

GIANT SWINGS ON THE PARALLEL BARS: A CASE STUDY

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INTRODUCTION: Giant swings, routinely performed by gymnasts on the high bar, rings and uneven bars, have been the subject of several investigations (Arampatzis & Brüggemann, 1998; Prassas, Papadopoulos & Krug, 1998; Yeadon & Brewin, 2003). They have not been studied, however, on the parallel bars, where they have been introduced only recently. The purpose of this study was to investigate the kinematics of giant swings on the parallel bars.

METHODS: Giant swings performed from a high cast by a collegiate level gymnast were videotaped at 60 Hz. Two giants-judged to be his best and worst performance-were analyzed utilizing the Ariel Performance Analysis System (APAS). The right foot, knee, shoulder, and elbow joints, the hand, the top of the head, and a point on the bar were digitized. Position data were smoothed by digital filtering at 5 Hz.

RESULTS AND DISCUSSION: Preliminary results are shown in Table 1. Bar levels I/II represent the instant where the gymnast's CM was level with the bars in the downswings/upswings, respectively. Bottom represents the point below the bars where the CM_{vy} changed from negative to positive. Vertical represents the instant above the bar where the CM_{vy} changed from positive to negative.

Table 1 Comparative Kinematic Results for two Giant Swings on the Parallel Bars.

| Variable | Bar Level I | | Bottom | | Bar Level II | | Vertical | |
|---------------------------|-------------|-------------|------------|------------|--------------|------|--------------|--------------|
| | Good | Bad | Good | Bad | Good | Bad | Good | Bad |
| HJ angle (deg.) | 181 | 172 | 180 | 182 | 216 | 224 | 172 | 164 |
| SJ angle (degrees) | 171 | 175 | 173 | 173 | 129 | 138 | 183 | 68 |
| HJ ang. vel. (deg/sec) | -152 | -231 | 248 | 255 | -425 | -328 | 88 | 69 |
| SJ ang. vel. (deg/sec) | 35 | -151 | -107 | -33 | -128 | -150 | 76 | 738 |
| Head angle (deg.) | 180 | 182 | 275 | 289 | 414 | 409 | 102 | 122 |
| CM v _y (m/sec) | -0.3 | 0.2 | 2.2 | 5.0 | -0.2 | 0.5 | -0.7 | 0 |
| CM v _x (m/sec) | -3.3 | -3.7 | 0.5 | 0.3 | 3.8 | 3.8 | 0 | 0 |
| Time | 0 | 0 | 0.366 | 0.33 | 0.66 | 0.66 | 1.419 | 1.036 |

Notes: 1) negative hip joint angular velocity denotes flexion; 2) negative shoulder joint angular velocity denotes extension; 3) "head angle" is measured from the right horizontal axis in the direction of motion (CCW).

With few exceptions-bolded in Table 1-, preliminary results at four critical positions did not reveal substantial quantitative differences in most kinematic variables. It appears that success/failure in the performance of giant swings on the parallel bars may be more sensitive to issues of timing of the actions of the gymnast than to any other issue.

REFERENCES:

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