

## CORRECTION

# Correction: The biomechanics of knuckle-walking: 3-D kinematics of the chimpanzee and macaque wrist, hand and fingers

Nathan E. Thompson

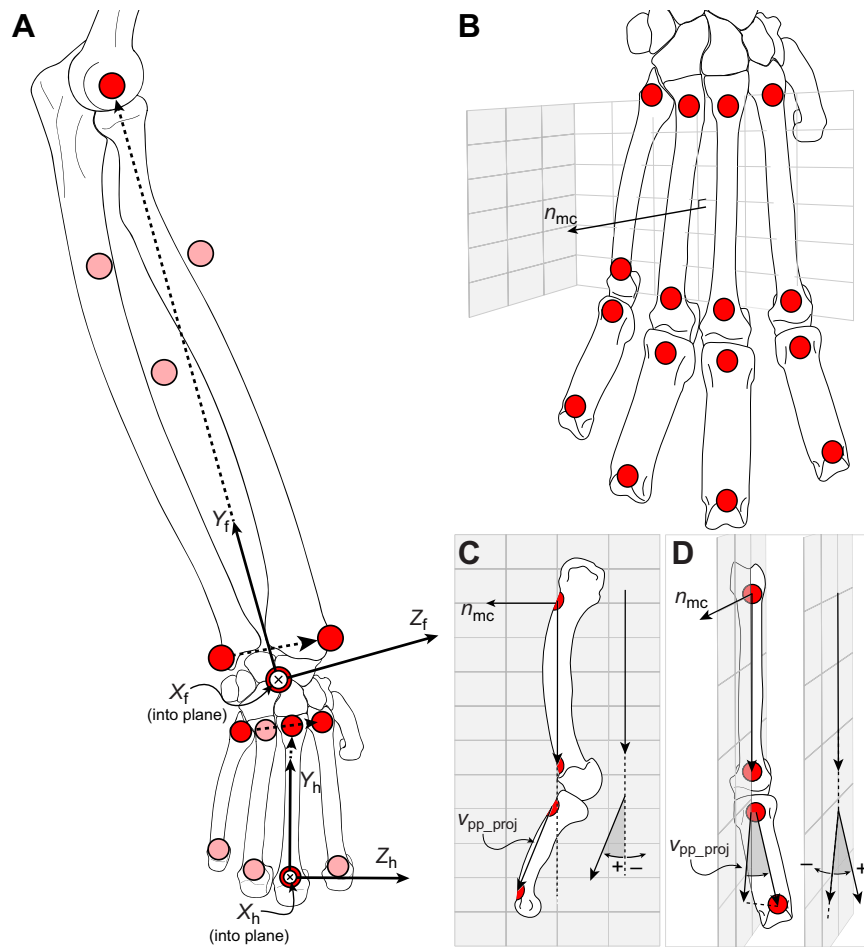
There was an error published in *Journal of Experimental Biology* (2020) **223**, jeb224360 (doi:10.1242/jeb.224360).

The description of the calculation of metacarpophalangeal (MCP) joint abduction and adduction was incorrect. It was originally described as the angle between the metacarpal and the projection of the phalangeal vector onto the plane of best fit of the metacarpals. This was not the case. The MCP adduction/abduction angle was calculated as the 3-D angle between the phalangeal vector projected onto the sagittal metacarpal plane (gray plane of Fig. 2) and the vector describing the actual position of the phalanges. The originally described calculation is sensitive to changes in MCP flexion and extension, whereas the calculation actually used is not. No data, analyses or conclusions are changed as a result of this; only the description of the calculation used in the Materials and Methods and the representation of this in Fig. 2 were incorrect.

