Expert Briefings
Parkinson's Foundation

WELCOME TO EXPERT BRIEFINGS

A Balancing Act – Freezing and Fall Prevention in Parkinson's Disease

- The program will begin at the top of the hour
- Meeting attendees will be muted

Better Lives. Together.

Expert Briefings
Parkinson's Foundation

James Beck, PhD
Chief Scientific Officer, Parkinson's Foundation

Colum MacKinnon, PhD
Professor, Department of Neurology, Institute of Translational Neuroscience, University of Minnesota

Better Lives. Together.

Our Mission

The Parkinson's Foundation makes life better for people with Parkinson's disease by improving care and advancing research toward a cure. In everything we do, we build on the energy, experience and passion of our global Parkinson's community.

We have everything you need to live better with Parkinson's.

Our Goals

To help our global community live better with Parkinson's, we pursue **three goals:**

- **Improve care for everyone with Parkinson's**
- **Advance research toward a cure**
- **Empower and educate our global community**

Your Parkinson's community across the globe

33 countries represented around the world:

- United States of America
- Jamaica
- Dominican Republic
- Puerto Rico
- Barbados
- Trinidad and Tobago
- Panama
- Colombia
- Peru
- Uruguay
- Norway
- Finland
- Ireland
- Netherlands
- United Kingdom
- Poland
- Switzerland
- Monaco
- Portugal
- Israel
- Ghana
- Nigeria
- South Africa
- Kazakhstan
- India
- Bangladesh
- Thailand
- Vietnam
- Singapore
- Philippines
- Australia
- New Zealand

Poll: Getting to Know You

What best describes your connection to Parkinson's disease?

- Person with PD
- Spouse/Partner
- Parent has/had PD
- Other family
- Healthcare Professional
- Physician/Clinician
- Scientist/Researcher
- Nurse/Nurse Practitioner
- Other

Today's Sponsor

PD Health @ Home is presented by

whose generosity has made this programming possible.

For Your Convenience

Recording

Expert Briefings are recorded and archived on
www.Parkinson.org/ExpertBriefings

Meet Your Expert

Colum MacKinnon, PhD

- Professor, Department of Neurology
- Institute of Translational Neuroscience
- University of Minnesota

Better Lives. Together.

Expert Briefings

Parkinson's Foundation

Morris K. Udall Centers of Excellence for Parkinson's Disease Research

National Institute of Neurological Disorders and Stroke

Movement Disorders Laboratory

Department of Neurology

University of Minnesota

A Balancing Act: Freezing and Fall Prevention in Parkinson's

Colum D. MacKinnon, PhD

Department of Neurology

Institute for Translational Neuroscience

University of Minnesota

Better Lives. Together.

Disclosures

Expert Briefings
Parkinson's Foundation

None

Objectives

Parkinson's Foundation

1. Learn the factors contributing to falls in PD
2. Learn of the principles of balance
3. Identify six primary barriers to safe and effective standing and walking
4. Discuss strategies and interventions to improve posture, balance and walking and prevent falls
5. Discuss the ingredients for quality movements.

Falls in Parkinson's Disease

Parkinson's Foundation

Significant cause of:

- Disability
- Reduced independence
- Reduced quality of life in people

Approximately 60% of people with PD will fall each year,

- 2/3rds of these people fall recurrently
- The severity and frequency of falls increases as disease progresses

Consequences of falls include:

- injuries (e.g. incidence of hip fracture is 4x times higher in people with PD)
- restriction of activities of daily living
- fear of falling
- high levels of caregiver stress

Pilcioni et al., Int J Environ Res Public Health, 16, 2019

Primary contributors to falls in PD

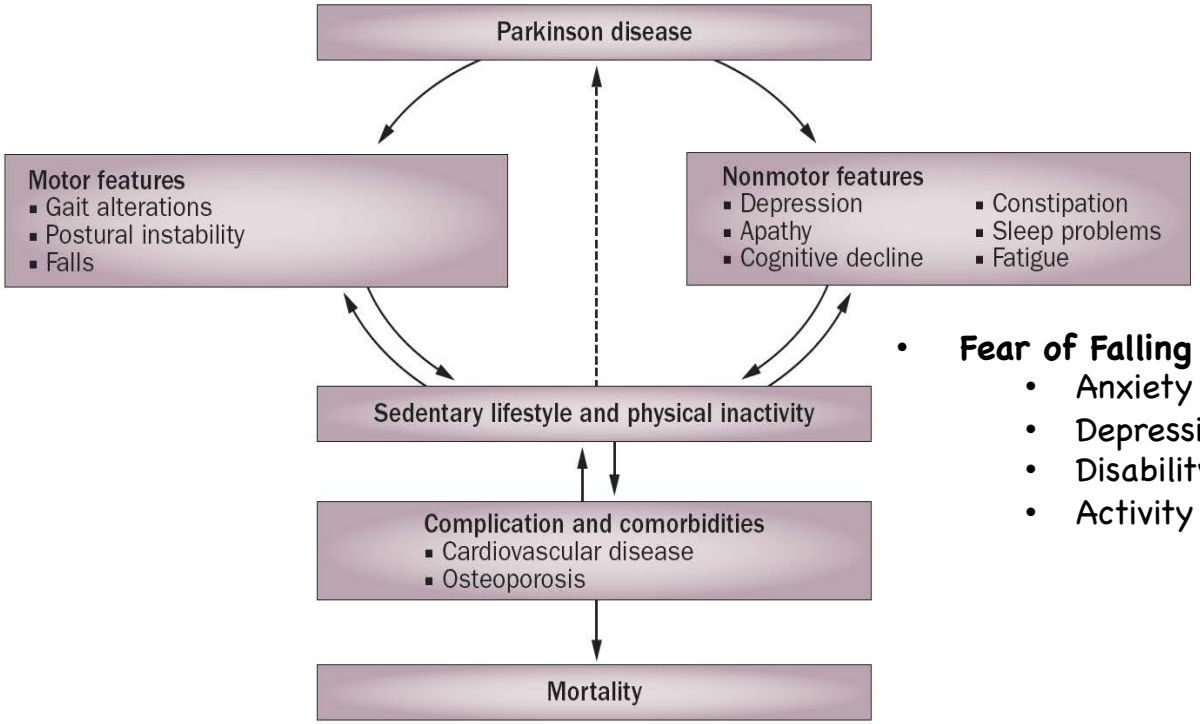
- **Postural instability**
- **Freezing of gait (FoG)**
- *Freezing of gait, together with postural instability, explain approximately 80% of falls*

Falls in PD mostly occur during:

- Turning (24%)
- Bending forward (16%)
- Standing up (15%)
- Other (45%) (e.g. initiating walking, trying to avoid an obstacle)

- ****Falls usually happen unrelated to dominant environmental hazards, but rather to <u>self-induced movements of the center of mass</u>**

Vicious Circle of Parkinson's disease



- **Fear of Falling** is Associated with:
  - Anxiety
  - Depression
  - Disability
  - Activity avoidance

Speelman et al. Nature Reviews Neurology 2011

Breaking the Cycle

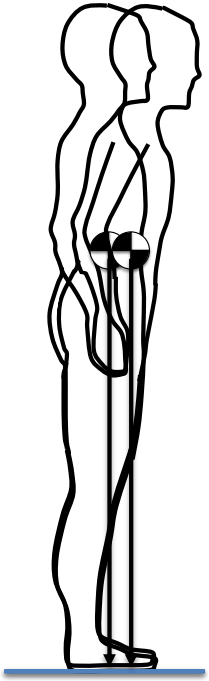
Parkinson's Foundation

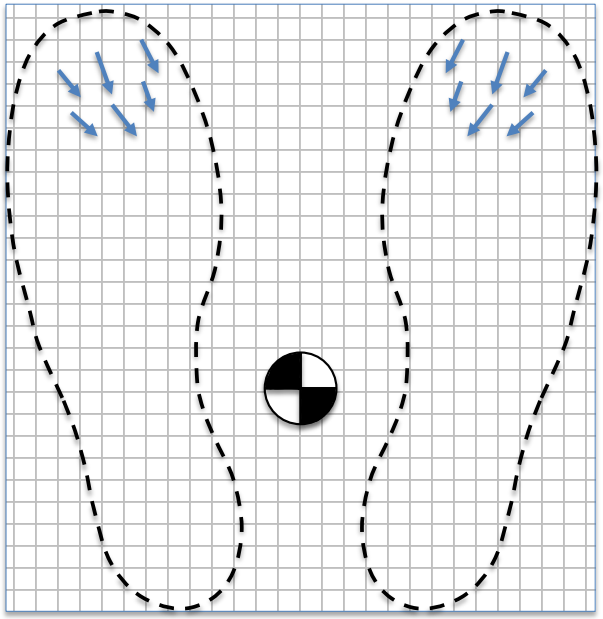
Recipe for a Great Movement Hotdish

1. Strength (4 cups)
2. Range of motion (4 cups)
3. Postural Challenge (to taste; increase as needed)
4. Cognitive load (to taste; increase as needed)
5. Tater Tots

Principles of balance

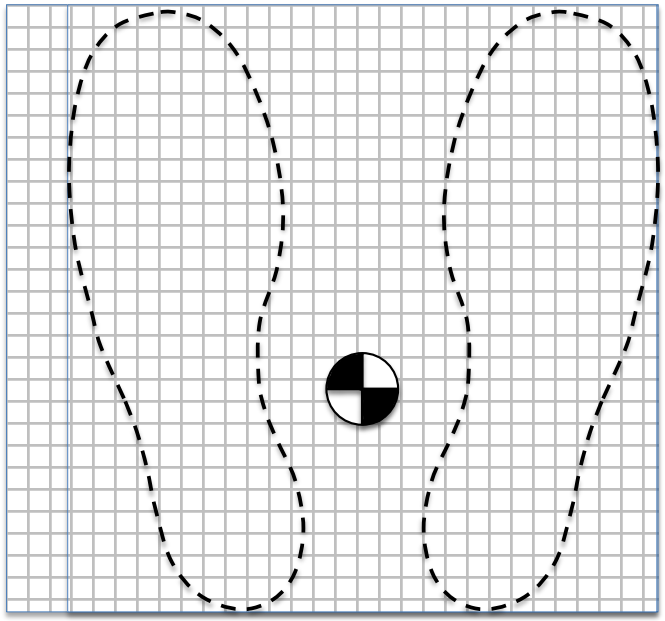
= Center of Mass



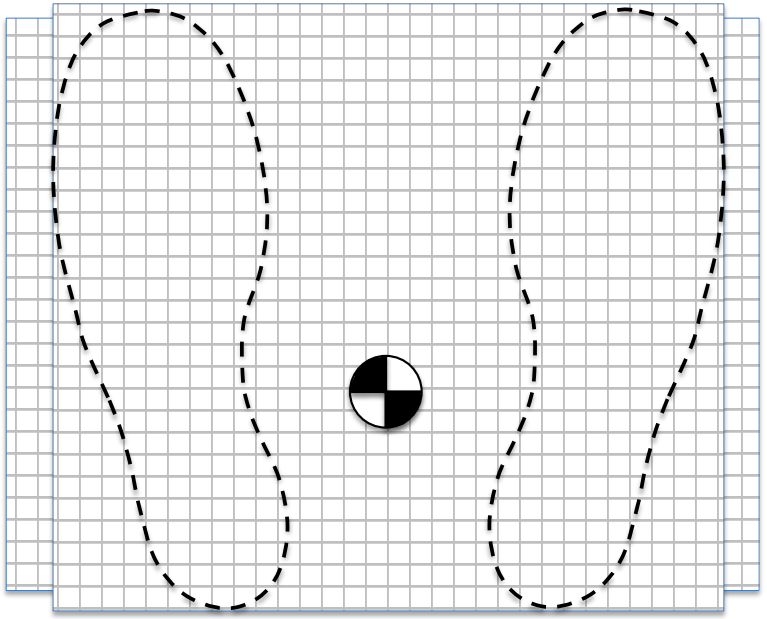


Principles of balance: Increasing base of support

Widen Stance Width



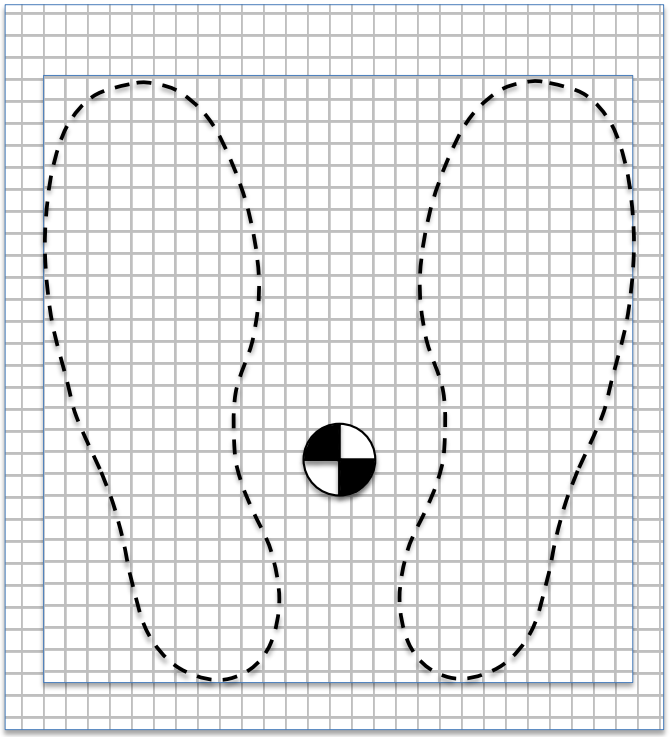
Externally Rotate Feet
(wider side-to-side, but shorter front-to- back)



