

Bhan

SCOTT RESEARCH FORUM (SRF)

(A Multi Disciplinary Researchers' Forum)

Proceedings of the Seventh All India
Conference of SRF

MARCH 13, 2010

VOLUME II

SCIENCES



Scott Christian College (Autonomous)

(Reaccredited with 'A' grade by NAAC)

Nagercoil - 629 003

Proceedings of the Seventh All India Conference of SRF

PART II - SCIENCES

Published by

Scott Research Forum
Scott Christian College (Autonomous)
Nagercoil - 629 003, Tamil Nadu, South India.
Phone: 04652 - 231807
Fax: 04652 - 229800
E-mail: scottnl@sancharnet.in

BIOMECHANICAL APPLICATION OF NETBALL SHOOTING

¹BHAVANI.AHILAN and ²V. GOPINATH

*Department of Physical Education and Sports Sciences, Annamalai University,
Annamalai Nagar, Chidambaram, Tamil Nadu.*

Abstract

Bio mechanics is a term formed by Combining the words 'biology' and 'mechanics' and thus deals with the principles and methods of mechanics applied to the study of the structure function of biological system. Bio mechanics is a science which deals with the application of mechanical laws to the leaving structure especially to the loco motto system of the human body. Sports bio mechanics is that area of study which is concerned with an application of the mechanical laws of nature to sports skill, and with the objective measurement of these skills in physical terms. The core of Sports bio mechanics is based on Newton's three laws. The insight that sports bio mechanics can give to the netball coach can best be developed within a netball context. Netball is played between two teams of seven players. The skills needed in netball include landing, pivoting, changing direction, stopping, starting, throwing, catching, getting free, marking, intercepting, and shooting. Successful shooting is perhaps the most important aspect of the game of netball, since without it the game cannot be won. Success in shooting comes from the careful execution of a precision skill. There Successful shooting is perhaps the most important aspect of the game of netball, since without it the game cannot be won. Success in shooting comes from the careful execution of a precision skill. There are only two players on a netball team who can shoot goals: the goal attack and the goal shooter. All of teams scoring come from these two positions. The 'Australian high release' and the Caribbean shot' are most successful shooting techniques in netball. The principles and techniques of biomechanics can be applied to the skills of shooting in netball to give an insight into their performance.

Key words: Netball, Shooting, Bio mechanics.

Introduction

Biomechanics is a term formed by Combining the words 'biology' and 'mechanics' and thus deals with the principles and methods of mechanics applied to the study of the structure function of biological system. Bio mechanics is a science which deals with the application of mechanical laws to the leaving structure especially to the loco motto system of the human body. Bio mechanical analysis is the process of identifying the internal as well as the external forces acting on human body during the execution of a movement and the effect or effects produced by such forces.

Sports Biomechanics

Sports bio mechanics is that area of study which is concerned with an application of the mechanical laws of nature to sports skill, and with the objective measurement of these skills in physical terms. Sports biomechanics can make two important contributions to the analysis of individual sports skills. Firstly, the human body can be considered as a multi-segment object, as obeying the mechanical laws of nature.

Secondly, sports biomechanics offers the methodology for making objective measurements of sports skills. The two main techniques with

which sports biomechanics is concerned for the provision of information are cine or video film analysis and force measurement. From Newton's laws of motion we know that objects will move only under the action of forces, and so if we can measure these forces we can predict the resulting movement that will occur. Cine or video film can give us a record of the movement that has occurred and allow us to make measurements of velocity, acceleration, position and angles. It can also permit us to time events or components of events and look at their sequence of occurrence. These two techniques allow a check to be made on the application of nature which enables us to make judgment concerning the effective performance of skills.

The core of biomechanics is based on Newton's three laws. Laws can be applied in their linear and angular forms, and can be extended by mathematical manipulation to cover the concepts of conservation of momentum and angular momentum, and the conservation of mechanical energy.

Game of Netball

Netball-today the most popular women's sport in Australia and New Zealand, and gaining an ever-increasing following in the United Kingdom, the Caribbean, Asia and Africa. When the students of Madame Osterberg's college of physical training at Hampstead, England, were first introduced to netball in 1895. The first netball rules were published in England in 1901.

