Using tools as cues for dual adaptation to opposing visuomotor rotations in virtual reality

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Contextual Cues are essential for learning how to use tools

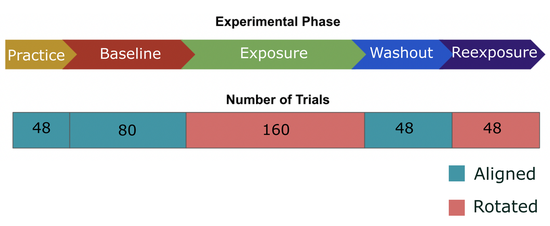
oEveryday tasks requires competent operation of different tool with seperate motor movements

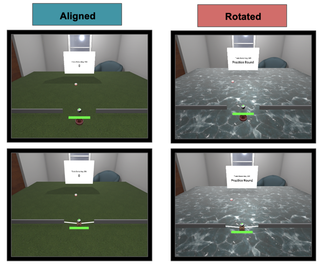
oSuccessful dual adaptation (concurrently learning two opposing pertubations) is reliant on extrinsic (shape of tool) or intrinsic (motor movement) contextual cues

oCan we use different tools to cue opposing rotations during dual adaptation in virtual reality?

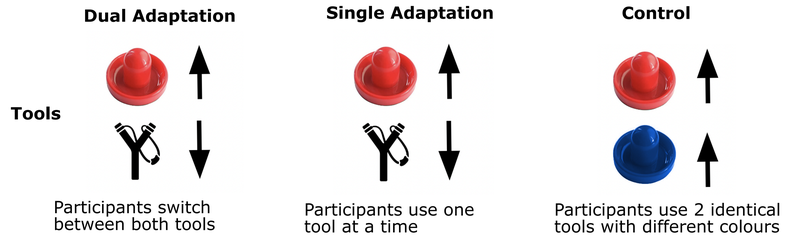
Virtual Paradigm

Participants (N = 40) used two tools in virtual reality to launch a ball toward a target

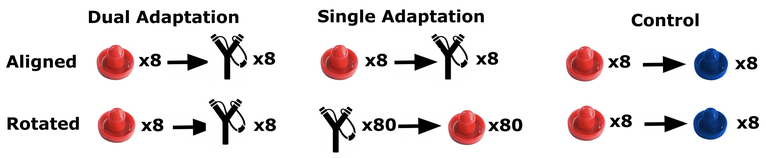


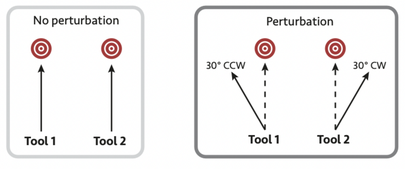


Three Conditions



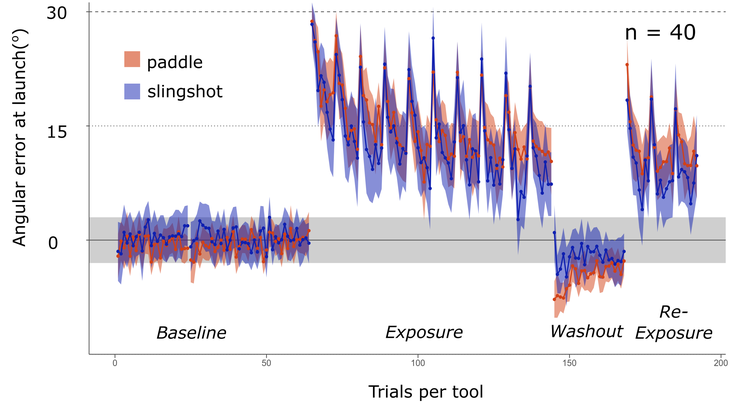
Shot Procedure



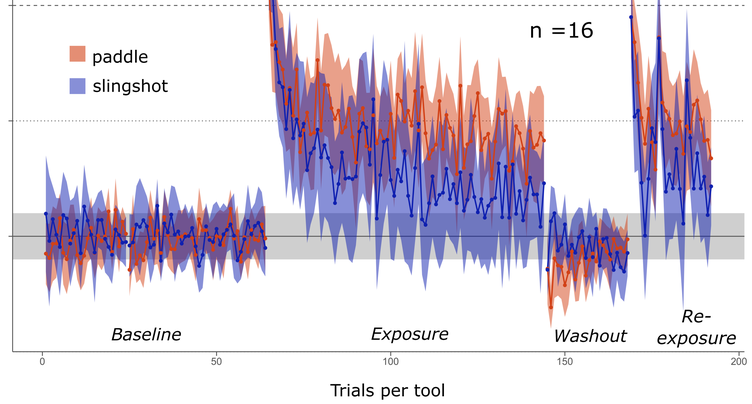


Each tool was associated with either a 30° (clockwise) or -30° (counterclockwise) rotation

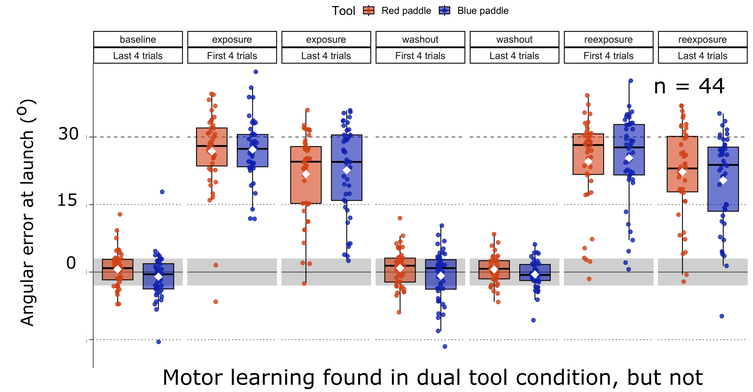
Dual Adaptation



Single Adaptation

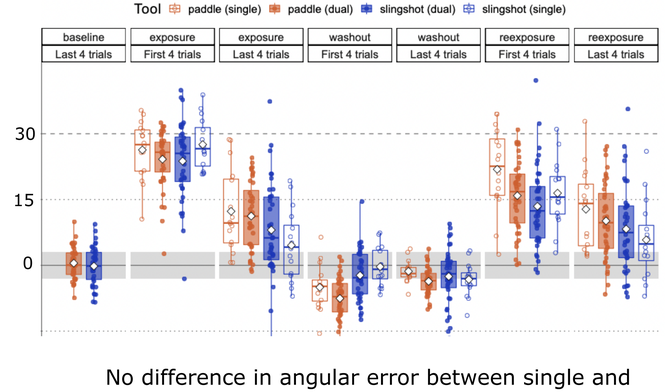


Control



Motor learning found in dual tool condition, but not in control

Individual differences between single and dual adaptation



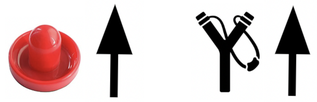
No difference in angular error between single and dual adaptation conditions

Main Takeaways

1) Visual cues not as important as motor cues in dual motor adaptation
2) Moderate task switching cost for all conditions
3) Decrease in angular error across exposure phase for both tools
4) Small aftereffect in washout for dual adaptation
5) Reducation in angular error during the beginning of Re-Exposure phase

Future steps

Are extrinsic contextual cues (visual information provided by the tool) strong enough to produce dual motor adaptation?



The contextual cues provided by tools are strong enough to facilitate the formation and recall of seperate motor memories

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