Paris (1975), 48, pp. 31-33

Stasjuk, A

Metanie kopja: kak izbezat osibok? Special-no-podgotovitelnye i obscepodgotovitelnye upraznenija [The javelin throw: How can errors be avoided? Special and general preparatory exercises]

Legkaja atletika, Moscow (1993), 1, pp. 8-10

Stasjuk, A.

General and specific exercises for javelin throwers

In: J. Jarver (ed.), The throws: Contemporary theory, technique and training (4th ed.), Mountain View (Calif.): Tafnews, 1994, pp. 129-131, ISBN 0-911521-35-6

The author looks at some common technical faults observable among javelin throwers and presents a series of general and specific exercises aimed at improving technical efficiency.

Theiurmel, M.

A javelin observation

In: J. Jarver (ed.), The throws: contemporary theory, technique and training (3rd ed.), Los Altos, Calif.: Tafnews Press, 1985, pp. 151-155, ISBN: 0-911521-17-8

This is a short summary of the major technique phases of the javelin throw translated into an observation chart which emphasizes the major aspects of each of the phases.

Thieurmel, M.

Javelin observations

Modern Athlete and Coach, Athelstone (Aust.), 23 (January 1985), 1, pp. 33-36

This is a summary of the basic technique of the javelin throw with emphasis on the major aspects, summed up in an observation chart.

Tidow, G.

Model technique analysis sheets – Part X: The javelin throw

New Studies in Athletics, Monaco, 11 (1996), 1, pp. 45-62

In this very detailed analysis, the javelin throw is divided into three distinct yet smoothly connected phases – the cyclic part of the approach, the acyclic part and the final delivery. Referring to the cyclic part of the approach, the author describes the procedure generally adopted by top class throws, as regards posture, the carry of the javelin and the number of strides, and makes appropriate recommendations. For the acyclic part of the approach, consideration is given to the 'counting' and the rhythm (5 or 7 strides) and the withdrawal of the javelin, with a comparison between the Finnish and Swedish methods. The method and purpose of the intermediate and impulse strides leading to the 'power' position, are described. For the purpose of analysis of the delivery, various phases are described – from the 'support contact' to the 'bracing contact', from the bracing contact to the striking position, from the striking position to the release and from the delivery to the recovery. Finally the nature of the 'arm whip' is discussed.

Torim, H.

The javelin runup

Modern Athlete and Coach, Adelaide 26 (1988), Bd. 4, pp. 28-31; also in: J. Jarver (ed.), The throws: Contemporary theory, technique and training (4th ed.), Mountain View (Calif.): Tafnews, 1994, pp. 132-134, ISBN 0-911521-35-6

A detailed outline of the author's views on the javelin run-up, from the initial stages to the impulse stride and the pre-delivery position.

Tucker, E.

European technique

Athletic Journal, Chicago (Ill.), 55 (March 1975), 7, pp. 12, 94-95

Regarding form, there are two basically different types of throwers, the arm thrower and the body thrower. The arm thrower is generally the American who has a super strong arm that was developed by throwing a football or a baseball. With only a few days of basic training he can throw the javelin and throw it well in dual meet competition. The distance is almost directly related to his arm strength with form, as the Europeans see it, entering very little into the picture. This type of throwing almost dominates the javelin throwers of America's high schools and the majority of college throwers. The body thrower uses, as the term says, all of his body in a well-timed,

coordinated effort. This system is obviously better due to the addition of the powerful leg muscles, and hip, plus the lower and upper torso all acting before the arm. The arm, in this case, when it enters into the throw, is the "icing on the cake."

Tucker, E.

The javelin – Finnish style

Athletic Journal, Chicago (Ill.), 49 (February 1969), pp. 54, 91-92

The authors identifies the hip position as the main difference between the American and the Finnish style of javelin throwing.

Vigars, R.

Analysis of some critical performance factors for shot, discus and javelin events

Track and Field Quarterly Review, Kalamazoo (Mich.), 78 (Spring 1978), 1, pp. 3-4

The purpose of this paper is to identify common principles of technique and to highlight the most important factors in putting the shot, throwing the discus and throwing the javelin. Analysis of movements in this paper begins at the final throwing stance since this position is the most critical factor leading to success in the throwing events of track and field.

Vince, A.

Throwing rhythm and rules

Athletics Weekly, Peterborough (Engl.), 50 (29 May 1996), 22, pp. 32-33; also in: Thrower, Solihull (Engl.) (October 1996), 71, pp. 31-33

Wade, M. G.

A javelin refutation

Track Technique, Mountain View (Calif.) (March 1966), 23, pp. 728-731

The Fins consider that the right angle for the Held 80 meter javelin is 14°, with the pull straight. It is important to sink the hips into the throw, and keep them low, at least the right hip, right up to the actual release of the javelin. Also to keep the body low and enable the arm to do its job properly, the front knee must be allowed to bend to a marked extent, only as the arm passes over the foot does the leg begin to straighten. This is almost the complete opposite to the technique used in Britain, which is only suitable for throws up to 70 meters.

2 Biomechanics of the javelin throw

Ariel, G. B., Pettito, R. C., Penny, M. A. & Terauds, J.

Biomechanical analysis of the javelin throw

Track and Field Quarterly Review, Kalamazoo (Mich.) 80 (1980), 1, pp. 9-17

The purpose of the present study was twofold: 1. To quantify several javelin throwing performances, 2. to compare throws by some of America's top javelin throwers with the Montreal Olympic finalists. The various cinematographical data reveal two opposite styles of throwing which are currently being utilized: They generally employ either (1) large body twist-sideways runs or (2) limited body rotation-straight ahead runs. The Americans employed an approach which kept the saggital plane of the body perpendicular to the plane of the throw and they approached the release with as high an initial running velocity as could be attained. The Olympians, including Sam Colson, showed more rotational torque in their throws with Nemeth demonstrating the extreme twist. This rotational technique resulted from a slower running velocity prior to release and incorporated a greater twisting torque of the body during the preparatory phase. The rapid and more severe twisting of the trunk by the Olympic throwers produced higher velocities of the throwing hand during the release.

Ariel, G.

Computerized bio-mechanical analysis of the javelin

In: F. Wilt (Ed.), The throws: Contemporary theory, technique and training, Los Altos, Calif.: Tafnews Press, 1974, pp. 124-125; originally in: Track Technique, Mountain View (Calif.) (1973), 54

In the past, the kinetic analyses of the human body has been lacking specific analyses of forces. Today, with the use of high speed photography, anatomical data and knowledge of mechanics, forces and moments of force about each body joint may be calculated for an instantaneous position. The author has done this with the drawing of Janis Lusis which appears in conjunction with this article.

Bartlett, R. M. & Best, R. J.

The biomechanics of javelin throwing: a review

Journal of Sports Sciences, London, 6 (Spring 1988), 1, pp. 1-38

In this paper, the scientific literature relevant to javelin throwing is critically reviewed. A full discussion of the aerodynamics of the javelin is presented with due consideration of the change in pitching moment characteristics that the rules change had brought about. The uses and limitations of current computer programs for simulating javelin flight are profiled. Consideration is also given to the effects of wind velocity, air density, javelin weight and the flutter and spin of the javelin on its flight. The review further considers the optimization of release parameters, drawing upon computer simulations and field-based data. The effects of release speed, height, angle, angle of attack and pitch rate are assessed. The importance to successful performance of the grip, the run-up and transition phases, the cross-over and delivery strides are each reviewed. Finally, some prognoses as to the direction of future research for this complex throwing skill are offered.

Bartlett, R. M.

A cinematographical analysis of an international javelin thrower

Athletics Coach, Halesowen 17 (1983), 3, pp. 10-19

Bartlett, R. M.

The aerodynamics of javelin flight: a re-evaluation

In: L. Tsarouchas (Ed.) et al., Biomechanics in sports V: proceedings of the Fifth International Symposium of Biomechanics in Sports, held in 1987 at Athens, Greece, Athens, Hellenic Sports Research Institute, Olympic Sports Center of Athens, 1989, pp. 71-87

Bartlett, R.

Sports biomechanics – Reducing injury and improving performance

London: Spon, 1999, XIV, 276 pp., ISBN 0-419-18440-6

On pp. 202-210 the author deals with the optimal javelin release.

Bartonietz, K.

Biomechanical aspects of the performance structure in throwing events

Modern Athlete and Coach, Adelaide, 34 (1996), 2, pp. 7-11

The author presents his views on the theoretical and practical aspects of the biomechanical performance structure in throwing events, stressing the close relationship between technique and mechanical performance capacity.

Best, R. J. & Bartlett, R. M.

A critical appraisal of javelin high speed cinematography results using a computer flight simulation program

Ergonomics, London, 31 (1988), 11, pp. 1683-1692

Errors in javelin release parameters obtained from high-speed film analysis of real throws have been quantified in order to assess the accuracy of studies that assume a rigid body javelin model when measuring human performance characteristics. Human digitizing errors and the inadequate rigid body javelin model represent increments of up to 6 m in range as predicted by a computer flight simulation program. These errors result from difficulties in digitizing blurred javelin coordinates caused by large release speeds and javelin flutter. Errors in release-pitch rate are as high as 27.0. Digital filtering methods tend to underestimate translational and angular speeds such that errors in previous literature represent simulated range increments of up to 29 m. This is owing to the filtering methods interpreting high frequency flutter as noise. It is concluded that present methods in javelin film analysis are inadequate for measuring absolute values of release parameters and need to be revised. Accurate quantification is essential before simulation programs can be used in human performance perspective.

Carr, G.

Mechanics of selected sport skills

In: G. Carr, Mechanics of sport: a practitioner's guide, Champaign (Ill.): Human Kinetics, 1997, pp. 159-200, ISBN: 0-87322-974-6

Pages 172-173 of this chapter contain a description of javelin throwing technique and mechanics based on a kinegram.

Daqing, L.

A preliminary study on some kinematic characteristics of cross-stride and final exertion skills in Chinese male javelin throwers

Sports Science, Beijing, 11 (1991), 1, pp. 34-38

In this paper, skills of elite male javelin throwers at home and abroad were studied and compared by means of film analysis. Results show that the excessively higher and bigger lift of the cross-stride in Chinese javelin throwers is closely related to the upward position of their left shoulder and arm. It has also been discovered that there is an insufficient and improper sequence in Chinese throwers' final exertion.

Deroanne, R., Delhez, L., Loveruis, J. P. & Calotte, M.

Analyse biomécanique du lancer de javelot [Biomechanical analysis of the javelin throw]

Sport, Brussels (French version), 22 (January 1979), 1, pp. 5-7

Dörr, J.

Die trainingsmethodische Nutzbarkeit biomechanischer Messwertverläufe am Krafttrainingsgerät Speerwurf [The use of biomechanical measurements on the javelin strength training apparatus for training methods in javelin throwing]

Theorie und Praxis Leistungssport, Berlin, 27 (1989), 7, pp. 64-77

Dyson, G.

Throwing

In: G. Dyson, Dyson's mechanics of athletics (8th ed.). London et al.: Hodder and Stoughton, 1986, pp. 201-244

Pages 239-244 of this chapter deal with the javelin throw.

Ecker, T.

Javelin throwing

In: T. Ecker, Basic track and field biomechanics (2nd ed.), Mountain View (Calif.): Tafnews Press, pp. 149-156

Velocity of release is the most important factor contributing to the distance a javelin may be thrown. The aerodynamic lift on the javelin is proportional to the square of its velocity, making it possible to produce great increases in distance with relatively small

increases in release velocity. Obviously, then, the javelin thrower's main effort should be to develop a technique that will produce the greatest possible javelin velocity at release. The other contributing factors are the angle of release, the javelin's angle of attack, the effects of air resistance and (to a lesser degree) the height of release. The javelin thrower begins by imparting horizontal force to the javelin during the approach run, and then contributes vertical and additional horizontal forces during the delivery. The total effect of all the horizontal and vertical forces applied to the javelin determines its angle of release and its velocity of release. The mass of the thrower and the length of his levers have a great effect on the forces that can be applied to the javelin prior to release, as in the other throwing events. However, the thrower must be able to run fast with the javelin in order to generate the horizontal velocity necessary for long throws. And since the big muscles move more slowly than the smaller ones (and since the implement is not heavy), it is far more important for javelin throwers to be agile than to be bulky.

Flatten, K.

Biomechanics of the javelin throw

Track Technique, Los Altos (Calif.) (Winter 1980), 78, pp. 2483-2486

Track and field and gymnastics, along with most other sports, call for repeated demonstrations of the laws that govern velocity, projectile motion, force, momentum and many other mechanical principles. In applying these laws to the javelin throw, the author breaks the event into sections and brings out the important biomechanical considerations of each section. Several different styles are presented to reflect most of the past and current technique in the javelin throw. The sections of the event to be discussed are the run-up, transition steps, and the throw itself.

Fleisig, G. S., Barrentine, S. W., Escamilla, R. F. & Andrews, J. R.

Biomechanics of overhand throwing with implications for injuries

Sports Medicine, Auckland (N.Z.), 21 (June 1996), 6, pp. 421-437

Proper throwing mechanics may enable an athlete to achieve maximum performance with minimum chance of injury. While quantifiable differences do exist in proper mechanics for various sports, certain similarities are found in all overhand throws. One essential property is the utilisation of a kinetic chain to generate and transfer energy from the larger body parts to the smaller, more injury-prone upper extremity. This kinetic chain in throwing includes the following sequence of motions: stride, pelvis rotation, upper torso rotation, elbow extension, shoulder internal rotation and wrist flexion. As each joint rotates forward, the subsequent joint completes its rotation back into a cocked position, allowing the connecting segments and musculature to be stretched and eccentrically loaded. Most notable is the external rotation of the shoulder, which reaches a maximum value of approximately 180 degrees. This biomechanical measurement is a combination of true glenohumeral rotation, trunk hyperextension and scapulothoracic motion. Near the time of maximum shoulder external rotation (ERmax), shoulder and elbow musculature eccentrically contract to produce shoulder internal rotation torque and elbow varus torque. Both the shoulder and the elbow are susceptible to injury at this position. At ball release, significant energy and momentum have been transferred to the ball and throwing arm. After ball release, a kinetic chain is used to decelerate the rapidly moving arm with the entire body. Shoulder and elbow muscles produce large compressive forces to resist joint distraction. Both joints are susceptible to injury during arm deceleration.

Ganslen, R. V. & Hall, K. G.

Aerodynamics of javelin flight

Fayetteville, Ark.: University of Arkansas, 1960, vi, 101 leaves

Ganslen, R. V.

Javelin aerodynamics

Track Technique, Los Altos (Calif.) (December 1967), 30, pp. 940-943

The investigations of javelin aerodynamics encompassed in this paper have extended over a period of nine years. Prior to 1950, aerodynamicists evidenced little interest in objects shaped like a javelin or discus, but with the advent of the space age, missiles and lenticular shaped re-entry vehicles have attracted a great deal of attention. The behavior of the javelin or discus in flight is not essentially different from that of similarly shaped aerodynamics bodies designed to carry men or materials. Technically, the javelin is defined as a "body of revolution" and one uses entirely different concepts of air dynamics in considering bodies of this shape, which is referred to as "cross flow principles of aerodynamics". Only those techniques of throwing which have a direct influence on performance are included in this paper.

Gershi, J.

An analysis of linear and rotational javelin technique

In: G. G. Dales (ed.), Proceedings of the International Track & Field Coaches Association IX Congress, Santa Monica, California, July 30-August 2, 1984, Kalamazoo (Mich.): N. C. A. A. Division 1 Track Coaches' Association, 1984, pp. 100-106

Gregor, R. J. & Pink, M.

Biomechanical analysis of a world record javelin throw: A case study

International Journal of Sport Biomechanics, Champaign (Ill.), 1 (February 1985), 1, pp. 73-77

As part of an ongoing project to evaluate elite track and field throwers in the United States, the javelin competition was filmed during the 1983 Pepsi Invitational Track Meet. During this competition, Tom Petranoff's world record (99.72 m) was filmed at 200 frames per second. Subsequent frame-by-frame digitization yielded results consistent with reports in the

literature. Release velocity was 32.3 m/s and represents one of the highest values ever reported. Angle of release was .57r, javelin attitude at release was .64r, and angle of attack was .07r.

Harnes, E.

Forms of evaluation of biomechanical data and possibilities transferring those data into the training of javelin throwers

Thrower, Solihull (Engl.) (December 1991), 52, pp. 38-58; German original in: Die Lehre der Leichtathletik, Berlin, 29 (1990), 38, pp. 19-22; 39, pp. 19-22; 40, pp. 19, 22

Hay, J. G.

Javelin throw

In: J. G. Hay, The biomechanics of sports techniques (4th ed.), Englewood Cliffs, N. J.: Prentice-Hall, 1993, pp. 495-501

The basic factors determining the distance with which an athlete is credited in the javelin throw are the same as those that apply in the case of the discus throw: the speed, height, and angle at which the implement is released and the aerodynamic factors that influence its flight. Although the techniques used in the two events are vastly different, the only one of these basic factors that warrants further consideration is the last, the aerodynamic factors.

Helenberger, D.; Sanders, M. T.

Temporal analysis of the javelin runup

In: J. Jarver (ed.), The throws: Contemporary theory, technique and training (5th ed.), Mountain View, Calif.: Tafnews Press, 2000, pp. 155-163

The release velocity of the javelin throw is influenced by the run-up velocity of the thrower, as well as the velocity generated by the movements prior to the release. This study, attempting to find correlations among the various segments of the throw to the distance thrown, comes to the conclusion that, while a shorter release segment will result in a greater distance, individual run-up time segments differ considerably.

Hubbard, M. & Alaways, L. W.

Rapid and accurate estimation of release conditions in the javelin throw

Journal of Biomechanics, Oxford, 22 (1989), 6/7, pp. 583-595

The authors have developed a system to measure initial conditions in the javelin throw rapidly enough to be used by the thrower for feedback in performance improvement. The system consists of three subsystems whose main tasks are: (A) Acquisition of automatically digitized high speed (200 Hz) video x,y position data for the first 0.1-0.2 s of the javelin flight after release; (B) estimation of five javelin release conditions from the x,y position data and (C) graphical presentation to the thrower of these release conditions and a simulation of the subsequent flight together with optimal conditions and flight for the same release velocity. The estimation scheme relies on a simulation model and is at least an order of magnitude more accurate than previously reported measurements of javelin release conditions. The system provides, for the first time ever in any throwing event, the ability to critique nearly instantly in a precise, quantitative manner the crucial factors in the throw which determine the range. This should be expected to lead to much greater control and consistency of throwing variables by athletes who use the system and could even lead to an evolution of new throwing techniques.

Hubbard, M. & Bergman, C. D.

Effect of vibrations on javelin lift and drag

International Journal of Sport Biomechanics, Champaign (Ill.) 5 (1989), 1, pp. 40-59

The theory of crossflow aerodynamics is used to estimate the effect of thrower-induced vibrations on javelin mean lift and drag. Vibrations of all modes increase both lift and drag from the vibration-free condition. Percentage increases in lift and drag are largest at small mean angles of attack, large vibrational amplitudes, and large relative wind speeds. Thus the consequences of vibration effects on aerodynamics may be most significant for elite throwers.

Hubbard, M. & Laporte, S.

Damping of javelin vibrations in flight

Journal of Applied Biomechanics, Champaign (Ill.), 13 (1997), 3, pp. 269-286

Javelin vibrations in flight are caused by large forces applied transversely to the javelin's long axis during its acceleration. These decay throughout the early portion of the flight but can have substantial effects on aerodynamic lift and drag forces. Vibration decay is due to two main factors: aerodynamic dissipation and material, or hysteretic, damping. The relative contributions of these two factors are identified using theoretical models and laboratory experiments. With models for vibration decay, flight simulations can include realistic, if hypothetical, vibrational effects on the achievable range.

Hubbard, M. & Rust, H. J.

Simulation of javelin flight using experimental aerodynamic data

Journal of Biomechanics, Oxford, 17 (1984), 10, pp. 769-776

This paper discusses computer simulation of the differential equations which describe javelin dynamics in flight. It is shown that the use of experimental aerodynamic forces and moments in the equations is preferable to theoretical approximations for these forces and moments which have been used in previous studies. An example which is characteristics of a good throw is presented and analyzed and many interesting features of the trajectory are pointed out.

Hubbard, M.

Javelin trajectory simulation and its use in coaching

In: J. Terauds (ed.) et al., Sports biomechanics: Proceedings of ISBS 1984, Del Mar, Calif.: Research Center for Sports, 1984, pp. 41-51

Numerical simulation of the differential equations describing javelin flight is discussed. Many such simulations can map the initial condition space into range and can be used as a basis for determination of the optimal way to throw a javelin with given aerodynamic characteristics. Vibration-free trajectories can be assured by choosing the initial angle of attack so that the impulse misalignment angle is made zero. Deterministic range contours in the initial condition space may be used for the computation of best aim points if reliable and accurate estimates can be made of the stochastic variability of the thrower fr each initial condition. Feedback to the throwers of their performance will be necessary for them to be able to converge to aim points. Computer simulation also appears to hold promise in the design process for javelins of the future.

Hubbard, M.

Optimal javelin trajectories

Journal of Biomechanics, Oxford, 17 (1984), 10, pp. 777-787

A companion paper has treated computer simulation of javelin flight using measured lift, drag and pitching moments. In the present paper the author presents, categorizes and discusses the relative significance of various initial conditions in such a simulation. Since the differential equations describing flight are autonomous, the eventual javelin range and entry angle are unique functions of the initial conditions. A series of successively less constrained optimum solutions is defined, the last of which is the global optimum javelin trajectory. Sensitivities of these trajectories to perturbations from the optima and their implications for throwers are discussed. Finally, the author investigates the effects of some design and environmental parameters on optimal initial conditions and trajectories.

Hubbard, M.

Some essential features of successful computer simulation of human motion in biomechanics

Biology of Sport, Warsaw, 5 (1988), Suppl. 1, pp. 75-83

This paper discusses several more general and philosophical facets of computer simulation, and their application in biomechanics, including 1) the ideas of suitable model complexity, including the appropriate choices for muscular dynamics submodels, 2) the essential role of user-friendly software and operating systems in increasing the ability of the user to exchange information with and benefit from computer simulation-based programs, 3) the use of computer graphics in the communication of results to the ultimate users, and 4) the incorporation of computer laboratory and in the field. Two computer programs for analysis of the javelin throw are used to illustrate the several ideas.

Hubbard, M.

The throwing events in track and field

In: C. L. Vaughan (ed.), Biomechanics of sport, Boca Raton, Fla.: CRC Press, 1989, p. 213-238

Pages 227-236 deal with the biomechanics of the javelin throw, the focus being on the flight phase, the launch phase, and the new rules javelin.

Johnson, C.

Mechanical and bio-mechanical principles – Javelin

Athletics Coach, London, 22(March 1988), 1, pp. 26-28; (June 1988), 2, pp. 11-12

The initial velocity of the javelin is created through the preliminary phase of the approach run. Because of this, the event has possibly as much in common with long jumping as it has with the other throwing disciplines. Although the thrower's aim ought to be to add force during the delivery actions, it is often difficult to achieve this without a prior reduction in velocity. Technical proficiency must be geared towards minimizing, and even eradicating, such mistakes. The five most important contributions made to the range traveled by the javelin after delivery are: a) release velocity, b) angle of release, c) aerodynamic factors, d) height of release, and e) the gravitational constant.

Keller, J. B.

Mechanical aspects of athletics: Javelin throwing, weightlifting, rowing

In: S. P. Ladany & R. E. Machol (ed.), Optimal strategies in sports, Amsterdam, North Holland, 1977, pp. 186-187

Köllner, J., Dörr, J. & Wiese, G.

Der Einsatz von Mess- und Bürocomputertechnik am Krafttrainingsgerät Speerwurf zur Bereitstellung von Sofortinformationen im Training [The use of measurement and office computer technology at the javelin strength-training apparatus for the provision of instant information in training]

Theorie und Praxis Leistungssport, Berlin, 27 (1989), 7, pp. 54-63

LeBlanc, M. K. & Dapena, J.

Generation and transfer of angular momentum in the javelin throw

In: American Society of Biomechanics: conference proceedings of the 20th annual meeting, Georgia Tech, October 17-19, 1996, Atlanta, Georgia: American Society of Biomechanics, 1996, pp. 157-158

Maeda, M., Shamoto, E., Moriwaki, T. & Nomura, H.

Measurement of applied force and deflection in the javelin throw

Journal of Applied Biomechanics, Champaign (Ill.), 15 (1999), 4, pp. 429-442

The present paper presents a new sensor to measure 6 components of force and 2 components of deflection applied to the javelin during the throw. Since the javelin is deflected and vibrated during throwing,

measurement of force and deflection applied to the javelin will provide important information for throwers in how to better throw the javelin and to design javelins with better dynamic characteristics. The sensor is designed not to significantly change the static and dynamic characteristics of the javelin. The force sensor performs well in terms of linearity and crosstalk, and the javelin equipped with this sensor has similar characteristics to ordinary javelins. This paper also presents an example of measurement in the javelin throw.

Maier, K. D., Wank, V., Bartoniertz, K. & Blickhan, R.

Neural network based models of javelin flight: Prediction of flight distances and optimal release parameters

Sports Engineering, Oxford (Engl.), 3 (2000), 1, pp. 57-63

A model has been developed to predict the flight of javelins using a multi-layer-perception neural network. The input parameters to the model are three release angles and the velocity at release, while the output is the distance reached. The inputs and outputs were recorded and analyzed for 98 throws. The neural network model was found to predict actual flights of javelins to within 5 %, with a mean difference between the model and real throws of 2.5 %. The model was used to generate maps of distances reached for different combinations of release parameters. It was found that the most important parameter was the release velocity and that a moderate side angle of attack should be used to attain the longest throws to compensate for rotation of the javelin on release. For release velocities up to 27-28 m s-1 javelins should have an angle of attack about 1-3 degrees larger than the angle of release. For higher velocities this is reversed. In conclusion, the model can be used as a coaching aid to optimize athletes; throws during training and competition.

Mazzalitis, V.

Observation of javelin trajectory

Track Technique, Los Altos (Calif.) (Winter 1985), 91, p. 2908

This is an overview of faulty javelin trajectories, their effects, causes (faults at release), and their corrections.

McCoy, R. W., Whiting, W. C. & Gregor, R. J.

