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1966
Johannesburg College of Education
https://hdl.handle.net/10539/27434
Hubert-White, G.M. (1966). The application of programmed learning to athletics. Symposium: A Journal of Education for Southern Africa, pp. 81-85, 87-89.

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The Application of Programmed Learning to Athletics

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by

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INTRODUCTION

THE track and field events in athletics are in four groups: sprints, runs, throws, and jumps.

The general aim of athletics is to achieve the correct physical values of posture, fitness, strength, and skill. For those with ability the specific aim is to train for competition. For both aims instruction is required to suit the ages and abilities of individuals.

There are two ways of learning any event in athletics: one is by trial-and-error, and the other is by receiving instruction.

Trial-and-error learning is inadequate. For instance, by following the descriptive phrase: "go to your mark, start with jump foot," the long jumper is actually told what to do, but he does not receive specific information on how to do it. These descriptive phrases do not provide any check on the performance of the individual. Those with ability may jump in the correct manner, but those less gifted get no chance to learn the action at all.

In addition, the duty of an athletics coach is to give instruction for all the events in one period, thus it is difficult to see how he can reach all the individuals in a class or group.

When an event is programmed the action is analysed into movements, the movements are broken down into elements, and then the instruction is presented in small steps. This method ensures that all the elements to complete one action are included.

The order of elements is based upon the laws of anatomy and kinesiology. This order is logical in the real sense, inasmuch as the component elements are in the correct order.

Programmes in small steps are arranged so that groups can follow the instruction. By this method also a check is provided on the attainment of each individual. Those who lag can be re-instructed.

Practice and training may be measured and timed, so that criteria may be specified. For each training period intermediate objectives may be set in order to obtain regular and progressive practice.

The construction of a matrix is required to secure all the essentials for learning and to cut out superfluous detail.

Programming is, therefore, a method which enables instruction to be given for every event, so that each individual receives suitable instruction.

