

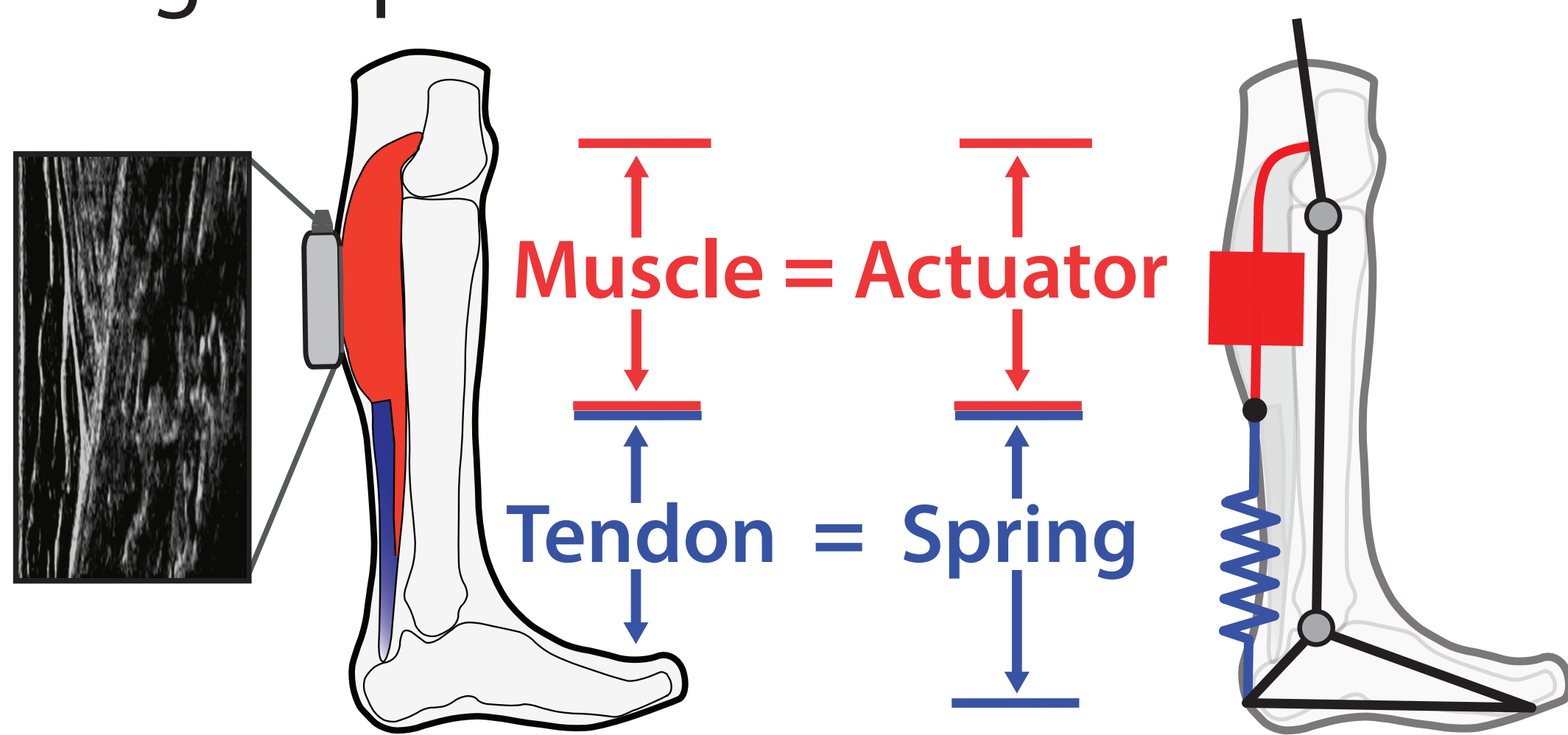
# Are Ultrasound-Based Estimates of Achilles Tendon Kinematics Consistent with the Expected Behavior of a Passive Elastic Tissue in Series with Muscle?

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## Unexpected AT Length Estimates Confound Interpretation of Function During Movement

