

EFFECTIVE SLIDE DESIGN

THE GOOD, THE BAD, THE UGLY

JUSTIN BOIS

BE 159, JAN 30, 2019

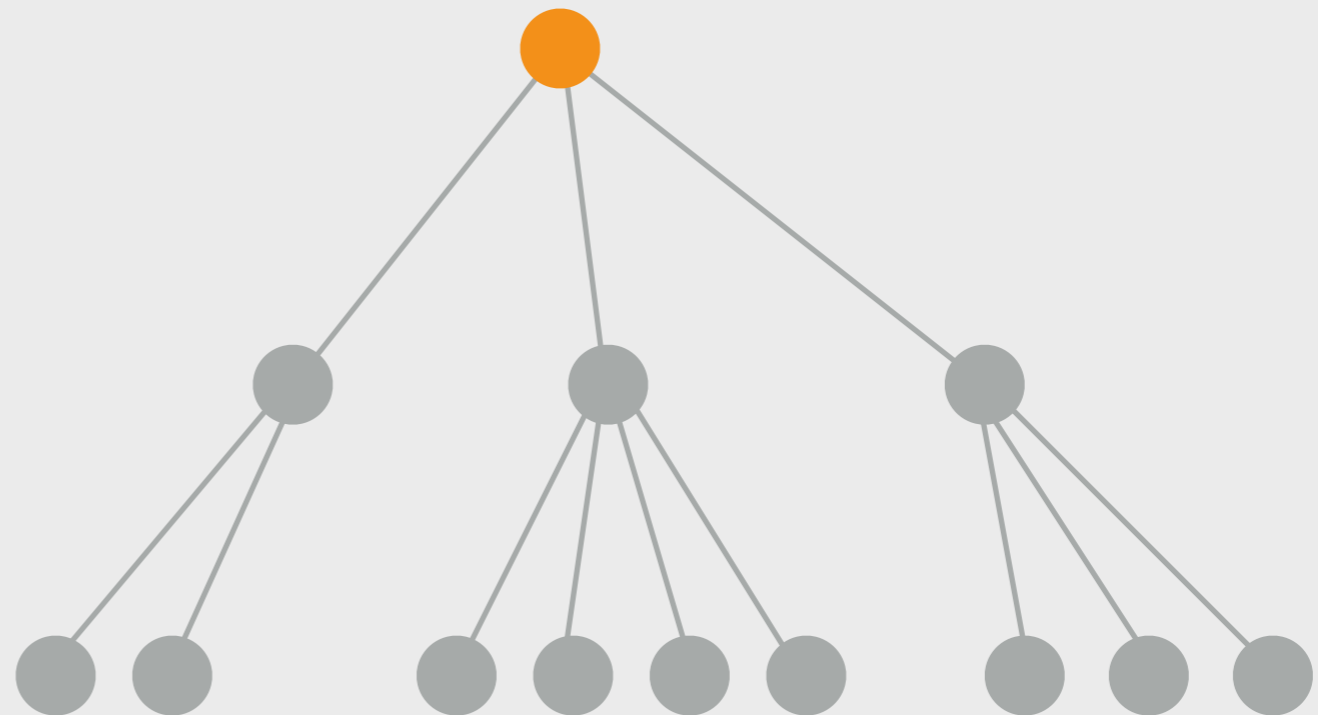
Scientific information is often organized in a hierarchical structure