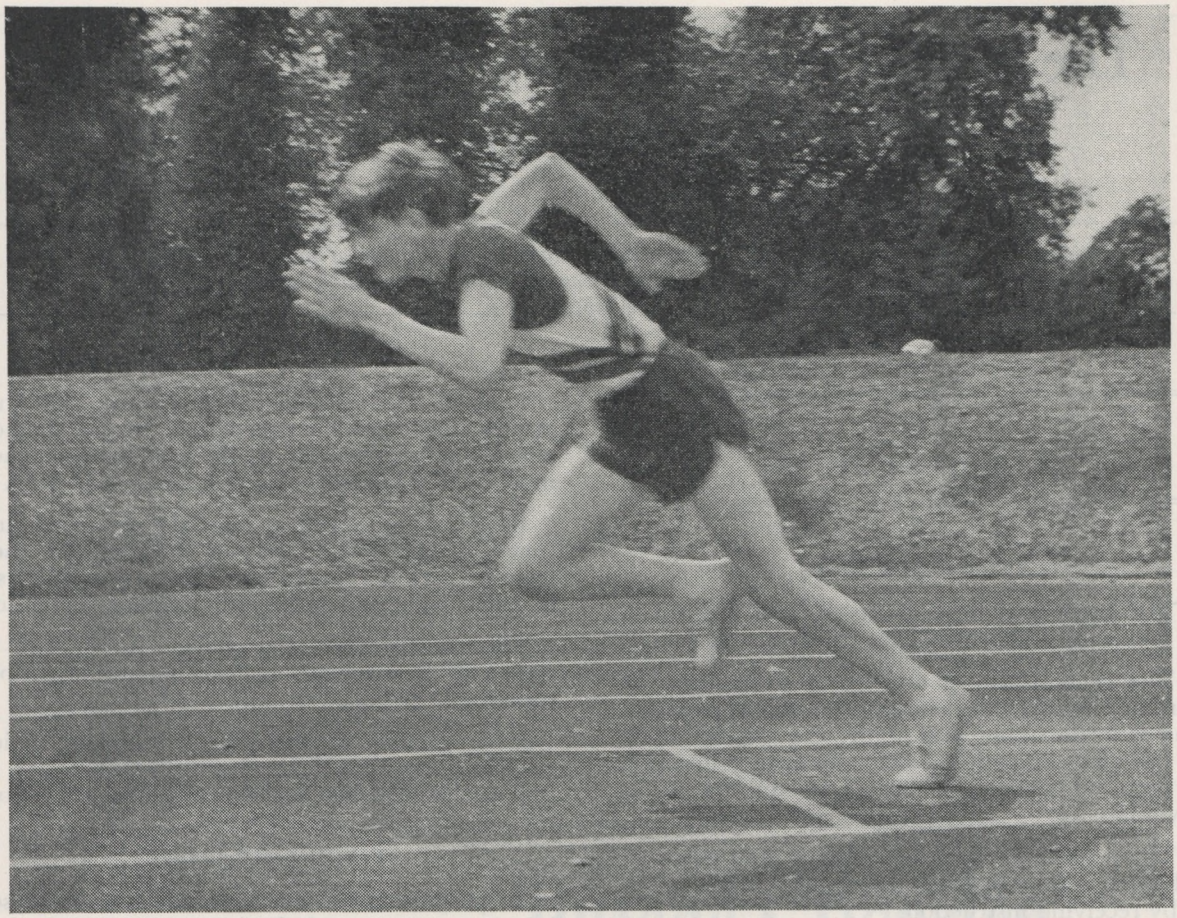
TO PROGRAMME

To programme an event, the action is analysed into movements, and the movements are broken down into elements, and then the instruction is presented in small steps. Thus:—

Long Jump

A–the elements:	B–combined into movements:
At start-mark:–	
1. feet point forward	
2. feet place 3″ apart	I feet parallel
3. stand upright	
4. hands stretched at sides	
5. chin in	II body support steady
6. get motionless	
7. eyes look forward	III attention on run-up
8. hands raise to hips	
9. elbows bend	
10. heels raise	IV set to go

The jumper is given the instruction, and in practices he follows the elements 1 to 10. In this way, he masters the movements naturally, for each element is used by the body to lead to the next element.



The athlete (aged 15) has obtained the position: 4(a) *hands lift* (b) *elbows bend* (c) *right arm lift backward* (b) *left arm lift forward* (e) *left leg straighten — body drive forward* (f) *right leg fold* (g) *right knee bring forward and through.*

Using the lane-line as a base, if a line is drawn through ear to ankle the angle is 40 degrees, which illustrates the correct forward and upward components of the body drive forward. For discussion on this point of technique see The Mechanics of Athletics — G. Dyson (*Univ. of London Press* — 1962).

The ideal is for the hips to be in this line. The reason for this slight non-alignment is the left arm elbow which is sideways not forward. This shows the need for learning the elements: here the athlete has lifted hand, bent elbow, lifted lower arm forward but upper arm is outward. Without a check list this might escape notice and the athlete would fail to get true drive forward.

This may seem unimportant, but if the drive is not through the physique then the kinesthetic effect is only partial, and motivation incomplete.

The elements 1 to 7 will develop the physical education factor of correct posture, and elements 1 and 2 will pinpoint foot eversion, or turn-out.

Programmes on these lines make certain that no element is omitted, and that each element is given due attention and value.

To validate: the test is whether this sequence of stimuli, the elements, elicits the kinesthetic responses which teach the physique to perform the movements which compose the action of the event.

Active responding

For the sprint start, the movements are:

1. assemble three paces back from start-line
2. on marks
3. set
4. gun or clap — go

The instruction for 4 is:

(*a*) hands lift
(*b*) elbows bend
(*c*) right arm lift backward
(*d*) left arm lift forward
(*e*) left leg straighten—body drive forward
(*f*) right leg fold
(*g*) right knee bring through and forward.

The sprinter, having received this instruction, performs in practices every element required to fulfil the movement.

The sequence of elements made by the physique is in logical order and has to be learned. In further practices the order of presenting the elements may be re-arranged to make elements salient, and so obtain motivation.

For example, the instruction may present element (*e*) left leg straighten . . . and element (*f*) right leg fold . . . repeatedly, until thrust is obtained. These are the elements required to get utmost effort and perfection in sprint striding.

Confirmation

For each event a programme sets out the instruction. Next, the instructor observes one or more elements in each practice. If satisfactory, he gives the athlete immediate confirmation. The following chart shows the marking for each individual in a group:

Long Jump—sail (age 11 plus) Date:
/ if done, X if not done.

