Meet the Panel
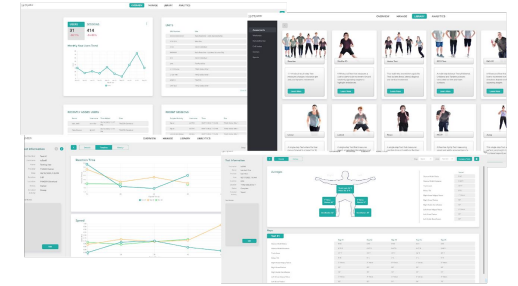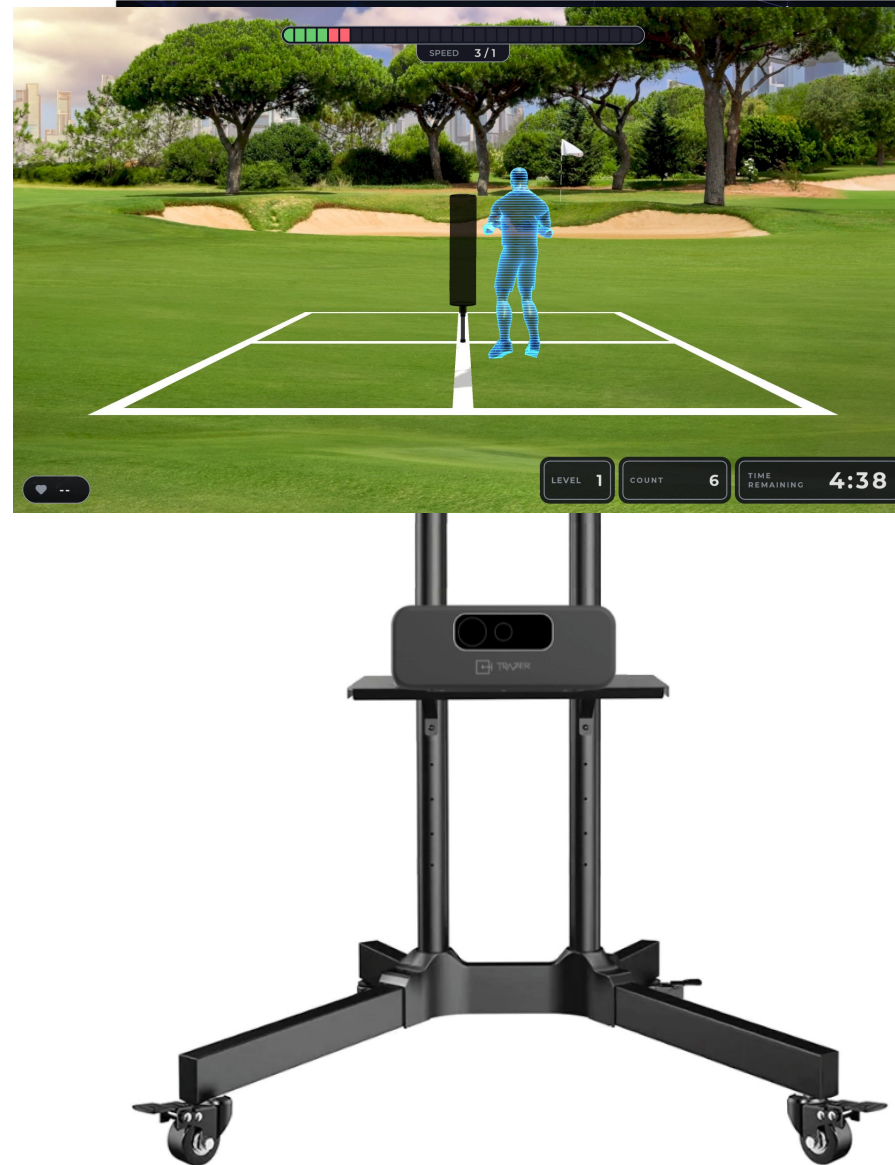

Kyle Lorenz
Police Officer |
Tucson Police Department

Jeff Denune, CP/L
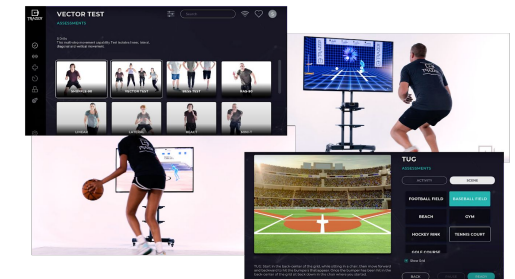**Managing Clinical Director |**
NuTech Institute

TRAZER

Technology for injury recovery, injury prevention, and enhancing performance, TRAZER tracks, measures, and enhances physical *and* cognitive function.

HIPAA-compliant Data Analytics Portal

100+ Immersive reaction-based activities

Healthcare | Senior Care | Special Needs | Sports | Wellness | Workplace Injury Prevention

4 PILLARS

Activities to Assess and Monitor Essential Metrics

100+ immersive, reaction-based activities in key categories:

Assessments | Rehabilitation | Drills | Workouts | Games

BALANCE	DYNAMIC MOVEMENT	KINEMATICS	NEUROMECHANICS
Evaluate stability and adherence to prescribed postures.	Identify and monitor asymmetry in multi-directional movement.	Analyze joint range of motion in upper and lower extremities.	Improve physical and cognitive accuracy via whole-body decision-making.

Balance

Balance Assessment

→ How do you determine if balance and stability are affected with the fitting of a prosthetic socket, or a change in ankle, foot, or shoe?

→ How do you determine if balance is improving with rehab?

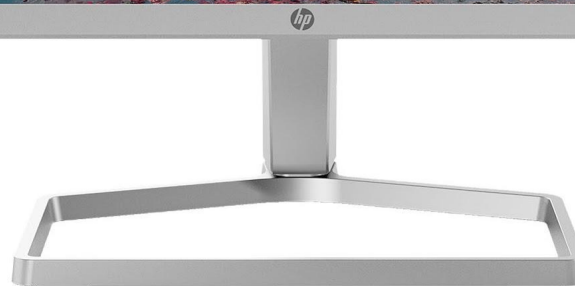→ How do you objectively determine if function is improving?

STEADI Balance

A 4-step Balance Test consisting of progressively challenging tasks designed to assess Users' ability to maintain balance per CDC guidelines.

Learn More

STEADI Balance
Modified Tandem

BALANCE

Footwear: Shoe 1
Rigid Foot. Soft Rearfoot and Forefoot.