Wnt signaling acts through fold change of β -catenin levels

Main message

Main points

Subpoints

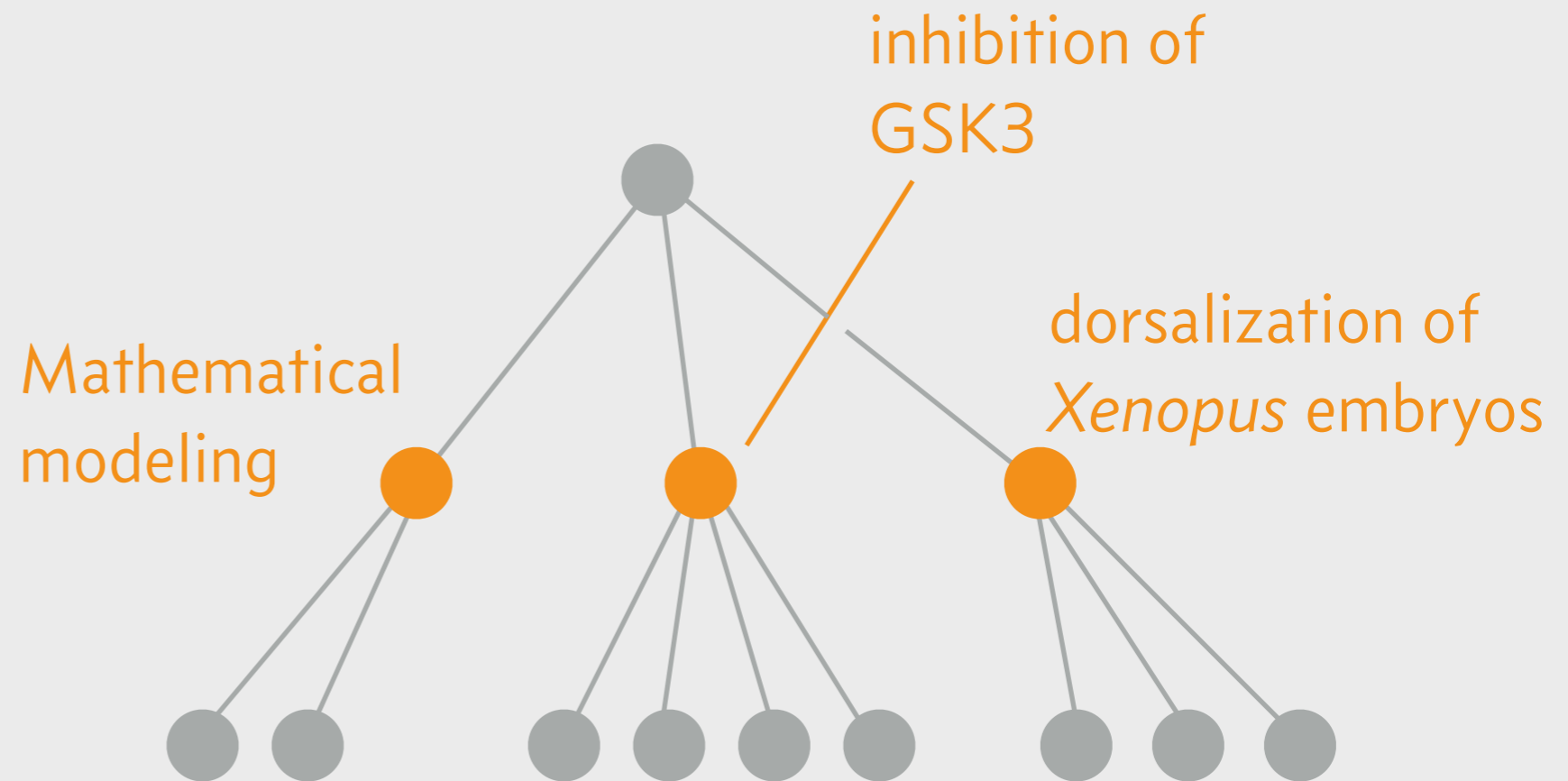


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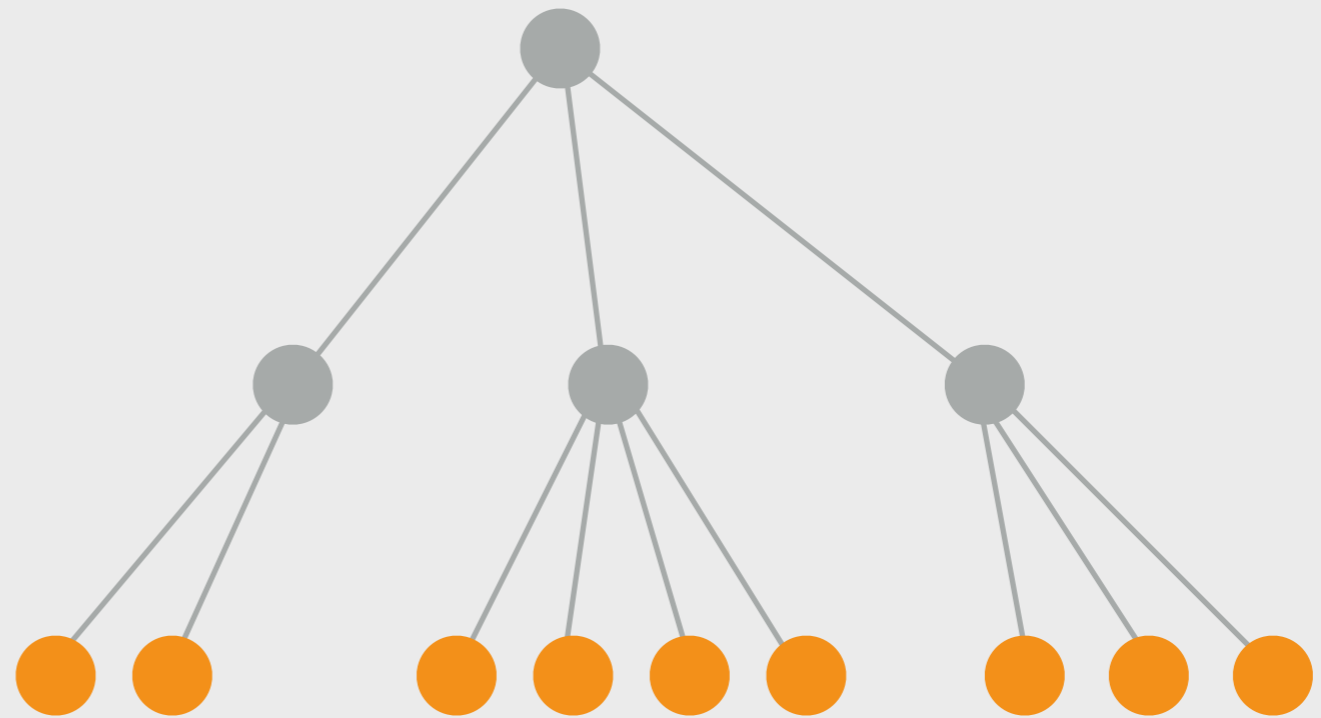


Each subpoint (or subsubpoint) is a single idea

Main message

Main points

Subpoints



ONE IDEA, ONE SLIDE.

C. elegans

- Well-established model organism
- Has 302 neurons
- Easy to manipulate
- Can put opsins in single neurons using a host of available genetic tools
- Cannot sense and light, so experiment is cleaner
- It is transparent, so no need for fiberoptic wires.

