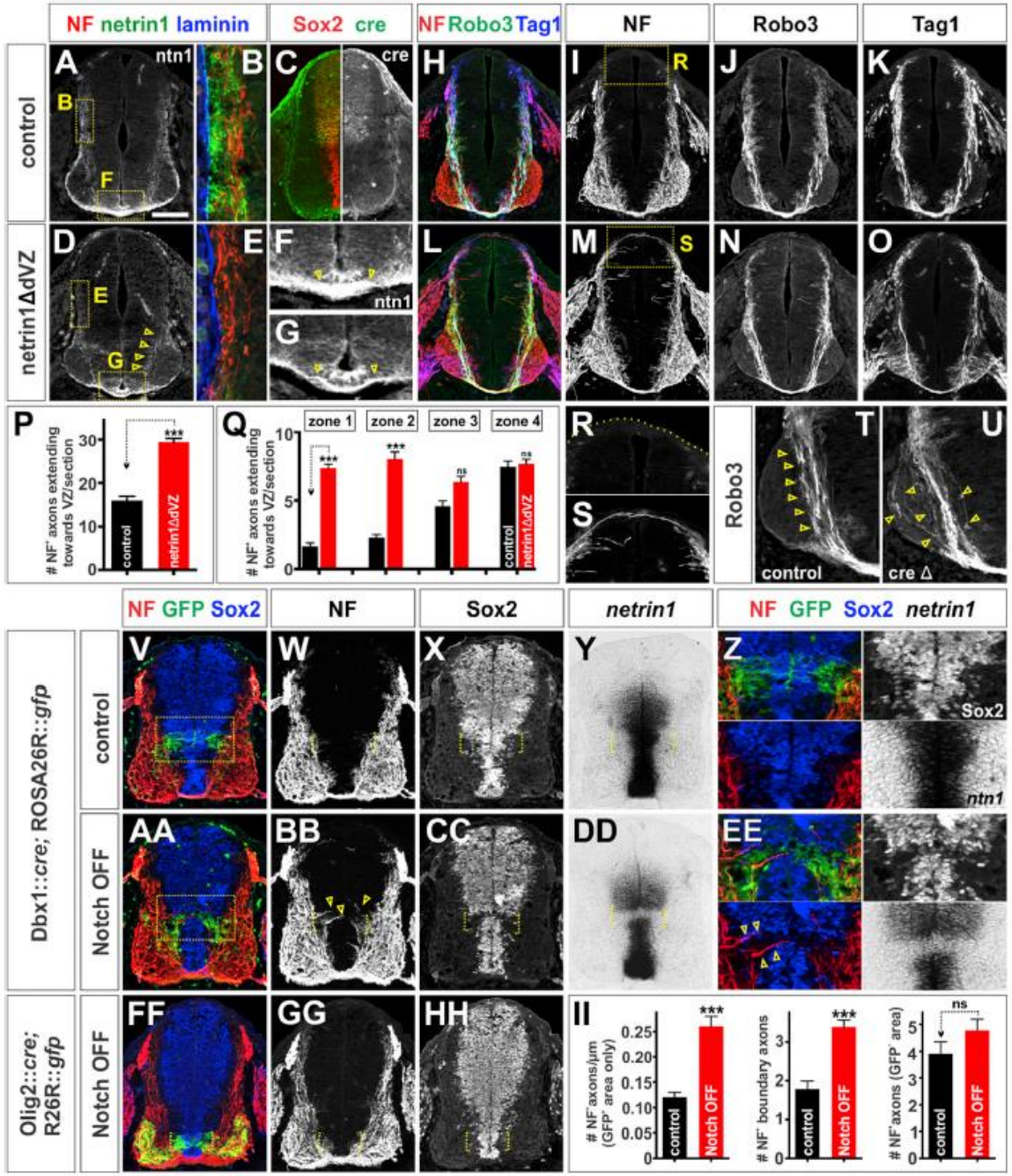
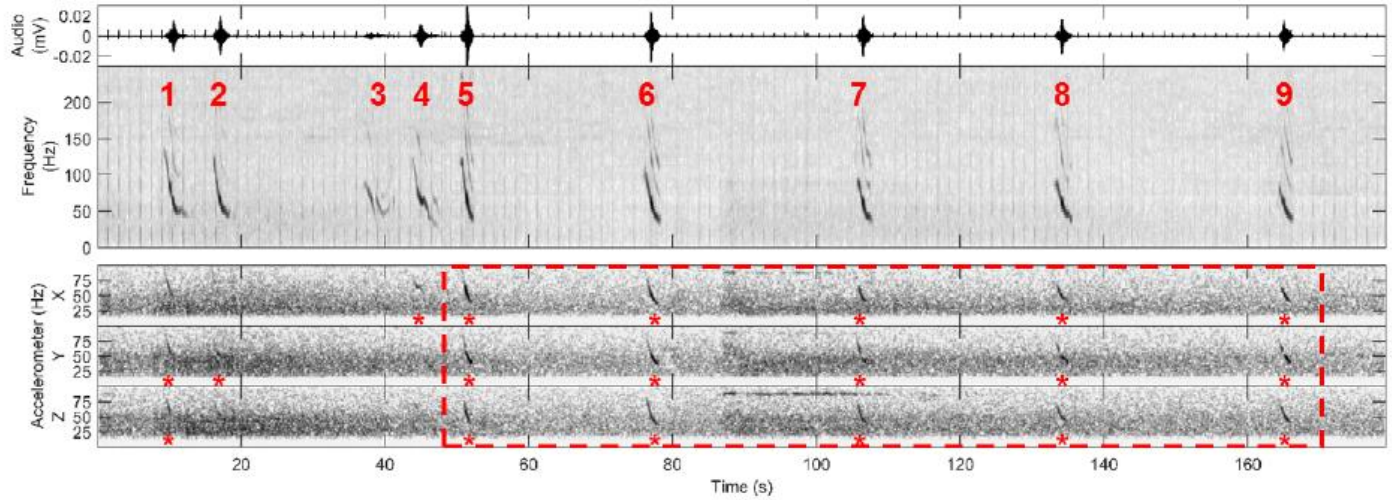
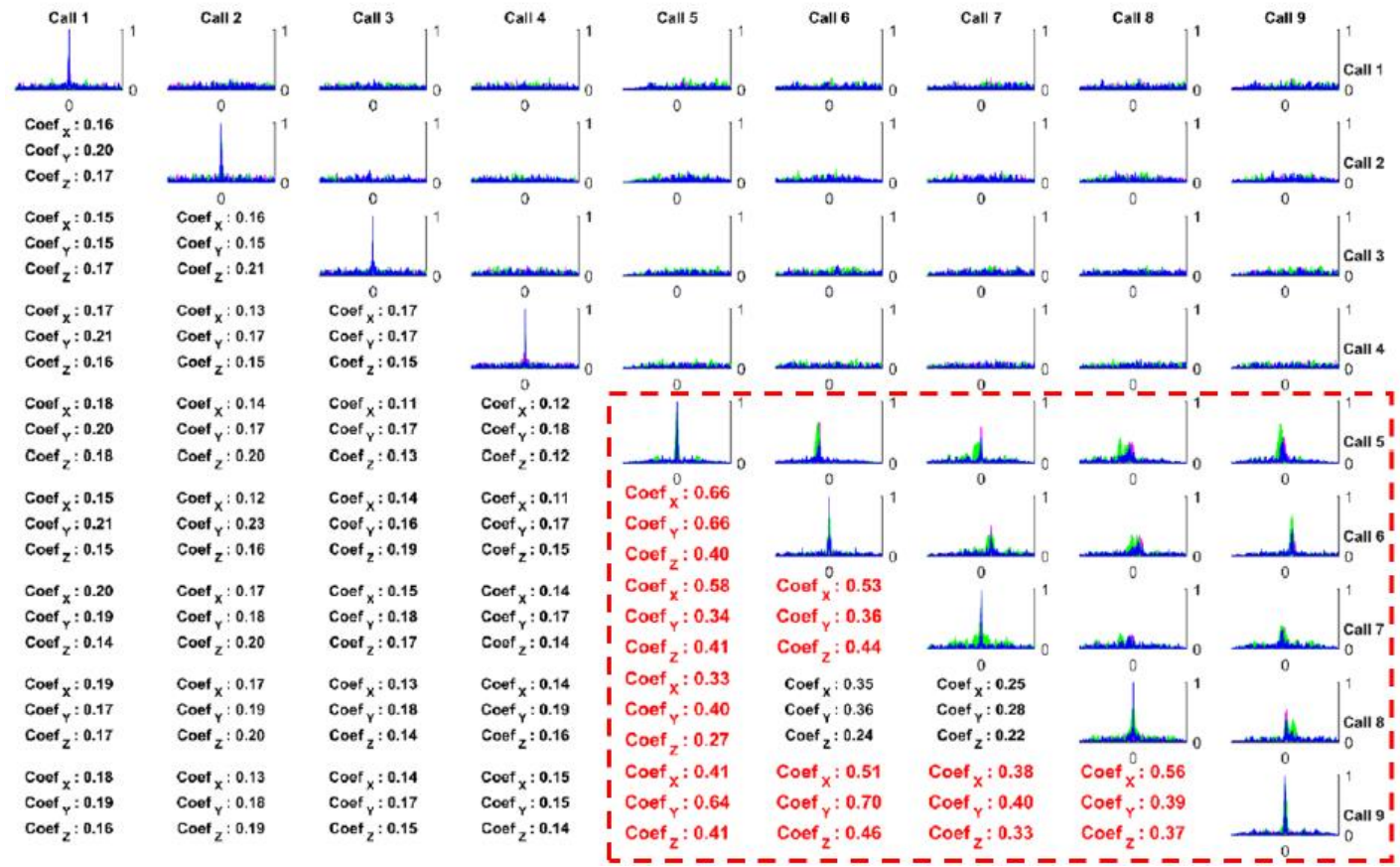
Ten Simple Rules for Better Figures