Sway
Feet (ft)

December 8, 2023

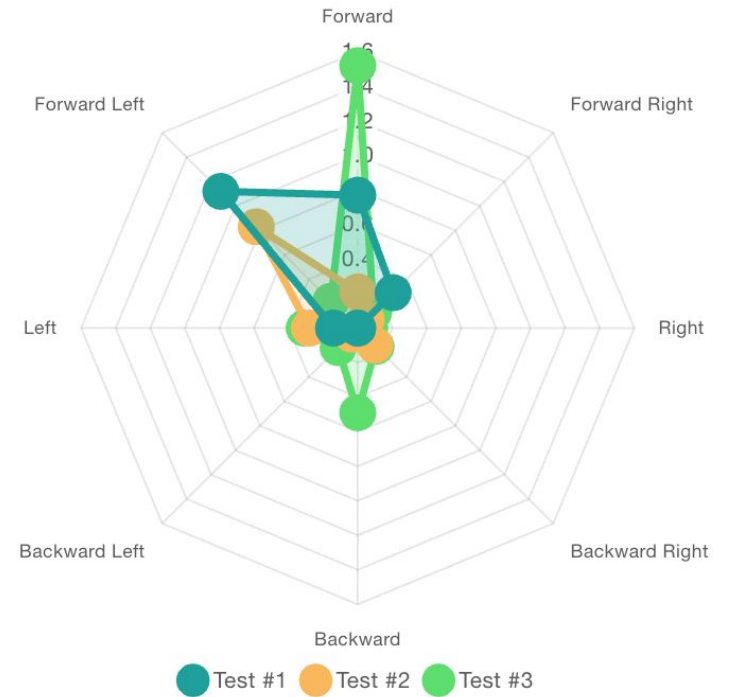**Test 1** | 7:31 AM
Test 2 | 7:32 AM
Test 3 | 7:33 AM

Sway in Feet | Total Movement

→ 2.32 | 4 Steps
→ 1.59 | 3 Steps
→ 3.06 | 1 Step

Subjective: felt stress/pressure points in socket

	Test #1	Test #2	Test #3
Forward	0.77	0.21	1.52
Forward Right	0.29	0.07	0.13
Right	0.00	0.01	0.07
Backward Right	0.00	0.14	0.15
Backward	0.00	0.01	0.49
Backward Left	0.00	0.05	0.16
Left	0.14	0.28	0.31
Forward Left	1.12	0.83	0.22
Total Sway	2.32	1.59	3.06

BALANCE

Footwear: Shoe 2
Solid Rearfoot with side reinforcement with soft Forefoot.
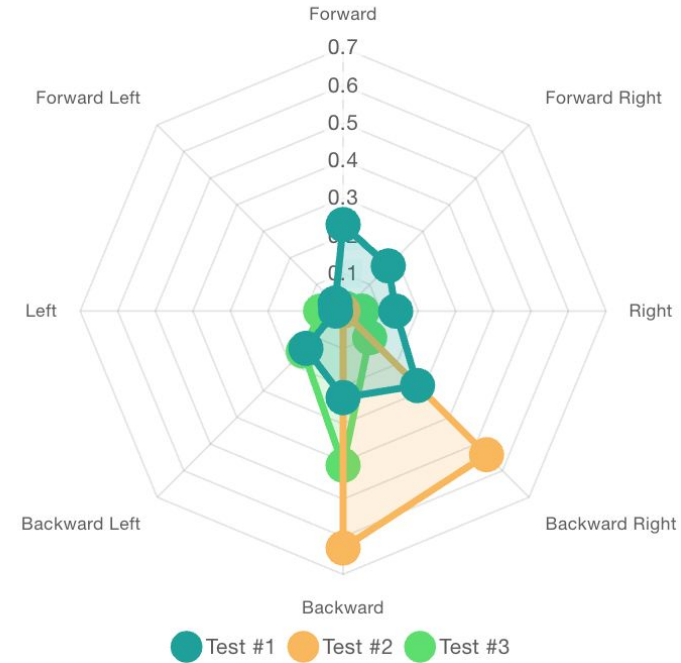

December 8, 2023

Test 1 | 7:44 AM
Test 2 | 7:45 AM
Test 3 | 7:46 AM

Sway in Feet | Total Movement

➔ 1.24 | 1 Step
➔ 1.18 | 1 Step
➔ .79 | 1 Step

Subjective: felt some pressure occasionally in socket

Sway
Feet (ft)

● Test #1 ● Test #2 ● Test #3

	Test #1	Test #2	Test #3
Forward	0.23	0.00	0.00
Forward Right	0.17	0.00	0.01
Right	0.14	0.00	0.05
Backward Right	0.28	0.54	0.10
Backward	0.23	0.63	0.41
Backward Left	0.14	0.00	0.15
Left	0.02	0.00	0.06
Forward Left	0.03	0.00	0.00
Total Sway	1.24	1.18	0.79

BALANCE

Footwear: Boot
Rigid Foot. Rigid Rearfoot and Forefoot.

No misses.

Subjective: felt more stability and less stress on socket

Sway
Feet (ft)

December 8, 2023

Test 1 | 7:51 AM
Test 2 | 7:52 AM
Test 3 | 7:53 AM
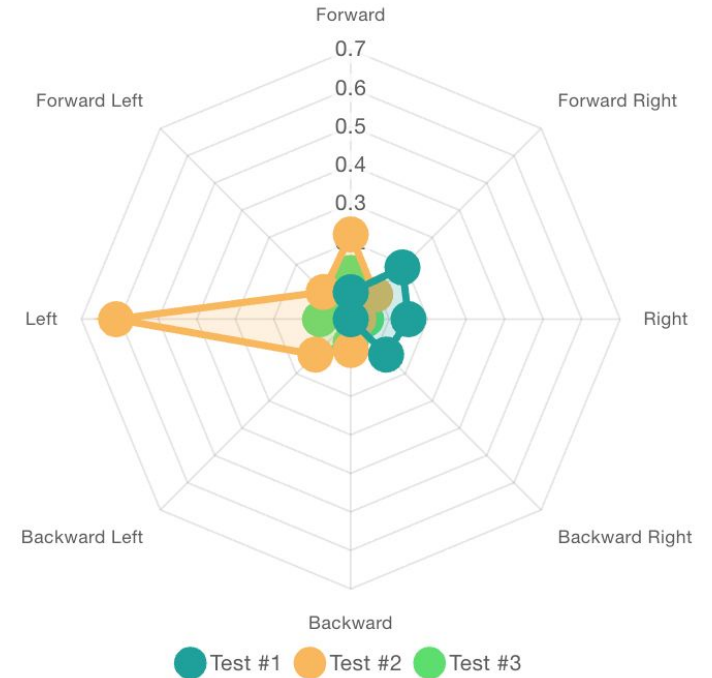
	Test #1	Test #2	Test #3
Forward	0.07	0.22	0.12
Forward Right	0.19	0.09	0.05
Right	0.15	0.02	0.04
Backward Right	0.13	0.00	0.02
Backward	0.00	0.08	0.06
Backward Left	0.00	0.13	0.13
Left	0.00	0.61	0.08
Forward Left	0.00	0.10	0.04
Total Sway	0.55	1.24	0.53