***C. elegans* is an ideal organism for optogenetics**



Complete set of genetic tools

Simple nervous system

Have no light sensing

Transparent!

C. ELEGANS: AN IDEAL ORGANISM FOR OPTOGENETICS

- Complete set of genetic tools
- Simple nervous system
- Have no light sensing
- Transparent!

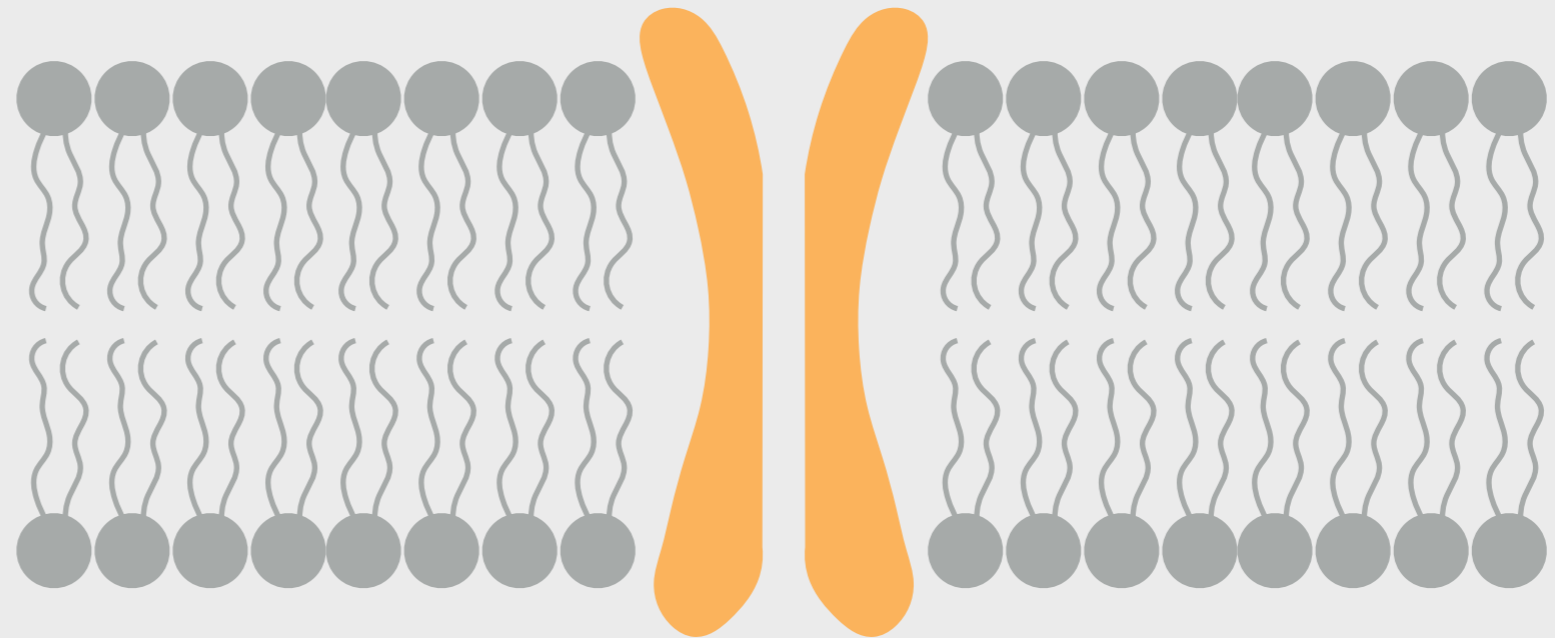
C. elegans: an ideal organism for optogenetics

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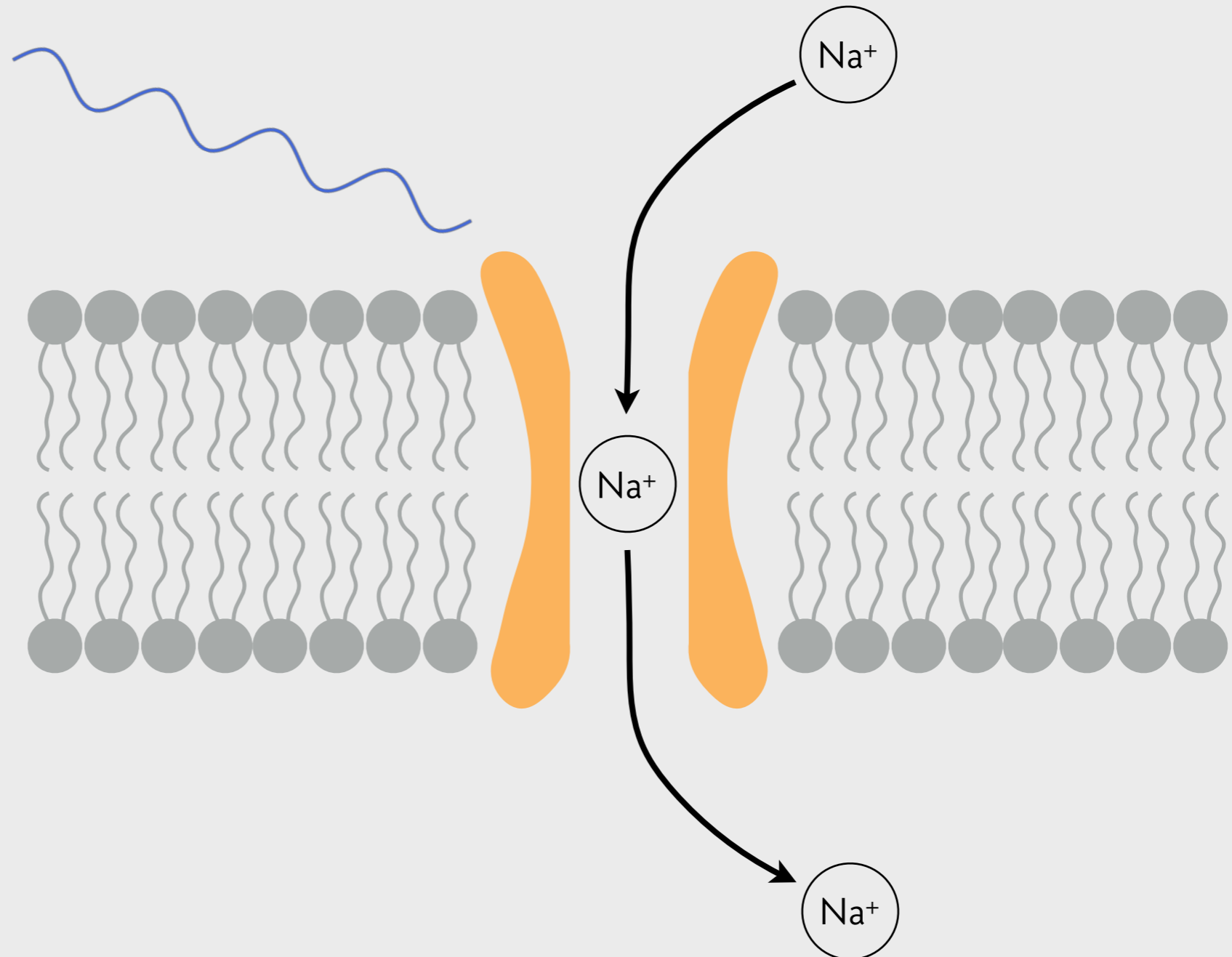
Use color sparingly to highlight

HOW DOES PROXIMITY OF THE CHANNELRHODOPSIN
TO MOTOR NEURONS AFFECT RESPONSE?

