

# Webinar Series



## Symptom Management: Motor Components

Tuesday, June 9, 2020

*Presented by:*

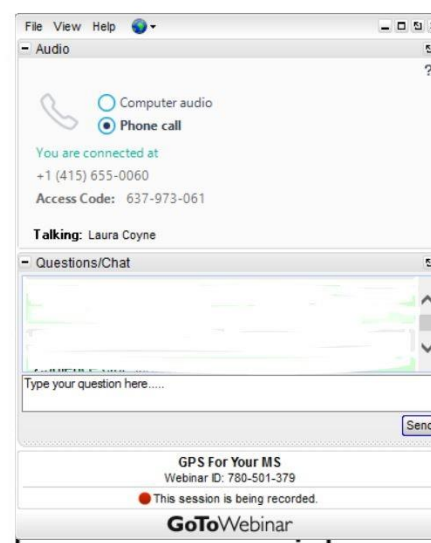


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# Jennifer Keller, MS, PT



**Physical Therapist**  
**Kennedy Krieger Institute**  
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# Sue Kushner, MS, PT

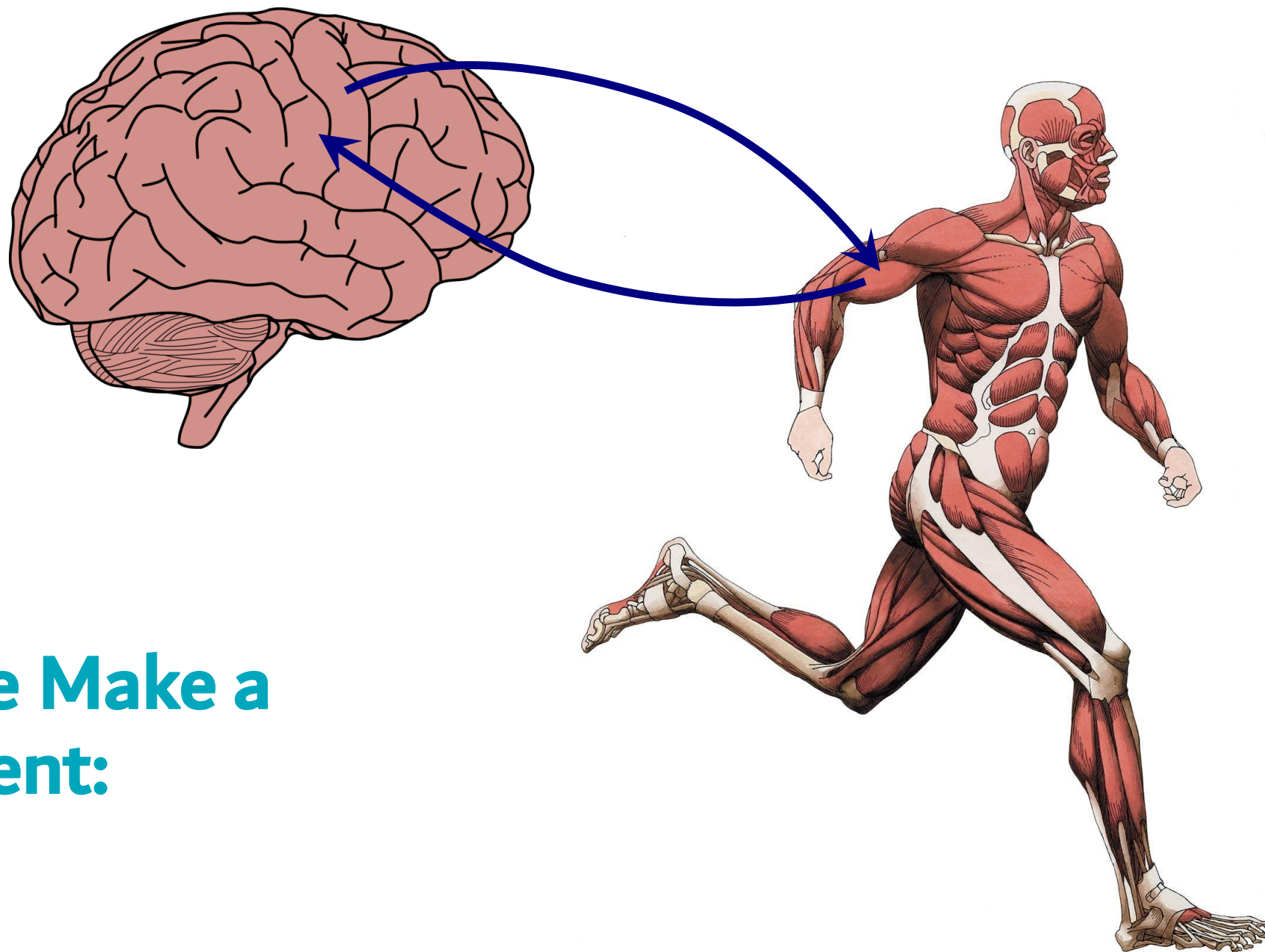


**Physical Therapist**  
**Slippery Rock University**  
**Slippery Rock, PA**

# Objectives

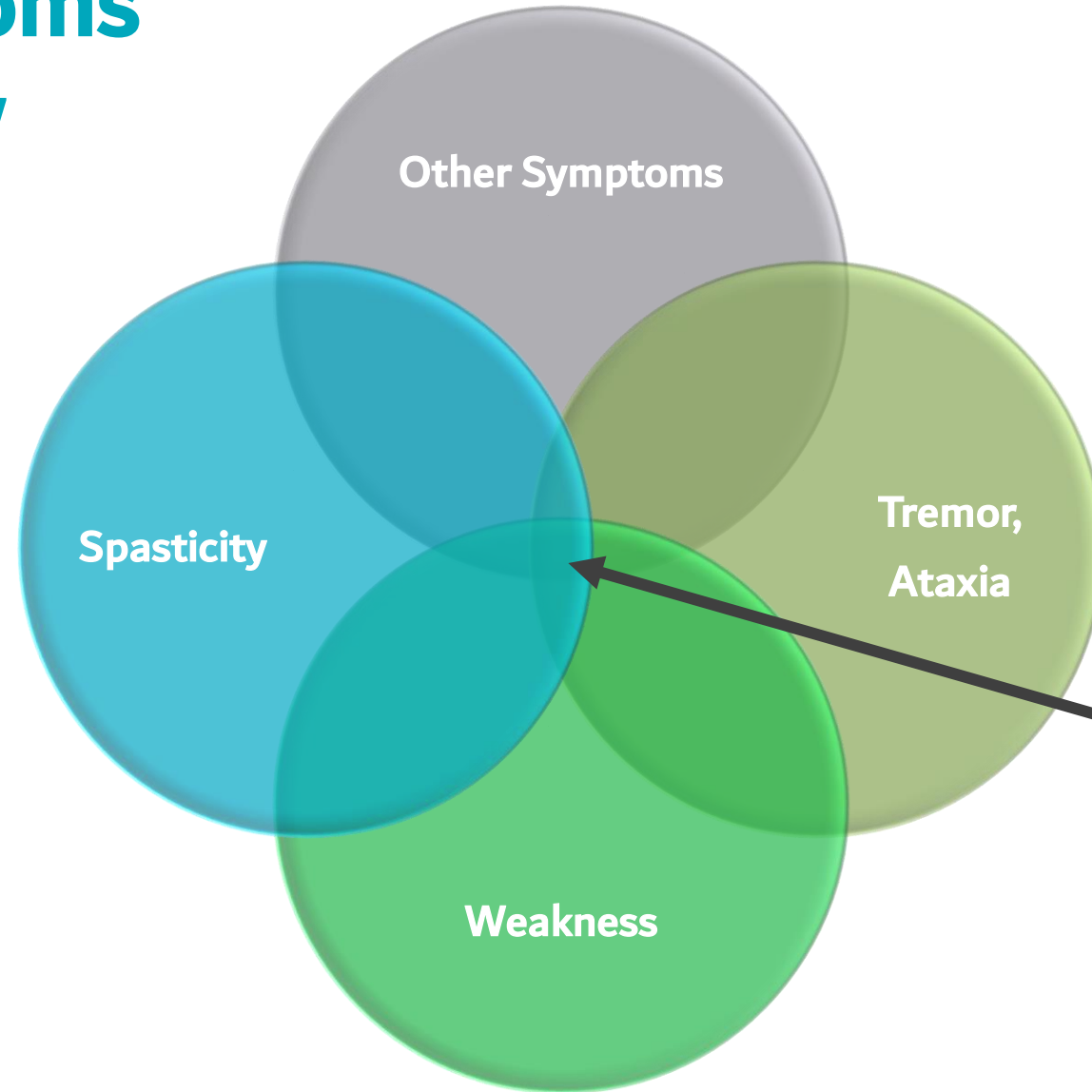
- Define weakness, spasticity, and tremor.
- Identify common movement challenges related to weakness, spasticity, and tremor.
- Explore practical strategies to manage motor symptoms.





## How We Make a Movement:

# MS Symptoms Affect How We Move:



Impairment:  
Walking  
Transfers  
Upper Extremity Coordination  
Trunk Control



# Walking is Highly Variable in MS



**Fast**



**Slow**



# Hemiparesis



**Spasticity**



**Ataxia**

# Why Distinguish Between These Symptoms?

- To understand **why** a desired movement doesn't occur.
- To select the **optimal** treatment for the symptom.
  - For example:
    - Weakness = strengthening
    - Spasticity = stretching, medication (Valium, Baclofen, Botox)
    - Tremor = slow down and simplify a movement



# Objectives

- **Define weakness, spasticity and tremor.**
- Identify common gross and fine motor challenges related to weakness, spasticity, and tremor.
- Explore practical strategies to manage motor symptoms.