COMPARISON

Best: **Shoe 1** **Shoe 2** & **Shoe 3**

Sway

Feet (ft)
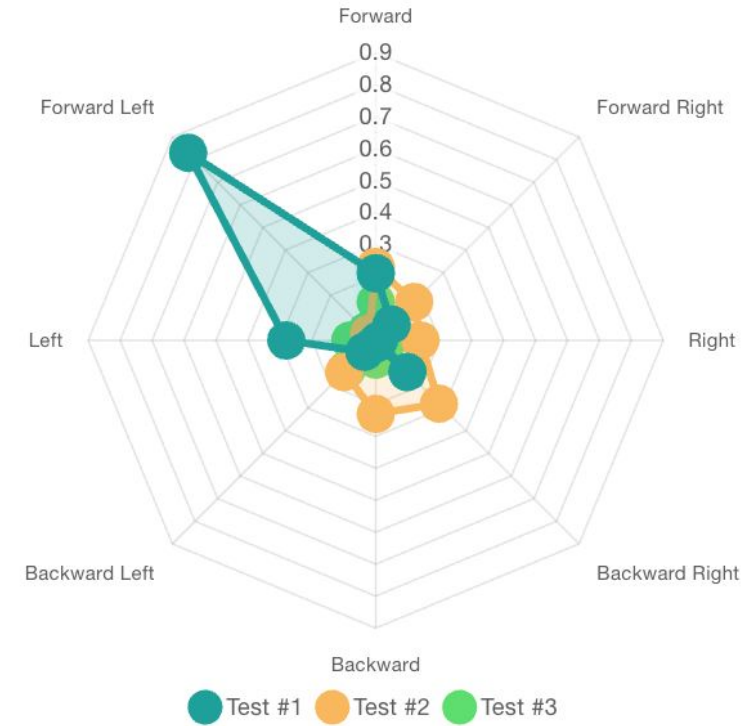
●Test #1 ●Test #2 ●Test #3

	Test #1	Test #2	Test #3
Forward	0.21	0.23	0.12
Forward Right	0.07	0.17	0.05
Right	0.01	0.14	0.04
Backward Right	0.14	0.28	0.02
Backward	0.01	0.23	0.06
Backward Left	0.05	0.14	0.13
Left	0.28	0.02	0.08
Forward Left	0.83	0.03	0.04
Total Sway	1.59	1.24	0.53

Misses

	Step Detected	Total
Test #1	3	3
Test #2	1	1
Test #3	0	0

COMPARISON

Best: Shoe 1 vs Shoe 2

Sway
Feet (ft)
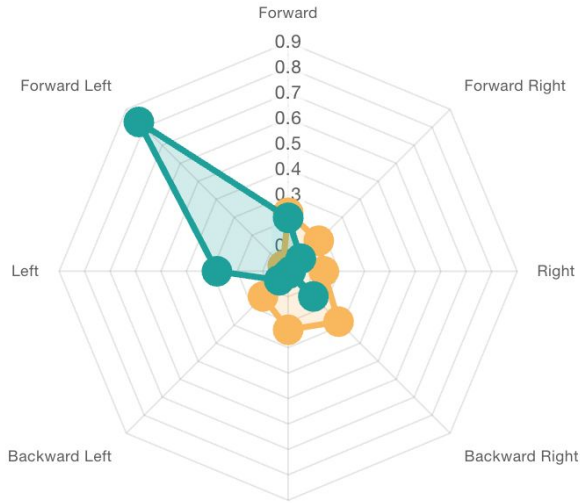
	Test #1	Test #2	Difference
Forward	0.21	0.23	+10.68 %
Forward Right	0.07	0.17	+150.49 %
Right	0.01	0.14	+1280.65 %
Backward Right	0.14	0.28	+97.01 %
Backward	0.01	0.23	+2063.64 %
Backward Left	0.05	0.14	+192.47 %
Left	0.28	0.02	-93.81 %
Forward Left	0.83	0.03	-96.37 %
Total Sway	1.59	1.24	-22.07 %

Best: Shoe 1 vs BOOT

Sway
Feet (ft)
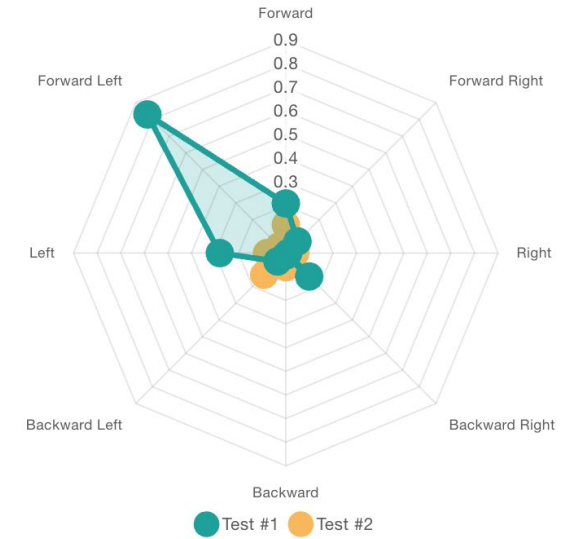
	Test #1	Test #2	Difference
Forward	0.21	0.12	-44.90 %
Forward Right	0.07	0.05	-25.98 %
Right	0.01	0.04	+251.61 %
Backward Right	0.14	0.02	-87.59 %
Backward	0.01	0.06	+481.82 %
Backward Left	0.05	0.13	+174.66 %
Left	0.28	0.08	-72.02 %
Forward Left	0.83	0.04	-94.71 %
Total Sway	1.59	0.53	-66.51 %

12

COMPARISON

Best: Shoe 2 vs BOOT

Sway

Feet (ft)

	Test #1	Test #2	Difference
Forward	0.23	0.12	-50.21 %
Forward Right	0.17	0.05	-70.45 %
Right	0.14	0.04	-74.53 %
Backward Right	0.28	0.02	-93.70 %
Backward	0.23	0.06	-73.11 %
Backward Left	0.14	0.13	-6.09 %
Left	0.02	0.08	+351.92 %
Forward Left	0.03	0.04	+45.65 %
Total Sway	1.24	0.53	-57.03 %

CONCLUSION: Shoe Balance Assessment

Measure What Matters

Tested 3 pairs of shoes on same day.

Able to make recommendation of stability based on objective numbers.

Able to get stable forefoot and rearfoot shoes with lower profile than boot with same stability.

DISCUSSION

Impact

- **1** x 30-Minute Session

- **3** Shoes

- **80%+** Better Stability

- Kyle thoughts

- Jeff impression. Use for other components?

DYNAMIC MOVEMENT

React

A single-step Drill designed to Test or Train reactive agility in 8 randomized directions.

