

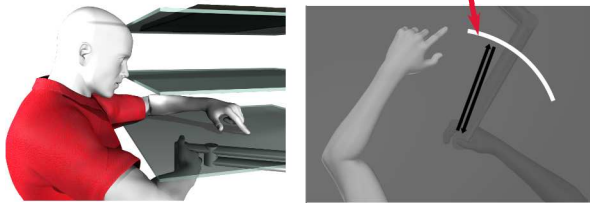
Proprioception and Prediction Do Not Optimally Integrate in Hand Localization

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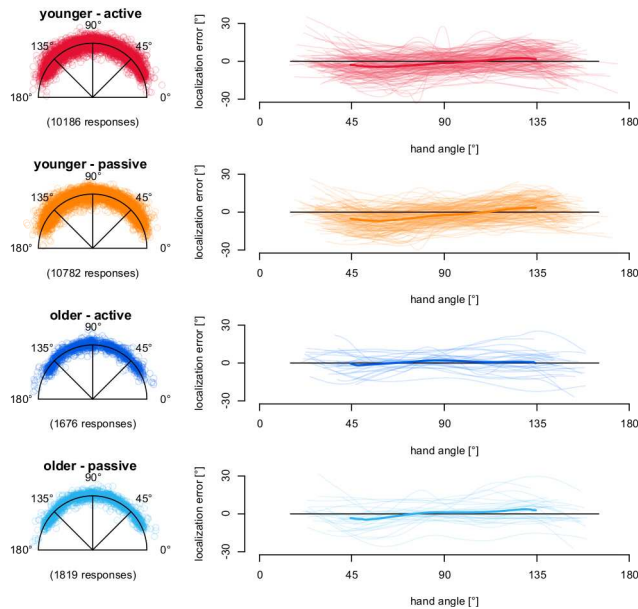
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Hand Position is Central for Reaching

Knowing where your limbs are, is important for planning and controlling movements, so it makes sense to use multiple sources of position information. Here we look at felt hand position, or proprioception, and predicted sensory consequences, likely based on efference signals. We expected these to integrate optimally as a maximum likelihood estimate (MLE; Ernst & Banks 2002), but it seems they don't.

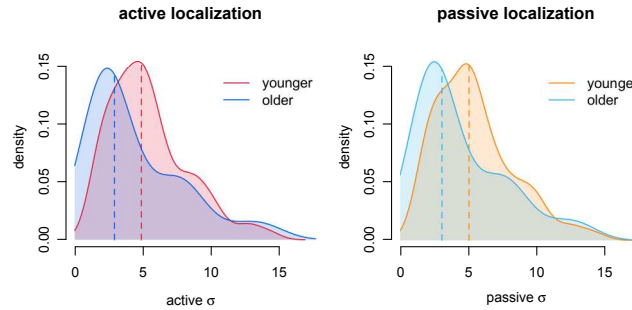


Data is from tasks where people localize the endpoint of the outward displacement after self-generated, active (prediction + proprioception) and robot-generated, or passive (proprioception only) movements of the unseen right hand (161 younger (<35) and 28 older (55+) participants).



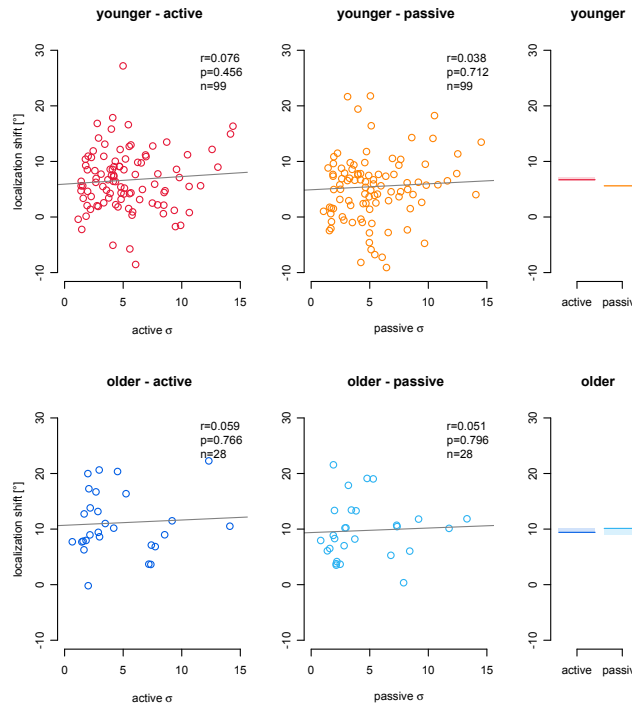
No Effect of Age on Reliability of Localization

Older participants have slightly lower variance in hand localization, but this is not significant.



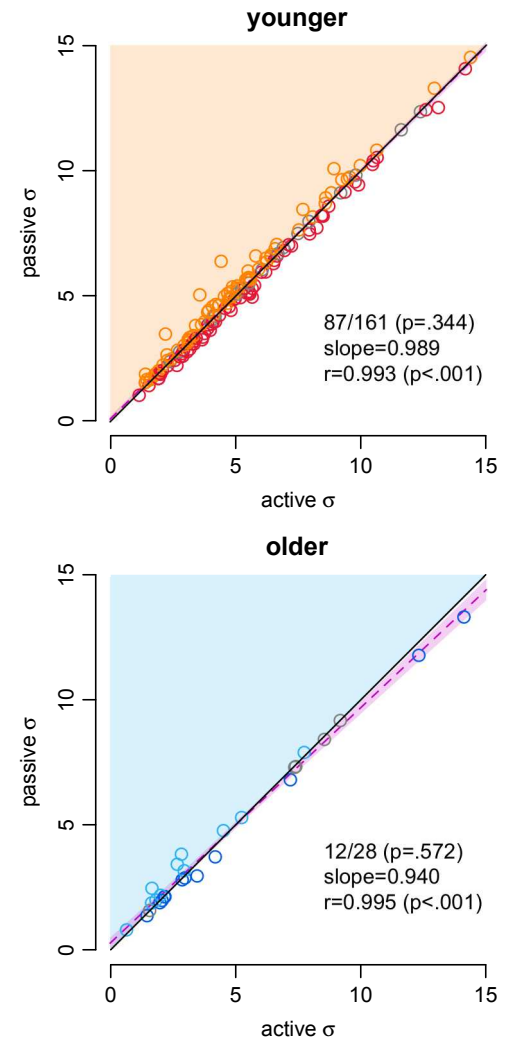
Reliability Does Not Predict Change

The Bayesian prediction that an estimate with lower reliability should shift more with training does not hold.



One or Two Signals: Equally Reliable

Passive hand localization, with access to only proprioception, should be less reliable than active localization, with both proprioception and prediction, but it is not.



Hand localization does not use a maximum likelihood estimate to combine prediction with proprioception