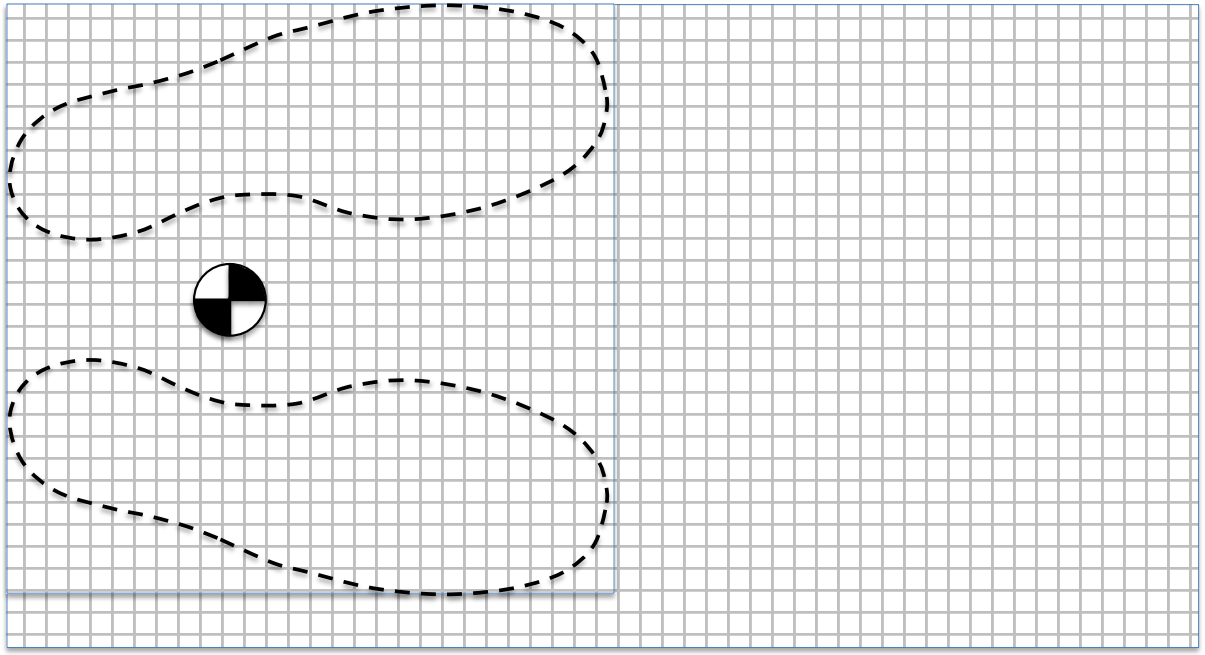
Principles of balance: Increasing base of support

Parkinson's Foundation

Lengthen and widen Stance Width

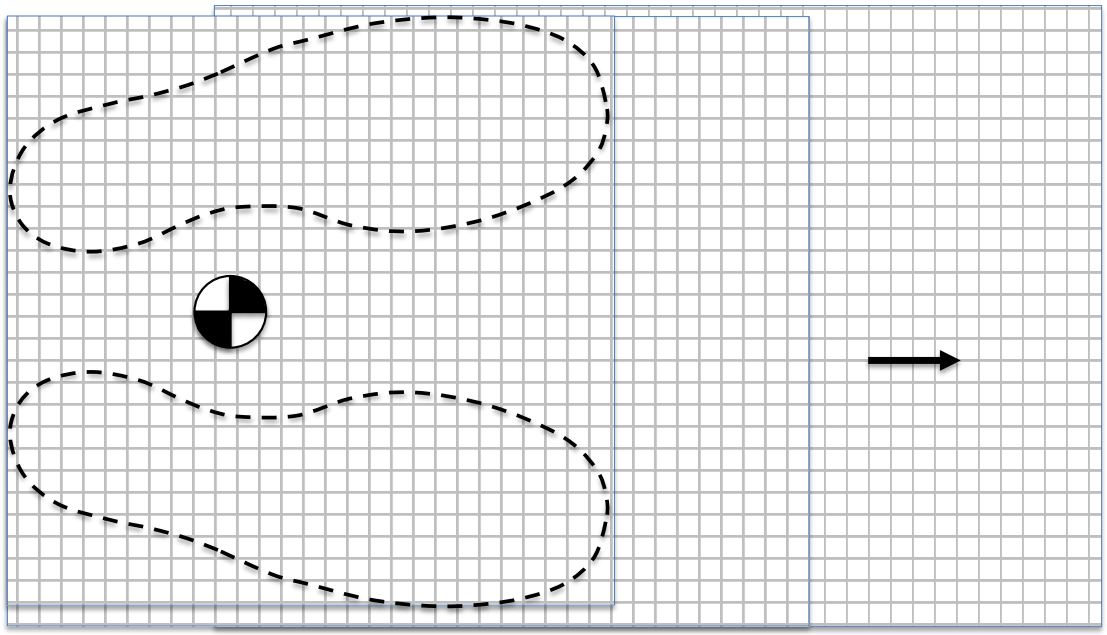


Principles of balance



1. Reactive Balance
2. Anticipatory

Principles of balance

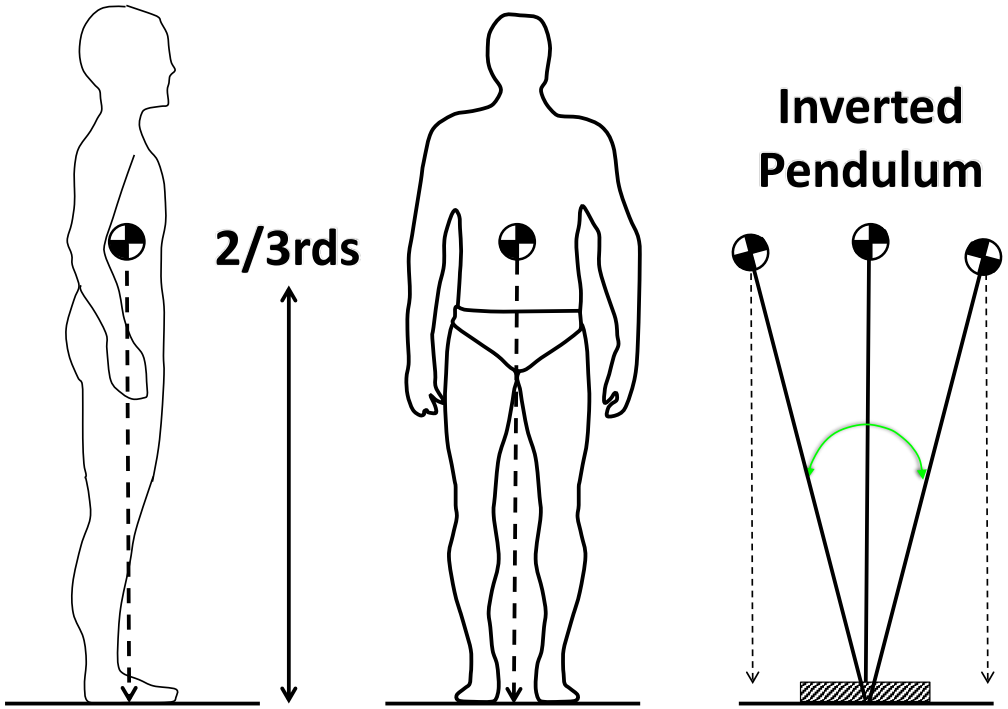


The Challenge of Standing while Walking

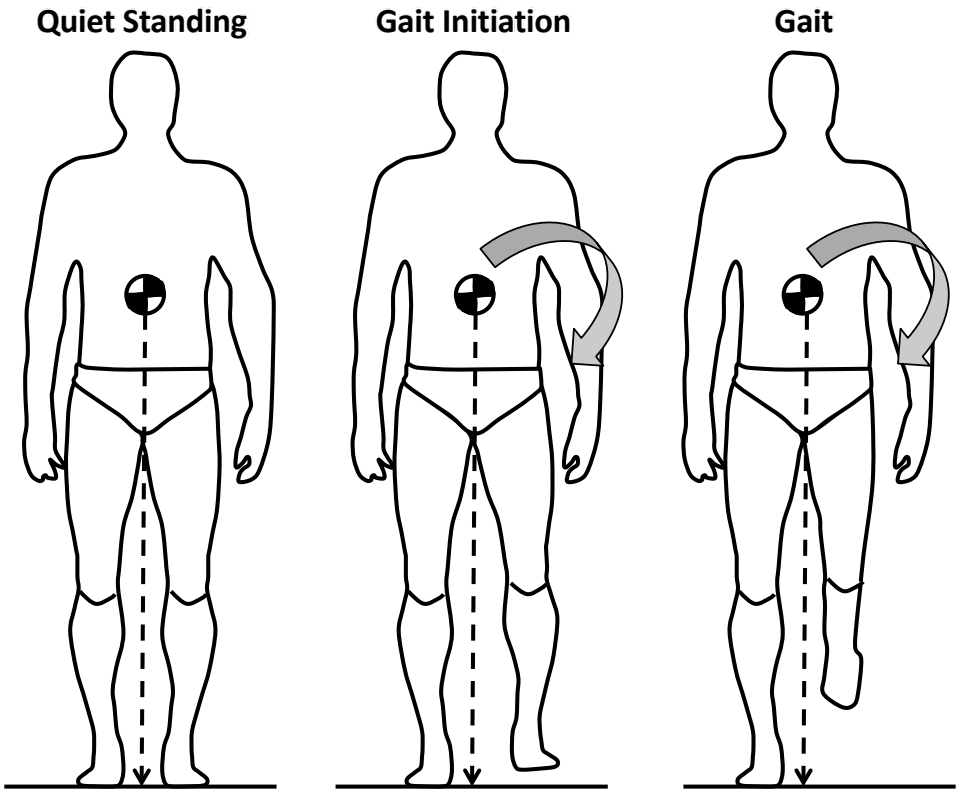
The Challenge of Standing while Walking

The Challenge of Standing

The 2/3rds-2/3rds Problem



The Challenge of Standing



Major Goals of the Motor System During Gait

(from Winter DA (1993) Medical Progress Through Technology. 19:61-81.)

Parkinson's Foundation

1. **Support**: Maintenance of support of the upper body (i.e. prevent a vertical collapse of the lower limb during stance)

2. **Balance**: Maintenance of upright posture and balance of the total body

3. **Foot trajectory**: Control of foot trajectory to achieve safe ground clearance, an effective step, and a gentle initial contact

4. **Energy Generation**: Generation of mechanical energy at key points in time in the gait cycle to maintain present velocity or to increase the forward velocity of the body

5. **Energy Absorption**: Generation Absorption of mechanical energy for shock absorption, stability or to decrease the forward velocity of the body

6. **Head Stability**: Attenuation of accelerations transmitted to the head

Freezing of Gait (FoG)

Definition: Paroxysmal episodes where there is an inability to step effectively, despite attempting to do so.

