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MOTOR EDUCATION

-

Elements from Athletics

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PREVIEW

We have to say from the beginning that this informative material is not new.

Although the number of books on the topic of athletics has recently increased, due to the change in curriculum content we find it appropriate to synthesize the information in the form of a course, to which we tried to give an intuitive form.

Because the content is adapted to the current curriculum, it is mainly addressed to students of the KMS-E study program (Kinetotherapy and special motricity in english) and eventually to ERASMUS students in the field of Physical education or Kinetotherapy/Physiotherapy. We will enjoy no matter who will find this material useful.

I. Theoretical competences

1.1 General aspects

Athletics/Track and field

Through his exercises, depending on the intended purpose, athletics can be regarded as:

- a component of Physical Education;
- a sport (athletics events/track and field events).

As a component of Physical education:

- athletics uses exercises (specialized exercises), that contribute to achieving the objectives of physical education. These exercises are not strictly regulated in their practice and do not have a competitive nature/character.

As a sport:

- refers to athletic events, which are strictly regulated and have a purely competitive nature/character; athletics as a sport contribute to achieving the objectives of the sport movement all over the world.

As a component of Physical Education, the system of athletics exercises, rationally used, contributes to the achievement of physical education tasks at all ages:

- enhancing health and harmonious growth;
- strengthening the body (by practicing outdoor activities in different weather conditions);
- developing skills;
- acquiring skills;
- learning specific knowledge;
- developing moral qualities;
- developing aesthetic sense.

As a sport, athletics is practiced at different levels: mass sport (sport for all), performance sport, high performance sport and:

- is based on individual competition;
- athletes are classified according to their individual value (even in the team events such as relay races, the rankings are also based on the individual aggregated results), based on universally valid and accepted competition rules;
- each of the athletic events is based on its own rules and there are no conditions between them.

Included in the large notion of sport, Athletics contributes to promoting friendship, honesty, sense of fairplay, self-confidence, respect for other people and so on.

The physical training of a performance athlete in almost any sports discipline (dynamic sports) without the contribution of athletic means can not be designed and accomplished.

The development of motor skills (speed, dynamic strength and resistance) can be achieved in the most efficient manner, using specific means of athletics (principles, methods, exercises).

Athletics and athletes are known mainly by the high performances in competitions (e.g. Carl Lewis [sprint and long jump], Sergey Bubka [pole vault], Usain Bolt [sprint] and many others).

Knowing the individual limits and overtaking them was always a challenge. Olympic motto "Citius, Altius, Fortius" (Latin: "faster, higher, stronger") merges with athletics.

Starting from the few athletic events in the Ancient Olympics program (1, 2, 4 or 20 stadium footrace, javelin throw, disc throw), during the years, competitive athletics has become enriched to a number of 24 events (plus 2 main combined events) in our days.

In the development process, each of the three categories of events - running, jumping, throwing - has diversified, it has better outlined its structure (technique), motor tasks and behavior in competitions (competition regulation), forming **the athletics events system** (**A.E.S.**) from our days.

1.2 The role of dynamic games in teaching athletics (skills)

The dictionary gives the concept of game several meanings, of which in the context of this paper, we present:

- Fun activity (mainly for children), consisting of a certain kind of dialogues, in small actions performed according to certain rules, imitation or simulation of realities etc.;
- Form of sport practiced between teams, according to precise rules.

All specialists agree that games (dynamic games or sports games) are important means of performing most of the physical education tasks. Summarizing several opinions, we can say that *the dynamic game is a physical activity that triggers physical and mental resources, causing interest (emulation) and pleasure (satisfaction)*. Through dynamic games, motor development (motor skills, basic motor skills and applicative-utilitarian skills) and psychic (perceptions, sensations, thinking etc.), as well as the improvement of the collective behavior and the formation of character traits are achieved.

Classification of games

Basic dynamic/motion games with simple and just few rules, primarily aimed at ensuring the general physical development of pupils;

Preparatory games for sports games (or other sports), with more and more complicated rules, aimed at developing motor skills, learning techniques and basic tactical actions in different branches of sport;

Sports games, which besides rich content (technical, tactical etc.), have more precise and more complicated rules.

Due to similar features - especially the character of competition - we consider it appropriate to include the relay games in the category of dynamic games.

Depending on the purpose they pursue, we can talk about:

Dynamic games for developing some forms of motor skills

(Speed: response to auditory or tactile stimulus, acceleration, repetition, movement; Force/Power: explosive, segmental; Endurance: in speed regime, in regime of force coordination, flexibility etc.);

Dynamic games containing basic (driving) skills (forms of running, jumps, throws) which aim to create favorable premises for acquiring the technique (Running: accelerated, turn running, relay, running over hurdles; Jumping: standing on a foot and landing on the same foot, on the other foot, both strides; Throwing: flinging type, push type, launch type);

Dynamic games for the development of superior nerve processes and psychic qualities (attention, analyzers, moral and volitional education);

Dynamic games for learning technical elements from various branches of sport, especially from sports games (games of manipulation, leadership, organization, strategy);

Applicative dynamic games (containing predominantly utilitarian-applicative skills as walk, creep, escalade, transport etc.).

Regardless of the purpose or effects, dynamic games are characterized by some common elements:

- purpose;
- topic;
- rules;
- dynamic content;
- form of organization.

To achieve the aims of physical education, it is necessary to comply with requirements on the organization of games and relays:

- planning the content to be in accordance with the particular age and gender, with the physical possibilities of pupils, as well as with material and climatic conditions;
- ensure early preparation of ground and materials needed;
- forming teams on the principle of numerical and value homogeneity;
- explaining the rules to their full understanding;
- providing arbitration, establishing rankings and game analysis.

Why use dynamic games (and relay games) to provide the basics needed to learn motor skills from athletics?

To answer, we think it's enough to point out a few things:

- the mobility of cortical nerve processes (excitation and nervous inhibition) specific to pupil age in the primary and secondary school (but not only);
- predominance of excitation at the cortical center level;
- the "dynamic games and relays" method develops qualities and forms of motor skills on a favorable emotional background without special strains;
- the game itself is a motivation factor.

1.3 General foundations of Athletics

Synthesizing the meanings that are closest to the present content, we can understand through the "athletics school" a training system consisting of a sum of specific means/exercises that are not part of the technique of athletics, but which by the formative effects generated by practice, "builds" a practical basis that favors the appropriation of the technique (exercises/athletic events).

All these means/exercises, without which it is impossible to conceive the initiation into athletics, grouped in three categories (associated with the three groups of athletic events) respectively "the running school", "the jumping school" and "the throwing school" represent for the initiation in athletics, which is the alphabet for initiation in anyone's language and literature.

We believe this association has motivated prof. D. Drăgan to name this system of means as the "ABC of athletics".

1.3.1 General foundations of running

Running as a form of locomotion, consists of a cyclic sequence of alternate contacts with the ground, between which a flight is interposed (cyclic succession of simple alternate running steps), meets besides athletics in other sports, as a general element linking specific sports actions (in the case of dribbling, counterattack, defense withdrawal etc.), as a means of warming up or for improving the capacity of effort (forms of endurance), but also in everyday life - where, however, the technique is of no importance.

Acquiring the technique of the running step in the forms in which it is presented, is favored by learning and repeated practice of exercises in the "running school", which represents in different proportions parts of the technique of running on flat terrain, on varied terrain (the cross country as a competition event), hurdles and steeplechase.

Running as an exercise or as an event of athletics, is based on the natural running (naturally learned) and in sport it is perfected for superior performance.

The cyclic sequence of steps in running, result from the alternative action of the lower limbs in periodic contact with the ground. The difference between walking and running is due to the existence of the flight phase, characteristic only to the running. The running step as a cyclic unit of running can be viewed from two perspectives:

- simple running step;
- double running step.

Simple running step is the basic cyclic unit in running and includes all actions and positions between two successive actions in which contact is made with the ground (two successive contacts with the ground). Thus, it includes: one-sided support, followed by a flight and landing on the opposite leg.

Double running step is the complete cycle of one running unit, consisting of two consecutive simple running steps. The movements made by each leg between two identical attitudes within a complete cycle (of the double running step), contain two distinct periods: support and swing. Each leg passes successively through the support and then swing period.

Analyzing therefore the double running step, there are two periods (through which both legs pass) subdivided each in three phases that alternate continuously during the run:

DUBLE RUNNING STEP

1. The support period

- 1.1 The amortization phase
- 1.2 The vertical moment
- 1.3 The impulse phase

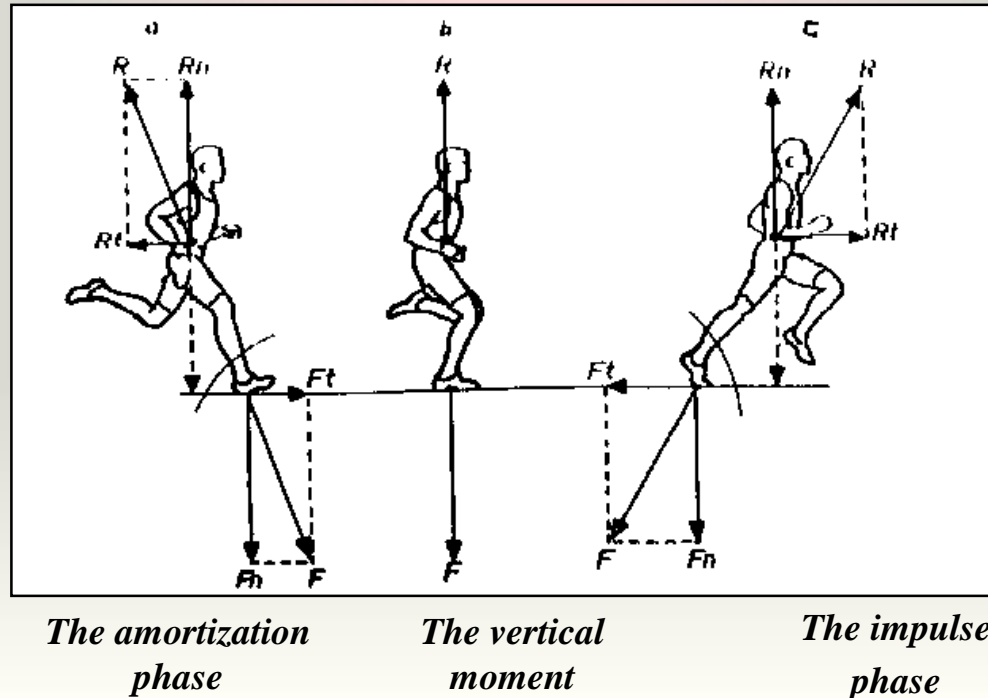
2. The pendulum period

- 2.1 The back step phase
- 2.2 The vertical moment
- 2.3 The front step phase

The support period

During this period, the runner is in alternatively contact with the ground. Due to the interaction with the support/ground (when the runner can act by his own forces on his body moving it at different speeds) we can say that the support period contains in his structure the motor source of the moving action.

The support period consists of three phases: the amortization phase, the vertical moment and the impulse phase.



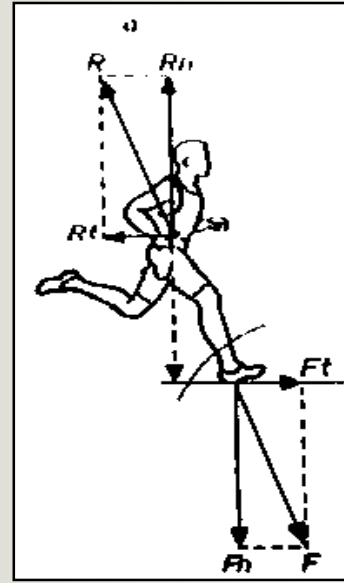
The amortization phase (negative character of braking)

It lasts from the moment of landing (when the normal projection of General Center of Gravity falls behind the contact) until the vertical (when the normal projection of G.C.G. falls on the support surface).

Because of the orientation of the normal projection of G.C.G. in relation to the support (behind it) during the amortization phase, the direction of the force determined by the ground pressure of the support leg is directed forward and down.

The oblique pressure force on ground (F) decomposes into:

- normal force (F_n), perpendicular to the ground, determined by the weight of the runner;
- tangential force (F_t), parallel to the ground and oriented in the direction of running.



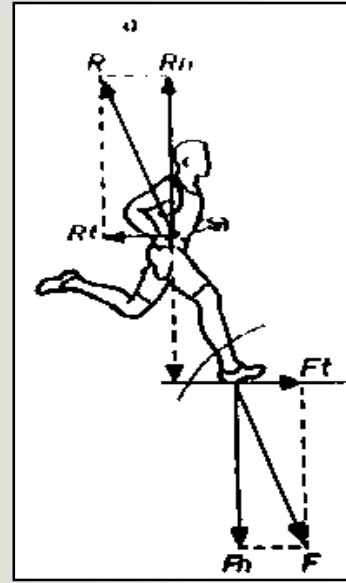
The amortization phase

The ground pressure force of the support leg (F) corresponds to a reaction force of the support (R), equal and opposite to the press force. This force (R), with the point of application in G.C.G.

decomposes itself into:

- normal reaction force (R_n), having a vertical direction and a down-up orientation;
- tangential reaction force (R_t), parallel to the ground, but oriented backwards.

