

Pilot study : testing our new bimanual task and adaptive training protocol

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ADAPTIVE TRAINING

Adapting task parameters to gradually increase task difficulty across training [1]. In this study : increase difficulty by decreasing the tolerance range allowed for the force produced

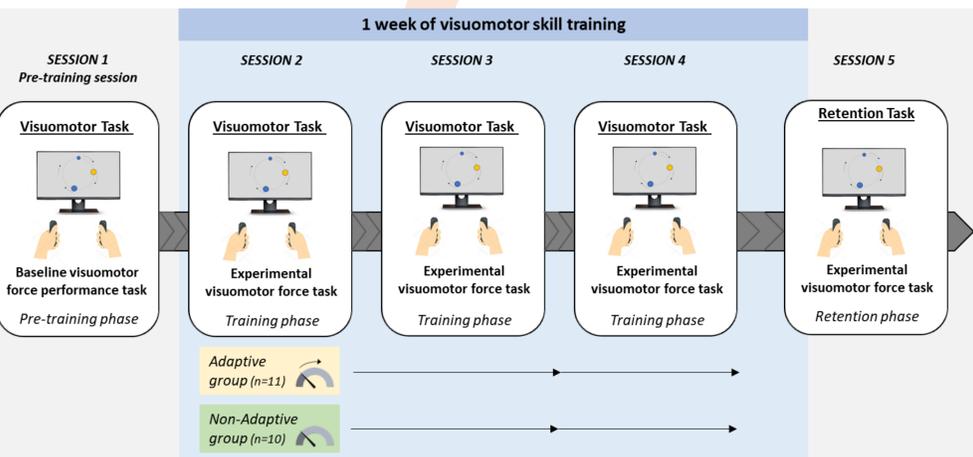
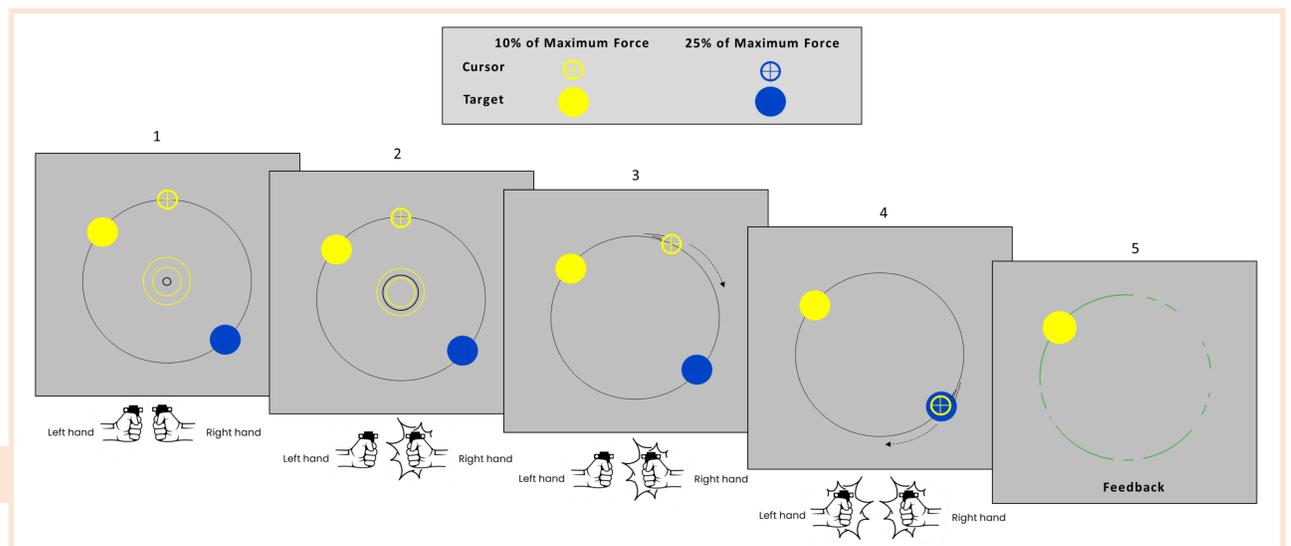
WHY STUDY IT?

More interest is needed regarding training conditions in view of individualizing interventions and promoting more efficient motor skill learning and relearning [2]. With EEG and MRI, in our prospective study, we will investigate how the learning conditions can interactively influence our brain characteristics.