Elements		*Names*	
	A	**B**	**C**
Practices	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
Feet:			
1 point forward	/	/	x
2 place 3 in. apart	/	/	/
Stand:			
3 upright	/	/	/
chin in	/	/	/
Hands:			
4 at sides	/	/	/
stretched	x	x	/

In practice 1—element 1 is done by A and B not C.
In practice 2—element 2 is done by A, B and C.
In practice 3—element 3 is done by A, B and C, but C does not do element 1—this is recorded.
In practice 4—element 5 is done by A, B and C.
In practice 5—element 4 is done by A, B and C, but A and B do not stretch hands—this is recorded.

The use of the chart enables the instructor to observe the practice of each element in sequence, and to build up the movements for each individual in the group.

For example, A and B are re-instructed for element 4. Likewise C for element 1, but if the foot joints are defective remedial exercises may be required.

The record also provides a basis for improvement of instruction, and for the revision of programmes. For example, element 4—hands stretched at sides, requires analysis into two elements: the position — hands at sides, and — hands stretched.

The order of elements may be re-arranged to bring together associated elements: i.e. element 3 is the position—stand upright, and element 5—chin in, is the cue stimulus to get the body to respond: stand upright. In fact, when revising the programme, element 3 might be replaced by element 5.

Re-inforcement

To re-inforce learning the athletes may be set questionnaires to enable them to recall what they did in practice. This provides a means of self-testing and self-correcting. As an example:

Shot Putt

Frame 1

Answer: yes—if done; no—if not done; X—if not remembered.

1. left hand took up shot .....
2. shot held in front of body .....
3. right hand placed over shot .....
4. fingers spread round shot .....
5. holding shot, both hands turned over .....
6. shot positioned in right hand:
   (*a*) $\frac{1}{2}$" up from base of fingers .....
   (*b*) thumb, 1st, and 2nd fingers took weight of shot .....
   (*c*) 3rd and 4th fingers held shot firm .....
7. shot placed:
   (*a*) in hollow of collar-bone .....
   (*b*) chin down onto shot .....

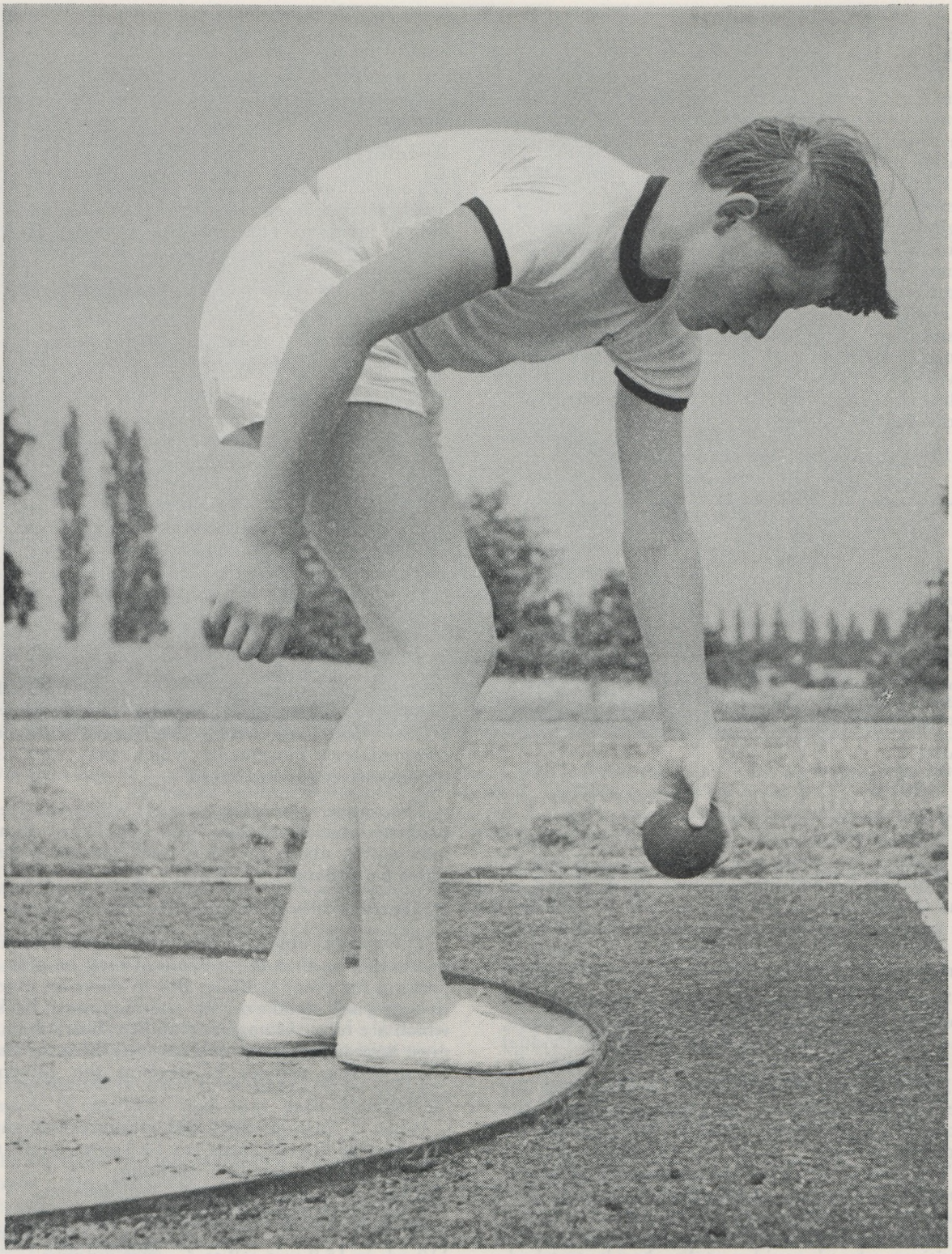
Unless the athlete achieves the movements by learning each element in sequence, his action will be incomplete. An element not learned will cause compensatory movements which may lack the required strength and speed.

