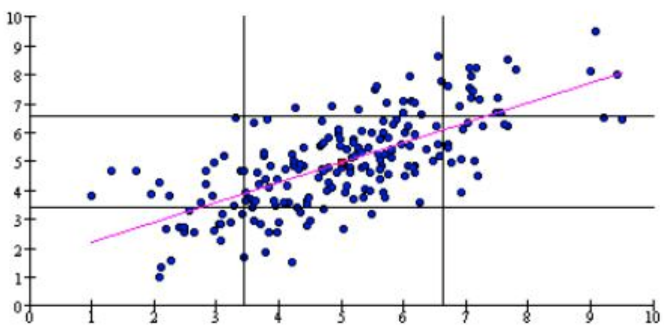
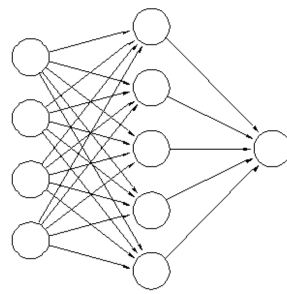
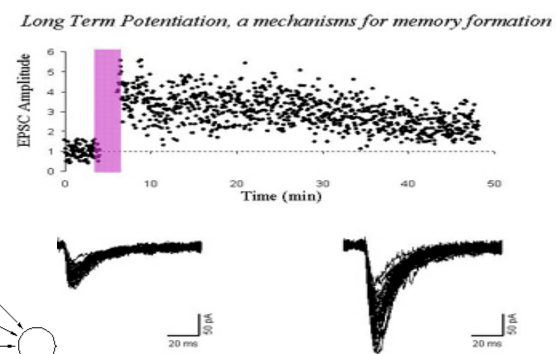
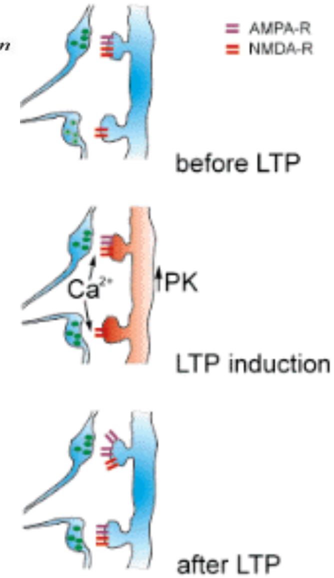
Can we develop an integrated theory of learning, in computational, behavioral and neural terms?

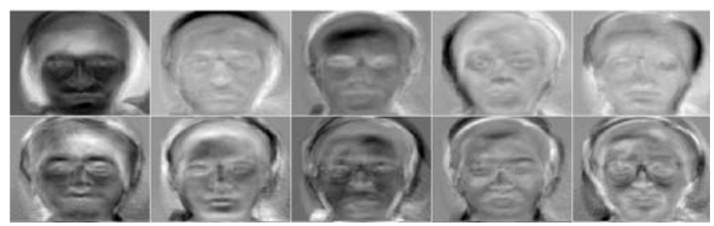
- The “standard model”

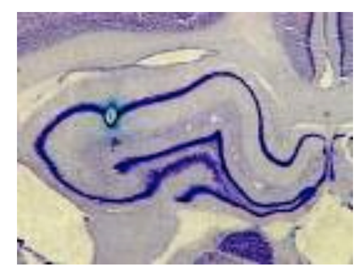












Supervised

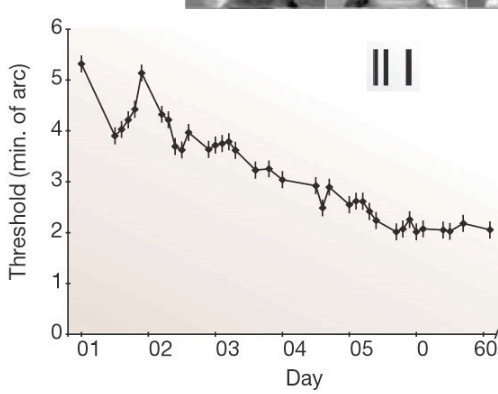
$$E = \frac{1}{2}\sum_{t=1}^{n}(y_t - w\cdot x_t)^2$$

$$\Delta w \propto -\frac{\partial E}{\partial w} = \sum_{t=1}^{n}(y_t - w\cdot x_t)\,x_t$$

Unsupervised

$$E = \frac{1}{2}\sum_{t=1}^{n} y_t^{\,2} = \frac{1}{2}\sum_{t=1}^{n}(w\cdot x_t)^2$$

$$\Delta w \propto -\frac{\partial E}{\partial w} = \sum_{t=1}^{n} y_t \cdot x_t$$



