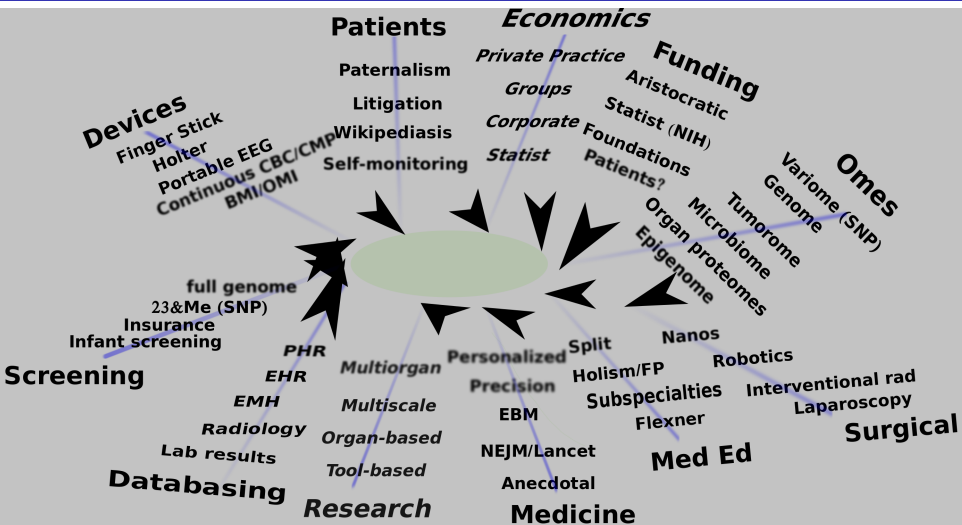




converging trends

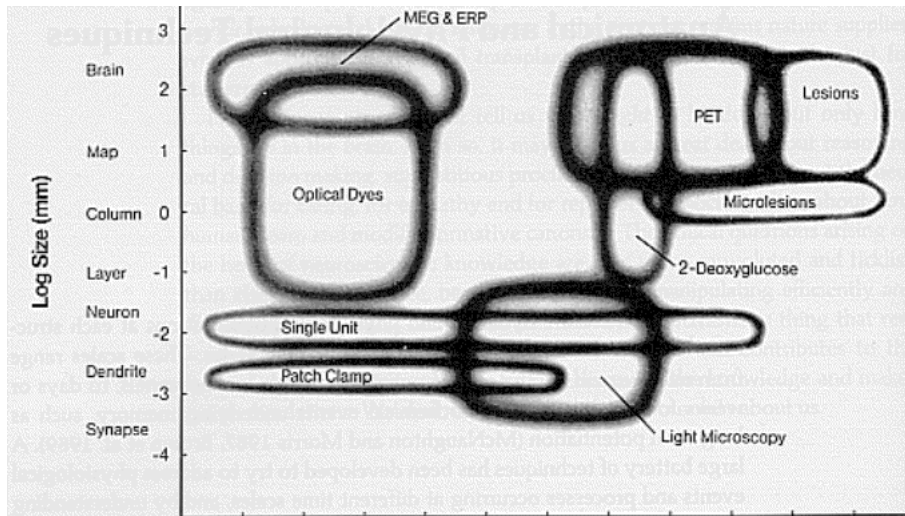


Climbing the omes

omeomics

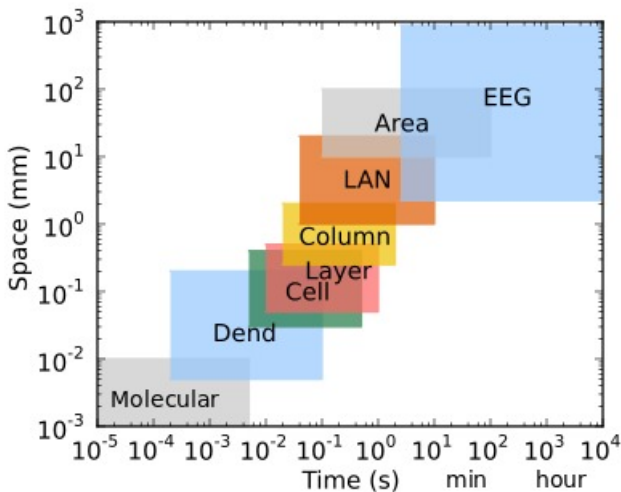
- genomes (microbiome, tumorome, virome)
- epigenomes (MS?)
- proteome (organ-specific), interactome, metabolome
- physiome
- connectome (in neuro)
- etceterome