Use color sparingly to highlight



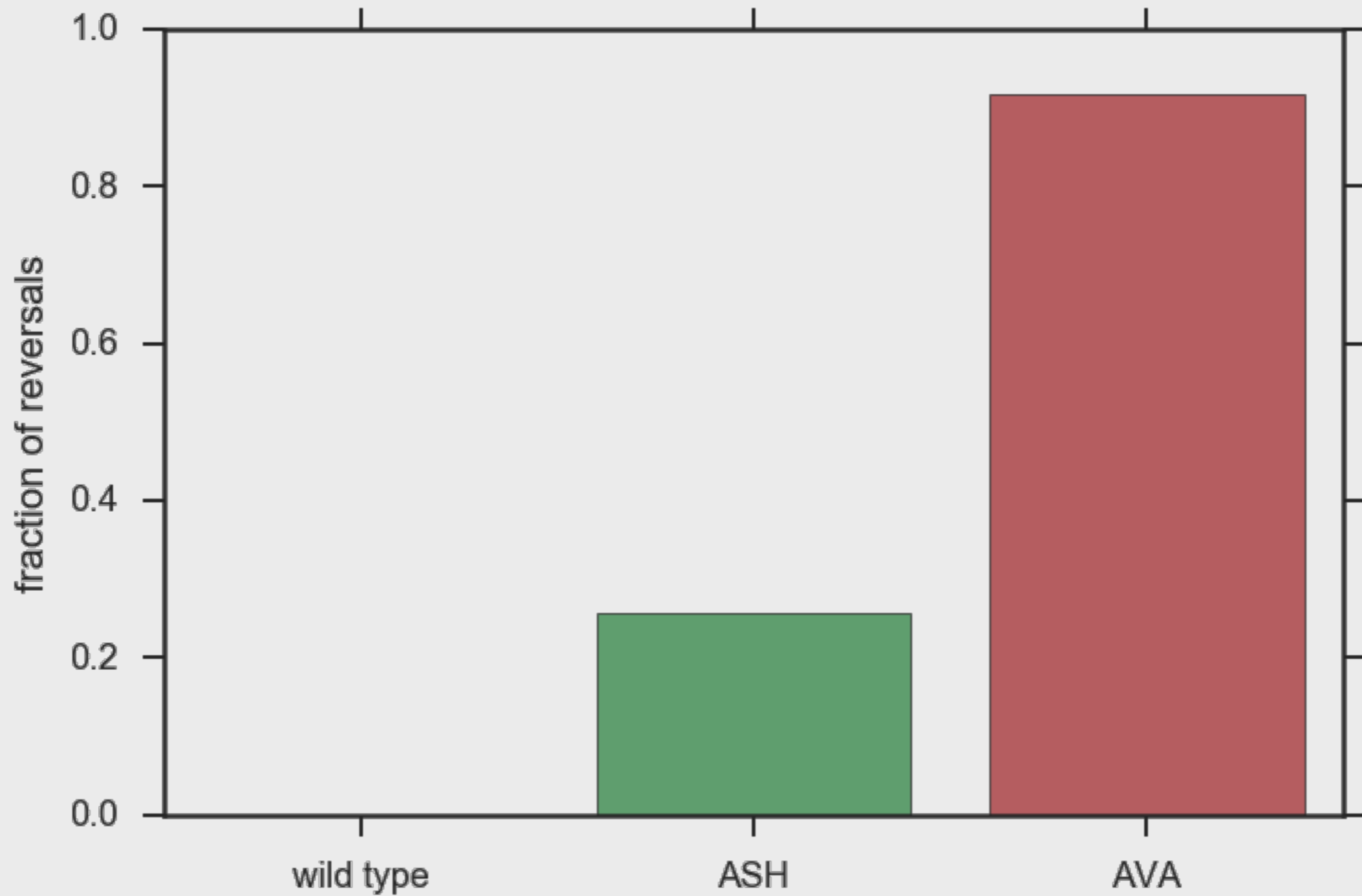
Use flat, recognizable, sparse graphics



**Citations should be small,
just legible without strain**

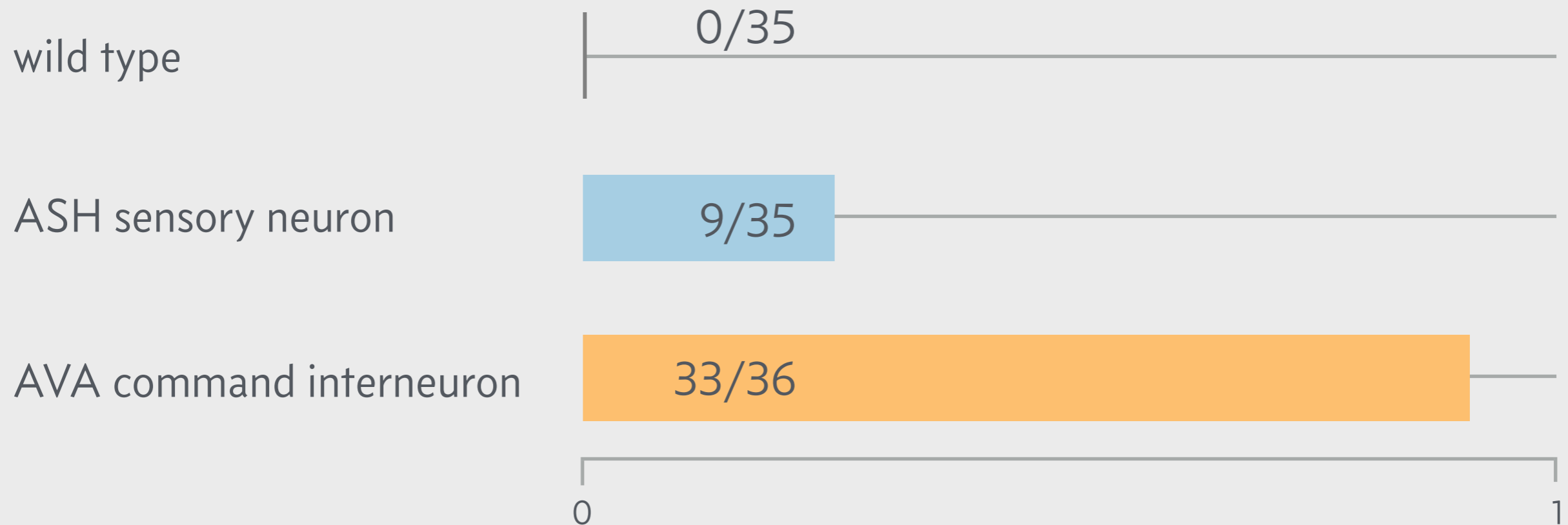


This is a bad bar chart

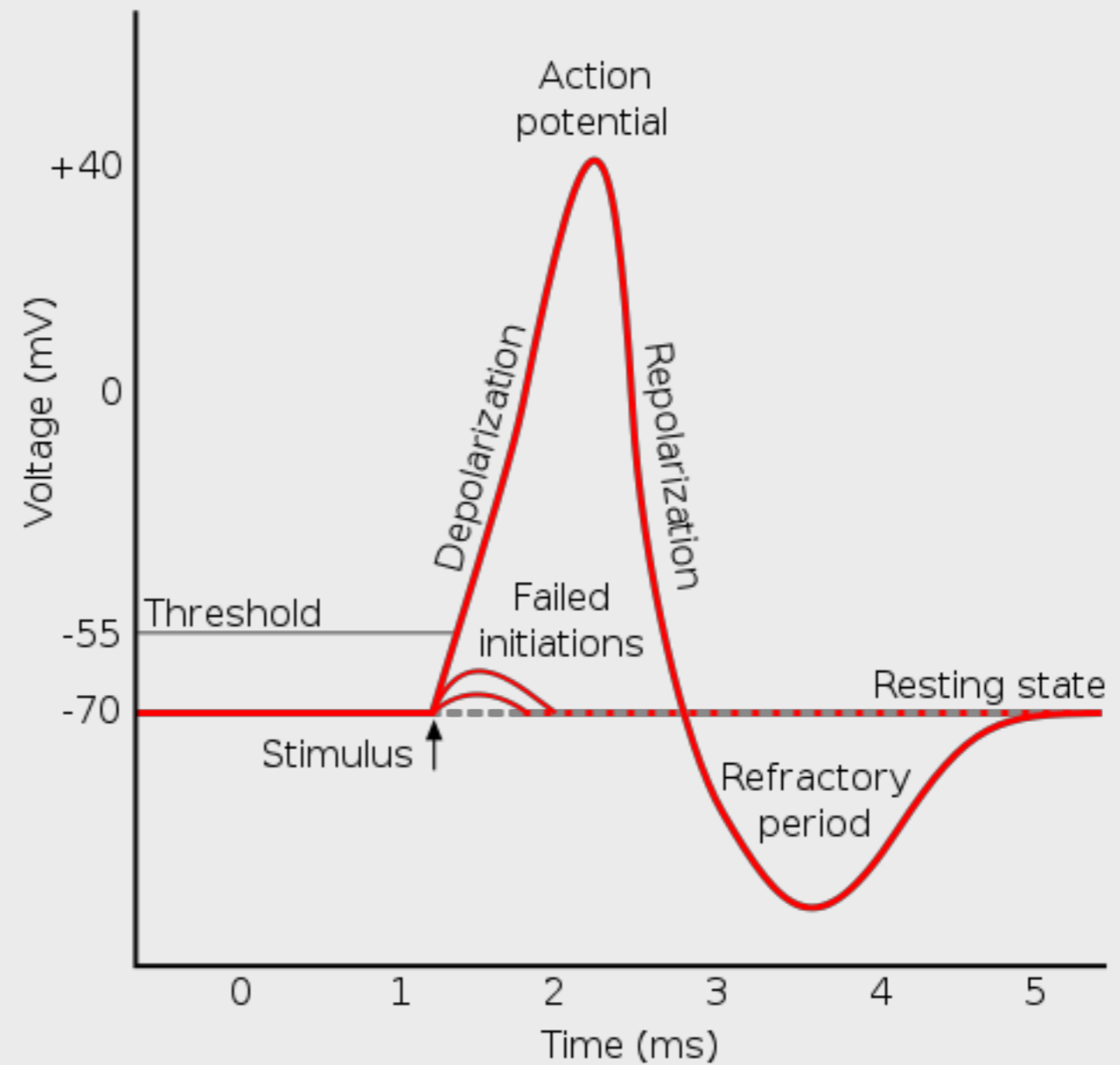


The command interneuron shows the strongest response

Fraction of reversals

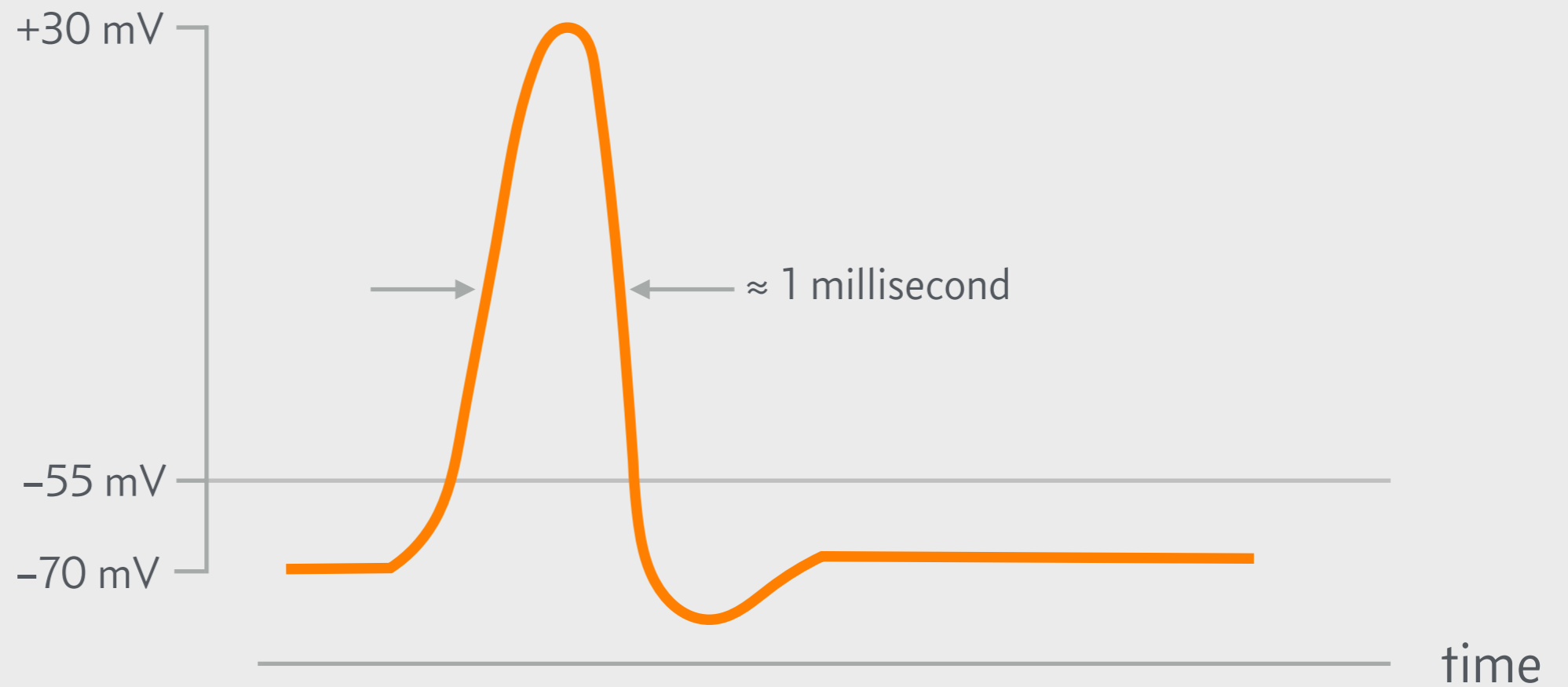


This is a bad schematic of an action potential

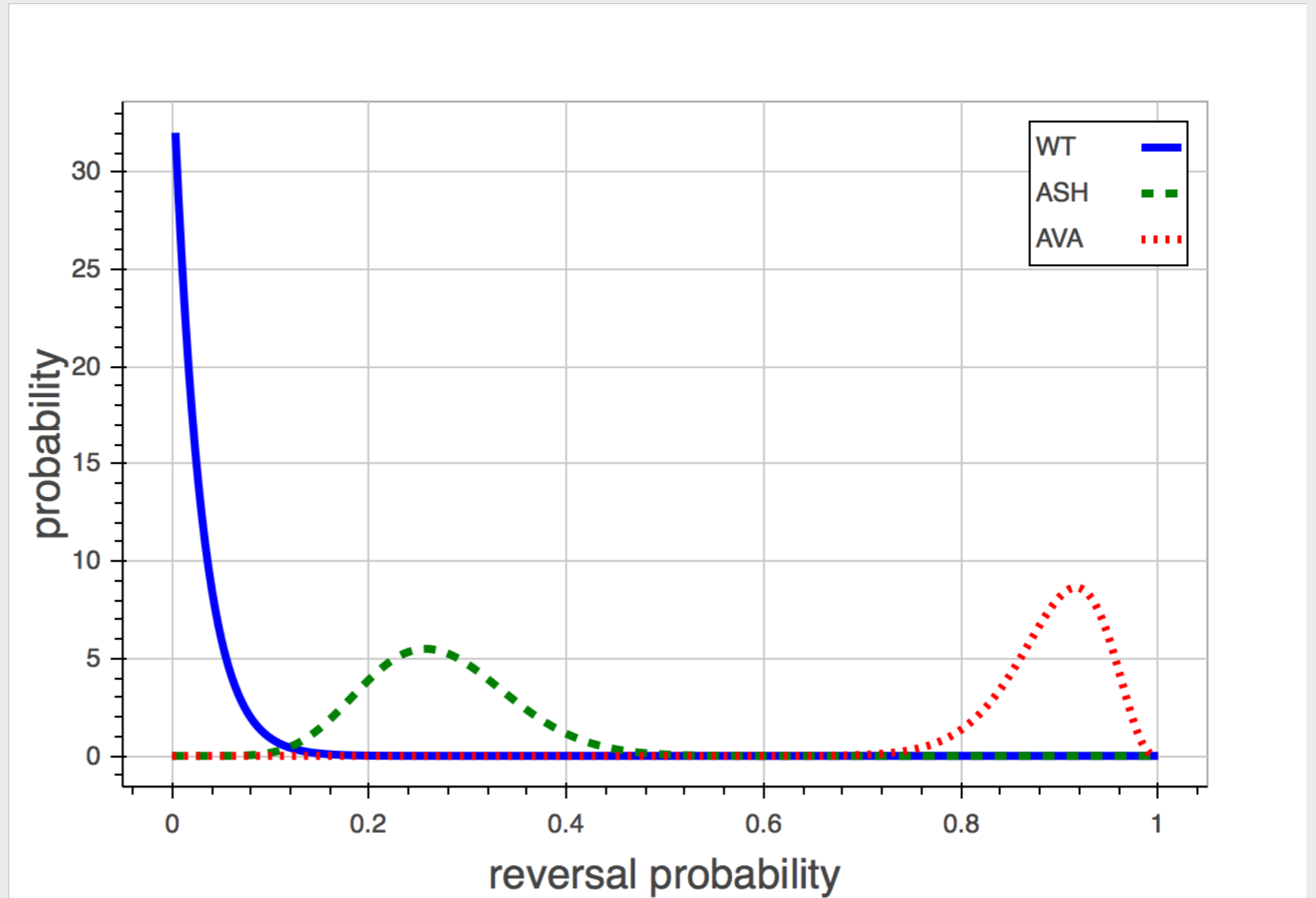


