

Abstract Submitted  
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**Matching tutors and students: effective strategies for information transfer between circuits** TIBERIU TESILEANU, CUNY - Graduate Center, VIJAY BALASUBRAMANIAN<sup>1</sup>, University of Pennsylvania, BENCE OLVECZKY, Harvard University — Many neural circuits transfer learned information to downstream circuits: hippocampal-dependent memories are consolidated into long-term memories elsewhere; motor cortex is essential for skill learning but dispensable for execution; anterior forebrain pathway (AFP) in songbirds drives short-term improvements in song that are later consolidated in pre-motor area RA. We show how to match instructive signals from tutor circuits to synaptic plasticity rules in student circuits to achieve effective two-stage learning. We focus on learning sequential patterns where a timebase is transformed into motor commands by connectivity with a ‘student’ area. If the sign of the synaptic change is given by the magnitude of tutor input, a good teaching strategy uses a strong (weak) tutor signal if student output is below (above) its target. If instead timing of tutor input relative to the timebase determines the sign of synaptic modifications, a good instructive signal accumulates the errors in student output as the motor program progresses. We demonstrate song learning in a biologically-plausible model of the songbird circuit given diverse plasticity rules interpolating between those described above. The model also reproduces qualitative firing statistics of RA neurons in juveniles and adults.

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