Fundamental mechanics

In: The Athletics Congress's Development Committee with Vern Gambetta (ed.), The Athletics Congress's Track and Field Coaching Manual (2nd ed.), Champaign (Ill.): Leisure Pr., 1989, pp. 147-152

The distance an object can be thrown depends on the following release parameters: Release velocity, release height, and release angle. Of importance are also: Gravity, the aerodynamic characteristics (form) of the object, environmental conditions (wind, air density), time patterns of the feet, and ground reaction force. The author illustrates the influence of these factors using the examples of the discus throw, javelin throw, and shot put.

Menzel, H. J.

Biomechanics of javelin throwing

New Studies in Athletics, Rome (1986), 3, pp. 85-89

The author here examines separately each of the four phases of javelin throwing, approach run, release, braking and flight of the javelin; having determined the biomechanical objective and the biomechanical factors of influence of each phase, he illustrates them and adds a number of training hints that may help to achieve the 'maximization of throwing distance' that every athlete pursues.

Menzel, H. J.

Biomechanik des Speerwurfs [Biomechanics of the javelin throw]

In: R. Ballreich & A. Kuhlow (eds.), Biomechanik der Leichtathletik, Stuttgart: Enke, 1986, pp. 110-120, ISBN 3-432-95311-9 (Biomechanik der Sportarten, 1)

Menzel, H. J.

Biomechanische Analyse der Stemmphase beim Speerwurf [Biomechanical analysis of the bracing phase in the javelin throw]

In: H. Letzelter, W. Steinmann & W. Freitag (eds.), Angewandte Sportwissenschaft, Clausthal-Zellerfeld: Dt. Verein. für Sportwiss., 1986, pp. 142-147, ISBN 3-923592-20-5 (dvs-Protokolle, 21)

Menzel, H. J.

Biomechanische Modellierung von Schlagwurfbewegungen [A biomechanical model of throwing movements]

Sportonomics, München, 1 (June 1995), 2, pp. 91-95

In terms of the analysis of technique of throwing movements a deficit can be identified concerning theory based research concepts as well as the use of deterministic models. For the movement of the javelin throw a 6-segment model of the javelin thrower, which consists of calf, thigh, hip axis, trunk, upper arm and forearm, was used to construct a deterministic model of the release velocity of the javelin. Variables of this model are the angles between the segments which define the relative positions and their angular velocities. The verification of the model was performed by comparison of the velocities determined by differentiation of the coordinates of the trajectory of certain joints with the velocities determined by application of the model. The verification of the model proves its sufficient precision for analyses of movement techniques. Optimizing this model by appropriate modifications leads to a wide field of applications for analysis of technique of various sports as volleyball, tennis etc.

Menzel, H. J.

Kinematische Affinität von Trainings- und Wettkampfwürfen im Speerwurf [Kinematic affinity between training and competition throws with the javelin]

In: H. J. Menzel & R. Preiß (eds.), Forschungsgegenstand Sport: Festschrift für Prof. Dr. Rainer Ballre-

ich, Frankfurt a. M.: Deutsch, 1990. S. 237-256, ISBN 3-8171-1169-X

Menzel, H. J.

Transmission of partial momenta in the javelin throw

In: B. Jonsson (ed.), Biomechanics X-B, Champaign, Ill.: Human Kinetics, 1987, pp. 643-647

The most important variable determining the distance of the flight in the javelin throw is its velocity of release. Some authors found correlations for velocity of release and distance of flight between 0.72 and 0.99. about 70% of this velocity results from the period between the lead foot contact and the release. During this period that lasts about 0.12 to 0.15 s, the velocity of the center of gravity of the thrower's body is reduced and partial momenta have to be transmitted from the lower limbs of the body to the forearm and the javelin. The purpose of this study was the identification of those parameters that adequately quantify the transmission of segmental momenta and determine the velocity of release.

Menzel, H. J.

Zur Biomechanik von Schlagwurfbewegungen: Empirische Untersuchungen am Beispiel des Speerwurfs [The biomechanics of overhead throwing movements: empirical investigations using the javelin throw as an example]

Frankfurt: Deutsch, 1988, 135 pp., ISBN 3-8171-1076-6 (Beiträge zur Sportwissenschaft, 9)

Mero, A., Komi, P. V., Korjus, T., Navarro, E. & Gregor, R. J.

Body segment contributions to javelin throwing during final thrust phases

Journal of Applied Biomechanics, Champaign (Ill.), 10 (May 1994), 2, pp. 166-177

This study investigated body segment contributions to javelin throwing during the last thrust phases. A 3-D analysis was performed on male and female javelin throwers during the finals of the 1992 Olympic Games in Barcelona. The subjects were videotaped from the right side of the throwing area by two NAC high-speed cameras operating at 100 frames per second. Both men's and women's grip of javelin and body center of mass displayed a curved pathway to the right from the left (bracing) foot during the final foot contact. The position of the body center of mass decreased at the beginning of the final foot contact, but after the decrease period it began to increase. Simultaneously with the increase, the peak joint center speeds occurred in a proper sequence from proximal to distal segments and finally to the javelin at release. Release speed correlated significantly with throwing distance in both males and females.

Milanovic, D., Mejovsek, M. & Hraski, Z.

Kinematic analysis of javelin release characteristics – A case study

Kinesiology, Zagreb, 28 (June 1996), 1, pp. 44-47

Many studies have recently dealt with the javelin throw in elite competitions such as Olympic Games and international competitions. Owing to them it has become possible to compare throwing techniques of any athlete with those achieved by athletes who, according to official results, rank as the best in the world. The purpose of this study was to compare javelin release characteristics performed by one Croatian athlete with those performed by the best male throwers in the 1992 Olympic Games in Barcelona. The achieved results have shown significant differences in numerous parameters: Javelin release angle, release velocities, knee and elbow angles, grip distance, as well as differences in timing of peak joint centers speed. Since those technical shortcomings significantly influence the distance of the throw, they should be corrected during the training process in order to increase the distance.

Miller, D. I. & Munro, C. F.

Javelin position and velocity patterns during final foot plant preceding release

Journal of Human Movement Studies, London, 9 (1983), 1, pp. 1-20

The purpose of this project was to investigate the feasibility of using a single motion picture camera and simple methods of analysis to study the position and velocity of the javelin during lead foot plant preceding release, and based on the resulting data, provide useful performance feedback to coaches and athletes. The result of this study indicated that athletes should be placing more emphasis on where they release relative to the foul line. It appeared that the combination of qualitative and quantitative feedback furnished by this study could assist coaches in improving performance.

Morris, C. L. & Barlett, R.

Kinematyczna analiza ruchu tulowia i konczyny gornej podczas rzutu oszczepem [Kinematic analysis of trunk and upper extremity movements in the javelin throw]

Sport wyczynowy, Warsaw, 35 (1997), 9-10, pp. 50-52

Morriss, C. J. & Bartlett, R.

Upper body movements in elite javelin throws

In: J. M. C. S. Abrantes (ed.), XIV Symposium on Biomechanics in Sports, June 25-29, 1996, Funchal, Madeira, Portugal: Proceedings, Lisboa: Edicoes FMH, 1996, pp. 232-235

Overhead throwing training exercises should enhance the athlete's ability to throw for distance because they replicate the stresses that are placed upon the body and thrower's actions when competing. Thus, in designing appropriate training exercises, and guidelines for the techniques involved in these exercises, it is necessary to accurately describe the thrower's movements when competing. Without this knowledge it becomes very difficult to prescribe relevant and correct training methods. The purpose of this study was to define the upper body movements

of a group of elite javelin throwers during the delivery phases of world class competitive throws. This was conducted to identify the body segment movements which appear to make the major contribution to the release speed of the javelin.

Morriss, C., Bartlett, R. & Fowler, N.

Biomechanical analysis of the men's javelin throw at the 1995 World Championships in Athletics

Track Coach, Mountain View (Calif.) (1999), 146, pp. 4661-4670

This paper presents an analysis of some of the best throws in the men's javelin final. For each throw, the release conditions are given, as is a technical breakdown of each athlete's movements. Certain technical factors which are considered fundamental to the throwing techniques of elite athletes, such as the hip and shoulder axes alignment, maintenance of a long acceleration path and the ability to block effectively were studied and full details are provided within the report. Notable findings include the medallists clear ability to generate the highest release speeds. However, the upper body movements used to produce these speeds varied considerably among throwers. For example, Backley utilized a high degree of shoulder extension to accelerate the javelin, whereas shoulder medial rotation and elbow extension appeared more important for Zelezny and Henry. Information about individual athlete's movement patterns when throwing in competition is useful to athletes and coaches in designing specific training exercises. This is because the muscles that each athlete uses to accelerate the implement should receive similar stresses when training. Without knowledge of an athlete's competitive throwing movement patterns this is a very difficult task.

Morriss, C., Bartlett, R. & Fowler, N.

Biomechanical analysis of the men's javelin throw at the 1995 World Championships in Athletics

New Studies in Athletics, Monaco, 12 (1997), 2/3, pp. 31-41; also in: Track Coach, Mountain View (Calif.) (Winter 1999), 146, pp. 4661-4670; Thrower, Solihull (Engl.) (July 1998), 78, pp. 18-31

This paper presents an analysis of some of the best throws in the men's javelin final at the 1995 World Championships held in Sweden. For each throw, the release conditions are given, as is a technical breakdown of each athlete's movements. Certain technical factors which are considered fundamental to the throwing techniques of elite athletes such as the hip and shoulder axes alignment, maintenance of a long acceleration path and the ability to block effectively were studied and full details are provided within the report. It was notable that all the medallists showed a definite ability to generate the highest release speeds. However, the upper body movements used to produce these speeds varied considerably between throwers. Therefore, the muscles that each athlete uses to accelerate the implement should receive similar stresses when training. Without knowledge of an athlete's competitive throwing movement patterns, this is a very difficult task.

Myers, B.

Review of the technical biomechanics literature in the javelin

Track and Field Quarterly Review, Kalamazoo (Mich.), 83 (1), Spring 1983, 47-51

This is a technical and biomechanical description of the approach, the power phase, and the follow-through and reverse of the javelin throw. The description is based on an analysis of the available specific literature.

Navarro, E., Campos, J., Chillaron, E. & Vera, P.

A method for determining the individual sport technique in javelin throwing based on a discriminant analysis

In: J. M. C. S. Abrantes (ed.), XIV Symposium on Biomechanics in Sports, June 25-29, 1996, Funchal, Madeira, Portugal: Proceedings, Lisboa: Edicoes FMH, 1996, pp. 228-231

Javelin throwing is a movement whose objective it is to reach the maximum velocity at the instant of release. Obviously, the height of the release speed depends on the preceding movements. The throwing phase begins with the last double feet contact and ends with the release of the javelin. During this short time, the greatest increase in javelin speed is produced. This movement phase is divided into two parts. During the first part, the thrower turns his hips and shoulders consecutively through the longitudinal axis of the trunk while the javelin should be kept backward so that the right shoulder, the upper arm and the elbow move upward and forward. At the end of this part an arched position must be reached. The kinetic energy of the thrower's body which is obtained during the approach run is stored as elastic energy in the earlier part and then released to accelerate the javelin in the later part, i. e. in the acceleration phase. The acceleration phase starts with the arched position and ends with the javelin release. The energy is restored starting with the trunk and followed by the upper arm, lower arm and the javelin. During the throwing phase the segments reach their maximum speed consecutively beginning with the proximal segments. The throwing pattern is therefore assumed to be based on kinetic energy transmission from one segment to the next. However, so far no quantitative relations between energy exchanges have been found which allow to establish, in an objective way, differences between throws of one object. Neither have there been any calculations of the kinetic energy of segments taking into account their six degrees of freedom. Therefore, the main objective of this study is to develop individual technique patterns based on the energy exchange among subjects. The resulting model should allow the objective assessment of performance.

Navarro, E., Campos, J., Vera, P. & Chillaron, E.

A kinetic energy model of human body applied to 3D-analysis of javelin throwing

In: Häkkinen, K. (ed.) et al., XVth Congress of the International Society of Biomechanics, July 2-6, 1995, Jyväskylä: Book of abstracts, Jyväskylä, University of Jyväskylä, 1995, pp. 668-669

Navarro, E., Campos, J., Vera, P. & Chillaron, E.

A procedure for determining the acceleration phase in javelin throwing

In: A. Barabas & G. Fabian (eds.), Biomechanics in sports XII: proceedings of the 12th symposium of the International Society of Biomechanics in Sports, Budapest: International Society of Biomechanics in Sports, 1995, pp. 357-359

Although it seems that the "arched position" is one of the most important factors in javelin throwing, the available literature does not include any information about the moment when exactly this position occurs. The objective of this work is to develop an upper limb model for calculating the instant at which the arched position is reached. This instant is considered as the moment when the maximum external rotation of the upper arm is produced.

Nigg, B., Roethlin, K. & Wartenweiler, J.

Biomechanische Messungen beim Speerwerfen [Biomechanical measurements in the javelin throw]

Jugend und Sport, Magglingen, 31 (1974), 6, pp. 172-174

Piron, A.

Analyse fonctionnelle du mouvement [Biomechanical analysis of movement]

E.P.S.: Education physique et sport, Paris (mars/avril 1987), 204, pp. 36-37

Rich, R. G., Gregor, R. J., Whiting, W. C., McCoy, R. W.

Kinematic analysis of elite javelin throwers

In: J. Terauds (ed.) et al., Sports biomechanics: Proceedings of ISBS 1984, Del Mar, Calif.: Research Center for Sports, 1984, pp. 53-60; also in: Track and Field Quarterly Review, Kalamazoo (Mich.) 86 (1986), 1, pp. 35-38

The purpose of this study was to assess the technique of America's top javelin throwers by examining kinematic measures which affect throwing distance. A secondary goal was to provide normative data on elite throwers. The results of the study suggest that no single kinematic parameter taken in isolation (e.g., release velocity) can predict distance thrown. Distance probably results more from a complex interaction between several different parameters, as well as the unknown wind factor. Women compared favorably with men regarding attack, release and attitude angles, but differed on release velocity and release height, due in part to body size and strength.

Rich, R. G., Whiting, W. C., McCoy, R. W., Gregor, R. J. & Ward P.

Analysis of release parameters in elite javelin throwers

Track Technique, Los Altos (1985), 92, pp. 2932-2934, 2947

The purposes of this study were to assess the technique of elite javelin throwers by examining kinematic measures which affect throwing distance, and to provide normative data on elite athletes. Unlike previous investigations, which have analyzed certain male athletes at specific competitions, the present study includes elite male and female throwers filmed over a 15-month period of time at major national competitions and selected throwing clinics. The following can be concluded from this study: (1) No single kinematic parameter taken in isolation (e.g., release velocity) appears to predict distance thrown. (2) Throwing distance probably results instead from a complex interaction between several parameters. (3) The attack, release and attitude angles observed in elite female throwers were similar to those in the males, but women's release velocity and height of release were significantly lower than those of the men, presumably due to differences in size and strength. (4) To optimize performance, javelin throwers should: (a) maximize release velocity, (b) maximize release height as is individually consistent with body structure and lateral trunk flexion, (c) minimize foot to foul line distance at release while still being able to stop the body's forward momentum without fouling. (5) The optimal angle of attack remains a subject open to debate. (6) While not measured here, aerodynamic (e.g., wind) factors logically play an important role in throwing performance and need further study.

Salchenko, I. & Smirnov, A.

Muscle activity in the javelin throw

Soviet Sport Review, 17 (September 1982), 3, pp. 110-113

The purpose of this study was to compare the muscle activity of skilled and beginning javelin throwers during the run-up steps and the final effort. Determination of coordination characteristics of throwers with different levels of preparation helps to identify typical technical errors, facilitates finding efficient ways of correcting these errors, and also precludes the emergence of errors during beginning instruction.

Schmucker, U., Warnemünde, R., Ritschel, M. & Hinz, L.

Digitaler Wurfspeer – Beschleunigungs- und Geschwindigkeitsmessung im Leistungssport [Digital javelin – measurement of the acceleration and velocity in competitive sport]

Leistungssport, Münster, 31 (September 2001), 5, pp. 32-34

In this article a new measuring system for the determination of the acceleration and velocity during the approach and release phase in the javelin throw is presented. From the point of view of the coach and

the sport scientist, first experiences with this measuring system, which is completely integrated into the javelin, are described and training-methodical possibilities, which are offered in the training process when using the measuring system in a purposeful way are discussed.

Simon, J., Valjent, Z. & Susanka, P.
Kinematograficka analyza hodu ostepem [Kinematographic analysis of javelin throwing]
Teorie a praxe telesne vychovy, Prague, 31 (1983), 6, pp. 347-356

Soong, T. C.
Biomechanical (analyses and applications) of shot put and discus and javelin throws
In: D. N. Ghista (ed.), Human body dynamics: impact, occupational, and athletic aspects, Oxford: Clarendon Press, 1982, pp. 462-497

Soong, T. C.
The dynamics of javelin throw
Journal of Applied Mechanics, 42 (June 1975), pp. 257-261

Sprecher, B.
Essai sur la trajectoire d'un javelot [A study of the javelin trajectory]
Révue de l'Amicale des Entraîneurs Français d'Athlétisme, Paris (1986), 97, pp. 43-45

Stojkov, S.
Biomehanicen analiz na finalnoto usilie pri kopiehvarljaci [Biomechanical analysis of the release phase of the javelin throw]
Vaprosi na fiziceskata Kultura, Sofia, 31 (1986), 10, pp. 13-17

Stojkov, S.
Kolicestvena ocenka na techniceskoto majstorstvo na kopiehvarlaca [A quantitative assessment of the technical skills of javelin throwers]
Vaprosi na fiziceskata Kultura, Sofia, 32 (1987), 2, pp. 17-21

Stojkov, S.
Zsledvane ritmovo-tempovata struktura na chvarljascite kracki pri kopiechvarljaci s razlicna kvalifikacija [Examination of the rhythm-tempo structure of the run-up of javelin throwers of different qualification]
Vaprosi na fiziceskata Kultura, Sofia, 34 (1989), 8, pp. 2-7

Stoykov, S., Slavtchev, A. & Kogas, T.
A study on the changes in potential and their influence on sports performance of javelin throwers of different levels (poster session)
Exercise and Society Journal of Sport Science, Komotini (2000), 25, p. 316

Tazuke, S., Wakayama, A. & Sakurai, S.
The final step: The relationship between run-up speed and trunk-forward action at the release phase in javelin throwers competing in the 1994 Asian Games and the 1991 World Championships
In: Häkkinen, K. (ed.) et al., XVth Congress of the International Society of Biomechanics, July 2-6, 1995, Jyväskylä: Book of abstracts, Jyväskylä, University of Jyväskylä, 1995, pp. 916-917

This study was undertaken to examine run-up speed and trunk-forward action used by javelin throwers in the 1994 Asian Games and the 1991 World Championships in Athletics.

Terauds, J.
Biomechanics of the javelin throw
Del Mar (Calif.): Academic Publ., 1985, 236 pp. (Science in sport series)

The author gives an overview of the technical and biomechanical characteristics of the individual movement phases of the javelin throw. The choice of the correct javelin and the javelin rules which have been in existence since 1979 are also dealt with.

Terauds, J.
Biomechanis of Tom Petranoff's javelin throw
Track Field Journal, Vanier City (Ont.) (1983), 23, pp. 28-29; also in: Thrower, West Midlands (Engl.), 28 (February 1984), pp. 10-13

The author analyzes several throws of the javelin world record holder Tom Petranoff including his world-record throw of 99.72 m. The emphasis of the analysis is on the biomechanics of the release.

Terauds, J.
Computerized biomechanical analysis of selected javelin throwers at the 1976 Montreal Olympiad
Track and Field Quarterly Review, Kalamazoo (Mich.), 78 (Spring 1978), 1, pp. 29-31

Terauds, J.
Javelin aerodynamics and ballistics
In: T.K. Cureton (ed.), Human performance: efficiency and improvements in sports, exercise and fitness, Reston, Va.: American Alliance for Health, Physical Education, Recreation, and Dance, 1985, pp. 576-580; French version in: Révue de l'éducation physique, Liège, 14 (June 1974), 2, pp. 205-212

Terauds, J.
Javelin release characteristics of expert throwers
Bulletin of Physical Education, London, 11 (1975), 3, pp. 21-22

A study of the relationship between the ideal, calculated release angle in the javelin throw and the concrete data of elite athletes, which were collected at an international meeting between the USA and the USSR.

Terauds, J.

Javelin release characteristics of U.S.A. and U.S.S.R. throwers – 1974

Track and Field Quarterly Review, Kalamazoo (Mich.), 78 (Spring 1978), 1, p. 42

Terauds, J.

Javelin release characteristics

Track Technique, Los Altos (Calif.), 61 (September 1975), p. 1945

According to aerodynamic research data, the release angle in the javelin throw should be a low 20°. In practice, however, top javelin throwers release at an angle far above that figure. To obtain more information on the actual release characteristics of top-flight javelin throwers, the author analyzed films of world-class throwers Janis Lusis and Janis Ziernis of Latvia, and Sam Colson and Fred Luke of the US, taken at the 1974 US-USSR dual in Durham.

Terauds, J.

Release characteristics of international discus and javelin throwers

Modern Athlete and Coach, Athelstone (Aust.), 14 (January 1976), 1, pp. 28-30

The author presents data on discus and javelin throw release characteristics obtained at the 1974 U.S. vs U.S.S.R. meeting at Durham, North Carolina.

Ueya, K.

The men's throwing events

New Studies in Athletics, Rome, 7 (1992), 1, pp. 57-65

41 athletes representing 25 countries entered the preliminary round of the men's javelin throw. Qualification for the final was set at 82.00 m (top 12 throwers). The event was won by Kimmo Kinnunen (FIN) with a throw of 90.82 m. Seppo Räty (FIN) took the silver medal and Vladimir Sasimovich (URS) the bronze. Of special note is the difference in the length of Räty's and Saimovich's approach runs: the former takes only 14 strides, whereas the latter takes 19. Furthermore, a close examination of the approach run of each athlete shows a marked variation in the length of the 'bounding' step preceding the cross-steps (the fifth-to-last of the approach). Kinnunen's step was notably long (3.76 m); Räty's almost a meter shorter; while Sasimovich's approach hardly displayed this particular characteristic. Kinnunen and Sasimovich display a similar tendency to hold the javelin at a more perpendicular angle during the last four strides before release, whereas Räty holds the javelin almost horizontally.

Viitasalo, J. T. & Korjus, T.

Messung der Abwurfgeschwindigkeit und des Abwurfwinkels beim Speerwurf [Measurement of release velocity and release angle in the javelin throw]

Leistungssport, Münster, 17 (August 1987), 4, pp. 39-41

A photoelectronic measurement system was developed for release and coaching purposes to measure the release angle and velocity for a javelin or ball thrown indoors. The system consists of two photocell gates of 12 and 18 separate photocells, respectively, mounted vertically and connected to a microcomputer. When the javelin was thrown through the two photocell gates at a mat hanging on a wall, it started a timer in the microcomputer upon reaching the first gate and stopped the time upon reaching the second gate. The computer was fed information about the position of a javelin tip at each gate. From this information the release angle and velocity were immediately calculated and shown on the monitor. The accuracy and reliability of the measurement system as determined by high-speed filming were found to be good. The system can be used for indoor coaching and for testing force-velocity characteristics using javelins of different masses.

Viitasalo, J., Mononen, H. & Norvapalo, K.

Release parameters at the foul line and the official result in javelin throwing

Sports Biomechanics, Edinburgh, 2 (January 2003), 1, pp. 15-34

Range in javelin throwing is determined by the release parameters and aerodynamic factors. The current study was designed to investigate the effects of release speed, release angle and uncorrected angle of attack measured at the foul line on the official javelin throwing result. The data were collected in international competitions for 26 elite male and 15 elite female javelin throwers (total 248 throws). Multiple regression models were constructed to predict the range of throw for a) individual throwers, b) a group of throwers using the mean value for each thrower in the analysis, and c) all individual throws registered for each gender separately. The data collection was carried out using a computerized photocell gate that consists of two invisible infrared walls two meters apart, perpendicular to the throwing direction. Release speed was found to have the highest correlation with the official throwing result. The three release parameters accounted for 56 % of the variance in the official result for the male and 51 % for the female throwers. For individual male and female throwers, the variance explained by the model was between 46 and 87 %. Among the individual male throwers an increase of 1 m/sec in the release speed from 29 to 30 m/sec was calculated to increase the official result between 2.12 to 6.14 m while among the female throwers the effect of increase from 24 to 25 m/sec in the release speed was from 2.25 to 3.68 m. The study emphasizes the importance of investigating javelin throwing biomechanics on an individual thrower basis.

Voronkin, V. I. & Maksimov, R. I.

Objective control of the sports: Technical mastery of javelin throwers (abstract)

Yessis Review, Fullerton (Calif.), 10 (June 1975), 2, p. 55

From the method worked out to control sports-technical mastery, it is possible to receive dynamic and kinematic characteristics immediately, during the process of throwing in the teaching-training session. Use of the specially constructed tenso-metric javelin allowed for complete and precise observation of the interaction between the thrower and the javelin during the final effort phase and for simultaneous registration of the support reactions and the kinematic parameters made it possible to study the different components of technique and their relationships and to determine the leading elements with dynamic and rhythmic emphasis. From the results of the study a biomechanical model of the technical execution of the final phase in the javelin throw was received which significantly eased the process of sports improvement in this track and field event.

Wank, V.

Vergleichende Analyse von DLV- und Weltspitzenathleten im Speerwurf [Comparative analysis of javelin throwers of the German Athletics Federation with world-class javelin throwers]

In: W. Gutewort, T. Schmalz & T. Weiß (eds.), Aktuelle Hauptforschungsrichtungen der Biomechanik sportlicher Bewegungen: 1. Symposium der dvs-Sektion Biomechanik vom 29.-31. Oktober 1992 in Oberhof/Thüringen, Sankt Augustin: Academia Verl., 1993, pp. 142-147, ISBN 3-88345-429-X (Schriften der Deutschen Vereinigung für Sportwissenschaft, 55)

The author presents the results of a video analysis of javelin throwers of the German Athletics Federation and world-class javelin throwers. The focus was on kinetic parameters such as the run-up velocity, release velocity, and release angle. The comparison shows the expected differences, which are also responsible for the different throwing distances.

Webb, B.

