Computerized System For Testing And Formation The Speed Of Backward Push Of Sportsmen

Ph.D. eng. Dan Milici[1]

[1] Electrical Engineering Department, "Stefan cel Mare" University of Suceava, Roumania

Abstract – An important parameter in sportive training it's represented by the speed of reaction of sportsmen on the competitions. This paper presents a digital system meant for sportive probation in order to obtain some superior performance.

I. Introduction

Speed of backward push of sportsmen has a decisive function in all sports. Is that is it all about the start in sprint or about the fast reaction in posture of crisis what can appear during a competition, speed of backward push has an important function in development of a confrontations in which all participant sportive arrived at a same level of physical preparation.

The history of any science draws a very similar to the surfs oceans wave, which sequence should be identified with the apogee of alternance that it knows by the experimentalism and notionally substantiation, all refer, in their ensemble, to a definition of human epistemology. Owing to scientific feeds and technological in a undreamed-of rate some decades ago, an extravagantly sophisticated apparatus penetrated into all areas sports, offering the means of big variety and fineness. If over not long ago the sportive preparations in sport have to base the experience of an engineering able team, more or less, today the computer penetrated in this area also and the modern techniques of measure and keeping have a decisive function in one area [1].

Accordingly, the sportive and the one that prepare and form for arid performance also confront with the problem of optimum implementation of these equipments in their activity and with the problem of using of some complex units. Any meter represents a technical extension of our senses, permitting us penetration into the zone which shouldn't be us accessible, due to physiological limits. Besides measure problem, a substantial advantage is represented by the possibility to keep continuously a preparation with the possibility to evidence the progress of sportsmen in period of their preparation. This thing involves the requirement to reconsider the formation of sport-manager, who must be familiarized with the structure and the possibility of apparatus that are used, to can be able to fancy and to search new useful systems in the sportsmen preparation from his area. Likewise this must know the meaning of plant's parameters and the correctness (when it exists) between these and obtained results, in so kind to can choose the work protocol proper to the aim. An incorrectly choice of the parameters can adjourn to false results and can have noxious effects.

II. Speed of backward push of biotic organisms

The temporally evolution of biotic systems can be expressed by means of functions which describe the temporally evolution of non-steady thermodynamic systems. Through the cognition of these function it can be determinates the behavior that the biotic systems had it and can have it in future. Among the human qualities it is counts also the capacity of diction and estimation of some next events through the receiver of information from next. The activities for cognition of the past and the future of ones alive systems it's known in literature. Everything is known together with the initial date; at once a state is defined the law causes the whole system, enables to deduce his evolution. To generality of dynamics laws it corresponding the arbitrary of initial conditions and therefore the arbitrary of particular evolutions. Systems reflect in their structure the own evolution. The system is present in itself everywhere and always, each state contains the truth of all other, each can predict the evolution of the other, any should be the respective positions on the time axis.

The methods developed by theory of systems for determination of systems transmittances and those response time (often used in technique) are almost impossible to apply in the case of non-steady ergo-dice systems, disorder which appears during some process being seemingly. There is a hidden order in each case, well determinate, that the system creates it's through its capacity of evolution and itself-organization by means of data and energy. In the sense of that asserted, this thing is already confirmed by the following theories:

- the catastrophes theory of Rene Thom,
- the theory of fractals developed by Benoit Mandelbrot,
- the Ilya Prigogine's theory of dissipative structures,
- the theory of chaos and queer attractors of David Ruelle,
- the Hermann Haken's theory of synergetic, e.g. [1].

Systems that evolve to orderly structures are named systems with itself-organization and present a perfect coherence between the parts constituent of system. Any this kind of system, subdued to compulsion is forced to restructure and temporally or spatial order appears away from the thermodynamic equilibrium through shift of energy and substance with the environment. The specific behavior of systems with itself-organization depends on the intimate mechanism of non-linear process from inside of these.