Learn More

REACT

Movement in 8 Directions from Center
**Test 1:** June 5, 2023 **vs Test 2:** December 18, 2023

Dynamic Reaction Time
Seconds

Step Summary

	Duration	Targets	Calories	Distance	Deceleration Index
Test #1	2:00	12.00	6.68	107.28 ft	1.85
Test #2	6:47	72.00	41.54	754.12 ft	0.85

Averages

	Reaction Time	Dynamic Reaction Time	Speed	Acceleration	Deceleration
Test #1	0.85 s	0.85 s	1.06 ft/s	1.68 ft/s²	1.68 ft/s²
Test #2	0.39 s	0.50 s	2.00 ft/s	3.25 ft/s²	2.93 ft/s²
Difference	-53.95 %	-42.00 %	+89.99 %	+93.16 %	+74.41 %
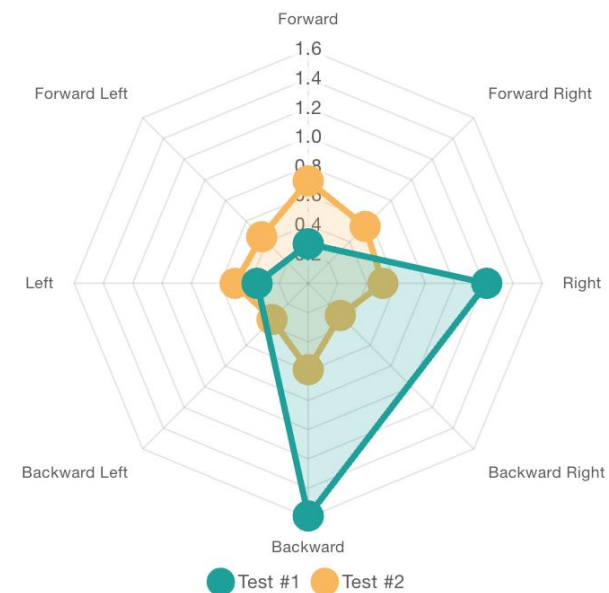
Speed
ft/s
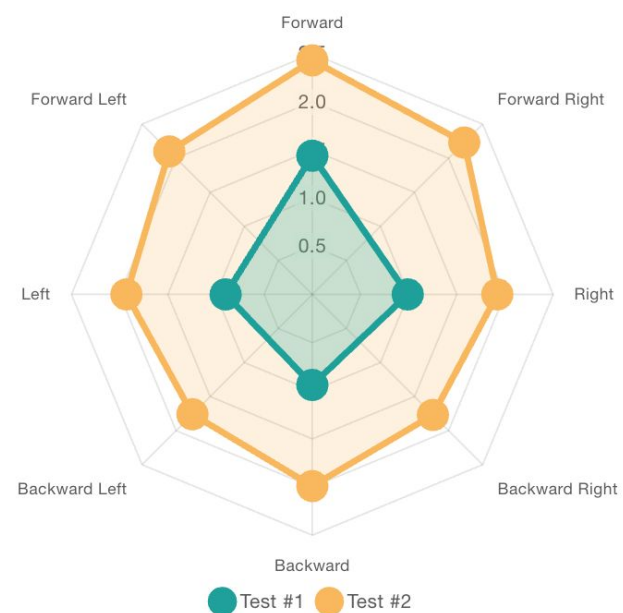
REACT

Movement in 8 Directions from Center

Distance
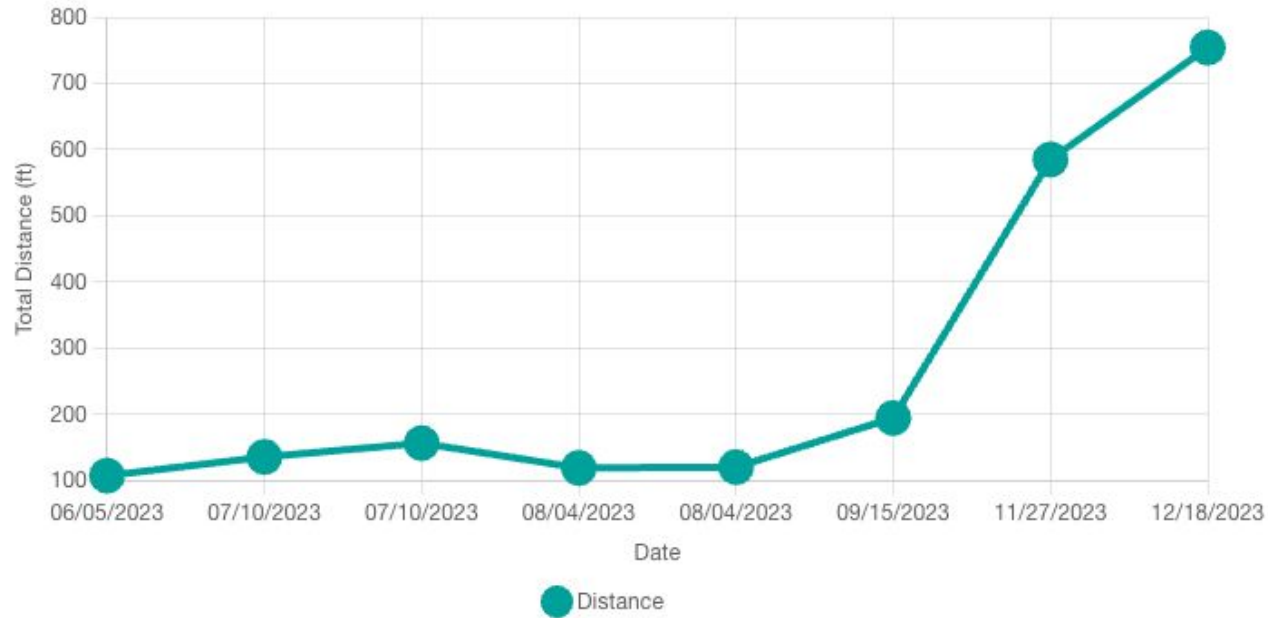
Date	Total Distance
06/05/2023	107.28
07/10/2023	135.54
07/10/2023	156.42
08/04/2023	118.91
08/04/2023	120.17
09/15/2023	194.43
11/27/2023	584.95
12/18/2023	754.12

