

## **The Effects of Error-Sensitivity in a Visuomotor Adaptation**

Adapting movements to our ever-changing environment likely involves many neural processes, and the two-rate model (Smith et al., 2006) nicely demonstrates that at least two processes are involved, called the “fast” and “slow” process, which work in parallel to contribute to our motor output. It explains a rebound phenomena, where people revert to reaching as if they were still adapted to the initially learned rotation, when doing error-clamped trials after a short reversal of the adapted perturbation. Later work has mapped the fast and slow processes onto explicit and implicit learning, respectively. To test this link between the model processes and actual learning processes, we used a within-subjects design where all participants (N=32) adapted to the same 30-degree rotation introduced both gradually and abruptly. Gradual rotations should rely on implicit learning more than abrupt rotations and lead to larger rebounds. However, we found no effect on either the size of the rebound or the fitted model’s parameter values. In attempt to tease out more of the explicit component of the abrupt condition, we did a follow-up experiment using the same paradigm, except this time participants (N=32) adapted to a 60-degree rotation. Similarly, we found no differences between the abrupt and gradual conditions on either the size of the rebound or fitted model parameters. This leads us to believe that the way the perturbation is introduced does not affect the size of the rebound, and further suggests that the applicability of the model is limited, as is fully in line with the conclusions of Smith et al. (2006). As a second study, we also ran this same paradigm in an immersive virtual reality setup. Preliminary results show no significant difference in the rebounds when adapting to a visuomotor rotation on a tablet and stylus or in a virtual reality environment.