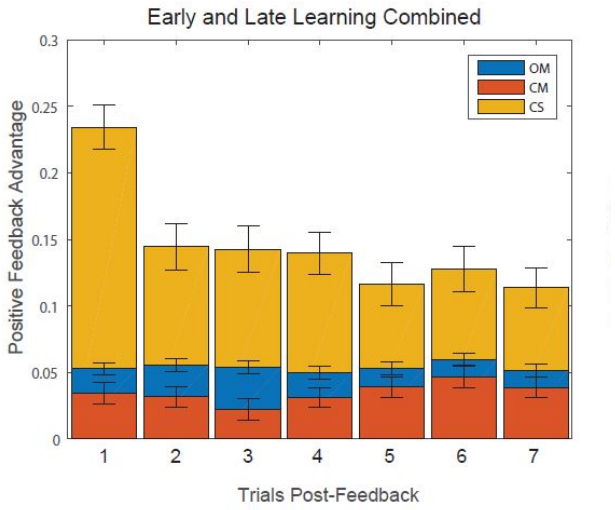

Figure S1. Related to Figure 2. In ***A,*** we have plotted the difference in performance across a series of 8 trials following a correct or an incorrect response. Behavioral differences between the Match and Saccade tasks persist across a whole series of trials, while there are minimal differences between the two Match tasks. The error bars reflect the +/- SEM.