Rougier, Droettboom, Bourne, PLoS 2014

Nhat Le, December 2017


NF netrin1 laminin
Sox2 cre
NF Robo3 Tag1
NF
Robo3
Tag1
control
netrin1ΔdVZ
ntn1
cre
R
S
zone 1
zone 2
zone 3
zone 4
NF+ axons extending towards VZ/section
control
netrin1ΔdVZ
Robo3
control
cre Δ
NF GFP Sox2
NF
Sox2
netrin1
NF GFP Sox2 netrin1
Dbx1::cre; ROSA26R::gfp
Olig2::cre; R26R::gfp
Notch OFF
Sox2
ntn1
NF+axons/μm (GFP+ area only)
NF+ boundary axons
NF+axons (GFP+ area)
control
Notch OFF
ns


Audio (mV)
0.02
0
-0.02
1 2 3 4 5 6 7 8 9
Frequency (Hz)
200
150
100
50
0
Accelerometer (Hz)
X
Y
Z
75
50
25
20 40 60 80 100 120 140 160
Time (s)


Call 1 Call 2 Call 3 Call 4 Call 5 Call 6 Call 7 Call 8 Call 9
Coef x : 0.16 Coef y : 0.20 Coef z : 0.17
Coef x : 0.15 Coef y : 0.15 Coef z : 0.17
Coef x : 0.16 Coef y : 0.15 Coef z : 0.21
Coef x : 0.17 Coef y : 0.21 Coef z : 0.16
Coef x : 0.13 Coef y : 0.17 Coef z : 0.15
Coef x : 0.17 Coef y : 0.17 Coef z : 0.15
Coef x : 0.18 Coef y : 0.20 Coef z : 0.18
Coef x : 0.14 Coef y : 0.17 Coef z : 0.20
Coef x : 0.11 Coef y : 0.17 Coef z : 0.13
Coef x : 0.12 Coef y : 0.18 Coef z : 0.12
Coef x : 0.15 Coef y : 0.21 Coef z : 0.15
Coef x : 0.12 Coef y : 0.23 Coef z : 0.16
Coef x : 0.14 Coef y : 0.16 Coef z : 0.19
Coef x : 0.11 Coef y : 0.17 Coef z : 0.15
Coef x : 0.20 Coef y : 0.19 Coef z : 0.14
Coef x : 0.17 Coef y : 0.18 Coef z : 0.20
Coef x : 0.15 Coef y : 0.18 Coef z : 0.17
Coef x : 0.14 Coef y : 0.17 Coef z : 0.14
Coef x : 0.19 Coef y : 0.17 Coef z : 0.17
Coef x : 0.17 Coef y : 0.19 Coef z : 0.20
Coef x : 0.13 Coef y : 0.18 Coef z : 0.14
Coef x : 0.14 Coef y : 0.19 Coef z : 0.16
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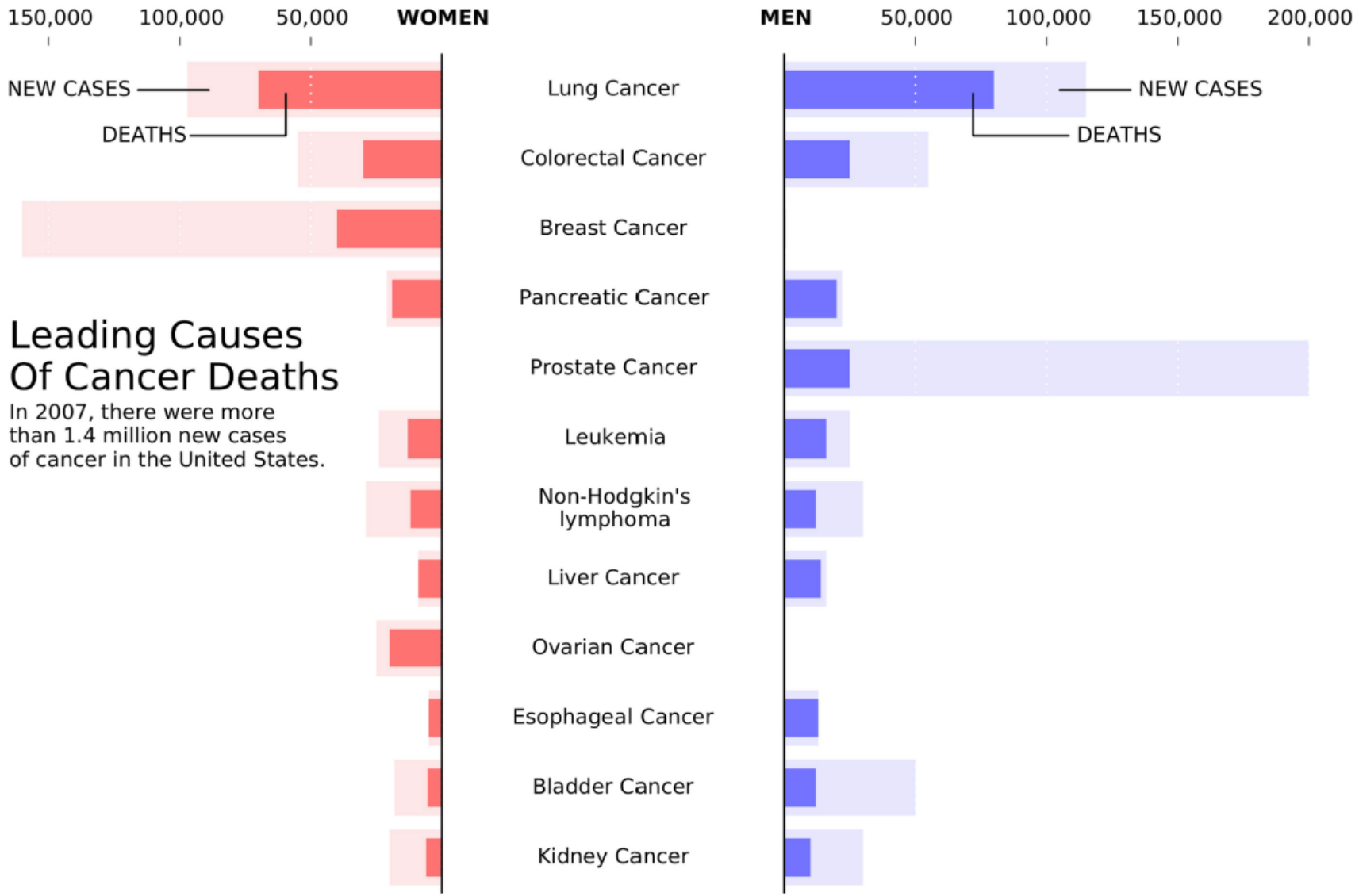
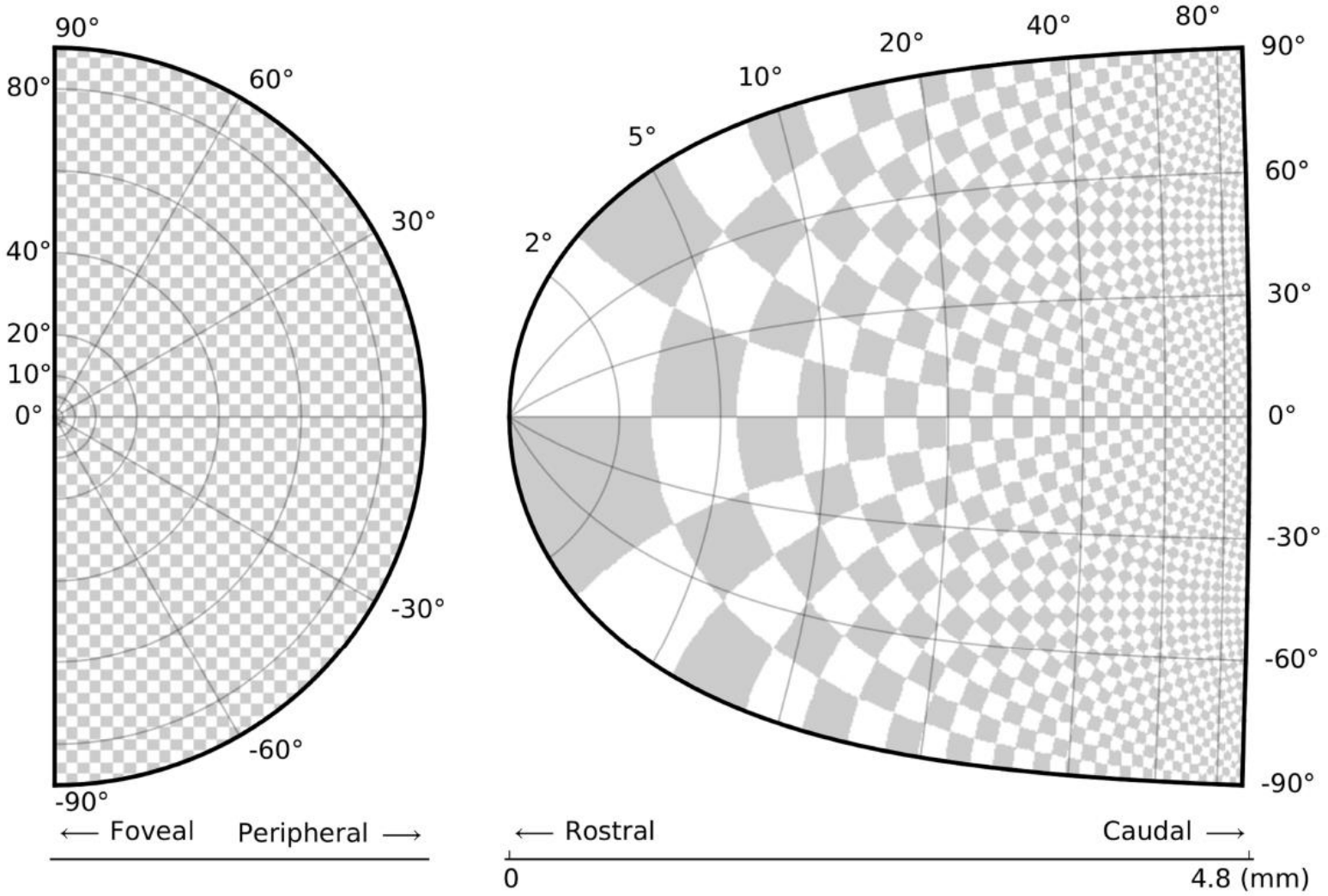
Coef x : 0.13 Coef y : 0.18 Coef z : 0.19
Coef x : 0.14 Coef y : 0.17 Coef z : 0.15
Coef x : 0.15 Coef y : 0.15 Coef z : 0.14
Coef x : 0.66 Coef y : 0.66 Coef z : 0.40
Coef x : 0.58 Coef y : 0.34 Coef z : 0.41
Coef x : 0.53 Coef y : 0.36 Coef z : 0.44
Coef x : 0.33 Coef y : 0.40 Coef z : 0.27
Coef x : 0.35 Coef y : 0.36 Coef z : 0.24
Coef x : 0.25 Coef y : 0.28 Coef z : 0.22
Coef x : 0.41 Coef y : 0.64 Coef z : 0.41
Coef x : 0.51 Coef y : 0.70 Coef z : 0.46
Coef x : 0.38 Coef y : 0.40 Coef z : 0.33
Coef x : 0.56 Coef y : 0.39 Coef z : 0.37
Call 1 Call 2 Call 3 Call 4 Call 5 Call 6 Call 7 Call 8 Call 9

