

Analyzing the Factors of Performance: Is There a More Accurate Way For Trainers to Score Form During Exercises.

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Objective: Determine if form scores are depictive of the individual's true form and analyze if there are any unseen irregularities.

Methods:

- An Xsens Awinda 17 IMU sensor suit for camera-less motion capture
- 3 Trials of the Lock and Load, an Exercise designed by ProTERF trainer Ed Downs
- The Lock and Load is performed on both the left and right hand



Figure 1: Xsens Awinda Suit¹



Figure 2: The Lock and Load

Theory: Center of Mass in the Anterior-Posterior and Medial-Lateral direction give us the sway range for analyzing control and balance throughout the drill. Maximum Acceleration was used for determining the concurrent movements of the active limbs.

Results:

- Trends show that not all above average performers fall below the average sway range for both front to back and side to side control

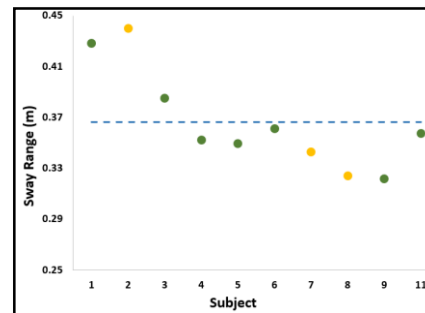


Figure 3: AP Sway Left Hand

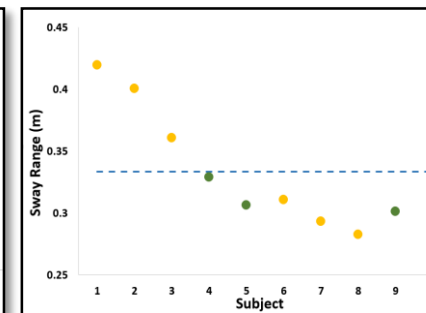


Figure 4: AP Sway Right Hand

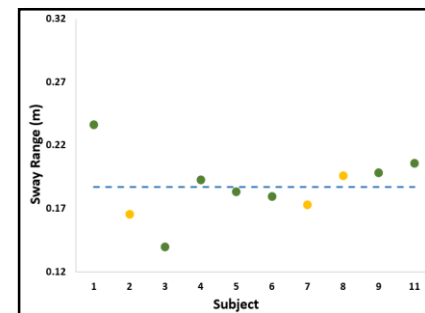


Figure 5: ML Sway Left Hand

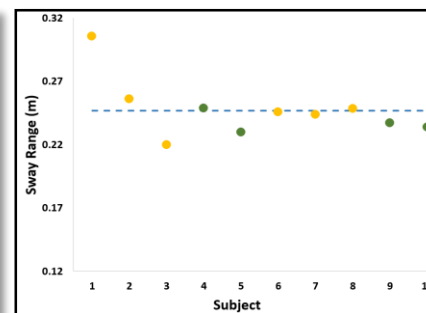


Figure 6: ML Sway Right Hand

- Trends show a gap in the accelerations of the hand and foot, the active limbs during the drill

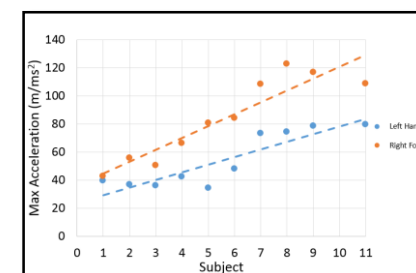


Figure 7: Max Accelerations of Left Hand and Right Foot

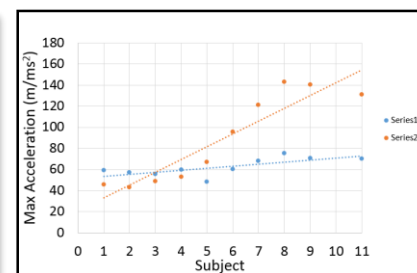


Figure 8: Max Accelerations of Right Hand and Left Foot

Key:

- = Above Average Performers
- = Below Average Performers

Conclusion:

- Not all above average performers had low sway ranges which correlates to more control and vice versa
 - No clear correlations
- The active limbs did not appear to have the same accelerations
 - May not be in sync on the way up
 - May not be in sync on the way down
 - Put down a hand/foot during the drill for stabilization
- More biomechanical markers are needed for further analysis of the form
 - Coordination plots
 - Pelvis rotation and tilting
 - Jerk analysis
 - Other sensor based outcomes

Acknowledgements:

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References:

1. <https://www.xsens.com/>