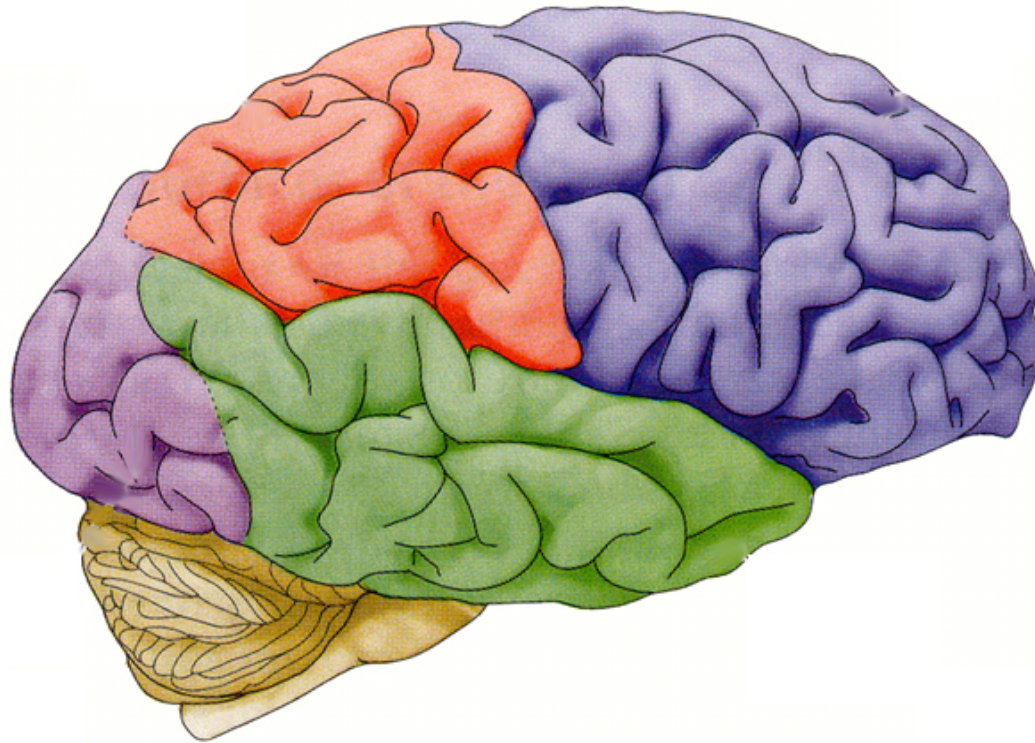
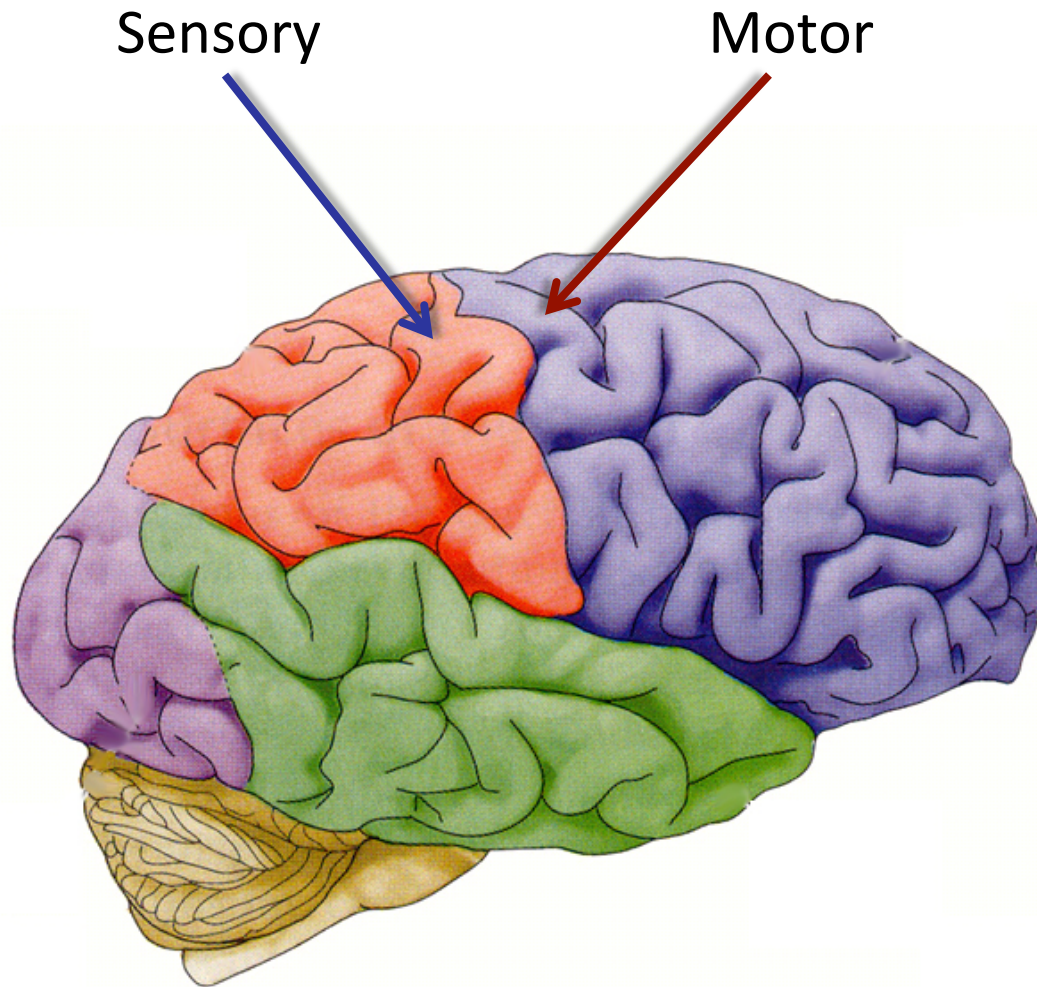


Think, then Move!



