Unit Assessment – Task 3 Practical Assessment (45%)

Biomechanics – Comparative Analysis: Kicking Movement of Youth Football Player

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Understanding Motion and Human Movement (SC222)

Raul Landeo Due: Week 13, 16/5/08

Abstract

The purpose of this analysis was to compare the kicking motion between a standing kick and a running kick frequently used in the sport of football (soccer). A number of conclusions can be drawn from the quantitative data produced by the computer analysis protocol, Swinger, on the biomechanics of this movement. To reach a more concise conclusion, qualitative data has also been considered in this analysis. It is important to highlight the muscles/joints used in this movement, the range of motion, internal and external environment, and level of ability of the subject used for the task.

To begin this comparative analysis of a youth football player, the subject was asked to perform the skill in two parts, standing and running. On Tuesday, 18 March 2008, arrangements were made to digitally record the subject. The subject's name is Michael Kenyon, aged 14 with two years experience playing football, which indicates a low level of familiarity with the game.

The standing kick was to be performed with Michael standing over the top of the ball, planting his non-kicking foot (in this case his left) firmly on the ground beside the ball. Then, lifting the kicking foot (his right) backward to gain force and power, and then swing forward to strike the ball using the in-step of the foot.

The running kick was to be performed with the same basic technique as the standing kick, with the placement of the non-kicking foot and use of the in-step in the same way. However, the difference was the movement toward the ball was not static but rather in a running motion producing force and momentum at a greater velocity.

Post the collection of data, two video files were produced and uploaded to Swinger. The shoulder, hip, knee and ankle movements were plotted producing quantitative data in which the "Joint Trajectory" and "Joint Velocity" were compared. The focal point of this analysis was to compare the hip, knee and ankle movements with the objective to measure the differences between the two kicks.

The results were both interesting and valuable in assessing the potential weaknesses in the movement. The joint trajectory results proved there was greater movement and momentum in the running kick than there was in the standing kick. There was little hip flexion and knee movement in the standing kick, whereas the running kick displayed greater movement in the hip and knee. Interestingly, the kicking foot produced more backswing in the standing kick than in the running kick. It was clear that the kicking foot did not produce the force expected in the running kick when compared to the standing kick.

"Biomechanics can be defined as the science that examines internal and external forces acting on the human body and the effects produced by these forces" (Sewell, Watkins & Griffin, 2005, p.191). The expectation was that there would be a marked difference in the force produced between Michael's two kicking movements. This was clearly not the case.

One could draw the conclusion that Michael was unable to successfully transfer momentum in the running kick and therefore did not produce a greater difference between that and the standing kick. This in part, contributed to the joint velocity results, which showed minimal differences between the two kicks. The joint velocity data proved greater hip flexion in the running kick (this was due to the running motion) when compared to the standing kick. However, there was not a significant difference in the knee and ankle movements.

The correct movement involves priming the thigh and leg during backswing, rotation of the thigh and leg laterally and flexion of the hip, deceleration of the thigh and acceleration of the leg, and the follow through (Howe & Hanchard, 2003). It would be suggested that eccentric or plyometric training would improve the kicking motion. Exercises which include bounding, hopping and jumping actions could improve the transfer of momentum to successfully execute the skill in one fluid motion. The results further display that technique is critical in producing the desired outcome of the skill.

Reference List

Howe, T., & Hanchard, N. (2003). Functional anatomy. In T. Reilly, & A.M. Williams, A.M. (Eds.), (2003). Science and soccer (2nd ed.) (pp. 9-20). Abingdon, Oxon: Routledge.

Sewell, D., Watkins, P., & Griffin, M. (2005). Sport and exercise science: An introduction. London: Hodder Arnold.