

A MODEL FOR SPORT TRAINING TO HIGH STANDARD.

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A B S T R A C T

A model is set to describe the functions of training players or a team to a high standard, and also, to investigate these mentioned functions interaction to each other.

The model input is a specific number of players each with a performance of attitude and quality. The output is of lesser players with a high record score in their game.

The model gives more insight to the role of each function to each other, as well as, to the main system output, and permitting prediction for future competition.

1. INTRODUCTION

Research in sport has made great advances by the number of research projects, as well as, their diversity and depth 1,2,3,4,5. The aim here, is to construct the guide lines of a model that can represent the training system for some players. The system formulation is collected from governing rules training programs, mathematical and statistical models all combined by adequate feedback to perform efficient harmonious system. The model is to assure flow of information in both directions with minimum disturbance by artifacts.

2. THE MODEL

The model is of closed type input - output with feedback. The input is a specific number of players (x_i) each with perfor-

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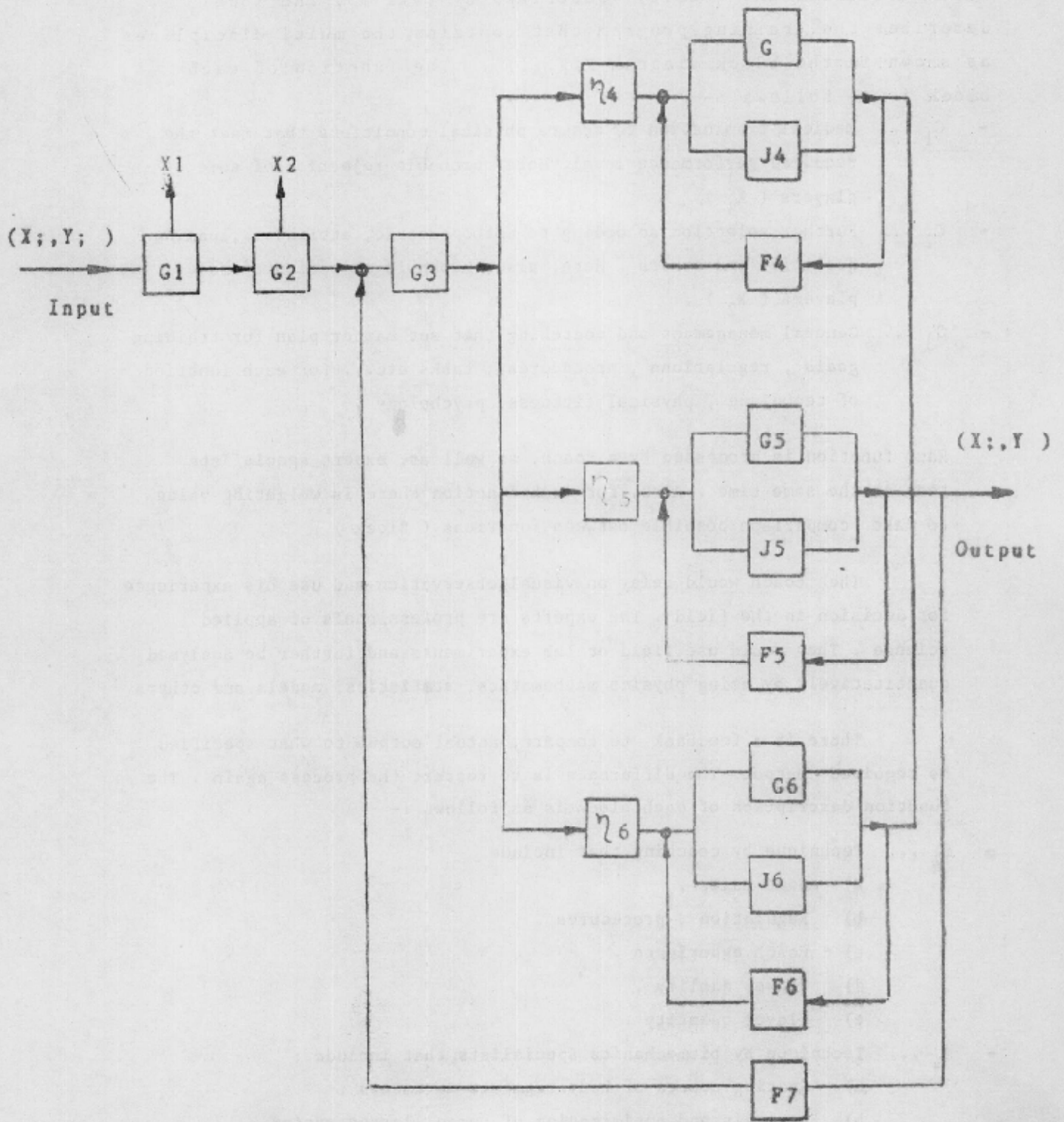


