

## ANALYTICAL STUDY OF MOVEMENT QUALITY AND MOVEMENT ECONOMY

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**DOI No. – 08.2020-25662434**

### *Abstract*

*As human beings, we move our bodies to express our needs, needs, feelings, thoughts, and beliefs. Ultimately, how well we go - and how far we go - determines how well we interact with the world in establishing our purpose in life. The wellness of movement depends upon the thinking, feeling and daily living. Movement quality is an indicator of the economic progress of a particular movement in terms of judgment given by a professional observer. The computer model can contain three main components: Biomechanical Performance, Shape, and Intrapersonal Synchronization and includes various features such as condition control, coordination, balance and flexibility. Movement and movement control emerges as an economic response to labor / environmental problems. The current study analyzes various aspects of the quality of economic mobility and their responses related to close-kinetic and open-kinetic chain operations.*

**Keywords:** *Movement Quality, Movement Economy, Closed Kinetic Chain and open Kinetic Chain.*

### INTRODUCTION

Movement is the basis of life. One of the most common aspects of the day-to-day running of a motor vehicle business is the tendency to complete a task with very little expense. Economic movement is what achieves the goal of work in the shortest possible time and the low energy consumption of a given task requires mental structures, the sector can now expand and develop continuously, with the aim of creating a cohesive vision of physical activity (1).

As human beings, we move their bodies to express our desires, needs, feelings, thoughts and ideas. Ultimately, how well we travel - and how far we travel - determines how much we interact with the world and shape our larger purpose in life. Related to all function and process in the body. Bernarr Macfadden (2) recommended diet, lifestyle and exercise to maintain body culture. He was a great influence on the pioneer of today's exercise industry (3).

After birth within a few years, most babies are fully functional, independent, gaining balance control, performing a wide variety of motor tasks and learning new skills that require a high level of control and vision (4).

Later and efficient and well-functioning vehicle building blocks were placed for the first two to three years after birth when the ability to stabilize a stable background, control, balance and coordination and plan and perform the desired action. The child uses movements to perform and replicate a variety of activities that will also promote the development of effective coordination of muscle action, strength, flexibility and endurance. A clear understanding of the developmental changes that occur during this period is essential if one wants to see problems beyond the expected range of normality and begin appropriate interventions. In the early stages of life many changes in posture and movement appear to follow a broad but orderly and understandable sequence that can be largely due to dependence on the maturity of the neural

system (5).

However, inherited physical characteristics as well as personal characteristics, physical growth and body composition and maturity, as well as natural experiences influence the mode of development and performance. Thus within this broad series of development there is a large proportion of variance that grows with age (6). Even within the same infant, various aspects of motor development may occur at different rates, one that progresses faster or slower, starting earlier or starting later.

The degree of movement is a measure of the general excellence of the recognition of a particular movement according to the judgment given by a professional observer. The conceptual calculation process consists of three main components: Biomechanical Efficiency, Shape, and Intrapersonal Synchronization and includes several components such as control of posture, coordination, and balance. The degree of movement is a measure of the general excellence of the recognition of a particular movement according to the judgment given by a professional observer. The conceptual calculation process consists of three main components: Biomechanical Performance, Shape, and Intrapersonal Synchronization and incorporates a number of features such as position control, coordination, and balance. The level of movement can depend on a variety of other functions as well. dance (e.g. classical and contemporary ballet dance (7-8), sports, arts, yoga, tai-chi, and music performance (9). Automatic motion quality checks may contain many important applications. It can be used, for example, for additional training. With the help of technology, small defects can be detected that can reduce performance or even cause sports injuries.

In addition, the development of information on the quality of movement can contribute to research in understanding the aesthetic experience from a computer perspective, contributing to artistic languages, and many other scientific fields. As a result, there is an urgent need to develop computer-based systems that automatically monitor the quality of physical activity and sports (10).

A number of factors may be involved in assessing a visual object, such as cultural background or an observer's experience. Physical activities can have different purposes, such as narrative, articulation, and physical activity. When teaching new exercises to students, the exercise trainer does it, emphasizing the difficult parts (e.g. by reducing their execution) to better communicate their details and difficulties. When learning how to play a musical instrument, students learn the movements needed to play a well-functioning body (e.g., pressure buttons, tread pedals) and how to convey emotions, for example, with auxiliary touches (11).