- a marked reduction or complete cessation in forward progression of the feet despite attempting to do so
- characterized by trembling of the knees, short shuffling steps or complete akinesia, and usually last 1–2 s, although longer periods can occur.

- FoG affects over half of people with Parkinson's disease

When do FoG episodes typically occur?

- **Turns**
- **Passing through narrow or congested passages (e.g. doorways)**
- **Approaching a destination (such as a chair)**
- **Starting to walk (gait initiation)**

Transitions in movement state

Factors that can increase the severity (incidence, duration) of FoG episodes:

- Anxiety (stress)
- Cognitive loading (dual-tasking)
- Environmental conditions (e.g reduced visual input (e.g. darkened room)

FoG is more pronounced with advanced disease and when OFF dopaminergic medication

Features of Freezing of Gait

Parkinson's Foundation

1. Hastening, or an increase in cadence with a decrease in step length, often precedes FoG

2. At the onset of the freeze, the foot or toe does not leave the ground or only barely clears the support surface
    - the body keeps moving forward despite the failed step
    - this an important feature to precedes a fall

3. After the failed step, there is often a period of alternate trembling of the legs that occurs at a frequency of 3–8 Hz
    - During this period, any further attempt to step is unlikely to be successful

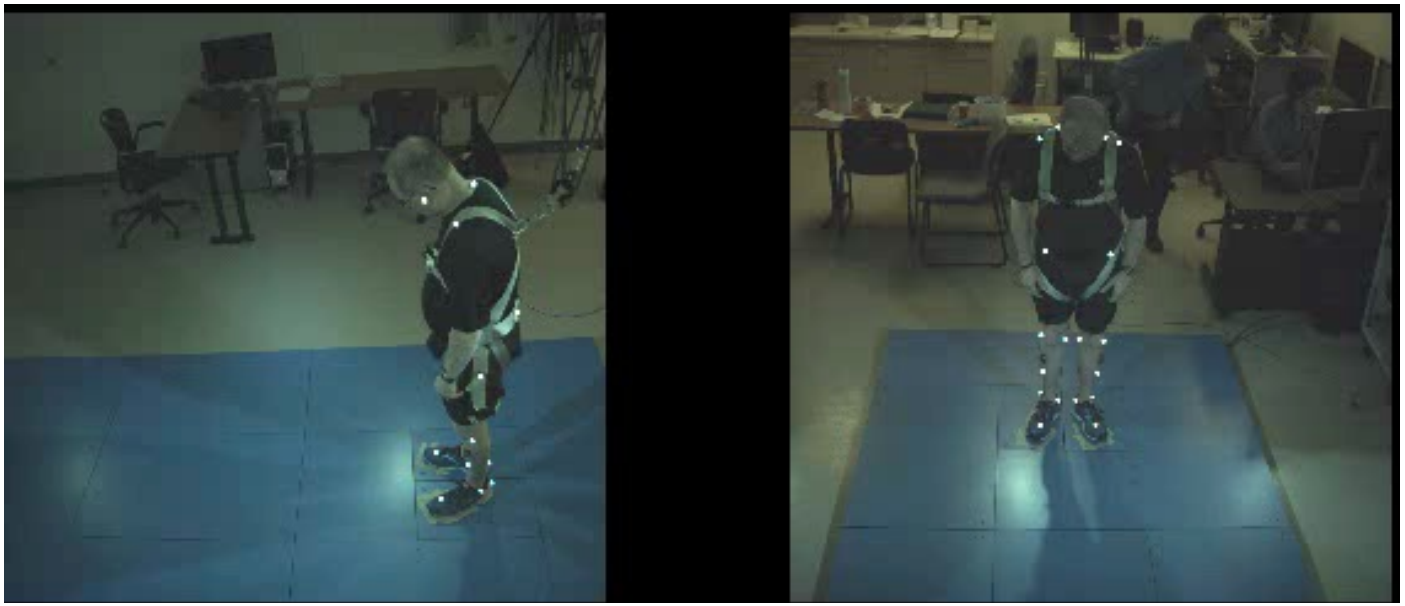
4. FoG is commonly precipitated or relieved by various cues

5. FoG can be asymmetrical, affecting mainly one foot or being elicited more easily by turning in one direction.

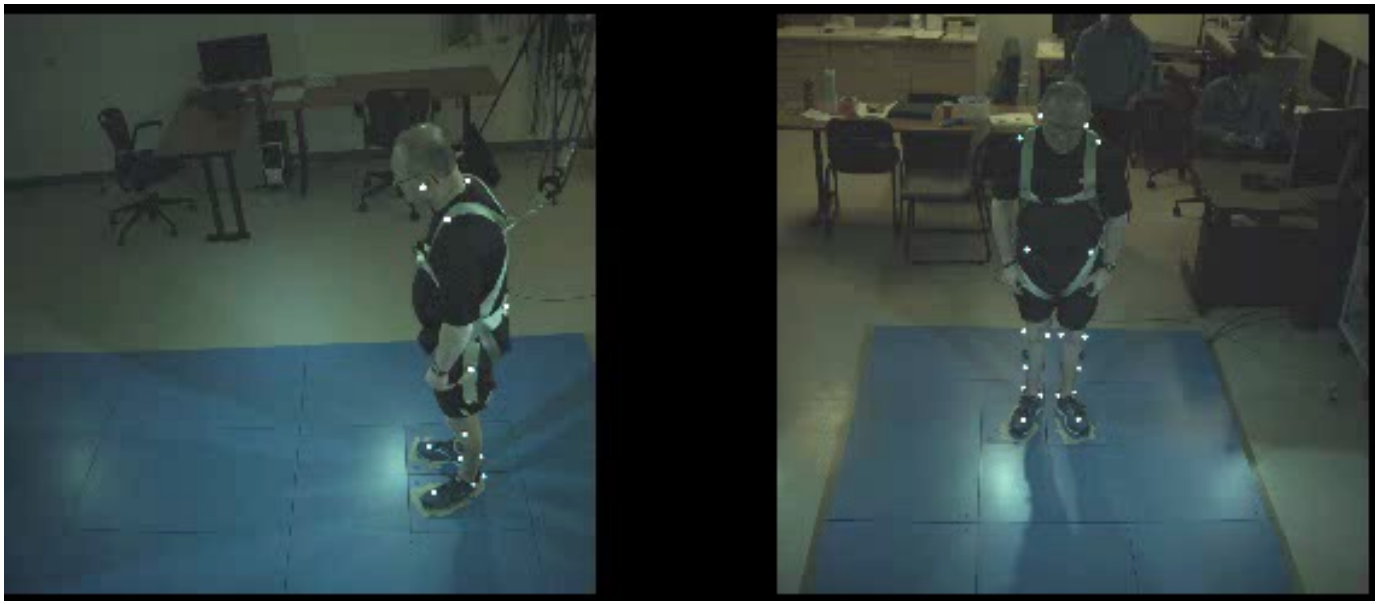
Freezing of Gait

Snijders & Bloem, New England J Med, 2010

Freezing During Gait Initiation



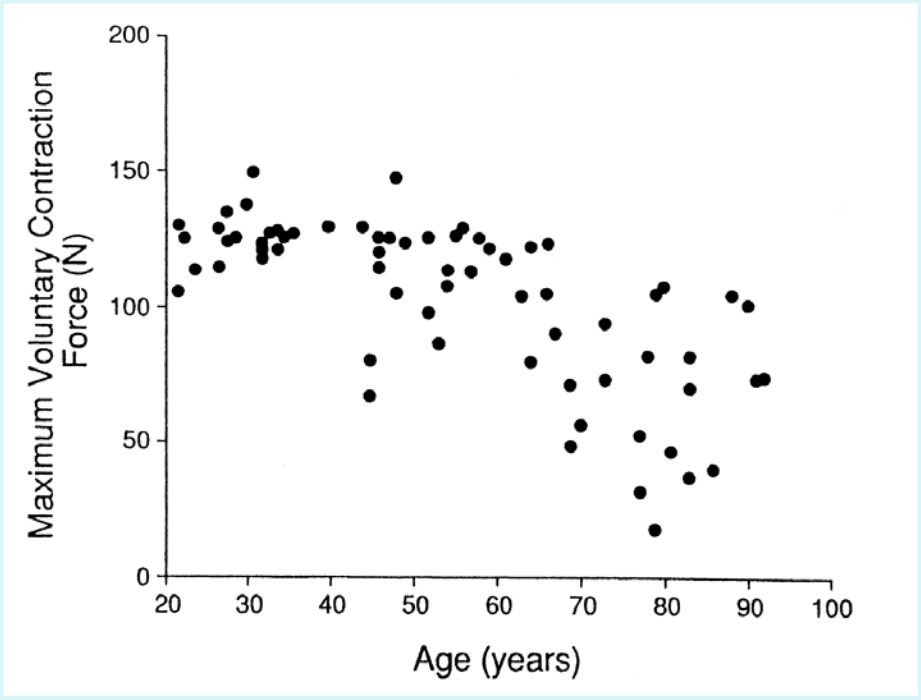
Freezing During Gait Initiation



Barriers to safe and effective standing and walking

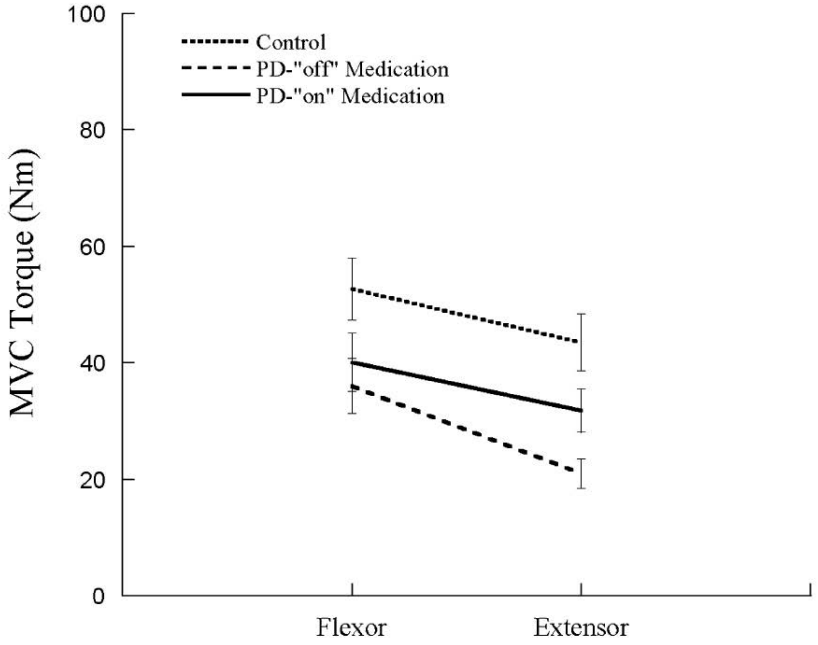
- **FORCE GENERATION (strength)**
- RANGE OF MOTION
- MOVEMENT RATE
- SELF INITIATION
- BALANCE AND POSTURE
- COGNITIVE RESERVE (DUAL-TASKING)

Age Influences Muscle Strength



Narici et al. J App Physiol, 1991

Strength in Parkinson's Disease



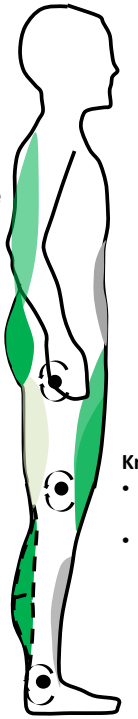
- Force production is reduced in PD
- Deficits are greater in **extensors** than flexors
- Strength is improved with medication or DBS, but not to normative states