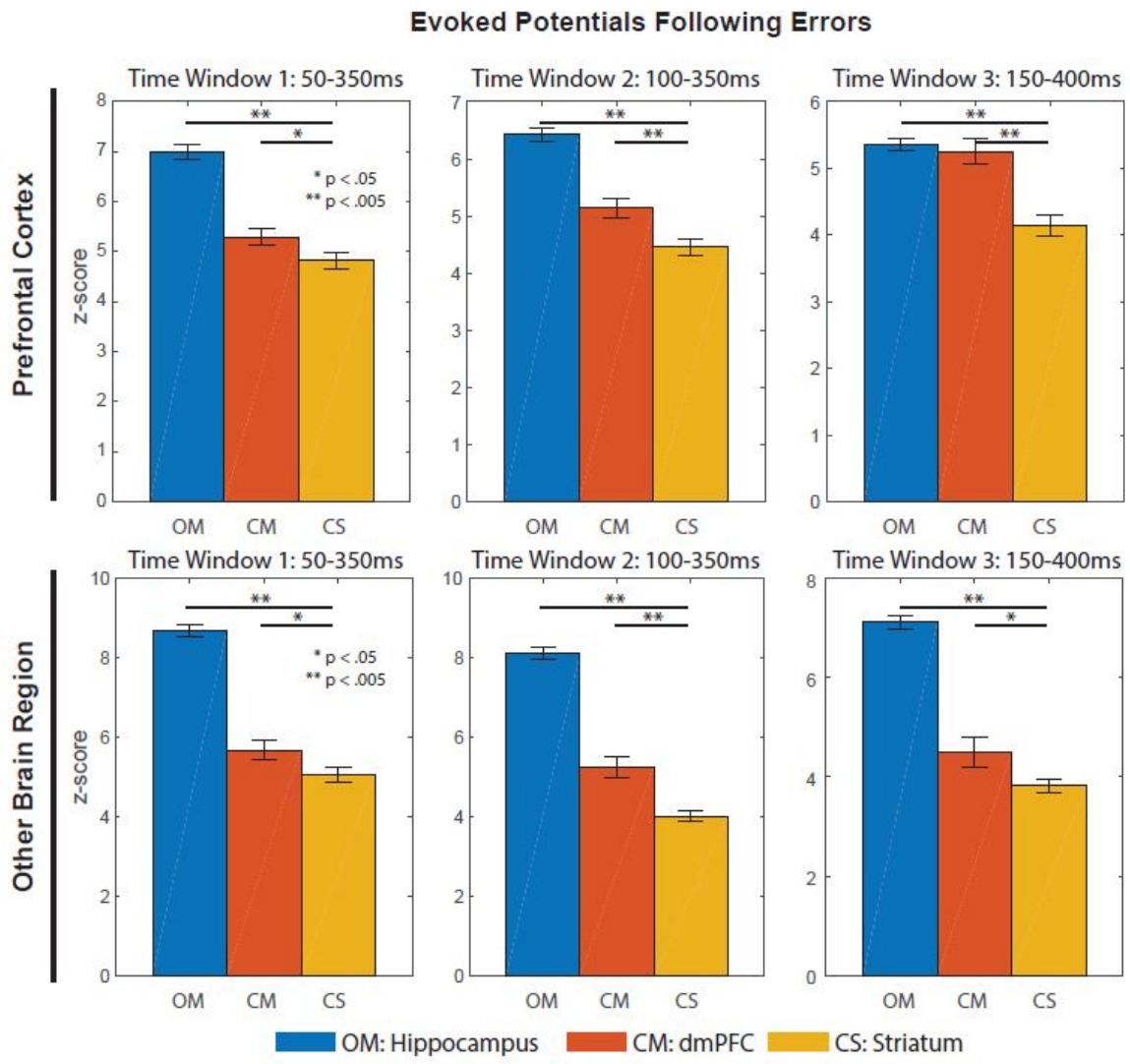

Figure S2. Related to Figure 3. In ***A,*** plotted are the magnitudes of the evoked potential following an error within Prefrontal Cortex. Both match tasks had significantly larger ERNs than in the CS task. (Time Window 1: OM vs. CS: +2.1686, $p < 1 \times 10^{-3}$; CM vs. CS: +0.4670, p = 0.015; Time Window 2: OM vs. CS: +1.988, $p < 1 \times 10^{-3}$; CM vs. CS: +0.6870, p = 0.0015; Time Window 3: OM vs. CS, +1.2215, $p < 1 \times 10^{-3}$; CM vs. CS, +1.1160, $p < 1 \times 10^{-3}$). In ***B***, the magnitudes of the evoked potentials following an error within Hippocampus (OM task), dorsomedial Prefrontal Cortex (CM task), and the Striatum (CS task). Again, both Match tasks had significantly larger ERNs than in the CS task (Time Window 1: OM vs. CS: +3.6194, $p < 1 \times 10^{-3}$; CM vs CS: +0.5925, p = 0.032; Time Window 2: OM vs. CS: +4.0871, $p < 1 \times 10^{-3}$; CM vs. OM, +1.2193, $< 1 \times 10^{-3}$; Time Window 3: OM vs. CS: +3.3044, $p < 1 \times 10^{-3}$; CM vs. CS, +0.691, p = 0.017). The error bars reflect the +/- SEM.