The temperature differences as well as the temperature gradients of bodies that appear by among the interaction between the biotic and abiotic systems and the environment are thermodynamic forces that launch and direct the processes inside of biotic systems.

Classic thermodynamics can't reflect the behavior of biotic systems found out in irreversible interaction with the environment because the models of the alive life-blood are non-steady or classic thermodynamics is elaborated in stabile regime. Biotic systems are thermodynamic systems away from equilibrium, which contradict the classic thermodynamics laws. From here the numerous preoccupations that the peoples of science have them to create thermodynamics of biotic systems with depending on tense.

All biotic systems are opened thermodynamic systems and their thermodynamic parameters have a big variability in space and tense. For biotic systems was elaborated the concept of *consumed* or *captured energy*, that expresses an interaction speed of irreversible process from the biotic system, generated by the temporally irreversible interactions of system with the environment.

The biotic systems (appreciated as opened thermodynamic systems) change energy, substance and information with the environment. Hereby the organization of biotic systems is performed based on the principles of: the minimal consumption of energy and substance, the way with minimal resistance, the using with maximum efficiency of matter and energy and the preservation of matters and energy. It's knows that in case of a system about whom don't arid interferes extrinsically, his evolution is result of the being of a potential difference in which the sense of process development results without say. Systems touch the deathly state, in case in which all potential difference become null.

Speed of backward push of an individual just as we perceive it is a complex process to which take part diverse structures of body. Thus, speed of backward push to visive stimulus, monitorised by us, depends on: the used method, the degree of concentration of sportsmen, the degree of lassitude of sportsman, the intensity of stimulus, the previously formation of some automatisms and their exercise, the mode of optimum operation of thought, of neuronal and loco-motor systems, of intercession mode in the moment of stimulus appearance, of mode in which is perceived the backward push as effectuated, the mode of data processing and so on, all these driving to the obtains of a performance in this area. All these parameters are very difficult (or impossible, some of their) to individually estimate.

For this reason it is attempted the performance of one system which models quotient better the postures of game and which permits the quantification of speed of backward push as sum of the elements enumerated previously, which element must evaluated abstract if it wanted the improvement of performances through the education of one of them.

Starting by these presented previously, speed of backward push of sportsmen is depended on:

o the environmental conditions:
- the intensity of visual stimulus (that must be over a certain threshold given by the perception sensibility of sportsman, by the tiredness degree, by the environmental illumination conditions, etc.),
- the used method (there are numerous recommended method, each with its advantages and disadvantages) and there through on: the kind of action, the manner how is perceived the backward push as effected, the processing and interpreting wais for obtaining the results (stipulated for each sport);

o the cumulated history of tested person:
- the possibility of concentration (exercised or not previously),
- the tiredness degree,
- the previous formation of some automatism through exercises and practice;

o the action way of body through the implied systems in the performing of action during a time as short is possible (the loco-motor system, the neuro system and of organs of sense, the thought and the analysis way of data) [4].

To a prime estimation the last presented group seems to go out from the debate when it speaks on a speed of backward push evolution of one person. However, human body have the possibility to form itself the centers of backward push in the spinal marrow which to short the propagate time of data through the neuronal system and which are able to take decisions which drive, for example, to the formation of some reflexes. Therewith, the nervous impulses what control the cramp can moderate through exercises, and regarding the taking of a fast and efficacious decision the thought can arrive at the amazing performances proven posture of crisis by the persons with a solid preparation.

III. Describe of the system for testing and formation the speed of backward push of sportsmen

The classic methods used up to the present in the sportive preparation area refer to the reaction speeds of sportsmen increase through game or game sequence shaming throwing with speed the ball and subjectively estimation of the way in which the subject succeeds or not to resolve the respective situation [3]. These method are disadvantageous from many points of view: the impossibility to create the desirable game situations by reason of uncertain throw of the ball, the necessary roominess to perform the exercise, the require to use an advised person for each trained sportaman which must create the situations meant for testing, the impossibility to perform a precise estimations of sportsman's performances aim to emphasize their evolution and to compare the performances of various sportsmen, etc.