Netball is a fast, enjoyable and skillful game in which people of all ages and levels of ability may participate. Netball is played between two teams of seven players-three centre court players (centre, Attacking centre, Defending centre), two attackers (Shooter and Attack), and two defenders (Defence and Goal Keeper)

The game involves a variety of ways of passing the ball successfully from one team member to another, so that a goal may be scored

from within the shooting circle by throwing the ball through the ring. All seven players in the team have an equal part to play in achieving this aim, and some stage will need to defend and to attack. This obviously demands a variety of skills and the ability of each player to be selective in the use of them, so as to produce a flowing, energetic and stimulating game. The players need to think quickly, as they are required to make speedy and accurate decisions on the ever-changing situations presented to them. The skills needed in netball include landing, pivoting, changing direction, stopping, starting, throwing, catching, getting free, marking, intercepting, and shooting. The aim of the study is to understand about the netball shooting and peak performance in netball shooting through biomechanical application.

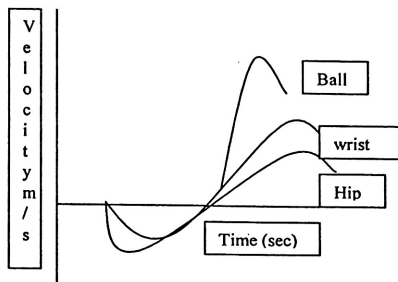
Netball Shooting

Successful shooting is perhaps the most important aspect of the game of netball, since without it the game cannot be won. Success in shooting comes from the careful execution of a precision skill. There are only two players on a netball team who can shoot goals: the goal attack and the goal shooter. All of the teams scoring come from these two positions. When the ball comes into the shooter's hand the entire court focuses on the outcome. Being a shooter is not only a very responsible position, it is very appealing because of the focus these players get throughout the match.

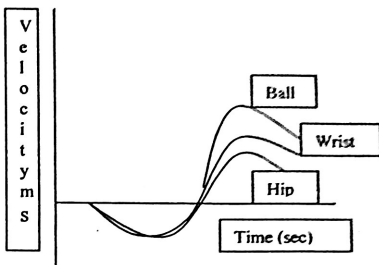
The 'Australian high release' and 'Caribbean shot' are the most successful shooting techniques in netball.

Shooting Action

The typical shot is one in which the feet are comfortably placed apart; the knees are flexed with the ball held in the dominant hand above the head. The throw is initiated by the extension of the legs with the trunk held firmly, and is concluded by a quick extension of the arm and a flick of the wrist. The importance of each of the



Long throw
Fig-i



Short throw
Fig-ii

actions, and how do they contribute to the final ball velocity. Measurements made on an international player of the vertical velocities of the hip (produced as a result of leg extension), the wrist (produced as a result of arm extension), and a ball (produced as a result of wrist flick)

For a long shot taken on the edge of the circle and short shot taken under the posts. From these results several points can be made concerning the execution of the skill.

- ❖ The similarity between the curves of hip and wrist velocity over the leg flexion or preparation phase indicates that only the legs are actively involved in this.
- ❖ In the propulsion phase, the legs first of all being to extend, moving the bulk of the body, and then extension begins. The difference between the two curves over phase is an indication of the contribution that arm extension makes to ball velocity (about 25%) for long throw.
- ❖ Both wrist and hip velocities peak at the same time, indicating that one velocity is building on another, which is an indication of effective performance.

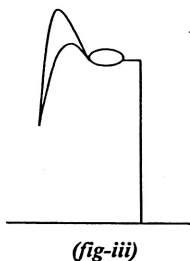
- ❖ The contribution made by wrist flexion in order to increase the ball velocity is in both throws quite marked, and indicates the importance of this action. Maximum ball velocity occurs at a slightly later time than maximum hip and wrist velocity, and contributes over 35% to the velocity of the throw.
- ❖ For producing maximum velocity, the delay in wrist flexion would be considered as poor performance. However, the nature of this skill should be remembered: it is one of precision. The majority of velocity is built up by the legs and arm, but it is the fingers of the hand which give the final fine control to the ball direction before release as well as adding additional velocity. It is advantageous to delay wrist flexion to allow the possibility of modification of ball-release velocity.