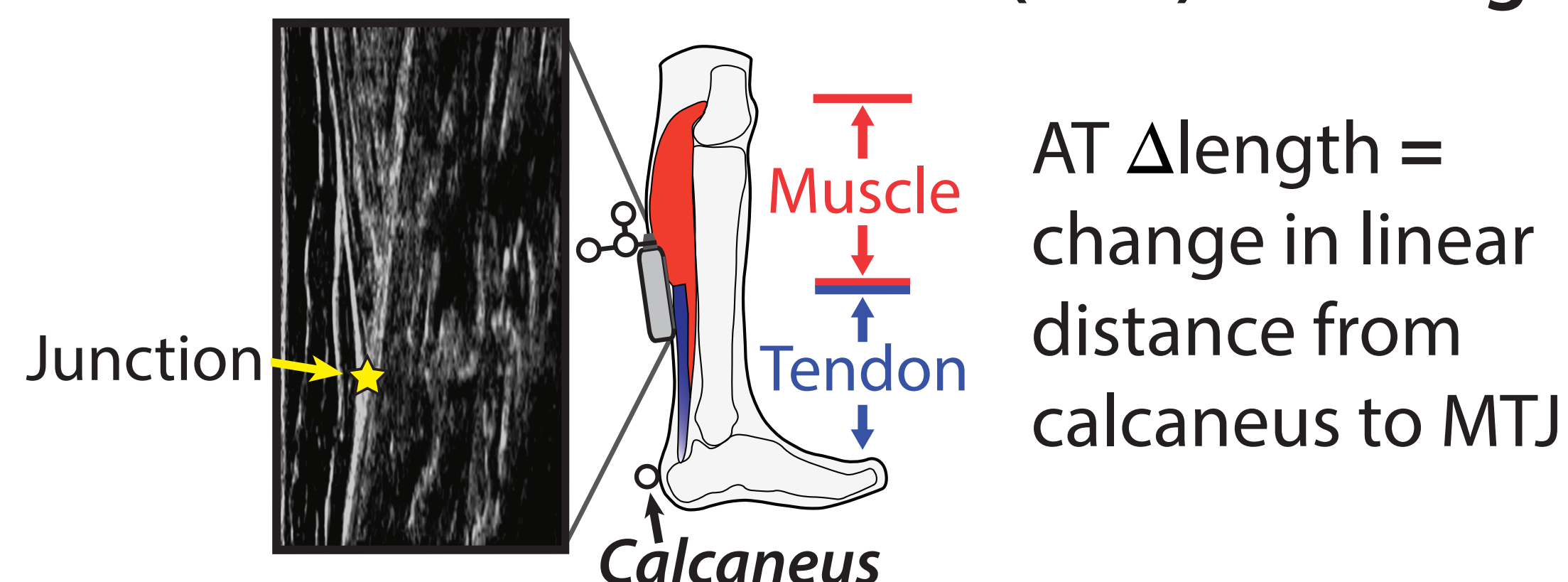
### Objective

Determine if ultrasound-based Achilles tendon (AT) length change estimates are consistent with model-based expectations during simple movement tasks

