**X-Factor study codebook**

The information in this file outlines the details of a pilot dataset for a study on the relationship between X-Factor in the golf swing and swing effort. The pilot dataset was collected to refine the experimental protocol and to determine sample size for a full powered study.

**File naming**

Each file is named according to the following convention ‘P*x*\_T*x*\_C*x*.txt’. Participant ID is identified by the number following ‘P’; Trial number is identified by the number following ‘T’ and the experimental condition is identified by the number following ‘C’. There are two experimental conditions, 1 = easy swing, 2 = hard swing. There are three trials for each condition; therefore, the trial number can be in the range 1–3.

**Data collection**

An eight-channel Polhemus Liberty electromagnetic motion tracking system (Polhemus, Colchester, USA) was used to collect kinematic data at 240 Hz. Five sensors were placed on the following landmarks: posterior aspect of the lead hand, lateral aspect of the lead upper arm, T3, L4 and centre of the forehead. The thorax and pelvis sensors were housed in a non-stretching, fabric belt, which ensured the sensors represented pelvis and thorax motion, respectively. The source transmitter was placed approximately 0.3 m behind the golfer. The anatomical landmark digitisation protocol was consistent with Evans et al. (2012).

The lab coordinate system was defined with +X directed away from the target and parallel with the target axis, +Y directed anteriorly and perpendicular to X and +Z vertically upward. The thorax coordinate system was defined as follows: the x-axis was directed through the left and right humeral heads with the origin midway between them.The y-axis was the cross product of x and a vector directed superiorly and parallel with the midline. The z-axis was the cross product of x and y. The x-axis of the pelvis segment ran through the left and right greater trochanters with the origin midway between them. The y-axis of the pelvis was the cross product of x and a vector directed superiorly through the left greater trochanter and the lateral aspect of the left iliac crest. The z-axis of the pelvis was the cross product of x and y.

Rotations about the pelvis and thorax z-axes were subsequently used for calculating their angular separation (X-factor). The start of the swing was defined as the first frame in which the velocity vector of the pelvis about the z-axis remained positive until the top of the backswing.We trimmed the last frame at release ­– 40 frames after impact.

Kinematic data were calculated using Golf BioDynamics software (Golf BioDynamics Pty Ltd., Brisbane, Australia) running in Windows 7. Further processing and analysis was done in MATLAB (R2016a version 9.0.0, The MathWorks Inc., Natick, MA) on a Mac OS X 10.11.6 operating system.

**Variables**

Note: “rotation” indicates rotation about the segment z-axis, “tilt” indicates rotation about the segment y-axis, and “bend” indicates rotation about the segment x-axis.

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| **Column 1** | XFactor computed by Golf BioDynamics |
| **Columns 2–3** | Spine (bend, tilt) |
| **Columns 4–6** | Neck (rotation, bend, tilt) |
| **Column 7–9** | Shoulder (rotation, bend, tilt) |
| **Column 10–11** | Elbow (rotation, bend) |
| **Column 12–13** | Wrist (bend, tilt) |
| **Column 14–16** | Pelvis (rotation, tilt, bend) |
| **Column 17–19** | Thorax (rotation, tilt, bend) |
| **Column 20–22** | Head (rotation, tilt, bend) |
| **Column 23–25** | Arm (rotation, tilt, bend) |
| **Column 26–28** | Forearm (rotation, tilt, bend) |
| **Column 29–31** | Lefthand (rotation, tilt, bend) |
| **Column 32–34** | Clubshaft (rotation, tilt, bend) |
| **Column 35–37** | Clubface (rotation, tilt, bend) |