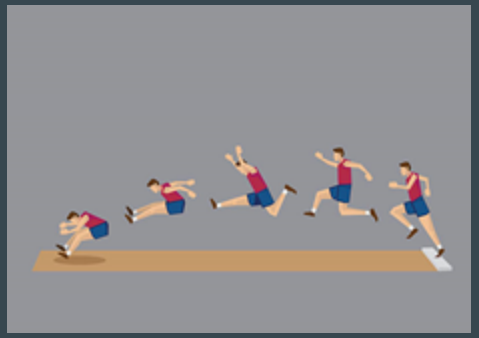
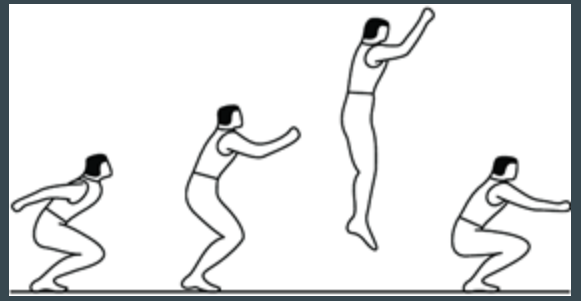


Final Project

...



Thomas Young

Background

- Different types of landing
  - Broad Jump
  - Countermovement Jump
    - Vertical takeoff and landing
    - Horizontal jump and landing
- Hip Injuries
- Knee Injuries
- Ankle Injuries

Introduction

- Joint kinematics are the significant factors that define good or poor landing technique, the moments that occur in the involved joints directly correlate with landing-technique injuries.
- Single-leg landing and double leg landing.
- With jumping and landing in sports, soft and rigid/stiff landings occur frequently in sports and are a cause of injury along with joint instability

Methods

- One male subject with no history of lower extremity injuries/surgeries
- Nike Pegasus 30 Model Shoe & Russell Compression Shorts
- 32 total markers
- 22 anatomical markers
- Knee Joint Only