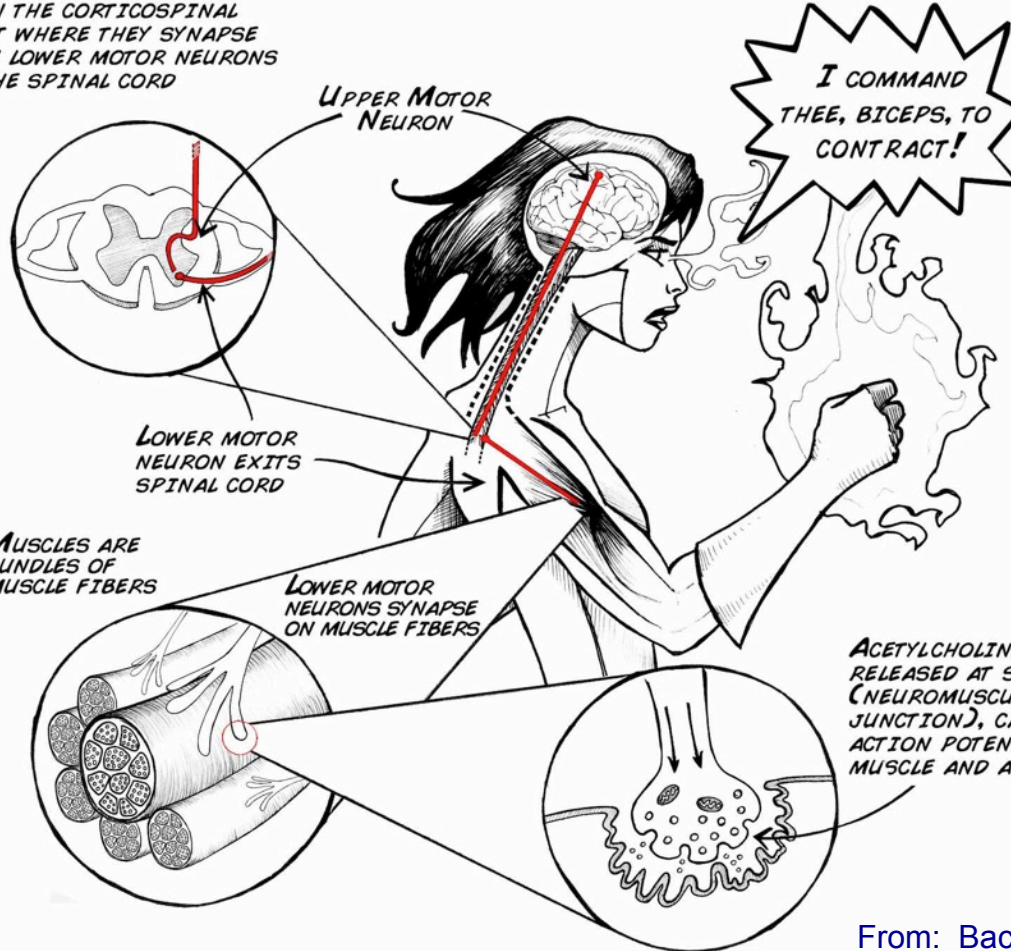
Rochelle D. Schwartz-Bloom, PhD
Professor of Pharmacology
Professor of Education
Duke University Medical Center