REACT

Movement in 8 Directions from Center

Reaction Time
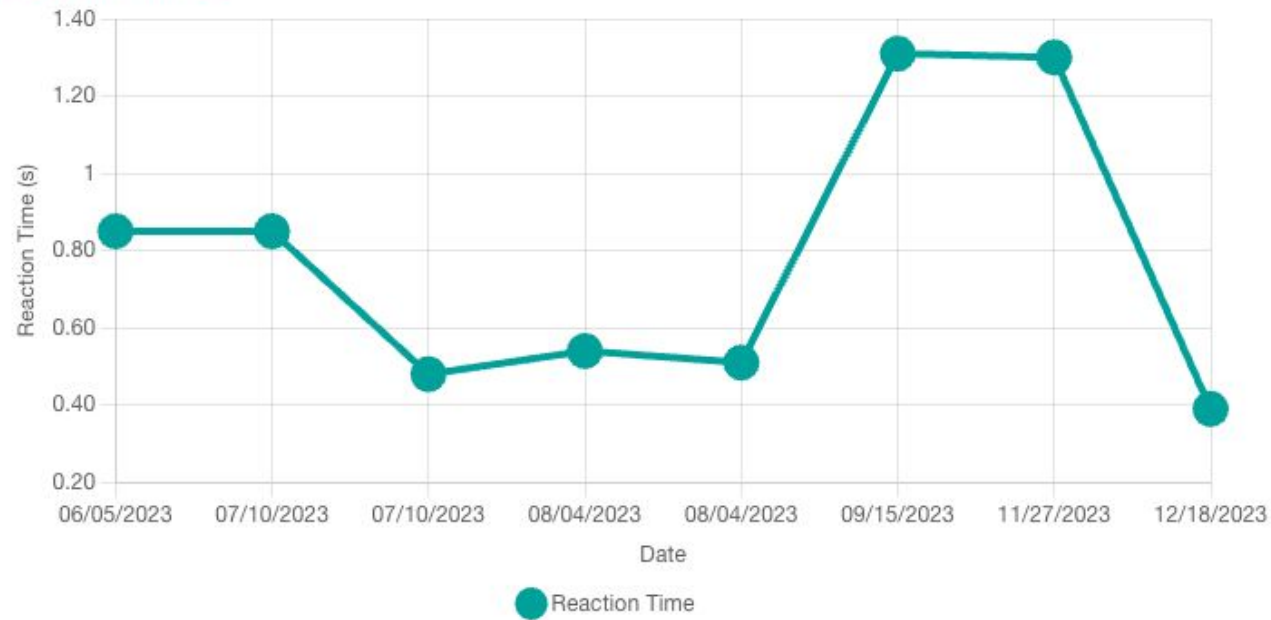
Date	Avg RT
06/05/2023	0.85
07/10/2023	0.85
07/10/2023	0.48
08/04/2023	0.54
08/04/2023	0.51
09/15/2023	1.31
11/27/2023	1.30
12/18/2023	0.39

REACT

Movement in 8 Directions from Center

Dynamic Reaction Time
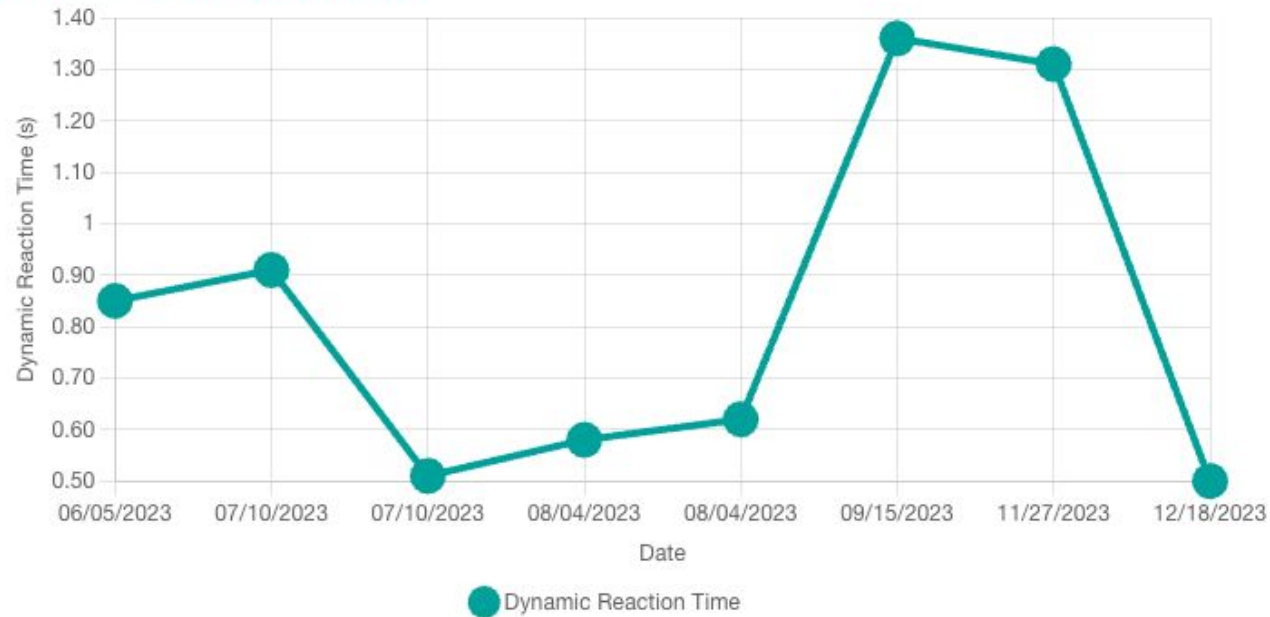
Date	Avg Dynamic RT
06/05/2023	0.85
07/10/2023	0.91
07/10/2023	0.51
08/04/2023	0.58
08/04/2023	0.62
09/15/2023	1.36
11/27/2023	1.31
12/18/2023	0.50

REACT

Movement in 8 Directions from Center

Speed
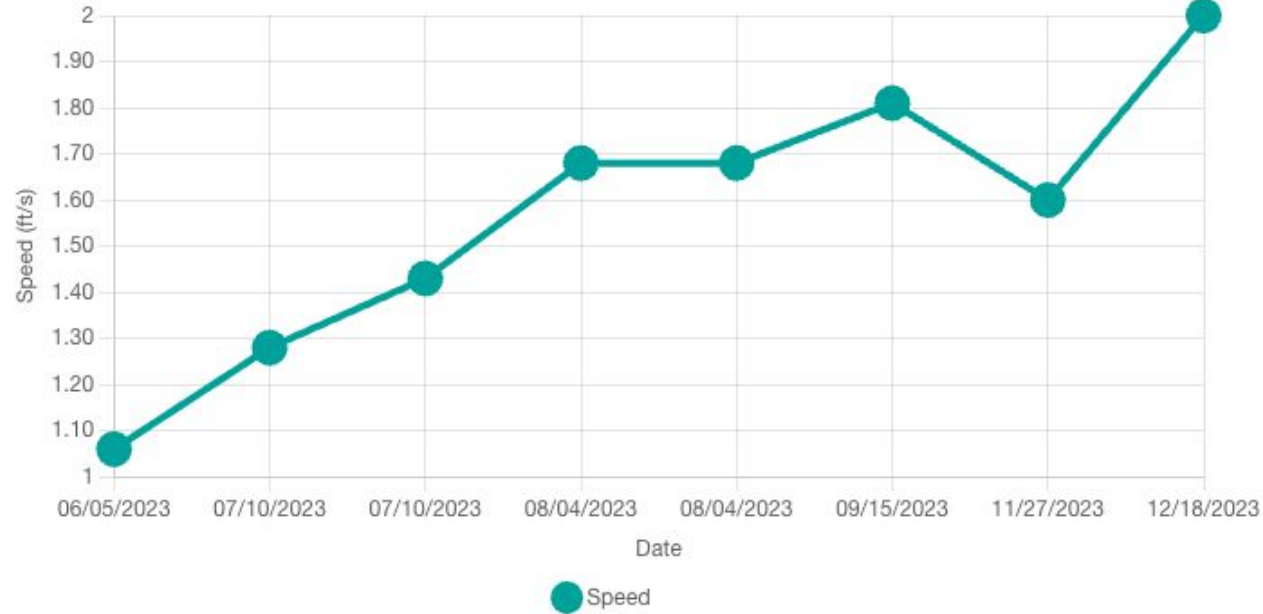
Date	Avg Speed
06/05/2023	1.06
07/10/2023	1.28
07/10/2023	1.43
08/04/2023	1.68
08/04/2023	1.68
09/15/2023	1.81
11/27/2023	1.60
12/18/2023	2.00