Robichaud et al., Exp Brain Res, 156, 2004

Key Muscles of Gait and Postural Stability

Parkinson's Foundation

MUSCLES OF VERTICAL SUPPORT



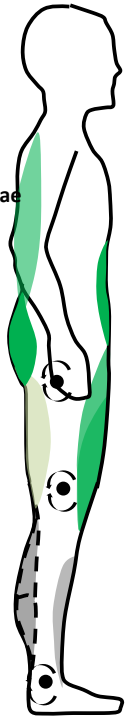
Back Extensors
- Erector Spinae

Hip Extensors
- Gluteus Maximus
- Hamstrings

Knee Extensors (Quads):
- Vastus lateralis, medias, intermedius
- Rectus Femoris

Ankle Extensors:
- Soleus
- Gastrocnemius

MUSCLES OF TRUNK SUPPORT



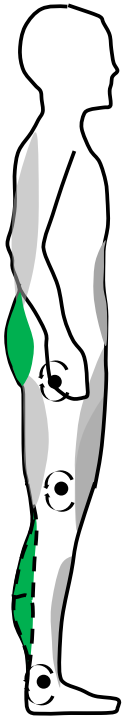
Back Extensors
- Erector Spinae

Hip Extensors
- Gluteus Maximus
- Hamstrings

Trunk Flexors
- Rectus Abdominus

Hip Flexors
- Rectus Femoris

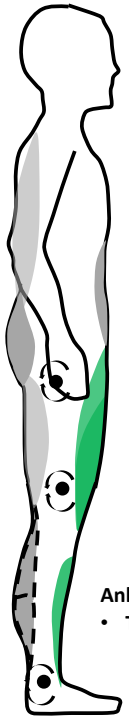
MUSCLES OF GAIT POWER



Hip Extensors
- Gluteus Maximus
- Hamstrings

Ankle Extensors:
- Soleus
- Gastrocnemius

MUSCLES OF TOE CLEARANCE



Hip Flexors
- Rectus Femoris

Ankle Dorsiflexors:
- Tibialis Anterior

Guidelines for strength training

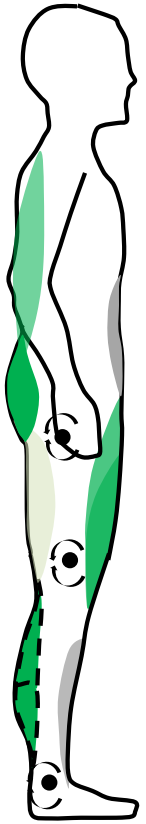
Parkinson's Foundation

- **Progressive resistance exercise**:
  - 2 to 3 times/wk
  - for 20 to 60 minutes or more.

- Specifically, progressive resistance exercise that systematically increases the intensity of muscular demand over time is recommended to maximize neuromuscular gains.

- Target all major muscle groups, but focus on:
  - Extensors (ankle, knee, hip, back)
  - Hip flexors and extensors
  - Hip abductors and adductors

- Additionally, progressive resistance exercises may be most beneficial when combined with:
  - Instability training (perturbations, balance on uneven surfaces)
  - flexibility exercises and tasks that emphasis a large ROM

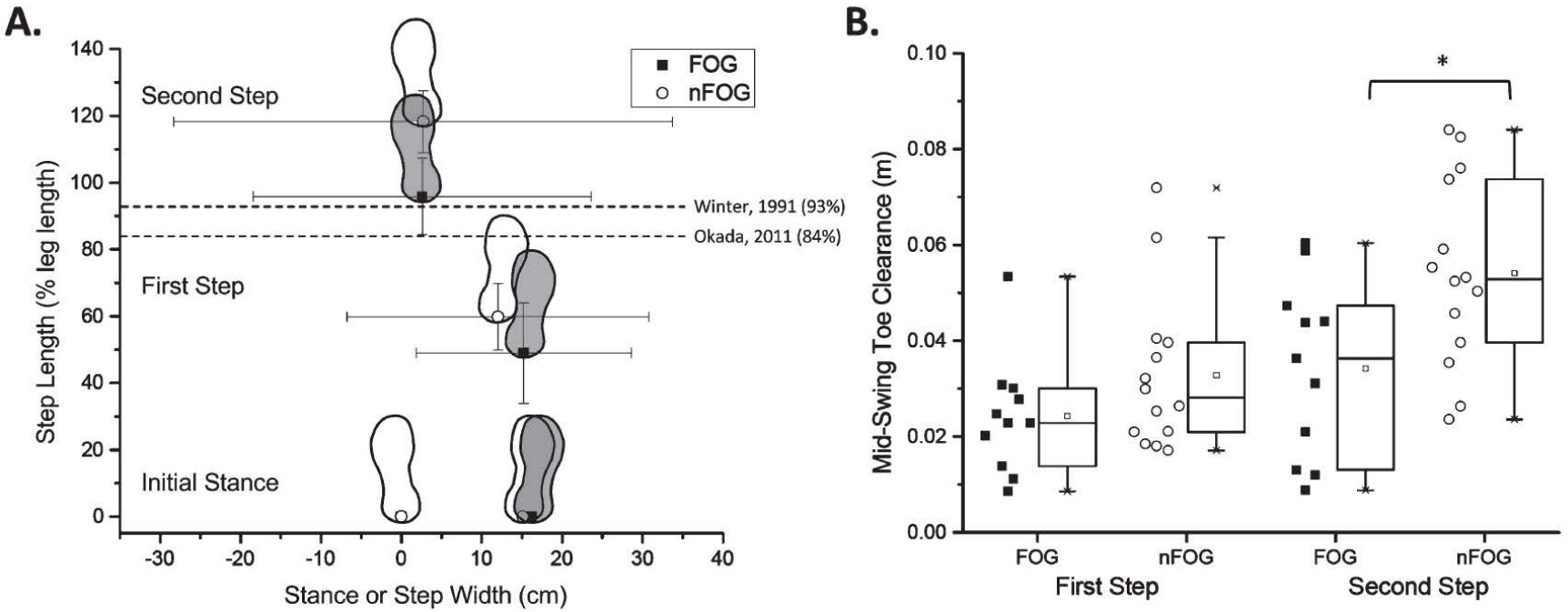


Barriers to safe and effective standing and walking

Parkinson's Foundation

- FORCE GENERATION (strength)
- **RANGE OF MOTION**
- MOVEMENT RATE
- SELF INITIATION
- BALANCE AND POSTURE
- COGNITIVE RESERVE (DUAL-TASKING)

Reduced step length and toe-clearance in FOG during gait initiation

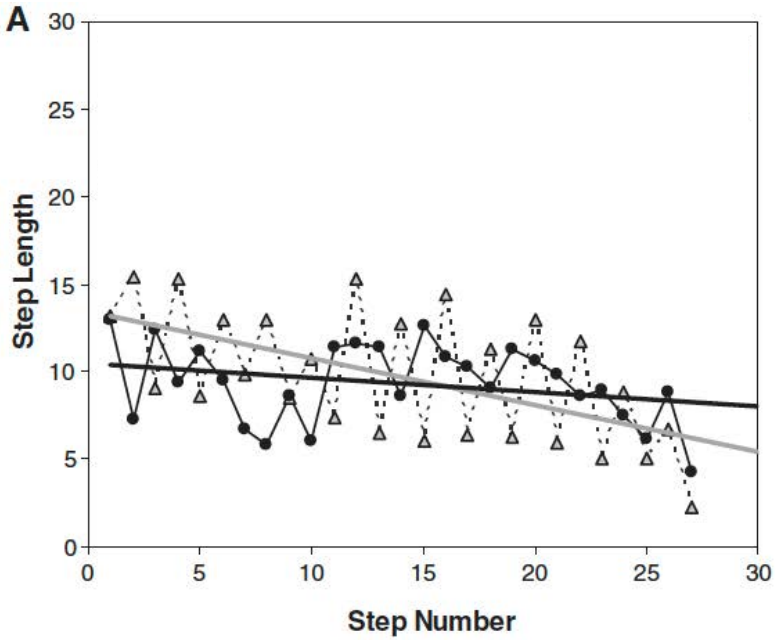


Amundsen Huffmaster et al., J Parkinson's Disease, 10, 2020

The Gait Sequence Effect

Decreasing step length with increasing step number

PD with FOG



Increased cadence in conjunction with decrease step length often triggers or precedes a FoG event leading to a fall.

Chee et al., Brain, 132(8), 2009

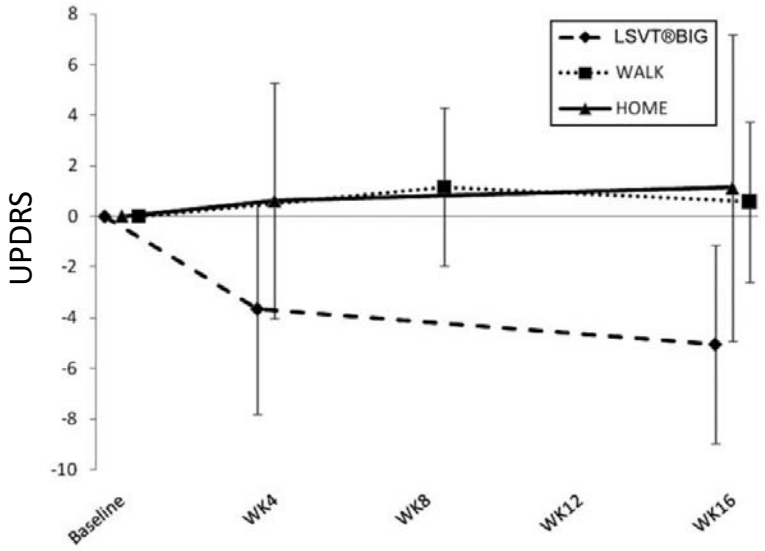
Lee Silverman Voice Therapy (LSVT LOUD & LSVT BIG)

Lee Silverman Voice Therapy (LSVT LOUD & LSVT BIG)

Parkinson's Foundation

Principles of LSVT BIG

- Amplitude (large ROM)
  - Large movements are associated with higher velocity
  - Large movements take longer to complete
- High Intensity (effort)
- Calibration (proprioceptive sense)

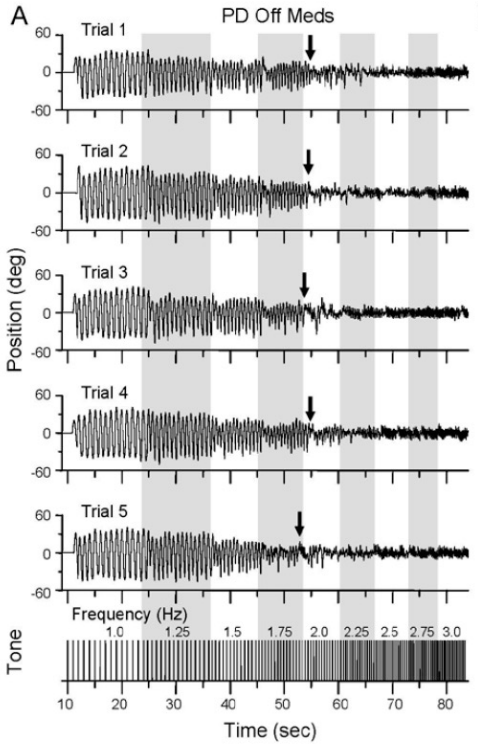


Barriers to safe and effective standing and walking

Parkinson's Foundation

- FORCE GENERATION (strength)
- RANGE OF MOTION
- **MOVEMENT RATE**
- SELF INITIATION
- BALANCE AND POSTURE
- COGNITIVE RESERVE (DUAL-TASKING)

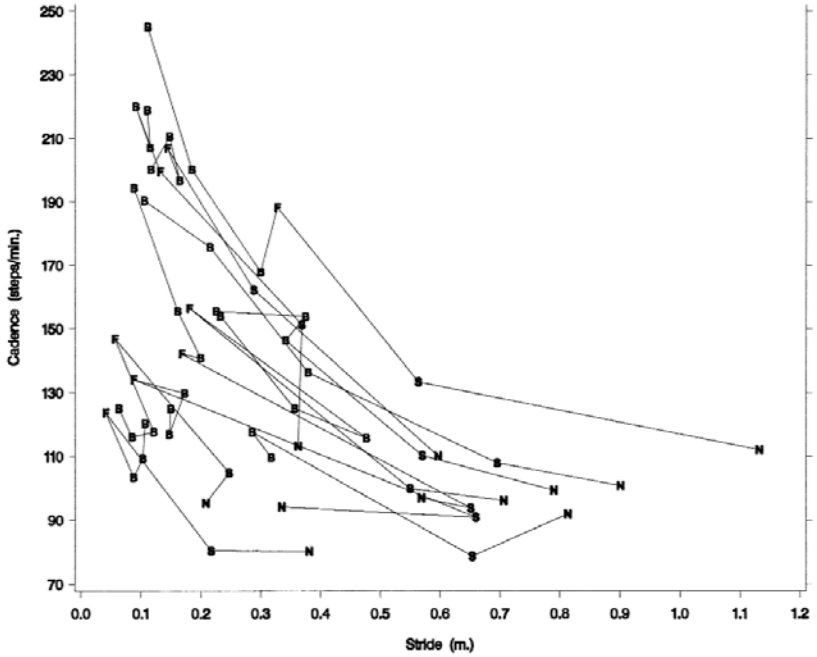
Low vs. High Tempo (Rate) Movements



Stegemöller et al., Movement Disorders, 24(8), 2009

Cadence (steps per minute and Stride Length

FOG associated with **short steps and high cadence**



Increased cadence in conjunction with decrease step length often triggers or precedes a FoG event leading to a fall.