The reaction force of the support (R) oriented back, obliquely and upwardly, demonstrates that the amortization phase is a negative phase, which brakes the running.

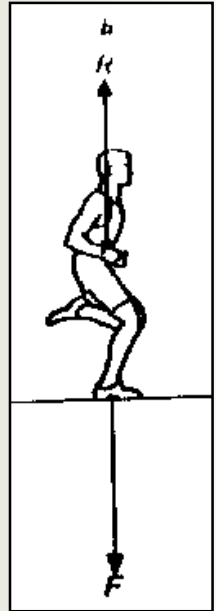


The vertical moment (neutral character)

During the amortization phase, the runner's body swings around the support point, gradually reaching the vertical projection of the center of gravity (G.C.G.) on its surface, defining the vertical moment.

In this phase (of the vertical moment), the support leg reaches the greatest flexion in the knee and the center of gravity descends on an arc at the lowest level of the whole cycle of the double running step.

At the vertical moment, the pressure exerted by the body on the support (F) is perpendicular to the ground, and the reaction of the support (R) is upward and is equal to the weight of the body.

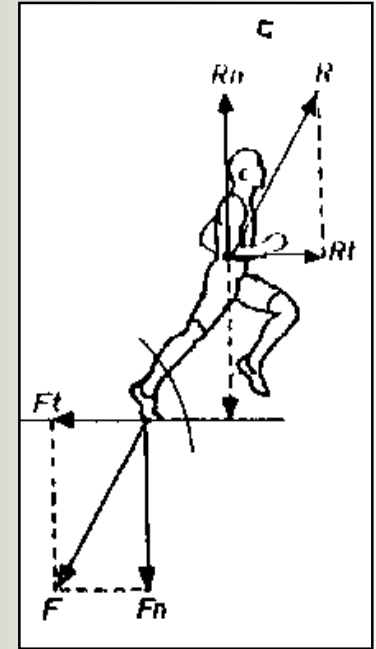


The vertical moment

The impulse phase (positive, dynamic character)

This phase begins when the vertical phase is over and ends when the front of the foot/sole lifts from the ground.

The characteristic part of this phase is the oblique backward push action on the ground, with a result oriented, this time, up and forward. G.C.G., which at the vertical moment has reached the lowest level due to the movements that continue around the support point, will describe a circle arc on an ascending trajectory. As much as the distance between the support point and the projection of G.C.G. on the soil is higher, the action on the ground will be skewed (the impulse angle will be lower).



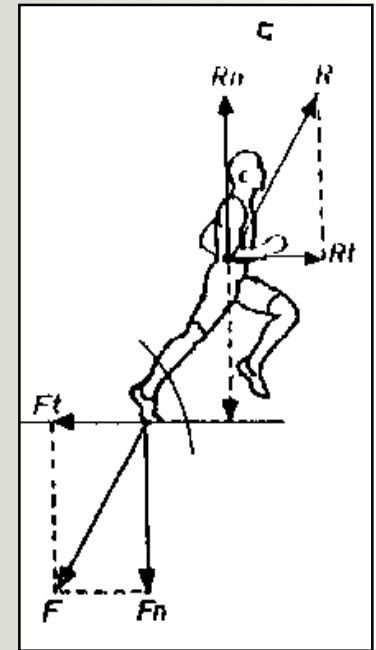
The impulse phase

The oblique force (F) of the pressure on the soil, in turn, decomposes itself into two components:

- normal force, perpendicular to the ground (F_n), equivalent to the weight of the runner's body;
- tangential force, parallel to the ground and pointing towards the rear of the running direction (F_t).

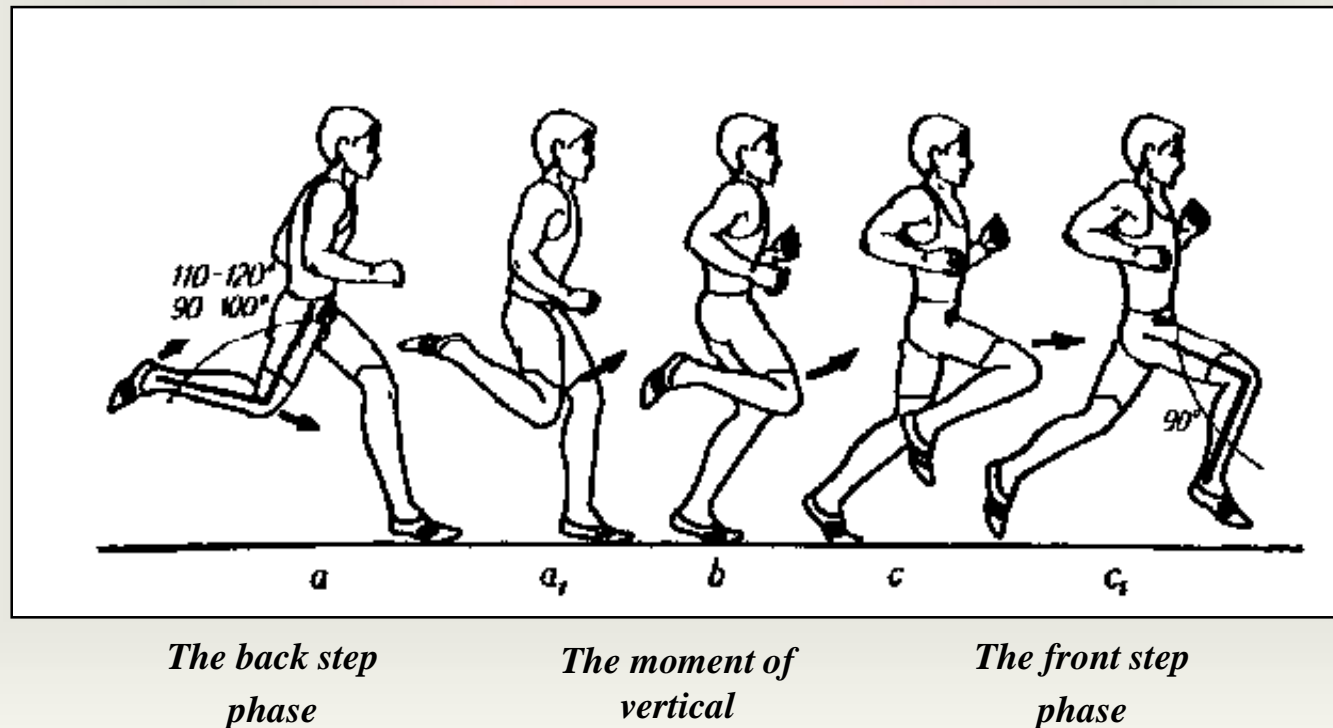
The reaction force of the support (R), corresponding to the force of action on the soil (F), also decomposing into:

- normal reaction force (R_n), perpendicular to the ground and oriented from bottom to top;
- tangential reaction force (R_t) parallel to the ground and oriented in the same direction as running.



The pendulum period

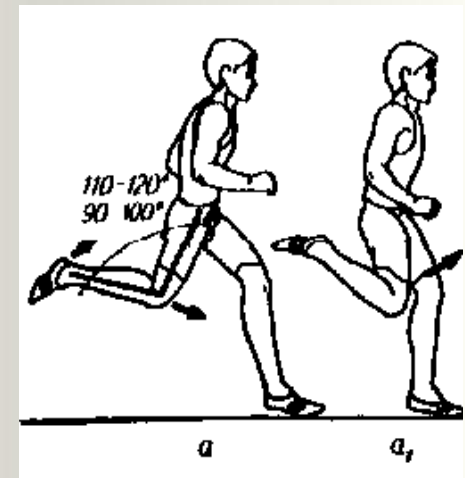
It begins with the end of the impulse phase and, through its phases, closes the double step cycle. Depending on the position of the pendulum foot towards the vertical on the support surface of the opposite leg, the swing period covers three phases: the back step phase, the moment of vertical and the front step phase.



The back step phase

It begins once the impulse foot has been lifted from the ground and lasts until the runner arrives at the vertical moment of the opposite leg. At the beginning of this phase, due to the horizontal rise of the supporting thigh and the rearrangement of the impulse foot, the angle between the two legs will have the maximum opening (a , a_1). The values of this angle are higher for speed runners ($110-120^\circ$), which makes a longer step length than the long distance runners ($90-100^\circ$ or less).

The rear swing is characterized by pulling the thigh forward from the hip joint, with the flexion of the calf on the thigh (from the knee joint). Thus, the angle between the two thighs decreases more and more, reaching 0° at the vertical moment; also, the angle between the thigh and the calf becomes smaller.



*The back step
phase*

The Vertical Moment

The vertical moment of the pendulum foot occurs simultaneously with the vertical moment of the support leg. It is marked by the crossing of the support leg with the pendulum foot.

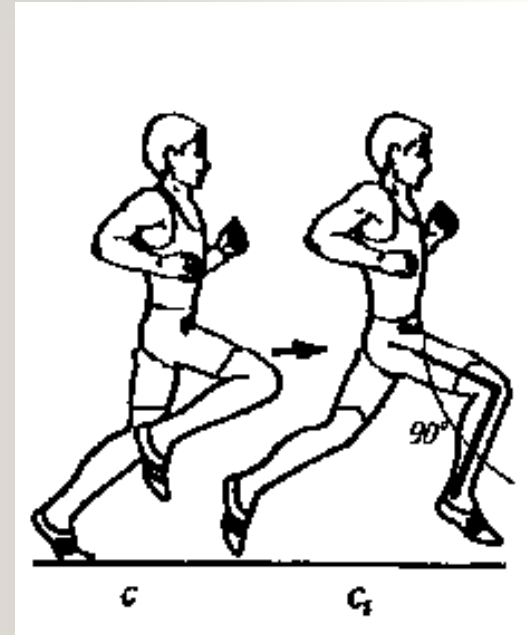
This phase produces a maximum flexion of the calf on the thigh (in the speed events), limiting the articular mobility and braking of the rotation due to the contact between the muscles of the calf and the thigh.



*The
moment
of vertical*

The front step phase

In this phase, the thighs continue moving forward and upward. The angle between the thighs progressively increases, reaching a maximum value when the thigh approaches a horizontal angle (more common for the speed runners than for the long distance runners). The angle between the calf and thigh increases gradually, reaching up to 90° . The movement continues until the thigh gradually descends with the duction of the calf forward, down and back, preparing the foot to be lowered to the ground in order to take over the landing shock (amortization).



*The front step
phase*

Body oscillations

During running, the trajectory of G.C.G. (of the body) is not linear due to the periodic interruption of contact with the ground, the one-sided support, the alternative transferring of body weight from one foot to the other, and the flight phase.

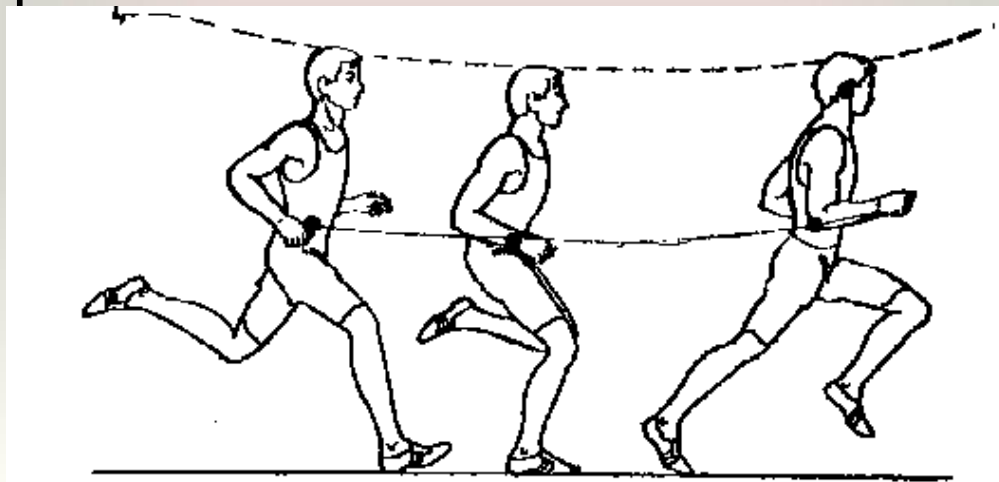
Thus, a series of oscillations of the body appear in the three planes: sagittal, frontal and horizontal. Although these oscillations are unfavorable to running performance, they are inherent and can not be eliminated, but, by knowing their limits, they can be attenuated.