REACT

Movement in 8 Directions from Center

Acceleration
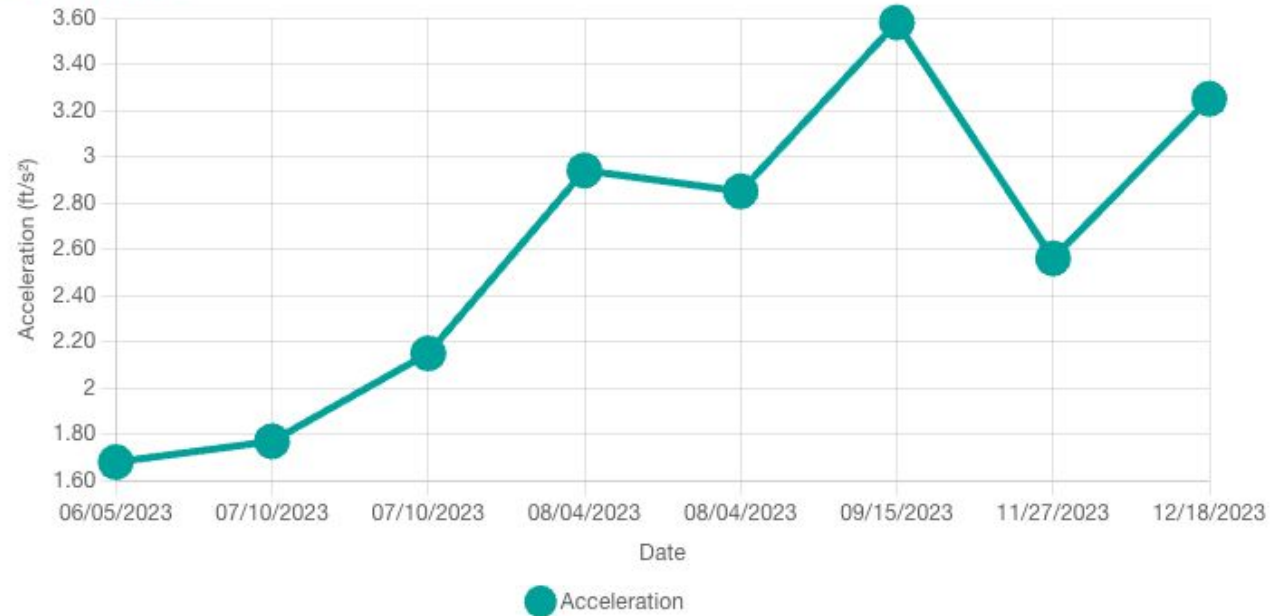
Date	Avg Acceleration
06/05/2023	1.68
07/10/2023	1.77
07/10/2023	2.15
08/04/2023	2.94
08/04/2023	2.85
09/15/2023	3.58
11/27/2023	2.56
12/18/2023	3.25

REACT

Movement in 8 Directions from Center

Deceleration
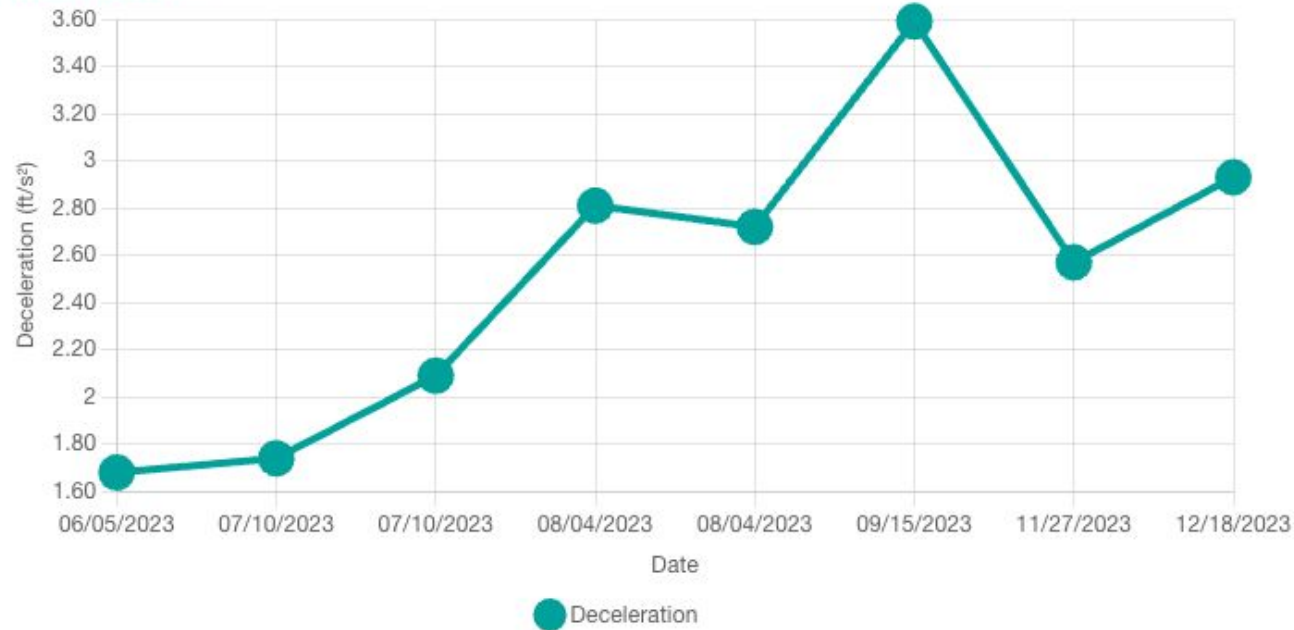
Date	Avg Deceleration
06/05/2023	1.68
07/10/2023	1.74
07/10/2023	2.09
08/04/2023	2.81
08/04/2023	2.72
09/15/2023	3.59
11/27/2023	2.57
12/18/2023	2.93

DISCUSSION

Impact

Kyle: 1st experience when doing dynamic movement on Trazer? Experience using when have new devices?

