**Supplementary File 1a.** Model fitting and simulation parameters with the PEA model.

|  |  |  |  |
| --- | --- | --- | --- |
|  | Data set | Parameters | Goodness-of-fit |
|  | $$σ\_{u}$$(deg) | $$σ\_{p}$$(deg) | *a* | *b* | *A* | *B* | *R2* | *RMSE*(deg) |
| Adaptation extent fitting(Figure 1B) | Kim 2018, Exp1 | -- | $σ\_{p}$*/a* = 3.406; *b/a* = 0.138 | -- | -- | 0.773 | 1.898 |
| Kim 2018, Exp2 | -- | $σ\_{p}$*/a* = 4.758; *b/a* = 0.168 | -- | -- | <0 | 2.163 |
| Morehead, 2017 | -- | $σ\_{p}$*/a* = 1.639; *b/a* = 0.044 | -- | -- | <0 | 2.937 |
| Trial-by-trial adaptation fitting | Exp 2,Figure 3 | 5.048 | 11.119 | \*1.853 | \*0.309 | 0.970 | 0.208 | 0.975 | 1.222 |
| 5.468 | 12.128 | 1.663 | 0.331 | 0.971 | 0.194 | 0.975 | 1.217 |
| Exp 2,Figure 3-figure supplement 4 | -- | -- | -- | -- | 0.991 | 0.364 | 0.989 | 0.815 |
| Tsay 2019, Figure 4A | 1.896 | 7.959 | \*1.853 | \*0.309 | 0.978 | 0.525 | 0.991 | 0.716 |
| Single-trial learning fitting | Tsay 2021, Figure 3-figure supplement 3 | $σ\_{int}$ *=* 7.364 | 1.179 | 0.384 | -- | 0.057 | 0.974 | 0.020 |
| Proprioceptive recalibration simulation | Exp 3,Figure 4B | 5.048 | 11.119 | 1.853 | 0.309 | 0.970 | 0.208 | -- | -- |
| Adaptation affected by visual uncertainty simulation | Exp 4,Figure 5 | 5.048 | 11.119 | 1.853 | 0.309 | -- | 0.208 | -- | -- |

\* Asterisks represent fixed parameters in specific data fitting. The fixed values equal to the slope and intercept estimated from Experiment 1.

**Supplementary File 1b.** Model comparisons.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Data set |  | PEA | PReMo | Causal Inference |
| Block-design learning fittingExp 2, Figure 3 & S3 | AIC | 2255 | 3543 | 3283 |
| *R2* | 0.975 | 0.749 | 0.711 |
| *RMSE* (deg) | 1.222 | 3.896 | 4.151 |
| Single-trial learning fittingTsay 2021, Figure 3-figure supplement 3 | AIC | -36.90 | -15.98 | -11.28 |
| *R2* | 0.974 | 0.584 | 0.305 |
| *RMSE* (deg) | 0.020 | 0.103 | 0.080 |