**Supplementary data**

The tables below provide the individual subjects data corresponding to Figures 4, 5, and 6.

Table S1. Angle in degrees (ANGLE1) between the measured maximal isometric force FEXP and the maximal predicted force by the FFS FSIM. Letters below the POSITION conditions (a for HB21, b for HB22 and so on) are used to identify Bonferroni adjusted pairwise differences in the table e.g., ‘a’ in exponent means that the value of ANGLE1 for the considered condition is significantly different from that obtained for the HB21 POSITION condition with p<0.05, whereas ‘b’ in exponent means that the value is significantly different from that of the HB22 POSITION condition with p<0.05 and so on.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | Condition | |  |  |  |  |  |
| Subjects | HB21  a | HB22  b | HB23  c | HB24  d | HB25  e | Mean | SD |
| 1 | 9.9 | 21.0 | 11.4 | 3.7 | 4.9 | 10.2 | 6.8 |
| 2 | 7.2 | 10.5 | 2.0 | 4.9 | 5.0 | 5.9 | 3.1 |
| 3 | 6.3 | 15.1 | 6.4 | 6.4 | 4.8 | 7.8 | 4.2 |
| 4 | 10.1 | 11.9 | 7.5 | 11.5 | 4.0 | 9.0 | 3.3 |
| 5 | 6.3 | 7.5 | 14.3 | 4.8 | 1.9 | 6.9 | 4.6 |
| 6 | 4.7 | 8.9 | 8.5 | 4.7 | 4.3 | 6.2 | 2.3 |
| 7 | 8.1 | 12.6 | 10.6 | 9.5 | 6.4 | 9.4 | 2.4 |
| 8 | 1.7 | 4.7 | 14.6 | 2.5 | 5.8 | 5.8 | 5.1 |
| 9 | 3.9 | 9.2 | 1.4 | 8.1 | 7.0 | 6.0 | 3.2 |
| 10 | 6.4 | 14.8 | 8.8 | 9.3 | 2.3 | 8.3 | 4.6 |
| 11 | 6.7 | 16.1 | 12.1 | 6.7 | 8.1 | 10.0 | 4.1 |
| Mean | 6.5 b | 12.0a,d,e | 8.9 | 6.6 b | 5.0 b | 7.8 | 2.8 |
| SD | 2.5 | 4.6 | 4.4 | 2.8 | 1.9 | 3.2 |  |

Table S2. Angle in degrees (ANGLE2) between the measured maximal isometric force and the direction from the point of force application on the hand to the glenohumeral joint centre position assessed from the musculoskeletal model. Letters below the POSITION conditions (a for HB21, b for HB22 and so on) are used to identify Bonferroni adjusted pairwise differences in the table e.g., ‘a’ in exponent means that the value of ANGLE2 for the considered condition is significantly different from that obtained for the HB21 POSITION condition with p<0.05, whereas ‘b’ in exponent means that the value is significantly different from that of the HB22 POSITION condition with p<0.05 and so on.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | Condition | |  |  |  |  |  |
| Subjects | HB21  a | HB22  b | HB23  c | HB24  d | HB25  e | Mean | SD |
| 1 | 9.7 | 18.0 | 9.1 | 5.7 | 2.6 | 9.1 | 5.8 |
| 2 | 8.3 | 9.0 | 9.6 | 3.8 | 3.7 | 6.9 | 2.9 |
| 3 | 9.1 | 16.6 | 12.2 | 8.4 | 5.6 | 10.4 | 4.2 |
| 4 | 9.5 | 18.9 | 12.2 | 6.4 | 1.9 | 9.8 | 6.4 |
| 5 | 1.5 | 5.6 | 5.5 | 3.7 | 4.4 | 4.1 | 1.7 |
| 6 | 2.8 | 3.8 | 2.6 | 3.3 | 3.6 | 3.2 | 0.5 |
| 7 | 7.6 | 12.7 | 9.3 | 8.9 | 5.4 | 8.8 | 2.7 |
| 8 | 4.5 | 5.1 | 7.6 | 1.2 | 4.1 | 4.5 | 2.3 |
| 9 | 1.8 | 6.9 | 6.9 | 5.9 | 4.2 | 5.1 | 2.2 |
| 10 | 6.6 | 14.0 | 5.2 | 6.4 | 2.2 | 6.9 | 4.3 |
| 11 | 11.8 | 18.4 | 10.6 | 7.6 | 5.8 | 10.9 | 4.8 |
| Mean | 6.7 b | 11.7a,c,d,e | 8.3 b, e | 5.6 b | 4.0 b |  |  |
| SD | 3.5 | 5.8 | 3.0 | 2.4 | 1.3 |  |  |

