A Biomechanical Analysis of the Weight Training Squat
Using Dartfish Motion Analysis Software

Introduction

Wesley Kephart was enrolled in the course Analysis of Movement, KIN 477, and is one of the co-requisite labs, KIN 478, during the Fall 2009 semester term. His course long-term project, A Biomechanical Analysis of the Weight Training Squat, was completed in the lab portion of the course. This project required the comprehension and utilization of various biomechanical principles, which were learned in the lecture portion of the Analysis of Movement class. The biomechanical principles, which are discussed in this paper, are derived from Newton’s Laws of Motion and assist us to understand the forces that produce and affect movement. The unique aspect of this project is that he was able to scientifically analyze the performance of the Weight Training Squat using the Dartfish Motion Analysis Software, which is the latest and most sophisticated computer video analysis software being used. This software is used by researchers, teachers, coaches, physical therapists, occupational therapists, and sports medicine specialists for detecting errors in a person’s movements, calculating angles, timing, distances, and velocities, and for providing feedback to the performer through the utilization of drawing tools and the production of a media book on a DVD. Stephen F. Austin State University is among an elite group of universities in the United States that has this sophisticated equipment.

Methods

A videotape of the weight training squat was created requiring strict instructions.

• The video was imported requiring strict instructions. into the Dartfish Motion Analysis computer software.

• The performance was then critically analyzed by utilizing the drawing tools (see pictures below).

• Conclusions were drawn by applying biomechanical principles and practical knowledge of weight training kinesiology (see comments below pictures).

• Results were provided to the performer by utilizing the drawing tools to illustrate errors and producing a DVD media book.

Abstract

During the Fall 2009 semester, Dr. Cole and her graduate assistant David Ware supervised several students in a term project in which the students analyzed a movement of their choice using the latest computer version of the Dartfish Motion Analyis Software. In this paper, a weight training squat was analyzed because it is considered to be the “king of all lifts”, but it’s frequently performed incorrectly.

The biomechanical analysis involved sixteen (16) subjects, who performed the squat in the best of their ability. The subjects were instructed in warm-up, stretching, and understanding the goal of the squat. They were then instructed to stand, hold the barbell vertically above their head, and squat down. The subjects were instructed to perform the squat three times.

After a careful review of the data, the details of the subject’s movements were analyzed and evaluated for strengths and weaknesses. The investigator then reviewed and evaluated the data and compared the movements of the subjects to each other to determine the average score. The investigator then reviewed the data and compared the movements of the subjects to each other to determine the average score. The investigator then reviewed the data and compared the movements of the subjects to each other to determine the average score. The investigator then reviewed the data and compared the movements of the subjects to each other to determine the average score.

Summary

The Dartfish Motion Analyis Software enabled the investigator to view the subject’s movements and analyze them with the known biomechanical principles by utilizing the software. The investigator was able to view the subject’s movements through the use of the software and analyze them with the known biomechanical principles. The investigator was able to view the subject’s movements through the use of the software and analyze them with the known biomechanical principles. The investigator was able to view the subject’s movements through the use of the software and analyze them with the known biomechanical principles. The investigator was able to view the subject’s movements through the use of the software and analyze them with the known biomechanical principles.

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