6 drunk blind men looking for keys on an elephant riding on an iceberg



Multiscale modeling

scales of investigation



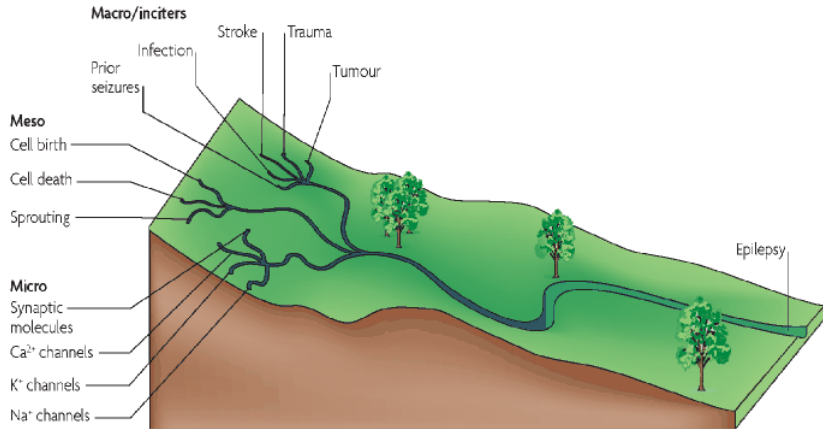
Dynamical disorders

dynamics of variability in degenerative disorders

- epilepsy
- migraine
- Alzheimer?
- Parkinson
- dystonia

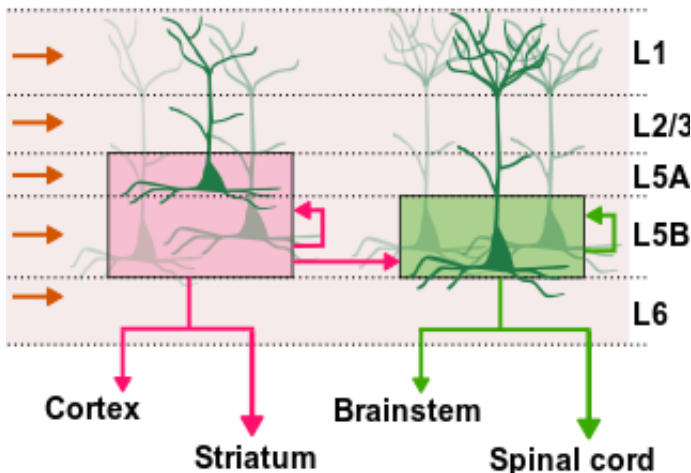
River of epilepsy

modified from Lennox&Lennox



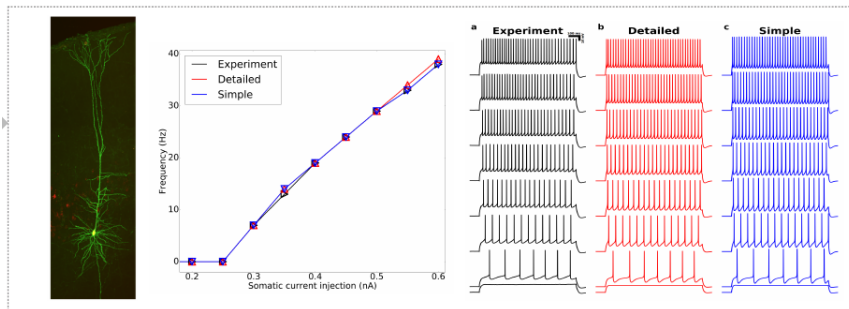
Lytton WW. Computer modelling of epilepsy *Nat Rev Neurosci* 2008

