

## THE CONCEPT OF KINEMATIC VARIABILITY AND THE LINK TO MOTOR SKILL OUTCOME

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**KEY WORDS:** movement variability, discrete skill, throwing

**INTRODUCTION:** There is continuing discourse in the biomechanics community relating to kinematic variability regarding whether successful athletes/performers exhibit large or small amounts of kinematic variability. A discrete motor skill, where the outcome of one performance does not affect the outcome of the second performance, may be associated with a large amount of kinematic variability; inter-trial efficiency is not important. For example, in javelin, if the performer does something outside his/her natural kinematic variability, then this may lead to a better than normal outcome.

**METHOD:** Subjects, while wearing 7 reflective markers on anatomical sites (adapted from Aguinaldo et al, 2007), throw a reflective tennis ball at various target locations. The targets, generated by LabView software (National Instruments Corporation, Texas), appear in random order in a 9-grid square. The target begins as a large circle, decreasing gradually to a small circular target. The subjects throw the ball, aiming to hit the target accurately and at the time that the target is at its smallest. Each subject performs 27 throws. Subjects are analysed using an EvaRT 4.4 motion analysis system.

**RESULTS:** The system records the subject's position, the position of the ball when it hit the wall, and the timing of the ball when it hit the wall. This will provide results of the outcome in the x-, y- and z-axes, the flight path of the ball and the subject's body position throughout the throw. Analysis of the correlation between kinematic variability and motor skill outcome will then be undertaken.

**DISCUSSION:** Results will be interpreted and discussed in relation to kinematic variability and the link to motor skill outcome.

**CONCLUSION:** The study will conclude having given a complete view of the kinematic variability of over arm throwing at various targets.

### REFERENCES:

- Aguinaldo, A.L., Buttermore, J., and Chambers, H. (2007). Effects of upper trunk rotation on shoulder joint torque among basketball pitchers of various levels. *Journal of Applied Biomechanics*, 2007; 23:42-51, Human Kinetics, Inc.
- Bartlett, R., Wheat, J., and Robins, M. (2007). Is movement variability important for sports biomechanists? *Sports Biomechanics*, 2007; 6(2):224-243, Routledge.