Basic principles related to the throws

Track and Field Quarterly Review, Kalamazoo (Mich.) 85 (1985), 1, pp. 5-6

The author gives an overview of the most important biomechanical principles in the discus, shot and javelin. Special focus is on the biomechanics of the release.

Whitbread, M.

Bio-mechanics of javelin throwing

Athletics Coach, Halesowen, 16 (December 1982), 4, pp. 8-12; also in: Track Technique, Los Altos (Calif.) (Summer 1983), 85, pp. 2710-2712

The distance a javelin travels depends on several factors: Speed of release, angle of trajectory and angle (or the "flight") of the implement. Each factor is examined by the author.

Whitbread, M.

Bio-mechanics of javelin throwing

Athletics Coach, Halesowen, 18 (1984), 2, pp. 31-32

The author emphasizes the importance of the biomechanical parameters release angle, run-up velocity, and air resistance in the javelin throw. Reasons for an optimal organization of the run-up and recommendations for the execution of the cross-step and the last stride are presented.

Witchey, R. L.

Factors influencing javelin performance

Track technique, Los Altos (Calif.) (June 1973), 52, pp. 1666-1667

Cinematographic techniques were used in conjunction with the BMD02R-Stepwise Regression computer program to determine the relationship between the mean horizontal distance attained in the javelin throw and: 1. the degree of body lean at the start of the power phase; 2. the horizontal velocity of the right iliac crest (right hip) during the power phase; 3. the angle of the javelin at the moment of release; 4. the difference between the angle of pull and the angle of the javelin at the moment of release; 5. the angle of the left knee joint at the moment of release; and, 6. the angle of the elbow joint of the throwing arm at the start of the power phase. The findings from the data provided by this study would appear to warrant the following conclusion: The horizontal velocity of the right iliac crest during the power phase was related positively to more advanced throws and was considered the most important factor influencing horizontal distance in the javelin throw.

Witchey, R. L.

Selected factors influencing performance in the javelin throw

Eugene, Oreg.: Univ. of Oregon, 1974. 1 fiche

3 The "new" javelin

Alford, J., MacWilliam, T., Lange, G. & Abdelmalek, E. H.

NSA round table: New events and development of events

New Studies in Athletics, London, 6 (1991), 3, pp. 13-16

One of the questions dealt with is: What effects have you noticed as a result of the recent changes to the men's javelin?

Arbeit, E.

Tendenzen der Entwicklung im Speerwurf der Männer nach dreijährigem Einsatz des Neuen: Analysen, Trends und Aussagen [Development tendencies in the men's javelin after three years of using the new javelin: Analyses, trends, and statements]

Leichtathlet, Berlin (1989), 19, pp. 8-10

Backley, S., Borgström, A. & Lawler, P.

Roundtable questions: New javelin for women

New Studies in Athletics, Aachen, 15 (September/December 2000), 3/4, pp. 33-35

The following questions are dealt with: (1) How do you judge the introduction of the "new" javelin for the women last season? (2) Do you think that the change of center of gravity by 3 cm was correct or too much? (3) Are you still using your old javelins in training? If yes, why do you use them? (4) How did biomechanical parameters like angle of release, or release velocity change? (5) What effects on technique and coordination did you experience with the new javelin? (6) Did you change the loading in strength and speed training? If yes, how did you change it? (7) What are your expectations on the performance development of the women's javelin throw?

Best, R. J. & Bartlett, R. M.

Aerodynamic characteristics of new rules javelins

In: Biomechanics in sport, London: Institution of Mechanical Engineers, 1988, pp. 33-40

Best, R. J. & Bartlett, R. M.

Javelin flight simulation for men's new rules and ladies' javelins coaching implications

Thrower, Solihull (Engl.) (39), Sept 1987, 26-27

Borgström, A.

Two years with the new javelin

New Studies in Athletics, Rome, 3 (March 1988), 1, pp. 85-88

The author briefly describes the tests and the experiments carried out by Swedish coaches and athletes in an effort to adapt the training content to the characteristics of the new implement.

Bremicker, E.

Why did the senior javelin specification have to be changed?

New Studies in Athletics, Aachen, 15 (September/December 2000), 3/4, pp. 29-31

The author explains why the IAAF Technical Committee decided to change the rules for javelin construction. He describes the problems concerning the kind of changes, the approval by various committees and the differences of changes between javelins for male and female throwers and its reasons.

Brown, H.

Javelin aerodynamics for the coach

Track Technique, Mountain View (Calif.) (Winter 1991), 118, pp. 3767-3769, 3781

This offering originated as a presentation given to the NCAA Division II Coaches Association in May, 1991. Dr. Brown, national chairman of the TAC Sport Science Committee, offers a summary of javelin rule changes and coaching responses to them in order to maximize performance.

Diddens, R. & Peetroons, L.

L'ancien et le nouveau javelot [Old and new javelin]

In: J. Boelte & J. L. Gastaldello (eds.), Les lancers: Rapport officiel/The throws: Official report (XIVe Congrès Fédération d'Europe des Entraîneurs d'Athlétisme/European Athletic Coaches Association, Aix-Le-Bains, 13-17/01/1987), Paris: A.E.F.A. (Amicale des Entraîneurs Français d'Athlétisme), 1987, p. 52 (Révue de l'Amicale des Entraîneurs Français d'Athlétisme, Paris (septembre/octobre 1987), 102) ; also in: Thrower, Solihull (Engl.) (38), May 1987, pp. 15-16

Based on the result of a project on javelin-testing, the authors think that there are no great differences in technique while throwing with the new javelin. Maybe there is a more pronounced projection of the throwing shoulder in the throwing direction, because it seems to be less important to hit the optimal angle of release exactly. So more attention can be given to the final acceleration of the javelin. For some throwers, there can be problems in reaching the same velocity at an higher angle of release. This results in an extra loss of distance. In general, there will be few changes on the international javelin throwing scene. The most important change is the disappearance of the influence of optimal circumstances on the throwing performance. Never again will the javelin start gliding far beyond the athletic capabilities of the thrower.

DiGiorgio, G.

Coaching insights for the new javelin

Track Technique, Los Altos (Calif.) (Summer 1988), 104, p. 3318

The author shares his insights into the effects of the new javelin and its performance implications

Duchateau, J.

Le nouveau javelot: Quelle trajectoire choisir? [Choosing the trajectory of the new javelin]

Sport: Communauté française de Belgique, Brussels (1987), 2/118, pp. 100-104

Glad, B.

The technical scene and the new javelin

New Studies in Athletics, Rome, 1 (1986), 3, pp. 13-16

The author juxtaposes the arguments which led to the change of the men's javelin in 1984 with the arguments of the critics of this decision. The juxtaposition shows that the change of the men's javelin was justified mainly because of safety reasons.

Held, D.

Proposed rule change on flat javelin landings

Track Technique, Los Altos (Calif.) (Winter 1980), 78, pp. 2478-2479

An innovator in javelin design (inventor of the Held javelin), the author offers a practical design alteration which would minimize flat landings.

Hubbard, M. & Alaways, L. W.

Optimum release conditions for the new rules javelin

International Journal of Sport Biomechanics, Champaign (Ill.), 3 (August 1987), 3, pp. 207-221

Changes in the rules for construction of the men's javelin have dramatically altered the pitching moment profile as a function of angle of attack. Thus the optimal release conditions are different for the new javelin. Optimal release conditions are presented for nominal release velocities in the range 20-35 m/s. Although the optimal release angle remains roughly constant near 30 degrees over this speed range, the optimal angle of attack and pitching angular velocity change substantially with speed. The main effects of the rule change have been (a) to decrease the achievable range at a nominal velocity Vn equals 30 m/s by about 10% by making it impossible to take advantage of the javelin's potentially large aerodynamic lift forces, and (b) to make the flight much less sensitive to initial conditions.

Jones, M.

The javelin event: A radical change

Athletics Coach, London, 19 (March 1985), 1, p. 31

At first glance the apparently minor modifications to Handbook rule 186 (paras 14-19) in the I.A.A.F. appear insignificant to the athletics enthusiast, but by pushing the center of gravity of the javelin 4 cm forward via altering the dimensions of the javelin's tail, the whole structure alters quite radically.

Julin, A. L.

The new Javelin: Effects on level of performance

New Studies in Athletics, Rome, 3 (1988), 1, pp. 75-84

The author compares 1986 year lists with similar lists for preceding years in order to observe the effects of the new implement on the performances achieved in the men's javelin throw. His observations lead him to the unexpected conclusion that the importance of technique in this discipline has greatly increased after the radical changes in the specifications of the men's javelin.

Moore, K.

Talk about a change of pace: The IAAF rewrote the rules to make the javelin safer, and now the event's practitioners can't throw it as far as they once could

Sports Illustrated, New York, 65 (28 July 1986), 4, pp. 52, 54, 56, 59

Ottley, D.

Les modifications de la technique avec le nouveau javelot [The modifications of technique with the new javelin]

In: J. Boelte & J. L. Gastaldello (eds.), Les lancers: Rapport officiel/The throws: Official report (XIVe Congrès Fédération d'Europe des Entraîneurs d'Athlétisme/European Athletic Coaches Association, Aix-Le-Bains, 13-17/01/1987), Paris: A.E.F.A. (Amicale des Entraîneurs Français d'Athlétisme), 1987, pp. 43-49 (Révue de l'Amicale des Entraîneurs Français d'Athlétisme, Paris (septembre/octobre 1987), 102)

Ottley, D.

Ottley on the new javelin

Thrower, Solihull (Engl.) (May 1987), 38, pp. 12-15

Paish, W.

Implications of the new javelin specifications

Athletics Weekly, Rochester (Kent), 39 (24 August 1985), 34, pp. 48-49

Paish, W.

Some initial observations on the new men's javelin

New Studies in Athletics, Rome (1986), 3, pp. 81-84

The new specification men's javelin, that is compulsory since April 1986, has been the subject of a number of discussions. In this article the opinion of a well-known and experienced coach, who illustrates his point of view, is presented.

Peukert, R.

Training and biomechanical factors in the development of the javelin throw technique (in accordance with the new regulation of the IAAF)

Track and Field Quarterly Review, Kalamazoo (Mich.) 37 (1987), 1, pp. 37-44

In 1984 it was decided at the IAAF Congress to change the dimensions of the men's javelin by transferring its center of gravity by 4 cm towards the metallic head. The official explanation was that this would prevent the javelin from sliding, while for safety reasons world records like Hohn's (104.80 m) would no longer be possible. In addition, decisions about admissible and invalid throws would be made easier and mistakes excluded. Against this background, some of the questions dealt with in this article are: (1) What changes will be needed in training techniques to achieve optimum throwing distances with the new javelins? (2) What are the design specifications of the best new aerodynamic javelins? (3) In view of the fact that they have now lost their "sliding" ability, what are the optimum throwing angles for the new javelins? (4) What kinetic changes should be pursued by the athlete in order to optimize the effects of the different factors?

Stephens, B.

A comparison of old and new javelin technique

IAAF Regional Development Centre Bulletin, Adelaide (Aust.) (1993), 4, pp. 17-19

Trower, J.; Pearson, S.; Ottley, D.

Constructive comment on the new specification for the men's javelin

Thrower, Solihull (Engl.) (April 1985), 32,pp. 26-29

Whitbread, F.

Letters to the editor

New Studies in Athletics, Rome, 3 (March 1988), 1, p. 26

The author expresses her lack of understanding for the fact that the IAAF is considering a change in the technical design of the 600 g javelin. Her arguments are that such a change would not only be very costly but there is also the chance of the women's javelin throw losing attractiveness.

4 Photo sequences and kinegrams of the javelin throw

Dmitrusenko, O. & Papanov, V.

Steve Backley and Victor Zaitsev: Javelin technique

Soviet Sports Review, Escondido (Calif.), 26 (September 1991), 3, pp. 127-130; Russian original in: Legkaja atletika, Moscow (1991), 3, pp. 20-23

A comparative analysis of the javelin throwing technique of the world-class throwers Steve Buckley (GB) and Victor Zaitsev (GUS) based on two picture sequences.

Geinitz, R.

Tasks of the javelin run-up (abstract of the author's original article in: Der Leichtathlet (September 1983), 37)

Modern Athlete and Coach, Athelstone (Aust.), 22 (July 1984), 3, p. 23

This article, evaluating photo sequences of three young female javelin throwers, lists the main tasks for each separate phase of the technique before suggestions are made how to correct the faults that have occurred.

Harnes, E.

Besprechung der Lehrbildreihe Nr. 1128 [Comment on photo sequence No. 1128]

Die Lehre der Leichtathletik, Berlin, 27 (1988), 22, pp. 734

Harnes, E.

Besprechung der Lehrbildreihe Nr. 1141, Speerwurf, Jan Zelezny (TCH) [Comment on photo sequence 1141, Javelin throw, Jan Zelezny (TCH)]

Die Lehre der Leichtathletik, Berlin, 29 (1990), 40, p. 22

Harnes, E.

Lehrbildreihe Nr. 1128: Speerwurf – Manuela Alizadeh [Photo sequence No. 1128: Javelin throw – Manuela Alizadeh]

Die Lehre der Leichtathletik, Berlin, 27 (1988), 22, pp. 732-733

The photo sequence shows a 63.40 m throw by the German javelin thrower Manuela Alizadeh.

Harnes, E.

Lehrbildreihe Nr. 643: Der Speerwurf – Björn Grimnes, Norwegen [Photo sequence No. 643: The javelin throw – Björn Grimnes, Norway]

Die Lehre der Leichtathletik, Berlin, 24 (1973), 22, pp. 774-775

The photo sequence shows a 81.66 m throw by the Norwegian javelin thrower Björn Grimnes.

Held, D.

Russian vs. American javelin styles

Scholastic Coach, New York, 39 (March 1970), pp. 16-18

Apart from the technical comparison, this article also includes a photo sequence and a form study of a throw by Janis Lusis.

Hommel, H.

Lehrbildreihe Nr. 915, Speerwurf, Bernadette Blechacz (Polen) [Photo sequence No. 915, javelin throw, Bernadette Blechacz (Poland)]

Die Lehre der Leichtathletik, Berlin, 30 (1979), 32, pp. 1172-1173

This sequence shows a throw of 60.28 m.

Hommel, H.

Lehrbildreihe Nr. 923, Speerwurf, Detlef Michel (DDR) [Photo sequence No. 923, javelin throw, Detlef Michel (GDR)]

Die Lehre der Leichtathletik, Berlin, 30 (1979), 42/43, pp. 1428-1429, 1434-1436; 44, pp. 1465, 1468

This sequence shows a throw of 82.94 m.

Hommel, H.

Lehrbildreihe Nr. 924, Speerwurf, Antero Puranen (Finnland) [Photo sequence No. 924, javelin throw, Antero Puranen (Finland)]

Die Lehre der Leichtathletik, Berlin, 30 (1979), 44, pp. 1466-1467

This sequence shows a throw of 83.48 m.

Hommel, H.

NSA photosequence 3 – Javelin throw: Fatima Whitbread (GBR)

New Studies in Athletics, Rome, 3 (March 1988), 1, pp. 94-100

This sequence shows Fatima Whitbread's winning throw at the 1987 World Championships in Athletics: 76.64 m.

Hommel, H.

Lehrbildreihe Nr. 1130: Speerwurf – Fatima Whitbread (GBR) [Photo sequence No. 1130, javelin throw, Fatima Whitbread (GBR)]

Die Lehre der Leichtathletik, Berlin, 27 (1988), 24, pp. 828-830

The photo sequence shows a 76.64 m throw of Fatima Whitbread at the 2nd World Championships in Athletics in Rome, 1987, where she took the gold medal.

Hommel, H.

Lehrbildreihe Nr. 1130, Speerwurf, Beate Peters (FRG) [Photo sequence No. 1130, javelin throw, Beate Peters (FRG)]

Die Lehre der Leichtathletik, Berlin, 27 (1988), 25, pp. 988-989

This sequence shows a throw of 68.82 m.

Hommel, H.

Lehrbildreihe Nr. 1141, Speerwurf, Jan Zelezny (TCH) [Photo sequence No. 1141, javelin throw, Jan Zelezny (TCH)]

Die Lehre der Leichtathletik, Berlin, 29 (1990), 40, pp. 20-21

Kovalakides, N.

Nemeth's 310-4 could have been 325-4

Scholastic Coach, New York, 46 (April 1977), 9, pp. 24-25, 98-101

Based on a photo sequence of Nemeth's 310-4 throw the author arrives at the conclusion that this throw was a most powerful one in its early stages, but then went on to lose some of its force by a deviation - left and right - from the direction of power.

Matveev, E.

Jorma Kinnunen in the javelin throw

Yessis Review, Fullerton (Calif.), 7 (March 1972), 1, pp. 12-15

This is a description of Kinnunen's javelin technique based on photo sequence.

Moogan, J.

Sequence analysis of Tom Petranoff

Thrower, West Midlands (Engl.) (April 1985), 32, pp. 22-25

Nett, E.

Lehrbildreihe Nr. 563: Der Speerwurf - Klaus Wolfermann (SV Gendorf) [Photo sequence No. 563: The javelin throw - Klaus Wolfermann (SV Gendorf)]

Die Lehre der Leichtathletik, Berlin, 22 (1971), 1, pp. 18-19

The photo sequence shows a throw by the German javelin thrower Klaus Wolfermann, German record holder and champion in 1970.

Nett, E.

Lehrbildreihe Nr. 575: Der Speerwurf - Klaus Wolfermann [Photo sequence No. 575: The javelin throw - Klaus Wolfermann]

Die Lehre der Leichtathletik, Berlin, 22 (1971), 17, pp. 630-631

The photo sequence shows a 79.64 m throw by the German javelin thrower Klaus Wolfermann.

Nett, E.

Lehrbildreihe Nr. 608: Der Speerwurf - Ewa Gryziecka, Polen [Photo sequence No. 608: The javelin throw - Ewa Gryziecka, Poland]

Die Lehre der Leichtathletik, Berlin, 23 (1972), 13, pp. 450-451

The photo sequence shows a 55.96 m throw by the Polish javelin thrower Ewa Gryziecka.

Nett, T.

Lehrbildreihe Nr. 753: Speerwurf - Hannu Siitonen (Finnland) [Photo sequence No. 753: Javelin throw - Hannu Siitonen (Finland)]

Die Lehre der Leichtathletik, Berlin, 26 (1975), 24, pp. 846-847

The photo sequence shows a 89.58 m throw by the Finnish javelin thrower Hannu Siitonen.

Paish, W.

Analysis of Petra Felke

Thrower, Solihull (Engl.) (October 1993), 59, pp. 17-20

Paish, W.

Photosequence analysis: Petra Felke (Germany)

Athletics Coach, Birmingham (Engl.), 27 (Autumn 1993), 3, pp. 15-17

Paish, W.

Sequence analysis of Tiina Lillak

Thrower, West Midlands (Engl.) (28 February 1984), 3, pp. 21-24

Ritzenthaler, J.

Kinogrammes de U. Hohn et T. Petranoff [Kinegrams of U. Hohn and T. Petranoff]

In: J. Boelte & J. L. Gastaldello (eds.), Les lancers: Rapport officiel/The throws: Official report (XIVe Congrès Fédération d'Europe des Entraîneurs d'Athlétisme/European Athletic Coaches Association, Aix-Le-Bains, 13-17/01/1987), Paris: A.E.F.A. (Amicale des Entraîneurs Français d'Athlétisme), 1987, pp. 69-73 (Révue de l'Amicale des Entraîneurs Français d'Athlétisme, Paris (septembre/octobre 1987), 102)

Schäfer, G.

Kommentar zur Lehrbildreihe Nr. 1130, Speerwurf: Beate Peters [Comment on photo sequence No. 1130, javelin throw, Beate Peters]

Die Lehre der Leichtathletik, Berlin, 27 (1988), 25, p. 987

Steben, R. E.

Javelin mechanics of two-time all-American

Shawn Burks

Scholastic Coach, New York, 52 (February 1983), 7, pp. 19-21, 56-57

This is an analysis of a photo sequence showing a throw by the American javelin thrower Shawn Burks.

Terauds, J.

Photo sequence: Tom Petranoff

Track Technique, Los Altos (Calif.) (Summer 1984), 89, pp. 2846-2847

An examination of the javelin form of American Tom Petranoff, who in May of 1983 at age 25 (6-1_/216) raised the World Record in that event to 327-2.

Trower, J.

Analysis of Zelezny and Backley

Thrower, Solihull (Engl.) (October 1998), 79, pp. 17-20

Trower, J.

Javelin sequence analysis

Thrower, Solihull (Engl.) (October 1995), 67, pp. 15-18

Trower, J.

Sequential analysis: Ferenc Paragi – 1980: 96.72m (WR)

Thrower, Solihull (Engl.) (May 1986), 35, pp. 27-30

Whitbread, M.

Kommentar zur Lehrbildreihe [Comment on photo sequence No. 1130]

Die Lehre der Leichtathletik, Berlin, 27 (1988), 24, p. 827

The author comments on a 76.64 m throw of her own at the 2nd World Championships in Athletics in Rome, 1987, where she took the gold medal.

Wilt, F.

Javelin: Hannu Siitonen

Track technique, Los Altos (Calif.) (March 1978), 71, pp. 2270-2271

This series of eight sequence photos of Hannu Siitonen of Finland was photographed June 26, 1977 at the "Saarijarvi Games," one of the most famous track and field competitions of the year in Finland. On this occasion, Siitonen threw 281-9.

5 Videos of the javelin throw

Australian Institute of Sport

World Cup Athletics, Canberra Australia 1985: Men's javelin

Belconnen, A.C.T.: Australian Institute of Sport with the assistance of Atlab Australia (1985?), 1 videocassette: col., 10 min

Biomechanical study of the men's javelin event at the fourth World Cup in track and field athletics in Canberra in 1985. Features a 96.96 m throw by Hohn of the G.D.R., an 87.4 m throw by Puuste of the Soviet Union and an 87.34 m throw by Petranoff of the USA. Three camera angles illustrate each throw by the eight competitors.

Australian Institute of Sport

World Cup Athletics, Canberra Australia 1985: Women's javelin

Belconnen, A.C.T.: Australian Institute of Sport with the assistance of Atlab Australia (1985?), 1 videocassette: col., 12 min

Biomechanical study of the women's javelin event during the fourth World Cup in track and field athletics in Canberra in 1985. Features a 66.80 m throw by Gavrilova of the Soviet Union and a 66.22 m throw by Felke of the G.D.R. Three camera angles illustrate each throw by the eight competitors.

Clarkson, B. & Ord, G.

Javelin; shot put; discus

Brisbane: Production Services Branch, Queensland Department of Education, 1983, 1 videocassette: sd., col., 46 min

Produced to support the teaching of throwing the javelin, the shot put and the discus in schools. Examines the skills and techniques involved in the three sports and provides coaching instructions, warm-up routines, practice drills and exercises.

Nemeth, M., Challis, D. & Maylam, T.

Javelin with Miklos Nemeth

London: Rediffusion Films, 1987, 1 videocassette: sd., col., 27 min.

Champion javelin thrower and coach, Miklos Nemeth instructs a group of young people in the technique of throwing the javelin. He covers warm-up, training drills and the correct technique. Produced for teachers, coaches and sports instructors of all levels, this program will also guide aspiring athletes of all ages.

No author

Track and field techniques: Javelin throw and hammer throw

Ann Arbor, Mich.: Mark Video, 1984, videocassette: col., 14 min

Footage of the javelin throw and hammer throw events at the United States Men's Olympic Trials and NCAA Championships, 1984. Featured athletes include Einar Vilhajalmsson, Tom Petranoff, Roald Bradstock and Steve Roller in the javelin throw and Bill Green, Ed Burke, Jud Logan and Albert Schoterman in the hammer throw.

Pickering, R. & Issacs, E.

The javelin

British Amateur Athletic Board (Engl.), Dan Productions (for) Guardian Royal Exchange Assurance, 1978, 1 videocassette: sd., col., 11 min.

Illustrates technique of correct javelin throwing and details essential training for the javelin athlete. Essentials to be learnt include the run-up rhythm and the

body positions for an effective throw. Illustrates common grips, and correct equipment. Athletes featured include Tessa Sanderson and Fatima Whitbread.

Togher, S.

Bill Dellinger's track & field fundamentals: Javelin

Eugene, Oreg.: Video Sports Network, 1995, 1 videocassette: sd., col., 28 min

The University of Oregon javelin coaching program is described by coach Stewart Togher. The basics of throwing techniques, how to start throwing training and the importance of teaching safety habits are described. Various conditioning exercises suitable for throwing are demonstrated including stretching, dynamic stretching, and, specifically for the javelin throw, running with an emphasis on good form. Togher then presents javelin techniques including the grip, target throwing, the release, the final steps, the approach-bounding-release, and the jog-approach-release. Various drills are demonstrated to reinforce these skills. The program concludes with advice on identifying potential javelin throwers.

6 Training, conditioning and coaching aspects of the javelin throw

Arbeit, E., Borgström, A., Johnson, C. & Sedykh, Y.

NSA round table 30: The role of speed in the throws

New Studies in Athletics, Monaco, 11 (1996), 1, pp. 11-16

The following questions are dealt with: (1) What particular sort of speed ability would you look for in a potential shot, discus, hammer or javelin thrower? (2) What sort of training do you consider most beneficial in the development of speed in the various throwing events? (3) In your opinion, what is the relationship between the various forms of strength and strength training and speed in the throwing events? (a) beginners, (b) advanced, (c) top level. (4) What tests would you recommend for the monitoring of speed development in the throws? (5) Do you believe that throwing with lighter weights than regulation implements is an effective way of developing speed for the throws?

Avellan, L.

Medicine ball exercises

Track and Field Quarterly Review, Kalamazoo (Mich.) 79 (1979), 4, pp. 56-59

This contribution consists of 45 pictures of medicine ball exercises for javelin throwers (no text).

Bakke, S.

Training of Trine Solberg (68.94 javelin): How have you trained the last two years, Trine?

Thrower, Solihull (Engl.) (May 1986), 35, pp. 18-20

Bartonietz, K. & Strange, D.