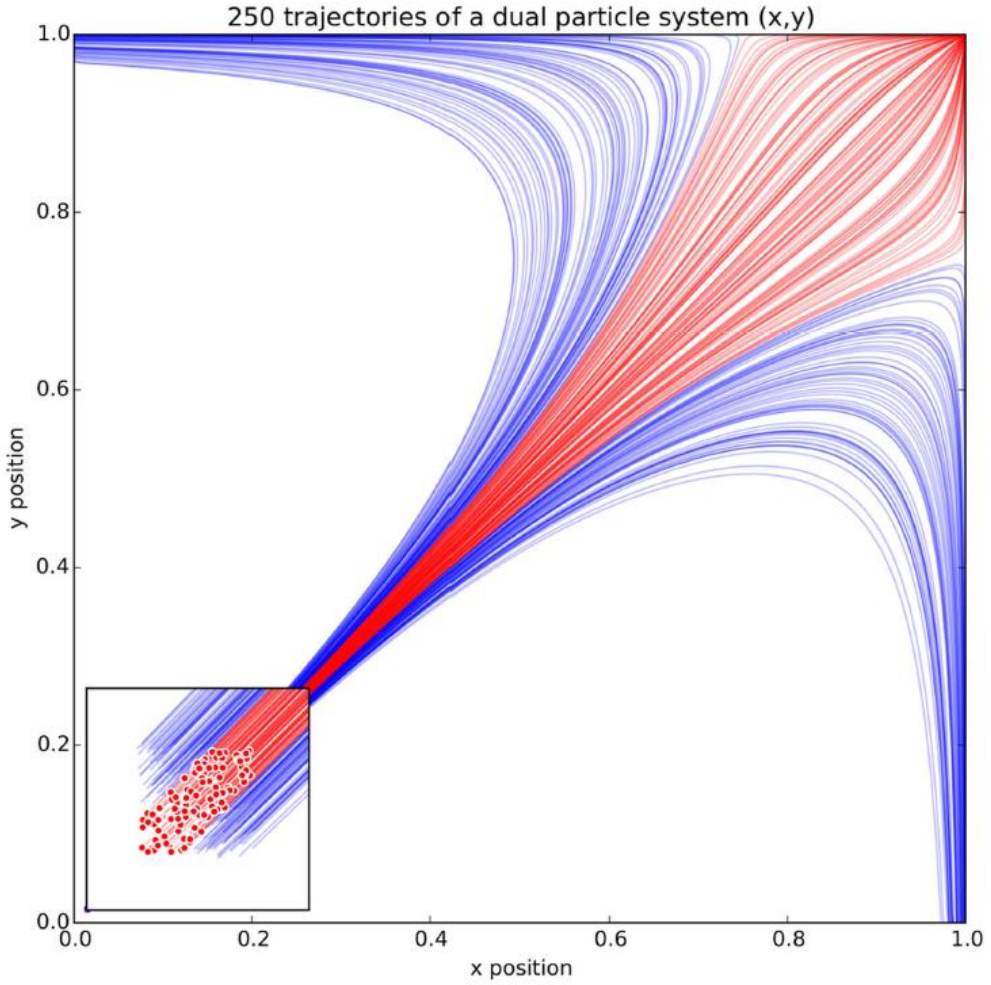
Rule 1: Know your audience

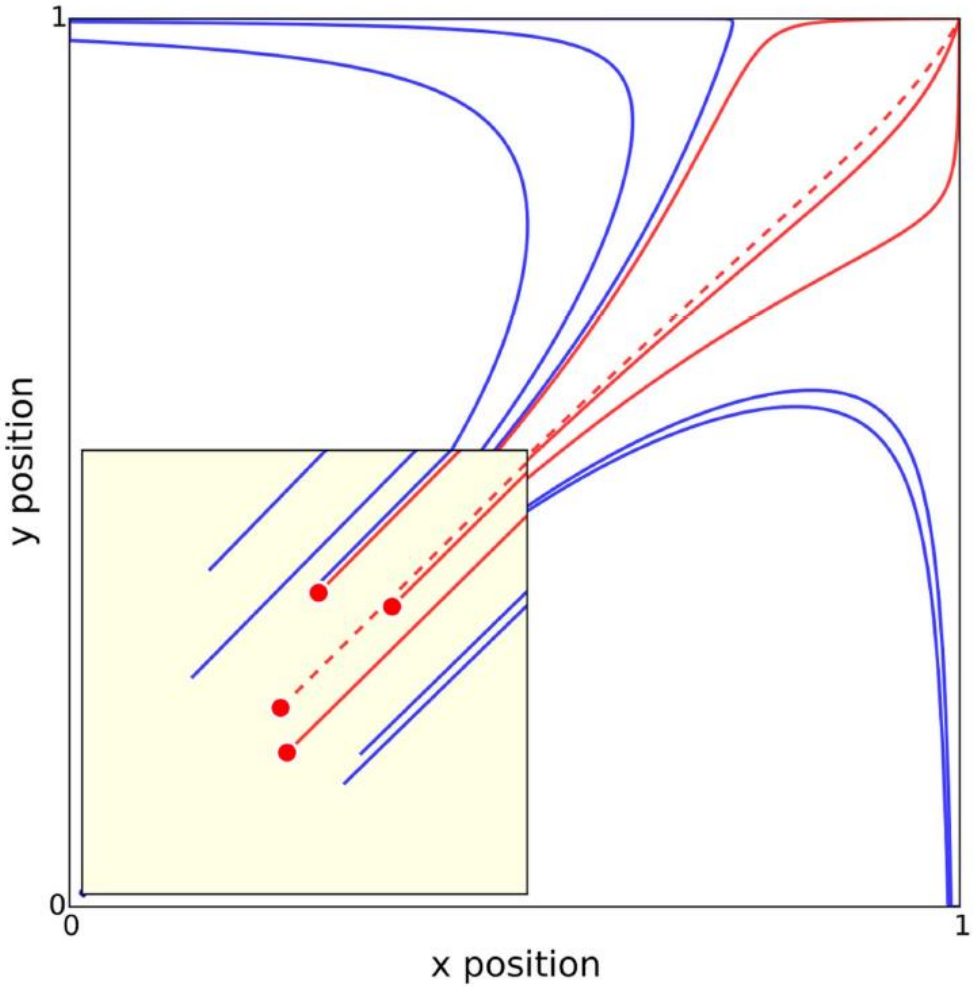


Rule 2: Identify your message



Rule 3: Adapt your figure to the support medium





Rule 3: Adapt your figure to the support medium

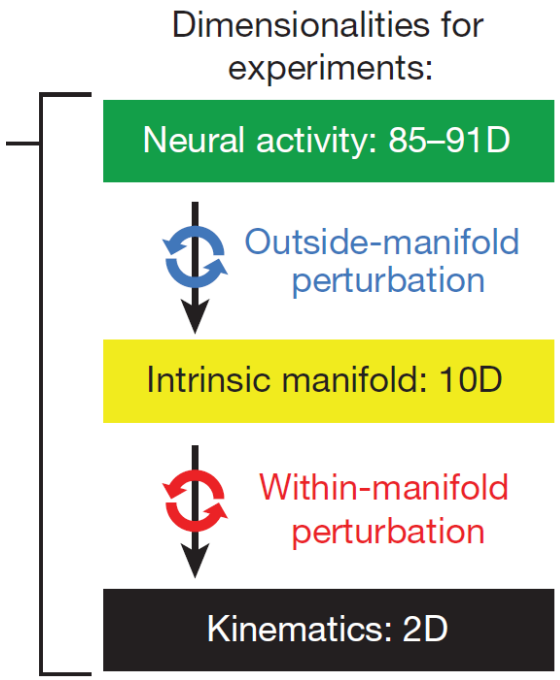
Oral presentation: simple figure, visually salient message.

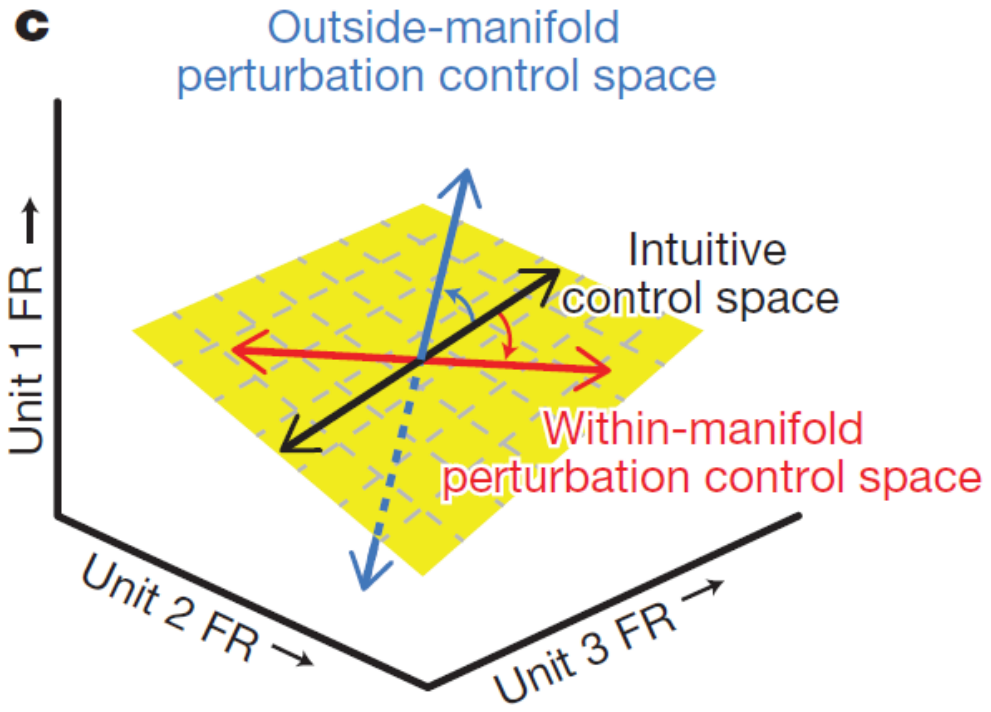
- Thicker lines, bigger points, text.
- Colors should have strong contrast.
- Vertical text should be avoided.

Journal article: more details can be added, along with explanations in the captions

"You should abandon the practice of extracting a figure from your article to be put, as is, in your oral presentation."

Rule 4: Captions are not optional



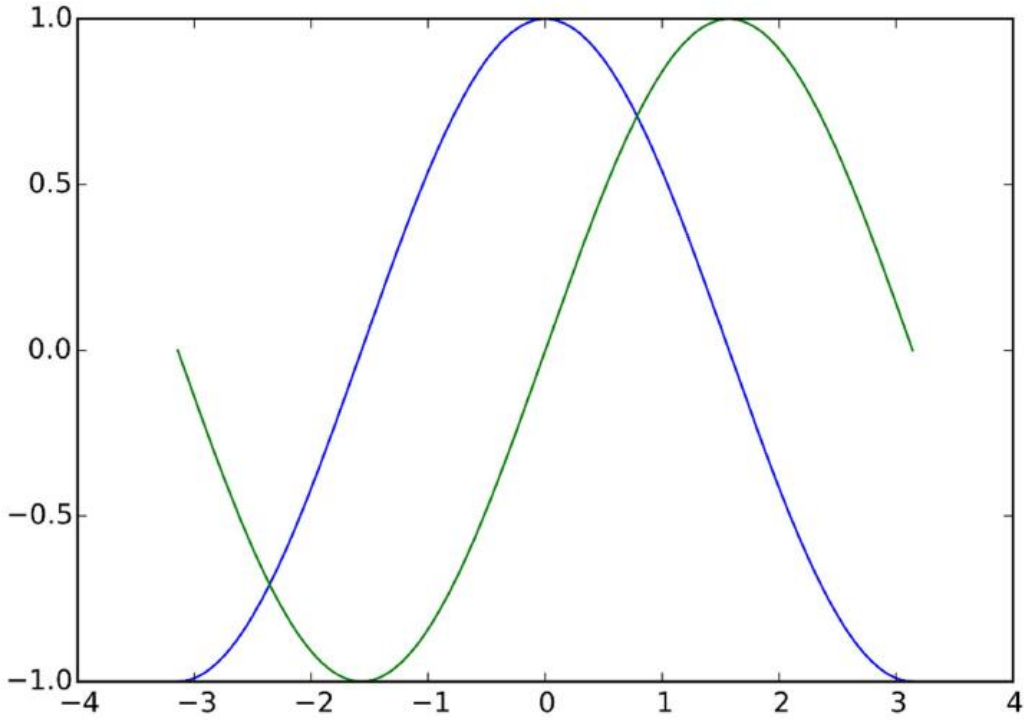


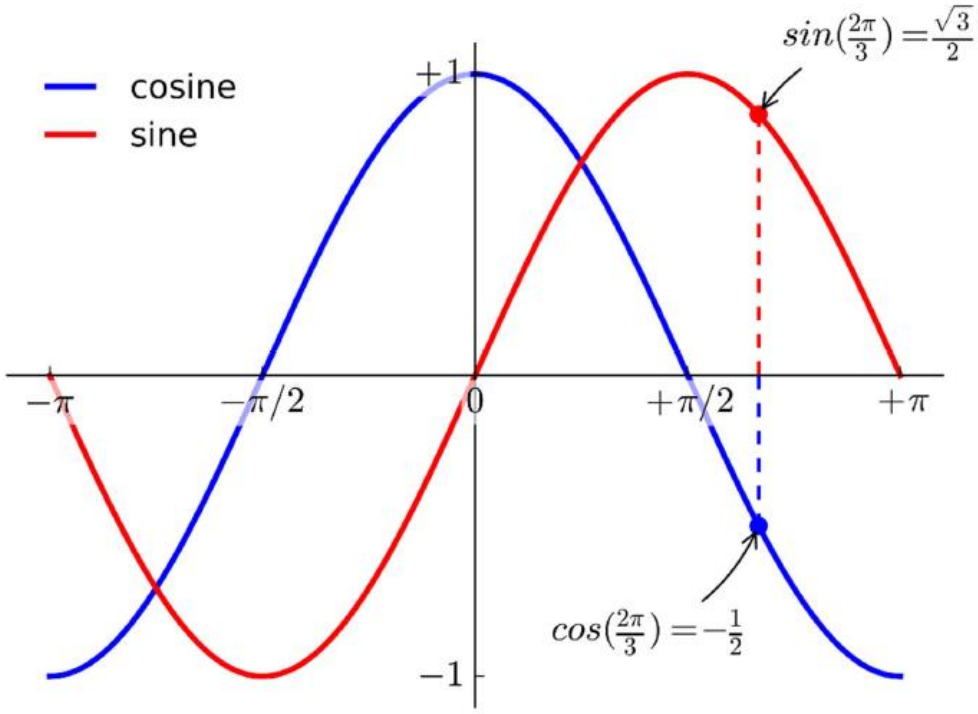
- Point out relevant numeric values on the figure or in the caption.
- If there is a point of interest, made sure it is visually distinct and mention in the caption.