From: Neuroscience, Sinauer Press

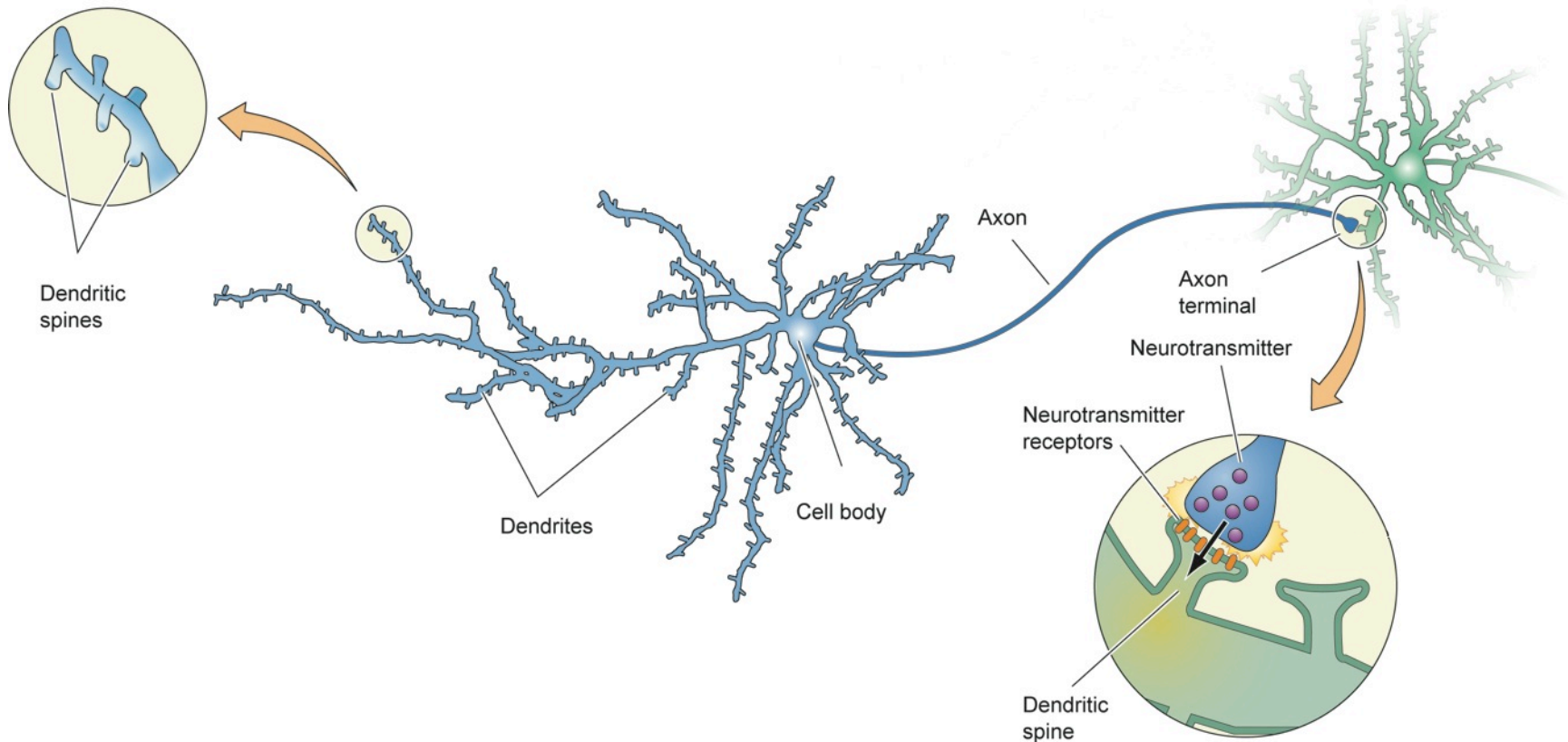
Think, then Move!