The answers comprise a report which is a feed-back to the instructor, who will thus obtain information about the individual and the nature of his performance.

Objectives

The general objective of a programme is to give instruction so that the individual may be able to perform his event skilfully. But to make an objective precise, standards for training must be set which are related to age and ability. This standard must appear to be attainable, yet at the same time be strenuous enough to develop the personal capacity.

When a sprinter, aged 11, attains an average standard for the 100 yards, say 14.4 secs.—grade C, he is trained in repetition sprinting:
50 yds. in 7.5 secs. $\times 4$ to 6—half distance,
75 yds. in 10.8 secs. $\times 2$ to 4—three-quarter distance,
110 yds in 15.2 secs. $\times 2$ to 4—over distance.
to be done in arranged schedule of X sessions with



Frame 1: *Athlete age* 13. 1. *Left hand took up shot; this exercises the left arm and reserves the right arm for putting.*

the objective of 13.2 secs.—grade B.

When this quantitative criterion has been attained, appropriate repetitions are set with the objective of 12 secs.—grade A.

For the high jump, a programme objective would be:–

jumper aged 15—grade B 4ft. 10 ins.
—grade A 5ft. 0 ins.
add conditions—straddle or Western roll style
—to do x practices in y weeks, to attain grade B, then A.

Thus the programme objective becomes a method to test and to motivate the individual in every event. This is possible in athletics because performance in practice and competition may be measured or timed.

Presentation of instruction

Adherence to a programme makes it possible to master an event with the minimum of errors. Errors if made will be small and easily corrected. Movements learned and performed correctly, stimulate the individual to feel that the activity is rewarding, and that progress by small steps is easy if the elements are learned one by one.

In all athletic events responses are made by specific behaviours of the body. Therefore, a programme can be arranged to educate the application of the physical values of posture, fitness, strength, and skill.

As shown already the long jump may be programmed to obtain posture and positions of feet.

The sprint start movements stretch muscles and tendons, loosen joints and ligaments, and demand full range movements. This, therefore is an efficient exercise for fitness.

The sprint striding teaches the body to add force to movements which create speed. This increases muscular force by extending exertion against resistance within the physique. So sprinting is a strengthening exercise.

In programmed application to athletics the objective is to enable the individual to have access to instruction in the events for which he has ability.

The view then is to give the individual experience of sensory, motor and kinesthetic functions. The feedback will motivate him to carry out regular and progressive training, and thus become competitive. Although the event will be important for him, the larger value is physical education.

This plan of work in condensed form proposes that the writing of programmes should be concurrent with the use of programmes in instruction as follows:

(*a*) select event from sprints, runs, jumps, throws

(*b*) analyse action into movements, then into elements

(*c*) arrange elements in a programme of small steps

(*d*) prepare charts to check elements; prepare questionnaires

(*e*) arrange training period to try-out programme

(*f*) evaluate: instruction given—not given
instruction received—not received

(*g*) from evaluations: revise programmes and charts; arrange practice and training.

(*h*) write up programme to teach the event, for machine or book format.