FIG. 1
The model input-output

mance attitudes and quality described by (y_i) . The model describes the training program that contains the multi disciplines as shown in the block diagram Fig.(1). The function of each block is as follows :-

- G_1 ... Medical examination to assure physical conditions that meet the required performance level. Here, probable rejection of some players (X_1)
- G_2 ... Further selection according to anthropometric, attitudes, learning qualities and others. Here, also, probable rejection of some players (X_2) .
- G_3 ... General management and coaching that set master plan for training goals, regulations, procedures, tasks etc... for each function of technique, physical fitness, psychology.

Each function is processed by a coach, as well as, expert specialists team at the same time. Also, for each function there is weighting value to make comparison possible between functions (Block).

The coach would rely on visual observation and use his experience for decision in the field. The experts are professionals of applied science. They would use field or lab experiments and further be analysed quantitatively by using physics mathematics, statistics, models and others.

There is a feedback to compare, actual output to what specified as required output. The difference is to restart the process again. The function description of each block is as follows :-

- G_4 ... Technique by coaching that include
 - a) Game rules.
 - b) Regulation, procedures.
 - c) Coach experience.
 - d) Player quality.
 - e) Player quantity.
- J_4 ... Technique by biomechanics specialists that include :
 - a) Setting courses of body segments movements.
 - b) Analysis and optimization of human linkage system.
 - c) Analysis of and optimization of player muscle groups.

- d) Interaction with environment as boundaries shoes, air wind etc..
- F₅ ... The function is to measure the players kinematic dynamic variables and compare them to theoretical or required values . The difference will stimulate the process again
- G₅ ... Physical fitness by coaching that includes the following :
 - a) Measuring and improving general physical fitness .
 - b) Measuring and improving special physical fitness .
 - c) Measuring and improving body related systems (Blood circulation system, respiratory system, digestive system.
- J₅ ... Physical fitness by kinesologist and biomechanics specialists that includes the following :
 - a) Setting requirements of body muscle groups .
 - b) Measuring actual and existing conditions of body muscle groups .
 - c) Setting regulation for training doses and players' nutrition.
- F₅ ... The function is to measure the actual and existing conditions of the general health and the special muscle groups then feed it back for adequate setting of programs to coach and specialists.
- G₆ ... Psychology by coach that includes the following :
 - a) Coordination .
 - b) Reaction to environment .
 - c) Motivation .
- J₆ ... Psychology by specialists that includes the following :
 - a) Coordination .
 - b) Reaction to stress .
 - c) Reaction to task complexity .
 - d) Reaction with novelty and creativity .
 - e) Vigellance .
- F₆ ... The function is to measure the actual feedback and existing psychomotor skills on to be compared with required standards .
- F₇ ... The function is to feedback the final players score and to be compared with the required score and make it possible to change the master plan of training system .
- 5,6,7... This is the relevant importance of each branch to others . It's values are estimated from experts and consultants in the field of training .

These are tabulated as follows for complicated construction games as gymnastics and are considered , here , as suggestive .