Sadtler et al., 2014, *Nature*

Rule 5: Do not trust the defaults

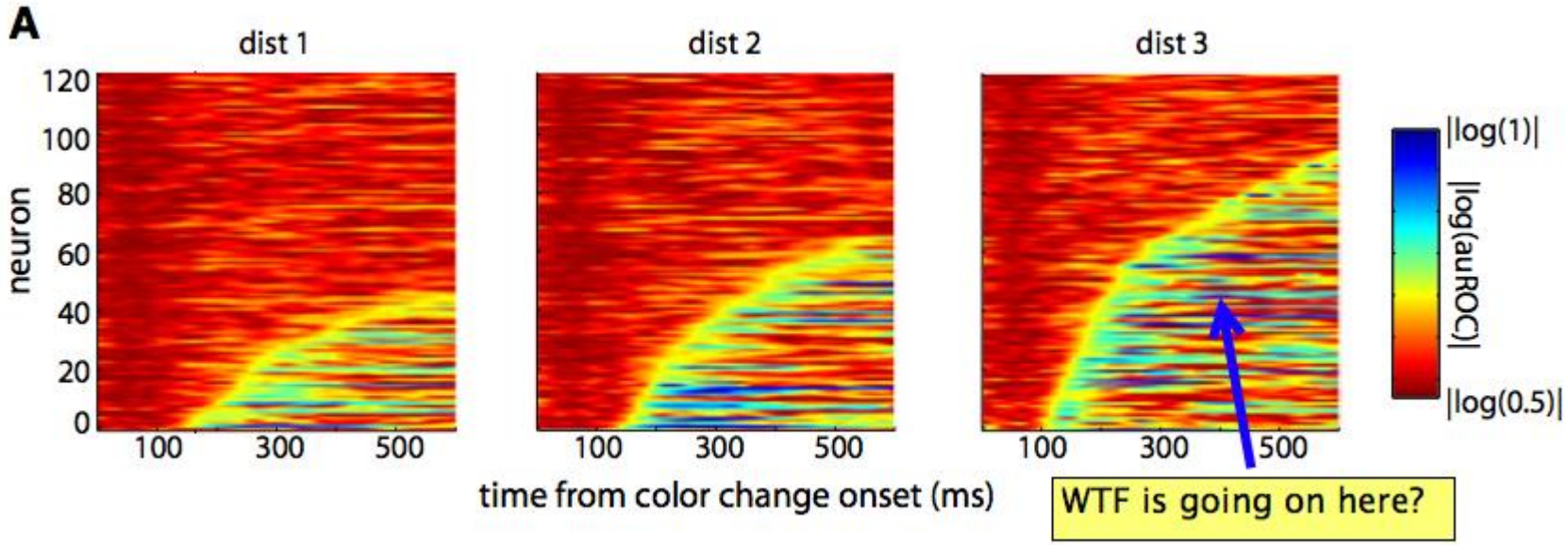
“Default settings are good for any plot but they are best for none”

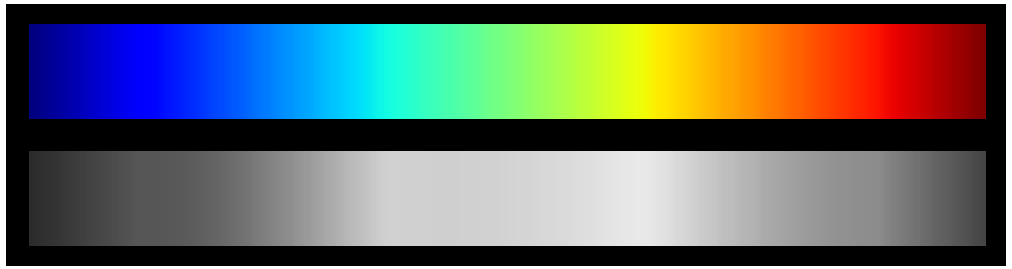




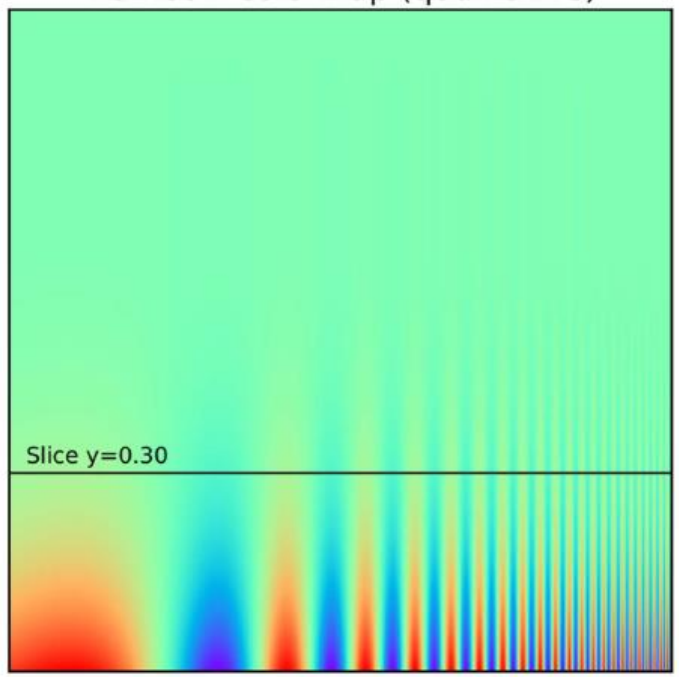
Demo

Rule 6: Use color effectively



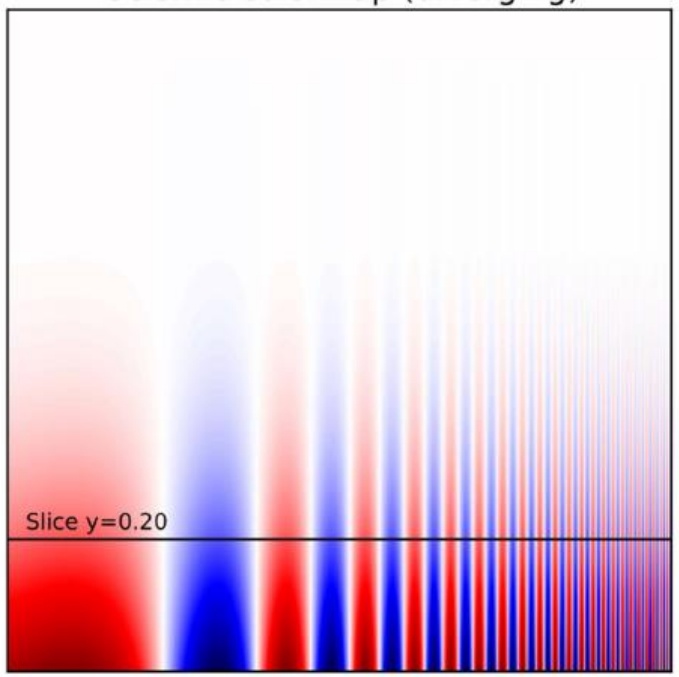


Rainbow colormap (qualitative)



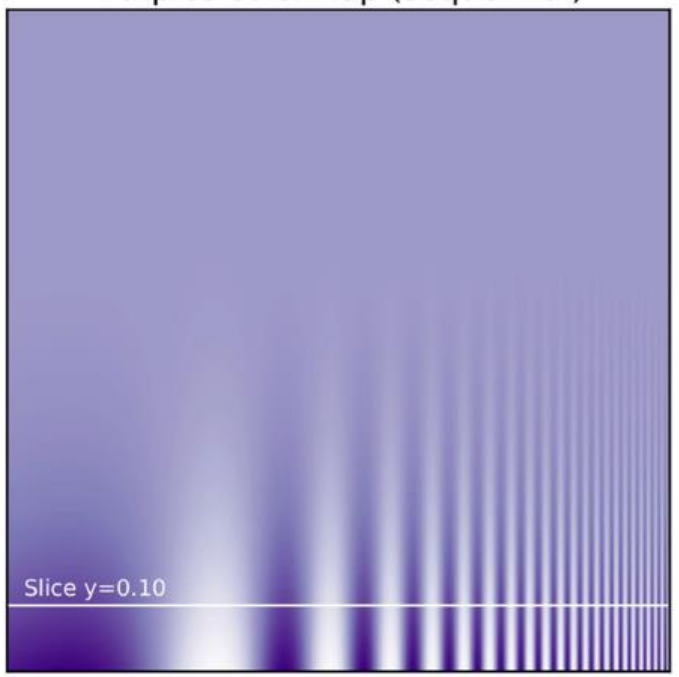
Slice detail

Seismic colormap (diverging)