Table S3. Mean and SD (N) of the norm of the measured (FEXP) and predicted (FSIM) maximal isometric force during handbraking and error of prediction (Δ) according to condition (HB21, HB22, HB23, HB24 and HB25). Letters after the condition (from a to e) are used to identify Bonferroni adjusted pairwise differences with p<0.05 according to the same scheme than that of tables S1 and S2.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **SUBJECT** | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | **Mean** | **SD** |
| **FEXP** | **HB21 a** | 279 | 150 | 286 | 177 | 296 | 171 | 176 | 356 | 145 | 426 | 440 | **264b, e** | **109** |
|  | **HB22 b** | 210 | 106 | 209 | 126 | 215 | 155 | 147 | 279 | 111 | 279 | 258 | **191a, c, d, e** | **65** |
|  | **HB23 c** | 260 | 166 | 303 | 176 | 239 | 186 | 184 | 392 | 131 | 408 | 433 | **262b, e** | **107** |
|  | **HB24 d** | 291 | 149 | 302 | 183 | 303 | 200 | 173 | 356 | 166 | 436 | 466 | **275b, e** | **111** |
|  | **HB25 e** | 395 | 223 | 430 | 231 | 411 | 238 | 258 | 618 | 218 | 564 | 565 | **377a, b, c, d** | **154** |
| **FSIM** | **HB21 a** | 329 | 204 | 471 | 178 | 365 | 198 | 191 | 453 | 319 | 474 | 420 | **327 b, e** | **119** |
|  | **HB22 b** | 207 | 133 | 324 | 109 | 255 | 186 | 170 | 324 | 162 | 364 | 292 | **230 a, c, d, e** | **87** |
|  | **HB23 c** | 360 | 221 | 509 | 216 | 393 | 204 | 228 | 528 | 258 | 535 | 488 | **358 b, e** | **138** |
|  | **HB24 d** | 361 | 201 | 491 | 168 | 353 | 216 | 191 | 446 | 320 | 433 | 430 | **328 b, e** | **117** |
|  | **HB25 e** | 434 | 350 | 574 | 315 | 419 | 404 | 342 | 644 | 430 | 708 | 519 | **467 a, b, c, d** | **128** |
| **Δ** | **HB21 a** | 50 | 54 | 185 | 1 | 69 | 27 | 15 | 96 | 174 | 49 | -20 | **64** | **66** |
|  | **HB22 b** | -3 | 27 | 115 | -18 | 40 | 31 | 23 | 46 | 50 | 85 | 33 | **39c** | **37** |
|  | **HB23 c** | 99 | 55 | 206 | 40 | 154 | 17 | 44 | 136 | 127 | 127 | 54 | **96b** | **59** |
|  | **HB24 d** | 71 | 52 | 189 | -15 | 50 | 16 | 18 | 90 | 154 | -3 | -36 | **53** | **70** |
|  | **HB25 e** | 39 | 127 | 144 | 84 | 7 | 166 | 84 | 26 | 212 | 144 | -46 | **90** | **78** |

Table S4. Angle in degrees (ANGLE1) between the measured maximal isometric force and the maximal predicted force by the FFS in the medium configuration (HB21) for the three different force intensity instructions (MAX, HIGH, and LOW). The two last lines correspond to the mean measured force amplitudes in each condition. Letters below the INTENSITY conditions (a for LOW, b for HIGH and c for MAX) are used to identify Bonferroni adjusted pairwise differences in the table e.g., a in exponent means that the value of ANGLE1 for the considered condition is significantly different from that obtained for the LOW INTENSITY condition with p<0.05, whereas b means that the value is significantly different from that of the HIGH INTENSITY condition with p<0.05 and so on.

|  |  |  |  |
| --- | --- | --- | --- |
| SUBJECT | LOW  a | HIGH  b | MAX  c |
| 1 | 18.9 | 17.3 | 8.4 |
| 2 | 31.8 | 8.9 | 5.5 |
| 3 | 6.7 | 7.9 | 5.5 |
| 4 | 8.3 | 11.0 | 9.9 |
| 5 | 20.3 | 9.5 | 8.2 |
| 6 | 13.8 | 7.6 | 7.0 |
| 7 | 8.1 | 7.6 | 4.7 |
| 8 | 4.7 | 1.9 | 2.1 |
| 9 | 19.3 | 5.0 | 4.4 |
| 10 | 9.2 | 7.2 | 4.9 |
| 11 | 10.0 | 9.9 | 7.3 |
| Mean | 13.7c | 8.5 | 6.2a |
| SD | 8.1 | 3.8 | 2.2 |
| Measured force amplitude FEXP [N] | | | |
| Mean | 51.5a,b | 130.9a,c | 287.8a,b |
| SD | 35.9 | 53.2 | 115.6 |