There are three types of oscillations depending on the plane in which they occur:

- vertical oscillations
- side/lateral oscillations
- transverse oscillations

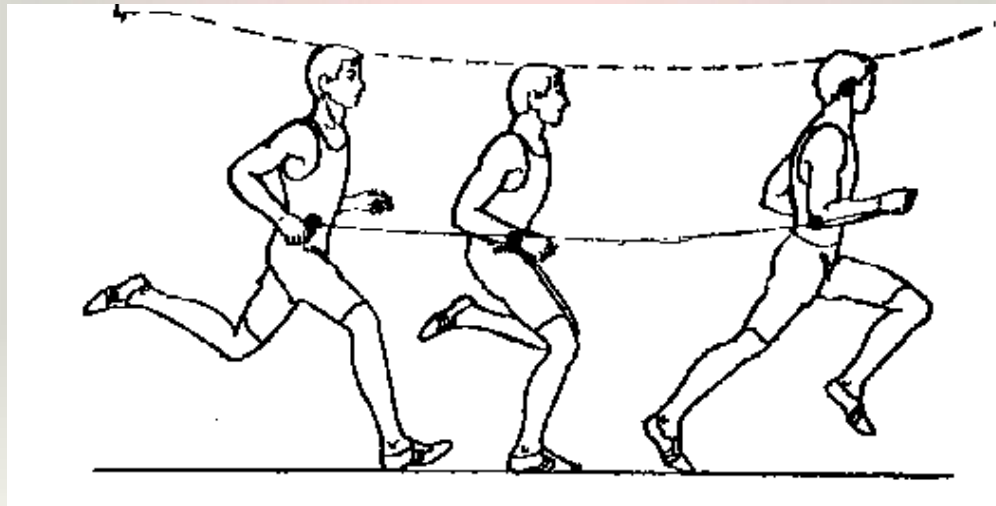
Vertical oscillations

These oscillations take place in the sagittal plane and are due to the forward-facing and upward oblique impulse of the support leg. The amplitude of these oscillations is determined by the difference between the high position of the runner's body in the flight phase (maximum height) and the low position of the vertical moment in the support period (minimum height), and is on average between 6 and 12 cm. An amplitude of less than 6 cm denotes a sharp impulse angle, the running pitch/step being small and the efficiency of running being low. On the other hand, an amplitude greater than 12 cm denotes a high impulse angle, resulting in a skipped run.



As the running becomes faster, the G.C.G. denotes a smoother trajectory, with lower amplitude of vertical oscillations. Thus, during the support period, G.C.G. denotes a curved trajectory with upward concavity and, during the flight period, downward concavity.

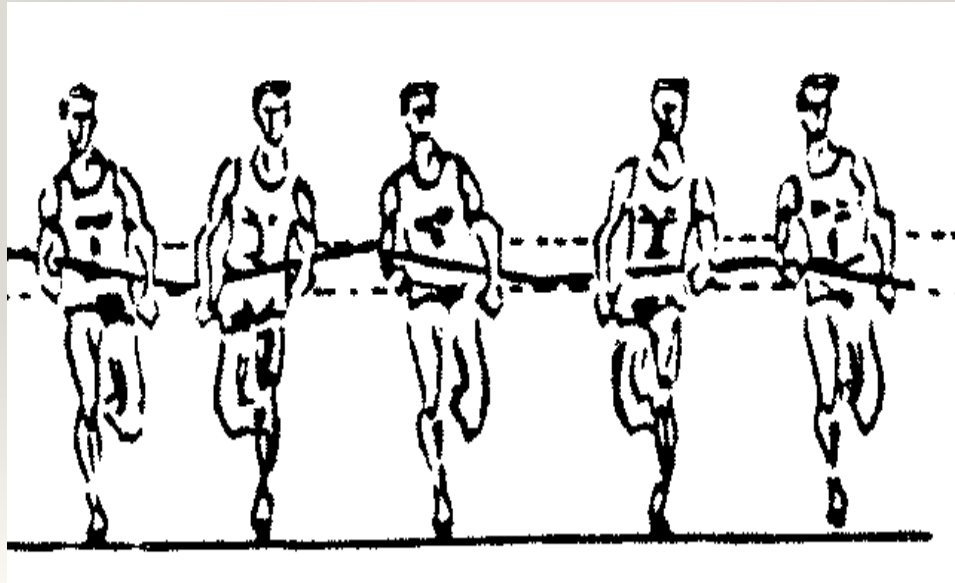
Vertical oscillations are highlighted in the head crown, the level of which decreases at the vertical moment and increases to the maximum in the middle of the flight phase.



Side/lateral oscillations

They occur in the frontal plane due to the transferring body weight from one leg to the other, occurring during the support period. They are highlighted at the moment of vertical and are more pronounced as the frontal dimension of the pelvis is larger and the lateral distance between the soles is greater.

In women, lateral oscillations are more evident due to the relatively larger width of the pelvis.

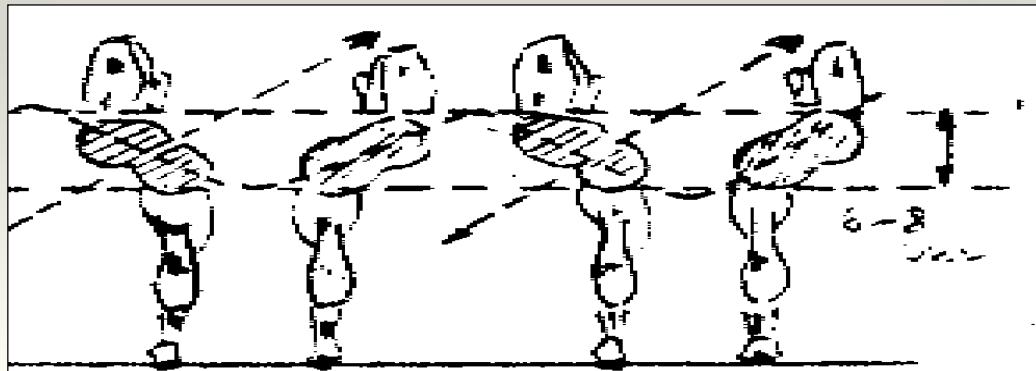


Transverse oscillations

They occur in the horizontal plane, the axis of rotation being vertical and manifested by forward projection of the pelvis in correspondence with the pendulum foot, while the back of the pelvis on the support leg side remains at the rear.

These oscillations reach the maximum value when the angle between the thighs (implicitly between the sides of the pelvis) has the greatest amplitude and becomes null at the vertical moment.

Compensation of pelvic transversal oscillations is achieved by oscillations in the opposite direction of the shoulders and trunk. A high speed will cause large transverse oscillations. They can be considered useful to the runner, as long as the frequency of compensatory movements of the arms and shoulders do not work as a brake for the the movement of the legs.



Running pitch/step according to the speed

Speed gives the running pitch/step a series of features in terms of:

- contact with the ground
- length and frequency of steps
- duration of the support and flight
- body oscillations
- general body position

Contact with the ground, regardless of the run, also occurs on the outside of the foot. In a short sprint (100-200 meters), contact with the ground is made with the front of the sole. In the prolonged sprint (400 meters) contact with the ground is also made with the front of the sole but a little further back, closer to the heel. In the middle range (800-1500 meters), contact with the ground is made with the flat portion of the foot. As the running distance increases (as with the marathon) and the speed decreases, contact with the ground progresses to the heel. As the speed increases, contact with the ground becomes more and more vigorous through an active downward movement of the calf, from the front to the back and down again ("hanging" action).

Contact with the ground using the heel is more stable and, at equal impulse efforts, the pitch tends to be longer than that of the front of soles or on soles.

We believe that the most efficient landing is on the front of the sole. This is because in the supple mechanism of damping, the ankle joint is used. Contact with the ground first and the heel is tougher because it removes this joint (and accentuates the damping phase, with less efficiency).

The length (L) and the frequency of the steps (F.s.) are the main parameters of the run (running steps), on which the speed depends ($V = L \times F.s.$).

As the run becomes longer and the speed decreases, the length and frequency of the steps decrease, likewise decreasing the length of the steps and becoming more pronounced than the frequency of the step:

| <i>Parameters/Running type</i> | <i>Sprint</i> | <i>Middle range</i> | <i>Long range</i> | <i>Very long range</i> |
|---|------------------|---------------------|-------------------|------------------------|
| <i>Speed (meters/second)</i> | ~12 | ~10 | ~7 | ~5-6 |
| <i>Strides/Steps lenght (meters)</i> | 2.40-2.65 | 1.80-2.20 | 1.70-2.10 | 1.50-1.70 |
| <i>Strides/Steps frequency (steps/second)</i> | 4.4-5.0 | 3.3-4.0 | 3.3-3.7 | 3.2-3.5 |

Support and flight duration is dependent on the impulse energy. Thus, in speed running, the duration of the flight is higher than the duration of the support phase. In middle range running, this ratio is balanced, whereas in long range running, it is slightly reversed favoring the duration of the support:

| <i>Parameters/Running type</i> | <i>Sprint</i> | <i>Middle range</i> | <i>Long range</i> | <i>Very long range</i> |
|--------------------------------------|---------------|---------------------|-------------------|------------------------|
| <i>Support duration</i> (seconds) | 0.08-0.09 | 0.14-0.16 | 0.16-0.18 | 0.18-0.21 |
| <i>Flight duration</i> (seconds) | 0.10-0.12 | 0.14-0.16 | 0.13-0.14 | 0.11-0.14 |

Vertical and lateral oscillations decrease as speed increases in contrast to transverse oscillations that increase as speed increases.

As the speed increases, the thigh in the anterior plane is raised closer to the horizontal (without overtaking it). The flexion of the calf on the thigh in the posterior plane is more pronounced, and the movement of the arms become wider and more energetic.

The phases of competitive running

Running as a competition event is carried out in the sequence of the following stages/phases:

- the start: it can be downward (in speed runs) or upward (in middle/long distance runs); by the start we understand all the positions and movements performed in accordance with the starting commands, in order to start the run with maximum efficiency in relation to the requirements of the run/event.
- the launch: this stage looks like an accelerated run; it begins at the sound of the pistol and ends when the optimal running speed is reached.
- the run: begins when the optimal speed is reached and is based on the speed run step. The (optimal) speed must be chosen so that it can be sustained for the entire distance and work to support the best performance/time.
- the finish: finishing (met in the middle and long distance runs) denotes the increase of the running speed towards the end of the run; arrival denotes passing over the finish line.

1.3.2 General foundations of jumping

Jumping is a naturally-occurred motor action that involves disrupting contact with the ground as a result of an impulse/take off, followed by a long or high flight. The “School of Jumping” contains a sum of exercises that, through their content and form, precede and favor the learning of jumping techniques (as a competition event – long jump, triple jump, high jump, pole vault). These contribute directly to:

- detecting the takeoff leg;
- developing the sense of balance and coordination of the movements in the flight phase;
- learning the techniques of jumping (takeoff);
- developing the explosive speed.

In addition to the exercises that will be described, the "school of jumping" can also include a number of secondary exercises, simple and easy to perform especially for younger ages. These may precede the acquisition of the main exercises:

- free jumping from one foot or both, landing on one foot or both;
- jumping on, from and over a high or long obstacle on one or both of the legs;
- different combinations of long or high jumps, either from one or both feet, with free landing or on marked areas, either on one or both legs, over signs or over obstacles.

Jumping - as well as athletic events and exercises (school of jumping) - can be defined as specialized motor actions which aim to propel the jumper's body (G.C.G.) on a long flight path (horizontal jump events) or on a high flight path to pass an obstacle (vertical jump events) as a result of the interaction between internal forces (muscle contractions) and external forces (environmental/air resistance and ground reaction).

Because interruption of contact with the ground in order to enroll G.C.G. on a flight path is determined by the contribution of the jumper's own forces, this action can be understood as a self-propulsion of the body on a flight path by transforming the horizontal kinetic energy into a vertical movement at a smaller or greater angle of takeoff.

Depending on the characteristics of the trajectory on which the jumper's body (G.C.G.) has entered, jumps as competition events can be classified as:

- horizontal jumps (takeoff angles between $\sim 20^\circ$ and 25°) – long jump and triple jump;
- vertical jumps (takeoff angles between $\sim 60^\circ$ and 65°) – high jump and pole vault.

As a sum of movements, jumps start with a succession of cyclical movements (approaching a run) and continue with a succession of acyclic movements, the set of movements defining the jump being strictly bounded by space-time.

The phases of competitive jumps

The motor actions specific to the basic jumps (long jump and high jump) in order of their succession (and structured in phases) are: the approach run, the takeoff, the flight and the landing. The particular points of emphasis in the case of derived jumps (triple jump and polevault) are as follows:

- the approach run is followed by a succession of three takeoffs, flights and landings in the case of the triple jump;
- after the approach run and takeoff, part of the flight is accomplished by interposing an object (the pole) between the jumper and the ground as in the case of the pole vault.

Interdependence of the relations, established between the phases of any jump in an athletic event, determine subordinate relationships showing the importance of each phase in relation to the others. These depend on the purpose of the jump, which determines its characteristics of rhythm, tempo, amplitude etc.

