

Lecture 13

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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.)