Two pathways out of M1



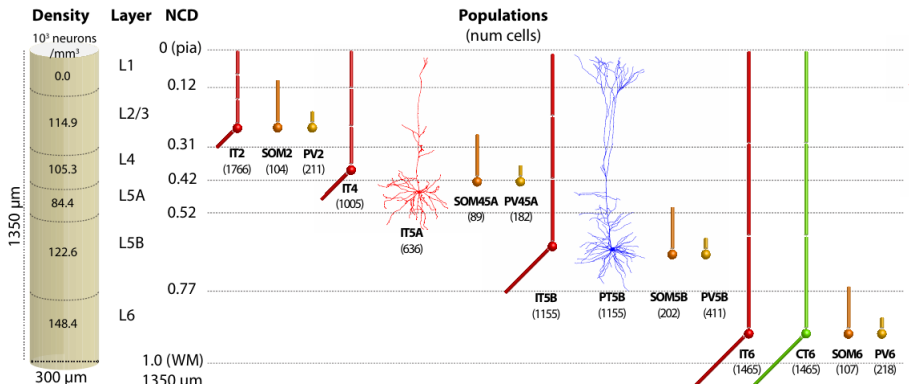
Detailed modeling of major cell types of Layer 5

PT==SPI



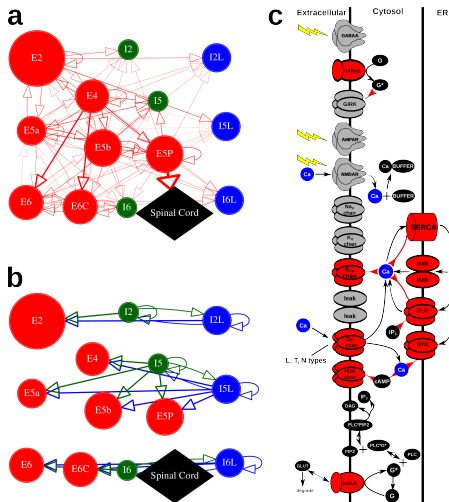
Schematizing neocortex

NB: mouse M1 has a layer 4



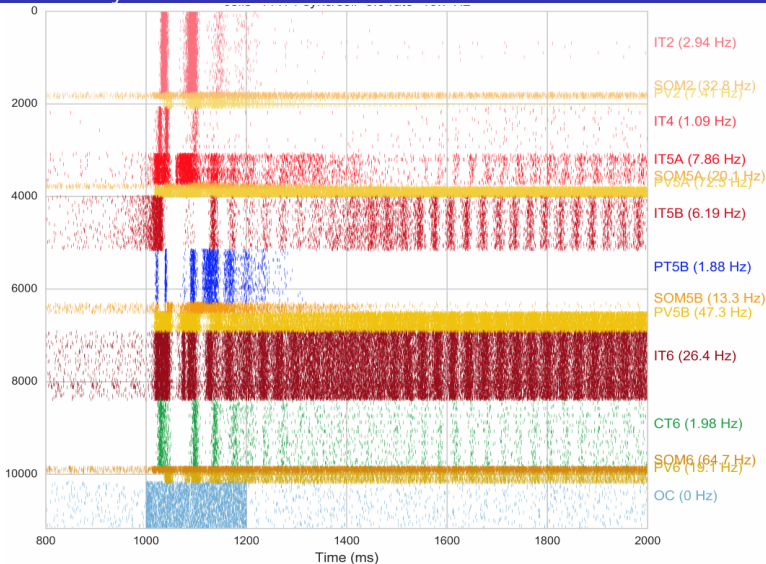
Working out drug cocktails