It is unanimously acknowledged that takeoff (the main link of the technique) is the most important phase, subordinating and conditioning the other phases. This is because in that sequence the potential of the jumper is exploited and the main characteristics of the C.G.G trajectory in flight are determined, finally achieving the goal of the jumping action.

1.3.3 General foundations of throwing

In the most general sense, throwing implies a direct interaction between an object and a person acting on it through the muscular force, involving a movement.

In athletic competitions, throws are stylized motor actions that aim at the enrollment of an object (specially designed) on an air trajectory (shot, disc, javelin, hammer, small/oina ball) as far as possible, in accordance with the provisions of the Regulations of Athletic Competitions, which emphasizes the importance of the following factors:

- the shape, size and weight of the throwing objects;
- the way of holding the object and the movements made;
- the size and shape of the runway and landing sector.

We have to say that the activity of throwing a small/oina ball, although not found in the system of athletic competition, is justified by its importance in the curriculum of physical education and gymnasium education, as well as in the school athletic tetrathlon, which is part of the system of school sports.

As part of the “school of throwing”, the exercises involved are classified into three categories, depending on how the thrower's force is transferred to the object. The categories include: throw/fling-type, push-type and launch-type throws, either with one or two hands.

We also want to justify the use of the phrase "small ball" along with the „oina ball" by the fact that the oina ball as a throwing object has begun to be replaced by throwing objects of the same spherical shape that are made from other materials and with different dimensions.

Phases/stages of throws

Analyze the technique of a throwing event reveals, from an instructive point of view, the distinct sequence of four phases:

- preparation for throwing;
- approach run (including withdrawal and transition);
- delivery/throwing (including the pre-delivery stride);
- recovery.

Based on the importance of these phases in achieving optimum performance, specialists have set the following priority:

- 1 – delivery;
- 2 – approach run;
- 3 – preparation for throwing;
- 4 – recovery.

II. Practical/methodical competencies

2.1 Practical foundations of Athletics (school of athletics)

The phrase "school of athletics" can best be understood by defining the terms. The dictionary (DEXI) gives the following definitions :

School - I 1 Educational institution ♦ Building in which an educational establishment is located ♦ All pupils and teachers in an educational establishment. 2 Study, learning in a school ♦ Amount of knowledge acquired. 3 Total of educational institutions; organizing the process of instruction and education in schools. 4 Fig. Source of knowledge, teachings etc.; teaching/training means, systems etc. II adepts of a master, idea, theory, doctrine ♦ a set of ideas, principles (philosophical, scientific, artistic) that are adopted by a number of people.

Athletics (sport) A sports branch that includes running and marching (at different distances), jumping (long jump, high jump, triple jump, pole vault), throws (shot put, javelin, disk, hammer) or combined events (pentathlon, heptathlon, decathlon); lightweight athletics.

By synthesizing the meanings closest to the contents, we can understand through the phrase “school of athletics,” a training system consisting of a sum of specific means (exercises), which are not part of the technique of athletics, but which, through the formative effects generated by practicing, "build" a practical basis that favors the appropriation of the technique (athletic exercises /events).

All these means (exercises), without which one can not conceive initiation in athletics, are grouped into three categories (associated with the three groups of athletic events), respectively “the school of running”, “the school of jumping ” and “the school of throwing.” These categories represent the initiation in athletics, otherwise known as the alphabet for initiation in language and literature, which we believe motivated D. Dragan (2003) to name this system of means the "ABC's of Athletics".

Among the effects that the practice of these exercises produces, we can include (Alexe D.I., 2010):

- forming the skill of proper coordination of the movements of the body and its segments in relation to time and space;

- development of specialized perceptions and sensations;
- the use of the means learned in other motor structures;

To these, we can also add (Dragan D., 2003):

- improving morpho-functional indices;
- development of the muscular and osteo-articular system;
- development of some forms of manifestation of motor skills;
- consolidation of the basic mechanism of the technique - when it is naturally acquired, or its formation if it is not naturally acquired;
- familiarization/acquaintance with the "main link" of the athletic technique.

2.2 The role of running exercises

Running is a natural form of locomotion that consists of a cyclic succession in which a person makes alternative contact with the ground, between which a flight is interposed (cyclic succession of simple alternating running steps); in addition to athletics, running meets in other sport disciplines such as a general link between specific actions (in the case of dribbling, counterattack, return to defense etc.) as a means of warming-up or for improving exercise capacity (resistance /endurance), but also in everyday life - where, however, the technique is irrelevant.

Acquiring the technique of running in the forms in which it is presented, is done by repeatedly learning and practicing exercises that make part of the “school of running.” These exercises represent, in different proportions, phases in the running technique occurring on flat or varied terrain (the cross country), as well as on hurdles and steeplechase.

2.3 The role of jumping exercises

Jumping is a naturally acquired motor action, that involves disrupting contact with the ground as a result of an impulse, followed by a long or high flight and a new contact with the ground (landing).

The "school of jumping" contains a sum of exercises that, through their content and form, precede and favor the learning of jumping techniques, leading to overall qualitative and quantitative changes to the body (Rață G., 2002) and directly contributing to:

- detection of the takeoff leg;
- developing the sense of balance and coordination in the flight phase;
- learning the technique of jumping (long jump takeoff);
- developing explosive speed.

In addition to the exercises described below, which we consider to be the main ones, we can also include a series of secondary exercises. These exercises are simple and easy to perform especially for younger ages and may precede the main exercises (free jumps from one or both legs, landing on one or both legs, jumps from a long or high obstacle from one or both to one or both legs etc.).

2.4 The role of throwing exercises

Throwing in the most general sense implies a direct interaction between an object and the person acting on it through the muscular force, enrolling it in a movement.

As part of the "school of throwing", exercises are classified into three categories depending on how the thrower's force is transferred to the thrown object, respectively:

- throw/flip-type with one or two hands, where the force of the thrower is transferred to the object in the form of a traction above the shoulder, on a trajectory backwards and upwards. It should be specified that the particularity of traction consists in placing the motor force (muscular force) before the thrown object;
- push-type with one or two hands, where the force of the thrower is transferred to the object by applying pressure, on a trajectory backwards and upwards, with a releasing angle close to 45° . It should be specified that the particularity of traction consists in placing the motor force (muscular force) behind the thrown object;

- launch-type with one or two hands, where the force of the thrower is transferred to the object in the form of a side traction, on a trajectory backwards and upwards; over the entire duration of the throw, the arm (arms) remains (remains) stretched (the elbow joint is blocked).

III Practical competencies (technique)

3.1 Exercises in the School of Running

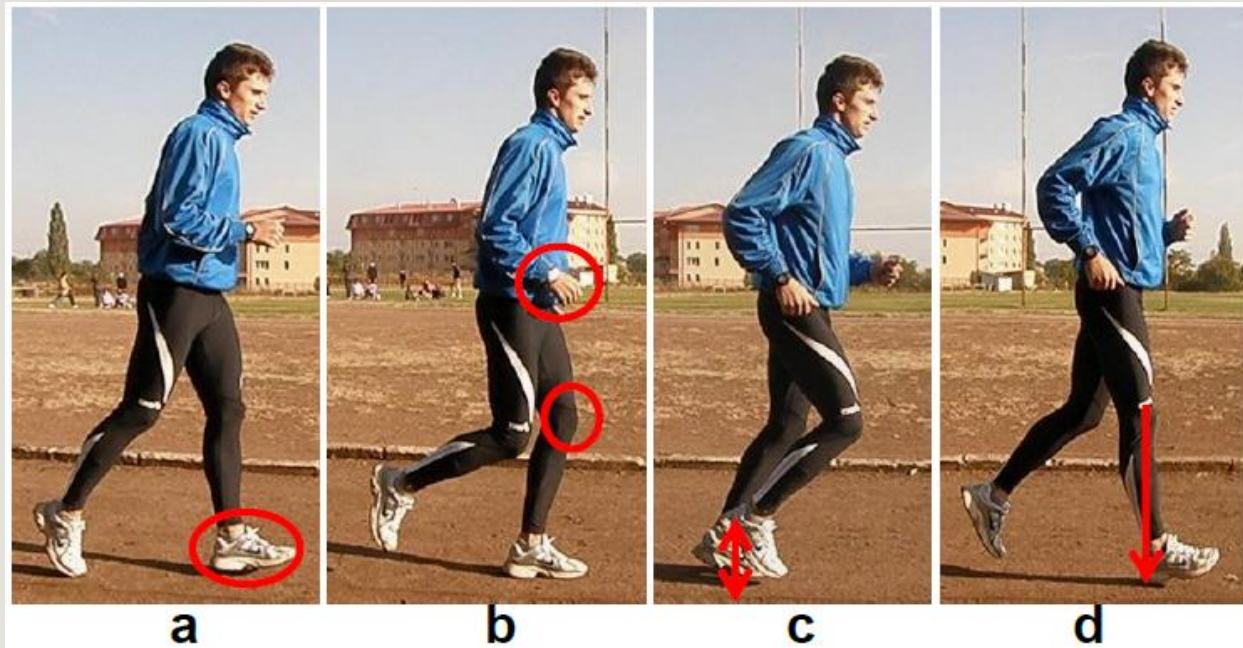
We must remember that running, defined as a form of locomotion consisting of a cyclic sequence in which a person makes alternative contact with the ground, between which a flight is interposed (cyclic succession of simple alternate runners), meets, in addition to athletics, in other sporting disciplines:

- as a general link between specific actions (in the case of dribbling, counterattack, return to defense etc., in team sports);
- as a means of warming-up in most dynamic sports;
- for improving exercise capacity (resistance/andurance), in the form of jogging;
- in everyday life (where, however, the technique does not matter).

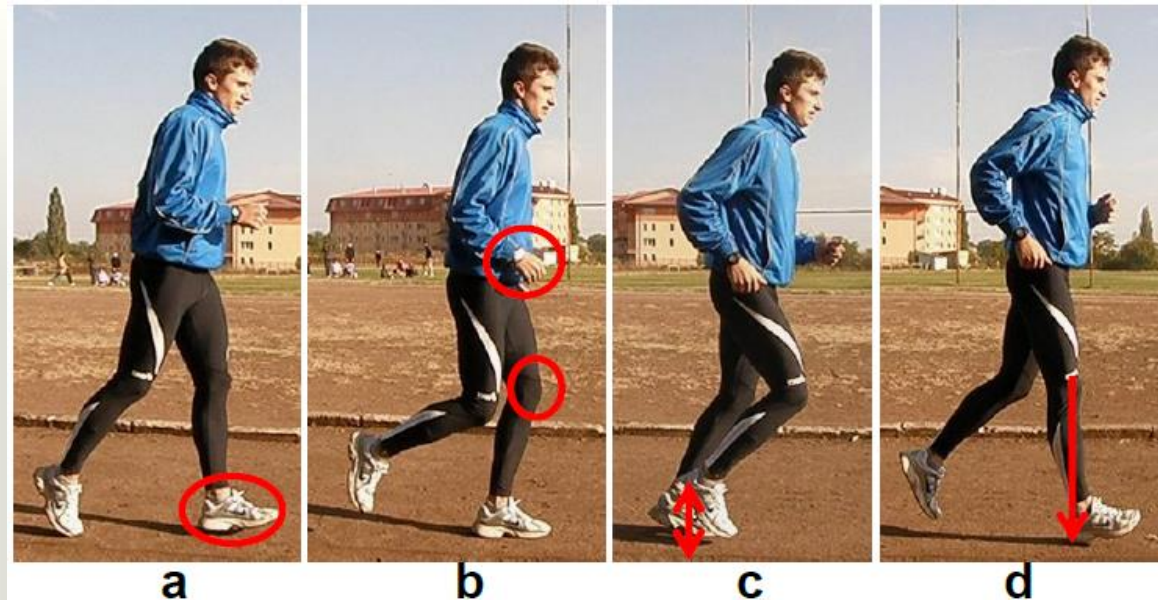
Light running

As a means of warming-up and as a basis for the assimilation of running at a moderate speed (jogging), light running is characterized by a uniform rhythm and slow pace, naturalness, relaxation and economy of effort (Rață G., 2002).

