**Progress Report**

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**Title of Project: Pharmacologically manipulating dopamine to remediate age-related deficits in sensorimotor adaptation**

***Summary****:*

*Progress summary: Due to the lockdown and the coronavirus pandemic, we were unable to commence testing on vulnerable older adult populations, as the University of Queensland increased its COVID-19 risk reduction procedures to protect older Australians. However, we are currently recruiting older adults from our collaborator Prof Paul Dux’s lab, who has dopamine genotype information for their participants* (*COMT*/*BDNF*) *from their recently published work (Horne et al., 2020, Nature Human Behaviour). The capacity to share the genotype data promises to increase the explanatory power of our study dopamine manipulations, as previous work has shown that effects of dopamine manipulations depend on dopamine genotype (Furman et al., 2020)*

*In absence of data collection in older adults, we completed data collection in young adults, where we found that pharmacological manipulation of dopamine modulated movement vigor in implementing effortful strategies in motor learning. Specifically, dopamine manipulation slowed reaction times and peak velocities when participants engaged in cognitively effortful movement strategies. This idea is consistent with the extant literature demonstrating that dopamine plays an essential role in modulating the decision to engage effort (Walton & Bouret, 2019). This work formed the master’s thesis project of a cross-institutional student Lena Bernheine, who I co-supervised in collaboration with Prof Markus Kurscheidt from the University of Bayreuth. The student achieved the highest rank possible for the thesis.*

***Hypothesis vs Findings***

*Hypothesis: We hypothesized that modulations of dopamine function will affect the deployment of effortful strategies.*

***Unanswered Questions***

*It remains to be seen if the results shown in young adults will generalise to that in older adults.*

***What these research outcomes mean***

*Here, we show that pharmacological manipulation of dopamine altered movement vigor in the use of effortful strategies. This work has implications for motor learning in older adults (e.g., within leisure or rehabilitation settings), where age-related decrements in dopamine function might reduce the vigor with which older adults choose to engage physically or mentally effortful processes in motor learning.*

**References.**

Furman, D.J., White III, R.L., Naskolnakorn, J., Ye, J., Kayser, A. & D'Esposito, M. (2020) Effects of Dopaminergic Drugs on Cognitive Control Processes Vary by Genotype. *Journal of Cognitive Neuroscience*, **32**, 804-821.

Horne, K.S., Filmer, H.L., Nott, Z.E., Hawi, Z., Pugsley, K., Mattingley, J.B. & Dux, P.E. (2020) Evidence against benefits from cognitive training and transcranial direct current stimulation in healthy older adults. *Nature human behaviour*.

Walton, M.E. & Bouret, S. (2019) What Is the Relationship between Dopamine and Effort? *Trends Neurosci*, **42**, 79-91.