Induced charge difference mimics an action potential

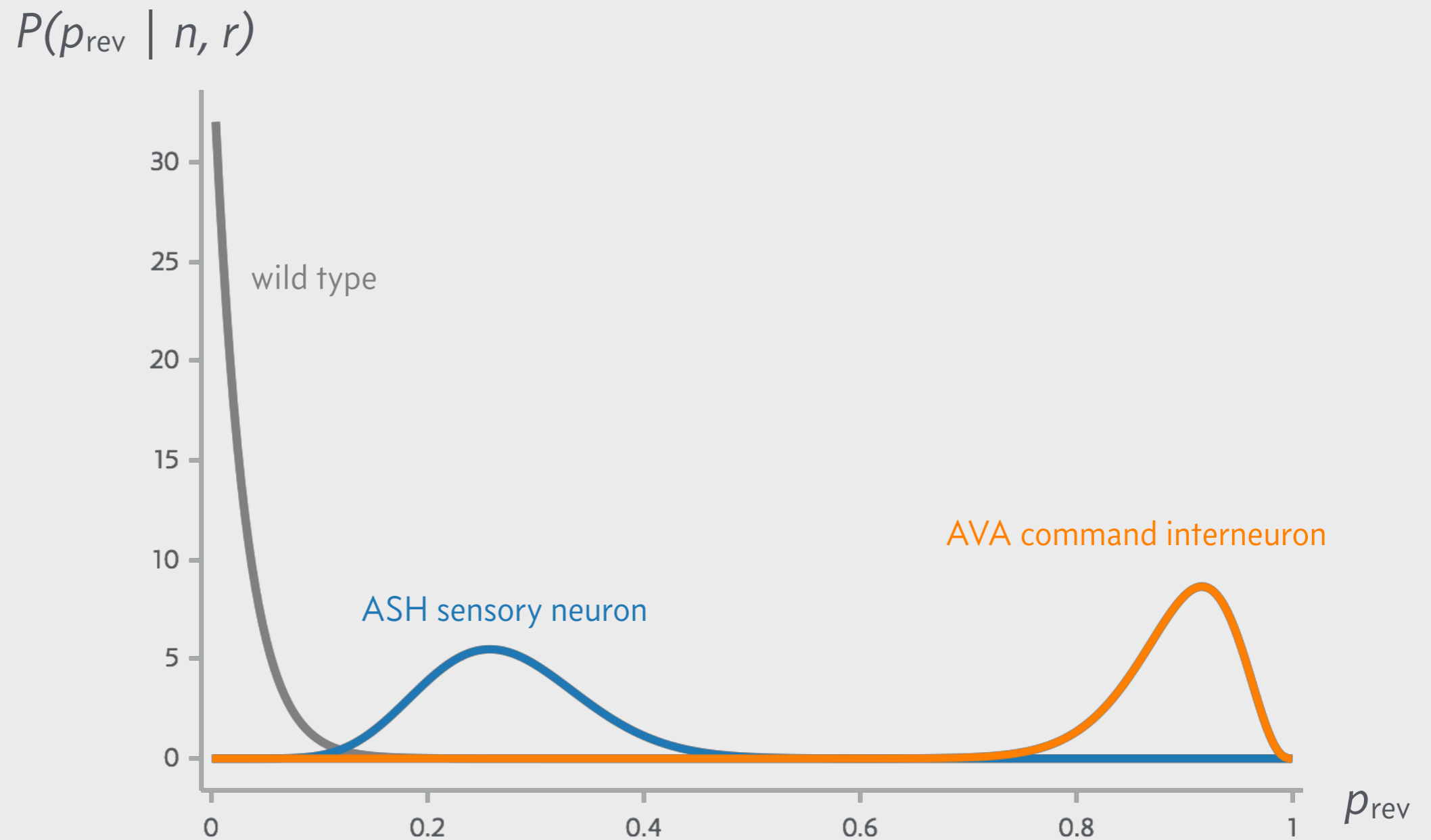
membrane potential



This is an ugly, noisy plot



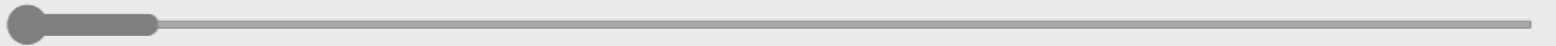
A Bayesian analysis give a complete description of reversal probability



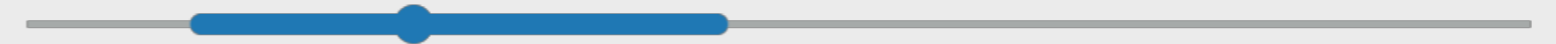
**For the science of this talk,
this is ideal**

Probability of reversal

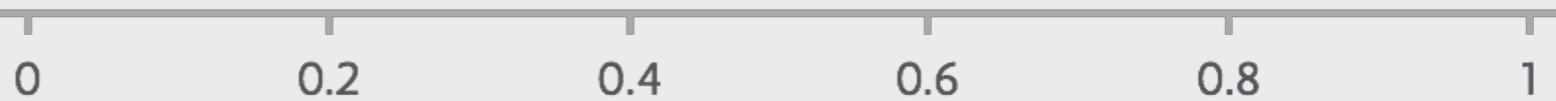
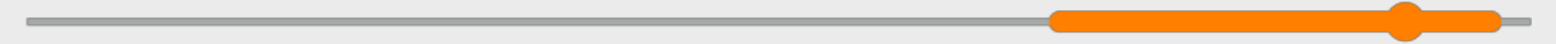
wild type