In addition to the variation in the objectives and definitions of physical activity, each movement or sequence of movements can be assessed in terms of its quality judgment, i.e., Excellence of motion quality according to Biomechanical Efficiency, Shape, and Intrapersonal Synchronization. Biomechanical performance refers to whether a movement is effective in terms of biomechanical principles e.g., reducing jerk (12) or a three-dimensional force law (13). Biomechanical efficiency helps prevent injury and energy loss. In sports, effective biomechanically approach theoretical maximal performance (in terms of velocity or force) also increases energy efficiency. In the current article of the analysis article is made to discuss the various modes of movement namely the quality of travel and the economy of travel.

The current research-based article discussed a different view of the quality of movement and the economics of movement to make any kinetic series open and open.

### MOTIVATIONAL CONCEPT

Communicating the concepts of knowledge and expertise

- (1) By being active,
- (2) Describing human experiences, contemplating experiences and
- (3) Thinking, ideas, combined with Important learning physiotherapy (14).

The desire to discover basic concepts, such as the quality of movement, physiotherapy, and at the same time share information with students and teachers, provides a unique opportunity to develop a remarkable understanding of human movement and function. Such a state of learning movement enables students to use the mobility resources available in a different context.

Thinking and demonstrating the process of becoming more familiar with the content, process, and efforts of one's efforts to add meaning to the experience (15-16). Cognitive learning is re-evaluated when thinking is found to be unfounded (16-17) Demonstrative relationships are the most important factor for physiotherapy students in learning (18). Reflectivity is important in learning processes of human movement (19-21).

Demonstrations are important in learning programs for Movement can be divided into three categories: effort, time, and flow. Each aspect is important and related to the other. Learn more about each aspect and how they relate to the whole movement (25). Basic Movement Skills Development Process A phase of motor development skills that can be discussed with four heads, the following (26): Body parts awareness (eg arms, legs, elbows, knees, head, etc.) physical condition (e.g. simple, folded, wide, narrow, twisted, flexible, unbalanced etc.) Physical action (eg twisting, stretching, rotating, twisting, pushing, pulling, etc.), back, side, up, down) levels (e.g., up, middle, bottom) routes (e.g. curved, straight, curved planes) (e.g. horizontal, horizontal, vertical) Attributes of effort time (e.g., speed, slow motion) energy (e.g. firmness, light, light) flow (e.g. ease, binding to match, mirror, follow, lead) objects (e.g., near) , far, in, out, out, over, under, around, in, in, closed, above, below) other (e.g. movement in relation to music, and nature).

Arnold identified three ways of movement learning: Learning about movement, learning through movement and learning in movement (14-15). Learning through movement is highly related with teaching physical activities. It uses movement in learning is a way for achieving goal, so far as skill learning is concerned. Movement learning emphasizes development of motor qualities as a process to be experienced through learning by doing of a person (20,21-23). He emphasizes the connection between learning being in movement and its purpose within education (21).

### Movement Quality

The use of different levels of energy for performing a movement is often described as dynamic quality to movement. Specifically, in case of dance one can find six dynamic qualities: sustained, percussive, swinging, suspended, collapsed, and vibratory (24).

- Sustained = slow, smooth, continuous, even
- Percussive = sudden, sharp, choppy, jagged
- Swinging = sway, to and fro, pendulum, under curve

- Suspended = stillness, balance, high point
- Collapsed = fall, release, relax
- Vibratory = shake, tremble, wiggl

Another way we can express the movement quality such as;

**A) Running**

**B) Jumping**

**C) Catching**

**D) Climbing**

**E) Twisting and**

**F) Rolling**

These are the basic forms of activities by which the movement quality depend for normal individuals.

Physical Development and Movement is related with experiencing and developing a range of fundamental movement skills that depends co-ordination, locomotion, control, balance, and manipulation.

The fundamental movement skills to be developed through Physical Education include:

- Locomotors and non-locomotors skills — rolling, balancing, sliding, jogging, running, leaping, jumping, hopping, dodging, climbing and skipping etc.
- Object control skills —throwing, catching, kicking and striking etc.

Movement can be broken into three factors: effort, time, and flow. Each factor is important and is related to each others. Read on to learn about each factor and how they relate to movement as a whole (25).

### **BASIC MOVEMENT SKILLS DEVELOPMENTAL PROCESS**

Basic movement skill developmental stage can be discussed into four heads, which are as follows (26):

#### **1. Awareness of Body**

- Parts of the body (e.g., arms, legs, elbows, knees, head etc)
- Shape of the body (e.g., stretched, curled, wide, narrow, twisted, symmetrical, asymmetrical etc)
- Bodily action (e.g., flexion, extension, rotation, swing, push, pull etc)

#### **2. Awareness of Space**

- Location (e.g., personal and general space)
- Position(e.g., forward, backward, sideways, up, down)
- levels (e.g., high, middle, low)
- pathways (e.g., curved, straight, combination)
- planes (e.g., horizontal ,frontal, sagittal)