AIM : Pilot study to test our new experimental bimanual task and obtain a population sample to calculate initial performance in this new task

EXPERIMENTAL TASK & DESIGN

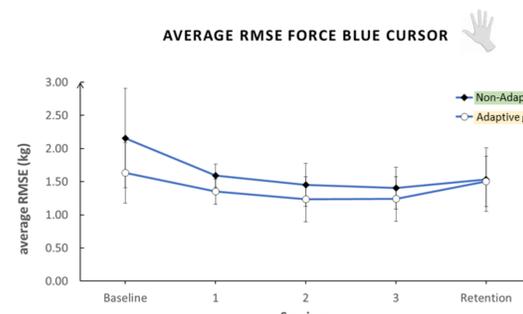
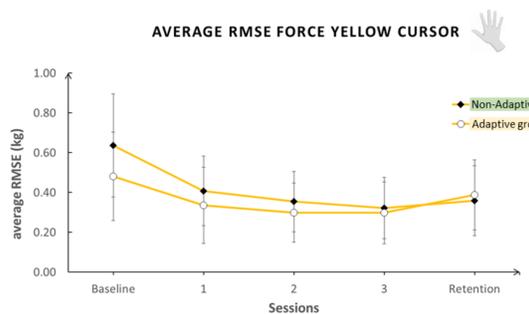
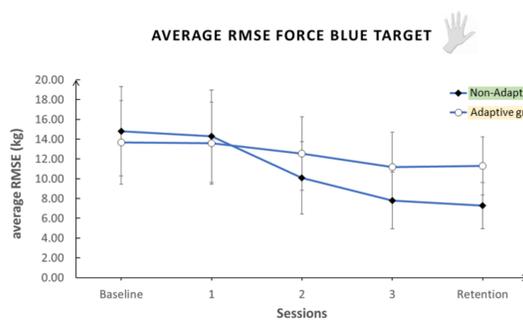
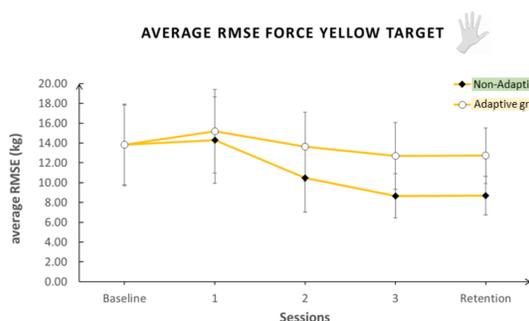
Bimanual visuomotor task



	Yellow cursor	Blue cursor	Yellow Target	Blue Target
7/11 adapted during training				
Difficulty increase in session 2	4/7	4/7	None	None
Difficulty increase in session 3	2/7	3/7	None	None
Difficulty increase (in 4 th session)	0	1/7	1/7	1/7
4/11 did not adapt during training				
Difficulty increase (in 4 th session)	1/4	0	1/4	2/4

VD = Root Mean Square Error (RMSE)

distance between expected force and actual force produced (ie. the force error)
→ performance measure for both hands



RESULTS AND OBSERVATIONS :

- Groups matched by baseline performance (average of both hands) : adaptive group started off better in the cursor than the non adaptive group
- Investigation of early phase learning (only 3 sessions)
- Faster acquisition in non-adaptive group : still learning after session 3? Or already at their best? Still room to improve within those conditions? → to be tested in longitudinal study
- No decrease of tolerance for the Targets force : focus on controlling the right (dominant) hand first before the left hand?

PENDING QUESTIONS :

- Match groups by baseline performance for both hands (not averaged score)
- Decrease complexity of task by imposing only one force instead of two?
- Tolerance range for the cursor too easy? Already plateauing after 3 sessions
- Maintain motivation across training and not cause frustration in adaptive group when difficulty increases by introducing reward during training?
- Measure the performance in the task without distinguishing both hands ? One combined measure ?

REFERENCES

[1] C. R. Kelley, "What is Adaptive Training?," *Hum. Factors J. Hum. Factors Ergon. Soc.*, vol. 11, no. 6, pp. 547-556, Dec. 1969, doi: 10.1177/001872086901100602. [2] D. I. Anderson, K. R. Lohse, T. C. V. Lopes, and A. M. Williams, "Individual differences in motor skill learning: Past, present and future," *Hum. Mov. Sci.*, vol. 78, p. 102818, Aug. 2021, doi: 10.1016/j.humov.2021.102818.