UPPER MOTOR NEURONS RUN DOWN THE CORTICOSPINAL TRACT WHERE THEY SYNAPSE WITH LOWER MOTOR NEURONS IN THE SPINAL CORD



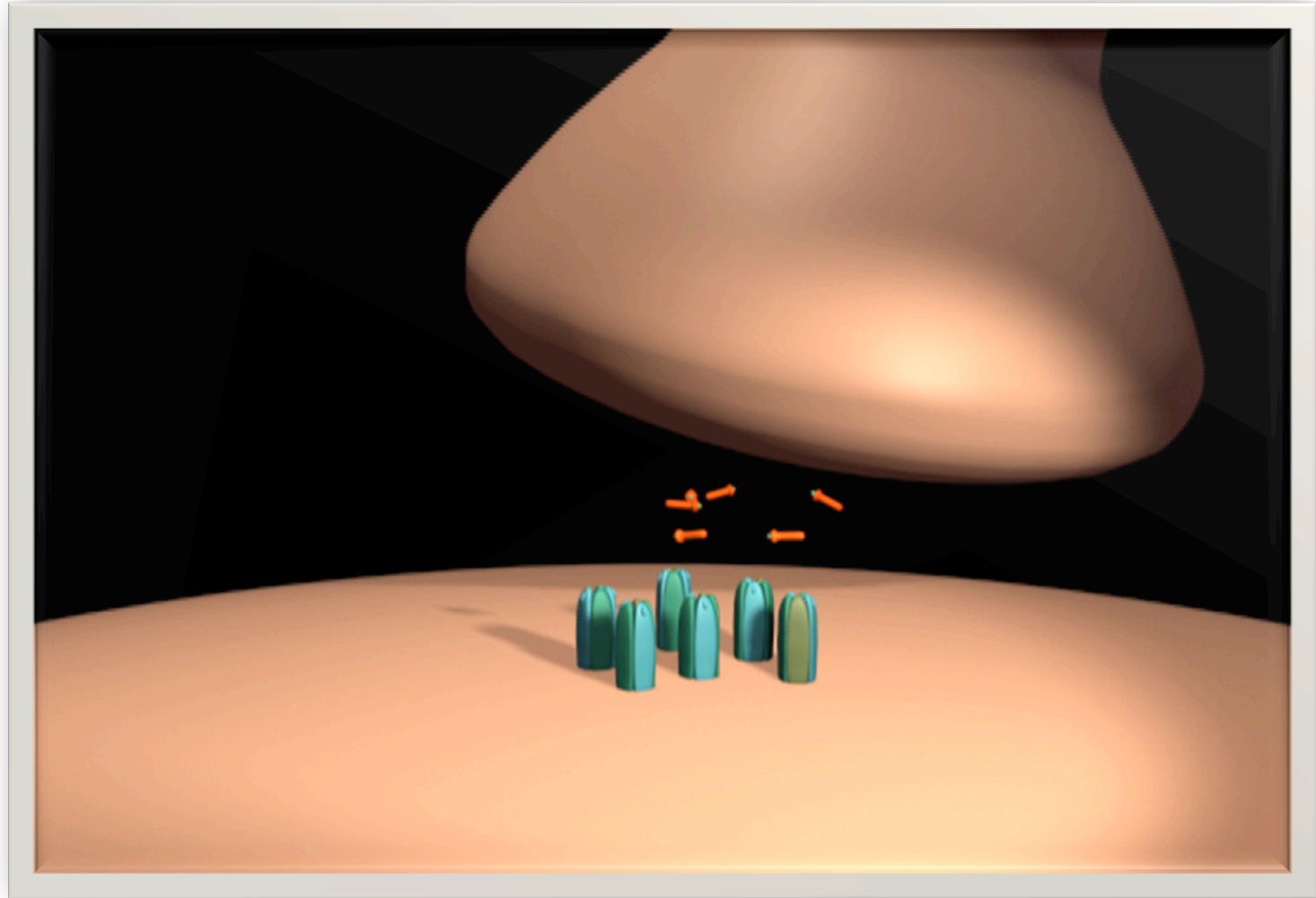
From: Backyardbrains.com

Biology: Neurons do the work



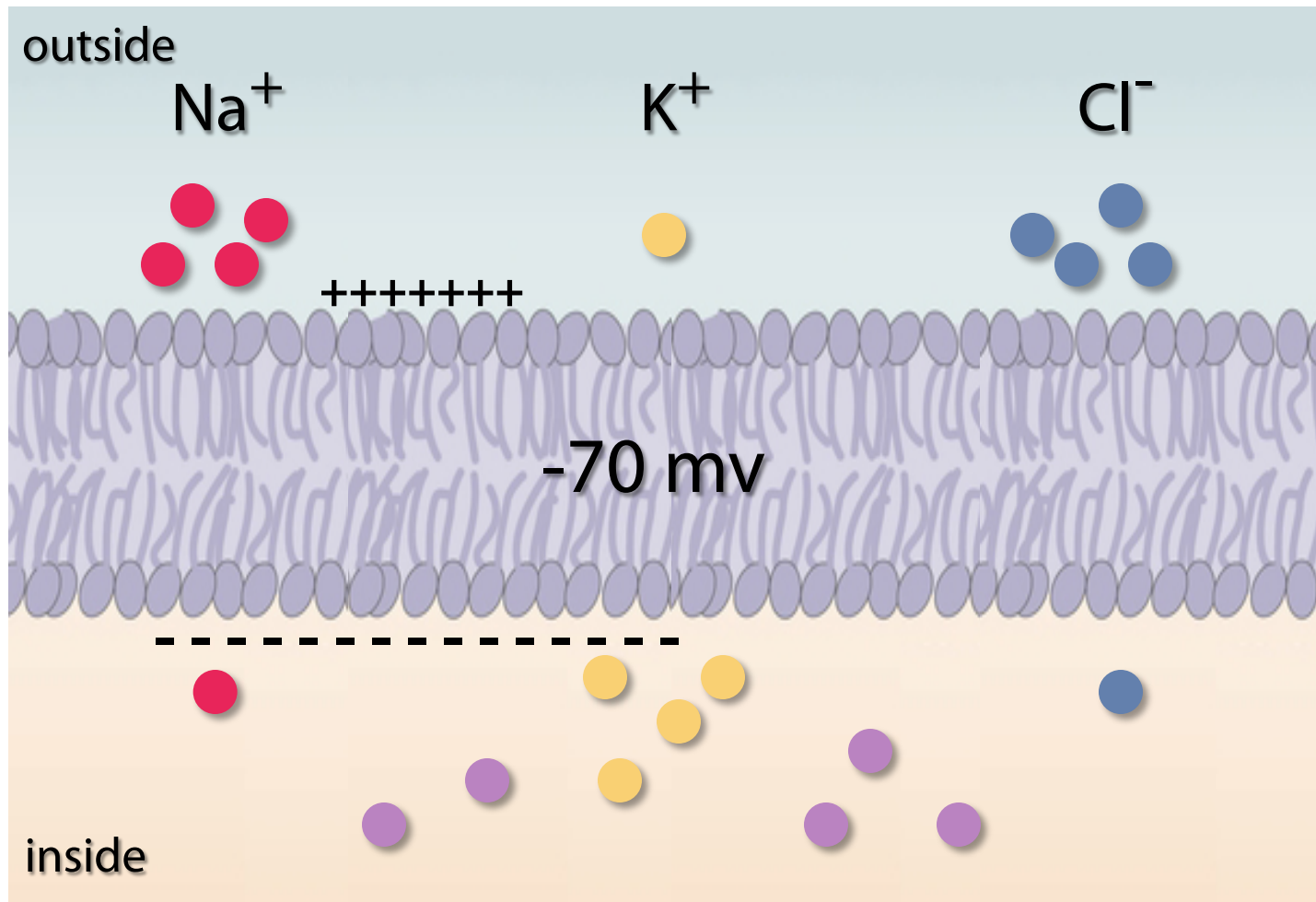
From: Understanding FASD: A Comprehensive Guide
<http://sites.duke.edu/rise/resources/teaching-material/>

