

**S1 Table. Model Summary**

<b>Populations</b>	Four: Visible and Hidden neurons, and one Inhibitory Pool for each layer.
<b>Connectivity</b>	Each visible unit connects reciprocally to each hidden unit. No lateral connections. Each visible and hidden unit connects reciprocally to every inhibitory unit in that layer's pool.
<b>Neuron model</b>	Leaky integrate-and-fire with synaptic scaling and spike-frequency adaptation.
<b>Synapse model</b>	Conductance inputs with instantaneous rise after transmission delay and exponential decay.
<b>Input pre-processing</b>	Mean-value subtraction, whitening (natural image patches only), rectification & concatenation to ON/OFF units
<b>Training</b>	For $N_{\max}$ repetitions: 1. Choose input stimulus. 2. Set $t = 0$ and reinitialize all neurons to random membrane potentials. 3. Apply input stimulus until $t = t_{\text{stim}}$ . 4. Turn off stimulus, continue running network until $t = t_{\max}$ . 5. Calculate and apply weight changes.
<b>Plasticity</b>	Weights via mSTDP, synaptic scaling via homeostatic adaptation
<b>Measurements</b>	Learned weights, reconstruction error, hidden unit correlations.