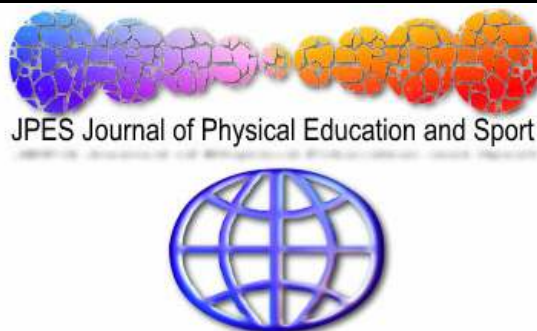




Online Publication Date: 20 June, 2010

ORIGINAL RESEARCH

ANALYSIS OF SOME ELEMENTS OF COMPLEXITY OF MOVEMENT ACTIVITIES

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Abstract

The aim of the study is to develop a classification of motor activities and sports that will be useful to researchers who either directly or indirectly deal with the subject areas relating to human motion analysis. This need is due to the complexity of the phenomenon of motor activities and sports. It calls for the study of those characteristics that identify the different motor activities in order to simplify and understand in greater detail this phenomenon.

The research was carried out through a theoretical-argumentative approach and was based on a review of the literature relating to the classification of motor activities and sports.

Through a classification that takes into account several specific variables such as conditional, temporal and spatial aspects, a theoretical framework has been created for studies aimed at investigating motor activities and sports.

Key words: Motor activities – Sport classification – skill

Introduction

The complexity of motor activities and sports requires the study of the elements that not only characterize them but also give a simpler and greater understanding of the phenomenon. The reason for this orientation is determined by the desire to help those who either directly or indirectly deal with the subject areas relating to the analysis of human movement and motor activities in general. An attempt to simplify makes it possible to classify motor activities. A comprehensive classification can provide a good understanding in the methods used in a particular movement activity as well as the opportunity to develop research projects that may be useful in developing such methods.

Movement activities, given the variety and complexity of their forms, are considered a complex system that is generally regarded and classified according to:

- specific purposes;
- environment where it is practiced;
- the type of participation;
- the type of choice of commitment and practice.

The complexity of this phenomenon requires further evaluation and analysis related to space, distances, equipment, as well as quantitative and qualitative performance characteristics.

¹ Rodolfo Vastola has edited the analysis of research and the literary review.

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The aim of the research is to analyze movement activities and develop a possible classification targeted at studies that take into account:

- the quantitative and qualitative parameters;
- the technical features and performance,
- the distances;
- the equipment used.

Methodology

The research was carried out through a theoretical-argumentative approach and was based on a review of the current literature on the classifications of motor activities and sport. Elements from previous classifications as well as additional categories and subcategories of quantitative and qualitative parameters that will satisfy the aim of the research were highlighted.

Results

Movement activities can be analyzed according to:

- the type of performance;
- the type of space and distance between the athletes;
- the characteristics of the equipment used and the way they are used;
- the structural characteristics of the performance required;
- the quantitative characteristics of the performance required;
- the quality characteristics of the performance required;

Motor activities and sports **according to the type of performance** can be analyzed in relation to *the prevailing impact of energy processes that determine the operating performance* (Bellotti et al., 1978) and can be classified into:

- a. *Alactic-acid or power sports movement activities* (Dal Monte, 1977), when the type of performance required by the motor activity or sport includes a priority commitment of the anaerobic energy system ATP-Pcr,
- b. *Predominantly lactic acid movement activities* (Dal Monte, 1977), when the physical effort is such to assume the use of the anaerobic glycolytic energy system (Wilmore H.J., Costill D.L., 2008). These movement activities provide an extension of the average maximum effort. It should be noted that some sports are characterized by the repetition of actions or gestures, with the energy resources, in this case, initially coming from the anaerobic system ATP-Pcr in continuous activity from the anaerobic glycolytic energy system (Altimari, J. et al. 2007). These include most motor activities and sports.
- c. *Predominantly aerobic movement activities*, when physical activity is over an extended period of time and low-intensity, using mainly aerobic energy mechanisms. These include all those activities with minimum workloads and prolonged over time, such as walking or running at low intensity (Helgerud, J. et al. 2007). Dal Monte develops a subdivision defining anaerobic-aerobic systems, predominantly alternating aerobic and aerobic.