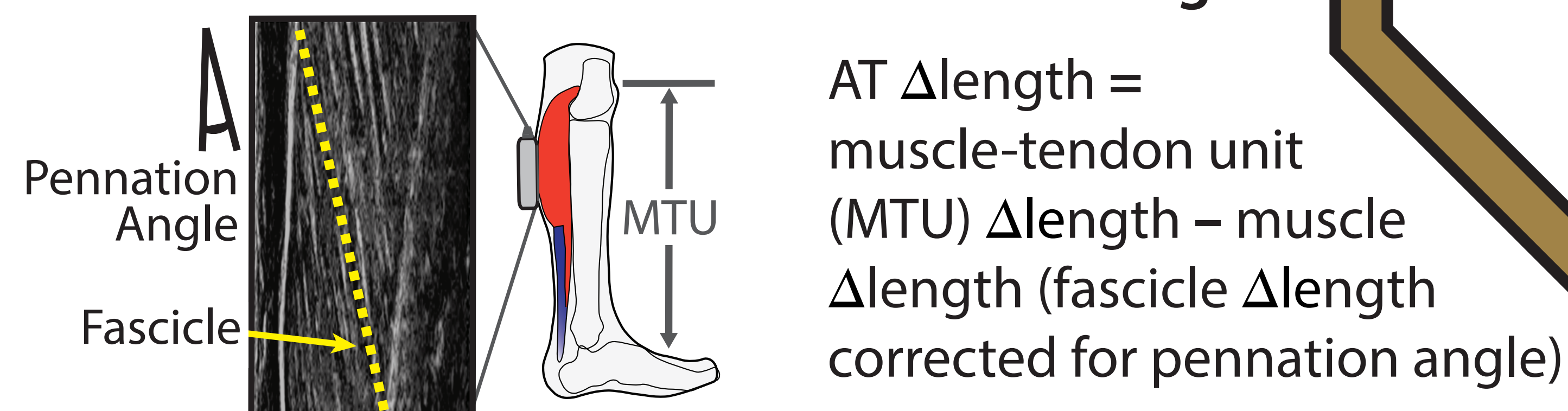


### AT Length Estimation Methods

#### Muscle-Tendon Junction (MTJ) Tracking