Technique

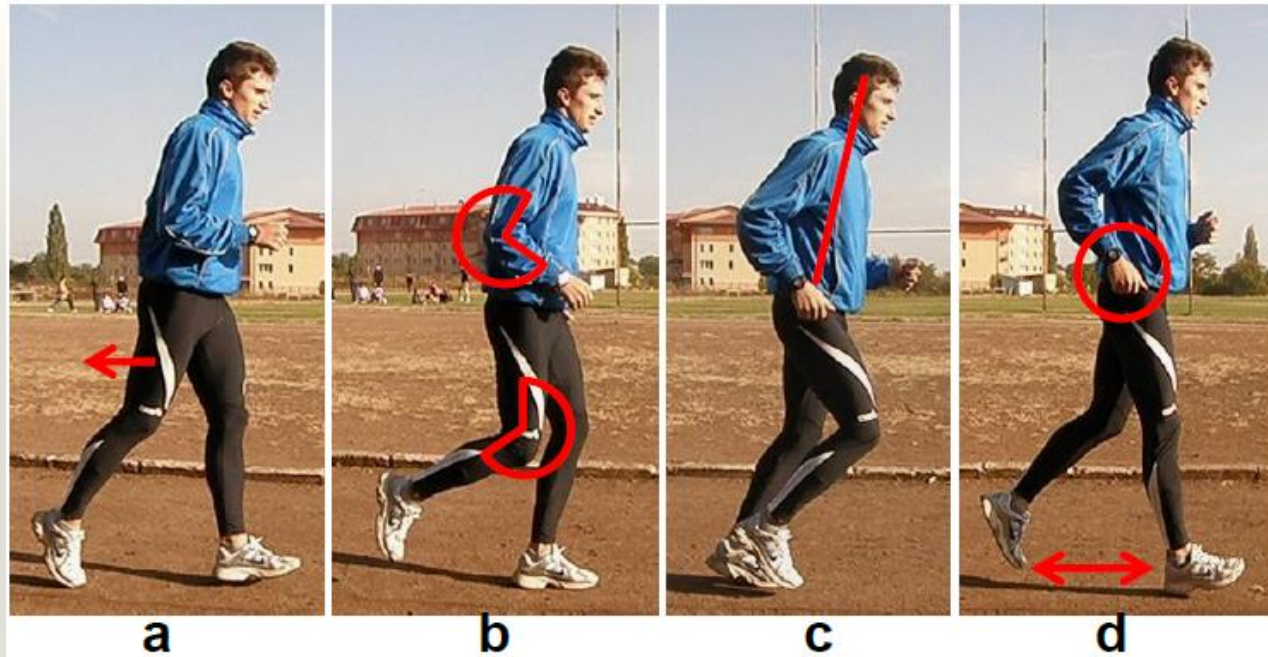


Light running consists of a succession of running steps, in which alternating contact with the ground is made on or almost the entire sole, with the tip of the foot in the running direction and without side deviations (a).



The amortization of the shock due to contact with the soil is done by "the relaxed action of the joints (knee, hip) and lower limb muscles" (Drăgan D, 2003), with a reduced amplitude (b) which together with the reduced intensity of the impulse muscular effort, determines a reduced amplitude of vertical oscillation (the difference between the vertical moment and the end of the impulse phase).

In the front step phase, the pendulum thigh rises very little (c) with a reduced flexion of the calf on the thigh. With the lowering of the thigh, the calf moves forward, the contact with the soil being approximately under the vertical projection of the knee on the ground (d).



In the back step phase, the amplitude of the movement is also reduced as a result of the slight backward movement of the thigh (a) and the lowered amplitude flexion of the calf on the thigh (b), resulting in a short length of the running steps (d).

The trunk is vertical or slightly flexed (c), with lowered shoulders, rounded back, head in the trunk axis (c) and forward look. The arms oscillate next to the body, bent from the elbow joints at approx. 70° to 90° (b), on a forward and outward trajectory. The palms are semi-closed, with the fingers flexed and relaxed (d).

Side running with added steps

Side running is an exercise that is not directly related to the running technique, but which has effects on the development of muscle groups not involved in other movements (eg. abductors and thigh adductors), or on improved coordination.

Technique



The main feature of this type of running is that during the execution, the lateral axis of the body (the shoulder axis) is parallel to the direction of movement, the advance being accomplished by a sequence of closeness and leg remoteness.



The contact with the ground is made on the front of the foot (which is oriented perpendicular to the running axis), predominantly on the outside of the forefoot and on the inside of the rearfoot (a, b). The impulse is made by the forefoot (b), followed by a flight with the approach of the legs (c). The back leg makes contact with the ground (d) and almost simultaneously, distance is made between the forefoot and the rearfoot, in the direction of the movement. Dampening is achieved by the release of muscular effort and by flexion in the joints of the rearfoot. The trunk is vertical, with head view oriented perpendicular to the direction of movement. The arms oscillate parallel to the running axis by performing one cycle of motion (crossed in front of the body - b or laterally - e) at each added step.

Side running with crossed steps

Side running is an exercise that is also not directly related to the running technique, but which has effects on the development of muscle groups not involved in other movements (eg. abductors, thigh adductors and others), or on improved coordination. There are two ways of crossing: alternative (**A**) and in the front (**B**).

A



The crossing of the legs alternates from front to back.



a

b

c

d

These types of exercise involve successive crossing of the back leg over the front leg (c), the overall body position being one in which the lateral axis of the body (shoulder axis and pelvis-**a**) is parallel to the direction of movement. The impulse is made by the forefoot (**b**), the back flexes from the hip joints (the thighs form an angle of 90° with the trunk-**b**), the knee (the shank forms an angle of 90° with the thigh-**c**) and the ankle (the foot forms a 90° angle with the shank-**c**), passes vigorously forward and over the front leg, then descends to the ground by stretching, making new dampened contact with the ground (**d**). The forefoot, immediately after crossing, pushes forward upon the ground, passing in front of the rear foot.

Low skip

In addition to the importance of learning to make proper contact with the soil (the dampening phase), this technique also contributes to the development of flexor muscles and extensors of the lower limbs.

Technique



a

b

c

d

e

Contact with the ground is made on the front of the foot (**a**) with the tip oriented in the direction of movement and without side deviations, followed by a rapid tip-sole-heel rolling, with the full extension of the foot in the anterior plane of movement, taking on full body weight (**b, c**).



a

b

c

d

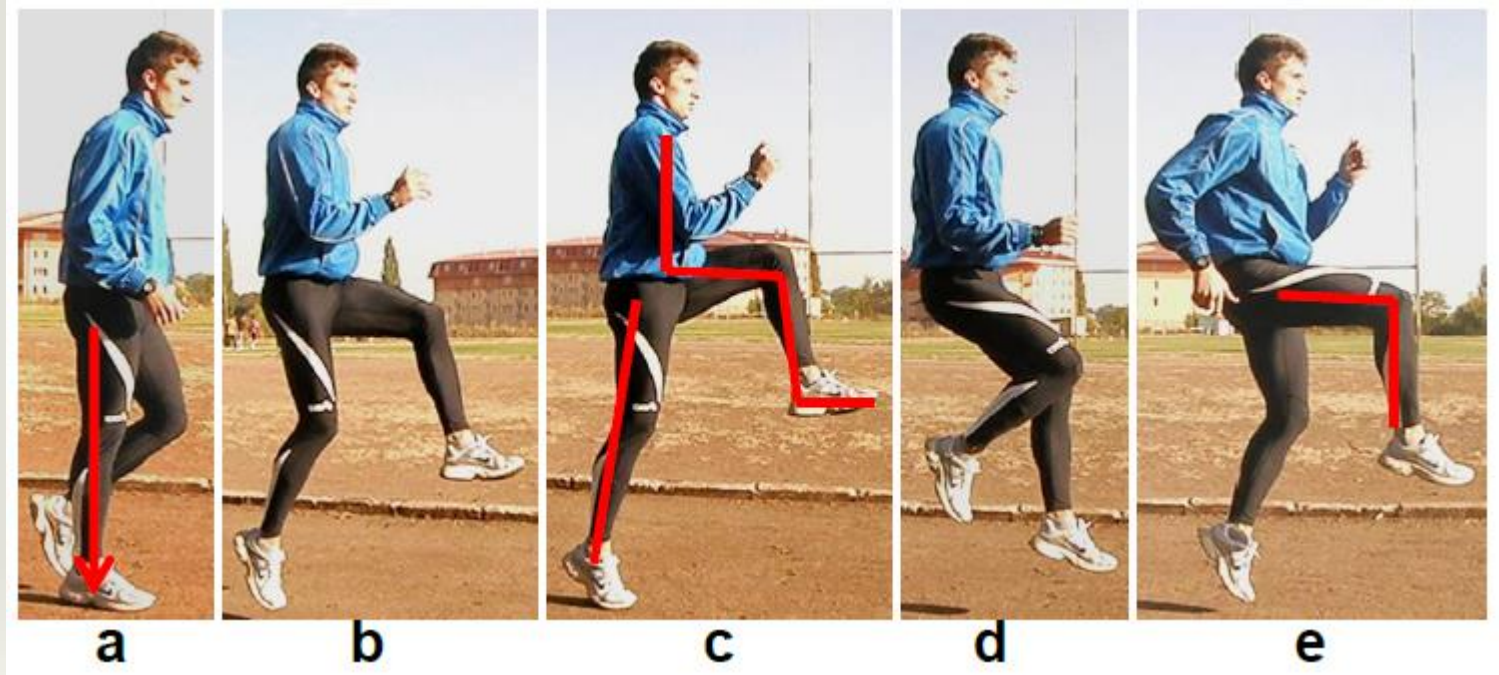
e

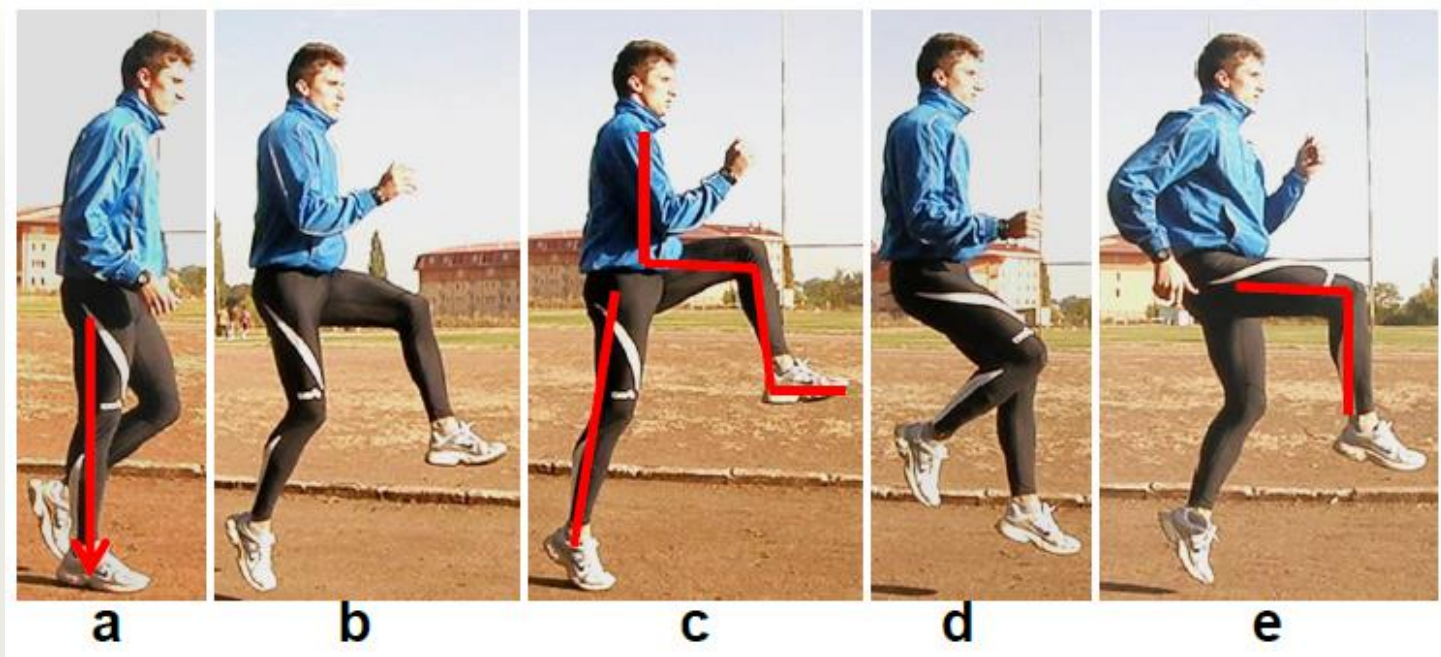
As the anterior leg is extending, the flexion of the foot in the posterior plane of movement (from the hip and knee joint) is carried out. This flexion moves rapidly nearer to the next moment in which contact is made with the soil (**b**, **c**). Movement of the posterior leg is done by obtaining low flexion both in the hip and knee joints, with the tip of the foot passing near the ground and a step length that is about 30-50 cm, depending on the speed (**d**). The trunk is vertical, with the head in forward look. The arms oscillate and synchronize with the movement of the legs, in vigorous motion.

High skip

This high skip is an exercise that, through practice, contributes to: faster learning of the impulse phase of the support period, assimilation of the front step phase, development of the flexor muscles and extensors of the lower limb, improvement of the coordination motor skills and improvement of exercise capacity (by increasing the number of repetitions and distances).

Technique





The front of the foot makes contact with the ground, with the tip of the foot oriented in the direction of movement and without side deviations (b), followed by a rapid tip-sole-heel rolling, with the complete extension of the foot in the front plane of movement, taking on all body weight (a). With the extension of the front foot, the rear foot makes a simultaneous wide flexion (from the hip and knee joint) and passes forward and upwards, reaching the thigh at the horizontal (parallel to the ground), with the calf perpendicular to the ground (or obliquely oriented backwards) and the sole almost parallel to the ground (c).