Nieuwboer et al., Mov Disord, 16, 2001

Movement Rate Barrier

- Repetitive movements often have a rate-dependent impairment
- Individuals with PD often show impairments in limb movement at rates near 2 movements/s
    - the "2 Hz Barrier"
- This impairment is resistant to levodopa replacement therapy
- This impairment is resistant to STN-DBS therapy
- **Strategies to overcome difficulties with repetitive movements:**
    1. **Slow down (reduced the movement rate)**
    2. **Keep the movement large**
    3. **Execute the movement with vigor!**

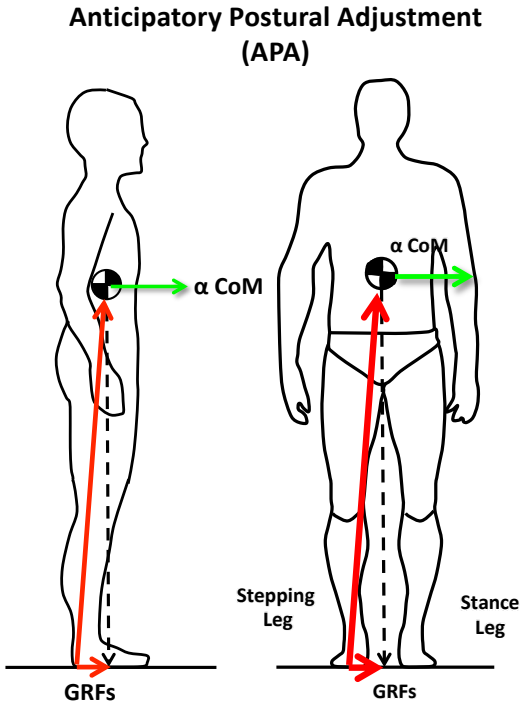
Barriers to safe and effective standing and walking

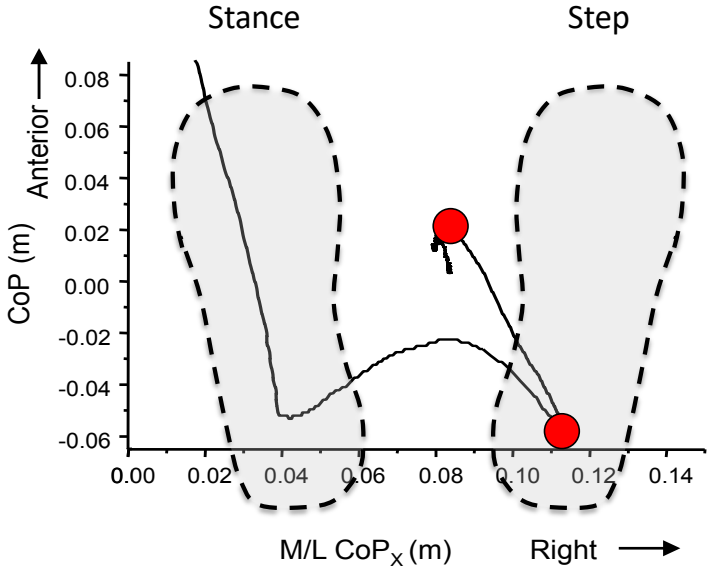
- FORCE GENERATION (strength)
- RANGE OF MOTION
- MOVEMENT RATE
- **SELF INITIATION**
- BALANCE AND POSTURE
- COGNITIVE RESERVE (DUAL-TASKING)

"Paradoxical" movement in Parkinson's disease

Snijders & Bloem, New England J Med, 2010

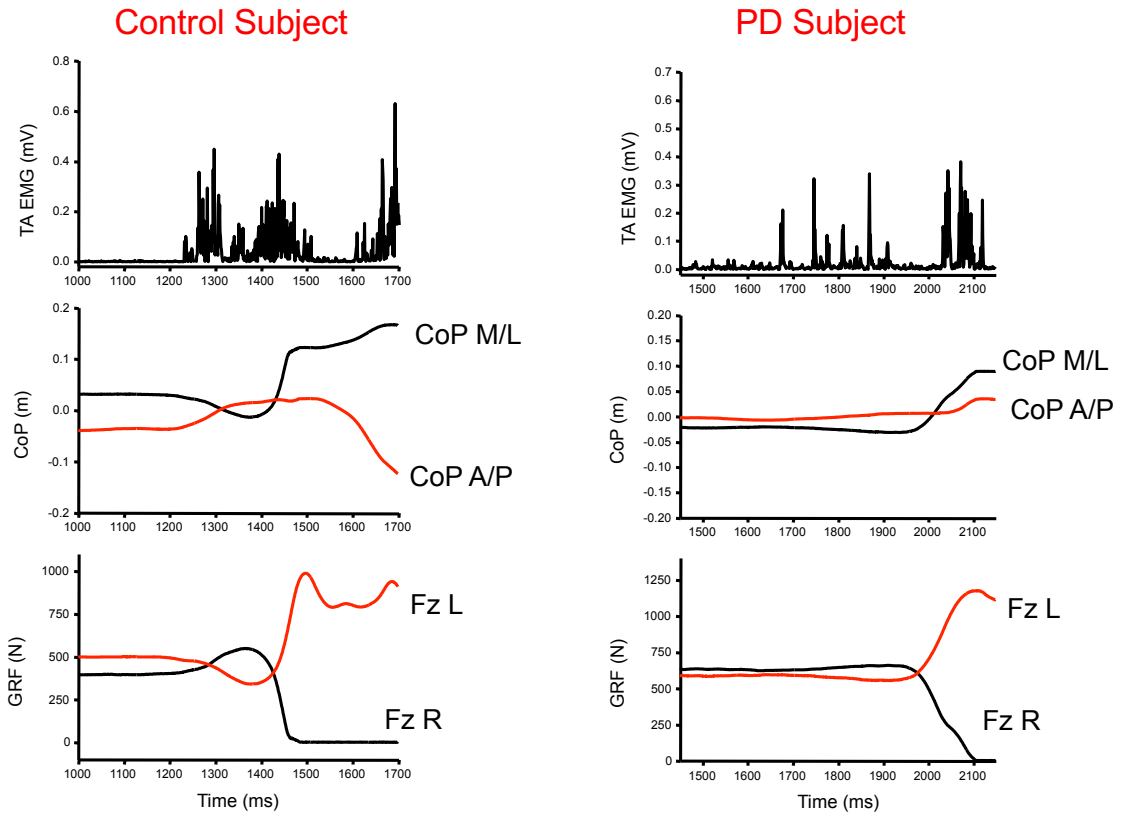
How do you initiate walking?





Step Initiation in Parkinson's Disease

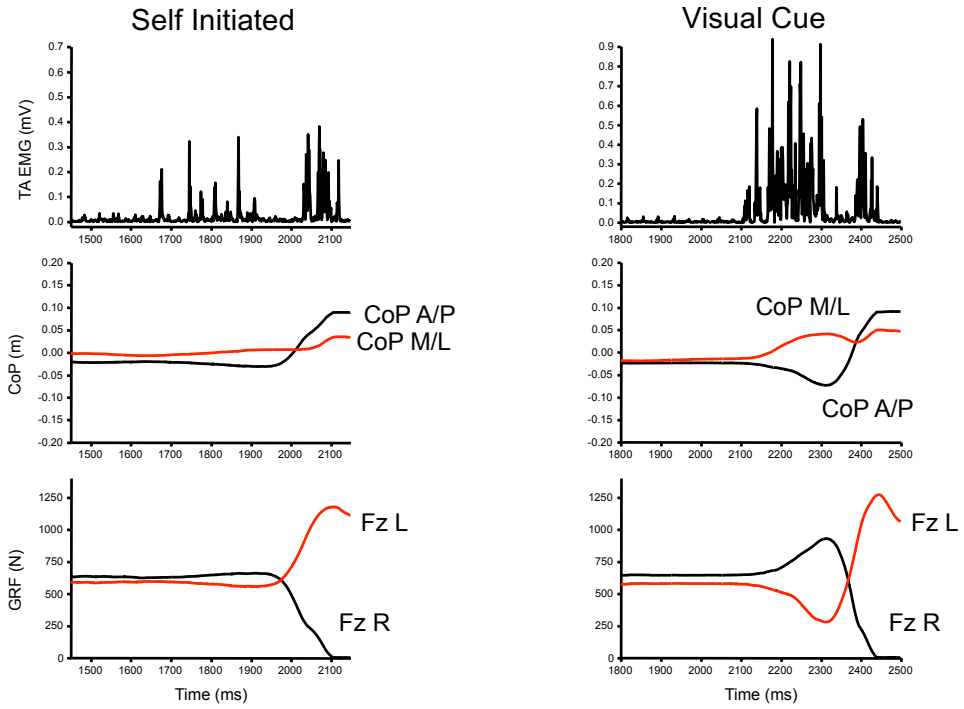
Parkinson's Foundation



Rogers et al., J Neurophysiol, 106, 2011

Impact of a simple visual cue on gait initiation in PD

Representative Parkinson's Subject

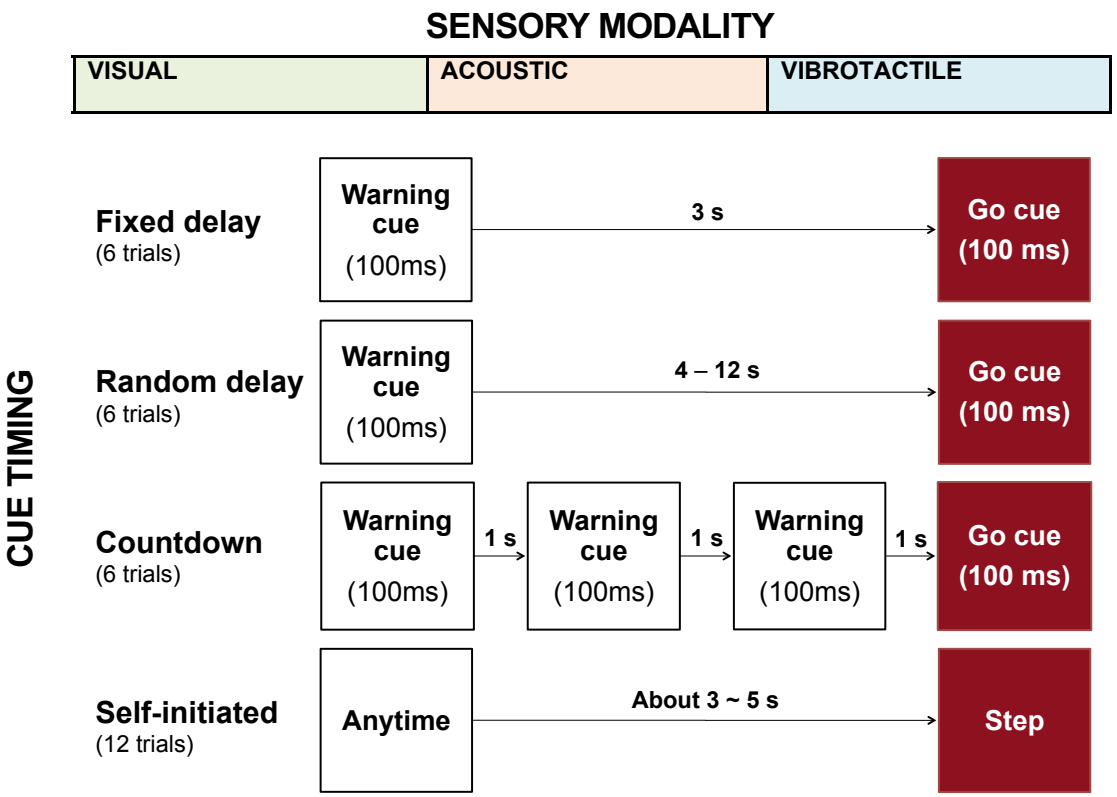


APAs Absent: 20% < 1%

Rogers et al., J Neurophysiol, 106, 2011

What is the best method to cue?