# What is Weakness?

- Lack of muscle strength
  - Primary
    - Could come from changes in the nerve stimulus to the muscle
      - From lesions in the brain and spinal cord
  - Secondary – disuse atrophy – “use it or lose it”
    - From deconditioning because of generally reduced activity
    - From changes in how one moves reducing specific muscle activity
- How does it feel? - fatigue, heaviness



# How Do We Measure It?

## In the lab

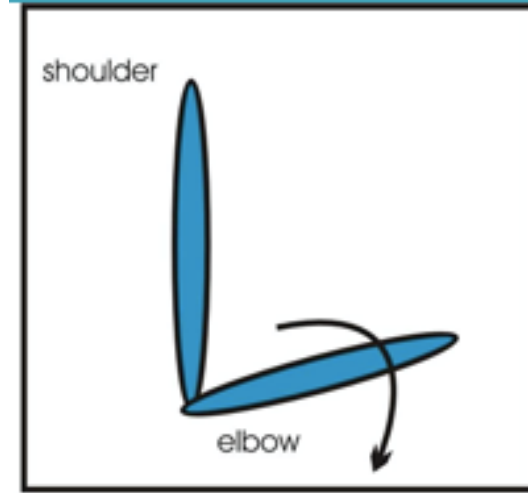


## In the clinic



# What is Spasticity?

Occurs when resistance to **externally-imposed movement**:



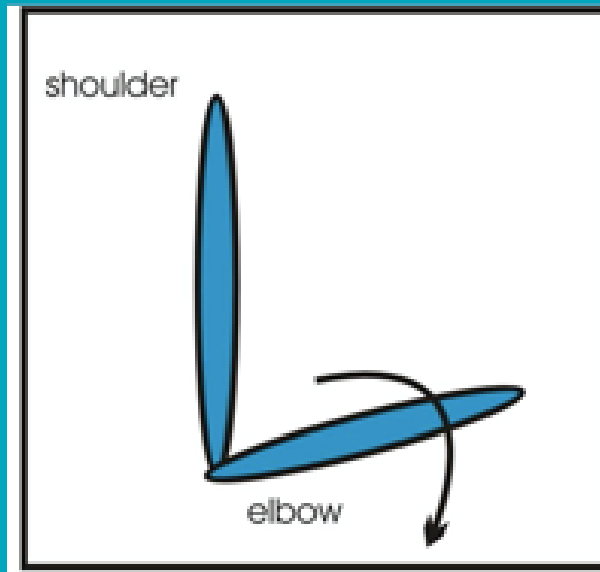
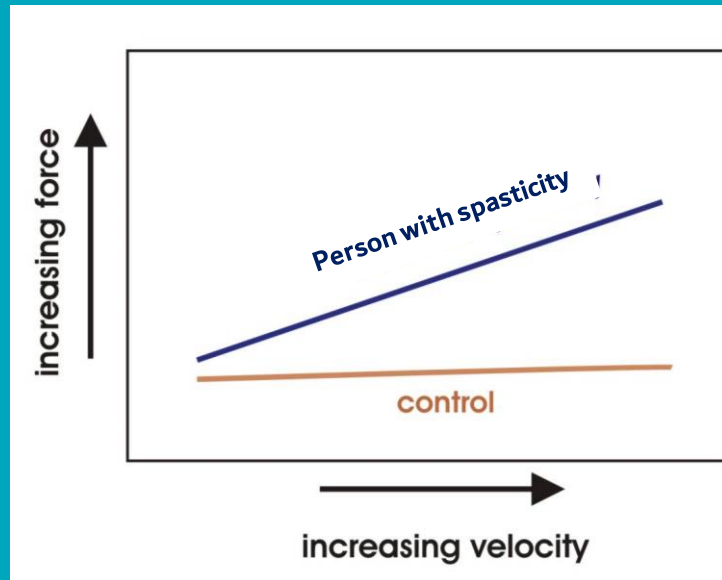
- 1) **Increases** with increased speed of stretch and varies with direction of joint movement

*and/or*

- 2) **Rises rapidly** above a threshold speed or joint angle ('catch')  
*(Sanger et al 2003)*