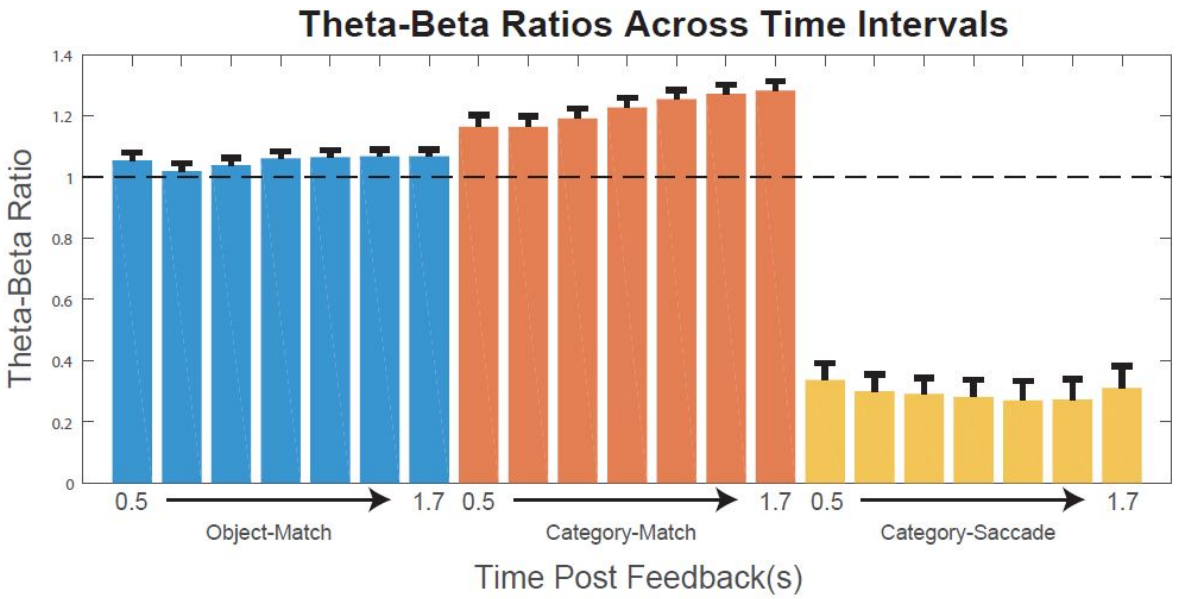

Figure S3. Related to Figure 4. The theta-beta ratio averaged from 0.5 to 1.7s post-feedback in 0.2s increments in the OM task (blue bars), CM task (orange bars), and the CS task (yellow bars). Error bars reflect 95% confidence intervals.

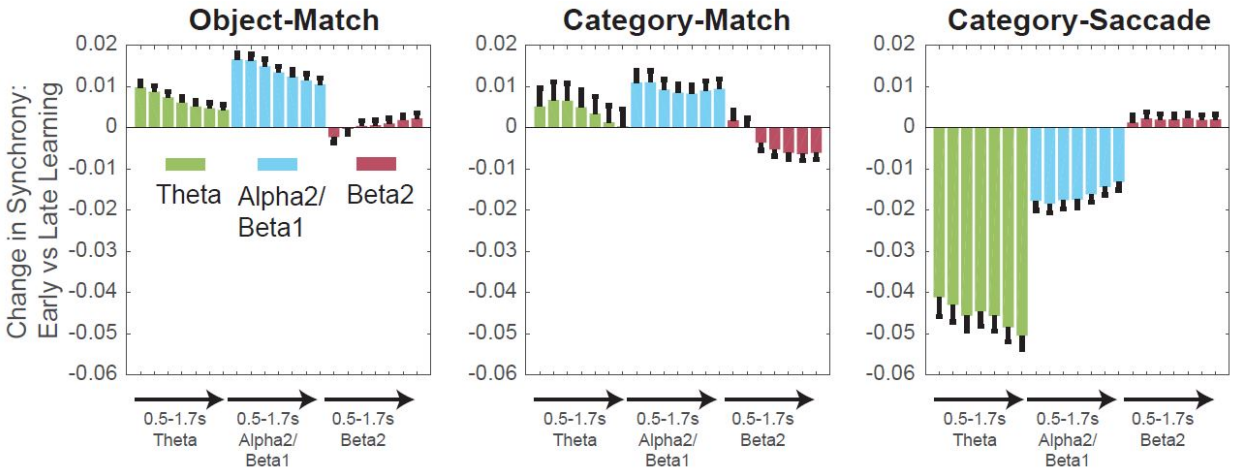

Figure S4. Related to Figure 5. The changes in synchrony between early and late learning averaged from 0.5 to 1.7s post-feedback in 0.2s increments in the OM task (blue bars), CM task (orange bars), and the CS task (yellow bars). Synchrony values were averaged over the theta (3-7 Hz), alpha-2/beta-1 (10-17 Hz), and beta-2 (18-30 Hz) bands. Error bars reflect 95% confidence intervals.