#### **3. Qualities of Effort**

- time (e.g., fast, slow)
- force (e.g., strong, light)
- flow (e.g., free, bound)

#### **4. Relationships**

- person (e.g., alone, with partner, with group, meet, part, match, mirror, follow, lead)
- apparatus (e.g., near, far, in, out, over, under, around, through, on, off, above, below)
- other (e.g., moving in relation to music, to the environment)

Table-1 Movement skill associated with biomechanical Principles

Movement Category	BASIC MOVEMENT SKILL	BIOMECHANICAL PRINCIPLES	EXTENSION ÷ as applied to various sports, games, alternative environments, rhythmic activities
Transport Skills	<ol style="list-style-type: none"> <li>1. Running</li> <li>2. Jumping</li> <li>3. Hopping</li> <li>4. Galloping</li> <li>5. Skipping</li> </ol>	Centre of gravity and laws of motion as they apply to locomotion	<p><b>Skills:</b> leaping, sliding, step-hopping, rotating, dodging</p> <p><b>Suggested Activities:</b> tag games, track and field, folk dance, hopscotch, jump rope, gymnastics, expressive movement</p>
Manipulation Skills	<ol style="list-style-type: none"> <li>6. Rolling</li> <li>7. Underhand throwing</li> <li>8. Overhand throwing</li> <li>9. Striking</li> <li>10. Kicking</li> </ol>	Law of force and motion as it applies to sending skills	<p><b>Skills:</b> side arm throwing, passing, heading, tossing, dribbling with feet</p> <p><b>Suggested Activities:</b> baseball, volleyball, tennis, football, bowling, badminton, floor hockey, soccer</p>
	11. Catching	Absorption of force for receiving skills	<p><b>Skills:</b> trapping</p> <p><b>Suggested Activities:</b> baseball, ball games, frisbee, juggling</p>
	12. Bouncing	Laws of force in accompanying skills	<p><b>Skills:</b> dribbling using hands, controlling the ball or object</p> <p><b>Suggested Activities:</b> basketball, rhythmic sportive gymnastics, team handball</p>
balance Skills	<ol style="list-style-type: none"> <li>13. Static</li> <li>14. Dynamic</li> </ol>	Laws of motion and balance for body- management skills	<p><b>Skills:</b> static balances, landings, springs, swings</p> <p><b>Suggested Activities:</b> gymnastics, station activities, dance, cross- country skiing, cycling</p>

From table-1 we can observe the different movement skills associated with the application of biomechanical principles with different extensions.

It is hypothesized that movement quality interaction could promote more explorative and expressive usages. This approach can be implemented in various interaction techniques. These can vary significantly depending on the choices of (a) the body part (b) the types of movement qualities involved, (c) the modifications of the movement qualities and (d) the interaction between feedback and display. The framework actually depended upon technological approach and performance interaction (see Figure 1); it depends on the intersection of three different fields: i.e. Dance, Computer-based Recognition and Interaction Design (27).

The structure actually is depending on the technology, the approach and the performance of the interaction (see Fig. 1), and it is up to the junction of the three-way dance, computer, diagnostic,

and interaction design (27). The structure of the movement is of the quality as well as a form of interaction. Ride on the economy: The Economy of movement of the time, place and movement-perfection. Make repetitive tasks easier, more efficient, and more effective.

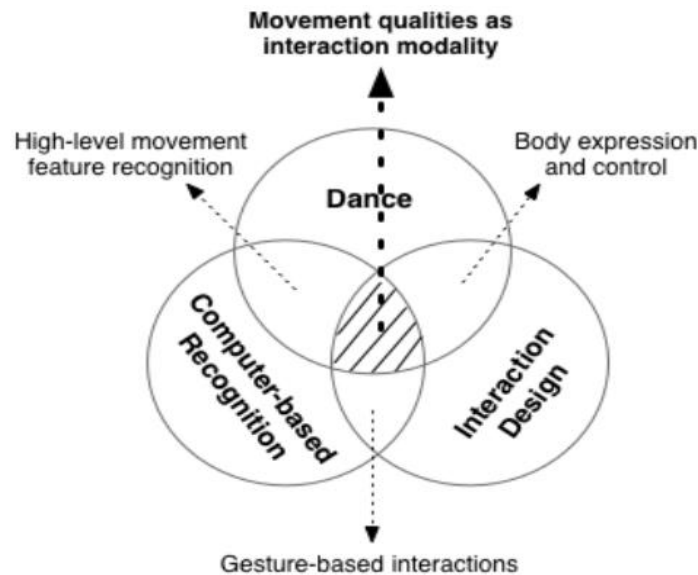


Figure 1. Framework for movement quality as interaction modalities.