Biology: Acetylcholine is the key



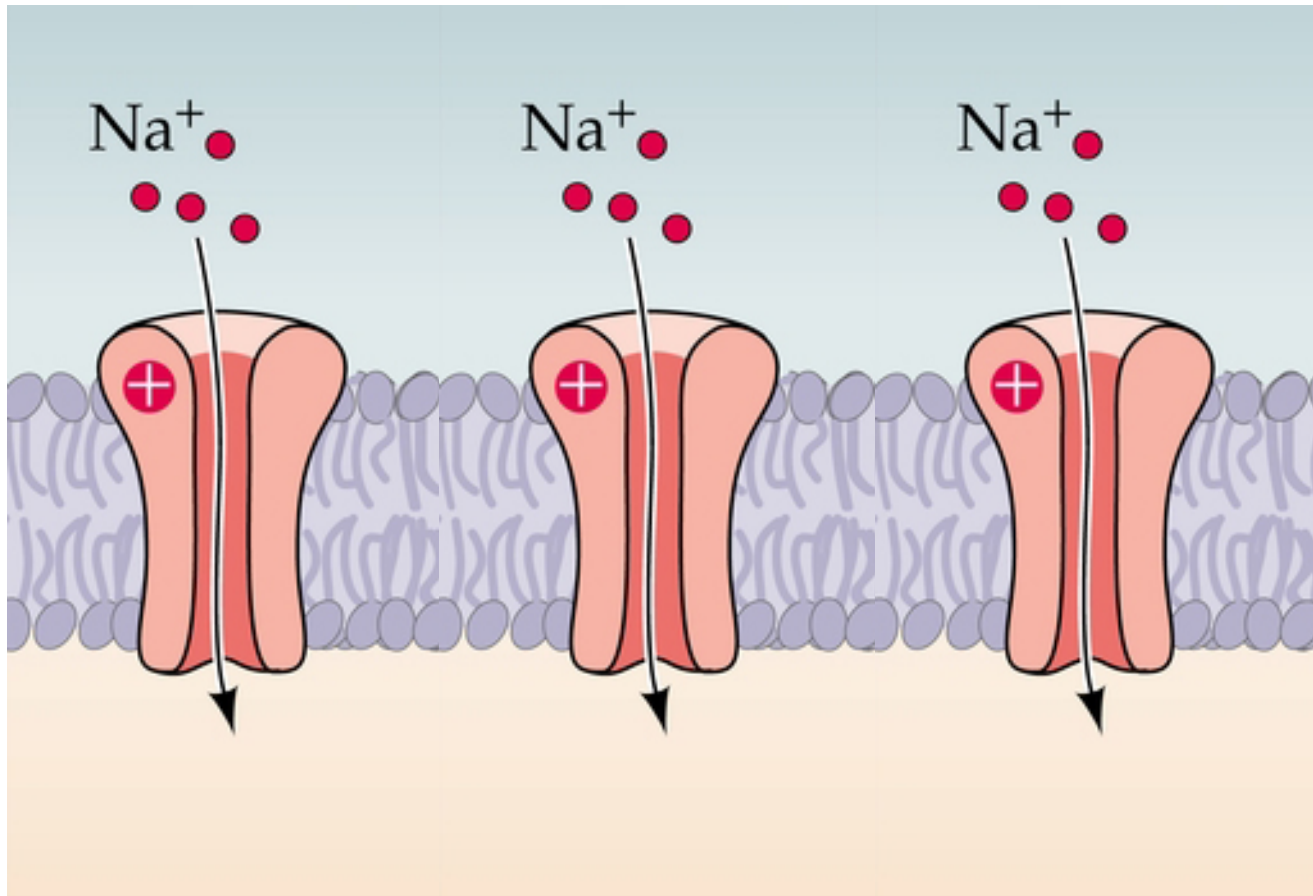
From: Animated Neuroscience & the Actions of Nicotine, Cocaine, & Marijuana in the Brain

Chemistry & physics: It's the ions!