How does it feel? – tightness, difficult to move fast

# Recognizing & Measuring Spasticity Is Not Easy



## Rating scale of increased tone:

0 = no increase

1 = slight

1+ = minimal

2 = marked

3 = considerable; difficult to move passively

4 = Rigid posture

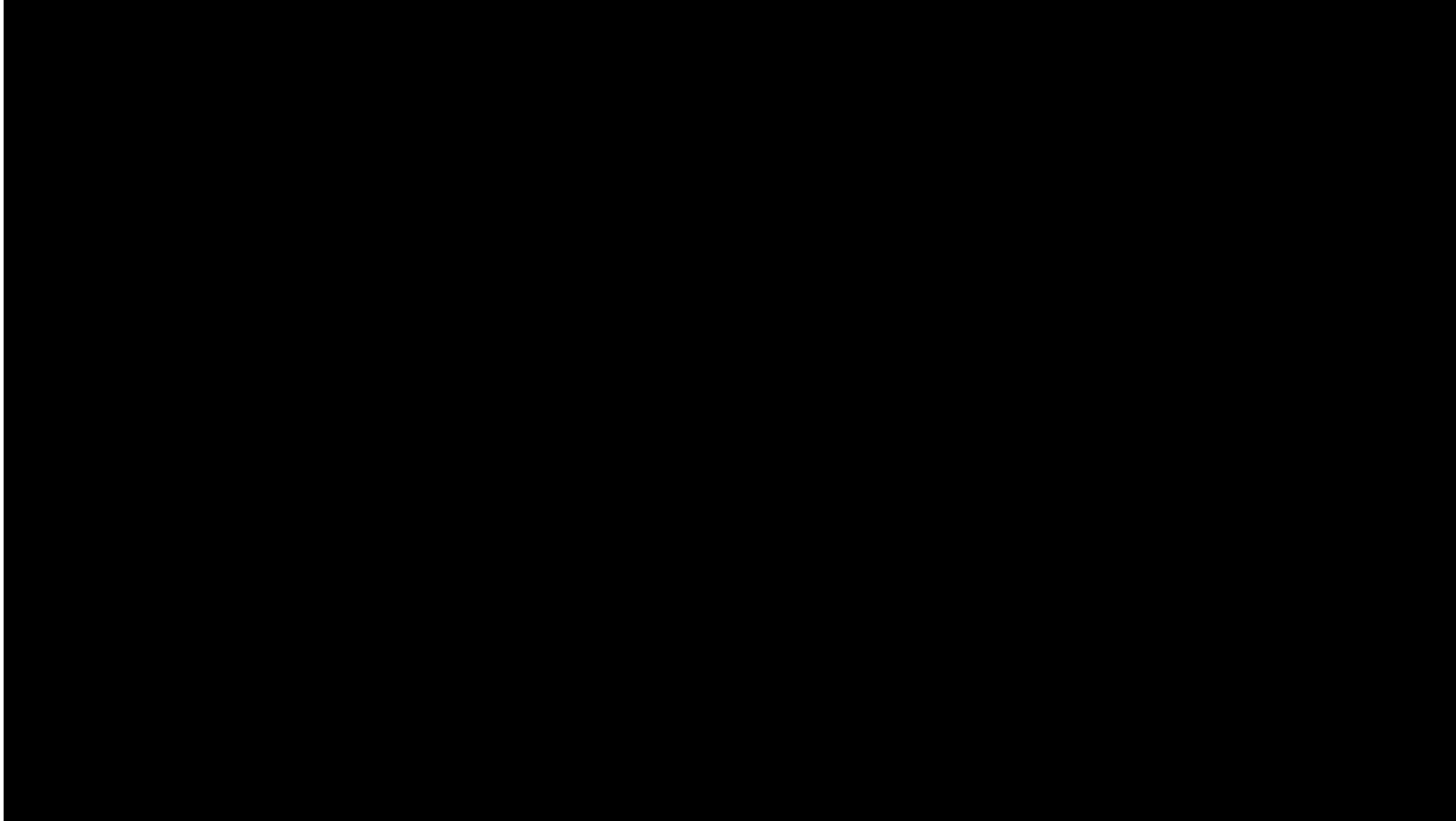
# Relationship Between Weakness and Spasticity

- Spasticity can actually assist weakness, up to a point
- If muscles are very weak, e.g. quadriceps or hamstrings, some increased tone can actually HELP with walking and act as increased strength
- Can be in flexors (bending) or extensors (straightening)
- Can also add to weakness by increasing fatigue
- Muscle strength must be determined independent of the amount of spasticity
- Prolonged spasticity can lead to contractures

# What Is Tremor?

- Lack of control with voluntary movement
- Lack of coordination throughout movement
- Movement may be shaky or “jerky”
- More often in upper extremities
- May affect activities of daily living: fine motor skills: eating, writing, computer skills, dressing
- If trunk or lower extremities involved, may have difficulty with transfers, walking
- May be very fatiguing

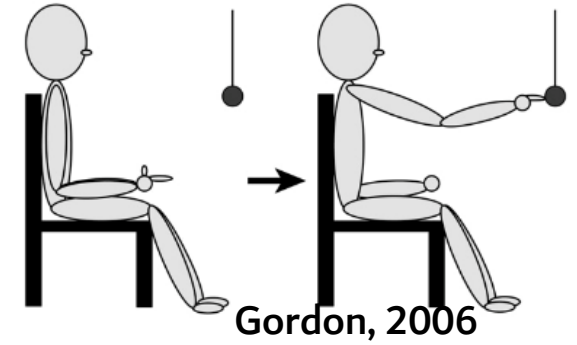
# What Is Tremor?