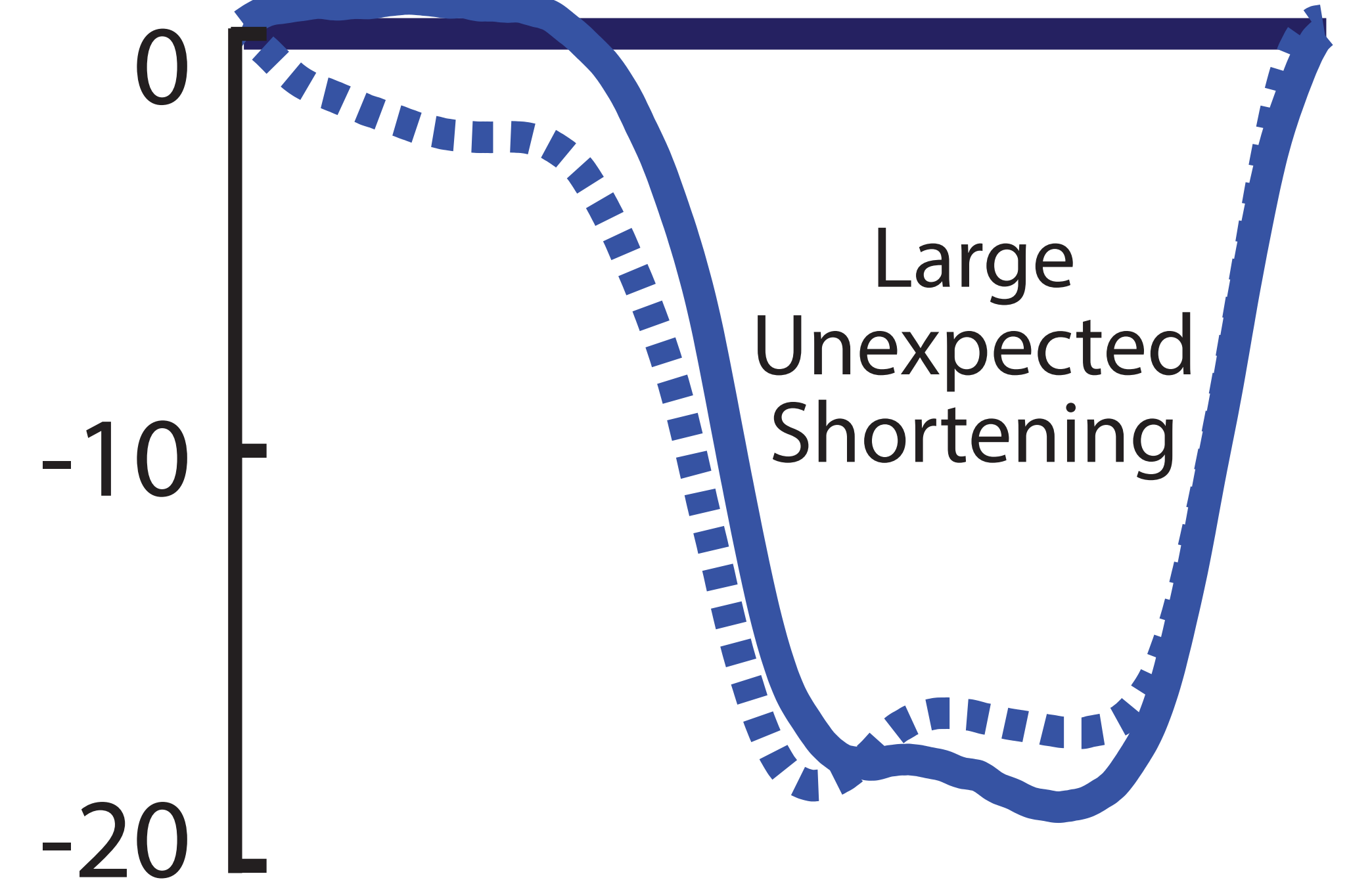
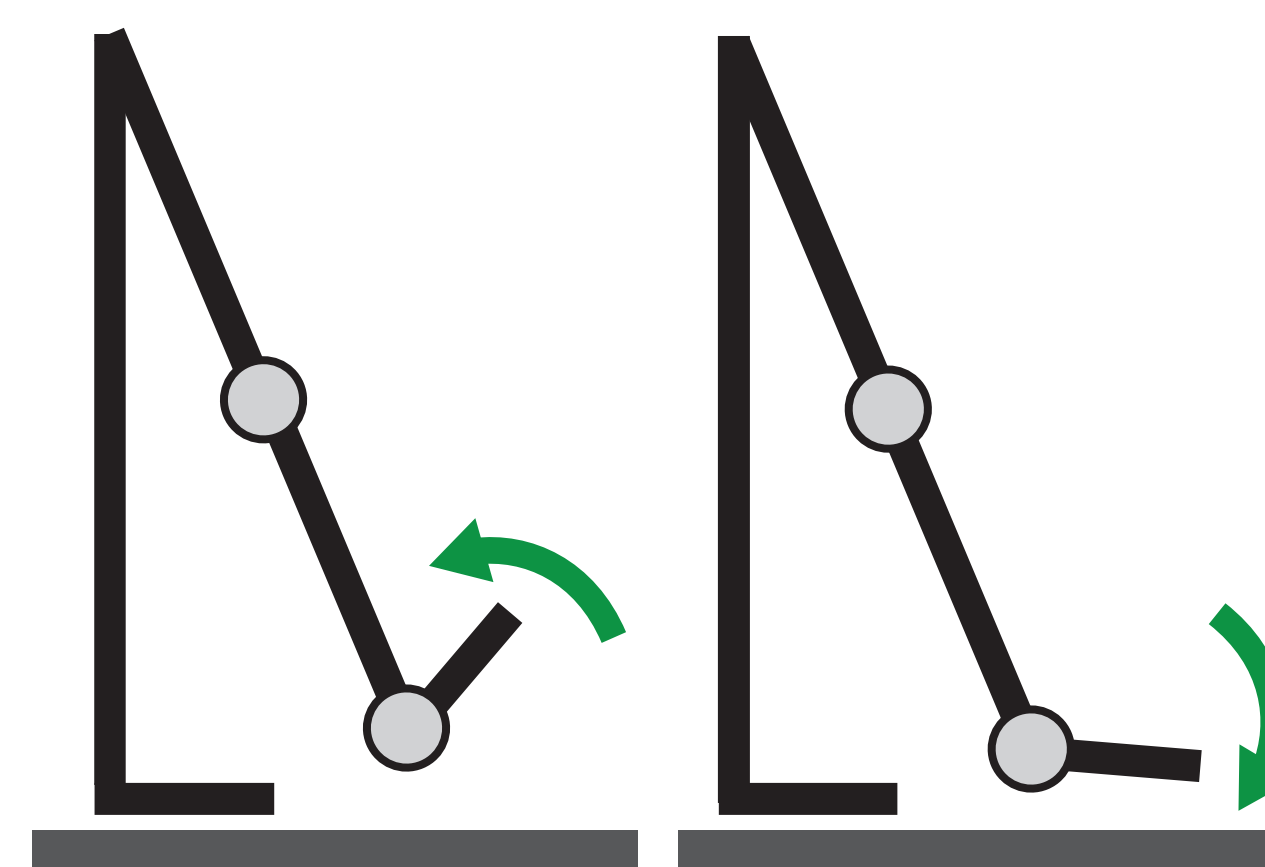
#### Medial Gastrocnemius Fascicle Tracking