Movement activities, **according to the type of spaces and distances between people during the motor action** can be classified into:

- a. *Distance movement activities*, corresponding to motor activities in which there is no contact between athletes. These include jogging, spinning, etc.
 - b. *Distance sports* are those sports where the athletes compete without there being any direct contact between them. (tennis, volleyball, archery, etc.).
 - c. *Direct contact movement activities*, corresponding to motor activities and sports where competition involves physical contact between athletes. These may correspond to different free games, games with a not encoded ball etc.
- c.1) Contact sports *can be classified into the following subcategories:*
- Disciplines with contact for attack and defence purposes, in which the contact is intended to help execute actions to obtain a final result that correspond to protective or offensive movements. These include boxing, wrestling, martial arts, etc..
 - Disciplines where contact has the aim of facilitating tactical tasks, in which case the contact is intended to facilitate the actions of attack and defence as well as the success of an athletic movement, to protect actions of the game, to disturb the time of execution. These include football, basketball, handball, water polo, rugby, etc..

d) *Indirect contact movement activities*, corresponding to motor activities and sports that involve contact between athletes who compete through the use of equipment. These include free games where a piece of equipment is used or passed.

d.1) Indirect contact sports *can be classified into the following subcategories*:

- Disciplines with indirect contact for attack and defence, in which the contact is contested by the athlete through the piece of equipment and is designed to execute actions relevant to the final result. These include fencing, kendo, etc..
- Disciplines with indirect contact for tactics or strategy, in which the contact is through pieces of equipment and is designed to facilitate the actions of attack or defence to either protect or disrupt the game when executing a movement. These include football, basketball, etc..

Movement activities **according to the characteristics of the equipment and their use**, can be classified into:

- a. *Movement activities with large pieces of equipment*, (C. Scotton, 2003) are the motor activities and sports that require the athlete to use pieces of equipment to carry out the motor action, with it not being possible to change the position of the piece of equipment. Examples of motor activities with large pieces of equipment are all movement activities carried out in the gym such as on the wall-bars or using pieces of equipment like the beam, pole, etc..

Sports with large pieces of equipment can be classified into:

- Prehension activities, in which the athlete grasps the piece of equipment and moves on it. These include gymnastics, with the horse, rings, parallel-bars, etc..
- Sliding activities in which the athlete establishes contact with the piece of equipment which he moves on and realizes the athletic movement, sliding. In these sports the large piece of equipment which is fundamental to the sport is the area in which the athlete moves, and must have specific characteristics. The ice-rink, the ski field, the skating-rink are such pieces of equipment where the athlete performs the technical activities required for the specific sport (skating, skiing, rollerblading, windsurfing, etc.).
- Thrust activities, in which the athlete exerts pressure through the piece of equipment that allows the creation of an athletic movement. These include the vault and the floor in gymnastics, climbing on artificial walls, etc..

- b. *Movement activities with small pieces of equipment*, including the motor activities and sports that require the athlete to move the piece of equipment. Motor activities with small pieces of equipment are all those non-sporting activities that use these aids to make it possible to characterize and practice it. Small pieces of equipment used in sports may be used for most of these activities.

Sporting activities with small pieces of equipment can be classified into:

- ✓ **Activity with throwing equipment**, which includes the catching and throwing of a piece of equipment. These include basketball, shot-put, discus, javelin, handball, baseball, polo, etc;
- ✓ **Activity with direct striking equipment**, which requires that the athlete directly hits the piece of equipment in order to throw or direct it. These include volleyball, soccer, etc.;
- ✓ **Activities with equipment directed with other striking equipment**, which involves the use of a piece of equipment by the athlete to hit and direct another piece of equipment. Examples include tennis, cricket, polo, golf, shooting;
- ✓ **Activity with indirect striking equipment**, involving the use by the athlete of a piece of equipment to strike an opponent. These include fencing, kendo etc.;
- ✓ **Activity with precision equipment**, which involves the use by the athlete of a piece of equipment to carry out specific actions, aimed at directing other pieces of equipment toward a target. Examples are archery, rifle shooting, etc.;
- ✓ **Activity with thrust equipment**, which involves that the athlete in realising the athletic movement is pushed when using the piece of equipment. Examples include canoeing, rowing, pole-vaulting, etc..