Chiahao Lu, PhD



Lu et al., Arch Phys Med Rehab, 98, 2017

What is the best method to cue?

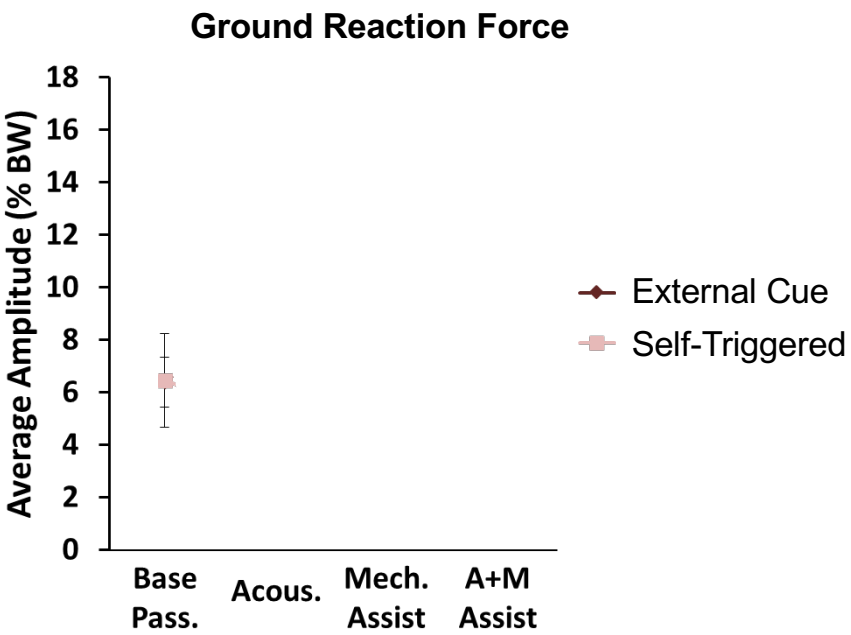
Chiahao Lu, PhD

Percentage of Trials Without an Anticipatory Postural Adjustment

SELF INITIATED	VISUAL			ACOUSTIC			VIBROTACTILE		
	FIXED	RANDOM	COUNT-DOWN	FIXED	RANDOM	COUNT-DOWN	FIXED	RANDOM	COUNT-DOWN
17 ± 25%	1 ± 3%	0 ± 0%	2 ± 10%	0 ± 0%	0 ± 0%	2 ± 7%	1 ± 4%	2 ± 5%	2 ± 5%

Lu et al., Arch Phys Med Rehab, 98, 2017

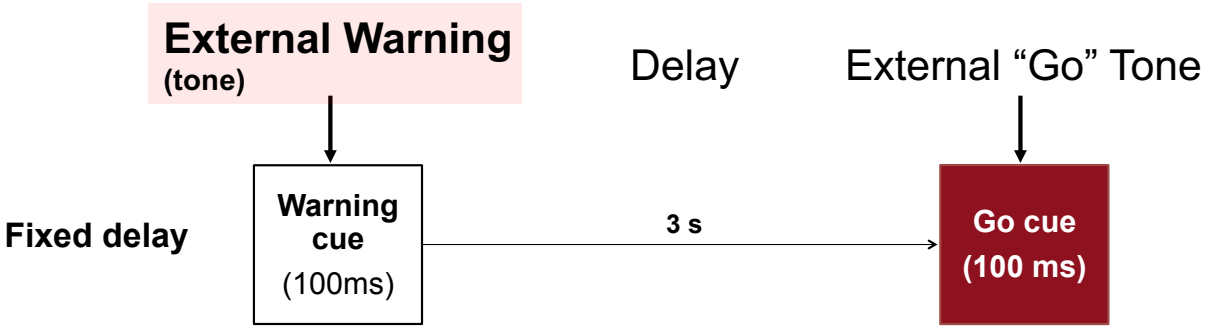
Can you "self-trigger" gait initiation?



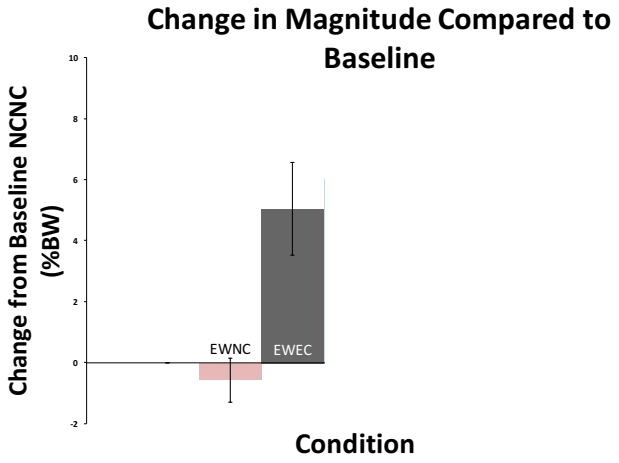
Matthew Petrucci, PhD

Petrucci et al., J Parkinson's Disease, 12, 2022

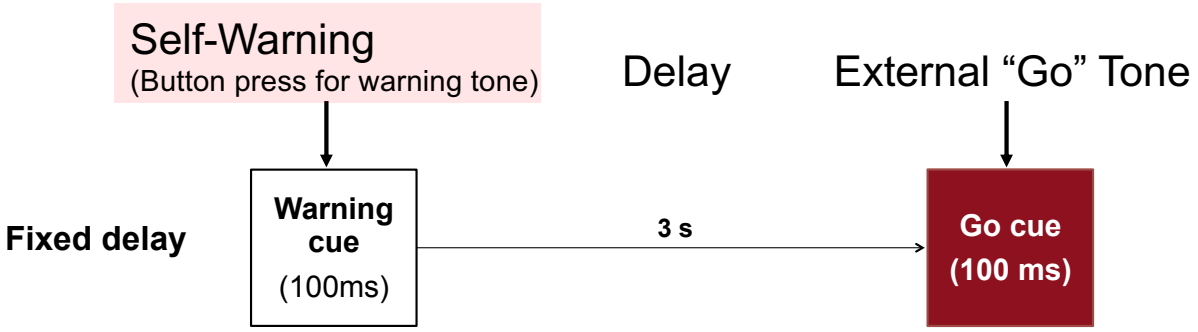
Overcoming the "self-initiation" problem: Use a "self-warning" cue



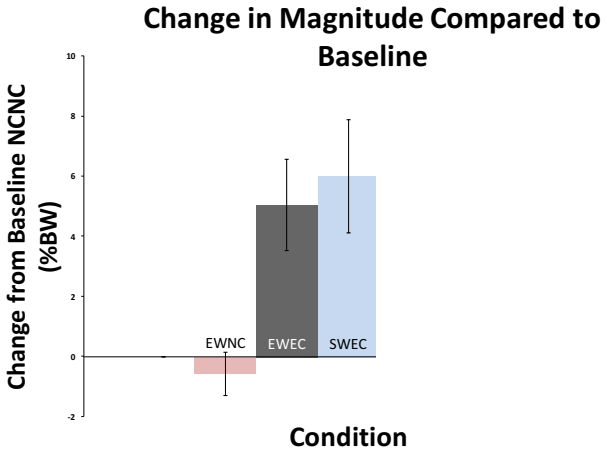
Matthew Petrucci, PhD



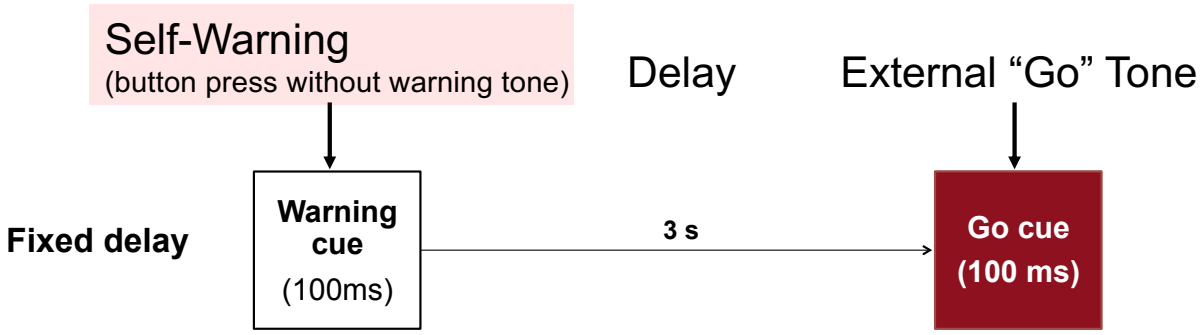
Overcoming the "self-initiation" problem: Use a "self-warning" cue



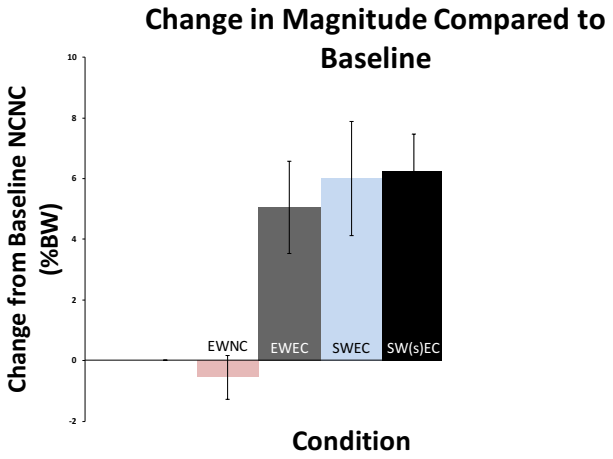
Matthew Petrucci, PhD



Overcoming the "self-initiation" problem: Use a "self-warning" cue



Matthew Petrucci, PhD



Barriers to safe and effective standing and walking

Parkinson's Foundation

- FORCE GENERATION (strength)
- RANGE OF MOTION
- MOVEMENT RATE
- SELF INITIATION
- **BALANCE AND POSTURE**
- COGNITIVE RESERVE (DUAL-TASKING)

Exercise Programs that Improve Balance

Parkinson's Foundation

Elements of effective balance programs

- Can be performed in a safe environment (postural support as needed)
- Involves weight-bearing (progressive as necessary)
- Progressive
  - Movements puts the body in an extended position that challenges the postural control system (center of mass outside the base of support)
  - Advanced): Challenging terrain; obstacles, uneven surfaces, uphill/downhill
- High cognitive, proprioceptive, and motor control demands
- *3x per week, 30-40 minutes*

Examples:

- Aqua Aerobics (water provides support & resistance)
- Tai Chi (whole body, controlled, balance challenging)
- Dance (e.g. tango) (social, balance challenging)
- Rock Steady Boxing (balance challenging, vigor!)
- Yoga (controlled, balance challenging)

Falls Prevention Training

Weight-bearing Exercise for Better Balance (WEBB)

PD-WEBB program: www.webb.org.au

Grading components from easiest to hardest		
Centre of mass *Aim to increase number of body segments involved*	***Base of support*** *Aim to reduce size of base provided by feet*	***Arm support*** *Aim to reduce support*

Exercise Components:

1. **Progressive resistance training**: participants wears a vest or belt with no weight or up to 2% of body weight added before commencing strength exercises. Gradually increase resistance or intensity so that person can do 2 sets of 10 repetitions max.
2. **Endurance:** aim for 30 to 60 minutes of moderative intensity exercise and lower limb strengthening exercises 3 times a week