The proposed system, designed, achieved and testate in this theme remove the disadvantages high mentioned and shortens the training (or intensify it) in addition and it is designed from two panels, each contains eight pairs stimulus-switch (figure 1).
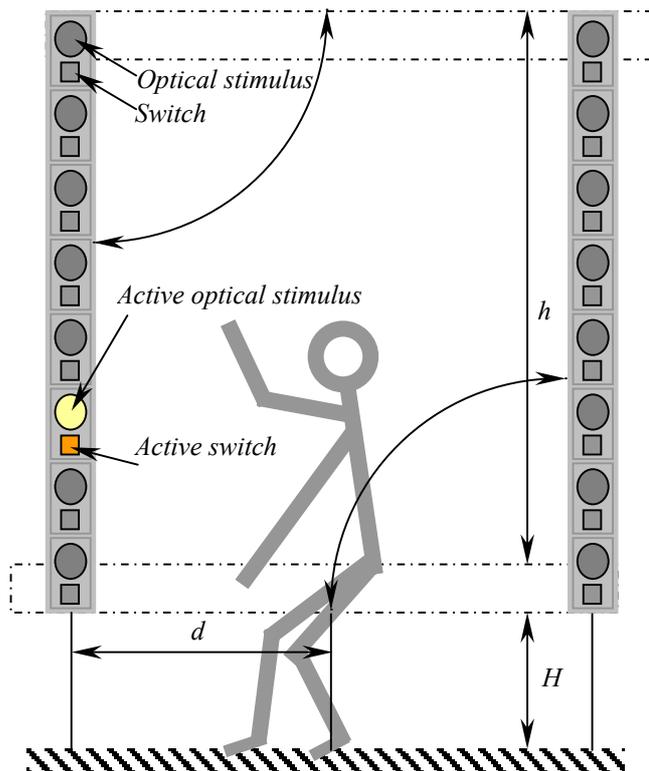

Figure 1. The formation and testing device for reaction speed of sportsmen

The pair stimulus-switch is achieved by a bulb choose depending on the luminous emissive intensity and chromatic range of light, commanded through a digital signal and a tactile sensor, positioned in immediate proximity of luminous stimulus, which is connected to the digital inputs port of an adding system that has the switch function for that [2].

On period of training or probation the sportsman must to follow the light up of a stimulus and to operate with maximum speed the proper circuit breaker. The stimulus light up one after other in a certain order, just one of these being lighting to a certain moment. After the circuit breaker operation and the blanking of the proper bulbs the order system of panels will achieve a variable temporization needed for fast reversion of sportsman in the initial position.

The activation of the pair stimulus-switch it is achieved by means of an adding system equipped with 16 digital outputs and 16 digital inputs (figure 2) and which achieve the stimulus control (through an amplifier or relay), the temporization between stimulus turning-on and proper switch driving or between the switch driving and turning-on of the next stimulus, the estimation of reaction speed for each act, the average calculus and the record of all data aim to processing and ulterior evaluation.
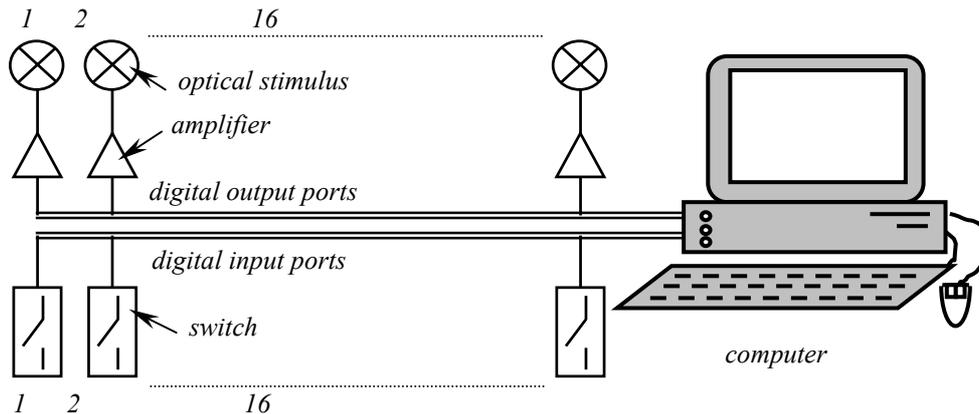
Figure 2. The block-diagram of formation and testing device for reaction speed of sportsmen

