Title:

--The joint angles can be described by coordinate system or attitude vector (Rouhani et al. 2012).--

1. Introduction

* In gait analysis, joint angles are generally described using Euler Angles. Joint angles are defined by rotations occurring about the three joint coordinate axes.
* Gait analysis measurements incorporates an inherent variability associated to diverse causes as marker placement, soft tissue artefacts, etc.
* Hypothesis: Variability in Gait analysis is increased by axes definition.
* Describe population
* Another way of describe the joint angles is the attitude vector.
* Attitude vector consists on a single axis that calculates the motion of one segment relative to another at a specific time frame.
* It is expected that theta and alpha (not dependent on the segment/joint axes) demonstrate less variability than projected ktheta and Euler angles. It is also expected that projected k theta and Euler angles (dependent on the segment/joint axes) demonstrate a comparable variability.
* The objective of this study is to compare the sensitivity of both Euler angles and attitude vector as descriptive of joint angles.

1. Methods
   1. Database from Montreal. 10 subjects, 3 therapists, 2 sessions.
   2. Data Processing:
      1. Extract rotation matrix from Euler angles
      2. Extract theta and k from rotation matrix
      3. Calculate mean of k among all frames and norm it
      4. Compute angle alpha between mean k and instant k (inverse cos of dot product between mean k and instant k.
      5. Project ktheta to Euler angles (=JCS axes)
      6. Calculate variability (ICC) of theta, alpha, projected ktheta and euler angles
      7. Compare variability