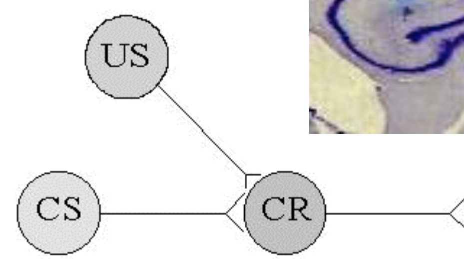
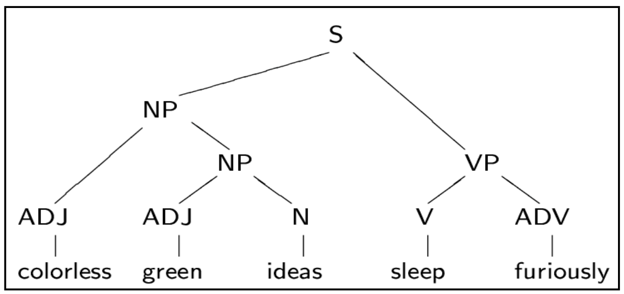
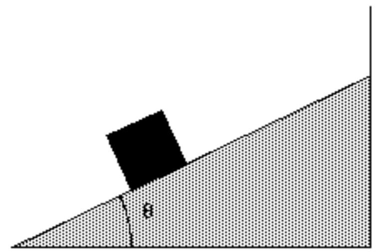


Fig 1.1: **Hebbian Synapse**neuro-modulators work across the synapse between the facilitator and motor neuron.

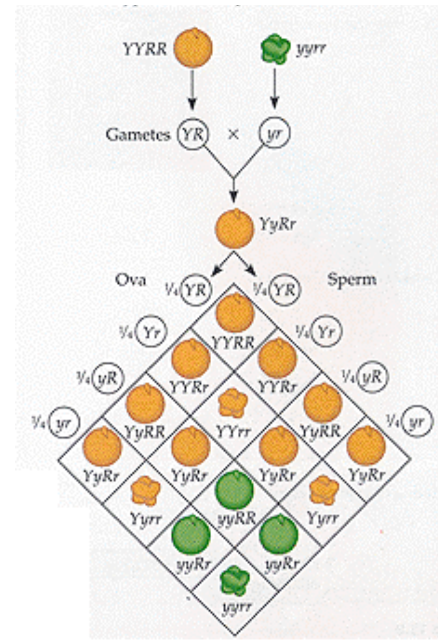
Can we develop an integrated theory of learning, in computational, behavioral and neural terms?

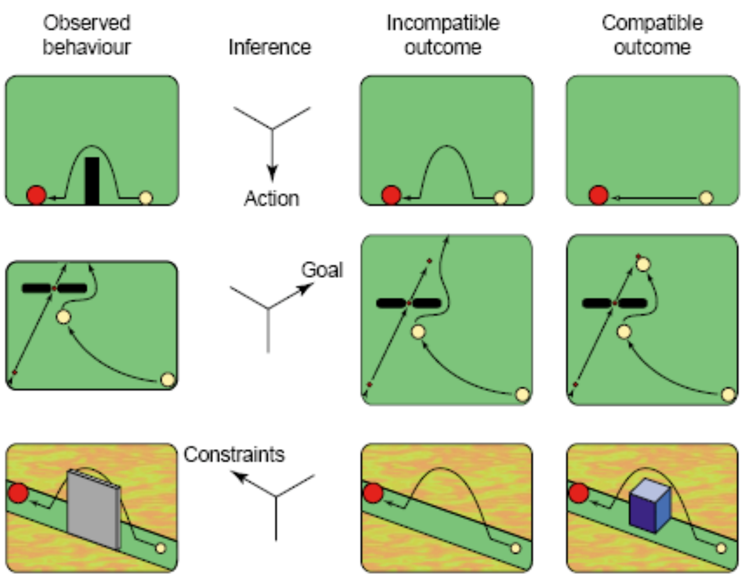
- The really hard problem





$$F = m\, a$$





Period \ Group	I	II	III	IV	V	VI	VII
1	H=1						
2	Li=7	Be=9.4	B=11	C=12	N=14	O=16	F=19
3	Na=23	Mg=24	Al=27.3	Si=28	P=31	S=32	Cl=35.5
4	K=39	Ca=40	?=44	Ti=48	V=51	Cr=52	Mn=55
5	Cu=63	Zn=65	?=68	?=72	As=75	Se=78	Br=80
6	Rb=85	Sr=87	?Yt=88	Zr=90	Nb=94	Mo=96	?=100
7	Ag=108	Cd=112	In=113	Sn=118	Sb=122	Te=125	J=127