In this way, the passage of the rear leg forward and upward causes the formation of 3 angles of approximately 90° (between thigh and trunk, calf and thigh, sole and thigh) and occurs at the same time as the full extension of the front foot and the pressing of the heel on the ground. The trunk is vertical or slightly forward, with the head in the extension of the trunk and the forward look, the arms oscillating simultaneously with the movement of the legs, in a vigorous and ample action, the palms reaching the level of the eyes.

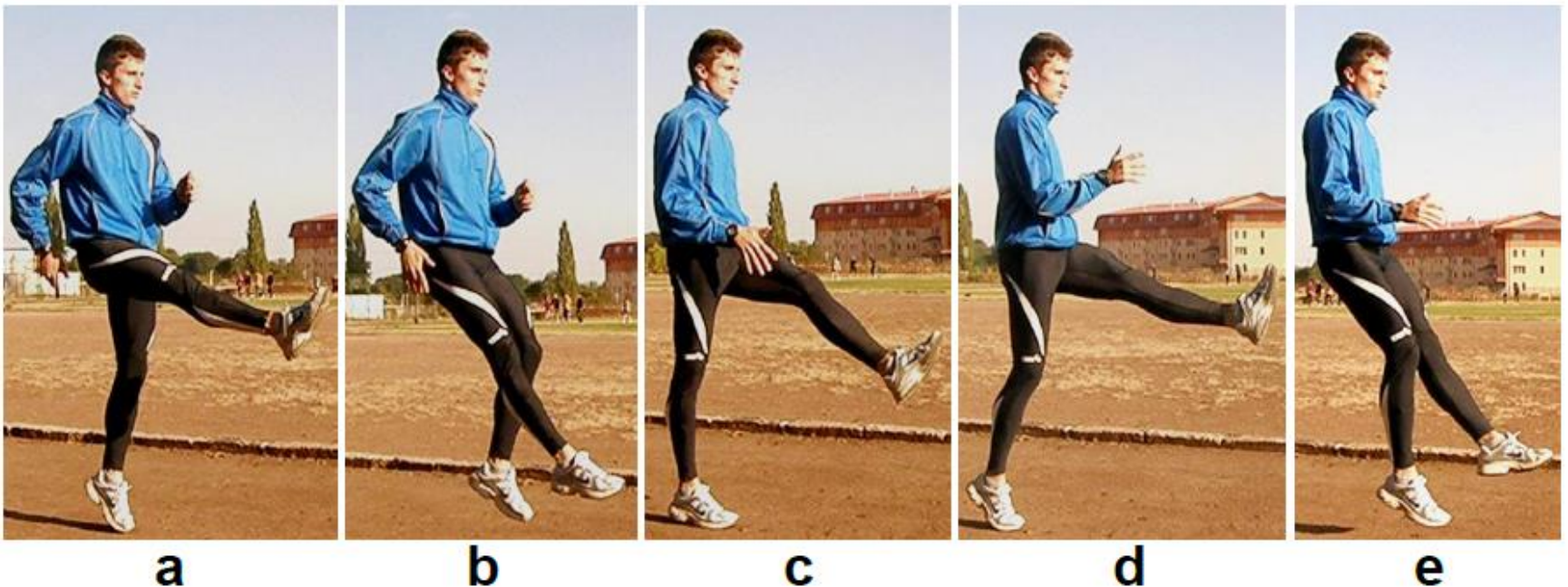
Due to the orientation of the impulse being predominantly vertical, the length of the steps will be small and the advance will be rather slow.



Front crossing legs

This exercise is sometimes used due to the effects it has in the aspect of muscle processing - flexors and thigh extensors, extensors of the calf - but especially in the direction of improving neuro-muscular coordination. Movement occurs exclusively in the front plane, as a result of an impulse made by the energetic plantar flexion and the locking of the knee joint of one leg, while the other leg is first engaged in an upward movement reaching an angle with the ground of less than 45° (d) after which it descends and makes dampened contact with the ground on the front of the sole (b).

Technique



The upward movement of one leg occurs simultaneously with the downward movement of the other leg.

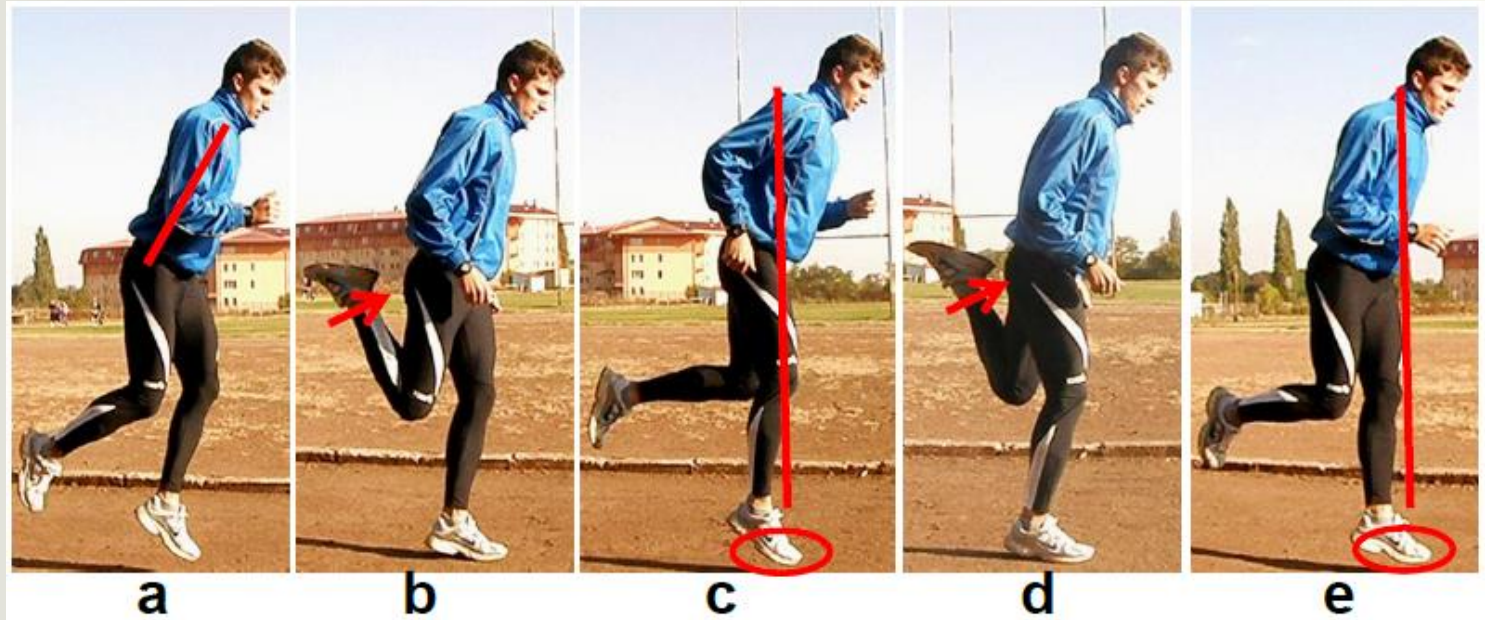
The trunk is tilted backward, favoring the movement of the legs in the front plane, the head in the extension of the trunk, facing forward.

The arms oscillate alongside the body with limited amplitude.

Swinging the calves back/Backwards running

Backwards running is a form of movement in which the back step phase is emphasized, and the front step phase is missing, the entire movement being carried out in the posterior plane of movement.

Technique



After making contact with the ground, the shank swings actively upwards, with a maximum flexion on the thigh, the heel in contact with the buttocks (b, d), then descending to the ground - without exceeding the vertical projection of G.C.G. – contact with the ground is then made on the forefoot (c, e).

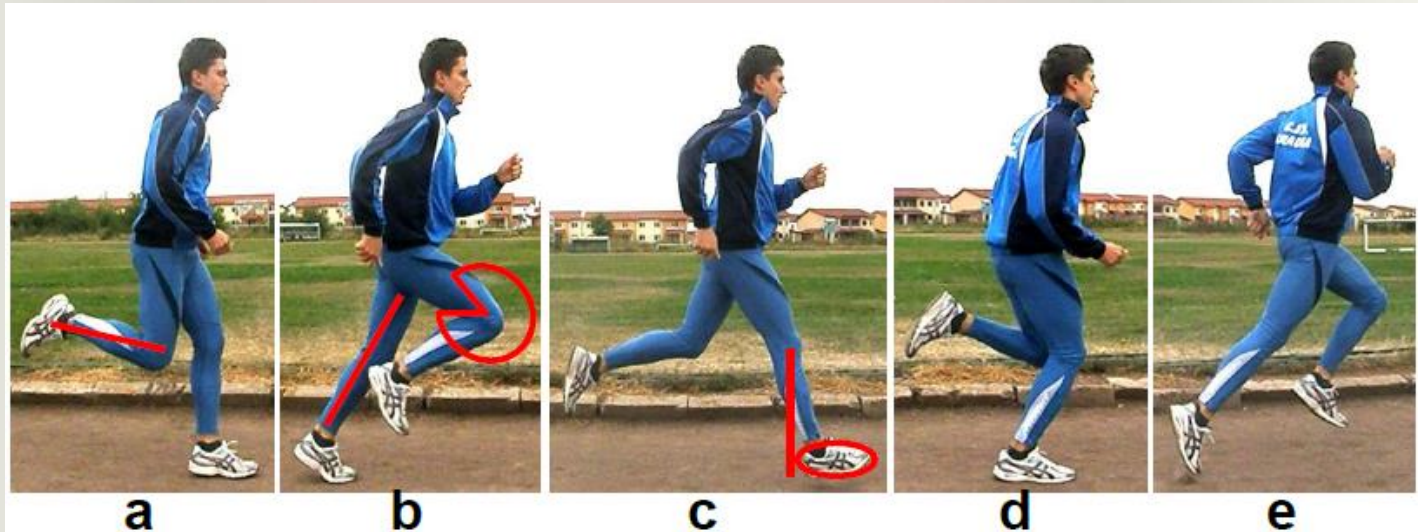
The trunk is tilted forward, favoring the movement of the legs in the posterior plane (a), the head is in the extension of the trunk, with a forward look. The arms oscillate bent from the elbow joints back and forth with limited amplitude.

The length of the steps is reduced, the whole movement being smooth, relaxed, and natural.

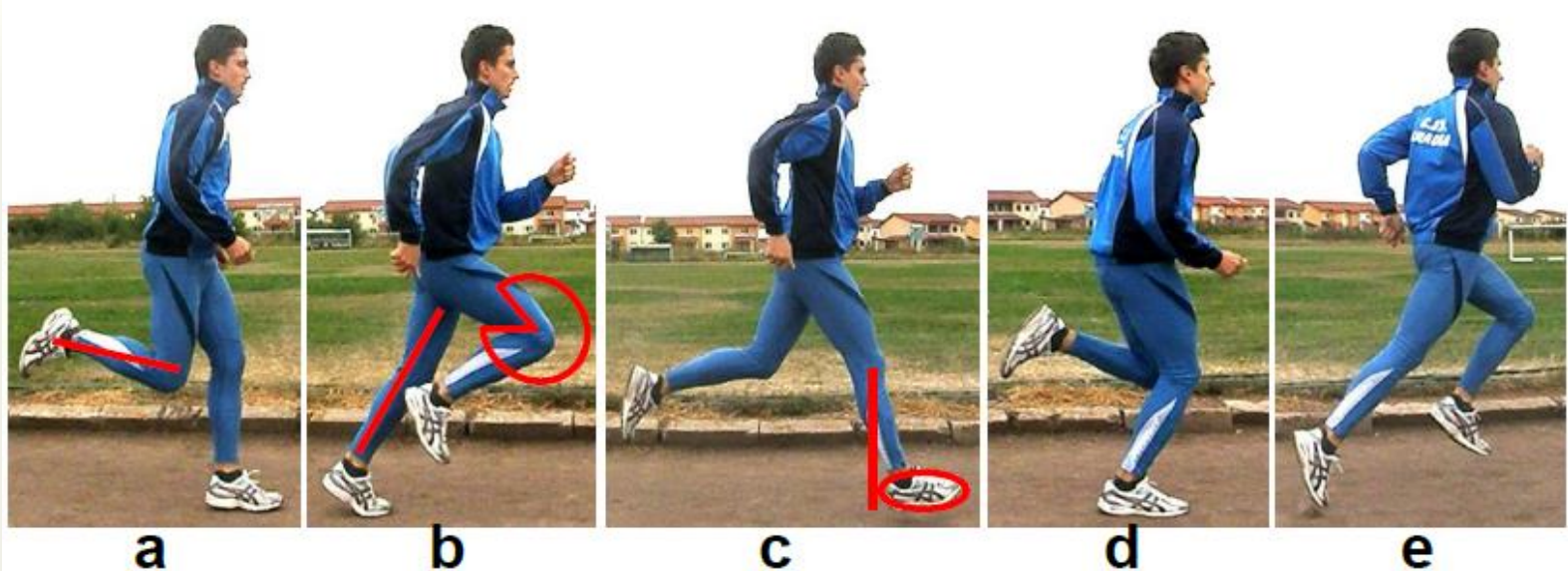
Moderate tempo running/Jogging

This type of running is the main exercise used to develop aerobic resistance. It is carried out at a moderate pace and in uniform rhythm. The execution technique is based on light running (it requires the same structure of the running step but with other characteristics due to its higher speed).