# How Do We Measure Tremor?

- Is the path of movement smooth?
- Does the movement hit the target?



Control

Tremor

Distance



*(adapted from Bastian et al. 1996)*

# Objectives

- Define weakness, spasticity and tremor
- **Identify common gross and fine motor challenges related to weakness, spasticity, and tremor**
- Explore practical strategies to manage motor symptoms

# Motor Control - Definition

- **Gross motor-larger muscles and muscle groups, e.g.:**
  - Biceps to bend elbow
  - Quadriceps to straighten leg
  - Muscles used to go from sit to stand
  - Muscles involved in walking and transfers
- **Fine motor-smaller muscles and muscle groups, e.g.:**
  - Muscles used for writing, using utensils, precision movements
  - More often involved with upper extremities

# Challenges in Motor Control from Weakness, Spasticity and Tremor

- Loss of Range of Motion
  - Hip:
    - May have lack of full hip extension
    - Falls
  - Knee:
    - May have lack of full knee extension
    - Falls
- Coordination problems
- Balance issues
- Fatigue

# Range of Motion Loss

- Frequently in the foot and ankle
- Can be due to a long term result of spasticity
- Can be due to a long term result of weakness
- Balance impairment
  - Foot less adaptable
  - Frequent falls and loss of balance
- Gait
  - Frequent tripping
  - Toe clearance
  - Stair ambulation

# Objectives

- Define weakness, spasticity and tremor
- Identify common gross and fine motor challenges related to weakness, spasticity, and tremor
- **Explore practical strategies to manage motor symptoms**



# Making Life Easier: What Can You Change?



- About **yourself**.



- About the **strategy** you use.



- About your **environment**.

# What Can You Change About Yourself?

## Strength and Endurance Training

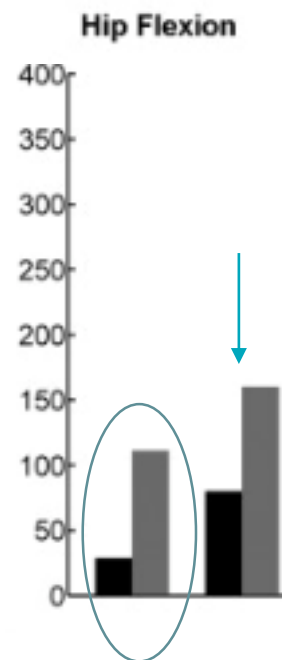
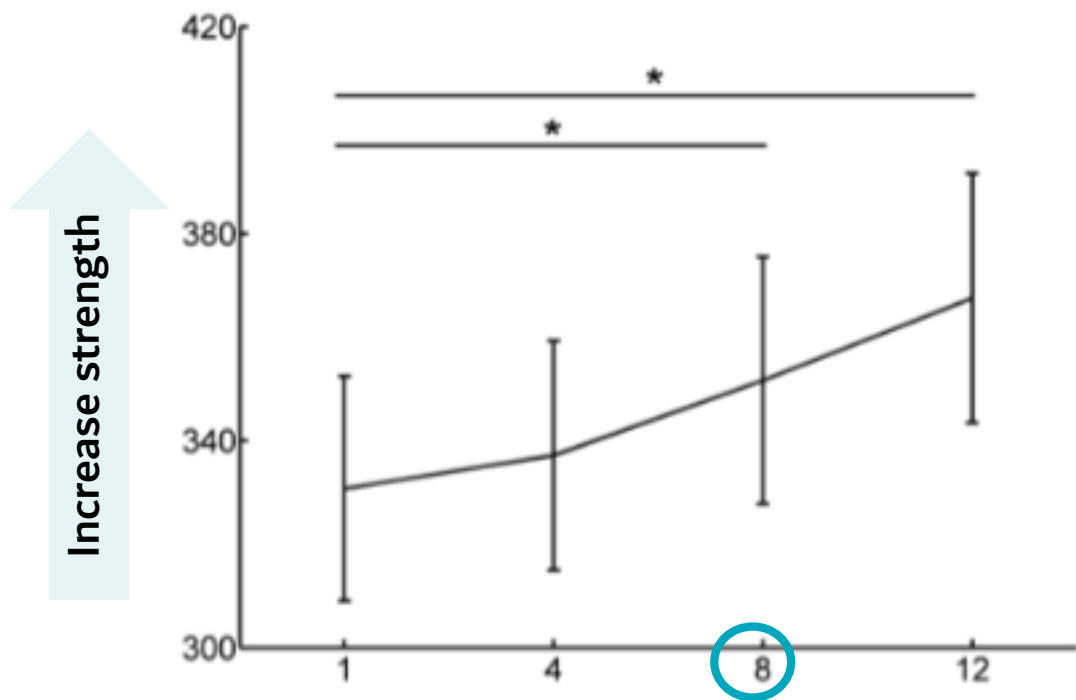


Helps manage fatigue!