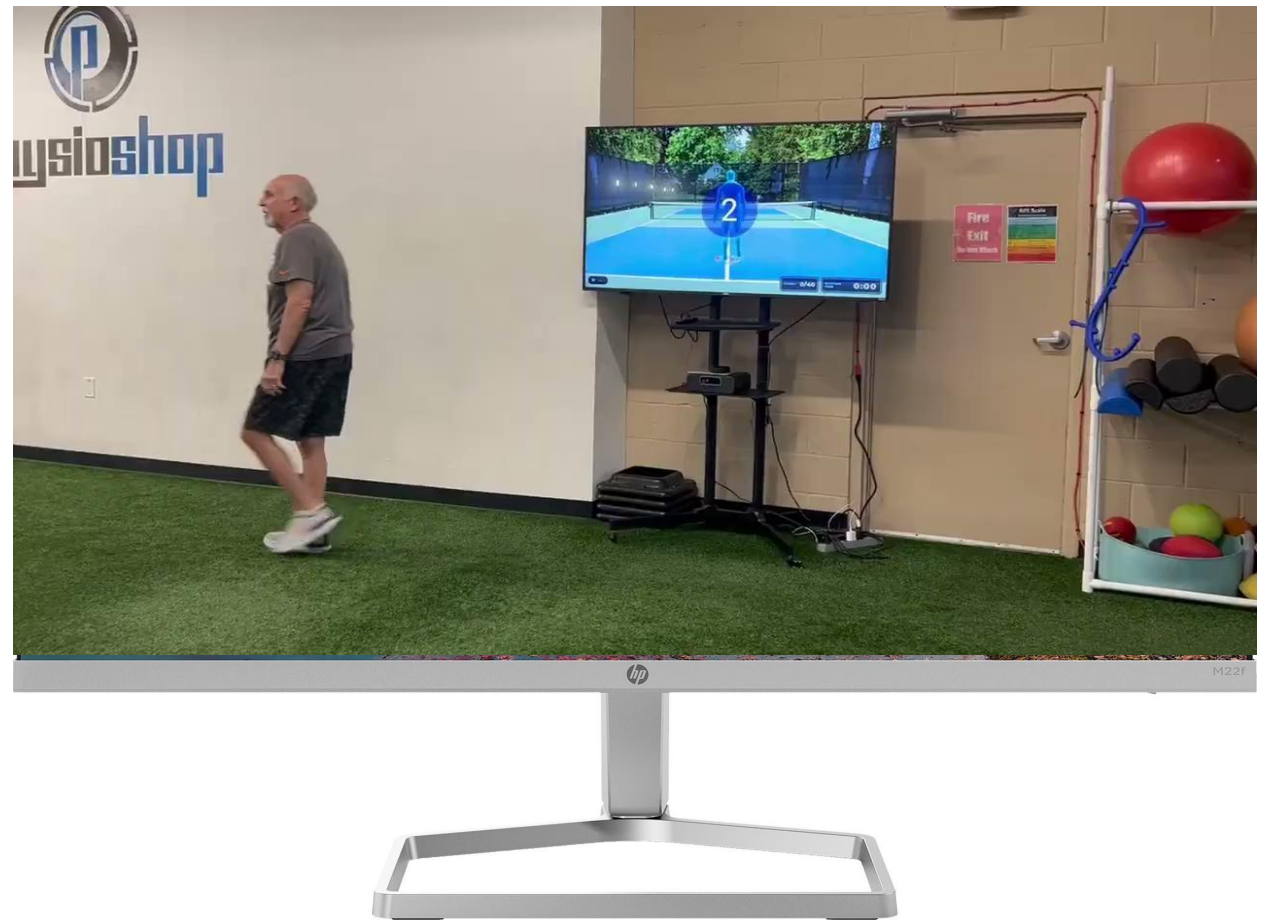**Jeff: Thoughts on this movement pattern and data?**

MINI-T

Measure speed and reactive agility

Mini T

A single-step Drill measuring speed and reactive agility, requires Users to move to random prompts in a Mini-T formation L/R then back to center.

Learn More

MINI-T

Measure speed and reactive agility

Step Summary

Mini-T	Duration	Targets	Calories
	3:33	12.00	6.48

Distance	Deceleration Index
111.13 ft	0.36

Averages

	Reaction Time	Dynamic Reaction Time	Speed	Acceleration	Deceleration
Test #1	0.53 s	0.80 s	2.06 ft/s	3.26 ft/s²	2.61 ft/s²

DISCUSSION

Impact

Jeff: Benefits of this movement pattern
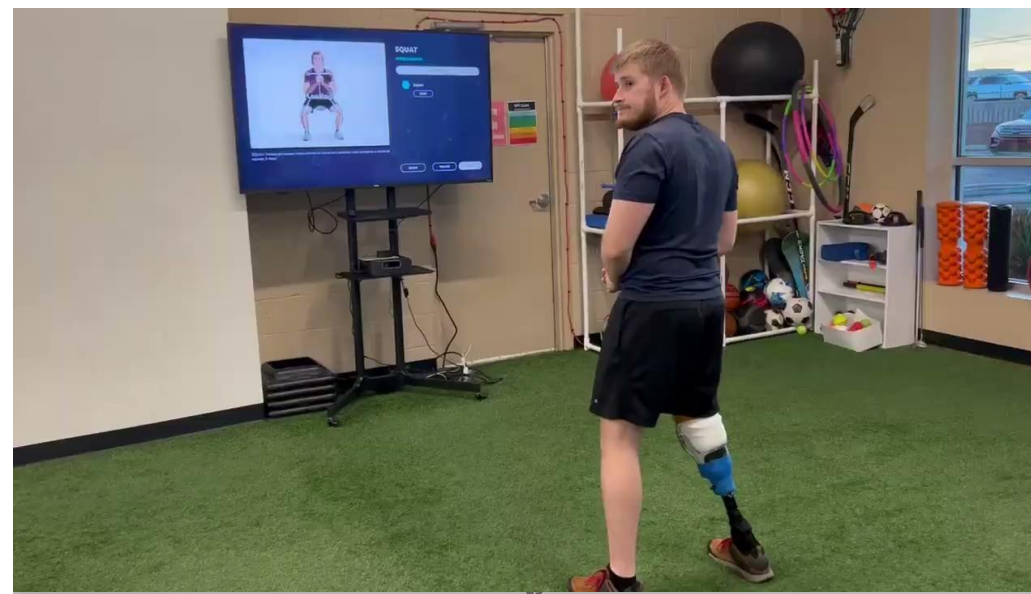
Kyle: Unique challenge of this pattern?

