METHOD OF IMPROVING TECHNICAL ACTION IN ARCHERY

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INTRODUCTION: Study of the underlying structures of various parameters of archers' movement operations has great significance, especially because their quantitative performances are known only partially. Whereas archers' operations have complicated coordination structures, and many of their characteristics are not accessible for direct measurements during training. Therefore the method for their simulation in sports pedagogy remains a unique area for deriving necessary subjective information about an investigated subject with consequent development of the recommendations on correction of revealed defects. Besides biomechanics models, used in training, characterize most successfully an internal essence of movements, which is accessible to sensitive of those being perception trained. Because of this it is possible to make one more note. Many techniques, developed for monitoring separate parameters of sport technique skill superbly approach as means of training just of those elements of sport technique, for study of which they have been developed [1,3].
Time is one of the main criteria for the correction of actions. One meets a certain hindrance when trying to determine this time, because the duration of this phase, as part of a complete shot, lies in a range of several tenths of a second. The aim of the work is to develop methodical means and methods which would create high efficiency for an archer's micro-movements during a bow string's release.

METHODS: Pedagogical experiment with utilization of specialized micro-movement time-study in the phase of a string's release is the method of investigation. The method is based on the basic principle that there is a close correlative relationship between sport results and the stability of time parameters of a bow string's release in archery ($r = 0.79\text{-}0.94$). We managed to exactly determine the real time of a string's release using a 'device for the measurement of movements' time parameters of archers' which we have developed (Ukrainian patent N93030186).
Construction of the device suits general functional block-diagram of measuring system. This system consists of the following blocks: object of measurement; perceiving of measuring quantity; transformation of measuring information; reflection of information; analysis and storage of measurement's results.
This device consist of: contact group 1,2; contact 1 is placed on a bow's clicker 3, contact 2 - on bow's hilt 4 (under clicker). The second one- optoelectronic pare 5 which is situated on a special frame and this frame is fixed on a sigt's lath 6 and has a possibility to be moved longitudinally. The pare consists of light-emitting diode 7 which is in a modulator 8 and photo diode 9 which is in a detector's scheme 10 (fig.1).

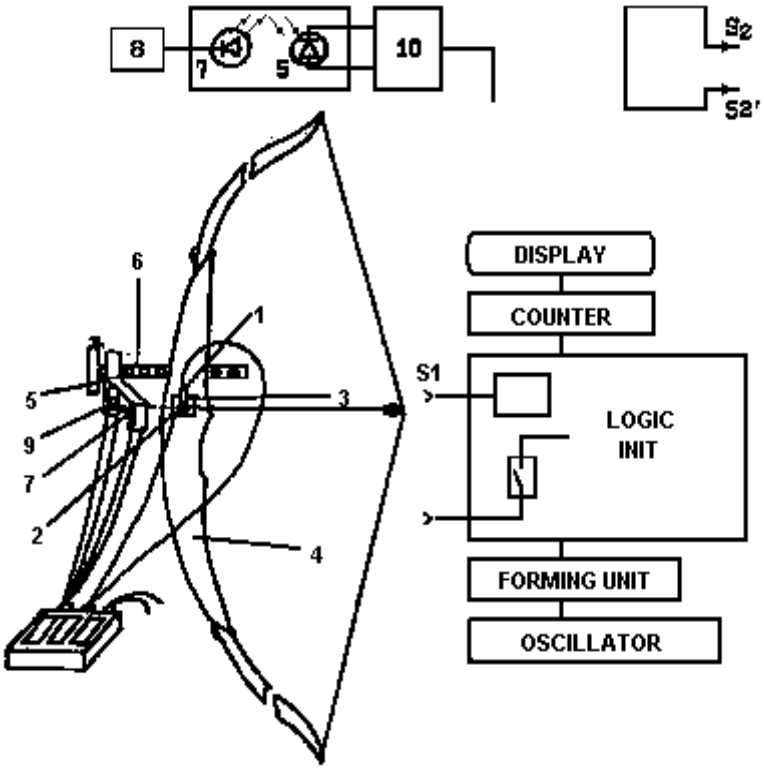

Fig.1. Structural construction of 'Device for the measurement of movements' time parameters of archers'

But man has no innate sensation of a hundredth of a second delimitation. Such capability could be achieved using a special sensoric method, based upon general principles developed by Hellershtain [2], but with important innovations, namely (Table 1): 1. Necessity is a numerical expression of time sensations and plays a considerable role in their development. 2. A perspective on the discovery of new and more precise signs of time's micro-intervals exists only in the presence of a close connection between subjective indices and objective criteria of time evaluation. Adding corrections to one’s actions, as well as to judgments about them, is also possible only under such conditions. 3. Time's micro-interval sensation during a string's release must not be separated from the archer's activities. Athletes' reactions would be omni-percipiently analyzed through the following algorithm: clicker's sound signal - reaction - subjective trace - objective device's result - memory of the previous shot sensation - comparison of sensations and objective data.

Table1. Structural construction of method of time's parameters of string's release improvement.

Stage	Duration of stage	Sense and tasks of the stage	Main result of the stage
1.	1-2 training sessions	Aim understending, interest's attaining, adaptation to device	Being adapted to shooting with device
2.	2-3 training session	Establishment of individual mean values of reaction and mean deviation	Begining of connection's establishment between qualiti and time of their performance
3.	7-10 training session	Archer's incite to self dimension of string's release time	Mean value of foresight's mistakes are 0,005-0,008s.
4.	5-7 training session	Archieve at most uniform time of string's release	Effect of archer's actions control appears

We should 'capture' those present, elementary time sensations, which remain after release completion, on the basis of the mentioned principles. Then we should transform them into a conscious category. That will cause an effect under which actions, which are time-sensitively regulated, will be more perfect.

RESULTS: We organized two groups of archers of medium levels of qualification (experimental and control) to check the efficiency of the proposed method. It should be supposed that we have positive effects when we survey a clear tendency to the stabilization of a string's release time parameters and an improvement in sport results as a result of the latter. Indices of Student's t-criteria for linked excerptions become a mathematical form of informative positive or negative displacements as well as changes in results of shooting before and after the pedagogical experiment. An index of bilateral Student's t-criteria equal to 2.262 was assumed to be of critical level for a=0.05 and u=34 (Table 2).

Table 2 Matrices of indices of Student's t-criteria for characteristics of changes in experimental group

Mean time of release	Mean square deviation of time of release	Variation's coefficient of time of release	Sport result
2.2	4.8	5.1	2.4

CONCLUSIONS: 1. A sensory method's introduction secured a perceptible increase in the stability of release time parameters and an improvement in sport results. 2. By contrast, we do not see such changes in a control group of athletes. 3. Improvement of differential ability of specialized micro-intervals' time characteristics is a basis for the stabilization of a string's release duration.

The further study of process of perfecting archers' technical skills are recommended to be conducted by revealing the most important criteria of technical skill for the fulfillment of the basic technical elements of the shot, determination of quantitative ratios of these criteria, maintenance of variants of deriving necessary information, development program, methods and means of study and perfecting of weak links in archers' technique.

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