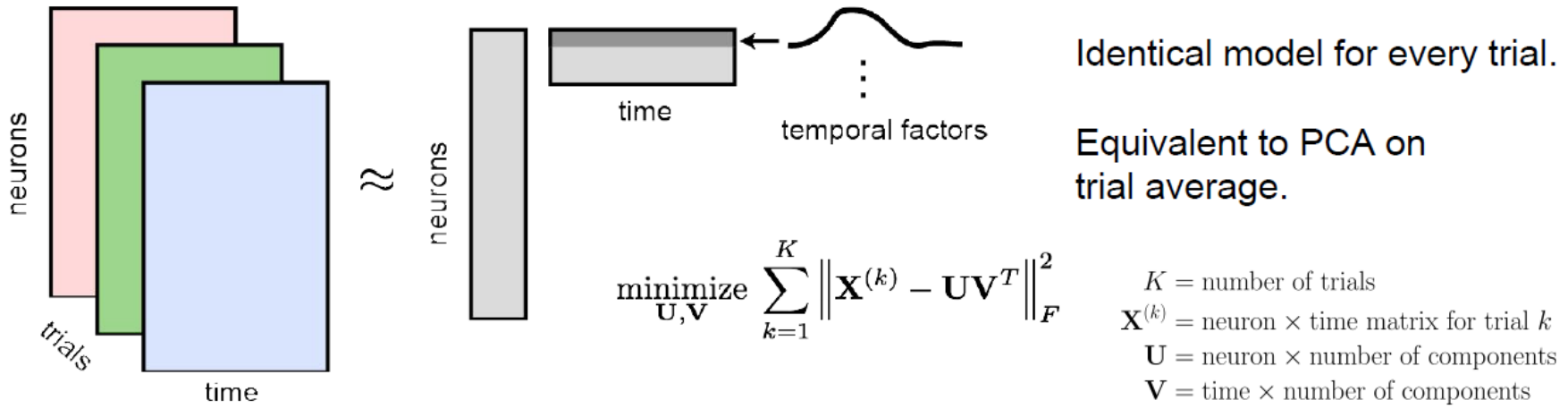
Slice detail

Purples colormap (sequential)

