Fig 1: CIFAR 10 results with a ResNet18. We compare the following learning algorithms and report the mean and 95% confidence interval across 5 runs: BP – backpropagation, FA – Feedback Alignment, CH Asym Init – Counter Hebb with weights initialized far from symmetric, CH WeakSym – Counter Hebb with weights initialized symmetric but with asymmetric noisy updates. The results demonstrate that CH can scale to ResNet18, successfully learning in the asymmetric case, and match the BP performance in the weak symmetric case, with almost overlapping lines.

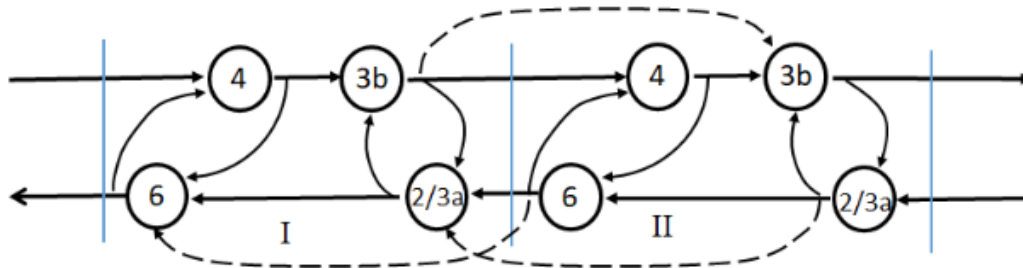| METHOD	TEST ACCURACY (PERCENTAGES)
BP	72.06 ± 0.69
FA	23.11 ± 2.01
CH ASYM INIT	61.58 ± 0.79
CH WEAK-SYM	71.98 ± 0.17

Fig 2: schematic figure of the known connectivity between the BU and TD in primates, adapted from (Ullman, 1995), with additions from (Markov et al., 2014), showing how the basic counter-streams structure is embodied in cortical connectivity of the ventral stream. It shows the main connections between successive areas labeled I, II. The BU path goes through layer 4 to layer 3B of area I and then to the next area. The TD path goes from layer 2/3A and layer 6 of area II to 2/3A and 6 of the lower area.