Keller, 2016

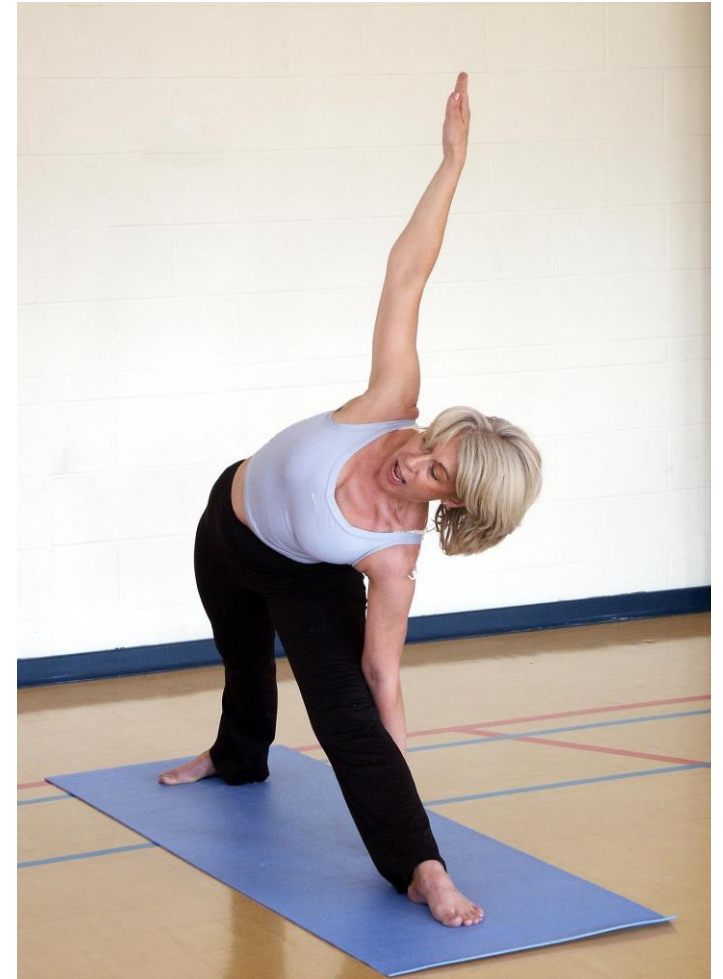
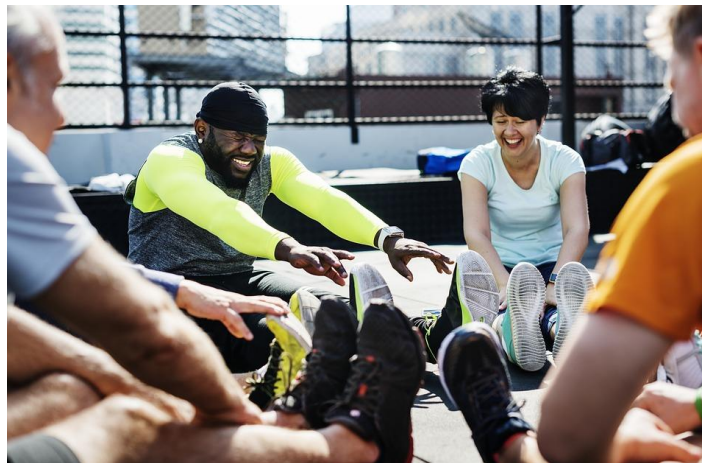
## Adapted Resistance Training Improves Strength in Eight Weeks in Individuals with Multiple Sclerosis



Helps manage weakness!

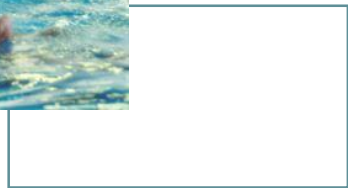
# Flexibility

- Manage spasticity with stretching
  - Smooth, prolonged movements
  - Yoga-Find a type that works for you!!!!



# Balance and Coordination

- Proper evaluation from PT/OT
- Incorporate exercises/activities to improve where needed
- Can be assisted with: yoga, tai chi, Swiss Ball, aquatic activities, etc.