KINEMATICS

Squat

0544 -

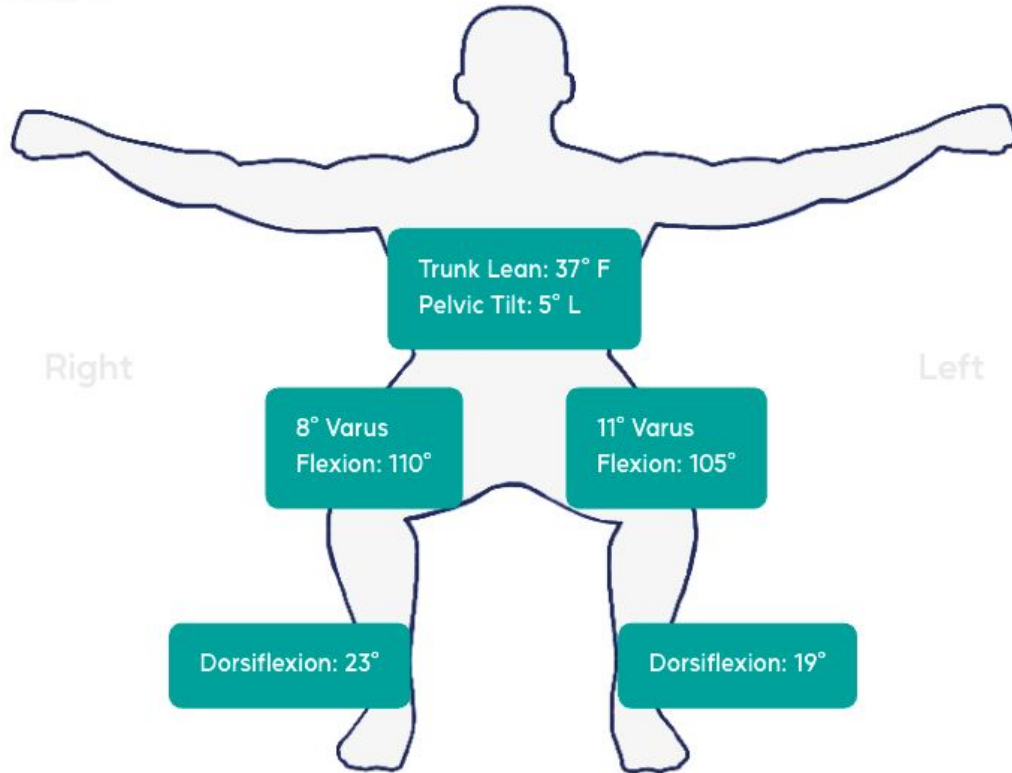A 5-rep squat Test to measure lower extremity joint angles.

Learn More

KINEMATICS

Double-leg Squat

Averages

Trunk Lean: 37° F
Pelvic Tilt: 5° L

Right

Left

8° Varus
Flexion: 110°

11° Varus
Flexion: 105°

Dorsiflexion: 23°

Dorsiflexion: 19°

	Test #1
Stance Width Ratio	1.75
Stance Width Distance	1.66 ft
Squat Depth	15.58 in
Trunk Lean	37° F
Pelvic Tilt	5° L
Right Knee Valgus/Varus	8° Varus
Right Knee Flexion	110°
Right Ankle Dorsiflexion	23°
Left Knee Valgus/Varus	11° Varus
Left Knee Flexion	105°
Left Ankle Dorsiflexion	19°

29

TRAZER O & P ASSESSMENT

O & P Assessment

Assessments

A multi-step Test involving ambulation and balance tasks to measure functional mobility.

1. TUG

Position a chair at the back center of the grid (12.5 feet from the Unit to the center of the seat). Calibrate standing, then sit in the chair over the start point circle. When a bumper appears, stand and walk to the bumper then turn and walk back to the chair and sit. 2 targets

2. Chair Stand-30

Position a chair behind center start point. Calibrate sitting at the edge of the chair with your feet in the start point circle. Stand up when a green ball appears. Sit down when a yellow ring appears. 0:30.

3. Mini-T

From back center start point, move to front center bumper, then move to random left and right bumpers forming a T pattern. Immediately backpedal to the flashing reset point for the next target. 40 targets.

4. Double Leg STEADI Balance

Stand straight with feet shoulder-width apart. Calibrate then hold the stance keeping the on-screen ball as close to the center circle as possible. 0:20.

TRAZER O & P ASSESSMENT

TUG

Based on the CDC Timed Up and Go Test (TUG), this Assessment measures the time it takes the User to stand from a seated position, walk 6 feet, and return to the seated

Learn More

Chair Stand-30

This single-step Test measures lower body strength and endurance as the User stands up and sits down as many times as possible in 30 seconds.

Learn More

Mini-T

A Reactive Agility Test measuring speed and agility, requires Users to move to random prompts in a Mini-T formation L/R then back to center.

Learn More

STEADI Balance

A 4-step Balance Test consisting of progressively challenging tasks designed to assess Users' ability to maintain balance per CDC guidelines.
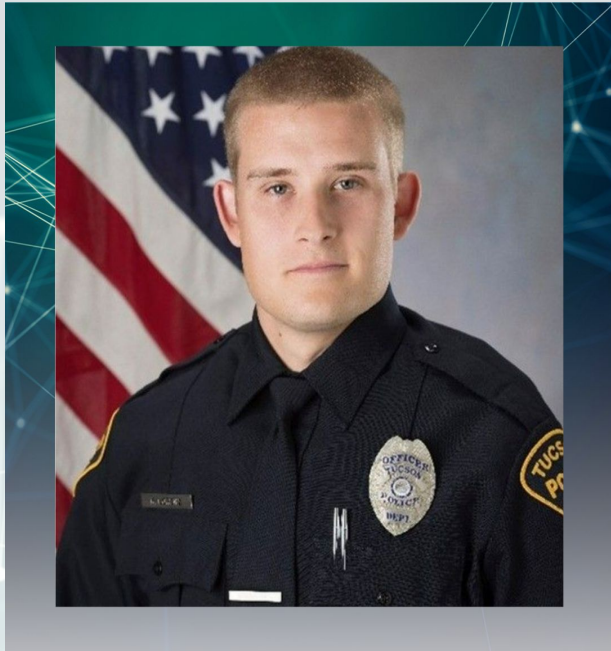
Learn More

Q & A

Thank you!

Kyle Lorenz
Police Officer |
Tucson Police Department

Jeff Denune, CP/L
Managing Clinical Director |
NuTech Institute

Thank you!

Randy Cohen
Randy@trazer.com

Jeff Denune
jeff.denune@nutechsyn.com

35

TRAZER   NUTECH
SYNERGIES

Learn More
trazer.com/nutech

See us in Chicago at AAOP

Booth 209

Technical Workshop
Wednesday, March 6
2:20 PM | Roosevelt 1AB