The use of Swiss Balls in athletic training – an effective combination of load and fun

New Studies in Athletics, Aachen, 13 (1998), 2, pp. 35-41

Swiss or Pezzi Balls are an effective training tool for increasing strength, improving joint and body stability and increasing joint flexibility. They are widely used in physiotherapeutic treatments and can be a part of each program in general training in athletics. Exercises with the Swiss Balls can be tailored to the specific demands of different competition movements. Top athletes, such as discus world champion Beatrice Faumuina, javelin thrower Gavin Lovegrove (both New Zealand), and Boris Henry (Germany), regularly use Swiss Balls in their training programs. Swiss Ball exercises can be executed at an advanced level in combination with exercises with rubber bands, or to complement a training program using weight machines and free weights. The exercises presented in this article are for beginners as well as advanced athletes.

Bartonietz, K. E.

Training of technique and specific power in throwing events

Modern Athlete and Coach, Adelaide, 32 (1994), 1, pp. 10-16

The author presents some biomechanical findings and their practical application in throwing events, including the problems in the use of heavy implements.

Beard, M.

How Kate Schmidt trains

Modern Athlete and Coach, Adelaide, 15 (October 1977), 4, p. 40

This is short description of the performance development and training of Kate Schmidt, bronze medallist in the javelin throw at the Montreal Olympics.

Bosen, K. O., Singh, H. & Sharma, V. S.

Comparison of physical fitness of Indian men javelin throwers with the international norms

Snipes Journal, Patiala, 7 (1984), 1, pp. 3-13

Beer, A.

Lancers lourds [Weight exercises for javelin throwers]

Révue de l'Amicale des Entraîneurs Français d'Athlétisme, Paris (novembre/décembre 1981), 75, pp. 82

This articles consists of 10 photos showing weighlifting exercises for javelin throwers.

Cantello, A.

The javelin throw

Track and Field Quarterly Review, Kalamazoo (Mich.) 80 (1980), 1, pp. 22

The author divides the training year of the javelin thrower into the basic phase (emphasis: intensive

strength and endurance training), the preparation or transition phase and the competition phase. Training contents are presented.

Dearmond, R. & Semenick, D. M.

The javelin throw: A kinesiological analysis with recommendations for strength and conditioning programming

National Strength and Conditioning Association Journal, Lincoln (Nebr.), 11 (1989), 2, pp. 4-7, 77-79

In the javelin throw, the human body is called upon to acquire momentum, produce torque, and ultimately to transfer momentum of effort to attain maximal displacement of the projectile. The distance of the throw is determined by the height and angle of the release point in adjunct to angular velocity of the javelin at the instant of release. A high release point in relation to the runway (with an angle of release not to exceed 45 degrees to the horizontal), and near-maximal force imparted to the projectile will afford the javelin more time in flight before it must succumb to the forces of gravity. Clearly, the taller, more powerful thrower will have a physical advantage over a shorter, less powerful opponent. For analytical purposes, the javelin throw is generally discussed in terms which illustrate four discernible phases: the run-up, the withdrawal, the cross-over, and the throw and follow-through.

Digiorgio, G.

Javelin training: The dynamic approach

Track Technique, Mountain View (Calif.) (93), Fall 1985, 2970-2973; also in: Track and Field Journal, Vanier City (Ont.), 26 (May 1984), pp. 25-28

The author discusses the linking of progressive skill development activities to performance in the javelin throw. There are many practical suggestions that are applicable to athletes at all levels of development.

Dupont Glineur, C.

Exemple de plan d'entraînement (javelot) [A model training plan for the javelin throw]

Révue de l'Amicale des Entraîneurs Français d'Athlétisme, Paris (novembre/décembre 1981), 75, pp. 85-87

Fiedler, K. M.

Kulcsar on the javelin

Track and Field Quarterly Review, Kalamazoo (Mich.) 81 (1981), 1, p. 38

Former Hungarian javelin champion and prominent coach Gergely Kulcsar believes that javelin throwers must be extremely fast, supple and relaxed. Muscular strength alone is not sufficient. "Less strength is often an advantage" claims Kulcsar, who places great emphasis on mobility, a well-established approach run and an excellent throwing technique. Kulcsar is also convinced of the extreme importance of the delivery angle in the javelin throw.

Figwer, U.

Strength training of young javelin throwers

In: F. Wilt (Ed.), The throws: Contemporary theory, technique and training, Los Altos, Calif.: Tafnews Press, 1974, pp. 110-111; originally in: Modern Athlete and Coach, 9 (January 1973), 1

The strength development of young javelin throwers must be based on all-around training with strict standards and restricted intensity. The methods of one-sided and often overemphasized strength work with weights, using exercises designed for weight lifters, should be avoided. It neglects several other important elements in training, needed for the general development of motor skills.

Foran, B.

Washington State University weight training and conditioning for the javelin

National Strength and Conditioning Association Journal, Lincoln (Nebr.), 5 (February/March 1983), pp. 43-44

The weight training consists of four phases: The conditioning circuit phase, the power circuit phase, the power phase, and the maintenance phase.

Fromm, J. R.

Javelin training programs

Athletic Journal, Chicago (Ill.), 51 (February 1971), pp. 64-65, 77-78

This article on training methods for javelin throwers has been excerpted from a master's thesis and is based upon the results of a questionnaire submitted to javelin throwers and coaches. Seventeen of the 20 throwers who had thrown over 250 feet in the period of 1956 through 1966 participated in the study. The track coaches questioned were those who had a thrower secure either a first, second or third in an NCAA meet or else at least two throwers who secured a fourth, fifth or sixth place in NCAA competition for the same period of years.

Fuchs, R.

Strength and javelin throwing

Thrower, Solihull (Engl.) (May 1990), 47, pp. 12-14

Giardino, J. J.

Séance de préparation spécifique pour lanceur de javelot [A specific preparatory session for javelin throwers]

Révue de l'Amicale des Entraîneurs Français d'Athlétisme, Paris (novembre/décembre 1981), 75, pp. 71-78

Giles, K. B.

Gymnastics exercises for vaulting and javelin

Athletics Coach, Halesowen, 12 (September 1978), 3, pp. 19-20

Giles, K. B.

More medicine ball exercises

Athletics Coach, London, 21 (1987), 3, pp. 10-12

The introduction of the medicine ball exercises presented in this article adds the ‚elastic' component to the conventional exercise regime plus some specificity, especially for javelin.

Giles, K.

Javelin training: The use of throwing balls

Athletics Coach, Halesowen, 12 (1978), 2, pp. 2-3

The author describes the use of balls of various weight in javelin training for the improvement of technique, agility, and throwing strength.

Gorchkov, A.

An unorthodox approach to javelin training

In: J. Jarver, The throws, Los Altos, Calif.: Tafnews Press, 1980, pp. 128-129

In this short article, Soviet coach Gorchkov explains his unorthodox approach to javelin training, emphasizing double-arm throws with overweight implements to maintain shoulder mobility and to avoid injury problems.

Haines, J.

Javelin interval training

Track Technique, Los Altos (Calif.) (March 1973), 51, p. 1638; also in: F. Wilt (Ed.), The throws: Contemporary theory, technique and training, Los Altos, Calif.: Tafnews Press, 1974, pp. 114-115

The author presents examples of interval workouts for javelin throwers with the Exer-Genie, which is a small cylinder through which a nylon rope is pulled by the athlete.

Hanebuth, O.

Diskus- und Speertraining mit Eisenring [Discus and javelin exercises with iron rings]

Turnen und Sport, 54 (1980), 7, pp. 154-155

Harnes, E.

Zum Krafttraining im Speerwurf [Strength training for javelin throwers]

Die Lehre der Leichtathletik, Berlin, 25 (1974), 30, p. 1056; 31, pp. 1125-1128

Immonen, L.

Javelin training in Finland

Modern Athlete and Coach, Adelaide (Aust.), 17 (October 1979), 4, pp. 9-13; also in: J. Jarver, The throws, Los Altos, Calif.: Tafnews Press, 1980, pp. 122-127

The author, national coach of the Finnish javelin throwers, describes Finnish javelin training procedures.

Immonen, L.

Training for the javelin in Finland

Track and Field Quarterly Review, Kalamazoo (Mich.), 78 (Spring 1978), 1, pp. 32-38

Jianrong, C.

A study of major training loads for five elite women javelin-throwers in a half-year cycle

Sports Science, Beijing, 10 (1990), 4, pp. 33-36

Three sorts of training loads (weight training, supplementary instrument throwing, and actual javelin throwing) used by five Chinese elite women javelin throwers during a half-year cycle and their overall influence upon javelin training intensity were studied by means of dynamic analysis. The results showed that a) the alternation of the three loads is generally in accordance with the theoretical load change required in a macro-cycle, yet the supplementary instrument training needs to be more specialized; b) the accumulative effect of the total load as well as the follow-up effect of the top-load period may probably be the cause of the sudden increase of training intensity appearing at the beginning of the competition season.

Johnson, C. T.

Strength loadings in phases of training

Athletics Coach, Halesowen, 12 (March 1978), 1, pp. 23-29

Jones, M.

Fatima – the way she trains

Thrower, Solihull (Engl.) (December 1987), 40, pp. 24-26

Jones, M.

So trainiert Fatima Whitbread [The training of Fatima Whitbread]

Die Lehre der Leichtathletik, Berlin, 27 (1988), 21, pp. 797-798

Karataev, N.

Bez metanij – net metanij [The javelin throw requires a lot of throwing exercises]

Legkaja atletika, Moscow (1990), 5, pp. 16-19

Karatajev, N.

Some observations about javelin training

Modern Athlete and Coach, Adelaide, 29 (1991), 3, pp. 7-10; also in: In: J. Jarver (ed.), The throws: Contemporary theory, technique and training (4th ed.), Mountain View (Calif.): Tafnews, 1994, pp. 123-125, ISBN 0-911521-35-6; Thrower, Solihull (Engl.) (April 1995), 65, pp. 18-22

This text looks at the methods and means employed in the training of junior javelin throwers at the Volgograd Sports School.

Koch, B.

Zum Leistungsprofil im Speerwurf: Eine komplexe Leistungs- und Bewegungsanalyse zur Auswirkung spezifischer Trainingsbelastungen auf das Wettkampfverhalten von Speerwerfern und zur Bedeutung verschiedener Wurfgeräte im Techniktraining im Hinblick auf die Bewegungsstruktur der Wettkampfdisziplin [About the performance profile in the javelin throw: A complex performance and movement analysis concerning the effects of specific training loads on the competition behavior and the importance of various throwing implements in

technique training regarding the movement structure of the competition discipline]
Cologne: Strauß, 1985, VI, 256 pp., ISBN 3-89001-024-5

Konstantinov, O.
Training of top javelin throwers
Modern Athlete and Coach, Adelaide (Aust.), 18 (January 1980), 1, pp. 32-36; also in: J. Jarver (ed.), Throws, Los Altos, Calif.: Tafnews Press, 1980, pp. 117-121, under the title: "Training of highly qualified javelin throwers"

The author presents a theoretically ideal model of world-class javelin throwers and discusses training methods to develop strength, power and throwing ability.

Konstantinov, O.
Training program for high level javelin throwers
Soviet Sports Review, 14 (September 1979), 3, pp. 130-134; (December 1979), 4, pp. 203-207; 15 (March 1980), 1, pp. 37-40; (June 1980), 2, pp. 62-65

Konstantinow, O.
Die Trainingsstruktur von Speerwerfern der Spitzenklasse [The training structure of top-level javelin throwers]
Die Lehre der Leichtathletik, Berlin, 30 (1979), 42/43, pp. 1425-1427, 1434-1436; 44, pp. 1465, 1468

Koslov, V.
Transfer of varied resistance training in javelin throwing
Modern Athlete and Coach, Adelaide (Aust.), 12 (April 1974), 3, pp. 35-36

Kovacs, E.
Complex development of strength, velocity and technique of young javelin throwers
New Studies in Athletics, Rome, 2 (1987), 1, pp. 43-45

This paper was presented at the European National Olympic Committee (ENOC) International Seminar on "New Trends in Training Methodology in Athletics", held in Formia, Italy, on the 25th and 26th April 1986. The author gives a classification of the exercises for the development of strength, speed and technique in young javelin throwers; he also illustrates the use of the so-called specific exercises to develop their technical skills.

Kozlov, V.
Varied resistance training in javelin throwing
In: J. Jarver (ed.), Throws, Los Altos, Calif.: Tafnews Press, 1980, pp. 117-121

The author discusses velocity changes in the delivery of varied weight implements in training and how it can change the action pattern with the competitive weight javelin. The article explains why large deviations in under- and over-weight should be avoided.

Lambert, T. K.
Study to compare two methods of conditioning the trunk flexor muscle groups used in the javelin throw
Eugene, Oreg.: Univ. of Oregon, 1967, 2 fiches

Leroy, S.
L'échauffement et le renforcement du coude [Warm-up and strengthening of the elbow]
Révue de l'Amicale des Entraîneurs Français d'Athlétisme, Paris (novembre/décembre 1981), 75, pp. 79-80

The author presents exercises for warming up and strengthening the javelin thrower's elbow.

Liebenberg, T.
Medicine ball training for the javelin thrower
Thrower, Solihull (Engl.) (December 1998), 80, pp. 20-22

Liset, G.
Circuit training with Tom Petranoff
Track Coach, Mountain View (Calif.) (2000), 150, pp. 4777-4779

This account is a very practical look at the training done by one of America's best-ever javelin throwers.

Milenski, M.
Problemi na techniceskata podgotovka v disciplinata chvarlane na kopie [Problems of technique training in the javelin]
Vaprosi na fiziceskata Kultura, Sofia, 33 (1988), 9, pp. 20-23

Milenski, M.
Usavarsenstvane upravlenieto na trenirovacnija proces pri visokokvalificirani kopiehvarljaci [Perfecting the management of the training process of highly skilled javelin throwers]
Vaprosi na fiziceskata Kultura, Sofia 32 (1987), 6, pp. 6-9

Milenski, M.
Vrazkata na rezultata v chvarlaneto na kopie s njakoi silovi pokazateli [Relationship between several strength characteristics and the javelin performance]
Vaprosi na fiziceskata Kultura, Sofia 22 (1977), 5, pp. 221-225

Milenski, M.
Za po-natasno usavarsenstrovane upravlenieto na trenirovacnija proces pro visokokvalificirani kopiechvarijaci [Towards the further perfecting of the management of the training process of highly skilled javelin throwers]
Vaprosi na fiziceskata Kultura, Sofia 32 (1987), 9, pp. 12-17

Molina, F.

Duncan Atwood

Track Technique, Los Altos (Calif.) (Winter 1978), 74, pp. 2362-2363

Description of the training and performance development of US javelin thrower Duncan Atwood.

Morrow, J. R., Disch, J. G., Ward, P. E., Donova, T. J., Katch, F. I., Katch, V. L., Weltman, A. L. & Tellez, T.

Anthropometric, strength, and performance characteristics of American world class throwers

Journal of Sports Medicine physical Fitness, Turin, 22 (1982), 1, pp. 73-79

Anthropometric, strength, and performance data were evaluated for 49 American discus, hammer, javelin throwers, and shot putters who participated in a pre-Olympic Training Camp. Comparisons between event participants indicated they differed significantly on the anthropometric and strength variables but were alike in terms of motor performance variables. Correlational analysis revealed that upper body strength correlated R =/> .60 with performance for discus throwers; fat weight correlated r = -.80 with hammer performance, and leg strength correlated r = .72 with shot put performance. For the javelin throwers, none of the anthropometric, strength, or motor performance variables were significantly related to event performance.

Myers, B.

A year-round training program for javelin throwers

Track and Field Quarterly Review, Kalamazoo (Mich.) 81 (1981), 1, pp. 36-38

The author develops a yearly training plan for javelin throwers taking into account training principles and forms. The training is divided into an off-season, a pre-season or fall workouts and a competitive season. The training load and frequency as related to strength, conditioning and technique training during the individual phases is presented.

No author

How Manfred Rohkamper trains

Modern Athlete and Coach, Adelaide (Aust.), 14 (July 1976), 4, pp. 30-32

The Australian javelin champion Manfred Rohkamper was born in Dortmund, Germany, on May 18, 1954. He competes for the Box Hill club in Melbourne and reached 70 meters at the age of 18. He threw 77.74 m in 1975. Rohkamper trains without a coach.

No author

L'entraînement [Training]

Révue de l'Amicale des Entraîneurs Français d'Athlétisme, Paris (novembre/décembre 1981), 75, pp. 81, 83-84

This articles describes the principles of javelin training and gives advice on nutrition.

No author

Tina Lillak (Finland) – her training programme 1981-2

Thrower, West Midlands (Engl.), 28 (February 1984), pp. 25-27

Noah, P.

Javelin training of Bill Schmidt

Track and Field Quarterly Review, Kalamazoo (Mich.) 71 (1971), pp. 84-88

O'Shea, J. P.

Quality strength training for optimal performance in the discus, javelin, shot and hammer throw

In: E. J. Burke (ed.), Toward an understanding of human performance (2nd ed.), Ithaca, N.Y.: Mouvement Publications, 1980, pp. 267-277

Summary guidelines for super quality strength training (SQST) for the throwing events: (1) Total commitment and dedication to SQST methods throughout one's competitive career. (2) Proper rest and nutrition. (3) Development of good concentration and unlimited self-confidence. (4) Overall level of strength fitness acquired through associated strength-building activities (i.e., gymnastics, intense cycling and running). (5) A strength training program established on a sound physiological and technical basis. (6) The application of scientific principles and methods of strength fitness training to achieve maximal dynamic force capacity. Achievement of maximal dynamic force capacity depends upon: (a) The strength athlete investing his time in training methods which help him to achieve optimal competitive performance. This involves sustaining full range multiple body joint free weight exercises (i.e., power cleans/snatches, high pulls, full squats, and either bench or incline press) – not machine training. (b) Speed of movement in performing the exercises with maximum or near maximum loads. (c) Intensity of training which is based upon proper selection of repetitions, sets and loads as related to one repetition maximum (1-RM); and the number of training sessions per week and per month. (d) Maintaining a balance between increasing dynamic strength and one's throwing technique.

O'Shea, P.

Super quality strength training for the elite athlete: Shot put, discus, javelin and hammer throwers

Track and Field Quarterly Review, Kalamazoo (Mich.) 79 (1979), 4, pp. 54-55; also in: J. Terauds & G. G. Dales (eds.), Science in athletics, Edmonton: International Congress of Sports Sciences, 1978, pp. 145-152

For field event athletes – shot putters, discus, javelin and hammer throwers – aspiring to excel in international competition, a high level of strength fitness is essential. Super quality strength training is composed of both fast moving and slow moving weightlifting exercises. Fast moving exercises

involve the employment of large muscle groups, multiple joint action, full range isotonic exercises using maximum or near maximum loads. Specific weightlifting exercises that meet these criteria are power cleans, power snatches, and high pulls. Slow moving exercises work isolated muscle groups through a limited range of body movement with heavy loads and very little speed and are referred to as "power exercises". Weightlifting exercises falling into this category are pressing movements (bench and incline press), squats, deadlifts (regular and rounded back), and "functional isometrics". Functional isometrics as a strength training concept incorporate both isotonic and isometric muscle contraction into a unified movement. The nature of this type of weight training requires the athlete to generate maximum dynamic force capacity in one explosive effort and then to sustain this effort isometrically for a short duration (3-5 sec). Super quality strength training also involves the task of establishing a productive training intensity. This is based upon the proper selection of repetitions, sets, and loads as related to the athlete's one repetition maximum (1-RM) in the individual lifts and the number of workout sessions per week (usually four).

Osolin, M. & Markow, D.

Jahrestrainingsplan für Speerwerfer (68- bis 70-m-Klasse) [Training program for javelin throwers (68-70 m category)]

Die Lehre der Leichtathletik, Berlin, 26 (1975), 24, pp. 845-848

Paish, W.

Javelin conditioning

Athletics Weekly, Rochester (Engl.), 41 (19 November 1987), p. 8

Paish, W.

Javelin training

Athletics Weekly, Peterborough (Engl.), 48 (May 1994), pp. 46-47

Paish, W.

The training of javelin throwers – a proven formula

Athletics Coach, Halesowen, 17 (1983), 1, pp. 3-12

The author divides the yearly training of javelin throwers into six stages and illustrates the contents of these stages by means of exemplary weekly training plans.

Paish, W.

The use of the basketball as a training aid for the javelin thrower

Carnegie Research Papers, Beckett Park (Leeds), 1 (December 1984), 6, pp. 19-21

Paish, W.

Training for javelin

Thrower, Solihull (Engl.) (October 1994), 63, pp. 4-6

Pedemonte, J.

Specific conditioning for javelin throwers

J. Jarver (ed.), The throws: contemporary theory, technique and training (3rd ed.), Los Altos, Calif.: Tafnews Press, 1985, pp. 156-158, ISBN: 0-911521-17-8

A series of suggestions to improve specific conditioning for javelin throwers. The author looks at exercises to develop the run-up and delivery phases with detailed tables of the distribution of specific exercises.

Ranson, R.

Sample training program for javelin throwers

Track and Field Quarterly Review, Kalamazoo (Mich.), 78 (Spring 1978), 1, pp. 43-45

Rieder, H. & Wolfermann, K.

Speerwurftraining [Training for the javelin throw]

Die Lehre der Leichtathletik, Berlin, 25 (1974), 12, pp. 441-444; 13, pp. 477, 480

Rieder, H.

Rahmentrainingsplan für Speerwerfer [General training plan for javelin throwers

Die Lehre der Leichtathletik, Berlin, 23 (1972), 4, p. 128

Ritschel, M.

Jahresplanung für den Speerwurf [Yearly training plan for the javelin throw]

Leichtathletiktraining, Münster, 5 (1994), 9/10, pp. 54-55

Samolinsky, L.

Rod Ewaliko

Track Technique, Los Altos (Calif.) (September 1977), 69, pp. 2203-2204

Description of the training and performance development of US javelin thrower Rod Ewaliko.

Schenk, H.

Darstellung von Mikrozyklen im Speerwurf der Männer [Presentation of microcycles in the men's javelin]

In: D. Augustin & N. Müller (eds.), Leichtathletiktraining im Spannungsfeld von Wissenschaft und Praxis: Arbeitsbericht des Internationalen DLV-Fortbildungs-Kongresses „Leichtathletiktraining vor Moskau" vom 23.-25.11.1979 am Fachbereich Sport der Universität Mainz, Niedernhausen: Schors, 1981, pp. 193-196, ISBN 3-88500-095-4 (Mainzer Studien zur Sportwissenschaft, 5/6)

Scholz, W.

Analyse der Kondition des Speerwerfers [Analysis of the physical condition of javelin throwers]

Die Lehre der Leichtathletik, Berlin, 30 (1979), 31, pp. 1139, 1142; 32, pp. 1171, 1174; 33, pp. 1203, 1206

Sergejcova, T. G. & Zukov, I. L.

Faktornaja struktura fiziceskoj podgotovlennosti metatelej kopja [Factor structure of the physical training state of javelin throwers]

Teorija i praktika fiziceskoj kul'tura, Moscow (1988), 3, pp. 41-42

Simon, J.

Hungary's world-record javelin program

Track Technique, Los Altos (Calif.), 69 (September 1977), pp. 2194-2195

Mikos Nemeth's great world javelin record in the still air of Montreal was but a prelude to his super '77 season, in which he topped 300-feet a half-dozen times. Here his coach, J. Koltai, describes the conditioning program of the Hungarian javelin throwers, including Nemeth.

Simon, J.

Zum Konditionstraining der ungarischen Speerwerfer [About the conditioning training of Hungarian javelin throwers]

Die Lehre der Leichtathletik, Berlin, 22 (1971), 17, pp. 629-632

Sloan, R.

Bob Roggy

Track Technique, Los Altos (Calif.) (Winter 1980), 78, pp. 2487-2488

Description of the training and performance development of US javelin thrower Bob Roggy.

Smith, C.

Coach's view: Wanted – more javelin throwers (in Australia)

Modern Athlete and Coach, Adelaide (Aust.), 19 (April 1981), 2, pp. 38-39

Sprecher, B.

Alourdissement des engins de lancers [Making the throwing implements heavier]

Révue de l'Amicale des Entraîneurs Français d'Athlétisme, Paris (1976), 53, pp. 49-51

Sprecher, B.

Pour une conception moderne de l'entraînement. II – application type le lancement du javelot [Towards a modern training concept in the javelin throw]

Grenoble: Centre Regional de Documentation Pédagogique, 1971, 233 pp.

Svendsen, J.

Conditioning for the shot, discus and javelin thrower: Part 1 – Weight training

Coaching: Women's Athletics, 4 (September/October 1978), 4, pp. 92, 94-95

Tanner, G.

Electromyographic investigation of 'specific' training activities for javelin throwing, with a view to establishing their place in the coaching and training of throwers

Track and Field Quarterly Review, Kalamazoo (Mich.), 82 (Spring 1982), 1, pp. 27-34

Thoreau, J. P. & Quievre, J.

La musculation du lanceur de javelot [Muscular development in javelin throwers]

Révue de l'Amicale des Entraîneurs Français d'Athlétisme, Paris (décembre 2001), special issue, pp. 72, 74, 76, 78, 80

The article presents a methodological approach based on biomechanical research for the javelin throw, that should help any coach in any discipline to prepare a specific muscle training program.

Tucker, E.

The javelin à la Finland

Track Technique, Los Altos (Calif.) (1970), 41, pp. 1314-1325; also in: In: F. Wilt (Ed.), The throws: Contemporary theory, technique and training, Los Altos, Calif.: Tafnews Press, 1974, pp. 126-128; German version in: Die Lehre der Leichtathletik, Berlin, 22 (1971), 18, pp. 665-666

The US made a poor showing at the 1968 Olympics in Mexico City. The author spent four months in Finland that year on a sabbatical study, keying on the training of one-time world record holder Jorma Kinnunen and his coach, Kalevi Rompotti. Even though the US made a surprisingly good showing at Munich in 1972 with third, eighth and tenth, the javelin is still a generally weak US event. This article contains an overview of how Finnish javelin throwers train.

Tucker, E.

Javelin training program

Track Technique, Mountain View (Calif.) (June 1975), 60, pp. 1904-1905

The intent of this project is to list numerically the key workouts and then show how they fit into a 6_ month training program. They are listed on a daily basis and in suggested order.

Turner, P. E. & Schleizer, S.