■ = Expectation ■ = MTJ Method ■ = Fascicle Method

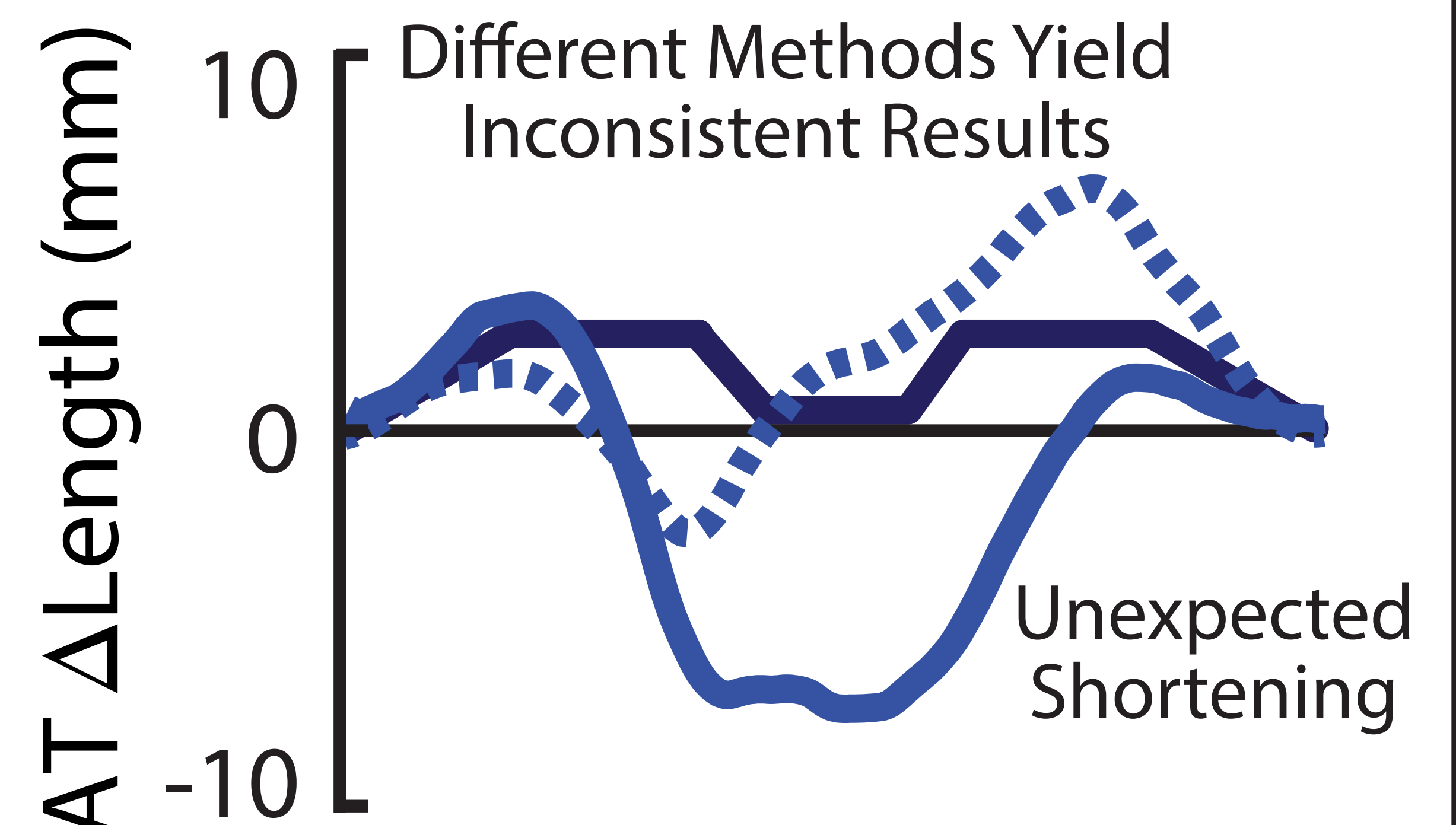
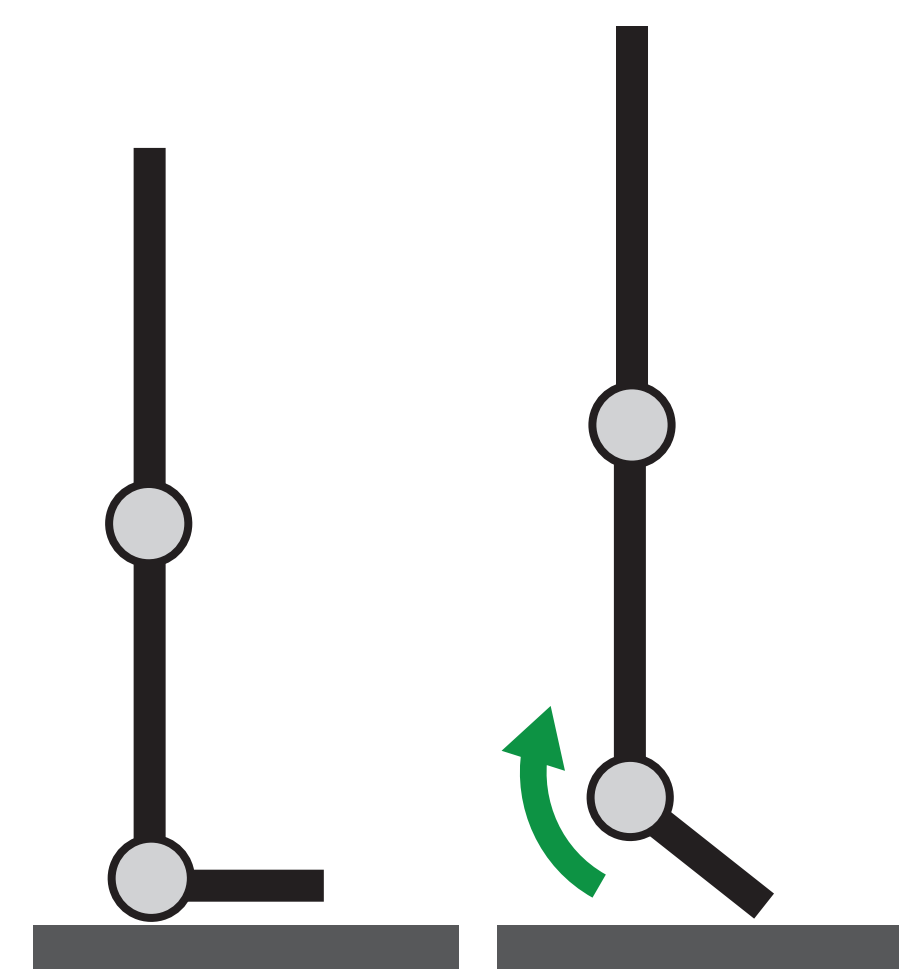
### Ankle Flexion