Technique



The impulse force is greater than in light running, ending with the impulse foot almost fully stretched (b). After contact is made with the soil, the back step phase is more extensive due to the thigh recurrence and the increased flexion of the shank on the thigh, causing the shank to be almost parallel to the ground (a).



After the vertical moment, the thighs move forward and upward, forming an angle of up to 45° with the ground (b). At the same time as the thighs are lowered, the shank extends forward in preparation to make contact with the soil on the front of the sole, just before the knee projection on the ground (c).

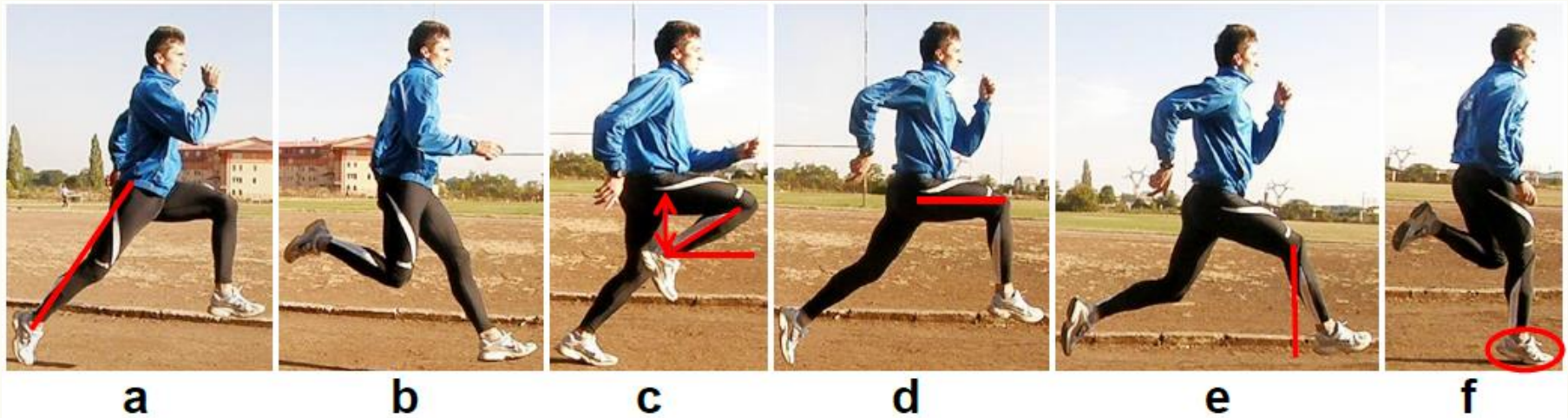
The trunk is vertical, the head in its extension, facing forward.

The arms support the effort by oscillating backwards, from the outside to the inside, synchronizing with the movement of the legs. This movement is as relaxed as possible.

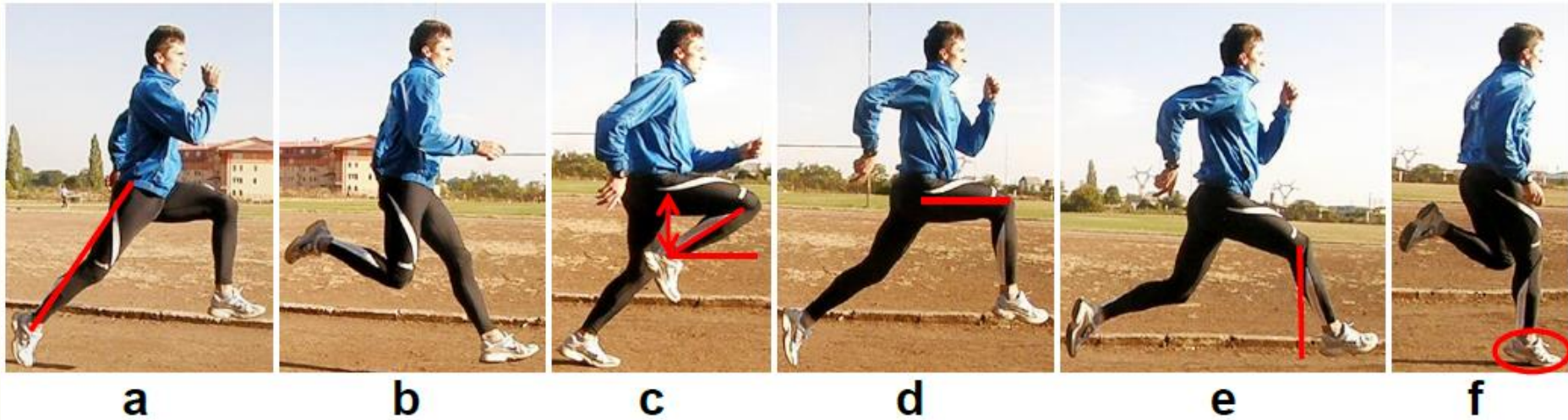
High speed running

High speed running is obtained by an incomplete acceleration - in the first 4-6 steps - by a rapid increase in frequency and length of steps. After reaching the optimal speed, the ratio between the frequency and the length of steps remains constant until the distance has been fully run (speed remains constant).

Technique



Contact with the ground is actively made (through a backward action) on the front of the sole, with a more consistent dampening phase (f). The leg ends the impulse in a stretched position (a), continuing with the comeback of the thigh and flexion of the shank at an angle of less than 45° , the shank being oblique to the ground (c).



The front step phase is also wide, the thigh approaching a horizontal angle (d). Lowering of the thigh occurs as the shank of the thigh extends. Contact with the soil is made before the knee projection on the ground (c, d, e).

Increasing the intensity of the impulse and amplitude of the two phases in the pendulum period (that of the posterior and anterior steps) creates a running step that is longer than steps in running at a moderate pace (e).

The trunk is slightly tilted forward, the head in its extension, facing forward.

The arms oscillate with great amplitude, synchronized with the movement of the legs.

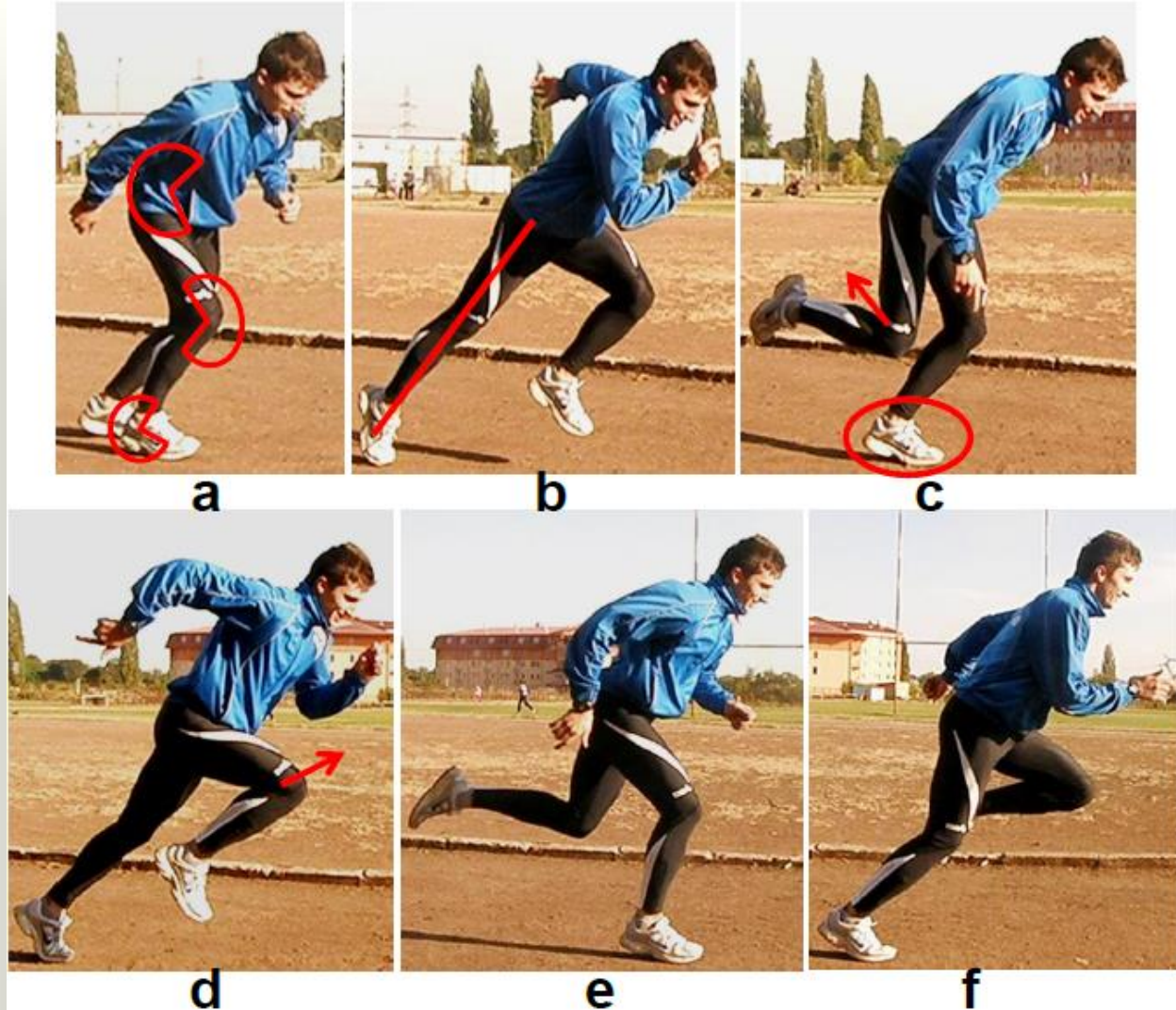
Accelerated running

The main feature in accelerate running is its progressive increase in speed as a result of the gradual increase in the length of the running steps. The frequency also undergoes a gradual increase, according to the specific needs of the event, reaching up to 90-95% of the potential maximum speed.

For this reason (reaching the needed speed), accelerated running can not be dissociated from the starting position, i.e. a position similar to the stand/up start, with an amplitude of the flexes in the three joints (ankles, knees and hips) proportional to the magnitude of the acceleration. Thus, as higher speeds are needed, the flexes will be more pronounced and G.C.G. of the body will be closer to the ground.

By repeating the accelerated run, the acceleration sense is gradually formed.

Technique



As running begins, one leg is forward the other back, oriented with the tip in the direction of running and with a distance of approx. $\frac{1}{2}$ foot length between them. The trunk is tilted forward so that the weight of the body is distributed almost exclusively on the forefoot, the back leg having an equilibrium role.

3.2 Exercises in the school of Jumping

Jumping is a naturally assimilated motor action that involves disrupting contact with the ground as a result of an impulse, followed by a long or high flight after which contact with the ground/landing is resumed. The "School of Jumping" contains a number of exercises that "by their content and form, precede and favors the learning of jumping techniques, leading to overall qualitative and quantitative changes on the body" (Rață G., 2002) and contributing to:

- detection of the takeoff leg;
- developing the sense of balance and coordination of movements in the flight phase;
- learning the techniques of jumping (takeoff);
- developing explosive speed.

In addition to the main exercises, we can also include a series of secondary exercises, simple in structure and easy to perform especially at younger ages. These exercises may precede the main exercises, such as: free jumps from one leg or both landing on one leg or both, jumps on, from and over an obstacle, from one leg or both, different combinations of long or high trajectory jumps.

Long jump/Standing long jump

This type of jump is a means/exercise used both to assess the explosive force of the lower limbs and to develop it.

Technique



The structure of the different movements can be divided into 4 phases: 1 - Grouping - is accomplished by lowering G.C.G. (flexion of the ankles and knees), in rhythm with the flexion of the torso and the thighs and with the transition of the arms from the anterior to the posterior plane (a,b,c). Body weight is directed toward the front of the support polygon. This phase causes an accumulation of internal tension in the lower limb muscles, which favors the impulse.



2 - The impulse - through the pressure exerted on the ground and the effort of the muscles of both lower limbs (full extension) occurring at the same time as the arms vigorously pass from backward to forward and upward. With the partial lifting upwards of the trunk, this movement breaks contact with the ground at an angle that favors the maximum length of the jump (c,d);

3 – Flight - just after the start of the flight, the lower limbs pass from the posterior to the anterior plane by the flexion movement from the three joints (ankle, knee, hip), the trunk returns to flexion, and in the last part of the flight the calves stretch to prepare for landing;

4 - Landing - consists of both legs resuming contact with the ground at the same time (g). When the ground is touched, the trunk accentuates its flexion, the pelvis is propelled forward, the arms move in the posterior plane, and the lower limb muscles make an effort to dampen the contact with the ground (especially if landing occurs on a rough surface).