The individuals, having learned the elements of their events from the programmes, come for practice primed how to carry on. The instructor is free to observe, to coach, and to re-inforce learning.

The next stage is for the individuals and the group to self-test, and to self-correct.

The individuals, having progressed in learning how to do their events, are ready to be coached for competition.

For this programmes may be devised to teach rules, strategy, mental and emotional attitudes, leading to the development of competitive ability.

SUMMARY

The theory of programmed learning is a basis for research into learning by the physique, and various kinds of behaviours.

In athletics the range of events offers scope for this research.

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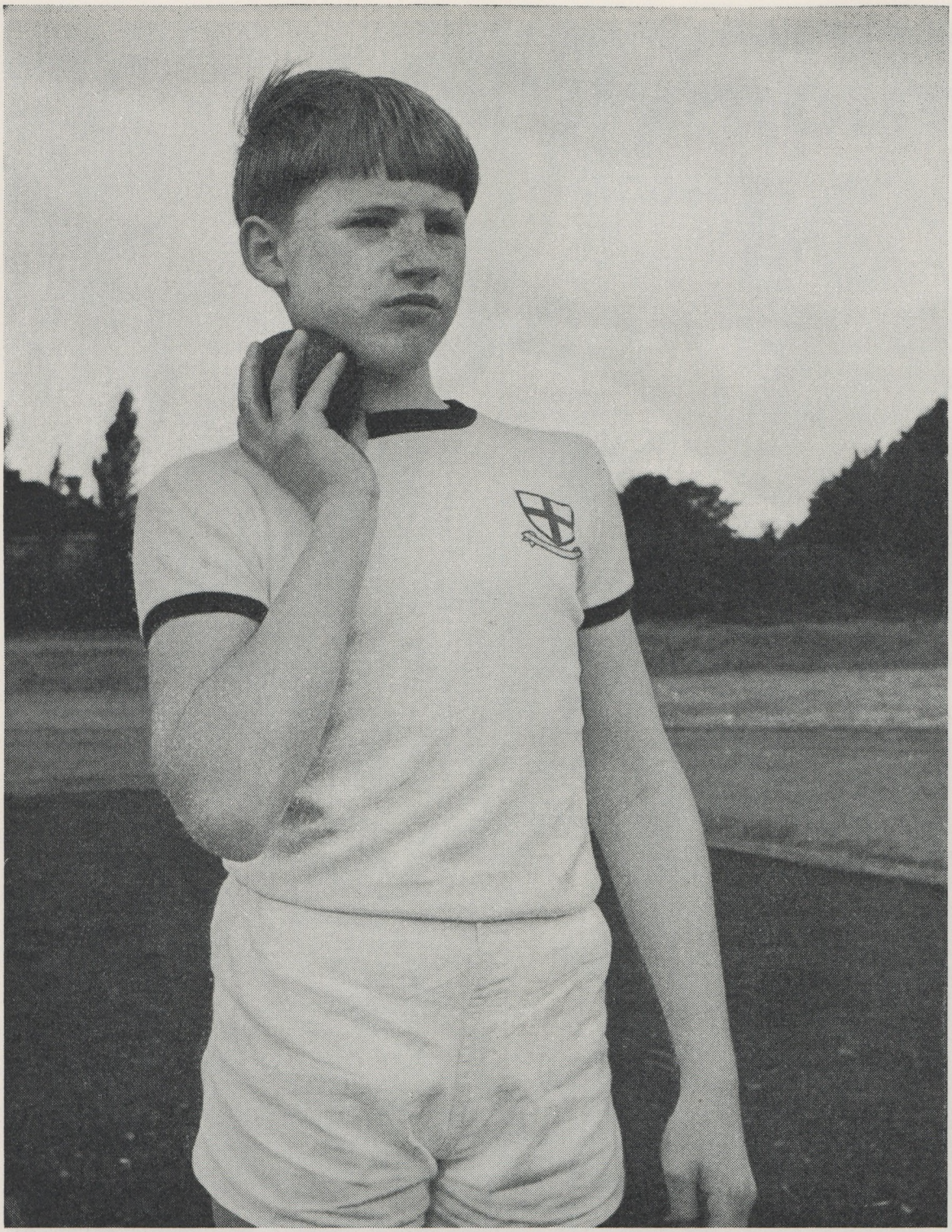