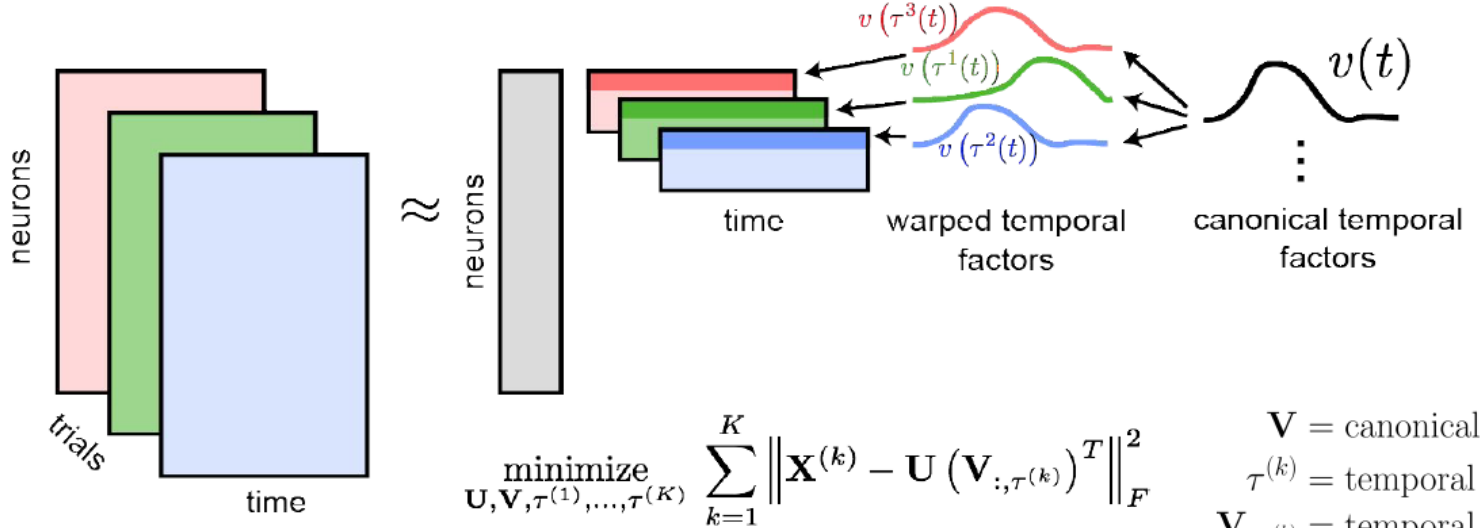


Slice detail

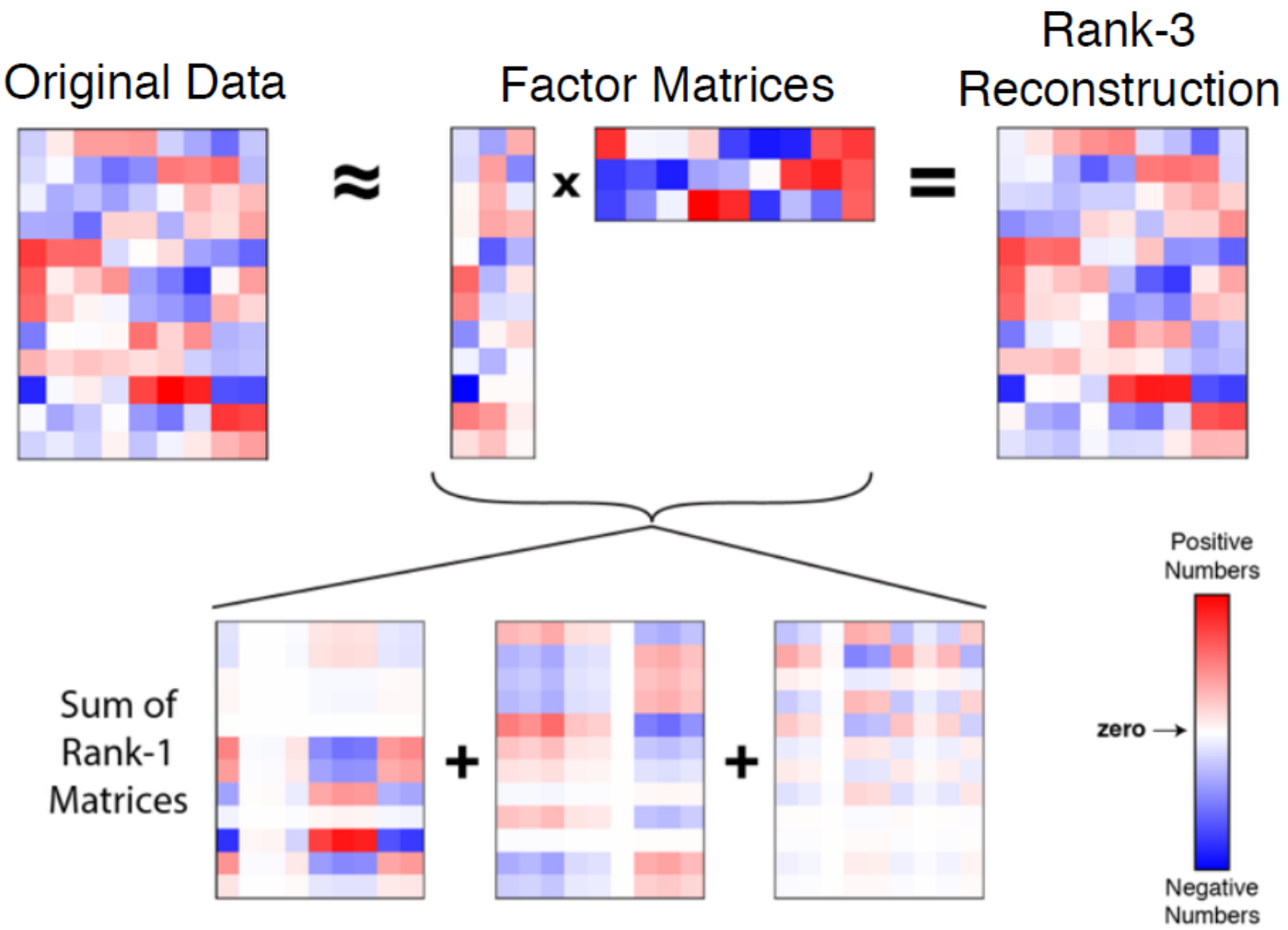
Qualitative color map



Time-warped PCA: *different* temporal factors for each trial

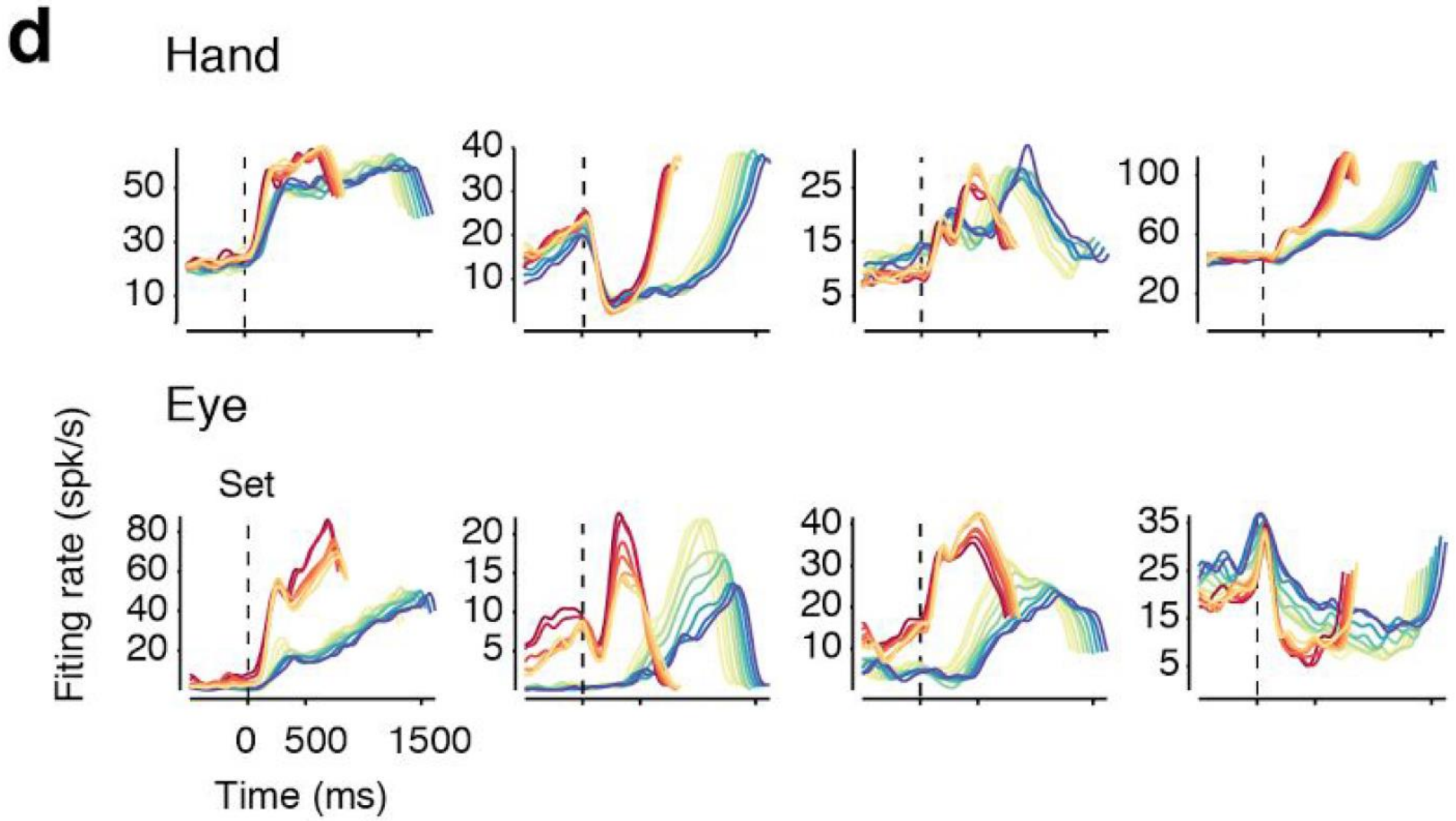


Diverging color map

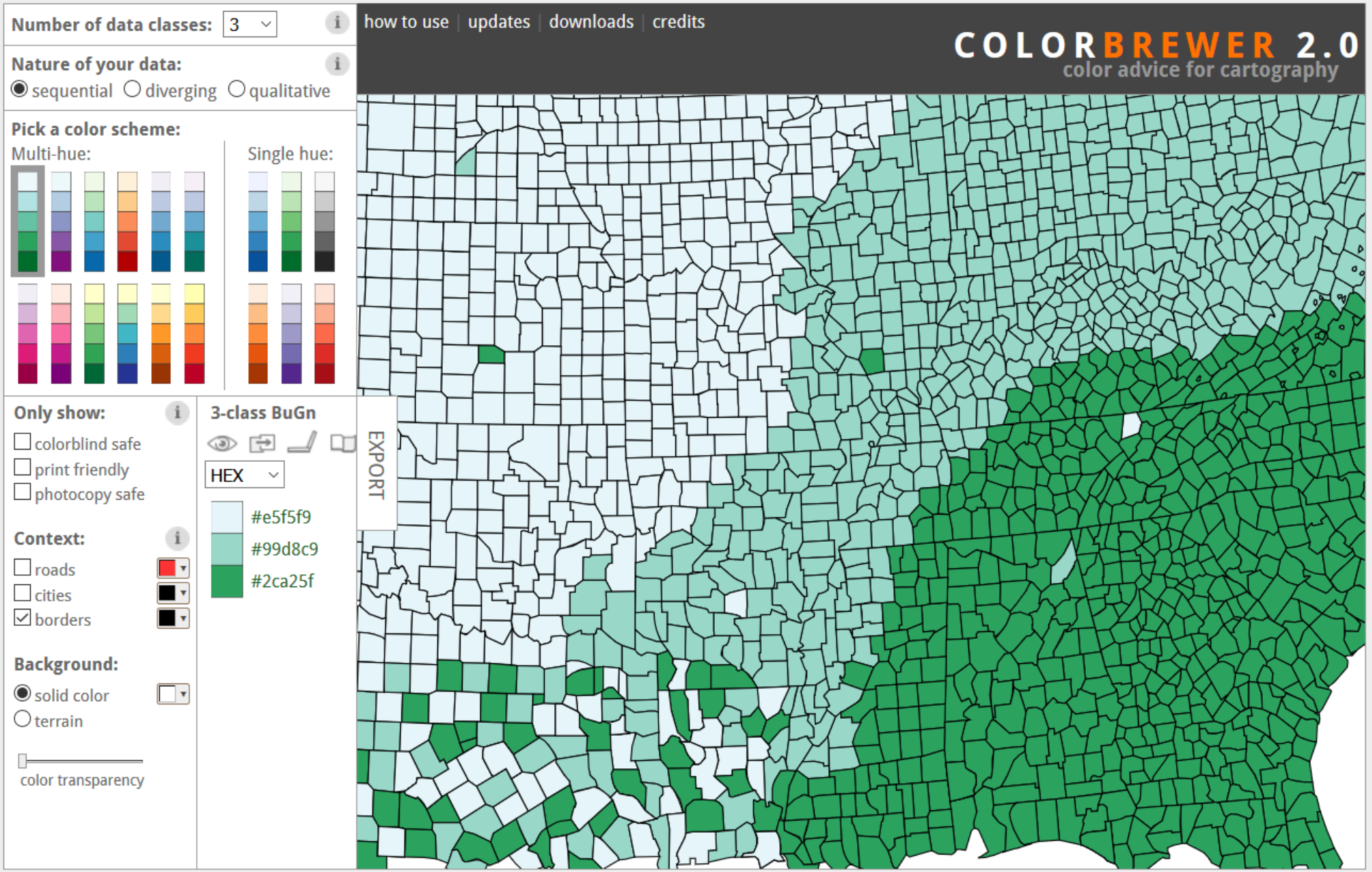