### MOVEMENT ECONOMY

The movement economy comprises of time, space and perfection of movement. They make repetitive tasks easier, more efficient and more effective. It is based on biomechanical principles and metabolic responses of our body.

The benefits of movement economy include:

1. It grows the ability of group of muscle to exert systematic contraction, relaxation, stabilize and neutralize the motion
2. Extended working capacity of muscles.
3. Reduces exhaustion or fatigue of a particular group of muscle after repetitive work..
4. Decreases time and energy.
5. Improve motor skills.

Before defining economy, it is useful first to define the related term *efficiency*, because some of the studies reviewed are concerned with both efficiency and economy and it is easier to explain economy, having first defined efficiency. Efficiency, as understood by exercise physiologists and sports biomechanists, has a number of problems of definition cover in detail here. It is advised to consult detail reviews of movement efficiency, which has previously done by Cavanagh and Kram (28-29), for a detailed exposition. For the present critical analysis, efficiency is defined as the ratio of mechanical work done to metabolic energy expended. It can be expressed as a percentage, depending to the following formula:

$$\text{Efficiency (\%)} = \frac{\text{Mechanical Work Done}}{\text{Energy cost of work}} \times 100$$

The numerator of the efficiency equation will be examined first. In performing any motor

activity, mechanical work is done in order to meet task demands.

For understanding everyday motor skills, the concept of economy is more useful than is efficiency, because it is often impossible to accurately measure the mechanical work done. Economy can, therefore, be defined as the metabolic energy expenditure to perform certain task. It was indicated above that heat energy can be calculated on the basis of the maximum volume of oxygen consumed and formation of ATPs food metabolism (30).

### A constraints-based framework for movement economy

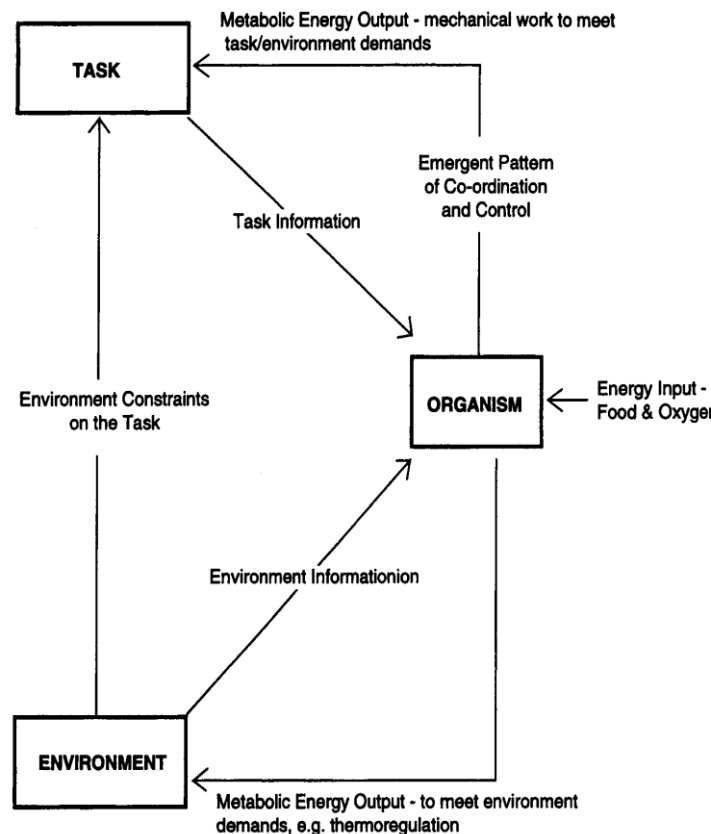


Figure 2. A constraints-based framework of expenditure of energy through metabolism and motor coordination and control (30).

The structure of the ride and the economy, which is based on the limitations / Figure 2. On the basis of the constraints, and the structure of the consumption of energy, metabolism, and motor co-ordination and control (30). In figure 2, is based on a conceptual framework for the interaction of various constraints, which we have described above, and in order to show how they affect the ride to the economy. The movements of the body can be characterized as the result of the interaction of the rules and duties of the limitations of the human body.

In addition, it is assumed that the adoption of the process is focused on the minimum energy-sharing criteria, so that the constraints of the task and the environment are to be met with a minimum metabolic cost. In addition to the internal assistance of the information on the condition of the body, the mission and the surrounding area also provides support for the body's energy and metabolism. The control and coordination of movements, to act as an economic response to the limitations of the job or the environment.

