MY TRAINING

Psychology/Kinesiology

Neurology/Balance Disorders
PRESENT POSITION

Associate Professor
  Department Of Psychology & Communication

Affiliate Faculty
  Department Of Biological Sciences

Graduate Faculty
  Human Factors & Neuroscience
Graduate Programs in
- Experimental Psychology/Human Factors
- Biology/Neuroscience
# TOPICS COVERED

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INHIBITION → INHIBITORY CONTROL

- Ability to withhold a response
- Important topic in
  - Neuroscience
  - Psychology
- Component of executive function
- Associated with choice
INHIBITORY CONTROL IS RELATED TO HABITUAL HEAD CARRIAGE

Stroop Task

A: Name the Colors
   XXXX  XXXX  XXXX  XXXX

B: Read the Words
   Green  Red  Purple  Blue

C: Conflict: Name the Colors
   Green  Red  Purple  Blue

Graph showing the relationship between Stroop Conflict Time (sec) and Torso-Neck Angle (deg).
END-GAINING WHEN PREPARING TO STEP

- End-gaining
  - Interfering with axial coordination when initiating a movement
  - Getting ahead of ourselves

- Task: Stand holding a tray at waist level
  - Baseline
  - Preparing to walk

- Measure
  - Neck length three seconds before step
Subjects with poor inhibitory control shortened their necks before walking.

Baer, Vasavada, & Cohen, 2019
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**Conclusion**
PARKINSON’S DISEASE AS OPPOSITE OF ALEXANDER TECHNIQUE

- Second-most common neurodegenerative disorder (1% over age 60)

- Cardinal Symptoms
  - Slow
  - Rigid
  - Stooped
  - Tremor

- Also affects
  - Executive functions
  - Motivation/Mood
  - Proprioception/Kinesthesia

Cognitive & Motor Symptoms
FREEZING OF GAIT IN PARKINSON’S DISEASE

“brief, episodic absence or marked reduction of forward progression of the feet despite intent to walk”

Context-dependent
- Doorways/crowding
- Starting/Turning
- Anxiety
Stroop Task

A: Name the Colors
  XXXX  XXXX  XXXX  XXXX

B: Read the Words
  Green  Red  Purple  Blue

C: Conflict: Name the Colors
  Blue  Green  Purple  Green

FREEZING OF GAIT AND INHIBITORY CONTROL

Cohen, Nutt, and Horak, 2017
MOVEMENT IS NOT SEPARATE FROM THOUGHT

- “Cognitive centers” and “movement centers” are deeply interconnected
- This is most obvious in neurological disorders such as Parkinson’s
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<td>Effects on tone, balance, and mobility</td>
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**Conclusion**
Can psychomotor intentions have global effects on the whole self, including posture and movement?
CAN POSTURAL INTENTIONS MODIFY BALANCE, TONE, AND MOBILITY?

- **Conditions**
  A. “Light” – Allow your bones to send you up.
  B. “Effortful” – Use muscular effort to pull yourself up tall.
  C. “Relaxed” – Stand as if you feel tired and heavy.

- **Protocol**
  - Brief instruction followed by performance of tasks
  - All subjects performed in all conditions

- **Participants**
  - 20 adults with Parkinson’s disease
  - 20 healthy older adults
POSTURAL INTENTION AFFECTS BALANCE

“Light” → Longest time in air & least balance disturbance
INTENTIONS AFFECT MUSCLE ACTIVITY AND SPINAL COMPRESSION

**LongL3 Muscle Activation**

- **Light**: Total iEMG (mV/Sec) = 0.02
- **Effortful**: Total iEMG (mV/Sec) = 0.04
- **Relax**: Total iEMG (mV/Sec) = 0.01

**IlioL3 Muscle Activation**

- **Light**: Total iEMG (mV/Sec) = 0.01
- **Effortful**: Total iEMG (mV/Sec) = 0.03
- **Relax**: Total iEMG (mV/Sec) = 0.02

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**Neck Length (cm)**

- **Lighten**: Neck length = 15.2 cm
- **Relax**: Neck length = 14.8 cm
- **Pull**: Neck length = 14.6 cm

*Significant difference indicated by asterisk (*)

Adapted from Cohen et al, 2016; 2020
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**Conclusion**
ALEXANDER CLASS FOR NECK PAIN

- Question
  - Does AT alter distribution of muscle activity?

- Population
  - 10 subjects with chronic neck pain

- AT course
  - 10 AT classes over 5 weeks

- Assessments
  - Two pre-tests and two post-tests

Becker, Copeland, Botterbusch, and Cohen, 2018
MEASURES

1. Self-reported pain

2. Neck muscle activity during Cranio-cervical flexion test (CCFT)
   - Thought to reflect tradeoff between deep muscles and surface muscles

Becker, Copeland, Botterbusch, and Cohen, 2018
Alexander group classes reduce neck pain and activity of surface neck muscles.
AT group classes reduced reliance on surface neck muscles.

Exercise did not.
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Conclusion
WHY IS MINDFULNESS SO POPULAR?

- Mindfulness Based Stress Reduction (1979)
  - Standard 8-week protocol – testable, adaptable, replicable
- Google Search on May 15, 2020
  - 10,900,000 results
  - Wikipedia: 80% of medical schools now offer some version
THE POISE PROJECT AIMS TO BE THE MBSR OF ALEXANDER TECHNIQUE

- Designing and delivering replicable, testable, scalable AT-based programs for specific populations
- Since 2016 we have reached:
  - 125 care partners (12 classes)
  - 65 people with Parkinson’s disease (7 classes)
- Presenting and networking at national and international conferences
- Basic Science Justification?
- Motivating funding.

Monika Gross, Executive Director
The Poise Project

www.thepoiseproject.org
AT FOR PARKINSON’S: A FEW FINDINGS

- Non-randomized preliminary study
  - 15 in AT group
  - 10 in control group

**BRIEF BEST SCORE**

**BALANCE**

**ANXIETY**

**DYSKINESIA**
AT FOR PARKINSON’S AFFECTS POSTURE

Before

After

6 Mo. Later
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| Direction / Postural Intention                      | Intention changes postural tone and mobility                |
| Distribution of muscle tone following AT            | Group intervention  
Comparison to Exercise                                     |
| The Poise Project                                  | Replicable AT courses for specific populations              |

**Conclusion**
If true, AT principles are out there in the world to be discovered. Now is an opportune moment for AT experts to join the conversation. We need to show up.
THANKS TO MY RESEARCH FUNDERS


Cohen, R.G., Nutt, J., & Horak, F.B. (2011). Errors in initial postural preparation lead to increased choice reaction times for step initiation in older adults. Journal of Gerontology A: Biological and Medical Sciences, 66, 705-713. PMID: 21498341

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