# Botox and Casting/ Splinting

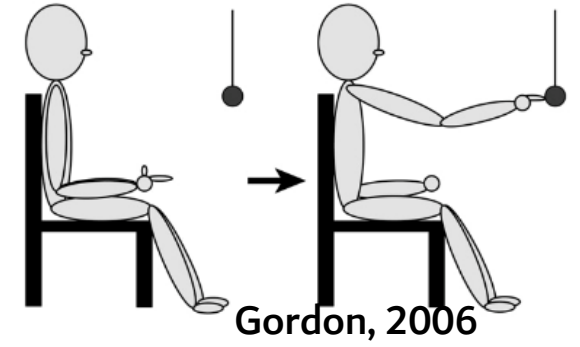
- Botox
  - Used to address spasticity that impacts active range of motion
  - Can be combined with casting when there is a contracture
- Casting/ Splinting
  - Muscle contracture
    - Casting – 5-6 weeks of repetitive cast
    - Splinting- 3 month with long term stretch

# How To Reduce Tremor?

## 3 Ways:

- Slow movements
- Reduce movements to single joint
- To weight or not to weight? No weight

# How To Reduce Tremor?



Slow the movement

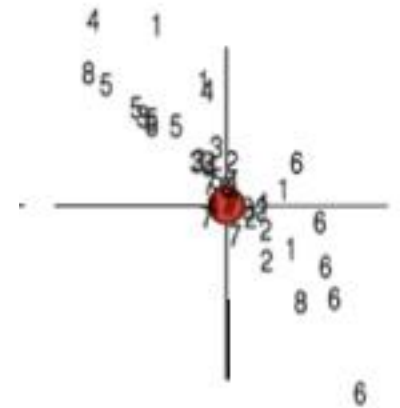
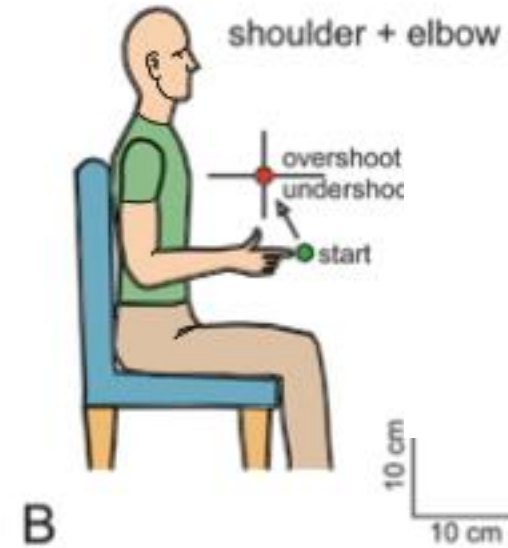
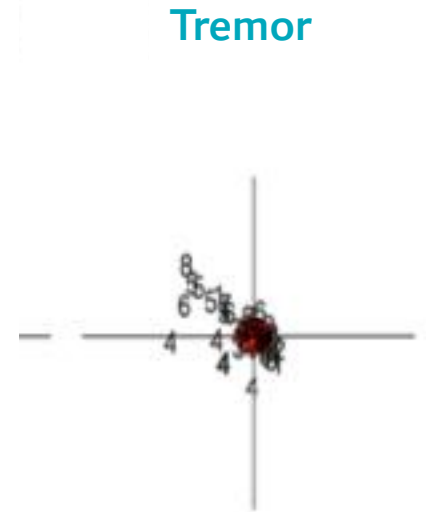
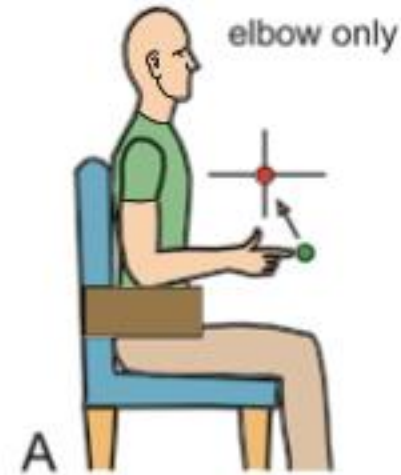


*(adapted from Bastian et al. 1996)*



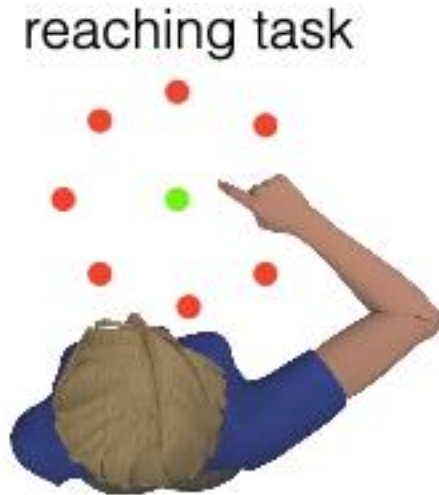
# How To Reduce Tremor?