Movement activities, **according to the structural characteristics of the performance required** can be classified into:

- a. *Principally cyclical activities* (Scotton C., 2003), characterized by visually recognizable movements that are repeated at low, medium and high frequency during the entire competition, whose effectiveness can be evaluated using the parameters of:
 - time, corresponding to the number of cycles of movement achieved in an established time period;
 - space, corresponding to the number of cycles completed over a preset distance;
 - effectiveness, corresponding to the maximum ratio between the characteristics of the subject, performance power and execution. Examples in sport are the movements for running, swimming, etc..

- b. *Principally combinatorial activities* (Scotton C., 1983), characterized by the combination of different motor movements necessary for the execution, whose effectiveness can be evaluated using the following parameters:
- functionality of the various movements for the final result of the execution;
 - time of completion of the motor combination;
 - distance travelled through the combination of movements.

Examples are the floor exercise in gymnastics, synchronized swimming, the triple jump, etc..

Movement activities, according to **the quantitative characteristics of the performance required** can be classified into:

- ✓ *Activities to execute a single movement* (Schidmt R.A., Lee T.D., 2005), corresponding to those activities whose performance is the execution of a single movement or gesture. In sports, these include the initial phase of archery, shot-put, etc..
- ✓ *Single execution of a motor combination activities* (Farrell, JE, 1975), consist of those activities whose performance consists of different linked movements. In sports, these include the approach in the high jump, the run-up in the triple jump, etc..
- ✓ *Repeated execution of the same movement activities* (Aune, T.K. et al. 2008), corresponding to those activities where the performance involves repeating the same movement or unique link between repetitions of the same movement. In sport, there are several examples, a series of the same blows in boxing, the pedal in cycling, the strokes in swimming, etc..
- ✓ *Single execution of repetition of various movements activities*, (Schidmt R.A., Wrisberg C.A., 2008), corresponding to those activities in which the moment of execution involves the link between the repetition of different movements. In sports, the examples include a continuous series of repeated, different blows in boxing, the pedal in cycling under different conditions (standing and sitting), etc..

Movement activities **according to the quality characteristics of the performance required** can be classified into:

- ✓ *Low expected demand activities* (Schidmt R.A., Wrisberg C.A., 2008), characterized by execution forms subject to a low percentage of variability of the responses. These movement activities in a performance may be subject to a small number of problematic situations which are highly predictable using a small number of variables on which to build. A perfect example is sprinting, which can be linked to the execution variability of the start, the frequency of the race, the width of the stride, acceleration and thrust.
- ✓ *High expected demand and high execution variability activities* (Schidmt R.A., Wrisberg C.A., 2008), characterized by the large number of variables required by the problematic situations whose characteristics require the use of combined motor skills, integrated and targeted to the specific problem to be solved. Examples are the movements from the games of football, basketball, etc..
- ✓ *High reproductive demand activities* (Schidmt R.A., Wrisberg C.A., 2008), characterized by low variability execution, with the characteristics requiring to accurately reproduce actions that have already been executed. The variability may depend on execution error or differences of reproductive movements, both positively and negatively. An example is springboard or platform diving.

Discussions and conclusions.

The need to collocate the activities into macro-categories allows the users to have immediate information on the common characteristics of that group as well as possible differences with groups that have similarities in order to avoid the problems generated by the wide variety and complexity that characterizes systemic motor activities and sports.

Through a classification that takes into account several specific variables such as conditional, temporal and spatial aspects, a theoretical framework has been created for studies aimed at investigating motor activities and sports.

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