Conditioning for the collegiate javelin thrower

Track and Field Coaches Review, Gainesville (Flor.), 98 (1998), 3, pp. 18-20; also in: J. Jarver (ed.), The throws: Contemporary theory, technique and training (5th ed.), Mountain View, Calif.: Tafnews Press, 2000, pp. 164-168

The authors present a conditioning program for college javelin throwers, covering weight training, running, plyometrics, and medicine ball work during preseason, early season and peaking phases of training.

Uppal, A. K. & Ray, P.

Relationship of selected strength and body composition variables to performance in shot put and javelin throw

S.N.I.P.E.S. Journal, Patiala, 9 (January 1986), 1, pp. 34-38

The purpose of this study was to determine the relationship between body fat and the performance of various motor activities. Thirty male subjects (15 shot putters and 15 javelin throwers) between the ages of eighteen and twenty-five years participated in the study. After recording the performance of the subject in their events, tests were administered to record their performance using strength and body composition variables. The results of the tests were analyzed and showed that while arm strength, grip strength and leg strength were directly related to performance in the shot put, there was no significant relationship between body composition variables and performance in that sport. In the javelin throw arm strength, leg strength and body weight variables were found to affect performance, while neither grip strength, body density nor fat percentage had any effect on performance.

Utriainen, E.

Javelin training in Finland

In: J. Jarver (ed.), The throws: Contemporary theory, technique and training (4th ed.), Mountain View (Calif.): Tafnews, 1994, pp. 120-122, ISBN 0-911521-35-6

This is a comparison of the development and training of male and female javelin throwers in Finland, looking at physical differences, strength development, natural aptitude to throwing and periodization.

Voronkin, V. I. & Nazarenko, E. V.

A javelin study

Modern Athlete and Coach, Adelaide, 26 (1988), 2, pp. 11-13; also in: J. Jarver (ed.), The throws: Contemporary theory, technique and training (4th ed.), Mountain View (Calif.): Tafnews, 1994, pp. 117-119, ISBN 0-911521-35-6

The authors analyze a study of the training methods used by Soviet women javelin throwers and come to the conclusion that an increased volume of full effort throws from longer run-ups should be responsible for improved competition performances.

Voronkin, V. I., Denisov, I. A. & Pozubanov, E. P.

Content and structure of a stimulated explosive isometric effort (condensed)

Soviet Sports Review, Escondido (Calif.), 20 (March 1985), 1, pp. 4-6

Webb, B.

Javelin profile Bob Roggy (U.S.A.): Training

Modern Athlete and Coach, Adelaide (Aust.), 18 (July 1980), 3, pp. 33-34

The author presents detailed information on the training of America's latest javelin star, Bob Roggy.

Webb, B.

Key training & coaching points for the javelin

Track and Field Quarterly Review, Kalamazoo (Mich.), 87 (Fall 1987), 3, pp. 26-27

Werner, H. L.

Relationship between selected throwing events and certain strength and differential test items in predicting performance in javelin throwing

Eugene, Oreg.: Univ. of Oregon, 1963, 2 fiches

Wilkinson, C. D., III.

Predicting potential in the javelin

Athletic Journal, Chicago (Ill.), 50 (January 1970), pp. 46, 83

Yingbo, Z.

Pre-competition preparation for throwers

New Studies in Athletics, London, 9 (1994), 1, pp. 43-45

The author gives his views on the organization of the vital pre-competition phase of training for throwers. He provides information about technique oriented training, explains how to convert overall physical capacity into specific explosive power and stresses the importance of intensity control and the correct psychological approach.

Young, M.

Developing event-specific strength for the javelin throw

Track Coach, Mountain View (Calif.) (Winter 2001), 154, pp. 4921-4927

The javelin throw is very different from the other throwing events. As a result special consideration must be taken when developing a training program to develop event-specific strength for the event. Coaches must remember that an athlete's adaptation to training is specific to the stress placed on him. This article focuses on exercises and methods to help a javelin thrower increase specific strength.

7 Teaching and learning the javelin throw (including novice technique, training, and related problems)

Atwood, D.

How to coach beginning javelin throwers

Track and Field Coaches Review, Gainesville (Fla.), 74 (2001), 2, pp. 14-16

Australian Track and Field Coaches Association

The javelin throw

In: Australian Track and Field Coaches Association in association with Rothmans Foundation National Sport Division & J. Jarver (ed.): Track and field coaching manual (5th ed.), 1991, pp. 178-182

This chapter consists of two parts: a description of the technique of javelin throwing and a teaching sequence.

Beaubrun, F. & Judey, P.

Approche dynamique et apprentissage du lancer du javelot [Javelin: Dynamic approach and learning]

E.P.S.: Education physique et Sport, Paris (novembre/décembre 2001), 292, pp. 13-17

The article proposes a new approach of teaching and coaching the javelin throw.

Beaubrun, F.

Idées neuves et apprentissage du lancer du javelot: Approche dynamique de l'apprentissage et du controle moteur au lancer de javelot [New ideas and learning of the javelin throw: Dynamic approach of learning and motor control of the javelin throw]

Révue de l'Amicale des Entraîneurs Français d'Athlétisme, Paris (printemps 2001), 161, pp. 18-24

Berschin, G.

Speerwerfen lässt sich auch ohne Speer erlernen [The javelin throw can even be learned without the javelin]

Lehrhilfen für den Sportunterricht, Schorndorf, 46 (1997), 9, pp. 129-133

Cahuzac, D.

Javelot en toute simplicité [The javelin throw simplified]

Révue de l'Amicale des Entraîneurs Français d'Athlétisme, Paris, 71 (mars/avril 1981), pp. 31-33

Calvert, S.

Throwing the javelin

Track and Field Quarterly Review, Kalamazoo (Mich.), 82 (1982), 1, pp. 23-26

Of the throwing events the javelin requires the most equal attention to the characteristics of: 1. flexibility, 2. technique, 3. speed, and 4. strength. To initially teach the event, however, these characteristics should be given priority in the order listed above. Flexibility is a must for anyone desirous of learning to throw the javelin. In some cases until flexibility is improved, primarily in the shoulder joint and lower back, the athletes should not begin throwing as they will be unable to throw properly. The joints most important to evaluate are those of the shoulder and lower back. Without flexibility in these areas the athlete risks injury and the frustration of not performing proper technique.

Daumail, D.

Javelot: Planer et piquer, repères techniques et pédagogiques [Javelin throw: Flight and landing, technical and pedagogical characteristics]

E.P.S.: Education physique et Sport, Paris (novembre/décembre 1996), 262, pp. 78-79

Eves, F. F. & Corban, R. M.

Effects of restricted visual input on javelin throwing

Journal of Human Movement Studies, Edinburgh, 39 (2000), 4, pp. 217-235

This paper reports two studies that investigated the possible contributions of peripheral and central vision to javelin throwing in novice throwers. Performance under full vision was compared with two conditions that restricted visual input using lightweight goggles. Vision was restricted to either a central visual field (25.3), hence removing peripheral vision or to a peripheral one by blocking out a central field of 53.1. In the first study, all throws took place in a single session. For this study, novice throwers showed improvement in performance over successive throws with full vision and when central vision was restricted. In contrast, no improvements in performance occurred when peripheral vision was absent. The second study assessed performance over four sessions on successive days. In this study, loss of peripheral vision reduced performance relative to both full vision and restriction of central vision. In addition, the absence of peripheral vision was associated with reductions in the distance between the feet during the plant phase of the throw. Taken together, these results suggest peripheral vision may be an important contributor to performance in sports involving a controlled run-up.

Franks, C.

Coming to grips with coaching the basics in the javelin throw

In: J. Jarver (ed.), The throws: Contemporary theory, technique and training (5th ed.), Mountain View, Calif.: Tafnews Press, 2000, pp. 147-149

There are several schools of thought re how to teach fundamentals in the javelin throw. This article outlines an example of a simple progression in the development of a basic technique, from gripping the implement to a three-stride throw.

Grätsch, F.

Speerwerfen mit 12jährigen Jungen – ein methodischer Versuch [Teaching 12-year-old boys the javelin throw]

Leibeserziehung, Schorndorf, 21 (1972), 6, Beil.: Lehrhilfen für die Leibeserziehung, 6, pp. 64-66

Grotenclaes, G.

Etude du lancer du javelot – initiation et entraînement [A study of the javelin throw – introduction and training]

Révue de l'éducation physique, Liège, 17 (1977), 2, pp. 115-142

Gygax, P.

Speerwurf [Javelin throw]

Jugend und Sport, Magglingen, 39 (1982), 8, pp. 14-15

The following aspects of technique training for the javelin are dealt with: 1. Holding the javelin; 2. carry of the javelin; 3. run-up; 4. recovery.

Haines, J.

Developing a European-styled javelin thrower

Scholastic Coach, New York, 39 (April 1970), pp. 52-54

This article covers both technical and training aspects with the focus on the beginner.

Harris, N.

Javelin tips for Little Athletics

Australian Athlete, Hawthorn (Vic.), 20 (September/October 2000), 3, p. 49

Janalik, C.; Janalik, H.

Wir lassen Speere fliegen [We let the javelins fly]

Sportpädagogik, Seelze, 19 (1995), 3, pp. 40-41

Jarver, J.

Javelin fundamentals for the novice

In: J. Jarver (ed.), The throws: contemporary theory, technique and training (3rd ed.), Los Altos, Calif.: Tafnews Press, 1985, pp. 132-138, ISBN: 0-911521-17-8

This is a summary of the fundamentals of an accepted orthodox javelin throwing technique with the description of common faults, recommended correction methods, and elementary drills to develop a basic technique.

Lenz, G. & Losch, M.

Methodical development of young javelin throwers

Modern Athlete and Coach, Athelstone (Aust.), 39 (July 2001), 3, pp. 21-25

There are different methods to introduce javelin throwing to young athletes. This article outlines the proven methodology used in the former German Democratic Republic.

Lenz, G. & Losch, M.

Speerwurf (Technik und technische Ausbildung) [Javelin throw (technique and technical training)]

In: K.-H. Bauersfeld & G. Schröter et al.: Grundlagen der Leichtathletik: Das Standardwerk für Ausbildung und Praxis (4th ed.), Berlin: Sportverl., 1992, pp. 325-341, ISBN: 3-328-00536-6

This chapter includes a description of javelin throw technique, a technical demand profile, and a methodical teaching guideline.

Lenz, G.; Losch, M.; Schröter, G. (ed.)

Speerwurf (Javelin throw)

In: Lenz, G.; Losch, M.: Trainingsprogramme Wurf/Stoß: Der Weg zur exzellenten Technik. Berlin: Sportverl., 1991, pp. 143-225, ISBN 3-328-00465-3

This teaching program for the javelin throw includes: (1) Technical model of the javelin throw (elite level). (2) Technical demand profile of the javelin throw for build-up training. (3) Criteria of an effective technique of javelin throwing in build-up training. (4) Instructional and learning cards for the javelin throw. (5) Catalogue for the judging of javelin-throw technique. (5) Assessment criteria for the different steps of skill development. (6) A catalogue of faults in the javelin throw.

Lohmann, W.

An introduction to javelin throwing

Modern Athlete and Coach, Athelstone (Aust.), 25(1), Jan 1987, 24-26

There are many ways to introduce students to the javelin throw. The method presented in this article is a summary of the approach used in the former German Democratic Republic.

Lutter, H.

Vom Schlagballwerfen zum Speerwurf [From throwing the ball to throwing the javelin]

Praxis der Leibesübungen, Frankfurt, 12 (1971), 7, pp. 124-127

Maynard, M.

Javelin: Cueing postural alignment and sprint mechanics within the approach

Track and Field Coaches Review, Gainesville (Flor.), 72 (1999), 2, pp. 15-17

The author describes the technique of the javelin throw run-up and gives advice on teaching methodology and training.

Mirabelli, M.

Basic javelin drills: The simple steps needed to throw successfully

Track and Field Coaches Review, Gainesville (Fla.), 75 (2002), 3, pp. 12-14

Simple, progressive and fun drills that have worked for this coach over the past twenty-five years.

Monneret, J.

L'initiation au lancer du javelot [Introduction to the javelin throw]

Révue de l'Amicale des Entraîneurs Français d'Athlétisme, Paris (printemps 2001), 161, pp. 25-28

Naclerio, A.

Javelin: Keeping it simple so that the young athlete fully understands his event

Track and Field Quarterly Review, Kalamazoo (Mich.), 78 (Spring 1978), 1, pp. 39-41

Owtschinnik, W.

Training of young javelin throwers

In: F. Wilt (Ed.), The throws: Contemporary theory, technique and training, Los Altos, Calif.: Tafnews Press, 1974, pp. 112-113; original German version in: Modern Athlete and Coach, 10 (1972), 5

During his second year as the coach for a youth training school in the USSR, the author visited numerous school competitions and observed over 10,000 boys and girls in action. While doing this, he had the vision of how an ideal future javelin thrower should look like – big, strong, and agile, with excellent coordination and mobility, particularly in the shoulders. Here is how they would lay the foundation.

Paish, W.

Coaching the novice thrower – hammer and javelin

Athletics Weekly, Rochester (Kent), 39 (25 May, 1985), 21, pp. 19-25

The essential feature of the javelin throw is the very fast arm action, more product of 'nature' than 'nurture'. Indeed, many good class throwers can record distances in excess of 70 m without taking an approach run, relying mainly on a fast arm movement. To generate this sort of speed, the arm must be capable of producing a 'whiplash' movement with a flail-like action about the elbow joint. The arm must always be in a position such that the elbow is as close to the javelin as possible throughout the entire movement until the 'flail' straightens at release. When the final arm action takes place, the arm rotates in the shoulder joint allowing the elbow to go high over the shoulder but close to the javelin. Indeed, the thrower should get the sensation of throwing the elbow directly through the point of the javelin. The novice is best advised to practice the grip and arm action by using a standing throw or a rocker stride throw. Progress should be quickly made to a three strides throw which forms the base for all javelin throwing. The rhythm must be practiced frequently and is best done from the standing position about three javelin lengths away from the scratch line. Progress from here is made to the nine strides approach run. This is done by adding a unit of four running strides to the basic five strides pattern already learned. Strength is best developed through weight training, while power is best developed through bounding activities, medicine ball work on both lower and upper body, depth jumping and skill isolation drills. Speed is likely to improve alongside power, but there must be some sprinting over a short distance to encourage leg speed, preferably in a competitive situation. Agility can be improved by concentrating on this quality during one of the medicine ball throwing activities, and by joint isolation techniques.

Paish, W.

Javelin throwing for youngsters

In: F. Wilt (Ed.), The throws: Contemporary theory, technique and training, Los Altos, Calif.: Tafnews Press, 1974, pp. 107-108; original German version in: Modern Athlete and Coach, 9 (1971), 4

Youngsters can be taught to enjoy even the most complicated of track and field events when proper methods of teaching are presented simply. Caution in this potentially dangerous event must of course be used. The author here offers a thorough method for introducing the javelin throw to school children.

Powell, J. T.

Track and field fundamentals for teacher and coach (4th ed.)

Champaign (Ill.): Stipes, 1987, 260 pp.

This book includes two chapters about the javelin throw: Chapter XXIII – How to introduce javelin throwing (pp. 174-177), and Chapter XXXVI – Coaching javelin throwing (239-244).

Rieder, H.

Lernen und Trainieren des (Speer-)Wefens – Psychische und kognitive Stimulantien [Learning and training of the (javelin) throw – Psychological and cognitive stimulants]

In: D. Kurz & U. Schütte (Eds.), Leichtathletik: Unterrichtsmaterialien zur Sportlehrerausbildung für den schulischen und außerschulischen Bereich, Schorndorf: Hofmann, 1986, pp. 107-110, ISBN: 3-7780-7231-5 (Texte zur Theorie der Sportarten, 6)

Ritzenthaler, J.

Athlétisme: Le lancer du javelot [Athletics: Javelin throwing]

E.P.S.: Education physique et Sport, Paris, 39 (janvie/février 1989), 215, pp. 52-53

Ritzenthaler, J.

Réflexions sur la pédagogie du lancer le javelot [Thoughts on teaching the javelin throw]

E.P.S.: Education physique et Sport, Paris, 35 (1987), 204, pp. 46-48

Roy, J. & Theiurmel, M.

The javelin for beginners

In: J. Jarver (ed.), The throws: contemporary theory, technique and training (3rd ed.), Los Altos, Calif.: Tafnews Press, 1985, pp. 151-155, ISBN: 0-911521-17-8; also in: Thrower, Solihull (Engl.) (December 1987), 40, pp. 48-51

The authors present the French approach of teaching the javelin throw, covering the grip, preliminary drills, run-up exercises, withdrawal drills and exercises to develop the throwing arc.

Rühl, J. K.

Der regressive Lehrweg im Speerwerfen: Demonstration einer Einführung des Speerwurfs in der Halle bei unbekannten Sportstudentengruppen [The regressive method of teaching the javelin throw: Demonstration of an indoor introduction to the javelin throw with an unknown group of sports students]

In: J. Recla & H. Recla (eds.), Sportunterricht im Aufriß: Ausgewählte Beiträge vom Internationalen Lehrgang für Sportunterricht 1978 der Sportwissenschaftlichen Gesellschaft der Universität Graz, Bad Homburg: Limpert, 1979, pp. 210-218, ISBN 3-7853-1309-8

Ryan, F.

Teaching the javelin throw

In: Track in theory and technique, Richmond, Calif.: Worldwide Publishing Co, 1962, pp. 366-371

Scheurer, A.

Notre leçon mensuelle: Athlétisme. Exemple d'une leçon de perfectionnement: Lancer du javelot [Our monthly lesson: Athletics. Example of a javelin lesson]

Jeunesse et sport, 8 (aout 1973), pp. 239-240

Schneider, B. M.

Du lancer spontane ... au lancer de javelot [From spontaneous throwing to the javelin throw]

E.P.S.: Education physique et Sport, Paris (mars/avril 1988), 210, pp. 38-40

Siekmann, H.

Ein Gefühl für den Speer entwickeln [Developing a feel for the javelin]

Sportpädagogik, Seelze, 14 (1990), 4, pp. 39-43

This is the description of a lesson with high-school students aiming at the improvement of the feel for the javelin.

Sprecher, B.

Lancer de javelot par le lancer de balle [From throwing the ball to throwing the javelin]

Révue de l'Amicale des Entraîneurs Français d'Athlétisme, Paris (1986), 96, pp. 47-48

Stenlund, G. M.

Javelin throwing for beginners

Sports, Kallang (Singapore), 12 (July 1984), 6, pp. 28-29

Torim, H.

The young javelin thrower

In: J. Jarver (ed.), The throws: Contemporary theory, technique and training (4th ed.), Mountain View (Calif.): Tafnews, 1994, pp 112-116, ISBN 0-911521-35-6

Views on a multifaceted approach in the development of young javelin throwers with illustrated exercises and drills that lead to a natural basis technique.

Torim, H.

How to develop a basic javelin technique

Modern Athlete and Coach, Adelaide 26 (1988), 2, pp. 25-28

The author presents a four-step teaching program for introducing the javelin throw.

Torim, H.

Young athletes and the javelin throw

Modern Athlete and Coach, Adelaide 28 (1990), 4, pp. 26-28

Early specialization in the javelin throw, as in other events, can lead to boredom, stagnation and injury. This text presents view on how to avoid it by employing an many-sided approach in the development of young throwers.

Tschistov, A.

Power development of young javelin throwers

Modern Athlete and Coach, Adelaide (Aust.), 14 (January 1976), 1, pp. 23-25

Tschistow, A.

Das Schnellkrafttraining sehr junger Speerwerfer: Untersuchungen an 11- bis 13jährigen Jungen [The speed-strength training of very young javelin throwers: Studies with 11- to 13-year-old boys]

Praxis der Leibesübungen, Frankfurt, 12 (1971), 7, pp. 131-132

Versepuech, G.

Lancer du javelot en classe de 6e mixte: Une pédagogie par objectifs [Throwing the javelin in a sixth mixed form: A goal-oriented approach]

E.P.S.: Education physique et Sport, Paris (May/June 1980), 163, pp. 54-57

White, S. C.

Introducing the essentials of javelin throwing to beginners

Track and Field Quarterly Review, Kalamazoo (Mich.), 86 (1986), 1, pp. 29-34

The teaching progression that is presented in this paper is one possible approach to introducing the essentials of javelin throwing. They have been used successfully in a number of seminars to teach this skill to coaches new to the event and to young athletes. The focus of the teaching sequence is on dynamic exercises with the javelin. Standing throws and static exercises are excluded.

Wollman, D.

Teaching the throws

Track and Field Coaches Review, Gainesville (Flor.), 96 (1996), 3, pp. 41-43

The author breaks down each of the throwing events into what he calls „The Big Four Components" of technical information. In addition there is to each event a single underlying principle. The javelin principle is: Linear acceleration. The Big Four Components of the javelin are: (1) relaxed slow to fast rhythm. (2) Javelin control – left shoulder and right arm. (3) Good power C position. (4) Don't slow it down!

8 Talent identification, selection, and development – statistics of the javelin throw

Arbeit, E., Bartonietz, K., Börner, P., Hellmann, K. & Skibbia, W.

The javelin: The view of the DVfL of the GDR on talent selection, technique and main training contents of the training phases from beginner to top-level athlete

New Studies in Athletics, Rome, 3 (1988), 1, pp. 57-74

Joch, W.

Increase in release velocity as the main objective in the throwing events: Report on the International Seminar in the Javelin and Hammer Throws in East Berlin March 4-7, 1987

New Studies in Athletics, Rome, 3 (1988), 1, pp. 35-38; also in: Modern Athlete and Coach, Adelaide 27 (1989), 3, pp. 31-34

This article is a summary of selected major points presented at the International Seminar for Javelin and Hammer Throws two years ago in East Berlin. This summary concentrates mainly on talent development and strength training.

Knapp, U.

Vom Talent zum Bronzenmedaillengewinner [From young talent to bronze medallist]

Leichtathletiktraining, Münster, 9 (1998), 12, pp. 26-29

This is an overview of the performance development and training of the German javelin thrower Boris Henry, bronze medallist at the World Championships in Athletics in Göteborg, 1995.

Lichtle, T.

Bilan javelot: Les diamants sont éternels ...! [Results for the javelin throw: Diamonds are forever!]

Révue de l'Amicale des Entraîneurs Français d'Athlétisme, Paris (hiver 2001), 164, pp. 23-25

Match analysis of the men and women javelin throw event at the World Championship 2001 in Edmonton. Includes results, statistics and a focus on the French team.

Pavlov. I.

Podbor na perspektivni sastezatelki v disciplinata chvarljane kopie [Selection of talented javelin throwers]

Vaprosi na fiziceskata Kultura, Sofia, 25 (1980), 5, pp. 245-279

9 History of the javelin throw and performance development

Balensiefen, M., Keydel, M., Burgkart, R. & Schittich, I.

Der klassische Fünfkampf in der Antike: Eine Darstellung der fünf Einzeldisziplinen auf der Grundlage von Ursprung und Bedeutung der antiken Olympischen Spiele [The original pentathlon in antiquity: Description of the five disciplines in respect to the origin and importance of the ancient Olympic Games]

Sportorthopädie Sporttraumatologie, München, 12 (1996), 2, pp. 137-139

The classical pentathlon included the long jump, running, the discus, the javelin, and wrestling.

Dickwach, H. & Scheibe, K.

Performance development in the throwing events

New Studies in Athletics, London, 8 (1993), 3, pp. 51-59

This article focuses on performance development in the throwing events from 1965 to 1992. Data obtained from world top 50 lists for the period is compared to results of the Olympic Games from 1968 onward and of the World Championships from 1983 onward, to provide a picture of long-term trends. As well as analyzing performance development in individual events, the authors also compare events and event groups.

Dmitrusenko, O. & Papanova, V.

Why are we standing still – accident or the rule? (javelin throw)

Thrower, West Midlands (Engl.) (December 1984), 31, pp. 24-30

Doblhofer, G.

Quellensammlung zur antiken Gymnastik und Agonistik: Grundlagen des Projekts [A collection of sources about ancient gymnastics and agonistics: Basics of the project]

Nikephoros, Hildesheim, 10 (1997), pp. 251-254

The project was initiated by Prof. Weiler and is funded by a research grant from the Austrian State Research Fund FWF; it set out in 1989 with a view to documenting the disciplines of the ancient pentathlon. In doing so, only the literary sources have been taken into account, with the Christian authors taking rather less than their due place, mainly because of their unrestrained use of metaphors, a fact that could only be mentioned but not gone into in more detail. Up to now, five disciplines have been covered (and the respective volumes been published), discus, long jump, javelin, boxing, and pancration. Dealing with combat sports, separate volumes have been published on boxing and pancration, with the forthcoming one on wrestling completing that aspect and adding an important step to the completion of the pentathlon

series. In collecting the sources the author tried to make sure that, as far as possible, all those discussed by modern scholars should be included, thus enabling people reading their books to check their conclusions from the sources for themselves. In addition, many more texts were brought in with the help of computerized databases. An appendix at the end of each volume groups the texts according to various aspects, e.g. events, ancient criticism, technique, drawing attention to the controversial discussion of terminological and technical details by modern scholars. At the end, a statistical survey gives an idea of how the distribution of texts varies in the course of time.

Frost, W.

Ein weiteres Mal: Zu den Anfängen des Speerwurfs in Deutschland [The beginning of the javelin throw in Germany revisited]

Theorie und Praxis der Körperkultur, Berlin, 39 (1990), 6, pp. 427-431

Hannus, M.

The throwing Finns: Are they made or born?

Peak Performance, London (December 2001), 158, pp. 6-8

A historical account reports on past successes of Finnish javelin throwers. Genetic, environmental, and sociological factors are expressed. Includes coaches' discussions.

Harris, H. A.

Greek javelin throwing

Greece and Rome (Second Series), 10 (March 1963), 1, pp. 26-36

Sprecher, B.

Opération javelot: Bilan 1975 [Operation javelin: 1975 balance]

Révue de l'Amicale des Entraîneurs Français d'Athlétisme, Paris (1976), 50, pp. 29-32

Tanner, G.

The development of athletic throwing. Part III: Pre-1939 discus and javelin

Thrower, West Midlands (Engl.) (April 1985), 32, pp. 43-47

Tempest, I.

Foundation for Tessa's gold laid 60 years ago

Athletics Weekly, Rochester (Kent), 39 (13 April 1985), 15, pp. 57-58, 61-62

Walthes, R. & Zink, B.