The hop step

The hop step consists of a foot impulse, with the body enrolling on a flight path - described below – and with both feet resuming contact with the ground.

In its main form of execution - which we will describe – this exercise assumes a succession of hop steps, in which the leg that takes on the impulse (takeoff leg), respectively resuming contact with the soil, changes continuously, in the form of alternating hop steps.

In addition to the main variant - the alternating hop steps, we must also mention the other variants – derived - which imply the same movements in order to takeoff and resume contact with the ground, as well as the same posture in the flight phase, in the form of hop steps with an intermediate rhythmic run of 3-5 (odd), or 2-4 (even) steps, and the hop step with approach and landing in the sand zone.

All of these exercises have a special role in improvement general motor capacity.

Technique



The proper movement consists of moving G.C.G. through a flight phase oriented on both a horizontal but especially a vertical component. As a result of a vigorous impulse at a high angle to the ground (about 75-80°), landing occurs on the same leg followed by a link step that transfers the same execution to the other foot.

The takeoff leg is placed on the ground actively (in the form of a beating) on the whole sole or even on the heel (a), followed by a heel, sole, peak rolling and a complete extension finished by the stretching of the segments in the main joints (ankle, knee, hip) involving the lower members (c).



a

b

c

d

e

At the same time as the action of the takeoff leg, the free leg swings forward (b) by flexion from the knee joint until the thigh reaches a horizontal angle (with an angle of approximately 90° to the trunk). The calf is perpendicular to the ground (with a 90° angle to the thigh) and the sole remains relaxed, slightly downwards (d).

During the action of the lower limbs, the trunk is held vertically with the head in its extension, and the arms oscillate alternately next to the body with a more vigorous movement of the arm opposite the free leg. This arm along with the fingers reaches an angle of approx. 90° between the arm and the forearm (c).



a

b

c

d

e

The extended position of the takeoff leg, flexion of the free leg, vertical trunk and head and the position of the arms (d, h), is maintained by blocking all the joints throughout the flight phase.

The landing takes place on the takeoff leg, on the front of the foot, running on the sole and heel. Successive contact with the ground is made without lateral deviations.

The jumped/leaped step

By analogy with the above-described movement structure, the jumping step consists of a takeoff on one leg, with the body enrolling on a flight path - with the features described below - and resuming the contact with the ground on the opposite leg.

Continuing the comparison with the hop step, the jumping step assumes a succession of consecutive jumps, with takeoff on one leg and resumption of contact with the ground on the other leg; thus, after each cycle of motion, the free leg - by resuming contact with the ground - becomes an takeoff leg, and the takeoff leg becomes an free leg.

These exercises also have a special role in the development of general motor capacity by:

- learning/consolidating one-sided takeoff;
- forming the skill of maintaining a large distance in the sagittal plane;
- improving coordination in flight phase and balance;
- forming the skill of dampening the contact shock on landing;
- developing the explosive force of the lower limbs.

Technique



a



b



c



d



e



f



g



h



i

Moving of the G.C.G. is produced by a succession of jumps (or flights), in which the takeoff - at a sharp angle to the horizontal - is made by one leg and the resumption of contact with the soil (landing) occurs on the opposite leg.

The takeoff leg is placed on the ground actively, on the heel (e,i), rolling in the heel-to-tip direction, extension with full stretch of all the joints involved, and detachment oriented on an oblique upward trajectory (b). Occurring simultaneously with the action of the takeoff leg, the opposite leg moves to the anterior plane flexed in the knee joint (b, c), with the thigh at the horizontal or even higher - an angle of 90° or less between the thigh and the trunk - and with a slight flexion of calf on the thigh - an angle of less than 90° between calf and thigh (c). The trunk is easily flexed (g,h), and the arms oscillate alternately (arm-opposite leg) or simultaneously, with very active in order to stimulate the takeoff. After interruption of contact with the ground, due to the action of takeoff and the free leg, between the thighs a great distance in the sagittal plane is created and maintained on most of the flight path (d,h). On the last part of the flight, the calf of the free leg extends, and descends by preparing to make contact with the ground (e, i).

In addition to the exercises described in this category (the school of jumping), there are also:

- squat long jump;
- crossing legs/stepping high jump;

These two exercises - known as basic mechanisms - are a link with the content of the technique of athletic exercises and their learning. Because the KSM in English study program does not include a deepening of knowledge in this direction, these two exercises will be presented only in practice, without introducing theoretical information.

3.3 Exercises in the school of Throwing

Throwing, in the most general sense, involves a direct interaction between a person acting on an object by means of a muscular force, impressing a movement on an object directing it on a parabolic trajectory in the air.

As components of the „school of throwing", exercises are classified into three categories, depending on how the thrower's force is transferred to the thrown object, respectively:

3.3.1 - fling-type throw with one or two hands;

3.3.2 - push-type throw with one or two hands;

3.3.3 - launch-type throw with one or two hands.

3.3.1 Fling-type throw

Historically, this kind of throwing is probably the oldest, being experienced by man's ancestors under the pressure of the need to defend himself or to find food, seen in the form of throwing stones, sticks or spears. In this type of throw, force is applied to the object in the form of a traction with one arm or two, over the shoulder, on a oblique trajectory forward and upwards, the throw being made from different positions.

Thus, in the posterior plane of the movement, the object to be thrown is found behind the stretched arm (arms); engagement of the object in movement is simultaneous with the flexion of the forearm; after passing the vertical plane of the body forward, the object passes before the arm (arms) by a vigorous stretch of the forearm in a whipping movement.

Throws can be done:

- standing
- with two hands
- from sitting, standing on one knee or both, side standing, saggital standing;
- with one hands
- from sitting, standing on one knee or both, side standing, saggital standing;
- in motion
- with two hands
- with one hands

We will exemplify with a few pictures, different positions from which the flinging throw with two hands is possible, without insisting on the technique of movements.



Flinging throw with two hands from sitting



Flinging throw with two hands from sitting on both knees



Flinging throw with two hands from sitting on one knee



Flinging throw with two hands from standing with legs spread apart but at same level



Flinging throw with two hands from sagittal standing

Flinging throws with one hand, through the succession of their use, aim to combine learning the energetic stretch of the forearm ("whipping") with the rational engagement of all the muscle groups that contribute to the throwing action (the three types of actions of the G.C.G. during the final effort: lifting, rotation, translation).

By using objects (balls) of small size and weights (because too much weight of the object transforms the flinging into pressure/push effort), the throws are performed at the beginning from sitting/standing, first involving only the force of the arm muscles, then the trunk and arm muscular force and finally the muscular force of legs, trunk and arm, from different positions.

The illustrations support this sequence, using the description of the technique only for the last exercise: throwing the oina/little ball.

- Forward facing, legs are laterally spaced with a distance equal to the width of the shoulders (arm muscles involved);



Flinging throw with one hand sided standing

- Forward facing, legs are sagittally spaced, with soles parallel to the throwing axis (arm muscles involved);



Flinging throw with one hand sagittal standing

- Sided stand, sagittal spaced legs, soles parallel to the throwing axis (arm muscles involved);



Flinging throw with one hand sided-sagittal standing

- Sided stand, sagittal spaced legs, soles parallel to the throwing axis (trunk and arm muscles involved);



Flinging throw with one hand sided-sagittal standing

- Sided stand, sagittal spaced legs, soles parallel to the throwing axis (legs, trunk and arm muscles involved);



Technique

Figure **a** illustrates the fundamental position; throwing begins with the muscular effort of the back leg (impulse to full stretch - **b**), which simultaneously performs a pivoting action on the front of the foot (external heel rotation). The movement then continues with the rotation of the pelvis around the vertical axis (**c**) and ends with the action of the throwing arm, emphasizing the vigorous stretching of the forearm (whipping - **c, d**);

In addition to all these exercises, there is also, one more exercise:

- approach flinging throw with one hand;

This exercise—known as the basic mechanism for javelin throw—is a link with the content of the technique of athletic exercises and their learning. Because the KSM in English study program does not go deeper in this direction, this exercise will only be illustrated (this topic need not be studied further).



3.3.2 *Push-type throw*

As a throw type, as well as fling-type throwing, pushed throws are naturally learned. This throw consists of an action in which pressure is applied on the thrown object, with a forward, oblique and upward orientation, releasing the object at an angle close to 45°.

The pushing throw is favored by a minimal level of muscle development (it is explosive) and, on the other hand, it aims, through repeated practice, to develop this motor quality.

Apart from the effects of developing motor qualities, pushed throws "by their variety will contribute not only to the creation of the basis for learning the "pushed throw" (basic mechanism for the shot put technique) "but also to developing coordination,, (Drăgan D., 2003).

Objects used for throws can be balls: handball, basketball or medical balls of different weights - adapted to the features of the subject, handled with two hands (from chest and shoulder) and with one hand, from different positions.

Because this type of throw does not involve an elevated technique, it will mostly only be illustrated. A deeper look will be given to throwing with one hand at the level of the shoulder.



Pushed throw with two hands from chest, seated



Pushed throw with two hands from chest, sitting on both knees



Pushed throw with two hands from chest, sagittal standing



Pushed throw with one hand from shoulder, seated



**Pushed throw with one hand from shoulder, sagittal stand
(arm force involved)**



Pushed throw with one hand from shoulder, sagittal stand (trunk and arm force involved)



**Pushed throw with one hand from shoulder,
sagittal stand (legs, trunk and arm force involved)**

Technique

Standing sideways towards the throw direction; feet are in the sagittal position, with soles parallel to the throwing axis; Throwing is determined by the lifting action of the G.C.G. The legs are stretched and the trunk is rotated towards the throwing direction. The action occurs in the throwing arm through the vigorous extension of the joints in the elbow and fingers.

In addition to all these exercises, there is also one more exercise:

- approach push throw with one hand;

This exercise—known as basic mechanism for the shot put—is linked with the content of the technique of athletic exercises and their learning. Because the KSM in English study program does not go deeper in this direction, this exercise will only be illustrated (this topic need not be studied further).



3.3.3 Launch-type throw

In studying this type of throw, specialists claim that the main tension in the upper train muscles is accomplished by a two-handed or one-handed traction applied to the thrown object, sideways, on a trajectory forward and upward. The elbow joint remains locked/stretched for the entire duration of the movement (Drăgan D., 2003, Alexe D.I., 2010).

Used in the form of simple motor actions or in combination of exercises (relays or applicative pathways), launching throws (especially the two-handed) contribute to the improvement of the explosive force, the general force, and the coordination in the upper train.

Before repeating the launch throws, we recommend the use of manipulation exercises that aim to habituate the thrower with the objects to be thrown (their shape, size and especially their weight) in the form of: swinging forward (lower-upper, left-right) and sideways (forward-backward, left-right).

In the introduction of this subchapter, we have already selected the launch throw based on the upper segments with muscles engaged in the effort—whether the throwing occurs with two hands or one hand. Although a common base for the movement is assumed, for fuller understanding, we will describe them separately.

Respecting the principle of accessibility, the two-handed throws will be addressed in the following sequence:

- Side launch throws with two hands, standing:
 - lateral standing with legs apart, engaging the muscles of
 - arms
 - trunk and arms
 - legs, trunk and arms
 - sagittal standing with legs apart, engaging the muscles of
 - arms
 - trunk and arms
 - legs, trunk and arms
 - side standing, engaging the muscles of
 - arms
 - trunk and arms
 - legs, trunk and arms

- Side launch throws with two hands, in motion:
 - from side standing, engaging the muscles of legs, trunk and arms;



Without going into technical details, we have to say that, as in case of the other types of throws, the succession of muscle involvement in the effort suggests the succession of the G.C.G. movements: lifting, rotation and translation.

Also without much detail, we will illustrate in the next slide the side launch throw with two hands, in motion.



Side launch throws with two hands, in motion (legs, trunk and arms muscle involved)

Respecting the principle of accessibility, the one-handed throws will be addressed in the following sequence (similar to the two-handed throws):

- Side launch throws with one hand, standing:
 - lateral standing with legs apart, engaging the muscles of – arms
 - trunk and arms
 - legs, trunk and arms
 - sagittal standing with legs apart, engaging the muscles of – arms
 - trunk and arms
 - legs, trunk and arms
 - side standing, engaging the muscles of – arms
 - trunk and arms
 - legs, trunk and arms
- Side launch throws with two hands, in motion:
 - from side standing, engaging the muscles of the legs, trunk and arms;

We will only illustrate the second and last way of throwing.



**Side launch throw with one hand, sagittal apart standing
(legs, trunk and arm force involved)**



Side launch throw with one hand, in motion (legs, trunk and arms involved)

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