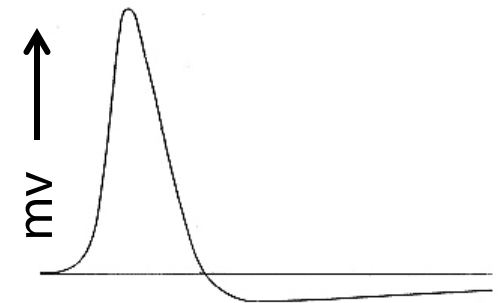
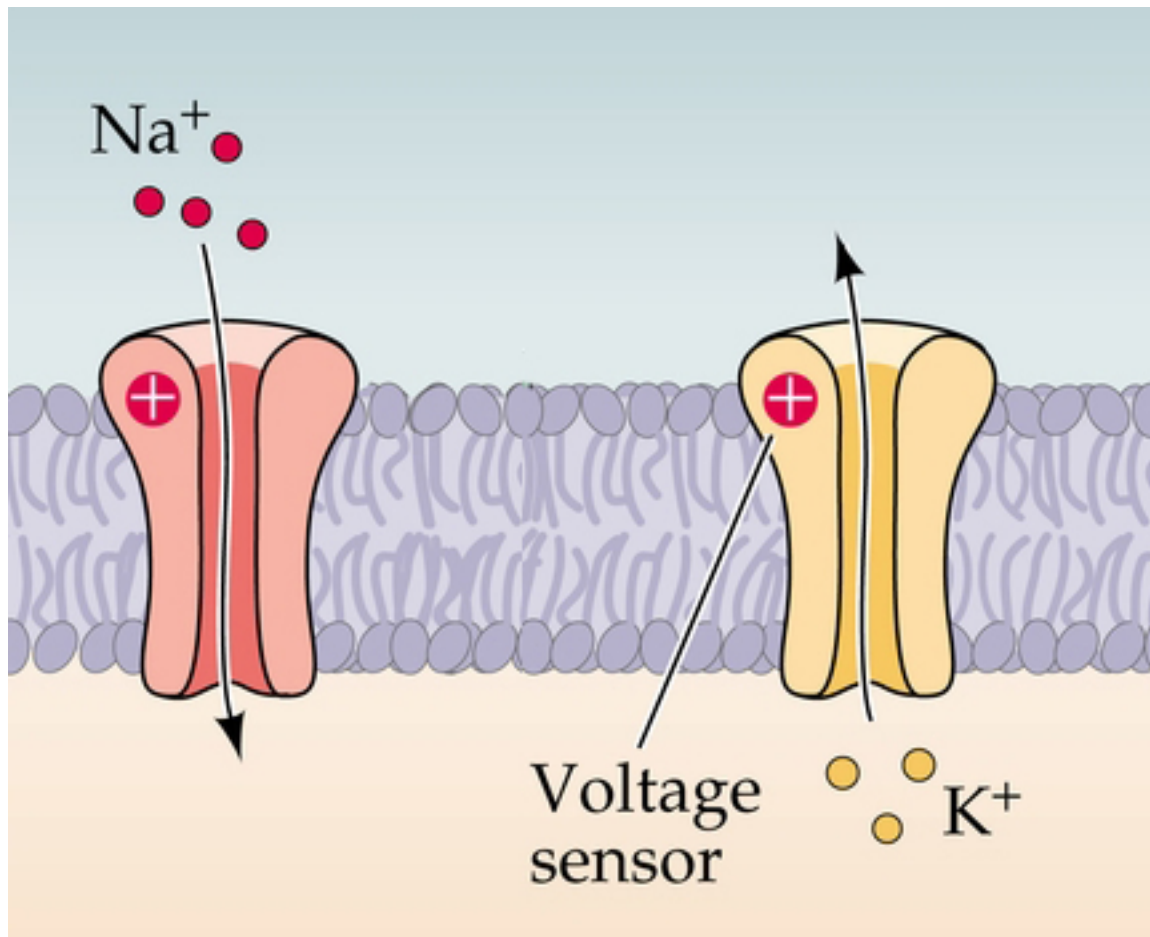
● = other anions

Biology, chemistry & physics: Currents flow



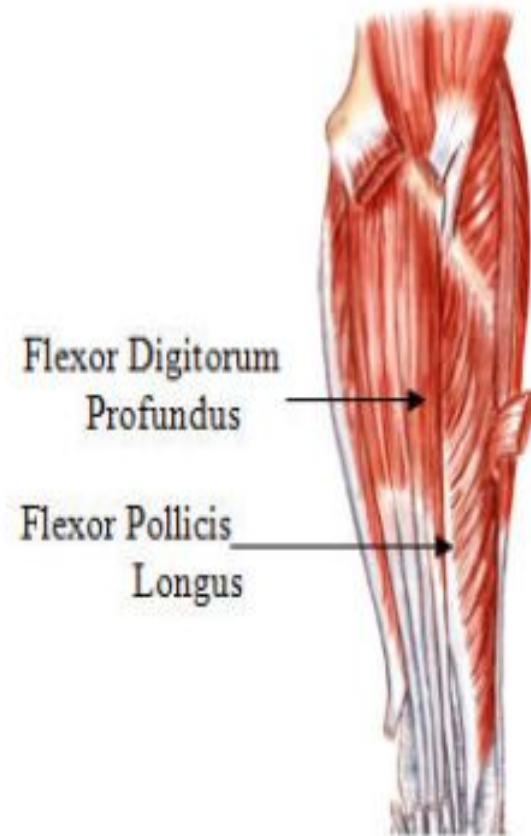
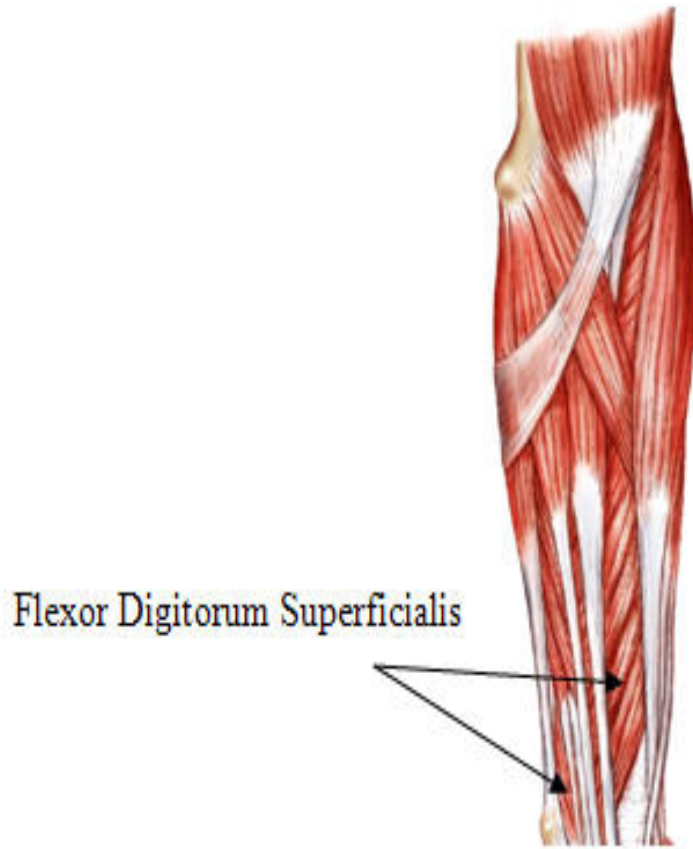
Adapted from: Neuroscience, Sinauer Press

