Appendix 4: Comparison of apparent and true axial rotation between current investigation and Ludewig et al [1]

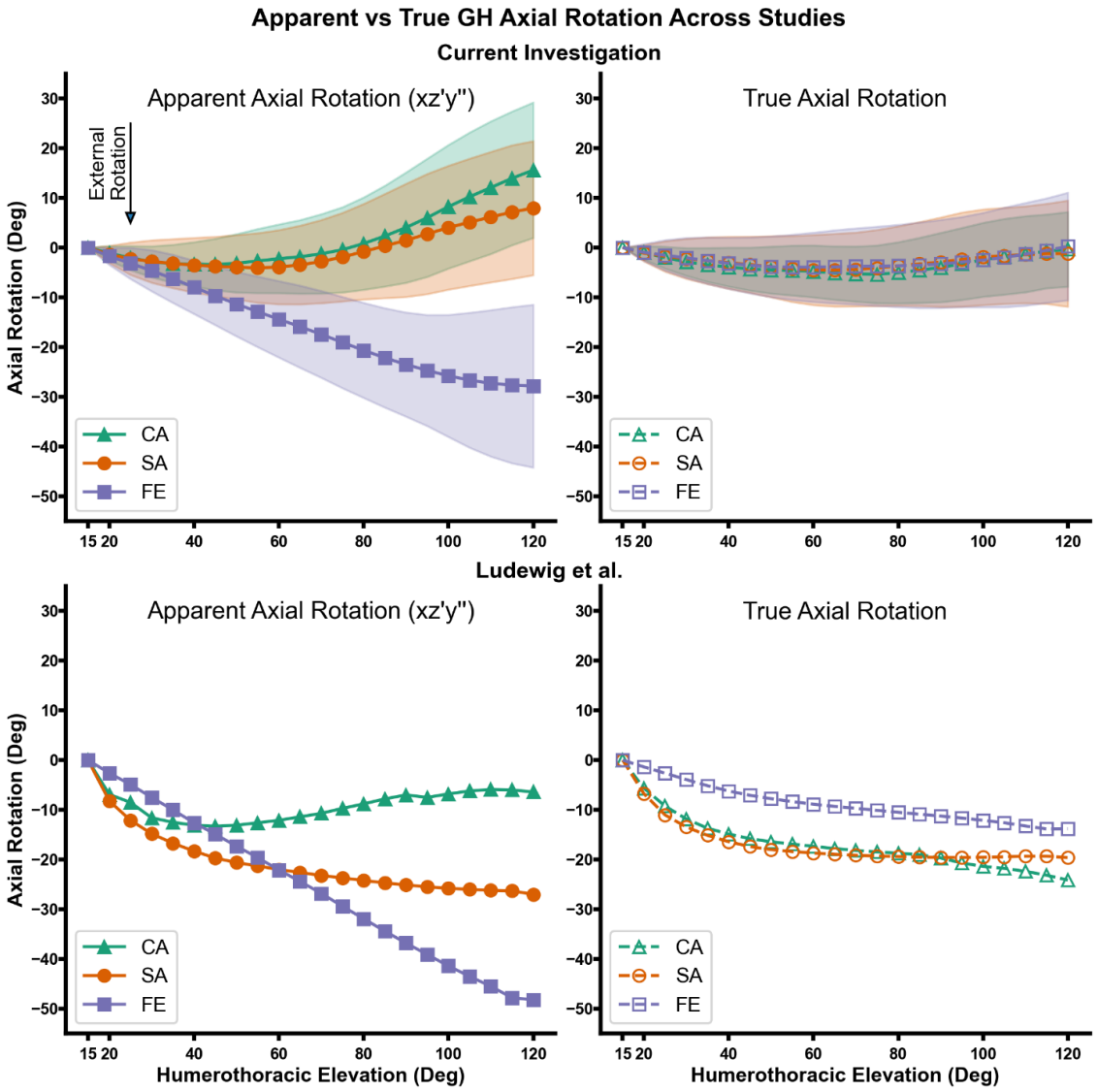

Fig A4: Apparent (left) versus true (right) axial rotation for the current investigation (top) and that of Ludewig et al. [1] (bottom). The lateral direction of the scapula was defined by the AC joint to conform to the dataset from [1]. To properly compare the current true axial rotation against the prior dataset, HT elevation angles between 15-120° were considered, and both apparent and true axial rotation were normalized by their respective values at 15° of HT elevation. Only 14 subjects (comparable to the N=12 from [1]) were able to achieve this ROM in our dataset. The mean GH CA, SA, and FE trajectories from [1] were converted to the rotation matrix representation and GH true axial rotation was computed.

In both studies, with increasing HT elevation angle, true axial rotation converges between different planes of elevation, while xz'y'' apparent axial rotation diverges. Furthermore, external axial rotation – as measured using true rather than apparent axial rotation – decreased ~35° for FE in the previously published dataset.

[1] P.M. Ludewig, V. Phadke, J.P. Braman, D.R. Hassett, C.J. Cieminski, R.F. LaPrade, Motion of the shoulder complex during multiplanar humeral elevation, The Journal of bone and joint surgery. American volume 91(2) (2009) 378-89.