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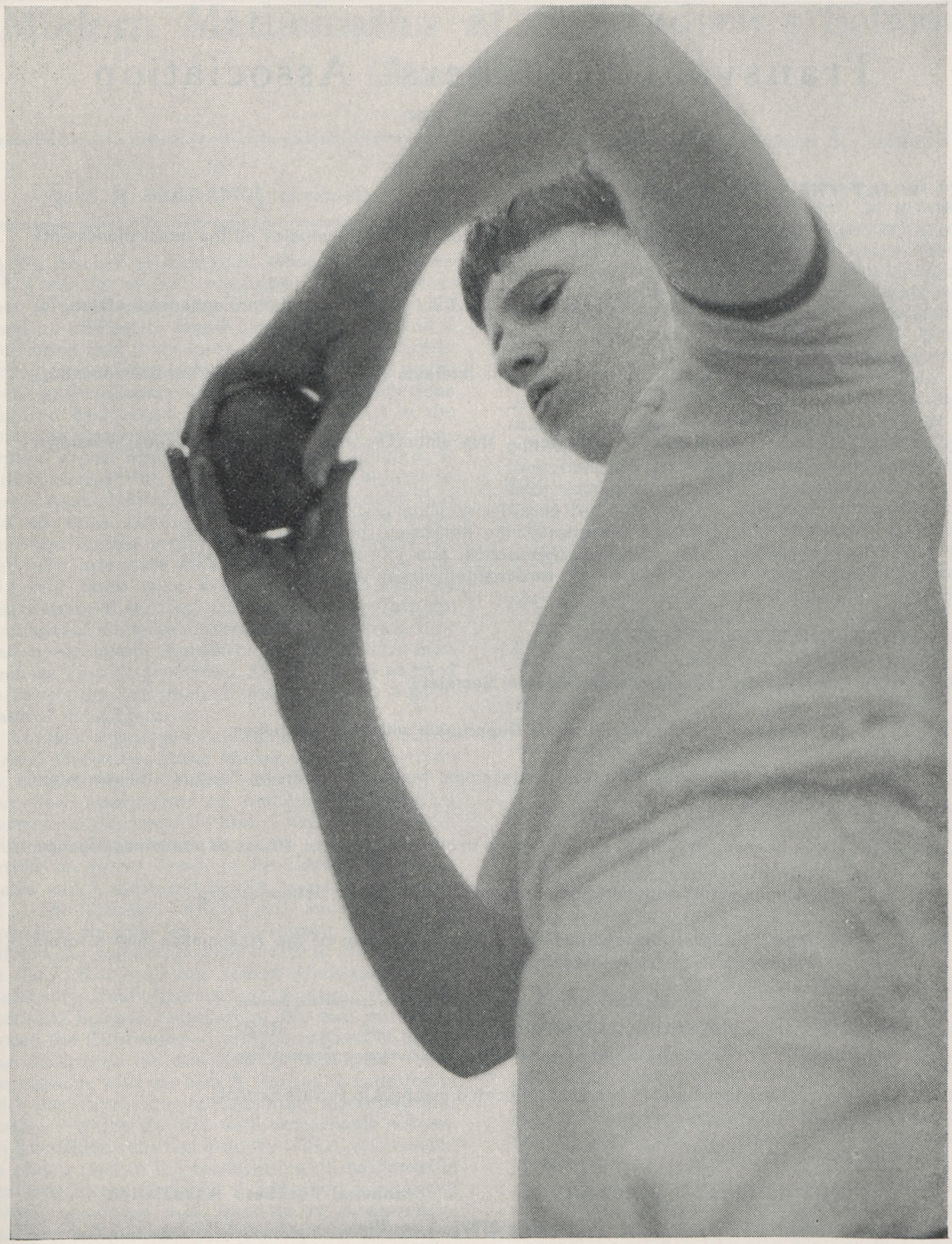
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2. *Shot held in front of body;* 3. *right placed over shot;* 4. *fingers spread round shot; the athlete is looking at shot: this helps him to get the elements correct.*



7. *Shot placed:–* (a) *in hollow of collar-bone; this cavity below the neck helps to get the shot secure;* (b) *chin down onto shot; the AAA rule requires the shot to "Be in close proximity to chin" This instruction makes it possible for the rule to be learned, and of course assists the hold of the shot securely.*



5. *Holding shot, both hands turned over;* 6. (a) (b), (c), *shot positioned in right hand; if the shot is not positioned precisely then the tendency is for the wrist to bend back unduly, so the putt does not become a thrust through arm and hand and fingers.*