Physics: Currents lead to Action Potentials!



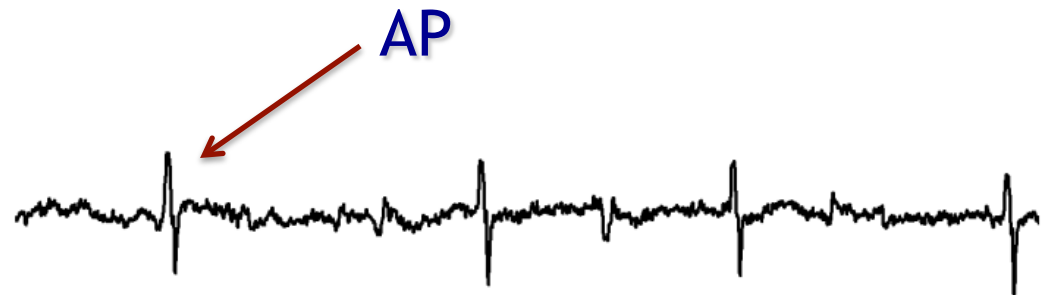
Adapted from: Neuroscience, Sinauer Press

How about some real Action Potentials! Let's "grip and squeeze"

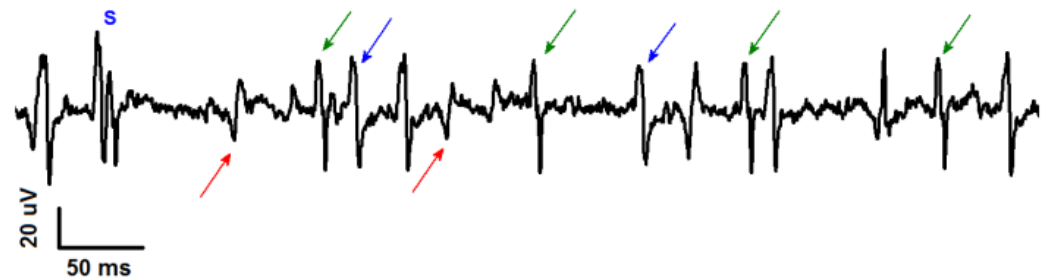


Real Action Potentials: grip and squeeze

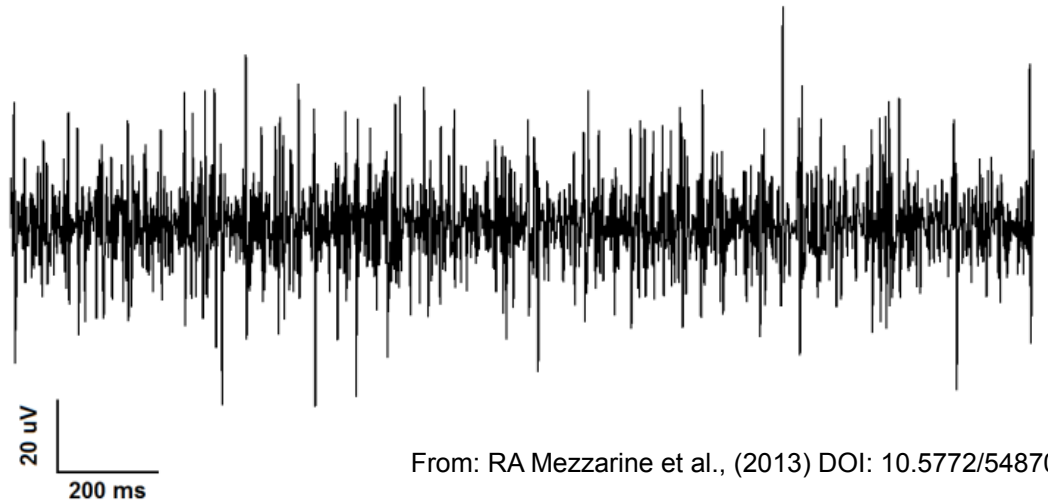
Weak: 1 motor unit



Moderate: > frequency
more motor units



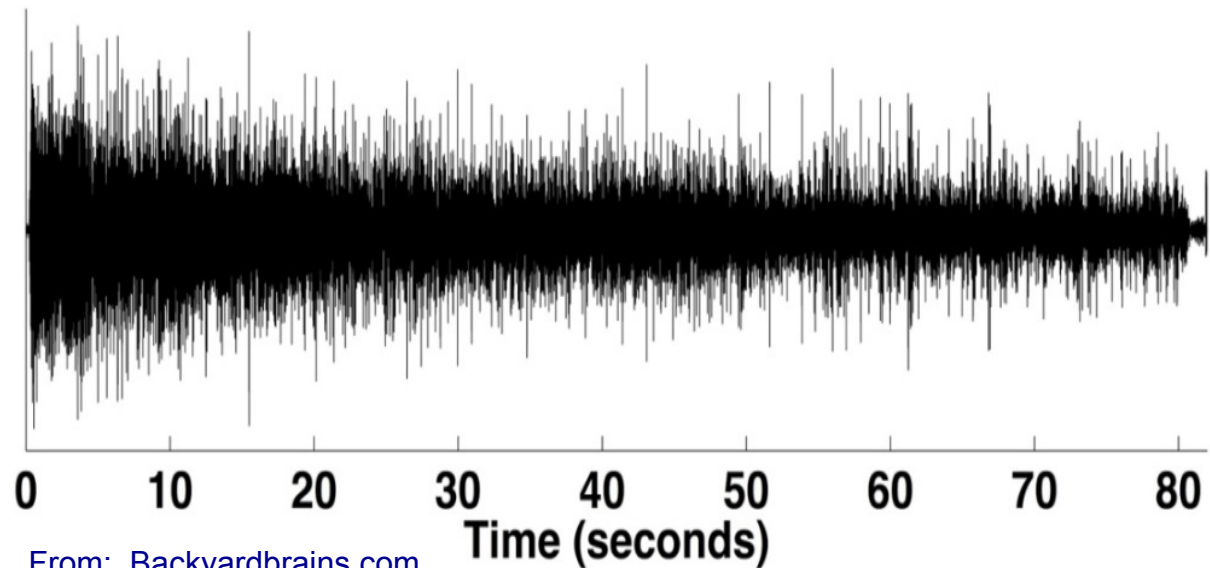
