A Biomechanical Analysis of The Gymnastics Cartwheel Using Dartfish Motion Analysis Software

Introduction

A course long term project, A Biomechanical Analysis of The Gymnastics Cartwheel, was completed during lab portion of KIN 417 Analysis of Movement. This project required the comprehension and utilization of various biomechanical principles that were taught in the lecture course. The unique aspect of this project is the capability to scientifically analyze the performance of the gymnastics cartwheel using the Dartfish Motion Analysis Software. This software is the latest and most sophisticated computer video analysis software that is used by teachers, coaches, physical therapists and sports medicine specialists. It is used to detect errors in a person’s movement, calculate angles, times, distances, velocities and provide feedback using the drawing tools and media book. Stephen F. Austin State University is among an elite group of universities in the United States that utilize this sophisticated software.

Methods

A videotape of the gymnastics cartwheel was created and imported into the Dartfish Motion Analysis computer program following strict instructions.

The performance was critically analyzed by utilizing the drawing tools. (See pictures) and conclusions were drawn using biomechanical principles and personal knowledge.

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

The biomechanical analysis required videotaping two subjects performing the cartwheel to the best of their ability. Strict protocols were followed to ensure the analysis was accurate. In order to measure distances in the Dartfish program, an object of known length had to be recorded. Subjects were asked to hold a scaling rod for ten seconds before beginning their trials. Subjects recorded four trials each and all data was imported into the Dartfish program.

Average trials for both subjects were chosen to be analyzed extensively for strengths, weaknesses and most importantly the overall biomechanics of the cartwheel. The subjects’ video was then broken down into separate frames to show the different phases of the cartwheel. The Dartfish drawing tools were used to illustrate the incorrect positions and form. An explanation was also offered to explain the illustrations and provide feedback on how the corrections were to be made. Basic physics and biomechanical principles were used to explain why the subject was struggling to complete the skill successfully; as well as explain why the corrections were beneficial. A DVD was created of each subject’s analysis so the subjects could watch and apply the corrections to improve their cartwheel.

Abstract

A videogame of the gymnastics cartwheel was created using biomechanical principles and personal

Introduction

A course long term project, A Biomechanical Analysis of The Gymnastics Cartwheel, was completed during lab portion of KIN 417 Analysis of Movement. This project required the comprehension and utilization of various biomechanical principles that were taught in the lecture course. The unique aspect of this project is the capability to scientifically analyze the performance of the gymnastics cartwheel using the Dartfish Motion Analysis Software. This software is the latest and most sophisticated computer video analysis software that is used by teachers, coaches, physical therapists and sports medicine specialists. It is used to detect errors in a person’s movement, calculate angles, times, distances, velocities and provide feedback using the drawing tools and media book. Stephen F. Austin State University is among an elite group of universities in the United States that utilize this sophisticated software.

Methods

A videogame of the gymnastics cartwheel was created and imported into the Dartfish Motion Analysis computer program following strict instructions.

The performance was critically analyzed by utilizing the drawing tools. (See pictures) and conclusions were drawn using biomechanical principles and personal knowledge.

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

The biomechanical analysis required videotaping two subjects performing the cartwheel to the best of their ability. Strict protocols were followed to ensure the analysis was accurate. In order to measure distances in the Dartfish program, an object of known length had to be recorded. Subjects were asked to hold a scaling rod for ten seconds before beginning their trials. Subjects recorded four trials each and all data was imported into the Dartfish program.

Average trials for both subjects were chosen to be analyzed extensively for strengths, weaknesses and most importantly the overall biomechanics of the cartwheel. The subjects’ video was then broken down into separate frames to show the different phases of the cartwheel. The Dartfish drawing tools were used to illustrate the incorrect positions and form. An explanation was also offered to explain the illustrations and provide feedback on how the corrections were to be made. Basic physics and biomechanical principles were used to explain why the subject was struggling to complete the skill successfully; as well as explain why the corrections were beneficial. A DVD was created of each subject’s analysis so the subjects could watch and apply the corrections to improve their cartwheel.

Abstract

A videogame of the gymnastics cartwheel was created using biomechanical principles and personal