Am Speerwerfen Entwicklungen des Sports begreifen [Using the javelin throw to understand the development of sport]

Sportunterricht, Schorndorf 33 (1984), 6, Beil.: Lehrhilfen für den Sportunterricht, 6, pp. 87-89

The authors present a teaching sequence with the aim of showing the pupils the historical development of the javelin throw and the changes which this event has undergone. The pupils learned that the goal of throwing as far as possible must not necessarily be the only goal of javelin throwing.

Weiler, I. (ed.)

Speerwurf: Texte, Übersetzungen, Kommentar [The javelin throw: texts, translations and commentaries]

Wien: Böhlau, 1993, 191 pp., ISBN 3-205-05600-0 (Qellendokumentation zur Gymnastik und Agonistik im Altertum, 3)

This volume contains historical sources on the javelin as a war, hunting and sports implement. Greek and Latin expressions for the javelin are translated and commentated on.

Zablocki, W.

Setting the record straight: Egil Danielsen, Janusz Sidlo and the true story of the 1956 Olympic javelin competition

Journal of Olympic History, Oosterwolde, 8 (January 2000), 1, pp. 8-10

10 Social and psychological aspects of the javelin throw

Ward, G. R., Morrow, J. R., Omizo, M. M. & Michall, W. B.

Prediction of performance of Olympic athletes in discus, hammer, javelin and shotput from measures of personality characteristics

Educational and Psychological Measurement, 39 (1979), 1, pp. 197-201

For each of four subsamples of athletes (from the US Olympic teams) – 14 discus throwers, 8 hammer throwers, 11 javelin throwers, and 12 shotputters – measures of personality constructs yielded only two statistically significant validity coefficients in the prediction of the average length of throw. It is concluded that the self-report personality measures employed afford little promise as predictors of success in the four Olympic events studied.

11 Medical (i.e., physiological, traumatological, nutritional, and anthropometric) aspects of the javelin throw

Adolfsson, L. & Lysholm, J.

Case report: Clavicular stress fracture in a javelin thrower

Clinicical Sports Medicine, London, 2 (1990), 1, pp. 41-45

A clavicular stress fracture on the dominant side of a 25-year-old male, professional javelin thrower is described. The fracture was revealed by radiographic tomography one week after the onset of symptoms. The fracture healed with conservative treatment and full training was resumed after eight weeks. During a follow-up period of 18 months no complications were seen.

Atwater, A. E.

Biomechanics of overarm throwing movements and of throwing injuries

In: R. S. Hutton & D. I. Miller (eds.), Exercise and sport sciences reviews (Vol. 7), Philadelphia (Penn.): The Franklin Institute Pr., 1980, pp. 43-85, ISBN 0-89168-025-X

While the efforts to identify the causes of throwing-arm injuries are still at the hypothetical level, the search is continuing for even more specific relationships between injuries and joint actions that occur in throwing. Kinetic analyses of the high-speed, complex, three-dimensional throwing actions have not yet produced sufficient data on joint moments of force or injury-producing torques to permit an explanation for specific injuries, but this area of study offers promise. Meanwhile, further kinematic analyses (via cinematography and electromyography) in conjunction with clinical study of throwing patterns in young throwers and in adults could fill the gaps in our present knowledge of throwing actions.

Baumeister, E. T.

Belastungen und Traumatologie des menschlichen Bewegungsapparates beim Speerwerfen [Stress and traumatology of the human movement apparatus in javelin throwing]

Bochum: Univ., 1992, Diss., 153 pp.

Benazzo, F., Lupo, R., Grassi, A., Ferrario, A. & Wiele-Wickler, R. v.

La spalla nel lanciatore [The thrower's shoulder]

Atleticastudi, Rome, 23 (1992), 1/2, pp. 18-20

Burgoyne, L.

Conditioning sites of stress in javelin throwers

Modern Athlete and Coach, Adelaide (Aust.), 40 (April 2002), 2, pp. 10-12

The unique demands placed on an athlete in the javelin throw are responsible for injuries peculiar to this event. This text sums up common javelin injuries and provides a selection of conditioning exercises that can be used to reduce the risk.

Burgoyne, L.

Stress sites in javelin throwers

Track Coach, Mountain View (Calif.) (Fall 2002), 161, p. 5156

Addresses proper training and conditioning to increase performance while decreasing injury risk in javelin throwers.

Butet, M.

La souplesse de l'épaule du lanceur de javelot [Shoulder flexibility in javelin thrower]

Révue de l'Amicale des Entraîneurs Français d'Athlétisme, Paris (printemps 2002), 165, p. 44

This article offers an example of orthopedic manipulation of the shoulder joint designed to increase shoulder flexibility in javelin throwers.

Cervoni, T. D., Martire, J. R., Curl, L. A. & McFarland, E. G.

Recognizing upper-extremity stress lesions

Physician and Sports Medicine, Minneapolis (Minn.), 25 (1997), 8, pp. 69-71, 76, 79-81, 85-86

Athletes in sports such as baseball, gymnastics, weight lifting, javelin, and racket sports are susceptible to stress lesions in the bones of the upper extremities. Injuries range from periostitis to bone spurs to stress fractures. Injuries in adolescents typically involve the growth plates, while midshaft injuries at the area of muscle insertion are more common in adults. It's especially important to detect these injuries in adolescents because untreated stress lesions at growth plates can have serious consequences. Plan films demonstrate obvious fractures and physeal injuries, but triple-phase bone scans are often needed to define the extent of stress lesions.

Coh, M., Jost, B. & Zvan, M.

Anthropometric model of top junior male and female javelin throwers

Acta Universitatis Carolinae Kinanthropologica, Prague, 37 (2001), 2, pp. 93-100

The purpose of this study was to find the anthropometric characteristics of elite junior javelin throwers on a sample of eleven male and twelve female finalists of the European Junior Championship in Athletics (MEPA 98). The chosen subjects were measured with a set of nine anthropometrical variables, according to the methodology prescribed by the International Biologic Program. The results show that no common constitutional type of a junior male or female javelin thrower exists, but that the anthropometrical characteristics are very individually defined. At least two constitutional types exist for each gender, ensuring equal success in javelin. Correlational analysis shows that no statistically significant ($P < 0.05$) correlations exist between the individual anthropometrical characteristics of the male and female throwers with their competitive result. Success in this track and field discipline is therefore more a synthesis of anthropometrical characteristics and motor abilities, as well as an optimal technique.

Dreyer, J.

[Spinal lesions in javelin throwers]

Zeitschrift für Orthopädie und ihre Grenzgebiete (Dezember 1972), 110, pp. 745-746

Faber, M. & Spinnler-Benade, A. J.

Mineral and vitamin intake in field athletes (discus-, hammer-, javelin-throwers and shotputters)

International Journal of Sports Medicine, New York (N. Y.), 12 (June 1991), 3, pp. 324-327

Thirty field athletes (discus-, hammer-, javelin-throwers and shotputters) were studied. Dietary intake was determined by using the seven-day estimated dietary record. Analysis of the dietary intake indicated that on average, the males (n = 20) consumed adequate amounts of micro-nutrients. The mean intake for the females (n = 10) were adequate for phosphorus, zinc, vitamin A, thiamin, riboflavin, nicotinic acid, vitamin B6, folic acid, vitamin B12 and vitamin C. Some of the females did not consume adequate amounts of calcium, iron, and magnesium. These dietary deficiencies can be corrected through proper food choices and by consuming a great variety of food. Athletes (especially the females) should be educated on their nutritional needs, good dietary practices, and planning adequate diets for training and performance.

Francois, M., Ledoyen, C. & Khayata, B.

Lancer de javelot: Un accident original [The javelin throw: A strange accident]

Médecine du sport, Paris, 58 (25 mai 1984), 3, p. 32

Harjula, A.

Javelin elbow

In: E. Oikarinen (ed.), International Congress on Sports Injuries, Espoo, August 11th to 13th, 1977: proceedings, Helsinki: Finnish Central Sports Federation, 1977, pp. 79-84; also in: Sport wyczynowy, 16 (1978), 10/11, pp. 49-50

Haw, D. W. M.

Avulsion fracture of the medial epicondyle of the elbow in a young javelin thrower

British Journal of Sports Medicine, Loughborough, 15 (1981), 1, p. 47

The avulsion fracture of the medial epicondyle of the elbow is a rare injury in javelin throwers which leads the author to discuss its probable causes.

Herrington, L.

Glenohumeral joint: Internal and external rotation range of motion in javelin throwers

British Journal of Sports Medicine, Loughborough, 32 (1998), 3, pp. 226-228

Objective: To assess differences in glenohumeral joint rotatory range of movement in javelin throwers between the throwing and non-throwing arm. Method: A universal 360 goniometer was used to assess glenohumeral joint external and internal rotation range in 90 of shoulder abduction in a group of ten senior international javelin throwers. Results: Both arms had significantly greater degrees of external than internal rotation ($p < 0.01$), and the throwing arm had significantly greater range of external rotation than the non-throwing arm ($p < 0.01$). Conclusions: The presence of an excessive range of external rotation in the throwing shoulder has the potential to increase eccentric load on the rotator cuff muscles and strain on the passive restraints of the glenohumeral joint. Both of these factors have been implicated in the pathological processes leading to injury in the overhead throwing athlete.

Higgins, G. L.

Penetrating trauma: Managing and preventing javelin wounds – case report

Physician and Sportsmedicine, New York, 22 (April 1994), 4, pp. 88-92, 94

Three case studies describe potentially life-threatening injuries associated with javelin throwing. Although overuse, biomechanical, or stress-related musculoskeletal disorders are more typical of javelin-related injuries, serious penetrating wounds do occur. Observing safety precautions can help prevent javelin impalement; careful on-field management can help contain those injuries that do occur.

Hulkko, A., Orava, S. & Nikula, P.

Stress fractures of the olecranon in javelin throwers

International Journal of Sports Medicine, Stuttgart, 7 (1986), 4, pp. 210-213

Between the years 1977 and 1984, four javelin throwers with a stress fracture of the olecranon were seen and treated. In one patient, acute painful dislocation of the fracture occurred during a competitive throw. Two patients had stress fracture of the tip. The fracture treated conservatively healed in 18 months. The patient treated by excision of the tip was able to throw after 2 months. Two patients had slightly oblique, more distally located stress fractures, which were treated with a tension band and 2 Kirschner wires. The fractures healed in 4 months. One of the patients had a refracture 11 months after the primary operation. It was successfully treated with a compression screw and two bone pegs. Because of the high risk of delayed union and nonunion, stress fractures of the olecranon should be treated operatively in javelin throwers.

Lang, G. & Kuentz, P.

Traumatismes du coude chez les lanceurs de javelot [Elbow injuries in javelin throwers]

Médecine du Sport, Paris, 60 (1986), 4, pp. 208-209

Larsen, U.

Physiotherapy clinic – Here's another case from the Crystal Palace Sports Injury Centre: A national-level javelin thrower with shoulder pain

Peak Performance, London (May 1999), 118, pp. 10-12

Leroy, S.

La préparation du lanceur de javelot [Training of the javelin thrower]

Révue de l'Amicale des Entraîneurs Français d'Athlétisme, Paris, 165 (printemps 2002), pp. 41-43

The article discusses the technique of javelin throw and the elbow injuries that can occur in this sport. Strength exercises for the elbow and shoulder as well as warm-up exercises are proposed.

Matsuoka, H., Furuta, H. & Kitagawa, K.

Effect of more amount intake of protein in competitve season on body composition and various body functions – in case of varsity throwers

Japanese Journal of Physical Fitness and Sports Medicine, Tokyo, 40 (1991), 2, pp. 219-226

The present study examined the effects of an increased intake of protein during the competitive season on lean body weight (LBW), cross-sectional area of thigh and abdomen, muscle strength, blood constituents and urinary urea. 17 male varsity throwers (javelin, discus, hammer and shot put; 19-22 yrs) were divided into two groups; group A (N=9) with a high protein diet (2.1 g/kg/d), and group B (N=8) with normal diet (1.5 g/kg/d). During the experimental period (62 d) they practiced 6 d/wk. Three days were for throwing practice. The other three days were for weight training. All subjects lived in the same dormitory, and their life styles were similar. The average daily diet of group A had 3824 kcal with 175 g protein (2.0 g/kg/d), 115 g fat and 552 g carbohydrates. The average daily diet of group B had 3441 kcal with 130 g protein (1.5 g/kg/d), 76 g fat and 559 g carbohydrates. The intake of vitamins (A, B1, B2, C) and minerals (calcium and iron) in the diet of each group was higher than the Japanese recommended dietary allowance. After the period, body weight, fat, fat and LBW, as well as muscle strength and cross-sectional areas in abdomen and thigh of both groups did not change significantly, nor did urinary urea nitrogen. Blood constituents (RBC, Hb, Ht, TP, Alb, BUN) of each group were still in normal ranges in spite of significant changes. Body composition and muscle strength remained unaltered. These results, therefore, indicated that the high protein diet was not effective in increasing LBW and muscle strength.

McFadden, P. M. & Ochsner J. L.

Javelin injury to the subclavian artery

American Journal of Sports Medicine, Baltimore (Maryld.), 9 (1981), 6, pp. 400-404

The authors quote the case study of a 13-year-old struck in the neck by a javelin to indicate the importance of assessment of these injuries by physical education staff and physicians. It is stressed that no matter how innocent an open neck injury appears, a thorough investigation must be done immediately. The authors conclude that serious repercussions from these injuries can be avoided with rapid action.

Merat, J.

Les fractures de fatigue du coude: Révue de la littérature [Stress fractures of the elbow: Literature review]

Journal de Traumatologie du Sport, Paris, 15 (1998), suppl. 1, pp. 49-52

Stress factures of the elbow are very seldom. The main localization is the olecranon. Wrestling, gymnastics but mostly javelin throw and baseball (pitcher) are the sports affected by this disease. The mechanism of throwing shows that during the acceleration phase, rapid hyperextension produces the injury. Elbow pain appears while throwing and decreases with rest. The examination reveals tenderness in the olecranon area. The diagnose is confirmed by X-rays but bone scintigraphy can detect the early stages. Conservative treatment is based on rest, immobilization and rehabilitation but if this therapy is unsuccessful in healing the fracture, then surgery is necessary – especially in case of delayed union or non union forms which are frequent. Return to throwing activity and then to competition may require 6 months to 1 year with some technical corrections.

Moore, M.

Javelin fatality prompts concern over impact areas

Physician and Sportsmedicine, New York, 10 (June 1982), 6, p. 24

The recent death of a high-school girl in North Dakota who was struck by a javelin is a tragic illustration of the necessity to isolate the throwing field events from the rest of the events at a track meet, says George D. Rovere, MD, medical director of the 1981 Junior Olympics. Rochelle Harding, 17, who had thrown the javelin earlier, was killed when she cut across the roped-off javelin area during the boys' competition in her hurry to get to a running event.

Neusel, E., Arza, D. & Rompe, G.

Verlaufsbeobachtungen bei Speerwerfern der Spitzenklasse [Process observations with elite javelin throwers]

Die Lehre der Leichtathletik, Berlin, 26 (1987), 33, pp. 1587-1590

Neusel, E., Arza, D., Rompe, G. & Steinbrück, K.

Röntgenologische Langzeitbeobachtungen bei Speerwerfern der Spitzenklasse [Long-term X-ray observations of elite javelin throwers]

Sportverletzung Sportschaden, Stuttgart, 1 (1987), 2, pp. 76-80

Neusel, E.; Arza, D.; Rompe, G. & Steinbrück, K.

Röntgenologische Reihenuntersuchung von Speerwerfern der Spitzenklasse [X-ray examinations of elite javelin throwers]

In: H. Rieckert, Sportmedizin: Kursbestimmung.

Prävention – Rehabilitation, Breitensport – Hochleistungssport, Leistungsphysiologie, Morphologie, Biochemie, Innere Medizin, Traumatologie, Sportmedizinische Diagnostik, Berlin: Springer, 1987, pp. 579-582, ISBN 3-540-17649-7

Ollivier, D. & Bugnard, M.

Le coude du lanceur de javelot [The javelin thrower's elbow]

Révue de l'Amicale des Entraîneurs Français d'Athlétisme, Paris (octobre/novembre/décembre 1985), 93, pp. 9-12

Ollivier, D., Chambat, P. & Rigal, F.

Le coude du lanceur: Aspects biomécaniques et anatomo-cliniques [The javelin thrower's elbow: Biomechanical and anatomical-clinical aspects]

Cinésiologie, 86 (décembre 1982), pp. 255, 257-259

Paar, O.

Die Epicondylitis humeri ulnaris beim Sportler [Epicondylitis of the ulnar humerus in the athlete]

Deutsche Zeitschrift für Sportmedizin, Cologne, 32 (1981), 10, pp. 258-262

Pierce, M. J., Weesner, C. L., Anderson, A. R. & Albohm, M. J.

Pneumomediastinum in a female track and field athlete: A case report

Journal of Athletic Training, Dallas (Tex.), 33 (1998), 2, pp. 168-170

Objective: To present the case of an elite female track and field athlete who suffered a pneumomediastinum resulting from a Valsalva maneuver performed while throwing the javelin. Background: Episodes of chest pain and labored breathing in athletes may be alarming. Accurate, early diagnosis is enhanced by an awareness of those relatively rare conditions that may cause these symptoms. Differential diagnosis: Bronchial injury/fracture, retropharyngeal abscess, acute pulmonary disease, pneumomediastinum, pneumothorax, cardiac disease, allergic reaction. Treatment: The athlete was given intravenous morphine for pain, prescribed oral pain medication, and restricted from strenuous activity for 6 weeks. Aerobic exercise was allowed after pain and air in the neck subsided, which was estimated at 1 week postinjury. Uniqueness: This is a rarely reported case of a pneumomediastinum in a female and a track and field athlete. Conclusions: Medical personnel must be aware of the possibility of pneumomediastinum in track and field athletes and in female athletes and must be knowledgeable in the follow-up care and the safe return of the athlete to activity.

Pincivero, D. M., Heinrichs, K. & Perrin, D. H.

Medical elbow stability – Clinical implications

Sports Medicine, Auckland, 18 (1994), 2, pp. 141-148

Medial elbow injuries of athletes, such as baseball pitchers and javelin throwers, can prove to be debilitating and may have a negative effect on performance. The most significant injury to the elbow is an ulnar collateral ligament (UCL) sprain or rupture, which compromises the medial stability of the elbow joint. It has been found that the anterior oblique portion of the UCL is the primary stabilizer of the elbow, and that trauma to this complex may significantly hinder normal elbow function. An accurate diagnosis will dictate the degree of injury to the elbow as well as determine the most appropriate means of treatment.

Pincivero, D. M., Rijke, A. M., Heinrichs, K. & Perrin, D. H.

The effects of a functional elbow brace on medial joint stability: A case study

Journal of Athletic Training, Dallas (Tex.), 29 (1994), 3, pp. 232-237

Medial elbow ligament sprains in athletics can be traumatic and disabling. In this case report, we outline the effect of a prototype functional elbow brace on joint stability in a female collegiate javelin thrower with an ulnar collateral ligament sprain. A valgus force to both elbows was applied using graded stress radiography (Telos GA-II/E stress device) at 0, 5, 10, and 15 kiloPascals (kPa) of pressure. The increase in gap width between the coronoid process and the medial epicondyle was measured from anteroposterior radiographs to determine medial displacement. The brace resulted in less displacement in both injured and non-injured ulnar collateral ligament; injured ulnar collateral ligament demonstrated greater displacement regardless of condition. The brace restored medial stability to the elbow joint by 49%, 38%, and 35% at 5, 10, and 15 kPa of pressure, respectively. The application of the brace may be useful in athletes with ulnar collateral ligament injuries.

Riand, N., Levigne, C., Renaud, E. & Walch, G.

Results of derotational humeral osteotomy in posterosuperior glenoid impingement

American Journal of Sports Medicine, Waltham (Mass.), 26 (May/June 1998), 3, pp. 453-459

We identified 20 throwing athletes who continued to have pain after articular debridement for posterosuperior impingement syndrome. These patients were unable to resume sports, and we subsequently performed a derotational humeral osteotomy with a myorraphy of the subscapularis muscle. Patients were observed for an average of 46 months (range, 12 to 69). Eleven patients were able to resume the same sport at the same level, five resumed the same sport at a lower level, three changed sport secondary to persistent pain, and the last patient did not resume any sport and was worse after surgery. Patients returned to sports at an average of 6 months postoperatively (range, 4 to 44) and to their previous level of sports at an average of 12 months (range, 8 to 18). The mean increase in humeral retro-

version was 29 degrees (range, 18 degrees to 44 degrees). Three women with preoperative multidirectional hyperlaxity were considered to have failed results. Derotational humeral osteotomy can be considered in the throwing athlete with posterosuperior impingement after failure of all other means of treatment. Careful patient selection and preoperative evaluation of humeral retroversion is important. Best results can be achieved in a motivated patient with low retroversion (less than 10 degrees). If retroversion is normal (20 degrees to 30 degrees), the surgical indication is unclear. We do not recommend this surgery for patients with hyperlaxity.

Riede, B.

Die Beanspruchung des Bewegungsapparates beim Speerwerfen: Sportverletzungen und Sportschäden [Stress placed on the movement apparatus during the javelin throw: Sports injuries and lesions]

Bonn: Univ., Diss., 1983, 89 pp.

Robinson, D.

Throwing injuries of the shoulder

Sports Exercise and Injury, Edinburgh, 4 (1998), 2/3, pp. 113-116

Athletes whose sport involves an overhead throwing action include not only the javelin thrower and baseball pitcher, but also tennis players and cricketers. These athletes are prone to injuries which differ from those of the non-throwing population. Injuries related to the throwing sports are commonly seen in the general sports injury clinic. The upper extremity accounts for 75% of these injuries, with the shoulder being the most common joint involved. The aim of this study is to present an overview of throwing injuries of the shoulder, describing the pathology and treatment of these conditions. Firstly, it is important to consider the anatomy of the shoulder and the biomechanics of throwing.

Schmidt, H. & Ahuja, R.

An orthopaedic preventive approach to elite Indian throwers

Athletic Asia, Patiala (India), 18 (March 1989), 1, pp. 17-22

Schmitt, H., Brocai, D. R. C. & Cartens, C.

Long term review of the lumbar spine in javelin throwers

Journal of Bone and Joint Surgery, British volume, London, 83 (2001), pp. 324-327

Schmitt, H., Hansmann, J., Brocai, D. R. C. & Loew, M.

Long term changes of the throwing arm of former elite javelin throwers

International Journal of Sports Medicine, Stuttgart, 22 (May 2001), 4, pp. 275-279

The aim of this study was to determine long term changes in shoulder and elbow joints of former elite javelin throwers. Twenty-one elite javelin throwers were examined at an average of 19 years after the end of their high performance phase. Mean age at examination was 50 years. Functional assessment of both shoulders was determined by the Constant-score. The shoulder of the throwing arm was examined by magnetic resonance imaging. Both elbow joints were examined clinically and radiographically. Five athletes complained about transient shoulder pain in their throwing arm affecting activities of daily living, fourteen athletes had a deficit of internal rotation of at least ten degrees. Constant-scores of throwing arms were six points lower than those of non-throwing arms ($P < 0.05$). Complete ruptures and partial tears of the rotator cuff were frequent. Three athletes complained about transient elbow pain in their throwing arm affecting activities of daily living; ten athletes had a deficit of extension of more than five degrees. All dominant elbows had advanced arthrotic alterations (osteophytes, sclerosis) compared to the non-dominant side. Athletes who trained with weights of more than 3 kg had a significantly higher risk of degenerative changes than athletes who did not ($P < 0.01$). The authors therefore recommend to avoid throwing training with weights of more than 3 kg.

Schmitt, H., Hansmann, J., Brocai, D. R. C. & Loew, M.

Spätschäden am Bewegungsapprat nach Hochleistungssport am Beispiel der Speerwerfer [Delayed injuries and troubles during and after competitive javelin throwing]

Deutsche Zeitschrift für Sportmedizin, Cologne, 49 (1998), 1 (special issue), pp. 295-299 (35. Deutscher Sportärztekongress Tübingen '97)

Nearly 20 years after their competitive sports career, 21 former German elite javelin throwers were reexamined clinically, radiologically and by MRI. The objective of the study was to show which injuries and troubles exist during and after competitive sport. A further aim was to demonstrate if there are correlations with training methods. Injuries of the elbow and problems with the spinal column (mainly in the lumbal area) predominate during the active career. Elite javelin throwers run a high risk of suffering from osteoarthritis of the throwing arm as well as the hip and knee joints. However, in most cases this does not lead to an impairment of daily activity.

Schmitt, O. & Biehl, G.

Die habituelle Luxation des Nervus ulnaris beim Speerwerfer: Eine interessante aetiopathogenetische Fallstudie [The habitual luxation of the ulnar nerve in javelin throwers: An interesting etiopathogenetic case study]

Deutsche Zeitschrift für Sportmedizin, Cologne, 30 (1979), 8, pp. 240-244

Sing, R. F.

Shoulder injuries in the javelin thrower

Journal of the American Osteopathic Association, Chicago (Ill.), 83 (May 1984), 9, pp. 680-684

Waris, W.

Elbow injuries of javelin-throwers

Acta Chirurgica Scandinavica, Stockholm, 93 (1946), pp. 563-575

12 Women's javelin throw

Ankonina, L.

X-ray study of the javelin throw

Yessis Review, Fullerton (Calif.), 13 (September 1978), 3, pp. 57-61

For women, throwing the javelin is associated with great difficulties, especially when bringing the javelin forward during the final effort of the power phase. Anthropometric, electromyographic, and biomechanical research of arm movement in final effort led to the necessity of studying the relationships among the separate links of the arm: hand, forearm, upper arm, and scapula. The task was to clarify by means of X-ray research the interdependence of the separate parts of the throwing arm in the shoulder, elbow, and wrist joints at the technically critical moments of the final effort: In the initial position before throwing (the arm with the javelin at an extreme rear position); when carrying the javelin forward (the elbow is brought up high); and at the moment of releasing the javelin. Female javelin throwers of various classifications were examined. The X-rays that were obtained showed the possibility of conducting an analysis not only of the interrelationships of the bones, but also of the workings of the muscles.

Becker, S.