3. RESULTS & DISCUSSION

The model is simulated by values to each transfer function for each block as shown in table 1. These function are theoretical and were collected from experts from faculty of physical education , Hellwan University .

The values divided the training period to preparation time (10 months) and championship time (2 months) . In the preparation time , the functions importance are arranged as follows : Physical fitness , technique and psychology , while in the championship time the function are as follows : Technique , psychology and physical fitness . Also, as a governing role , the sub ordinates and the experts play significant role in the preparation time , while at championship , the coach is the main decision making in all functions .

These data were processed in the model with the following hypothesis :

1. All the sub functions J_4 , J_5 , J_6 performed equal efficiency of 100 % , 50 % and 0 % .
2. Each sub function performed 50 % efficiency at a time when the other two performed 100 %

The results in table 2 show an efficiency for the training system of 91 % when coaching is assisted with experts in each main division . The output players score are expected to be at olympic competition level . The results, also, show that the efficiency is decreased to 23.5 % when advisory of experts are withheld . The output scores, here, is compatible to local competitiveness if advisory levels do exist and performs at 50 % capacity the output efficiency is 55.3 % .

These data show the importance of the team work entraining

the proper utilization of experts within each minor field within the training body . This process can be called the industrialization
 Table (1) : Values of the transfer function for each model block .

	Preparation	Championship
TIME	10 months	2 m.
4	.3	.5
G ₄	.2/(1+ S C)	.8/ (1 + S C)
J ₄	.8/ (1 + S C)	.2/ (1 + S C)
F ₄	.1	
5	.6	.2
G ₅	.2/ (1 + S C)	.8/ (1 + S C)
J ₅	.8 (1 + S C)	.2/ (1 + S C)
F ₅	.1	
6	.1	.3
G ₆	.6/ (1 + S C)	.9/ (1 + S C)
J ₆	.4/ (1 + S C)	.1/ (1 + S C)
F ₆	.1	

S = laplace transform

C = time

Table (2) : Results of overall system efficiency .

Sub System Eff.	Overall system efficiency	
	Preparation period	Championship competition
100 %	.91 %	.91
50 %	.553 %	.85
0 %	.235 %	.605
J ₄ = 50 %	.805 %	.747
J ₅ = 50 %	.702 %	.84
J ₆ = 50 %	.892 %	.83

of championship i.e. performing a scientific system that integrate a player with basic good skills and qualities to a record high score and compete for medals in Olympic competitions .

Also, the model is capable of presenting the impact of each function and subfunction to the final output player score . For example if advisory to technical coaching is at 50% capacity the system output performance is 80.5 % at training and 74.7 at competition .

4. CONCLUSION

The model is a strong tool , and superior to SUKOP biomechanics model , though both are suggestive , it permits an overall look to the training system from various point of views as quality improvement , cost effective , facilities required without being limited by artifacts .

The weighting of functions to each other needs further investigation to fit each game .

REFERENCES

- (1) DAPENA, J. Akinematic study of center of mass motions in the Hammer Throw. J. Biomechanics Vol. 19 , No. 2 pp 147-148, 1986 .
- (2) DAPENA, J. Stimulation of modified human airborne movements . J. Biomechanics Vo. 14 pp 81 - 89, 1981 .
- (3) GUPTA, S. & HSDRFF , L. Fundamentals of automatic control . John Willey & Sons Inc. 1970 .
- (4) SUKOP, J. ,PETAK , K.L. , NELSON, R.C. 1971.
An online computer system for recording biomechanical data, Res. Q . 42 : 101 - 102 .
- (5) SUKOP, J. 1978 : Application of biomechanics In the controlling system of athlete's sports movement activity .
Biomechanics 2B 5- 17. University Park Press , Baltimore .
- (6) THALER, G.BROWN,R. Analysis and design of feedback control systems . Mcgraw-Hill Book Company Ltd. 1960 .