ASH sensory neuron



AVA command interneuron



Let professionals pick your colors

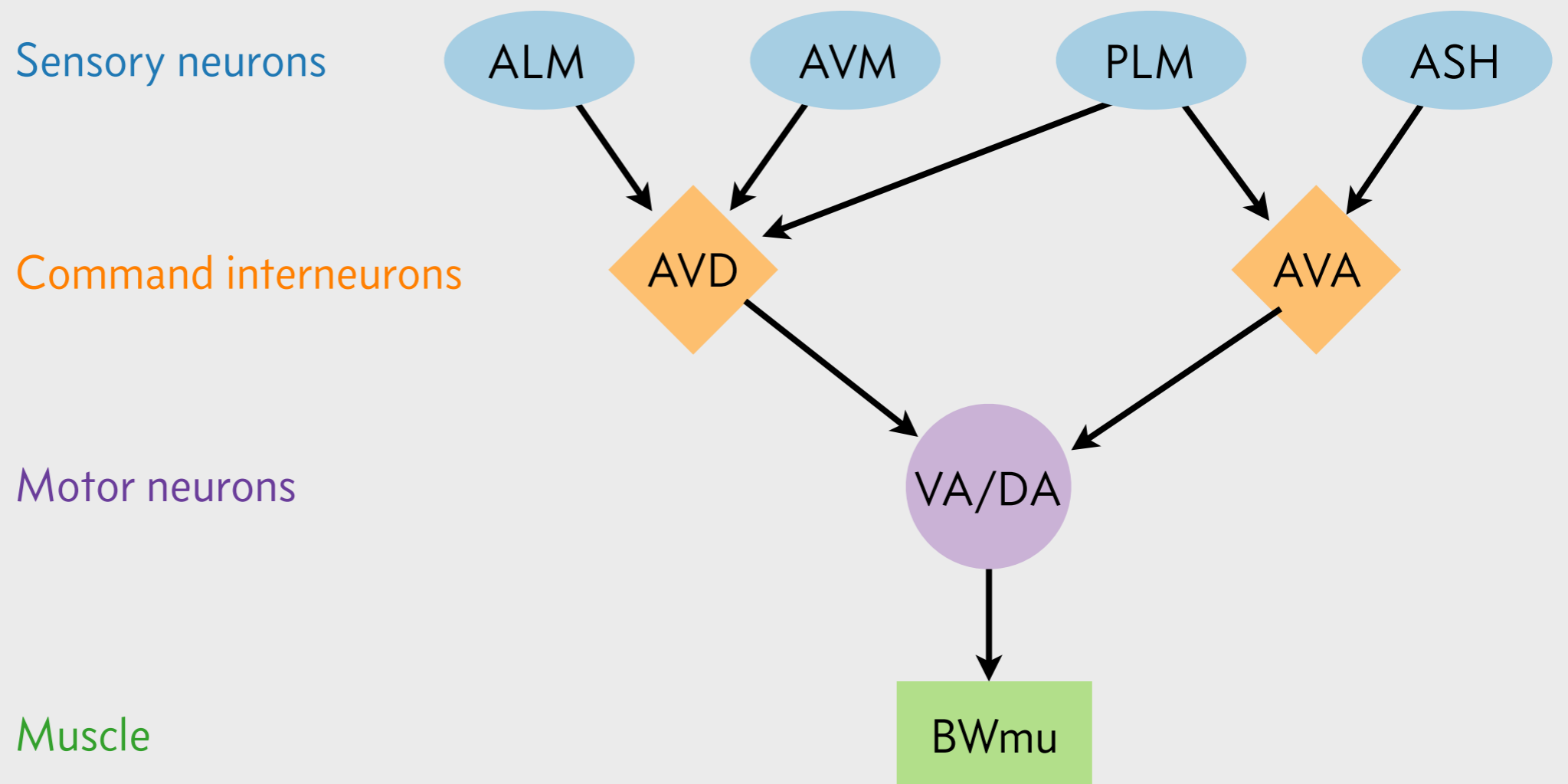
The screenshot displays the ColorBrewer 2.0 interface. At the top right, it says "COLORBREWER 2.0 color advice for cartography". The main area shows a map of the United States with a 10-class qualitative color scheme. The legend on the left lists the colors and their hex codes:

- #a6cee3
- #1f78b4
- #b2df8a
- #33a02c
- #fb9a99
- #e31a1c
- #fdbf6f
- #ff7f00
- #cab2d6
- #6a3d9a

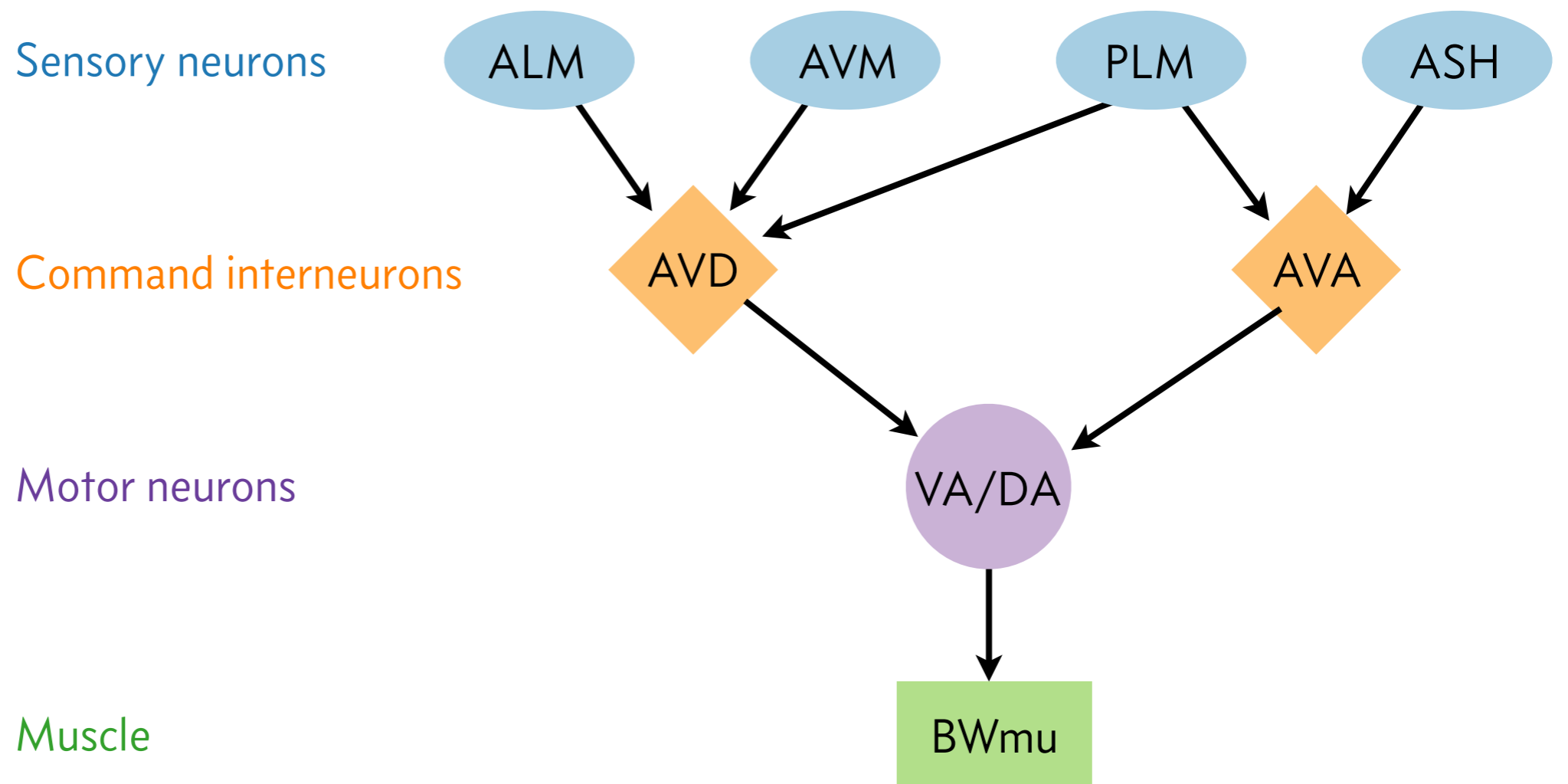
The interface includes several control panels:

- Number of data classes:** Set to 10.
- Nature of your data:** Radio buttons for sequential, diverging, and qualitative (selected).
- Pick a color scheme:** A grid of color swatches.
- Only show:** Checkboxes for colorblind safe, print friendly, and photocopy safe.
- Context:** Checkboxes for roads, cities, and borders (checked).
- Background:** Radio buttons for solid color (selected) and terrain.
- Color transparency:** A slider.
- EXPORT:** A vertical button.
- HEX:** A dropdown menu.