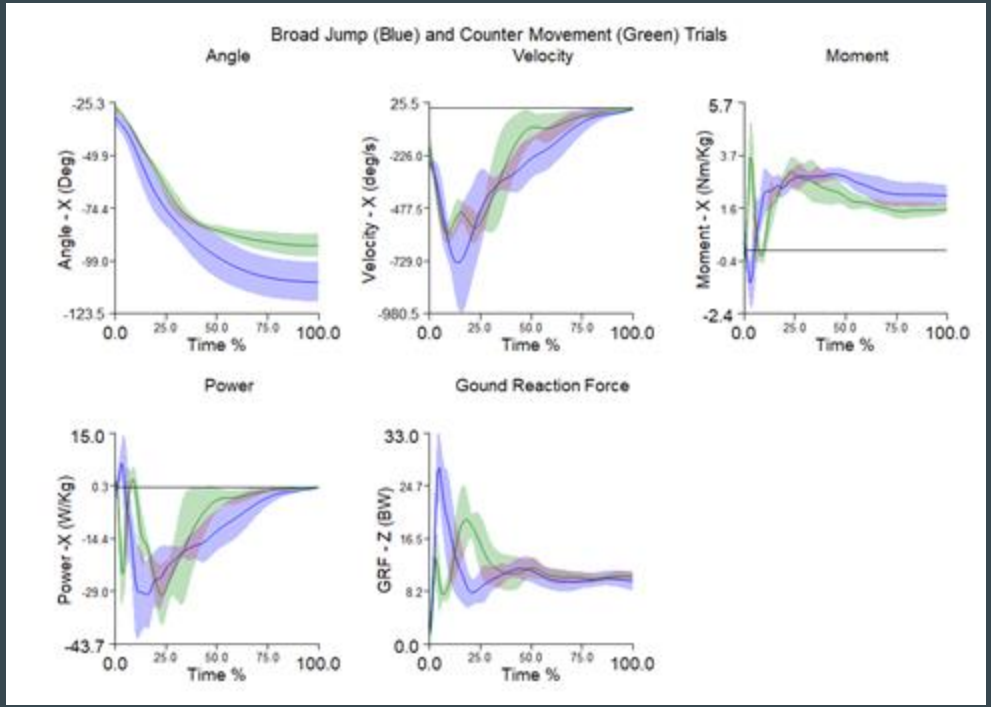
Methods

Visual3D

- Set Subject Height: 1.75 m
- Set Subject Mass: 75 kg
- Set Subject Mass: 75 kg * 9.81 (m/(s^2)) = 735.75 N
    - Condition 1: Countermovement
    - Condition 2: Broad jump

Results

- Blue is Broad Jump
- Green is Counter movement
- Only look at X for the following
  - Angle
  - Velocity
  - Moment
  - Power
- GRF - Z has highest significance
  - Red is overlap



Results

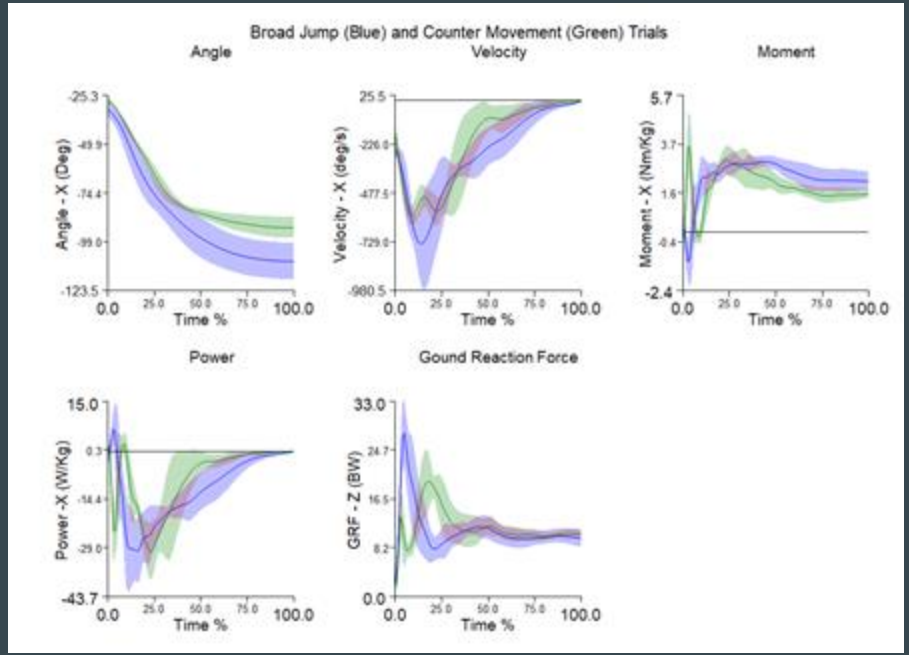
Table 1: Broad Jump (BJ) and Countermovement (CM) Trails

Mean and Standard Deviation (SD) for the four measured variables of the Knee Joint

Variable	CM	BJ
ROM - X	-64.14 (5.17)	-76.67 (6.44)
Max Flexion - X	-91.89 (5.29)	-108.88 (9.20)
Max Moment - X	4.38 (1.19)	3.30 (0.22)
Max GRF - Z	2.26 (0.25)	2.90 (0.57)

Discussion

- Higher forces that were exhibited in the countermovement jump
  - Larger angle of flexion
  - Higher max velocity
  - Higher power absorbed



Limitations

- Only had one subject for the study
- Potentially add some statistics
  - Outside of means and standard deviations
- Landing portion only
- Environmental factors not measured
- Muscles were not measured

$$\lim_{x \to c} f(x) = L$$

Future studies

- Could look at other joints
  - Ankle and Hip
- Randomize trials
- Other populations
- Other Conditions
  - C1, C2, C3 (max height)