- Reduce the movement to single joint
  - Bracing



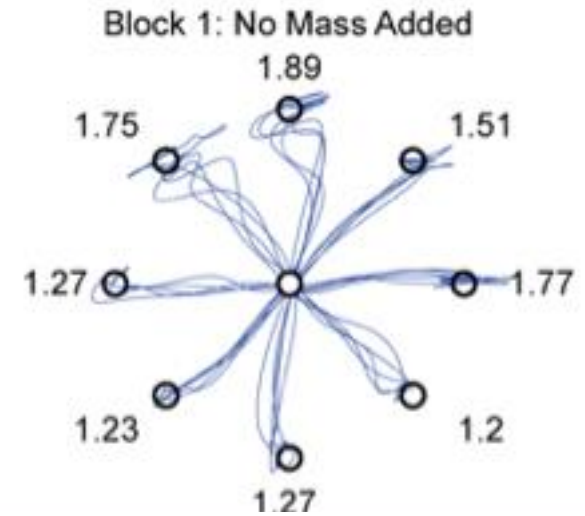
*(adapted from Bastian et al. 2000)*

# How To Reduce Tremor?



- To weight or not to weight?

No! Weights do not make movements more coordinated.  
We think that they may encourage you to move more slowly  
And moving more slowly makes the movement more accurate



*(adapted from Zimmet et al. 2019)*

# Optimize Safety!

- Proper footwear
- Clear floors
- Floor coverings
- Easy traffic flow
- Proper assistive devices

# What Strategy Can You Change?

- Move more slowly
- Simplify movements

Upon standing...

- Wait a few seconds to ensure you're stable
- Once stable, then take a step



# What Strategy Can You Change?

- Do one thing at a time
  - Avoid multi-tasking
  
- Give yourself permission to accept help  
(Let someone else take a hot dish out of the oven)

*Don't walk  
and talk!*



# What Can You Change About Your Environment?



[MyLifeGlider.com](http://MyLifeGlider.com)



Work with a PT to determine an appropriate walking device to manage risk for falls.



Drive Nitro  
Rollator  
Walker

[www.trionic.us](http://www.trionic.us)



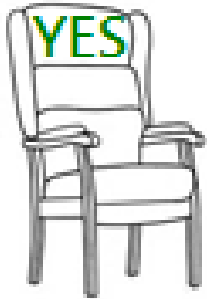
[tryupwalker.com](http://tryupwalker.com)

[ustep.com](http://ustep.com)



# Make Your Home a Safe Environment...

Choose a chair you know you'll be able to get out of!



Assess for fall hazards

- Remove area rugs
- Clear power cords
- Use night lights

Consider installing handrails or grab bars.



# Use Technology

Make your life easier...



**Liftware Level:**  
Computerized handle  
Keeps attachments level



**Example:** Let a remote vacuum help conserve your energy!



**Smart Lighting:**  
Controlled by phone,  
Alexa Echo Dot or  
Google home system



# How To Find a Virtual Physical Therapist:

Website: [www.apta.org](http://www.apta.org)

1. Click "Find a PT"
2. Select **Neuro Rehab Specialist**
3. Enter your zip code
4. View listings near you

The screenshot displays the APTA website interface. At the top, the navigation bar includes links for 'Join/Renew', 'Find a PT' (circled in red), 'APTA Communities', 'Related Organizations', 'Store', 'Login', and 'Profile'. Below this is the APTA logo and a search bar. The main navigation menu includes 'About Us', 'Careers & Education', 'Practice & Patient Care', 'Payment', 'Advocacy', 'News & Publications', and 'For the Public'. A large banner for the 'NEXT APTA Annual Conference & Expo' is visible, along with a 'Join APTA TODAY!' call to action.

The 'ChoosePT' search interface is shown below, with a red arrow pointing to the 'Find a PT' button. The 'Find a PT' button is highlighted in orange. Below it, the 'Find a PT' section is active, showing a search criteria dropdown menu. The dropdown menu is open, displaying a list of specialist categories: 'Find By Specialist', 'Cardiovascular and Pulmonary' (highlighted), 'Clinical Electrophysiologic', 'Geriatric', 'Neurologic', 'Oncologic', 'Orthopaedic', 'Pediatric', 'Sports', and 'Women's Health'. The 'Find By Specialist' option is also visible at the bottom of the dropdown. A red arrow points from the 'Find a PT' button to the 'Find By Specialist' dropdown menu.

Limit results to only Board-Certified Specialists.

# Acknowledgements

*Special  
Thanks*

TO THE PARTICIPANTS  
IN OUR STUDIES

Center for Movement Studies  
Kennedy Krieger Institute  
Baltimore, MD



# References

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Q & A





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Q&A

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The National MS Society exists because there are people with MS. **Our vision is a world free of MS.** Everything we do is focused so that people affected by MS can live their best lives as we stop MS in its tracks, restore what has been lost and end MS forever.



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life with multiple sclerosis



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# Webinar Series



## Symptom Management: Sensory Components

Tuesday, July 14, 2020

*Presented by:*



Genentech

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