The *C. elegans* reversal circuit is well-mapped and simple

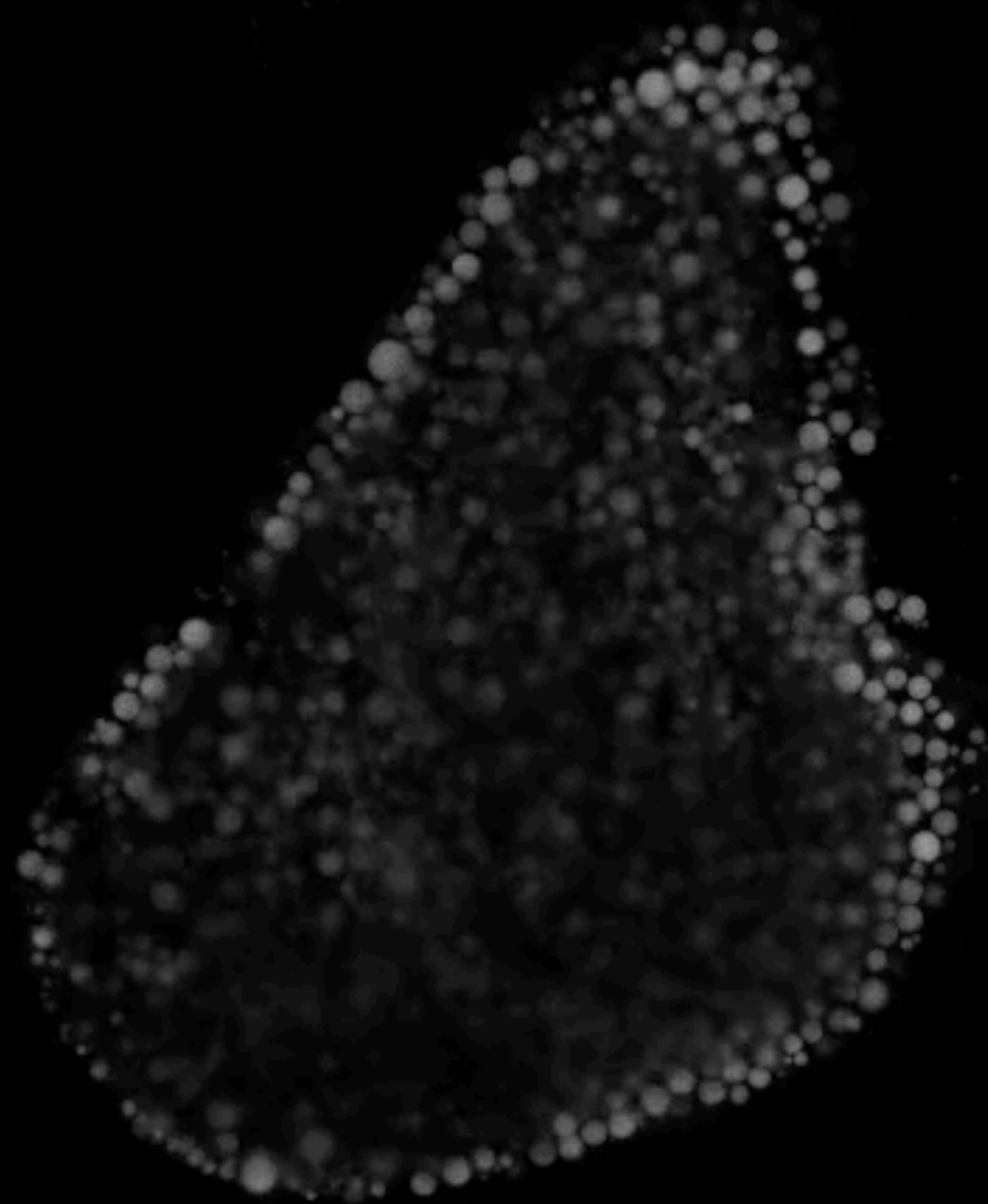


The *C. elegans* reversal circuit is well-mapped and simple



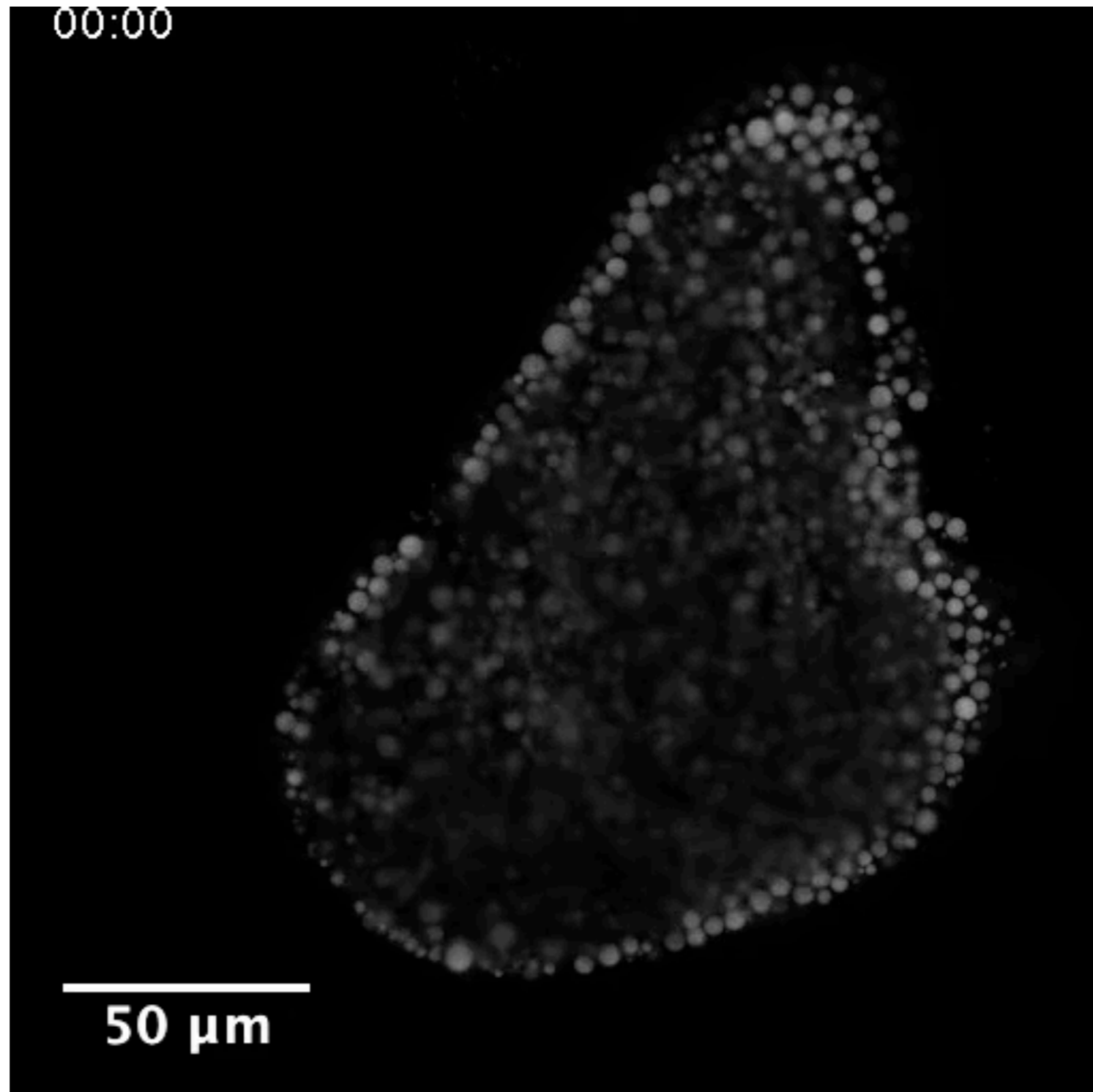
Stage 11 oocytes exhibit fast streaming

00:00



50 μm

Stage 11 oocytes exhibit fast streaming



**This equation is ok, but can be confusing
and a little hard to read**

$$\begin{aligned} P(p_{\text{rev}} \mid n, r) &= \frac{P(n, r \mid p_{\text{rev}}) P(p_{\text{rev}})}{P(n, r)} \\ &= \frac{(n+1)!}{(n-r)!r!} p_{\text{rev}}^r (1-p_{\text{rev}})^{n-r} \end{aligned}$$

We use Bayes's theorem to quantify reversal probability

$$\begin{aligned} P(p_{\text{rev}} \mid n, r) &= \frac{P(n, r \mid p_{\text{rev}}) P(p_{\text{rev}})}{P(n, r)} \\ &= \frac{\text{Binomial}(r \mid n, p_{\text{rev}}) \times \text{Uniform}(0, 1)}{\text{Uniform}(0, n+1)} \end{aligned}$$