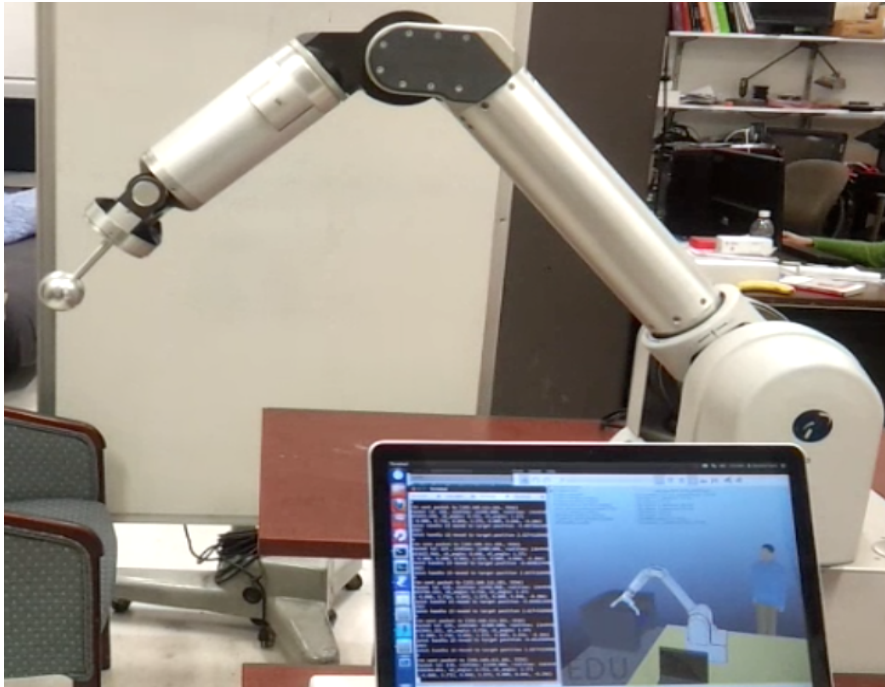
motor cortex (M1) model



Complex patterns of activity

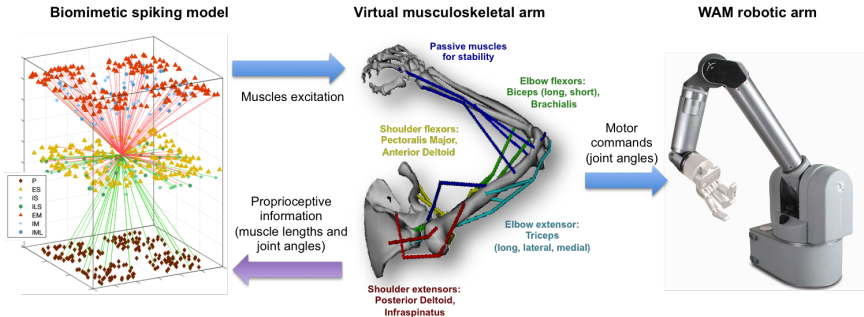
stim lower layers





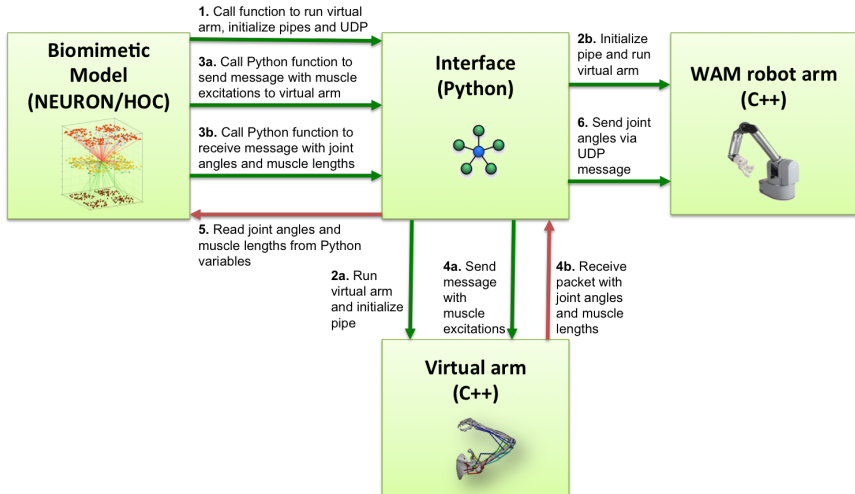
Interpose a virtual arm

Matching carrier as well as signal?