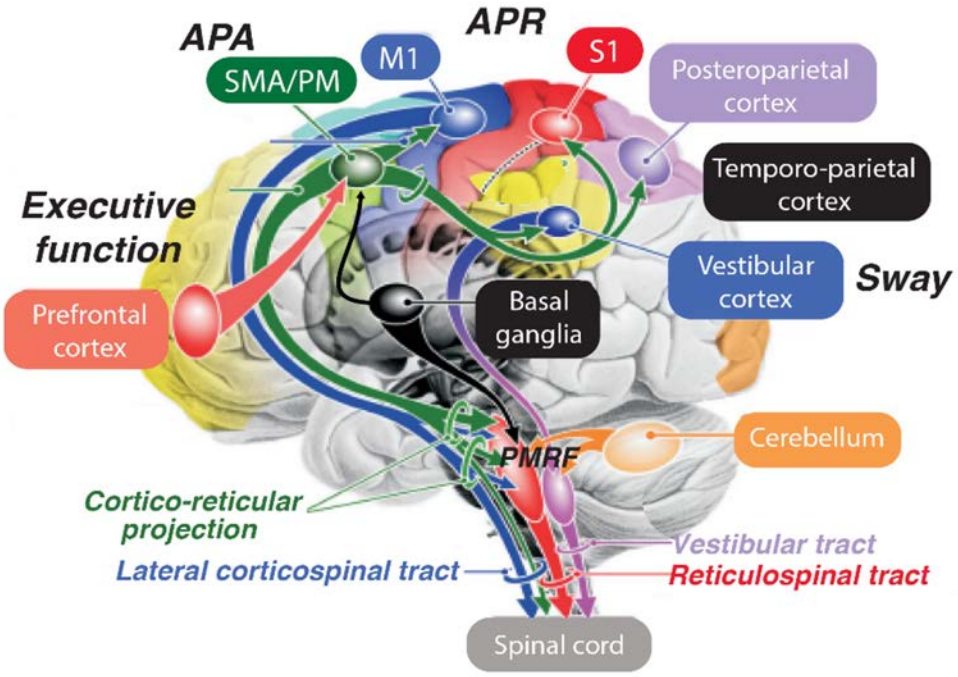
3. **Exercises:**
   - Standing with a decreased base of support
   - Graded reaching during standing
   - Stepping in directions
   - Walking practice
   - Sit-to-stand
   - Heel raises
   - Lateral step-up, forward step-up
   - Half-squats
   - Bike, treadmill, overground walking or sit-to-stand endurance

Barriers to safe and effective standing and walking

Parkinson's Foundation

- FORCE GENERATION (strength)
- RANGE OF MOTION
- MOVEMENT RATE
- SELF INITIATION
- BALANCE AND POSTURE
- **COGNITIVE RESERVE (DUAL-TASKING)**

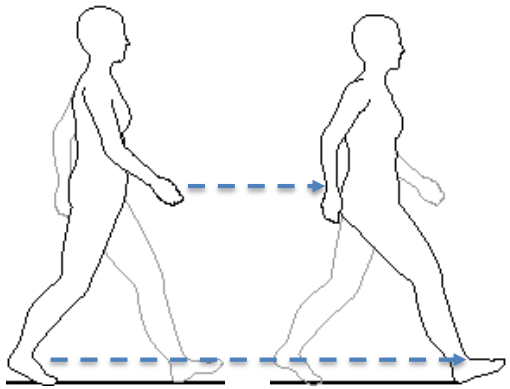
Brain circuits involved in maintaining posture, balance and gait



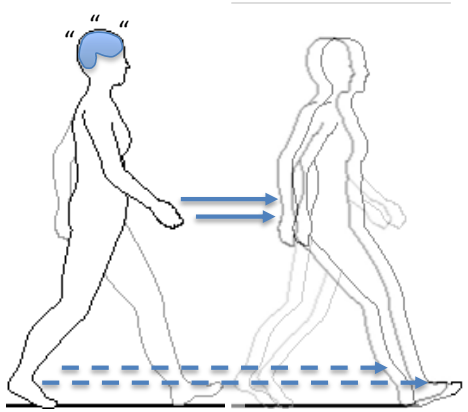
- Spinal cord (execution)
- Brainstem (pattern and timing)
- Basal ganglia (selection, gain, reward)
- Cerebellum (error detection/correction)
- **Cortex (planning, initiating, decision-making, dual-tasking)**

Role of cognitive decline in gait and postural impairment

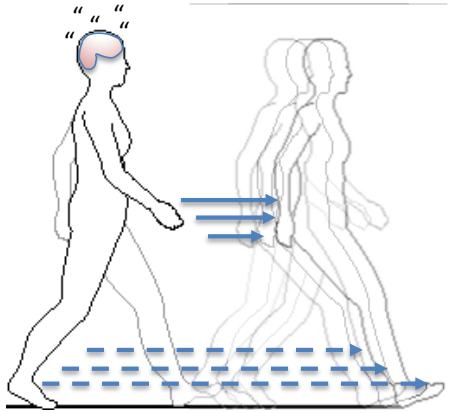
Gait is Automatic
- Performed without thought
- Consistent step length and timing
- Able to dual-task without interruption of gait cycle



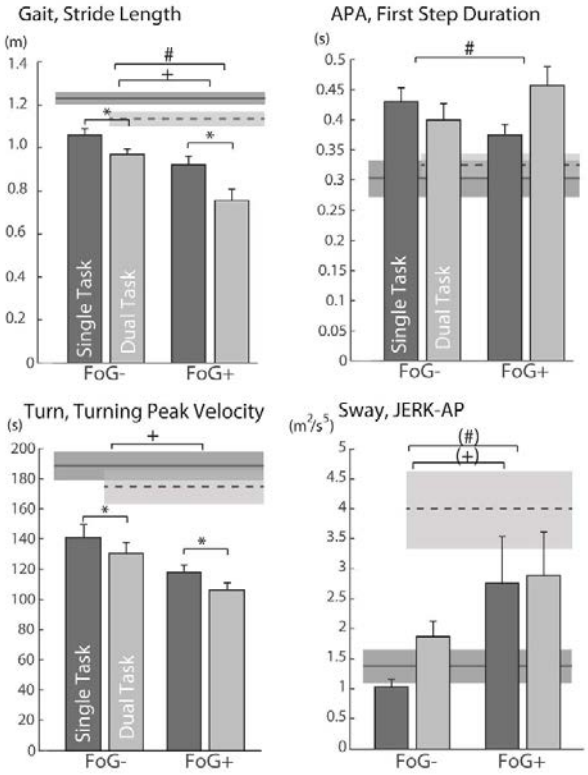
Decreased Automaticity
- Increased variability of step length and timing
- **Increased Cognitive Contribution**
- Dual-task cost
  - Thinking vs. walking
    - Priority #1: posture-balance-gait
    - Priority #2: thinking



Decreased Automaticity + Cognitive Impairment
- Increased variability of step length and timing
- Required increased Cognitive Contribution, but compromised cognitive impairment
- **Large dual-task cost**
  - Thinking vs. walking
    - Priority incorrect: Posture-second?"
    - Priority #1: thinking
    - Priority #2: posture-balance-gait



Dual-task cost in people with FOG



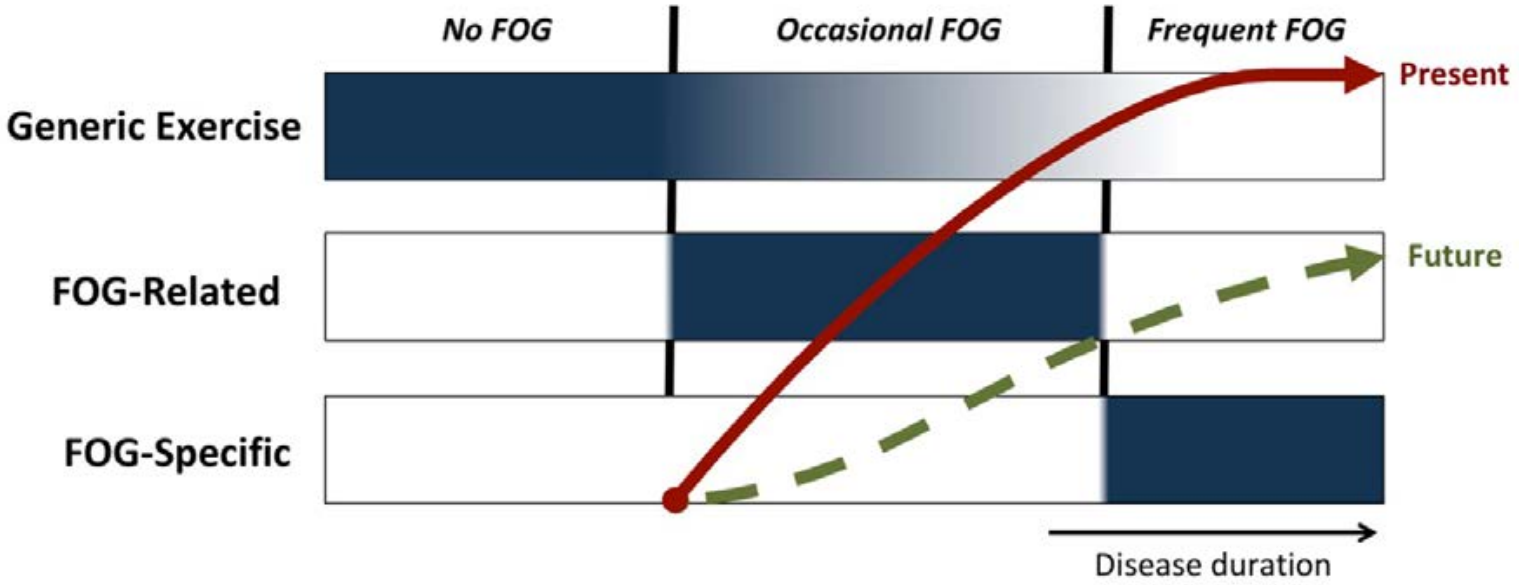
De Souza Fortaleza et al., Gait and Posture, 56, 2017

Occurrence of FoG Episodes

	Straight	180°	360°
Single task	0%	37.5% [21.4–53.6]	31.6% [16.1–47.1]
Dual task	5% [0–12.3]	37.5% [21.4–53.6]	61.1% [44.9–77.4]

Spildooren et al., Mov Disord, 25, 2010

A framework for selecting the type of exercise/training in PD



Gilat et al., NPJ Parkinsons Disease, 7, 2021

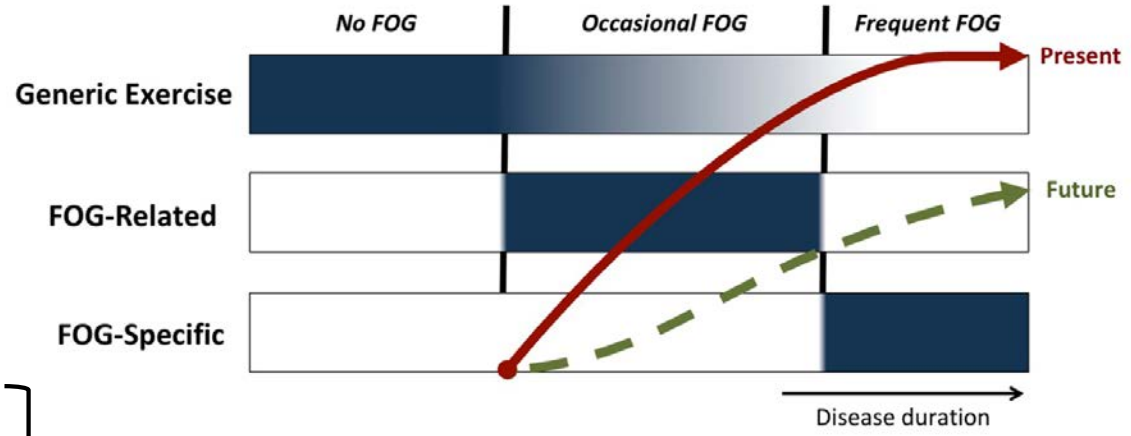
A framework for selecting the type of exercise/training in PD

Generic training:

Conventional physical therapy or generic exercise interventions that are also frequently offered to healthy older individuals to improve physical and/or mental fitness and other benefits, irrespective of their possible potential to also benefit FOG.