Alex Williams, Matrix Decomposition

Sequential and qualitative color maps



Wang et al., 2017, *Nature Neuroscience*



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Source code and feedback

Back to Flash version

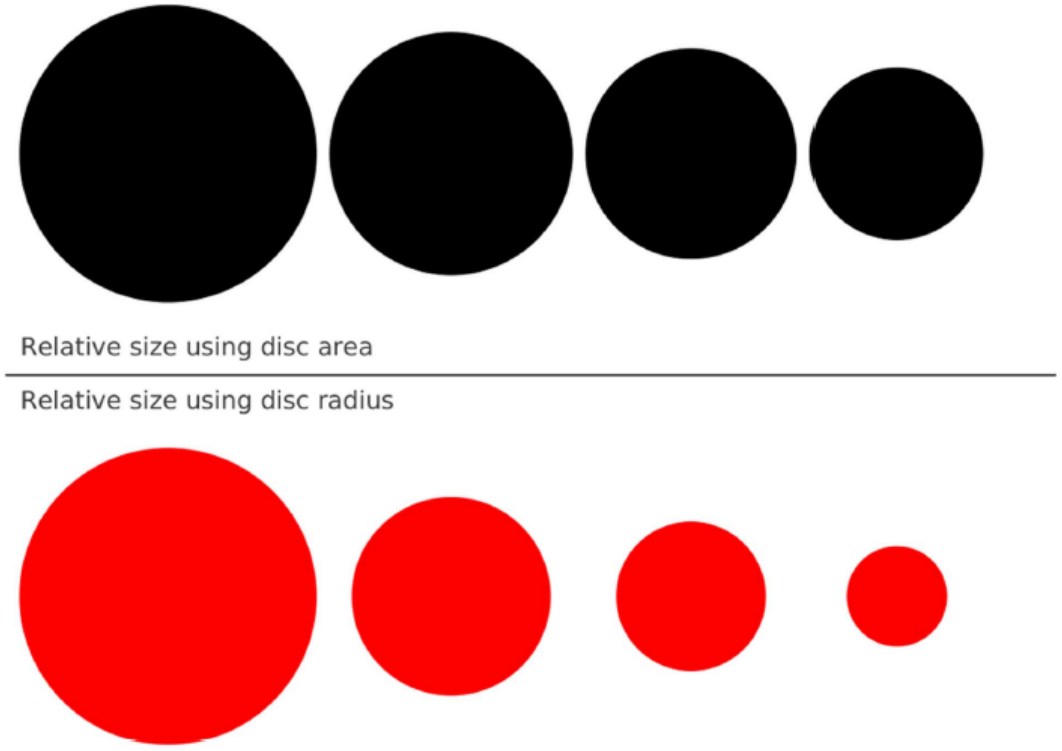
axismaps

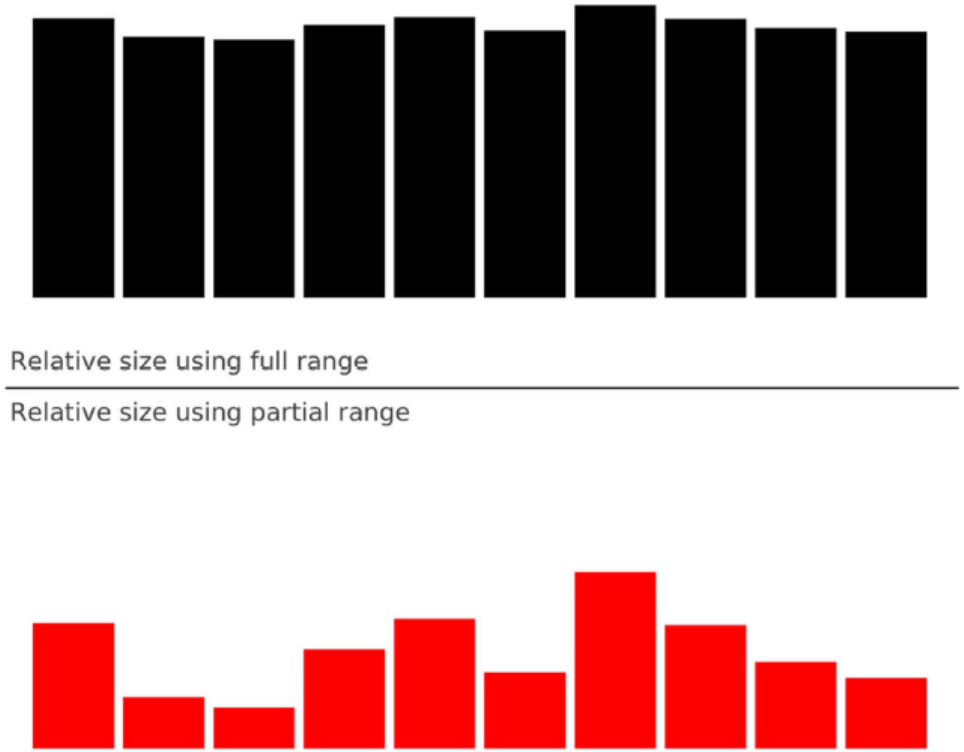