Aspects of training for women javelin throwers: interactions between strength training, training in throwing and training in technique

In: E. Foulkes (ed.): Women's track and field athletics: The official report of the First IAAF Congress on Women's Athletics, Mainz, F R Germany, 9-11 December 1983, London: International Amateur Athletic Federation, 1986, pp. 312-331

Javelin is the speed event of the athletic throws. This must be taken into account in the long- and short-term planning of training. The main focus of general and specific training should be on raising the speed of the throw (or initial velocity). This can be achieved by the conscious use of "plyometric training in javelin throwing".

Blackman, C.

Javelin

Coaching: Women's Athletics, 3 (November/December 1976), 2, pp. 6-9

Böttcher, J. & Kühl, L.

The technique of the best female javelin throwers in 1997: A "snapshot" on the basis of biomechanical investigations conducted at the ISTAF Grand Prix I meeting in Berlin in 1997

New Studies in Athletics, Monaco, 13 (1998), 1, pp. 47-61

The biomechanical parameters of female world-class javelin throwers who competed at the ISTAF meeting in Berlin 1997 were examined. The following top javelin throwers could be evaluated biomechanically and compared in terms of their movement parameters: Damaske (GER); Tilea (RUM); Hattestad (NOR); Rantanen (FIN); Nerius (GER); Ingberg (FIN); Shikolenko (RUS); Renk (GER); Forkel (GER). On the basis of a statistical analysis of data taken from an individual data bank and the results of the aforementioned women javelin throwers conclusions are drawn regarding generalizable factors of an effective javelin technique. The release parameters dealt with include: the angle of release, angle of attitude, angle of tilt, height of release as a percentage of body height, angle of arm bend, hip angle; knee angle; trunk and shoulder position during the delivery, trunk bend, turning away of the shoulder. As far as run-up and release preparation are concerned, the focus is on the approach velocity and the length of the last three strides. Additional parameters measured are: acceleration path, hold-back path, lean back angle, extension angle during the push-off of the cross-over stride, take-off angle of the CM.

Cannon, L.

A statistical analysis of U.S. women's javelin throw from 1968-80

Track and Field Quarterly Review, Kalamazoo (Mich.), 82 (Spring 1982), 1, pp. 35-36

The analysis presented in this article indicates that the U.S. has been making steady improvements in the women's javelin throw in the past thirteen years with no signs of approaching an ultimate performance. The last five years have shown the most significant gains, perhaps due to the advent of Olympic Development activities and new interests in women's sports.

Cannon, L.

A statistical look at the physical characteristics of the world's best women javelin throwers

Track and Field Quarterly Review, Kalamazoo (Mich.), 82 (Spring 1982), 1, pp. 37-38

The data evaluated in this article may suggest that top women javelin throwers are of somewhat homogeneous body type, and that neither height alone or

weight alone are significant contributing factors to better performance. There appears to be, however, an advantage to being of heavier build no matter what the height among this class of throwers. This suggests that the heavier, more muscular performer is superior.

Colvert, S.

Throwing the javelin

Coaching: Women's Athletics, 4 (May/June 1978), 3, pp. 84-85, 89-91

Foreman, K. & Husted, V.

Javelin

In: K. Foreman & V. Husted, Track and field techniques for girls and women (3rd ed.), Dubuque (Ia.): Wm. C. Brown, 1977, pp. 210-225, ISBN: 0-697-07139-1

Section headings: [1] Performance techniques. [2] Things to remember when teaching the javelin. [3] Steps in teaching the javelin throw. [4] Training schedules for javelin throwers. [5] Analysis of performance.

Fuchs, R.

Strength training for women javelin throwers

In: Foulkes, E. (ed.): Women's track and field athletics: The official report of the First IAAF Congress on Women's Athletics, Mainz, F R Germany, 9-11 December 1983, London: International Amateur Athletic Federation, 1986, pp. 332-339; also in: Thrower, Solihull (Engl.) (December 1987), pp. 52-55

Since the distance that a javelin can be thrown is determined essentially by the speed of the throw (initial velocity), the aim of strength training in this discipline can be defined as transmitting the highest possible speed of throw to the implement. In consideration of this aim, the structure of strength training can be divided into four areas: 1. general strength training, 2. maximum strength training, 3. special strength training, and 4. special strength training in throwing.

Harnes, E.

A study of run-up rhythm in the javelin throw for women

Thrower, Solihull (Engl.) (September 1989), 45, pp. 23-33; German original in: Die Lehre der Leichtathletik, Berlin, 27 (1988), 21, pp. 699-701; 22, pp. 731, 734; 23, pp. 795-797

Healy, P.

Women's javelin throw

Track and Field Coaches Review, Gainesville (Flor.), 97 (1997), 3, pp. 16-17

The author shows what to look for in a javelin thrower, describes how to start the throwing process, gives coaching tips, and presents drills for the javelin.

Hellmann, K.

Die Weiterentwicklung und Einordnung des speziellen Krafttrainings in den Trainingsprozess des Speerwurfs (Frauen) [The further development and integration of special strength training process of the women's javelin]

Theorie und Praxis Leistungssport, Berlin, 25 (1987), 4, pp. 44-51

Irving, S.

Javelin throwing

Coaching: Women's Athletics, 5 (March/April 1979), 2, pp. 24-28, 84

No author

Electomyographic study of arm muscle work in various means of throwing the javelin (abstract)

Yessis Review, Fullerton (Calif.), 10 (March 1975), 1, p. 28

In this study of women javelin throwers the authors look at three different techniques of throwing the javelin (final phase). Recommendations are given based on muscle activity in the shoulder, elbow and joints.

Oettingen, E. v.

Beobachtungen der europabesten Speerwerferinnen – Wettkampfbeobachtungen bei den Europameisterschaften in Helsinki 1971 [Observations with Europe's best female javelin throwers – Competition observations at the European Championships in Helsinki 1971]

Die Lehre der Leichtathletik, Berlin, 23 (1972), 13, pp. 449-452; 14, pp. 485-488

Olszewski, R.

Rel-event history: Women's javelin

Athletics, Toronto (Ont.) (December 2002), pp. 26-28

History of women's javelin in Canada. The earliest women's javelin competition took place in Toronto on August 25, 1925, with Jean Goodson winning over Fanny Rosenfeld. The article also includes the Canadian all-time list of women's outdoor javelin results.

Paish, W.

Javelin throwing for women

New Studies in Athletics, Rome, 3 (March 1988), 1, pp. 18-20

The author's advice is to change the rules relating to the specifications of women's javelin as was done with the men's javelin in 1986. This would make the sport fairer.

Utriainen, E.

Aix-les-bains 1987: XIV congress of the European coaches association: The differ-

ences between men and women javelin throwers

Thrower, Solihull (Engl.) (September 1987), 39, pp. 21-25

Utrianen, E.

Différences entre l'entraînement des hommes et celui des femmes au javelot [Differences between the men's and the women's javelin training]

In: J. Boelte & J. L. Gastaldello (eds.), Les lancers: Rapport officiel/The throws: Official report (XIVe Congrès Fédération d'Europe des Entraîneurs d'Athlétisme/European Athletic Coaches Association, Aix-Le-Bains, 13-17/01/1987), Paris: A.E.F.A. (Amicale des Entraîneurs Français d'Athlétisme), 1987, pp. 55-65 (Révue de l'Amicale des Entraîneurs Français d'Athlétisme, Paris (septembre/octobre 1987), 102)

Women can achieve good javelin results, good implement control, even in short time by doing more throwing exercises than men. Women have too little throwing experience. That is why, in the beginning, quantity is more important than quality.

Wakefield, F., Harkins, D. & Cooper, J.M.

Throwing the javelin

In: F. Wakefield, D. Harkins & J. M. Cooper, Track and field fundamentals for girls and women (3rd ed.), Saint Louis: Mosby, 1973, pp. 188-199

Javelin throwing for women was introduced at the 1932 Olympics and was won by Babe Didrikson (Zaharias) of the United States with a throw of 143 feet 4 inches. A world record was set in Tokyo in 1964 when Elena Gorchakoua of Russia threw the javelin 204 feet 8_ inches. Section headings: [1] History and background. [2] Special considerations. [3] Elements of throwing. [4] rules. [5] Common errors. [6] Teaching suggestions for beginner programs. [6] Training suggestions.

13 The javelin throw in the combined events

Bielik, E.

Relationships of release velocity to key delivery phase variables of highly skilled decathletes in the javelin event

Eugene, Oreg.: Microform Publications, University of Oregon, 1986, 2 microfiches

Kunz, H. & Kaufmann, D. A.

Cinematographical analysis of javelin throwing techniques of decathletes

British Journal of Sports Medicine, Loughborough, 17 (September 1983), 3, pp. 200-204

High speed films of 12 Swiss decathletes and 2 world class javelin specialists were analyzed by computer to compare techniques for correlations. The highest correlation was between velocity at release and distance thrown. Negative correlations were found between distance thrown and angle of javelin to the horizontal, and distance thrown and throwing hand to contralateral foot distance during the last strides. The results indicate that for maximal throwing distance the thrower must have positive acceleration during the approach, effective thrusting with the right leg on the last stride and obtain an optimal release angle of 32 to 36 degrees.

Kunz, H. & Kaufmann, D. A.

Essentials of the javelin throw: A biomechanical analysis

Track and Field Quarterly Review, Kalamazoo (Mich.), 80 (1980), 1, pp. 18-20

Film analyses of decathletes and specialists throwing the javelin show that, in order to promote maximal distances thrown in the javelin event, coaches should spend considerable time on emphasizing effective positive acceleration during the running approach, effective thrusting with the left and right leg and carry of the javelin at the optimal angle of release.

Matbejeb, E.

The javelin in multiple events

Modern Athlete and Coach, Adelaide (Aust.), 27 (1989), 4, pp. 31-33

The author suggests that multiple event athletes can gain valuable points by improving their javelin performances, looks at the common faults of decathletes and heptathletes and presents methods how to eliminate these. Although written with multiple events in mind, this article should prove to be of some interest also for javelin specialists.

Matveev, E.

The javelin for decathloners

Soviet Sports Review, Laguna Beach (Calif.), 26 (1991), 1, pp. 9-11

In this article the author tries to find out the reasons for decathloners' poor performances in the javelin throw. The first reason is that most decathlon coaches are not experts in javelin throwing technique and do not set high goals in this discipline. Technical faults are the consequence: The throw is performed with the arm alone, the athlete loses his feeling of support, and the strength of the leg, hip, and trunk muscles is not properly used during the throw.

Salo, A. & Viitasalo, J. T.

Vergleich kinematischer Merkmale des Speerwurfs bei Werfern internationalen und nationalen Niveaus und bei Zehnkämpfern [Comparison of kinematic characteristics of the javelin throw with international and national throwers and decathletes]

Leistungssport, Münster, 25 (1995), 5, pp. 40-44

Telfer, P.

The javelin in the heptathlon

Modern Athlete and Coach, Adelaide, 26 (1988), 3, pp. 32-34

The author analyzes the causes of the bad javelin throwing performances of the Australian heptathletes and gives hints for improvement.

14 Javelin equipment and safety

Best, R. J. & Bartlett, R. M.

Ladies' javelin: Aerodynamics, flight simulation and biomechanical considerations

In: L. Tsarouchas (Ed.) et al., Biomechanics in sports V: Proceedings of the Fifth International Symposium of Biomechanics in Sports, held in 1987 at Athens, Greece, Athens, Hellenic Sports Research Institute, Olympic Sports Center of Athens, 1989, pp. 88-103

Borgström, A.

The development of the javelin

New Studies in Athletics, Aachen, 15 (September/December 2000), 3/4, pp. 25-28

The author gives a short overview on the development of the javelin from ancient Greece to the modern era. He explains the development of material, aerodynamic qualities, rule changes, describes how rule changes affected production and led to new testing procedures as illustrated by the example of the Nordic company.

Dabnichki, P.

Biomechanical testing and sport equipment design

Sports Engineering, Oxford, 1 (1998), 2, pp. 93-105

The paper discusses possible ways for incorporation of biomechanical tests in sport equipment design. It is proposed that the testing of such equipment should simulate relevant sport actions with the emphasis on the scale and magnitude of observed loads and their relevant frequencies. However, such procedures require more intimate knowledge of the dynamics of the human body in terms of the exerted forces' magnitude, and relevant internal load distributions and frequencies, which should be obtained experimentally. It is pointed out that available commercial equipment is not always reliable and purpose-designed instrumentation is frequently needed to provide the necessary data with adequate accuracy. Examples of such instrumentation, a telemetric accelerometer for a bobsled and a built-in javelin force transducer, are discussed in some detail.

Ganslen, R. V.

A critique of javelin behaviour and design influencing international design specifications

Track and Field Journal, Vanier City (Ont.), 14 (April 1982), pp. 13, 15, 22

The author examines the design and flight characteristics of the javelin and makes a number of recommendations for design changes which eliminate the problem of flat landings.

Held, D.

Javelin: Aerodynamics and selection

Track Technique, Los Altos (Calif.) (Spring 1983), 84, p. 2671

Javelin designer Dick Held gives some simple insights into the aerodynamics of javelin flight and applies these principles to help guide the coach/athlete to select the proper implement for his/her level of skill.

Irving, S.

The crusade of the javelin: Knowledge of the rubber-tipped javelin may lead to its acceptance, making the possibility of sanctioning it throughout the country a reality

Track and Field Coaches Review, Gainesville (Fla.), 75 (2002), 1, pp. 13-15

Practically every high school in America has a discus/shot put program, but few support a javelin-throw program. A new rule on rubber-tipped javelins adopted, in 1985 by the National High School Federation Rules Committee, was seen as the catalyst for increasing support for the javelin at the high-school level. However, barriers to gaining support remain.

Malfait, C.

Le lancer de javelot – consignés de sécurite pour l'athlète et son entourage immediat [The javelin throw – safety indications for the athlete]

Sport: Communauté française de Belgique, Bruxelles (1988), 122, pp. 105-107

Paish, W.

Carbon fiber javelins

Track Coach, Mountain View (Calif.) (Spring 2002), 159, p. 5087

A commentary on the claim that carbon fiber javelins will add two meters to your performance.

Schmidt, V. J.

The javelin throw

Athletic Journal, Chicago (Ill.), 59 (January 1979), 5, pp. 26, 70

Part of the reason that the javelin has been shunned in the United States is that coaches and many state association have not taken necessary precautions to avoid injuries and thus they have eliminated the event. Against this background, the focus of this article is on rules for javelin safety.

Terauds, J.

How does your javelin behave

Modern Athlete and Coach, Adelaide (Aust.), 12 (April 1974), 3, pp. 7-9; also in: J. Jarver, The throws, Los Altos, Calif.: Tafnews Press, 1980, pp. 130-132

This study looks into the flight characteristics of popular makes of aerodynamic javelins, as determined by wind tunnel tests.

Terauds, J.

Optimum angle of release for the competition javelin as determined by its aerodynamic and ballistic characteristics

In R. C. Nelson & C. A. Morehouse (eds.), Biomechanics IV, Baltimore: University Park Press, 1974, pp. 180-183

The purpose of this study was to determine the optimal angle of release for the competition javelin as determined by its aerodynamic and ballistic characteristics. In particular, aerodynamic measurements included lift, drag, and the pitching moment, while ballistic tests consisted of horizontal flight distances of the javelin at various angles of release combined with various velocities.

Terauds, J.

The competition javelin

In: F. Wilt (Ed.), The throws: Contemporary theory, technique and training, Los Altos, Calif.: Tafnews Press, 1974, pp. 116-117

In 1971 the University of Maryland started testing competition javelins in conjunction with the Army Ballistic Research Laboratories of Aberdeen, Md. Included were tests on 21 different javelins, including those used in the 1968 and 1972 Olympics. All tests were conducted with experts operating the most advanced technological equipment available. The extensive data were analyzed by computers and recorded on several hundred pages of printout sheets. This article is a condensation of the original.

Terauds, J.

Wind tunnel tests of competition javelins

Track and Field Quarterly Review, Kalamazoo (Mich.), 74 (June 1974), p. 88

Ward, P.

Factors in choosing a javelin

Track and Field Quarterly Review, Kalamazoo (Mich.), 78 (Spring 1978), 1, p. 41

15 Interviews with and profiles of prominent javelin throwers

Alford, J.

NSA interview – 2: John Trower

New Studies in Athletics, London, 8 (September 1993), 3, pp. 41-43

This NSA interview considers the philosophy and methods of John Trower, the British Athletics Federation's National Senior Event Coach for the javelin throw. Trower has been coaching since 1985 when he was forced to give up his own competitive career because of a motoring accident. In 1987 he began coaching Steve Backley (GBR), who went on to win the 1990 European Championship title and whose personal best is 91.46 m (former world record). He also coaches Mick Hill (GBR), who won bronze at the 1993 World Championships in Athletics and whose personal best is 86.94 m.

Bakke, S.

68.94 javelin thrower aged 19: Stefan Bakke interviews Norway's Trine Solberg

Athletics Weekly, Rochester (Kent), 39 (9 November 1985), 45, pp. 38-41

Berenyi, I.

Girl to succeed Ruth Fuchs? A profile of Petra Felke: Will this be the girl to succeed Ruth?

Athletics Weekly, Rochester (Kent), 31 (31 December 1977), 53, pp. 26-27

Berenyi, I.

Hundred metre barrier breaker: Javelin ace Uwe Hohn profiled by Ivan Berenyi

Athletics Weekly, Rochester (Kent), 38 (3 November 1984), 44, pp. 24-25

Berenyi, I.

Profile of Ruth Fuchs: Cracks in shield of invincibility

Athletics Weekly, Rochester (Kent), 31 (31 December 1977), 53, pp. 24-26

Gammon, C.

Throwing caution to the wind: With the javelin, hotheaded Fatima Whitbread has won a world title and a new family

Sports Illustrated, New York, 69 (12 September 1988), 11, pp. 50-52

Gordon, J.

WTW interviews Sherry Calvert

Women's Track World, 11 (December 1979), 4, pp. 16-17

Hannus, M.

An athlete ahead of his time: Matti Jarvinen

Athletics Weekly, Rochester (Kent), 39 (10 August 1985), 32, pp. 49-50

Hannus, M.

It's Lilliak time in Finland: Matti Hannus writes about the new javelin world record holder

Athletics Weekly, Rochester (Kent), 36 (4 September 1982), 36, pp. 39, 41

Hendershott, J.
T&FN interview: Tom Petranoff
Track and Field News, 26 (October 1983), 9, pp. 48-49

Henderson, J.
Going for gold: Javelin thrower Goldie Sayers set a UK under-20 record when she won a silver medal at the European Junior Championships in July. Next year she steps into the senior ranks and is aiming to win a medal at the Commonwealth Games, writes Jason Henderson
Athletics Weekly, Peterborough (Engl.), 55 (5 December 2001), 49, pp. 24-25
Interview with English javelin thrower Goldie Sayers.

Henderson, J.
Simply the best? Steve Backley, Britain's greatest-ever thrower, is a man determined to eventually become the world's greatest ever javelin thrower. He took time out from promoting bananas to talk to Jason Henderson
Athletics Weekly, Peterborough (Engl.), 54 (3 May 2000), 18, pp. 14-17
Interview with British javelin thrower Steve Backley.

Henderson, J.
Spearheading the challenge: Steve Backley's victory at the Norwich Union British Grand Prix shows he has a great chance of winning his first global gold medal in Edmonton
Athletics Weekly, Peterborough (Engl.), 55 (1 August 2001), 31, pp. 14-15
Interview with British javelin thrower Steve Backley.

Hollobaugh, J.
Tom Pukstys
Track and Field News, Mountain View (Calif.), 47 (June 1994), 6, pp. 50-51, 55

Jones, M.
29th birthday present – Olympic Silver: Max Jones interviews David Ottley
Athletics Weekly, Rochester (Kent), 39 (13 April 1985), 15, 50, 52-55; also in: Thrower, West Midlands (Engl.) (April 1985), 32, pp. 38-42

Jones, M.
Profile: Mick Hill (date of birth 22.10.64)
Thrower, Solihull (Engl.) (December 1987), 40, pp. 56-60

Levin, D.
Spear-carrier no more: Bob Roggy moved to centre stage after making an astounding throw to break the American javelin record
Sports Illustrated, 56 (10 May 1982), 19, pp. 70, 72, 77-78

Lewis, R.
King of the javelin: Only Al Oerter has won more consecutive Olympic titles in one event than Jan Zelezny, thrice the javelin champion and now, surely, the greatest spear thrower of all time
Athletics Weekly, Peterborough (Engl.), 55 (14 March 2001), 11, pp. 12-14

Moore, K.
The latest in a long line: Finland, known for its male javelin throwers, now has a female champion in Tina Lillak, who brings to her event a balance of strength and beauty
Sports Illustrated, Chicago (Ill.), 61 (18 July 1984), 4, pp. 310-312, 314, 317, 320, 323, 327, 330, 332

Newman, S.
Bill Heikkila: Thoughts from the javelin sidelines
Athletics, Willowdale (Ont.) (June 1988), pp. 16-19

Newman, S.
Laslo Babits: An interview with Canada's outspoken javelin thrower
Athletics, Willowdale (Ont.) (January 1988), pp. 16-19

No author
Fatima Whitbread – World silver medallist
Thrower, West Midlands (Engl.) (November 1983), 27, pp. 11-12

No author
Profile: Laslo Babits
Track and Field Journal, Vanier City (Ont.), 26 (May 1984), pp. 19-20

No author
Yorkshire's javelin giant
Athletics Weekly, Peterborough (Engl.), 41 (5 September 1987), pp. 24-25

Turner, C.
Jury's still out on Parviainen
Athletics Weekly, Peterborough (Engl.), 54 (5 January 2000), 1, pp. 22-24

Turner, C.
Simply the best: It's hard to argue with any assessment that Jan Zelezny is history's greatest javelin thrower
Track and Field News, Mountain View (Calif.), 54 (November 2001), 11, pp. 12-13
Biographical article on the Czech Republic's Jan Zelezny who is the world and Olympic champion in the javelin throw.

Watman, M.
An athlete of many talents: The Tessa Sanderson story
Athletics Weekly, Rochester (Kent), 39 (15 June 1985), 24, pp. 26, 28-30, 32-37

Watman, M.
Fatima & Margaret Whitbread interviewed
Athletics Weekly, Rochester (Kent), 37 (24 December 1983), 52, pp. 36-41, 44-45

Watman, M.
Inspired by a Greek legend: The career of Fatima Whitbread
Athletics Weekly, Rochester (Kent), 37 (24 December 1983), 52, pp. 30-31, 33-34

Watman, M.
Moscow disaster ... Los Angeles triumph: The Tessa Sanderson story (part 2)
Athletics Weekly, Rochester (Kent), 39 (22 June 1985), 25, pp. 21-22, 24-30, 32

Weikang, H.
Javelinist from the "roof of the world"
China Sports, 14 (November 1982), 11, pp. 12-13

Willman, H.
Lillak a national treasure to Finns (Ilse Kristiina Lillak)
Track and Field News, Los Altos (Calif.), 37 (May 1984), 4, p. 66

16 Comprehensive and general articles about the javelin throw

Auzeil, M.
Compte rendu du javelot [Report on javelin throwing]
Révue de l'Amicale des Entraîneurs Français d'Athlétisme, Paris (octobre/décembre 2000), 160, pp. 46-48

Baert, J. P.
Javelin throwing
In: J. P. Baert, Throws: Theory and training for: Shot put, discus, javelin, hammer, Ottawa: Canadian Track and Field Association, 1980, pp. 63-77
This chapter contains a detailed technical description, training exercises, major errors, and a training program for the javelin throw. Photo sequences of throws by Yanis Lusis, Vasiliy Ershov, and G. Feldmanis are also included.

Bartonietz, K. & Larsen, B.
On the road to Sydney 2000 – the javelin throwers
IAAF Regional Development Centre Bulletin, Adelaide (Aust.) (1998), 13, pp. 6-10

Bartonietz, K.
Zur Entwicklung des Speerwerfens als leichtathletische Wettkampfdisziplin [The development of the javelin throw as an athletics competition event]
Leichtathlet, Berlin (1984), 33, pp. 7-10

Bosen, K.
Throwing the javelin
In: K. Bosen, Throws: Study material for athletic courses, Patiala: National Institute of Sports, about 1982, pp. 73-106
This is a comprehensive article covering almost all aspects of the javelin: history, rules, biomechanics, technique, coaching.

Bowerman, W. J.
The javelin throw
In: W. J. Bowerman & W. H. Freeman (ed.), Coaching track and field, Boston: Houghton Mifflin Company, 1974, pp. 285-307
The javelin throw is perhaps the most military of track and field events. It was contested by the Greeks as an event important to military prowess, for the javelin was an important weapon of that period. The ability to throw the javelin well was a mark of military skill in that day. Today the military has no need for javelins, but the event survives. Children still play at throwing spears, then graduate to the intricacies of the javelin. Technique becomes all-important, for the throwing form used with the javelin is not a natural motion. While the military value of the javelin throw has passed, the beauty of a good throw survives. This chapter also includes a photo sequence showing a throw by Janis Lusis.

Bowerman, W. J. & Freeman, W. H.
The javelin throw
In: W. J. Bowerman & W. Freeman, High-performance training for track and field (2nd ed.), Champaign (Ill.): Leisure Press, 1991, pp. 189-197
Section headings: [1] Training theory for the javelin. [2] Analysis of the javelin throw. [3] Common faults of javelin throwers. [4] Training considerations. [5] The training schedules: Special fundamentals for the javelin throw.

Bresnahan, G. T., Tuttle, W. W. & Cretzmeyer, F.X.
The javelin throw
In: G. T. Bresnahan, W. W. Tuttle & F. X. Cretzmeyer, Track and field athletics (6th ed.), Saint Louis: Mosby, 1964, pp. 326-353
The javelin throw has evolved into its present form from an ancient practice of throwing a spear for

either distance or accurarcy. When distance was the objective, the weapon was made with a blunt and equipped with a metal ring to give it weight. When it was thrown at a target, the end was sharp. Frequently when accuracy was being practiced, the javelin was thrown from horseback at a target. In the beginning the missile was provided with a leather strap, 12 to 18 inches long, known as a thong. This aid was bound around the shaft near the center of weight so that a loop was provided for the first and second fingers. The javelin was carried over the shoulder between the thumb and the first finger. It was delivered by a terrific whip of the right arm, the force being applied to it through the leather strap. As the javelin left the hand, it not only was propelled forward with great force, but it also was sent whirling through the air as a result of the unwinding of the leather strap. The forward propulsion and its whirling motion made it a deadly weapon. The revival of javelin throwing at the Olympic Games in 1906, when E. Lemming of Sweden threw the missile 175 feet and 6 inches, was responsible for the introduction of this event in America. Javelin throwing first appeared on the National Amateur Athletic Union program in 1909, when Ralph Rose of the San Francisco Athletic Club won the championship with a throw of 141 feet 7/10 inches. Section headings: [1] General considerations. [2] Technique of the javelin throw. [3] Comparison of styles of throw. [4] Common errors in the javelin throw. [5] Daily schedules of practice.