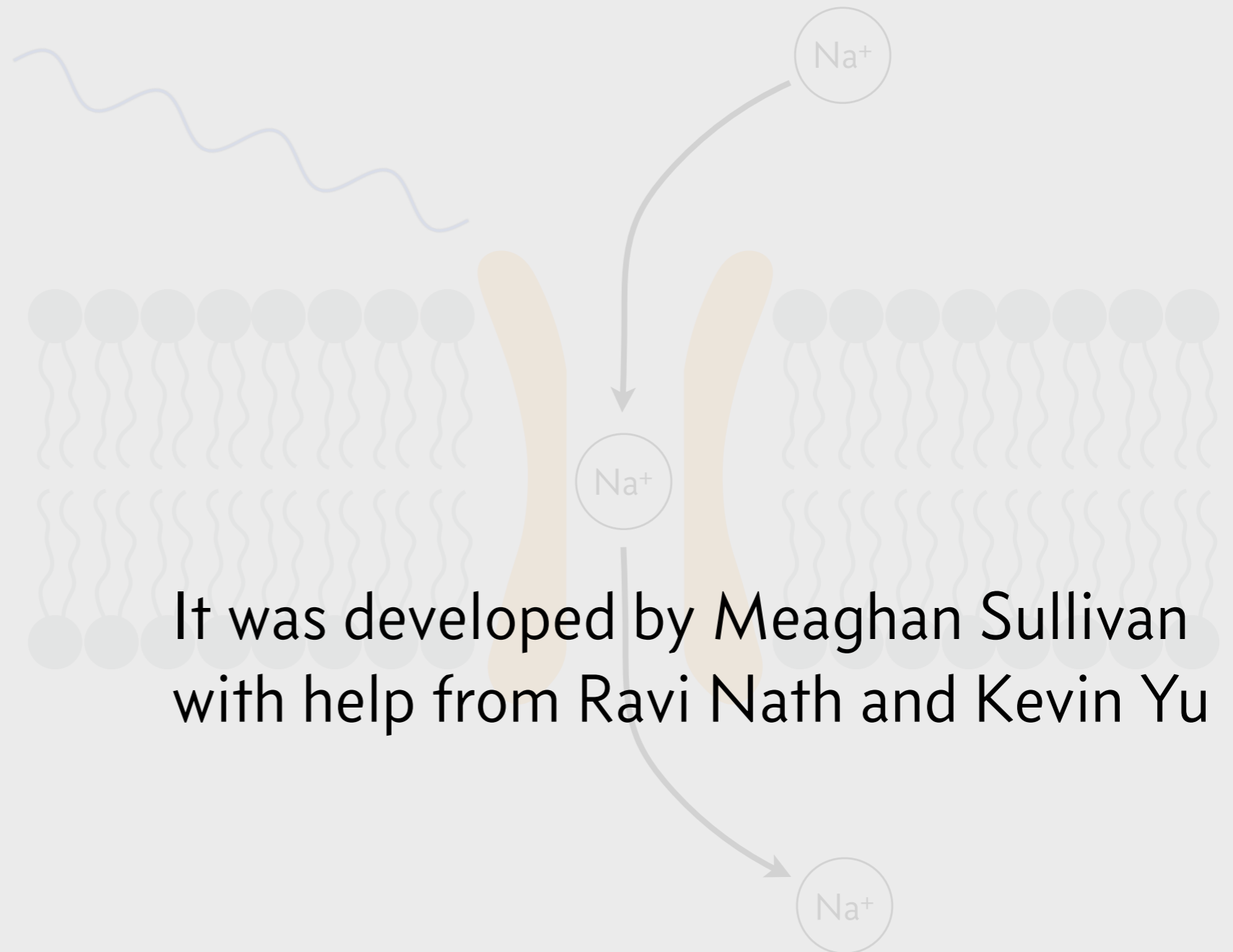
p_{rev} = probability of reversal

n, r = r reversals in n trials

Your Q&A slide: a simple reminder



This experiment was conducted
by the students of Bi 1x 2015

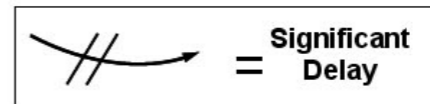


It was developed by Meaghan Sullivan
with help from Ravi Nath and Kevin Yu

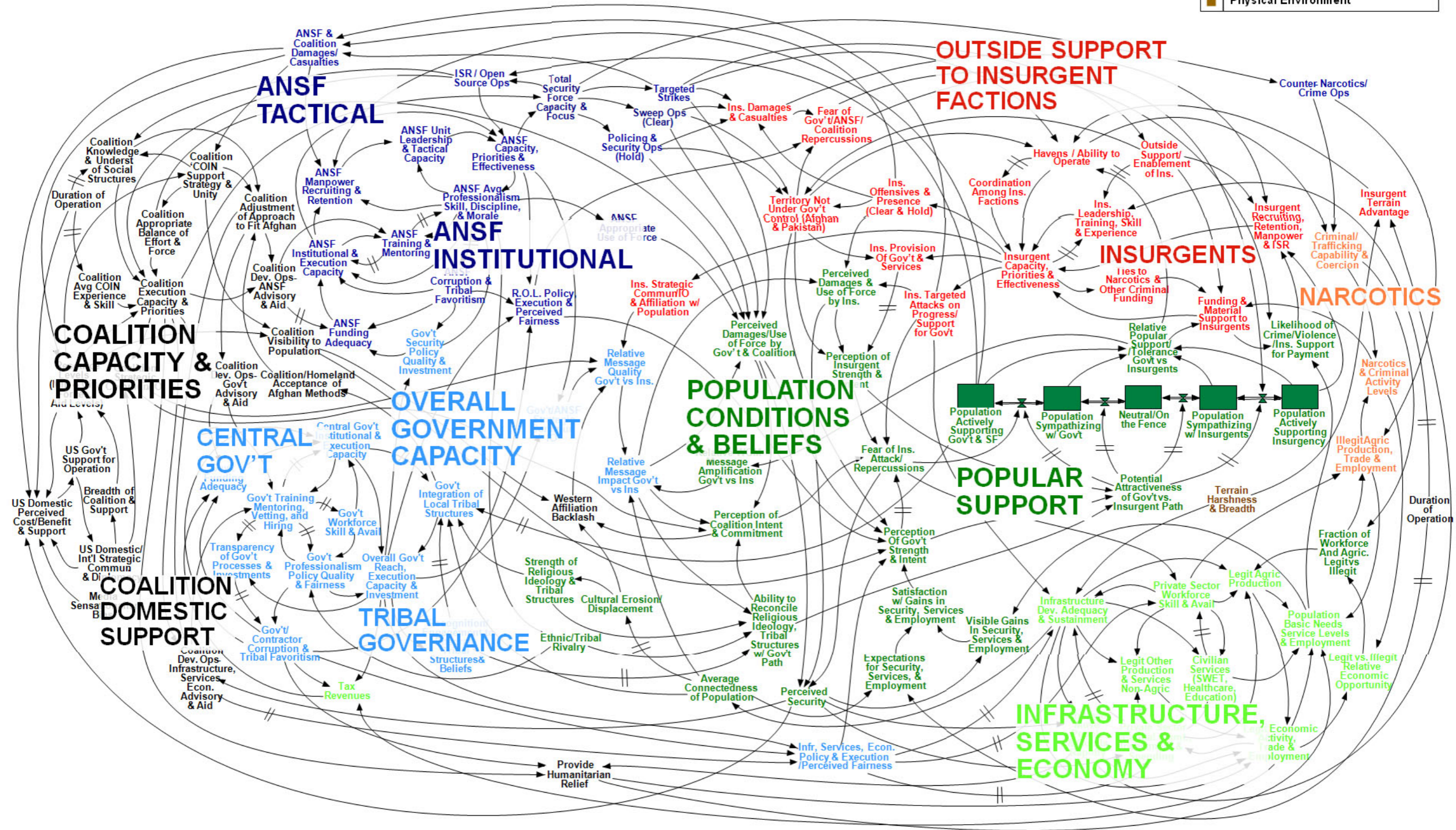
Why is General McChrystal so angry?



Afghanistan Stability / COIN Dynamics



- Population/Popular Support
- Infrastructure, Economy, & Services
- Government
- Afghanistan Security Forces
- Insurgents
- Crime and Narcotics
- Coalition Forces & Actions
- Physical Environment



WORKING DRAFT - V3

Why is General McChrystal so angry?

When we understand that slide,
we'll have won the war.

—Gen. Stanley McChrystal



Former Secretary Mattis is more blunt



PowerPoint makes us stupid.

—then-Gen. James Mattis

(paraphrased from Edward Tufte)

Jean-luc Doumont's work is an excellent resource

Trees, maps, and theorems

Effective communication for rational minds

Jean-luc Doumont