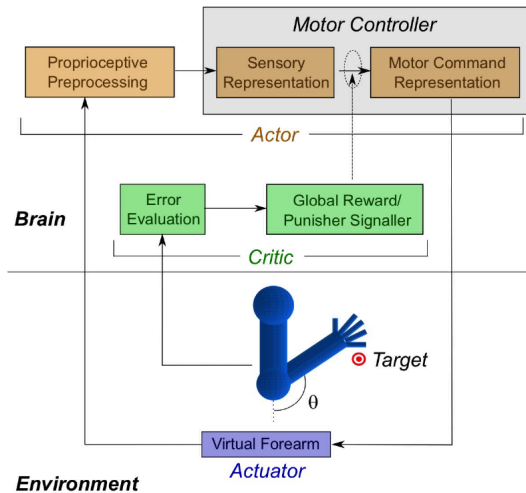


virtual arm courtesy Xianlian Zhou & Andrzej Przekwas, CFD Research Corp, Huntsville, AL

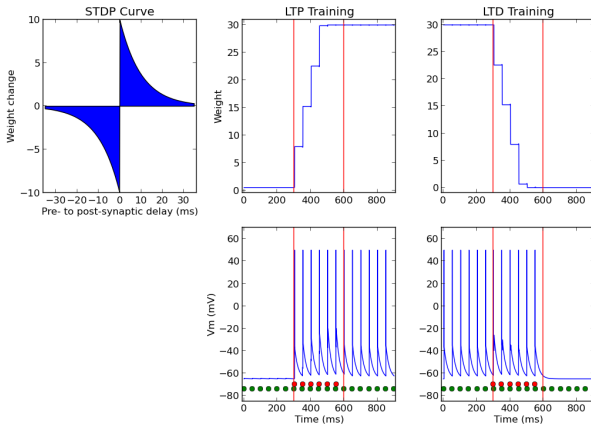
Robot follows virtual arm



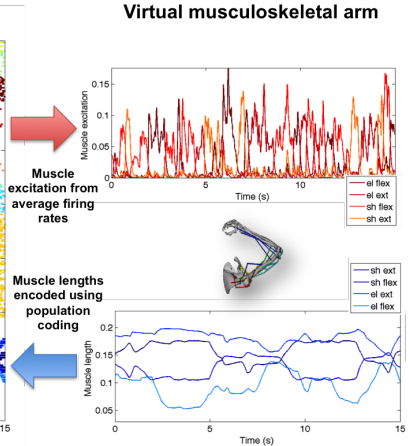
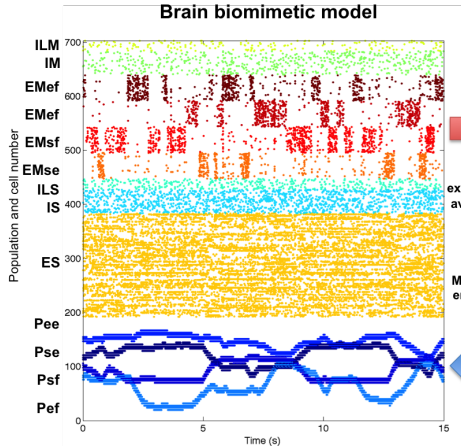
Reinforcement learning (RL)



RL alters STDP effect



Feedback from muscle lengths and forces



BEFORE TRAINING

Speed = 30%