Examples:

- Dancing dancing (e.g. tango)
- Yoga
- Physical therapy (not aimed at FOG)
- Aquatic training,
- Tai-chi gait training
- Muscle-power training
- Music therapy.
- Fall-prevention training



**Effective for improving postural stability and potentially reducing falls

Generic exercises do not contribute to the alleviation of FOG

Gilat et al., NPJ Parkinsons Disease, 7, 2021

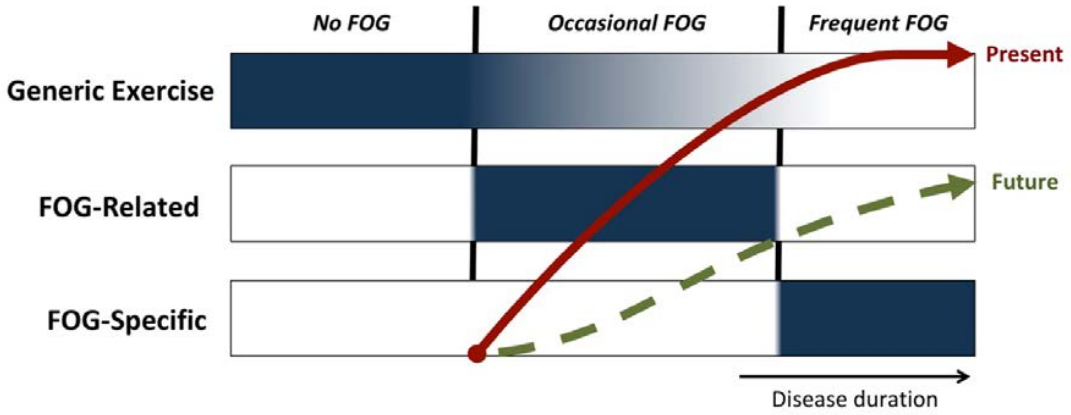
A framework for selecting the type of exercise/training in PD

FOG-Relevant Training Exercise:

- training-based interventions aimed at reduce the severity or amount of FOG following the intervention, but not aimed at the immediate alleviation of imminent FOG episodes or circumventing FOG provoking circumstances while the intervention was applied.

Examples are:

- cognitive training
- cognitive-motor dual-task training
- balance training
- curved treadmill training
- regular treadmill training with cueing that was aimed at improving gait parameters other than FOG;
- obstacle avoidance training.



Gilat et al., NPJ Parkinsons Disease, 7, 2021

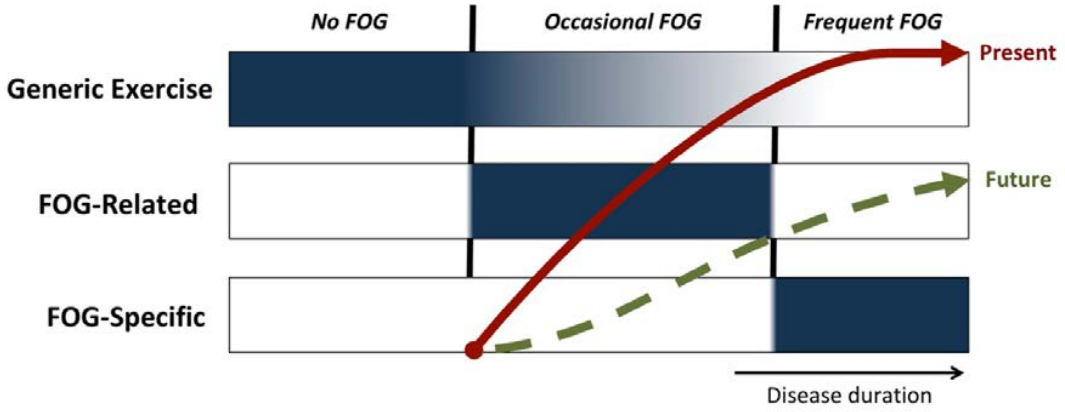
A framework for selecting the type of exercise/training in PD

FOG-Specific Training:

- Exercise or training-based interventions aimed directly at reducing FOG episodes or circumventing FOG-provoking circumstances

Examples are:

- Cueing offered to help patients overcome FOG episodes
- Action-observation training strategies designed to relieve FOG in FOG-provoking situations
- Fall-prevention training including strategies to overcome imminent FOG episodes, such as through the use of cueing.



Gilat et al., NPJ Parkinsons Disease, 7, 2021

Adapted Resistance Training with Instability

Results of an RCT

- 3 days per week for 12 weeks (36 training sessions)
- Each session lasted 80-90 minutes

Traditional Motor Rehabilitation (TMR):

- an active control group, consisted of exercises with focus on stretching, gait, balance, posture, and lower- and upper-limb free-weight exercises.
- sessions were group-based (up to 8 individuals) and monitored by a physical therapist knowledgeable in working with individuals with PD.

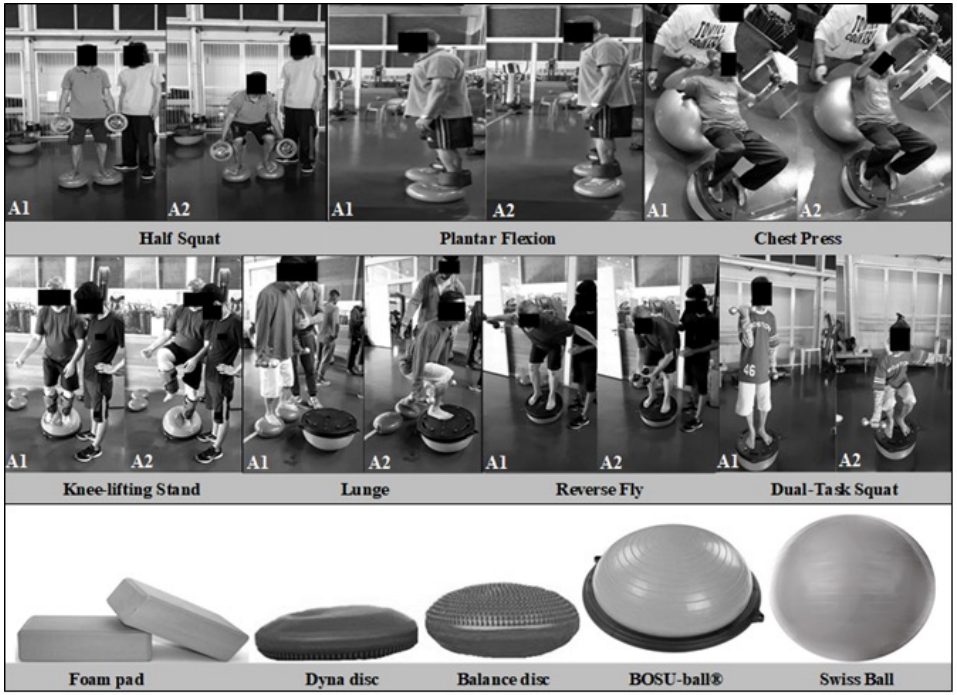
Vs.

Adapted Resistance Training with Instability:

- high motor complexity (ie, exercises that simultaneously require high cognitive, proprioceptive, and motor control demands)
- 7 lower- and upper-limb free-weight exercises combined with unstable devices
- Throughout the 12-week period, there was a progressive increase in motor complexity
- sessions were individualized and monitored by trainers

Silva-Batista et al., Mov Disord, 35, 2020

Adapted Resistance Training with Instability



Month 1: 2–3 sets of 10–12 repetitions maximum
Month 2: 3–4 sets of 8–10 repetitions maximum
Month 3: 4 sets of 6–8 repetitions maximum.

Lower-limb and upper-limb free weight exercises:

- half squat
- plantar flexion
- chest press
- knee-lifting stand
- lunge
- reverse fly
- dual-task squat)

Progression of weight:

- Increased 5%–10% whenever individuals were able to safely perform the predefined repetitions maximum for two consecutive training sessions

Performed on unstable devices

- foam pad
- dyna discs
- balance disc
- BOSU®-ball
- Swiss Ball

Progression of instability

- From least to the most unstable devices

Silva-Batista et al., Mov Disord, 35, 2020

Adapted Resistance Training with Instability

Results

- Only **adapted resistance training with instability improved:**
  - Freezing-of-gait ratio
  - Motor signs
  - Measures of quality of life
  - Anticipatory postural adjustment amplitude (better gait initiation)
  - Activation in the locomotor regions of the brainstem

  - Improvements in the New Freezing of Gait Questionnaire (−4.4 points) and UPDRS-III (−7.4 points) scores exceeded the minimally detectable change (traditional motor rehabilitation group data) and the moderate clinically important difference suggested for PD

Silva-Batista et al., Mov Disord, 35, 2020

Breaking the Cycle

Parkinson's Foundation

Recipe for a Great Movement Hotdish

1. Strength (4 cups)
2. Range of motion (4 cups)
3. Postural Challenge (to taste; increase as needed)
4. Cognitive load (to taste; increase as needed)
5. Tater Tots

Thank You!

Parkinson's Foundation

Movement Disorders Laboratory
Department of Neurology
University of Minnesota

University of Minnesota
Driven to Discover®

Udall Center of Excellence in Parkinson's Disease Research

Morris K. Udall Centers of Excellence for Parkinson's Disease Research
UAB NIH National Institute of Neurological Disorders and Stroke

2023 Expert Briefings

Expert Briefings
Parkinson's Foundation

Wednesday, March 8

Parkinson's & Medications – What's New
Tanya Simuni, MD

Wednesday, April 12

A Balancing Act – Freezing and Fall Prevention in Parkinson's
Colum MacKinnon, PhD

Wednesday, May 10

Understanding Gene and Cell-Based Therapies in Parkinson's
Roger Barker, MD

Wednesday, September 13

Parkinson's Disease & the Bladder
Abhimanyu Mahajan, MD, MHS

Wednesday, October 11

Parkinson's & the Gut-Brain Connection
Carley Rusch, MS, RDN, LDN

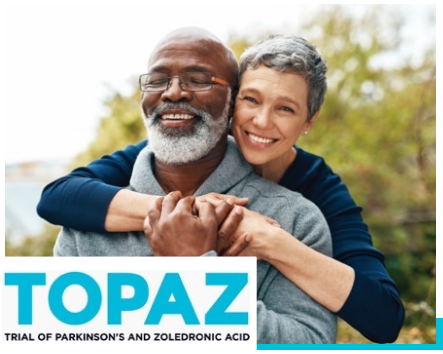
Wednesday, November 8

Do You See What I See? Hallucinations & Delusions in Parkinson's
Megan E. Gomez, PhD

Register at **Parkinson.org/ExpertBriefings**

Better Lives. Together.

Your loved one can join a Parkinson's Study without ever leaving their home



TOPAZ
TRIAL OF PARKINSON'S AND ZOLEDRONIC ACID

People with Parkinson's Disease and parkinsonism have a higher risk of fractures

The TOPAZ study will test if a medicine called zoledronate can prevent fractures and decrease the risk of death in those:

- aged 60 years or older
- with Parkinson's Disease or parkinsonism

If you're loved one is eligible for the study, a nurse will come to their home and they'll receive a one-time treatment (either zoledronate or placebo).

Want to learn more about TOPAZ?

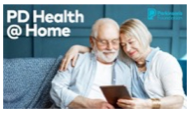
Call: 1-800-4PD INFO
(1-800-473-4636)

Website: topazstudy.org

Resources and Support

Aware in Care
Parkinson.org/AwareInCare

PD Library
Parkinson.org/PDLibrary



PD Health @ Home
Parkinson.org/PDHealth

Resources and Support Continued

Podcast: Substantial Matters
Parkinson.org/Podcast

Professional Education
Parkinson.org/ProfessionalEducation

PD Generation
Parkinson.org/PDGeneration

We're Here For You

Parkinson's Foundation

Parkinson.org

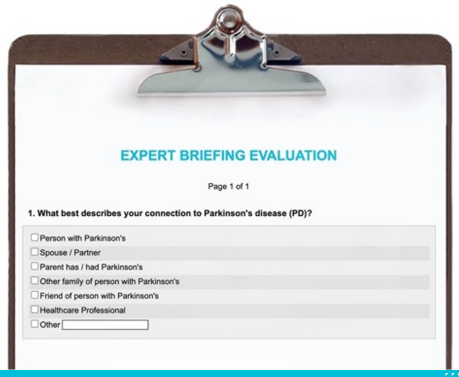
1-800-4PD-INFO
Helpline@Parkinson.org

Better Lives. Together.

Before You Go…

Parkinson's Foundation

Your feedback is important to us!
Please complete the evaluation after the close of this webinar.



Better Lives. Together.