MTU: Low Force, Large Displacement



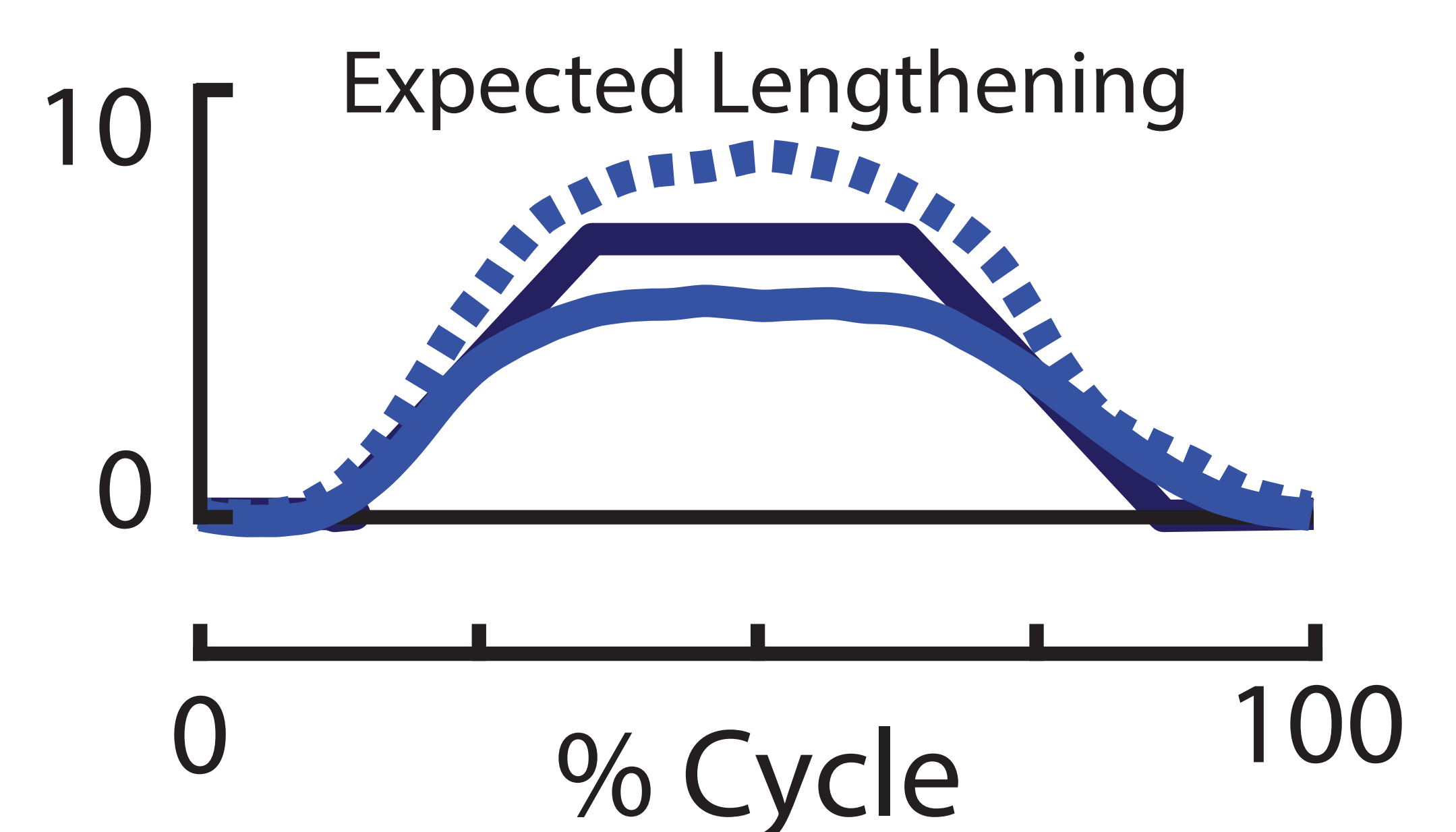
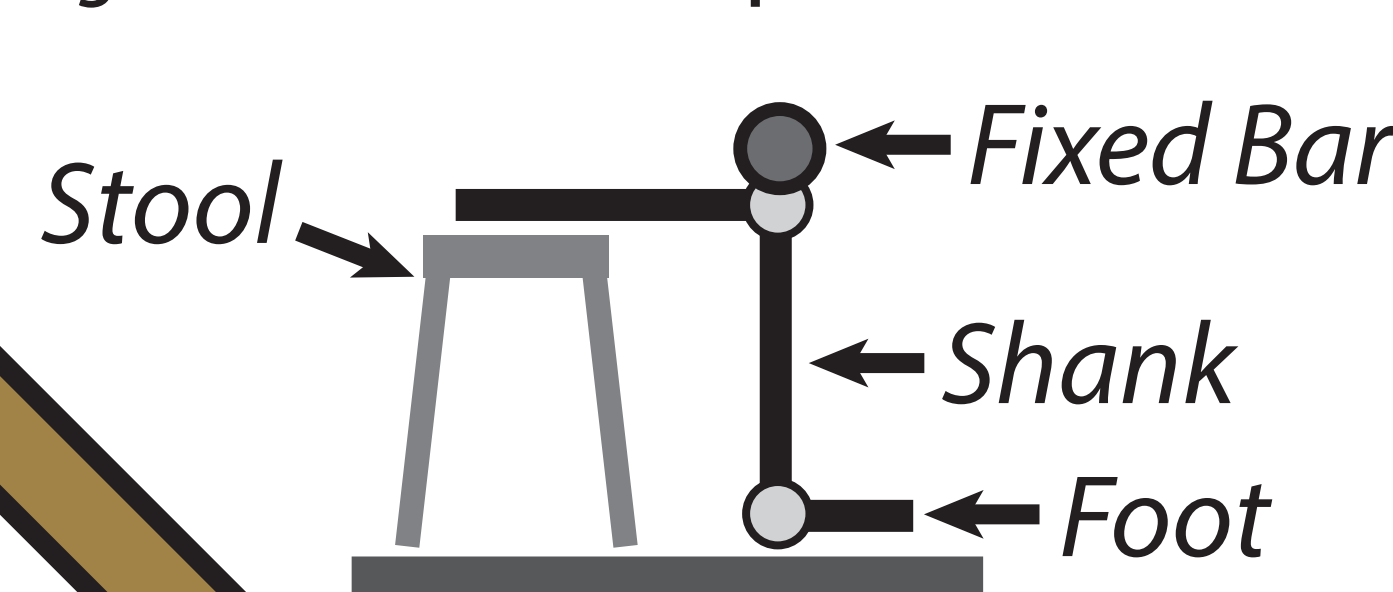
### Heel Raises