Entire action can be supervised, coordinated and online analyzed by a coach that collimates (by distance if it's required) on computer display the entire evolution of sportsmen through an instrument.
The stimulus activation and the time between two successively activations can be done in three distinct ways:
o the way 1 – aleatory, through the implementation of one subroutine for aleatory choice of bulb which follows to be light up for the usual training or general evaluation;
o the way 2 – manually, online achieved by the coach which, by means of mouse, can selects the digital active line to a given moment and the time after that actions an another one for the case in which the coach looks after a certain exercise type what is enforced and achieved to a certain moment;
o the way 3 – pre-established, which through a previously prepared algorithm by the coach and which allows the resumption for many time of the same sequences with a view to the evolution testing of one sportsman or to the estimation a sportsmen group.
The virtual suggested instrument (figure 3) permits also to memorize the datum of a probations by saving them in a text file with the sportsman name, of date and hour whereat is did the probation, of selected work mode, of endeavors number and the average backward push obtained as well as of the all necessary tenses of actuation for every sensor and of number of order of these in order to find a possible stimulus which required a long backward push comparative with his media or with a reference value. Text file name that follows to be write and place where it will be saved will be asked by program at the launch moment of its.

IV. Conclusions

 The designed and achieved digital system can be used in the sportive preparation from all sports with minimal accommodations come on the used-up stimulus and of the modification of used-up virtual instrument. Thus, besides the team sports (volleys, basketball, rugby, s.o.), the device permits also the sportive preparation from the individual sports (boxing, athletics, swim, s.o.), the sportive preparation being identically, with the possibility of adaptation to the conditions enforced by the prepared competition (location of stimulus, intensity of stimulus, number and type of stimulus).
There is also the possibility to train a sportive group allocating a stimulus group for each of these, in this case could form a team-work spirit of these through the distribution of the burdens that revive them, the duplication in critical actions or help in cases of maximum solicitation.
Besides the advantage of creation of critical posture similar to one from game and the continue formation of reflexes, the great advantages of suggested systems are given by the possibilities of recording and ulterior analysis of training and chiefly by the possibilities of quantification and notation of speeds of backward push of sportsmen, a difficult parameter for appreciation through another methods so that he can be used-up in comparison of performances achieved by various sportsmen or by the same in time.
Because the time meant for this stage was short, the results of designed and achieved equipments implementation couldn't be properly evaluated (human performances require a longer using and studying on sportsmen time). Up to the congress works date it will be done a concrete estimation for the results of suggested system implementation. So far are obtained some results that drive toward hypothesis that exist the premises of obtaining of some special results. The systems are used-up in

present for the preparation of some sportsmen lots with different ages and levels in order to can be tested the efficiency on age group and sportive level.

References

[1]   Gabriel I. Năstase, "*Rolul interactiv al informaţiei*", Editura Rapana, RO, 2001.
[2] D. Jones Larry, "*Electronic instruments and measurement*", Prentice Hall Inc., USA, 1991.
[3] Allan S.. Morris, "*Principles of Measurement and Instrumentations*", Prentice Hall Inc., USA, 1993.
[4] E. Ionescu, "*Studii ale implementării unor noi metode de antrenament în volei*", Annals of Suceava University, RO, 2001.