

# Lecture 13

Wednesday, July 14, 2021

22:01

## Applications of Biomechanics

- Levers
- Most muscles function at a large mechanical disadvantage
- Location of insertion: force-speed tradeoff
- Biomechanical factors in human strength (force output)
  - 1) Neural recruitment
  - 2) Muscle CSA (cross sectional area)
    - i. Not volume (which includes muscle length) determines strength from the perspective of biological real estate
  - 3) Arrangement of muscle fibers
    - i. Lots of architectural styles of muscle
    - ii. Variation in the arrangement and the alignment of sarcomeres in a muscle fiber
  - 4) Muscle length
  - 5) Joint angle
    - i. Notice moment arm (joint axis to tendon attachment)
    - ii. (joint axis to the *load*)
  - 6) Muscle contraction velocity
  - 7) Strength-to-mass ratio
    - i. Sprinting/jumping: ratio affects ability to accelerate body
    - ii. Weight class sports: ratio helps determine relative success
  - 8) Body size
  - 9) Physiological explanations (cross-bridge cycling, etc.)