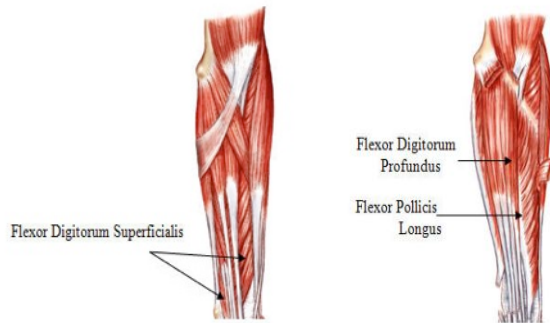
Strong: high frequency
random firing



From: RA Mezzarino et al., (2013) DOI: 10.5772/54870

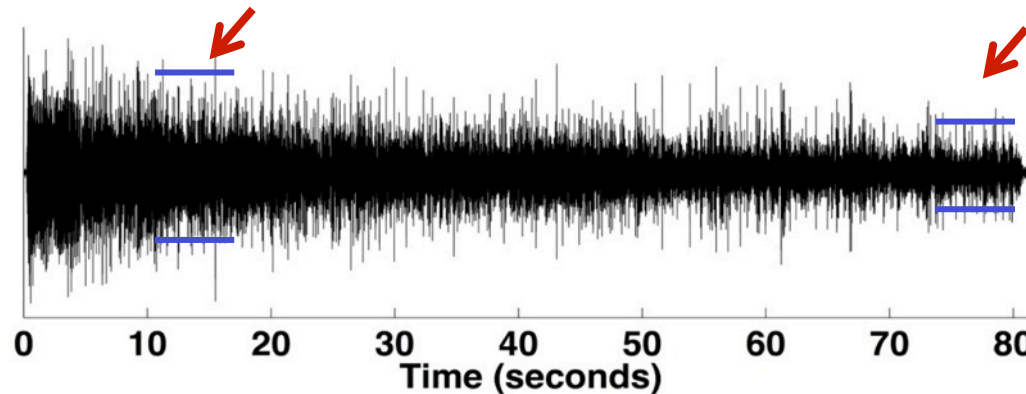
Let's do it!

Muscle fatigue: What happens to the APs?



From: Backyardbrains.com

Let's quantitate what happens: Use your iphone, iPad, computer!



Measurement	Rest	Grip time-1	Grip time-2	Grip time-3
Amplitude (mm)				
Frequency (Hz)				