### **Factors of movement economy and quality of movement:**

- Flexibility,
- Mobility
- Stability
- Kinesthetic Scenes
- Proprioception
- Principles of Biomechanics

### **Flexibility:**

Flexibility is the absolute ROM (range of motion) in a joint or system of joints, and the length of muscle that crosses the joint involved (31). It directly correlates with ROM and mobility, but does not directly correlate with the other fitness components such as strength, balance, and coordination etc. Range of motion is the maximum angle of the joint which the participating bones can move, while mobility is the ability of a point to move without restriction.

### **Mobility:**

Though flexibility and mobility looks like similar, they are not alike. Mobility within a joint (known as an articulation) is the degree of movement before restricted by the surrounding tissue such as tendons, muscles, and ligaments through neural mechanism (32). Mobility may consider the range of uninhibited motion around the joint. High degree of mobility allows a person to perform movements without restriction whereas; high degree of flexibility may not have the strength, balance or coordination to execute the same movement pattern. Good flexibility does not always denote good mobility (33). Depending upon the extent of mobility, it can be of two types, viz. hyper-mobility and hypo- mobility.

### **Stability:**

Mobility relates to movement while stability relates to restriction of movement. Stability can be consider as the ability to maintain control over joint movement or position by synchronous actions of surrounding tissues and the neuromuscular mechanism (34). Joint stability depends largely on the size, shape, and arrangement of the articulation (the position of joints and cartilage), the surrounding ligaments and muscle tone. Injuries including ligament tears and sprains can often lead to stability issues in the joint.

### **Kinesthetic sense:**

Kinesthesia is the perception of bodily movements. Without depending upon five senses it able to detect changes in body position and movements. Kinesthetic sense is detected by involving physical activity such as walking, running, jumping, swimming, and anything that requires bodily movements. Kinesthesia is one type of sense that is focused and deals with internal events of the body. With the help of this sense one is able to detect stimuli outside of oneself, the sense of kinesthesia allows to know the position of the body and to detect changes in position (35).

### **PROPRIOCEPTION**

Proprioception or awareness of body allows us to detect the limb position and joint motion when eyes are closed. Proprioception has distinct ascending pathways in the spinal cord and



sense organs. Unlike simple sensations, however, full perception requires a good functioning of contra-lateral cerebral cortex; which is the way to resembles cortical sensations. Proprioception is the sense of awareness of the body in space. The stresses placed upon the body by alteration of posture and movement causes the use of joint position sense and joint motion sense to respond to Proprioception encompasses three components, known as the 'ABC of proprioception'. These are: balance, coordination and agility. Agility is the ability to control the change of directions of the body or body part during intensive movements, while balance is the ability to maintain equilibrium by placing the line of gravity of the body within the body's area base of support. Coordination is the gracefulness of an activity (36) or the ability to move different parts of body together scientifically and easily.

### CLOSED KINETIC CHAIN AND OPEN KINETIC CHAIN

- A. **Open Kinetic Chains:** A kinetic chain is considered "open" when the part of the moving body (specially a limb) is loose in space. In other words, without pressing against a surface the limbs are free to move. This allows a muscle or muscle group to act in independently or isolation.

#### Characteristics

Open kinetic chain exercises have many things in common.

- They're characterized by rotation at the primary joint along with rolling and other types of movement.
- Usually, only one portion moves at a time (for example, while extending the lower arm from the elbow, the lower arm moves but the upper part remains stationary.)
- Only the muscles associated with one joint are involved.

### CLOSED KINETIC CHAINS

A kinetic chain is considered "closed" when the applied body part are (again, usually limbs) fixed against an unrelenting and hard surface.

- When the body part is pressed against a fixed surface, resistance is sent back into the trunk. The limbs through which the resistance moves make up the components of the chain for that particular movement.

#### Characteristics

Characteristics of closed kinetic chain exercises may include:

- Movement occurring at multiple joints , multi-joint axes and planes
- Stress patterns are linear in nature
- Different segmental simultaneous movement
- Promote joint stabilization.

As multiple segments are in motion, multiple muscles are contract at the same time in order to stabilize, neutralize and control movement across multiple joints.

### CONCLUSION

In all human movement domains, there are benefits associated with developing the means to explain, predict, and control human behavior in order to achieve greater economy. In the home, in the workplace, and in sport, greater economy of movement allows either more to be done in a given time or the same task to be completed with metabolic energy to spare. In all motor skills, therefore, a matter of advantage for those who are able to promote better movement economy. Movement quality and movement economy is closely related with graceful close and open

kinetic activities. Conceptual framework of quality of movement and movement economy critically discussed in order to better understanding and implementing close kinetic, open kinetic and combination types of activities.

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