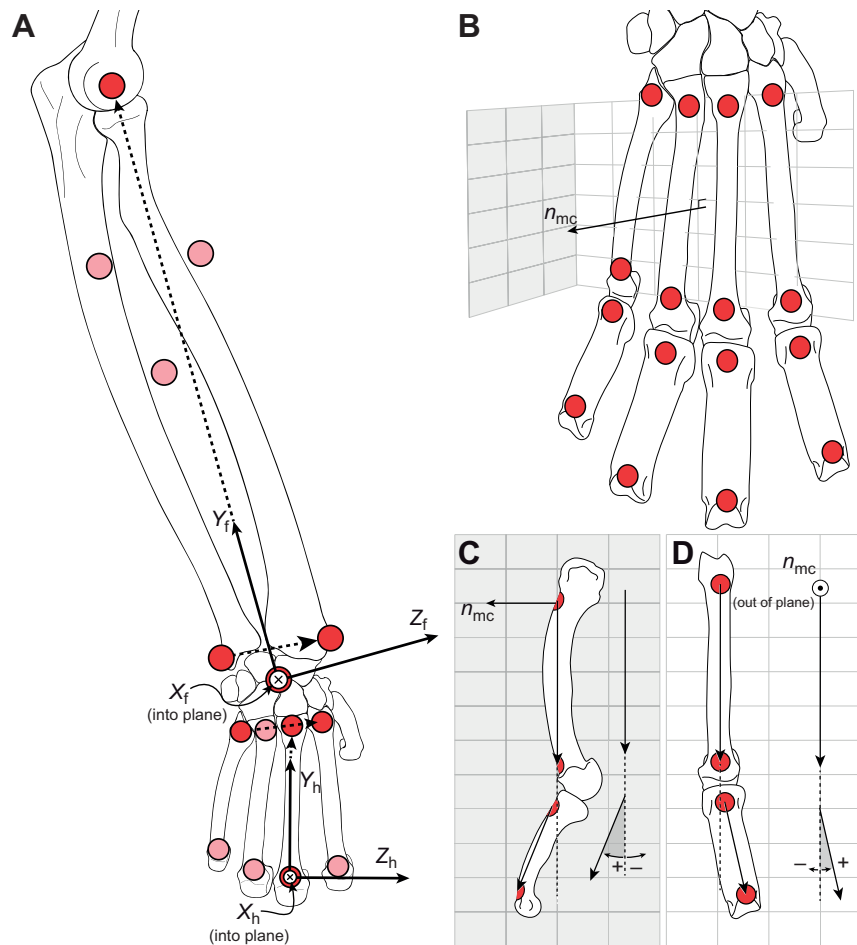
The corrected text in Materials and Methods (third to last sentence in ‘Metacarpophalangeal motion’) reads: ‘Adduction and abduction were calculated as the 3-D angle between the vector projection of the phalangeal markers onto the sagittal metacarpal plane ( $v_{pp\_proj}$  in Fig. 2C,D) and the actual vector defining each phalanx. This calculation returns a value for abduction and adduction that is insensitive to the degree of MCP flexion and extension.’

The original and corrected versions of Fig. 2 are shown below. Both the online full-text and PDF versions of the article have been updated.

The authors apologise to the readers for any inconvenience caused and thank Dr Joris Leijnse for identification of this error.



**Fig. 2. (corrected). Forearm, hand and phalangeal coordinate systems and marker sets for the right side in dorsal view.** Marker locations are described in Table S1. (A) The red markers are those that were used to define the forearm ( $X_f$ ,  $Y_f$  and  $Z_f$ ) or hand ( $X_h$ ,  $Y_h$  and  $Z_h$ ) coordinate system (black arrows). Dashed arrows represent vectors that were used to help orient the coordinate system. Pink markers are those additional markers that were used to help calculate wrist joint motion, but were not used in defining the coordinate system. (B)  $n_{mc}$  is the normal vector to a plane of best fit to all eight metacarpal landmarks (white plane; B). For each digit, a plane perpendicular to this, oriented along each metacarpal's base and head landmark, was used to describe the sagittal plane of each metacarpal (gray plane in B and C, describing sagittal plane of the second metacarpal). (C) The projection of the phalangeal vector onto this plane was used to describe flexion (–; deg) and extension (+; deg). (D) Adduction (–; deg) and abduction (+; deg) were calculated as the 3-D angle between the vector projection of the phalangeal markers ( $v_{pp\_proj}$ ) onto the sagittal metacarpal plane (gray plane) and the actual vector of the phalanges.



**Fig. 2. (original). Forearm, hand and phalangeal coordinate systems and marker sets for the right side in dorsal view.** Marker locations are described in Table S1. (A) The red markers are those that were used to define the forearm ( $X_f$ ,  $Y_f$  and  $Z_f$ ) or hand ( $X_h$ ,  $Y_h$  and  $Z_h$ ) coordinate system (black arrows). Dashed arrows represent vectors that were used to help orient the coordinate system. Pink markers are those additional markers that were used to help calculate wrist joint motion, but were not used in defining the coordinate system. (B)  $n_{mc}$  is the normal vector to a plane of best fit to all eight metacarpal landmarks (white plane; B). For each digit, a plane perpendicular to this, oriented along each metacarpal's base and head landmark, was used to describe the sagittal plane of each metacarpal (gray plane in B and C, describing sagittal plane of the second metacarpal). (C) The projection of the phalangeal vector onto this plane was used to describe flexion (-; deg) and extension (+; deg). (D) The projection of the phalangeal vectors onto the plane of best fit of the metacarpals was used to describe adduction (-; deg) and abduction (+; deg).