THE INFLUENCE OF EXPERIENCE ON FUNCTIONAL PHASE KINEMATICS OF THE LONGSWING

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INTRODUCTION: The biomechanics of successful longswings are well understood, however, the influence of experience on execution is not well defined. This study aims to explore functional phase (FP) kinematics during repeated longswings performed by an experienced (E), inexperienced (I) and novice (N) participant.

METHODS: Three participants performed five sets of five longswings on a high bar. Data were collected using an automated motion analysis system (CODA CX-1), sampling at 200Hz. Circle angle (θ_C) was defined by the mass centre to bar vector with respect to the horizontal. Kinematics ofFP's, defined by maximum shoulder flexion to extension (θ_{CS}) and hip extension to flexion (θ_{CH}), were analysed duringswing three and four in each set.

RESULTS AND DISCUSSION: Variabilityof the start (1) and end (2) of the functional phases ($\theta_{CS12}$and θ_{CH12}) were larger for participant I however, the range of the FP remained similar to that of participant N. These results suggest that the timing of FP initiation may well be important in the development of this particular skill (Figure 1).
The joint angle changes within the respective functional phases were smallest for E, and largest for N, where $\theta_{CS12}$and θ_{CH12}occurred earlier. It is likely that these findings reflect the mechanical result of an early onset FPwith increased shoulder and hip angles, indicating that the action and timing of the functional phases is critical in facilitating the mechanical demands of successful longswing performance (Irwin & Kerwin, 2005).

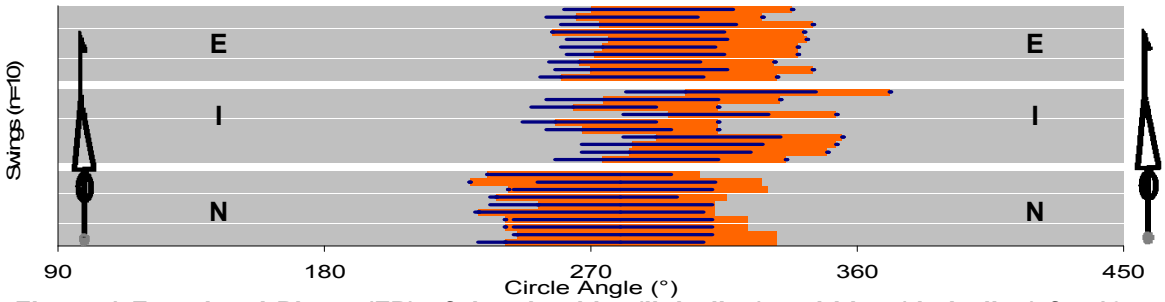

Figure 1 Functional Phase (FP) of the shoulder (light line) and hips (dark line) for 10 swings of experienced (E), inexperienced (I) and novice (N) participants

Table 1Mean [±sd] shoulder (θ_S) and hip (θ_H) angles, and changes in corresponding joint angles ($\Delta\theta$), at the start (1) and end (2) of the functional phases for experienced (E), inexperienced (I) and novice (N) participants

	θ_{S1}(°)	θ_{S2}(°)	$\Delta\theta_{S12}$(°)	θ_{H1}(°)	θ_{H2}(°)	$\Delta\theta_{H12}$(°)
E	6 [2]	-27 [2]	33 [3]	17 [4]	-23 [2]	49 [4]
I	3 [2]	-33 [4]	37 [4]	22 [3]	-57 [4]	79 [6]
N	17 [3]	-32 [7]	49 [8]	33 [5]	-67 [4]	100 [7]

CONCLUSION: These results show that kinematic analysis throughout the development of the longswing can be a valuable tool in identifying key variables required for skill progression. Current work is examining more participants of varying experience.

REFERENCES: Irwin, G. andKerwin, D. G. (2005). Biomechanical similarities of progressions for the longswing on high bar.*Sports Biomechanics, 4*, 164-178.