Brown, H.

Javelin throw

California Track News, 44 (April 1980), pp. 14-15

Brown, H., Webb, B. & Sing, B.

Javelin

In: J. L. Rogers (ed.), USA track & field coaching manual, Champaign, Ill.: USA Track & Field; Human Kinetics, 2000, pp. 249-264

The javelin, like all other throwing events, is a dynamic total body activity. While an explosive shoulder and arm is an asset for potential throwers, the javelin requires the use of the legs, hips, and abdominal muscles to throw well. Many young throwers have shortened their careers with elbow and shoulder damage by overusing the arms without learning to effectively use the whole body. Rather than being a "throw" which implies a predominantly arm activity, the javelin throw is an overarm, whip-and-flail motion that uses the entire body. Another factor that distinguishes the javelin from other forms of throwing is the aerodynamic feature of the javelin itself. If the application of the forces made to the implement are not made so that the flight of the javelin follows the correct flight path, distances will be cut short. Successful javelin athletes should possess speed, explosive strength, good coordination and kinesthetics, overall flexibility, and a feel for overarm throwing that can be transferred to the javelin. In screening athletes for the javelin, tests such as BAAB quadrathlon (30-meter sprint from standing start, two-handed overhead backward shot throw, standing long jump, and standing triple jump), as well as the softball throw for distance, are useful predictors.

Bush, J. & Weiskopf, D.

The javelin

In: J. Bush & D. Weiskopf, Dynamic track and field, Boston: Allyn and Bacon, 1978, pp. 327-349, ISBN 0-205-06005-6

The development of throwing velocity is perhaps the most important factor to the javelin thrower. While the javelin is considerably heavier than a baseball and more difficult to handle, the throw utilizes many of the same techniques as the baseball delivery. Developing a lightning fast delivery and thinking technique should be major concerns of a javelin thrower. While developing power, the athlete strives to make proper technique a habit by throwing thousands of times. The related muscle groups have to be trained for power, and a power position in the throwing stance must be developed. As a result, a sound program of training must develop maximum power in the throwing muscles. This work should be combined with skill training which will produce a fast run and a sudden stop. Timing is another key element in excellent performance – in the run-up, withdrawal of the javelin, cross-over step, body action, and the angle of throw. To maintain good coordination and rhythm, all of these actions must follow in sequential order. A smooth transition from one phase to the next requires considerable practice. Therefore, success in the javelin event requires a considerable amount of time and effort. Section headings: (1) Background. (2) Basic qualities. (3) Javelin throwing technique (grips; the carry; the approach; types of approach run; the throw; delivery; throwing stride; recovery stride; wind factor). (4) Training schedule (fall practice; suggested workout for fall season; pre-season; in-season; early season schedule; late spring; weight training; training aids. (5) Safety precautions.

Cantello, A.

The javelin throw

Track and Field Quarterly Review, Kalamazoo (Mich.) 70 (May 1970), 1, pp. 41-46

Carr, G.

Javelin

In: G. Carr, Fundamentals of track and field (2nd ed.), Champaign (Ill.): Human Kinetics, 1999, pp. 236-259, ISBN: 0-7360-0008-9

Javelin throwing has been in the Olympic Games since 1908 as an individual event for men and women; it is now also part of the decathlon and heptathlon competitions. Two developments have affected the conduct of competitive javelin throwing. The first was an attempt to use a discus-style rotation to throw. Although this method produced great distances, it was subsequently banned, and the rules now prohibit the athlete from turning the back toward the direction of throw. In effect this law has entrenched the traditional style of javelin throwing. The second development resulted

from the tremendous increase in distances (over 100 meters) thrown by men. Worried rule makers subsequently changed the configuration of the javelin, substantially reducing the distances thrown with the men's implement. Section heading: [1] Safety suggestions. [2] Technique. [3] Teaching steps. [4] Common errors and corrections. [5] Assessment. [6] Suggested standards of performance.

Cretzmeyer, F. X., Alley, L. E. & Tipton, C. M.

The javelin throw

In: F. X. Cretzmeyer, L. E. Alley & C. M. Tipton, Track and field athletics, Saint Louis: Mosby, 1974, pp. 237-257

Section headings: [1] General considerations. [2] Technique of the javelin throw. [3] Comparison og styles of throw. [4] Common errors in the javelin throw. [5] Daily schedules of practice.

Doherty, K.

The javelin throw

In: K. Doherty, Track and field omnibook (4th ed. rev. and updated). Los Altos (Calif.): Tafnews Press, 1985, pp. 249-263, ISBN: 0-911521-14-3

Chapter headings: [1] A summary history of the development of technique and distance. [2] Early American techniques. [3] Finnish javelin throwing. [4] Tom Petranoff, USA. [5] The whole action. [6] How to begin. [7] Essentials of sound technique. [8] Common faults in the javelin. [9] Safety in the javelin. [9] Organization of training.

Dunn, G. D. & McGill, K.

In: G. D. Dunn & K. McGill, The throws manual (2nd ed.), Mountain View, Calif.: Tafnews Press, 1994, pp. 101-128, ISBN 0-911521-39-9

Javelin throw

Section headings: [1] History. [2] Specifications and equipment. [3] Javelin technique: The grip, the carry, approach run, withdrawal, rotation or wrap vs. linear throw, the cross step, the throw. [4] Javelin flight faults, causes and corrections. [5] Teaching progression for the javelin. [6] Javelin drills. [7] Javelin training. [8] Test for javelin throwers.

Fabries, F. & Sprecher, P.

Lanceurs de javelot français en Finlande [French javelin throwers in Finland]

Révue de l'Amicale des Entraîneurs Français d'Athlétisme, Paris, 32 (Juli 1971), pp. 27-34

Gemer, G.

Javelin throw

Calgary: Amateur Athletic Union (AAU) of Canada, Alberta Branch, 1967, 19 pp.

Gorski, J.

My dinner with Klaus

Track Coach, Mountain View (Calif.) (1999), 147, pp. 4684-4689

The author conveys his impressions from a meeting with the German biomechanics expert and training scientist Klaus Bartonietz, who is also coach of the German elite javelin throwers. The fundamental principles of the German concept of javelin-related technique and training are presented.

Gorski, J.

Javelin

In: J. Silvester (ed.), Complete book of throws, Champaign, Ill.: Human Kinetics, 2003, pp. 99-129, ISBN: 0-7360-4114-1

While in the introduction the author gives an overview of the history of javelin throwing, the main part of this chapter deals with the following aspects of the javelin throw: [1] Technique (importance of the soft step; run-up; javelin grip and carry; transition; delivery). [2] Technique drills (medicine ball, weighted ball, and javelin throws; single-arm throws; running and cross-over exercises; simulation exercises; mental movies). [3] Flexibility drills (throwing simulation exercises; specific flexibility exercises; general athletic flexibility). [4] Power training drills (specific power; general power; athletic power). [5] Sample training program (conditioning cycle; preparation cycle; competition cycle).

Haines, J.

A study of America's top javelin throwers

Scholastic Coach, New York, 41 (April 1972), p. 84

This is a presentation of the results of a questionnaire study the author conducted on 42 US javelin throwers. The throwers give information on: Their best distance achieved in actual competition, their age, height, weight, whether they threw the javelin in high school, in which year of their throwing career they peaked, their 100-yard dash speed, their maximum bench press, the type of runway they prefer, the length of their approach, the position they carry the javelin in, the type of grip they prefer, the javelin they prefer, and other events they participate in.

Hignell, A. F.

Throwing the javelin

In: H. A. Meyer (ed.), Track & field athletics including cross-country, New York: A. S. Barnes, 1955, pp. 292-309

Section headings: [1] The javelin. [2] The grip. [3] Holding the javelin. [4] Carrying the javelin. [5] The run-up. [6] The transitional steps. [7] The throw. [8] The check. [9] Training.

Jarver, J.

Javelin throw in a nutshell

In: J. Jarver, The throws, Los Altos, Calif.: Tafnews Press, 1980, pp. 114-116

This is a short summary of basic mechanical concepts of the javelin throw, analyses of orthodox technique and elementary principles of training.

Jarver, J.

The Javelin throw

Modern Athlete and Coach, Adelaide (Aust.), 15 (July 1977), 3, pp. 34-37

This is basically a technical description of the javelin throw but some training information is also included.

Johnson, C.

Javelin throwing

London: British Amateur Athletic Board, 1987, 76 p.

Chapter headings: [1] History. [2] Physical attributes. [3] A guide to the rules. [4] Equipment: Selection and maintenance. [5] General principles. [6] Mechanical and bio-mechanical principles. [7] Technical training. [8] Physical training. [9] Planning training. [10] The organization of teaching and training. [11] Bits and pieces (competition, javelins, diet, supplements, coaching). [12] Glossary of technical terms which are not explained in the text.

Johnson, C.

Javelin

In: C. Johnson, Field athletics, East Ardsley: EP Publ., 1982, p. 74-79, ISBN 0-7158-0646-7

The javelin event, and its participants are dissimilar from the other throwing events. The event is a straight line one, performed from a runway, and the javelin thrower possibly has more in common with the long and triple jumper than the shot putter. Javelin throwers, therefore, tend to be more slender than other throwers, and often shorter in stature.

Jonath, U.; Krempel, R.; Haag, E.; Müller, H.

Der Speerwurf [The javelin throw]

In: Jonath, U.; Krempel, R.; Haag, E.; Müller, H.: Leichtathletik 3: Werfen und Mehrkampf. Reinbek: Rowohlt, 1995, pp. 131-211, ISBN 3-499-18662-4

This is a comprehensive chapter on the javelin throw dealing with technique, teaching methods, and training.

Jones, M.

The javelin

In: M. Jones, Throwing, Ramsbury, Marlborough, Wiltshire: Crowood Press, 1987, pp. 50-60, ISBN 0-946284-09-1

World-class javelin throwers are much lighter than other elite throwers with physiques akin to decathletes and heptathletes because the event relies much more on speed and explosive power than on strength. Athletes of average physical build have proved successful and, indeed, have won medals and set records. Chapter headings: Rules; Learning to throw (Grip; The standing throw; Three stride throw); Advanced technique (Approach; Withdrawal phase; Cross-over strides; Power position; The throw; Recovery); Drills (Running; Withdrawal; Stop and check; Restricted approach); Faults and corrections. The article also includes a picture sequence of a throw by David Ottley (GB).

Koltai, J.

Javelin

In: H. Payne (ed.), Athletes in action: The official international Amateur Athletic Federation Book on track and field techniques, London: Pelham, 1985, pp. 263-293

The aim to throw the javelin as far as possible is achieved by a) gaining optimum momentum in the run-up; b) using this momentum to attain a proper release position which is preceded by an uninterrupted transition from running to the actual throw; c) recruiting muscles used in an effective order to produce the highest release speed, to initiate the throw at an optimum angle and to provide a proper alignment and trajectory of the javelin. Of all the throwing events in track and field, it is in the javelin throw where the highest initial release velocity is attained. That is why the javelin throw requires the fastest explosive movement from extensive stretching and pretension of the muscles. Moreover, it is also important to recruit and coordinate the muscles used in the correct order. The technical description presented in this article is based on sequences showing the throws of the following athletes: Ferenc Paragi (Hungary), Tom Petranoff (USA), Maria Colon (Kuba), Sofia Sakarafa (Greece), Tina Lillak (Finland), Petra Felke (GDR), Dainis Kula (USSR).

Kovalakides, N.

Five A's of javelin throwing

Track and Field Quarterly Review, Kalamazoo (Mich.), 70 (May 1970), pp. 14-15; also in: Track and Field Quarterly Review, Kalamazoo (Mich.), 78 (Spring 1978), 1, p. 46

Kovalakides, N.

Throwing the javelin (3 parts)

Scholastic Coach, New York (February 1968), 6, pp. 12-13; (March 1968), 7, pp. 46, 48-49; (April 1968), pp. 28, 30, 54

This article includes a technical description of the javelin throw and training routines.

Kruber, D. & Kruber, A.

Speerwurf [Javelin throw]

Berlin: Verlag Bartels & Wernitz, 1972, unpaged

Kulcsar, G., Sprecher, P. & Nemeth, M.

Javelot [Javelin]

Révue de l'Amicale des Entraîneurs Français d'Athlétisme, Paris, 55 (deuxieme trimestre 1977), pp. 27-32

Lawler, P. J.

Producing the 60 to 70 metres schoolboy javelin thrower

Sydney: Australian Track and Field Coaches Association, 1983, 49 pp.

The paper considers in detail: (1) Technical considerations; (2) technical expectations, attainments and training; (3) weight training for the javelin; (4) mobility for the javelin. The techniques of javelin

throwers are analyzed in section 1 to give the coach a broad base from which to plan a training program. Section 2 is a developmental program for 12- to 17-year-olds, setting attainment goals for each age group for both 600 and 700 gram javelins. An expanded program of weight training for throwers over 14 years is suggested in section 3. Section 4 looks at exercises to improve the mobility of the shoulder girdle, elbow, torso, and legs, particularly the groin region.

Lawler, P.

The javelin throw – the past, present and future

New Studies in Athletics, London, 8 (September 1993), 3, pp. 15-23; also in: Track and Field Quarterly Review, Kalamazoo (Mich.), 94 (Fall 1994), 3, pp. 47-52; Thrower, Solihull (England) (December 1994), 64, pp. 4-14

Malcolm, A. R.

Javelin throw (2nd ed.)

London: Amateur Athletic Association (AAA), 1950?, 31 pp.

May, J.

The javelin throw

Track and Field Quarterly Review, Kalamazoo (Mich.) 66 (March 1966), pp. 46-46

Mazzalitis, V.

Javelin throwing, Russian style

Track Technique, Los Altos (Calif.) (September 1968), 33, pp. 1027-1045

The author deals with the following aspects of the javelin throw: [1] The grip of the javelin; [2] the run; [3] cross-steps; [4] the training of the javelin thrower; [5] the planning of the training; [6] training in the preparatory period; [7] training in the competitory period; [8] training in the conclusive period; [9] perfection (improvement) of the technique in throwing; [10] preparedness in strength.

Paama, M.

Thoughts about javelin throwing

Modern Athlete and Coach, Adelaide, 18 (1980), 3, pp. 12-14

This paper discusses javelin throwing technique concepts, by including film sequences of Antero Puranen (Finland) in action at the 1978 European championships. Samples of training methods used by Puuste of Estonia and Hovinen of Finland are detailed.

Paish, W.

Javelin throwing (5th ed.)

London: British Amateur Athletic Board, 1980, 48 pp.

Chapter headings: (1) Intoduction. (2) Rules and safety. (3) Javelin throwers and javelins. (4) Mechanics of the throw. (5) Technique of javelin throwing. (6) Learning to throw. (7) Training for the javelin throw. (8) Coaching the javelin throw. (9) Tips for the thrower. (10) Interview with a javelin thrower. (11) Photo-sequence studies.

Payne, R. & Payne, H.

Javelin

In: R. Payne & H. Payne, The science of track and field athletics, London: Pelham, 1981, pp. 355-362

Because of its military history, the javelin has always been the subject of attempts to increase the distance it can be thrown. For example, short slings have been connected between the thrower's fingers and small hooks at the grip to increase the release velocity, and the aerodynamic characteristics have been improved to the stage where correct angles of attitude and release for maximum lift in flight are an important part of the thrower's skills. It was not until the mid-1950s that an ingenious Spanish athlete discovered that the best method for distance throwing was to use a discus-style turn while holding the javelin just behind the grip in a pre-soaped or oiled hand. The low-friction hand-hold helped the easy release of the javelin, but this and the rotation made it an unpredictable and dangerous method. The athletic authorities have re-worded the rules and specifications several times to limit aerodynamic improvements, and to prevent the use of slings, hooks and discus-style turns. The javelin and the method of throwing it are now subject to very stringent conditions. The orthodox style of a linear run-up, a drawing back of the throwing arm followed by a checking of the landing leg and a bent-arm-elbow leading throw is virtually the only method possible, and the thrower must therefore concern himself with a fast controlled run which blends with and adds to the throwing action, resulting in a correctly angled fast delivery. This article includes a description of javelin throwing technique, illustrated with two photo sequences showing throws by Miklos Nemeth (Hungary) and Tesse Sanderson (Great Britain).

Pugh, D. L.

Javelin throwing (2nd ed.)

London: Amateur Athletic Association (AAA), 1960, 48 pp.

Pugh, L.

Javelin in perspective

In: F. Wilt (Ed.), The throws: Contemporary theory, technique and training, Los Altos, Calif.: Tafnews Press, 1974, pp. 101-106

Is the javelin a relatively stagnant event? Should new methods, like underhand deliveries and soaped hands, be allowed to permit greater world records? The author takes the reader back two decades to look at some Americans who were internationally prominent but, perhaps more importantly, challenged the classical styles put forward by the Scandinavians.

Robison, C. F., Jensen, C. R., James, S. W. & Hirschi, W. M.

Javelin throw

In: C. F. Robison, C. R. Jensen, S. W. James & W. M. Hirschi, Modern techniques of track and field, Philadelphia, Pa.: Lea & Febiger, 1974, pp. 236-249

Chapter headings: (1) Procedure. (2) Javelin throw technique (The grip; The carry; The approach run; The cross-over stride; The throwing stride; The recovery stride). (3) Application of scientific principles. (4) Common faults and how to correct them. (5) The training schedule (summer; fall; winter; spring (early and middle portion); Late spring (May-June)). (6) Conditioning exercises.

Roy, J. & Thieurmel, M.

Javelin

Track and Field Quarterly Review, Kalamazoo (Mich.), 83 (Spring 1983), 1, pp. 41-46

Royal Canadian Air Force Recreation Branch; Canada Dept. of National Health and Welfare

Javelin throw

Ottawa: DND, 1960, 32 pp.

Salmenkyla, M.

Javelin throw in Finland

Track and Field Quarterly Review, Kalamazoo (Mich.), 84 (Spring 1984), 1, pp. 27-28

Salomon, H.

Speerwurf: Technik, Training, Wettkampf

Berlin: Bartels & Wernitz, 1971, 96 pp.

Sawyer, C.

Clinic Sports Library: Discus; the javelin throw; weight training; the hammer throw

Portland, Oreg.: Clinic Sports Library, 1981, videocassette: col., 47 min

A detailed analysis of the components of the discus throw, the javelin throw, weight training and the hammer throw. Includes drills and lists coaching points and features footage of top level athletes at the 1980 U.S. Olympic trials.

Schmolinsky, G. (ed.)

Track and field (2nd rev. ed.)

Berlin: Sportverl., 1983, 416 pp.

This book includes a chapter on the javelin throw (pp. 360-375) dealing with the following topics: technique (grip, carry, approach, five-stride rhythm), technical training, club throwing, physical requirements and training methods for improving performance.

Smith, C.

Look at javelin throwing

Modern Athlete and Coach, Adelaide (Aust.), 19 (July 1981), 3, pp. 43-44

Sprecher, B.

Lancement du javelot [The javelin throw]

Révue de l'Amicale des Entraîneurs Français d'Athlétisme, Paris (1973), 38, pp. 43-52

Sprecher, B.

Opération javelot [Operation javelin]

Révue de l'Amicale des Entraîneurs Français d'Athlétisme, Paris (1972), 36, pp. 45-48

Sprecher, B.

Opération javelot [Operation javelin]

Révue de l'Amicale des Entraîneurs Français d'Athlétisme, Paris (1973), 41, pp. 55, 57-58

Stirzaker, B.

European javelin observations

In: F. Wilt (Ed.), The throws: Contemporary theory, technique and training, Los Altos, Calif.: Tafnews Press, 1974, pp. 129-134; originally in: Modern Athlete and Coach, Adelaide (1973), 2 + 3

The author attended the Munich Olympics in 1972 and afterwards traveled in Europe. He recorded his observations on javelin throw training methods and techniques in Finland and Germany. In Finland for three weeks, he visited with 1964 Olympic champion Pauli Nevala who trains Hannu Siitonen (308-1 in 1973) and Aimo Puska (252-8 in 1970). While in Germany, his studies centered mainly around Olympic champ Klaus Wolfermann.

Tancred, P. & Carter, C. A.

Javelin

In: P. Tancred & C. A. Carter, Athletic throwing, London: Faber and Faber, 1980, pp. 105-125

Section headings: [1] History of the event. [2] Safety precautions. [3] Breakdown of the event: The grip, the carry, the approach run, the transition, the delivery, the recovery. [4] Faults and corrective procedures. [5] Training to throw the javelin.

Wade, M. G.

Finnish javelin throwing – A comparative viewpoint

Track Technique, Mountain View (Calif.) (June 1967), 28, pp. 881-884

This article was produced from a series of discussions and training sessions with Finnish National Coach Mikko Paananen during the Royal Canadian Legion 5th National Track and Field Clinic at the University of Guelp, Ontario, August 1966. Both javelin technique and training is dealt with.

Webb, B. & Sing, B. F.

The javelin

In: The Athletics Congress's Development Committee with Vern Gambetta (ed.), The Athletics Congress's Track and Field Coaching Manual (2nd ed.), Champaign (Ill.): Leisure Pr., 1989, pp. 189-199

Throwing a javelin for maximum distance is physically demanding. Contrary to popular opinion, rather than being simply an arm throw, it is also a leg and total-body activity. Slight deviations from correct mechanics can adversely affect the distance obtained and greatly increase the specific stresses on the joints, the ligaments, and the tendons. To maximize potential, today's javelin thrower needs a com-

bination of speed, strength, coordination, flexibility, a good throwing arm, and a kinesthetic feel for the javelin. In addition, to throw far, the thrower must learn to relax and let things happen, instead of trying to force the throw. Analysis of the biomechanics of the javelin throw demands that we dissect the total throw into its component phases. However, it is the summation of those sequential phases that makes the throw. To obtain maximal distances in the javelin, the emphasis must be placed on five fundamentals: (1) Acceleration into the throw. (2) Initiation of the throw from the legs and hips, with effective forward transfer of the center of gravity. (3) Proper separation of the hip axis from shoulder line, with maximal delay of the arm strike. (4) A firm, blocked left side (for a right-handed thrower). (5) A long, accelerated power pathway for the arm strike to occur. Through proper biomechanics, we are able to maximize the factor that has been touted as the single most crucial factor in the determination of the distance throw: The velocity of the javelin at the release point. Modern principles of training require a multifaceted approach to the event. The throw-and-lift-only training patterns are long past. Besides throwing the javelin in practice and working hard in the weight room, plyometric activities like hopping and bounding are absolutely essential for developing the tensile strength and resiliency required in the lower body. Throwing various weighted balls, sand tubes, medicine balls, and other objects with one or both hands is a prerequisite for developing specific throwing power. In addition, some combination of activities, such as gymnastics or ballet movements, is necessary for increasing coordination, body awareness, dynamic flexibility, and balance.

Webb, B. & Sing, B.

Javelin throw principles

Track and Field Quarterly Review, Kalamazoo (Mich.) 89 (1989), 3, pp. 21-22; also in: Thrower, Solihull (England) (December 1989), 46, pp. 14-15

Throwing a javelin to obtain maximum possible distance is a complex activity that is physically very demanding on the body. Furthermore, contrary to popular opinion, it is a leg and a total body activity rather than just an arm throw. Slight deviations in correct mechanics can detrimentally effect the distance obtained and greatly increase specific stresses on the joints, ligaments and tendons. To maximize potential, today's javelin throwers need to combine and blend a combination of: speed, strength, coordination, flexibility, a good throwing arm, and a kinesthetic sense or feel for the javelin. In addition, to throw far, the thrower must learn to relax and "let things happen" instead of trying to force the throw by "arming it".

Webb, B.

Javelin observations

Modern Athlete and Coach, Adelaide (Aust.), 18 (October 1980), 4, pp. 10-13

The author, track coach at the California State University, discusses basic mechanical principles related to the javelin throw. He presents training schedules used by the Finns and Hungarians, Miklos Nemeth and by the University of California.

Webb, B.

The javelin

Track and Field Quarterly Review, Kalamazoo (Mich.) 80 (1980), 1, pp. 3-7

This article deals with the biomechanical principiles, the technique, the teaching and training of the javelin throw. Technical control points for the coach are listed.

Withbread, F., Borgström, A., Heikkila, B., Kühl, L., Launder, A., McGill, K., Ballesteros, J. M. & Etcheverry, S. G.

NSA round table [Javelin]

New Studies in Athletics, London, 8 (1993), 3, pp. 25-37

The following questions are dealt with: (1) Do you think it would be a good thing to modify the women's javelin so that its flight characteristics were more in line with those of the men's javelin? (2) In your experience, what are the most common injuries suffered by javelin throwers and what preventive measures would you suggest? (3) What are your views regarding the exact timing of the withdrawal of the javelin during the approach run? (4) What type of weight training would you recommend to help the javelin thrower make the transition from junior to senior ranks?

17 Bibliographies on the javelin throw

Schiffer, J.

Selected and annotated bibliography: Javelin throw

New Studies in Athletics, Monaco, 13 (1998), 1, pp. 65-86

This following bibliography is a selection taken from the database SPOLIT of the Federal Institute for Sport Science (BISp), the database of the Sport Research and Information Centre (SIRC) in Ottawa/Canada and material from private sources. This is the first bibliography dealing exclusively with the javelin throw in "New Studies in Athletics". It contains a total of 144 documents, most of which come from the year 1990 up to the present. The bibliography is subdivided into seven chapters: 1. Publications with an emphasis on the biomechanical analysis of the javelin throw (48 documents). 2. Articles dealing with technical aspects of the javelin throw (19 documents). 3. Javelin sequence analyses (6 documents). 4. Javelin videos (4 documents). 5. Publications focusing on the training and teaching of the javelin throw (45 documents). 6. Publications discussing medical aspects of the javelin throw (10 documents). 7. Publications of a comprehensive or unspecific character (12 documents).