MTU: High Force, Large Displacement

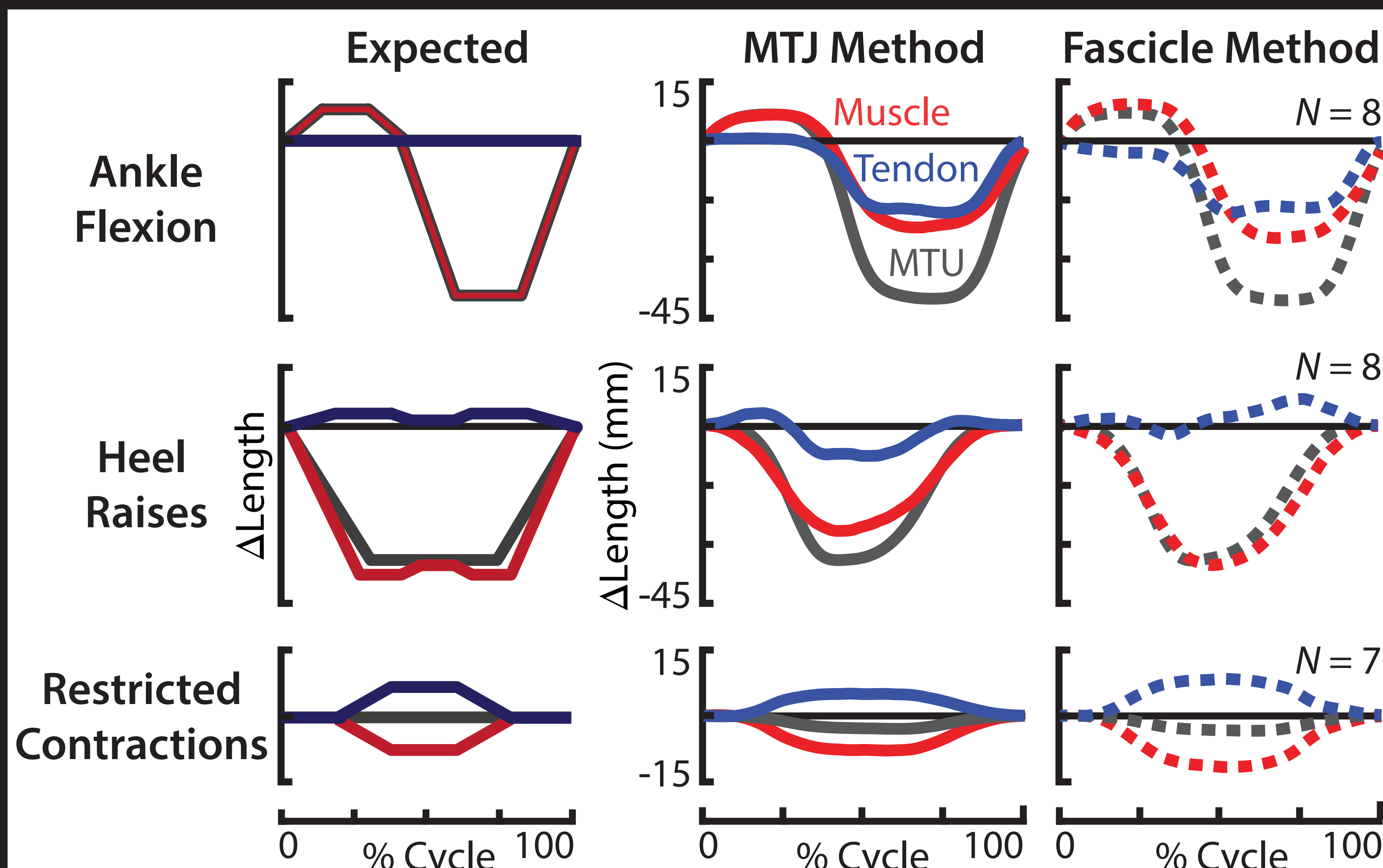


### Restricted Contractions

MTU: High Force, Small Displacement

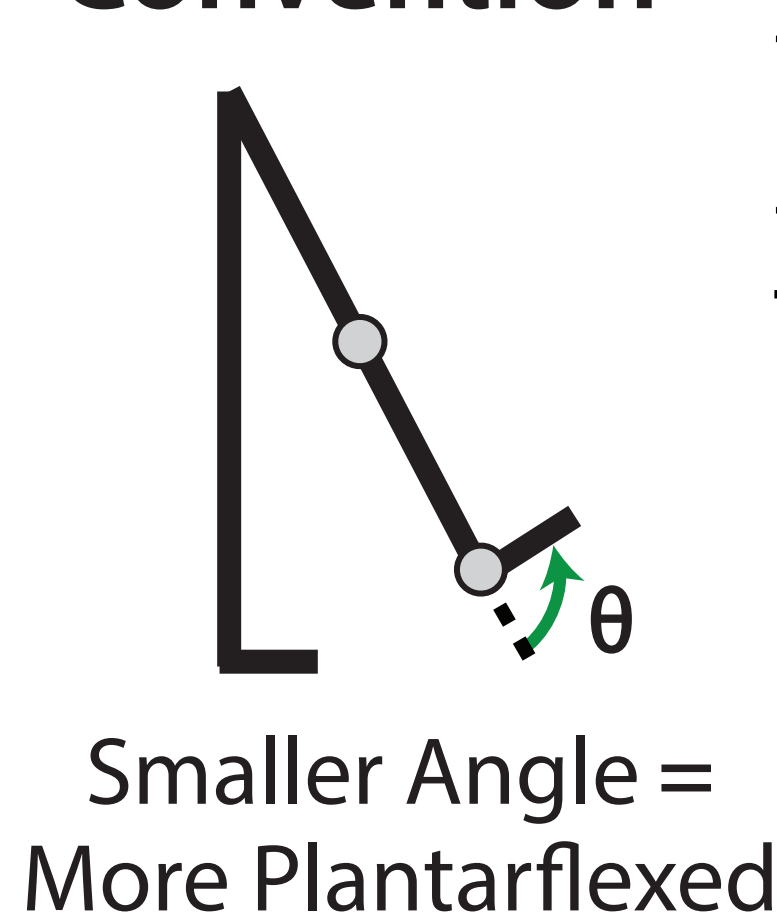


### Complete Muscle, Tendon & MTU Results



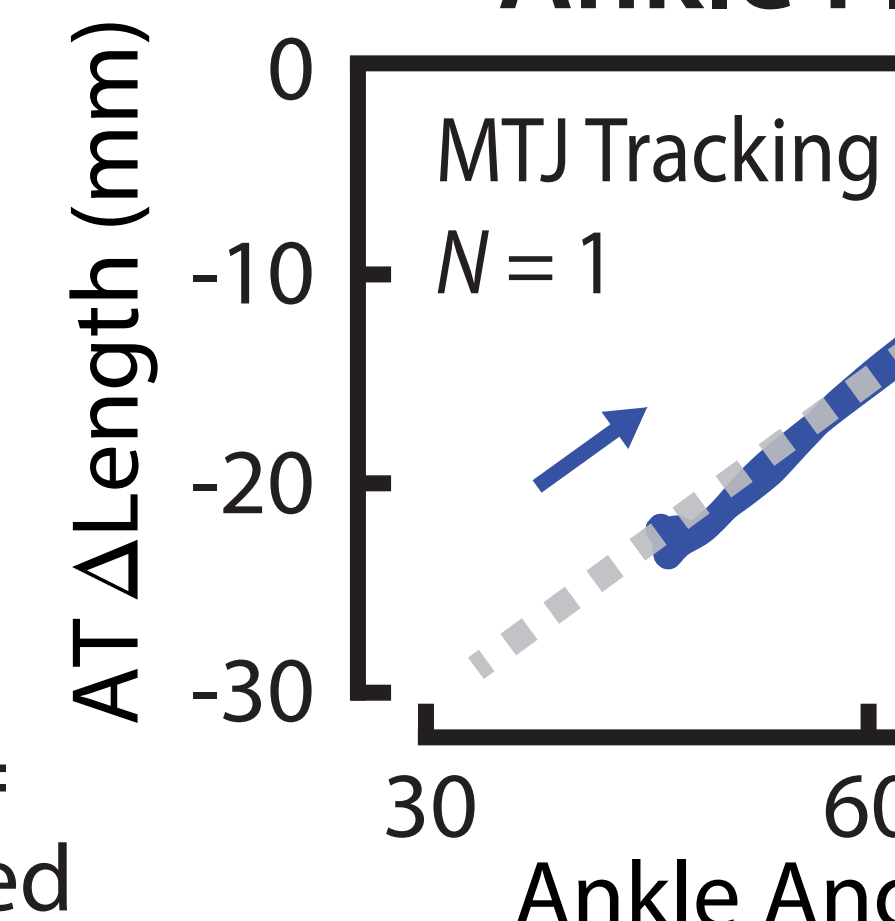
### Apparent Shortening with Plantarflexion

#### Convention

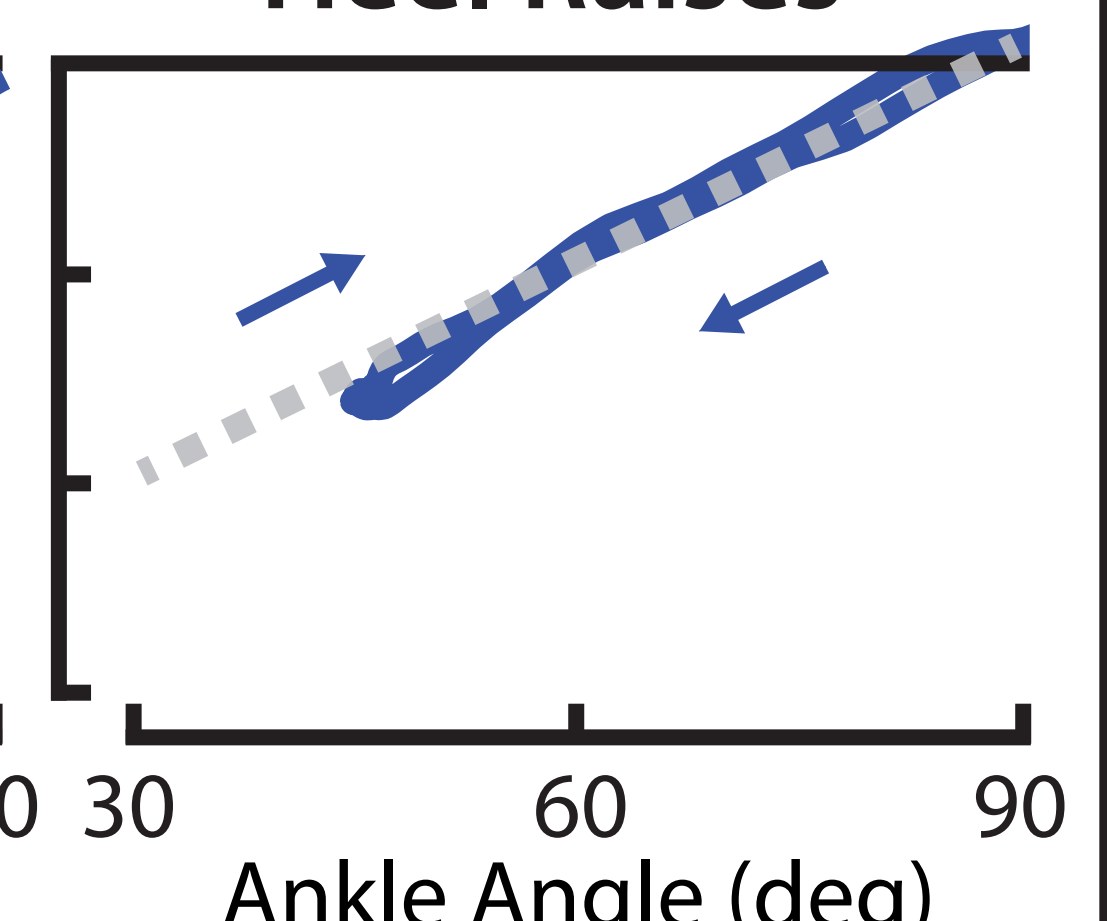


Smaller Angle = More Plantarflexed

#### Ankle Flexion



#### Heel Raises



### Potential Sources of Unexpected Results

#### Methods

- Probe placement
- 3D architecture of tissues
- MTU regression equations

#### Model

- In-series loading assumptions
- Transverse tissue dynamics
- Adjacent MTU contributions

### Acknowledgments

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