Coaches should be aware of the importance of each component to the shooting action, and they should endeavour to develop practices which serve to draw players' attention to them. Of particular importance are the variations in shooting pattern which occur as a result of length of shot, and the role of wrist flexion in both propelling and controlling ball-release direction.

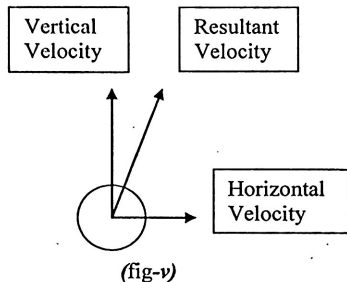
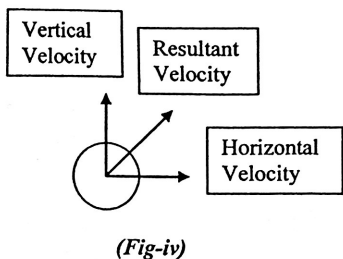
Ball trajectory

The ball to be projected higher into the air, one good reason for this is to make sure the ball clears the defence. Another good reason is to increase the effective target area into which the ball is directed. This can be illustrated by considering the area which is swept out by the ball as it travels in two different trajectories. In the case of low trajectory there is no margin for error for a clear entry into the net, while for a high trajectory there is much greater margin of error.

The direction in which a ball will go at release will depend on its horizontal and vertical velocities. If we wish to increase the height of the trajectory then we must increase the vertical velocity component. This will in effect increase the angle of projection.



By increasing the height of the shot the angle at which the ball enters the ring can be increased. This gives a greater margin for error for clear entry of the netball into the net.

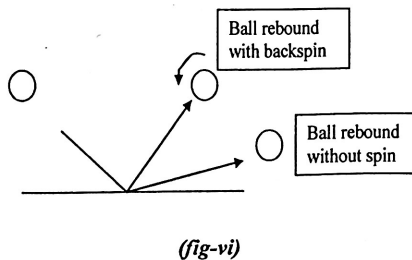


Velocity components of release and their relationship with release angle. An increase in vertical velocity in (v) increases the release angle and the resultant velocity.

The vertical component of velocity can be increased by a more vigorous leg, arm and wrist action in the vertical direction. From the results of figures i,ii that wrist flexion is likely to be the most easily utilized action for this, although both leg and arm actions should also be used to preserve the precision of the skill.

Ball Spin

The wrist flick used in the shooting action naturally tends to produce backspin on the ball. When shooting a goal, the rear rim of the net is the target area so that, when it hits the rim, the ball will have a tendency, if it has backspin, to roll back into the net.



The rebound can be affected by spin. Backspin can cause the ball to increase its angle of rebound from a solid surface.

Conclusion

The principles and techniques of biomechanics can be applied to the skill of netball shooting to give an insight into their performance. While, based on such analyses, generalization can be made which form a sound basis for the generation of coaching points, it should be remembered that all individuals vary in their method of performance. It is the art of the coach to such generalization to specific individuals.

Recommendation

The insight that sports biomechanics can give to the netball coach and player can best be developed within a netball context. Selected netball shooting skill can be taken in isolation and their execution viewed in biomechanical skill.

Shooting is one of the most important skills and goals win games.

Reference

1. Crouch Heather.(2003). The Netball Coaching Manual, United Kindom, A&C Black. London.
2. Shakespear Wilma.(1997). Netball-Steps to Success, United States of America, Human Kinetics.
3. Know the Game Netball, All England Netball Association, 1951.
4. Shaw Dhananjoy.(1998) Bio Mechanics and Kinesiology of Human Motion, India, Khel Sahitya Kendra.
5. Shaw Dhananjoy. (2000). Mechanical Basis of Bio Mechanics, Delhi, Sports Publication.