Some color advice

“Is there any reason this plot is blue and not black?”

- Do not use the default colormap (jet or rainbow)
- Avoid using too many similar colors

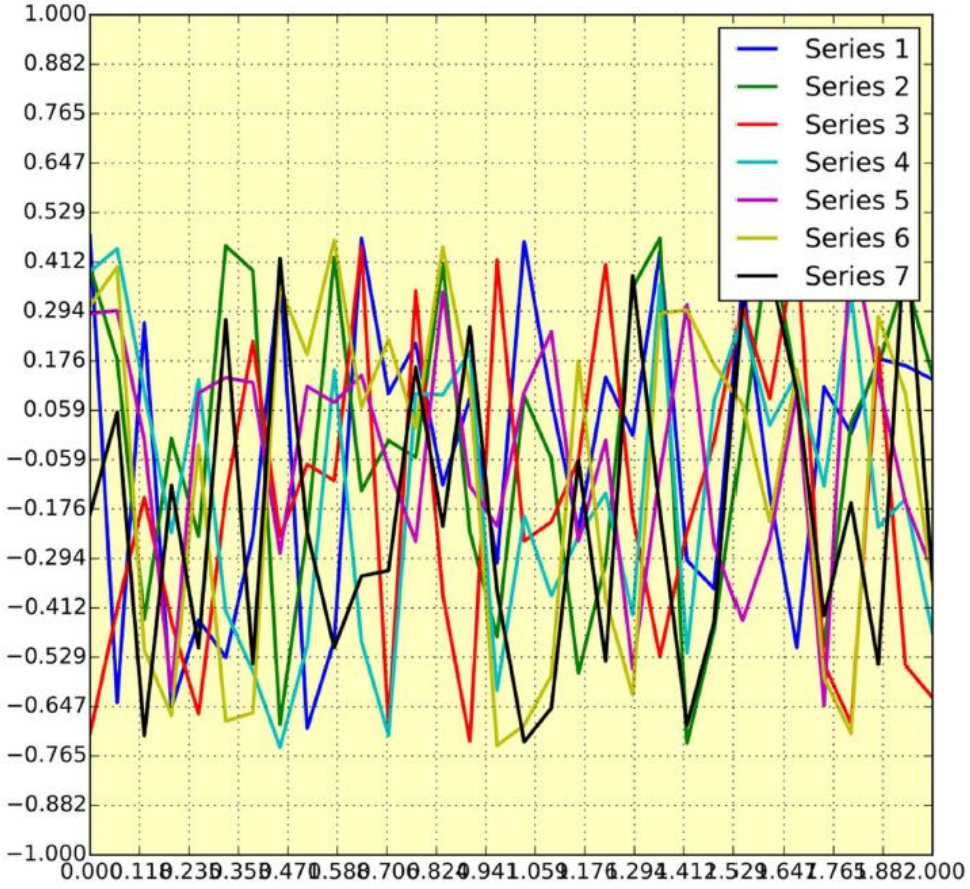
Rule 7: Do not mislead the reader

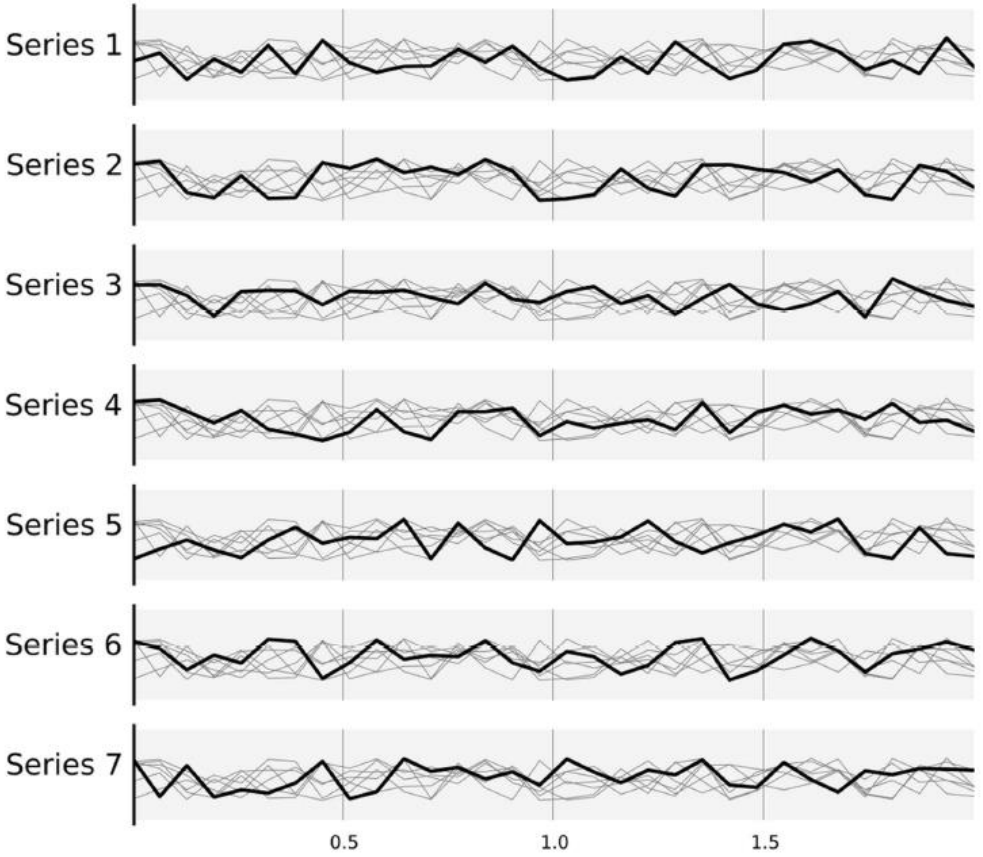


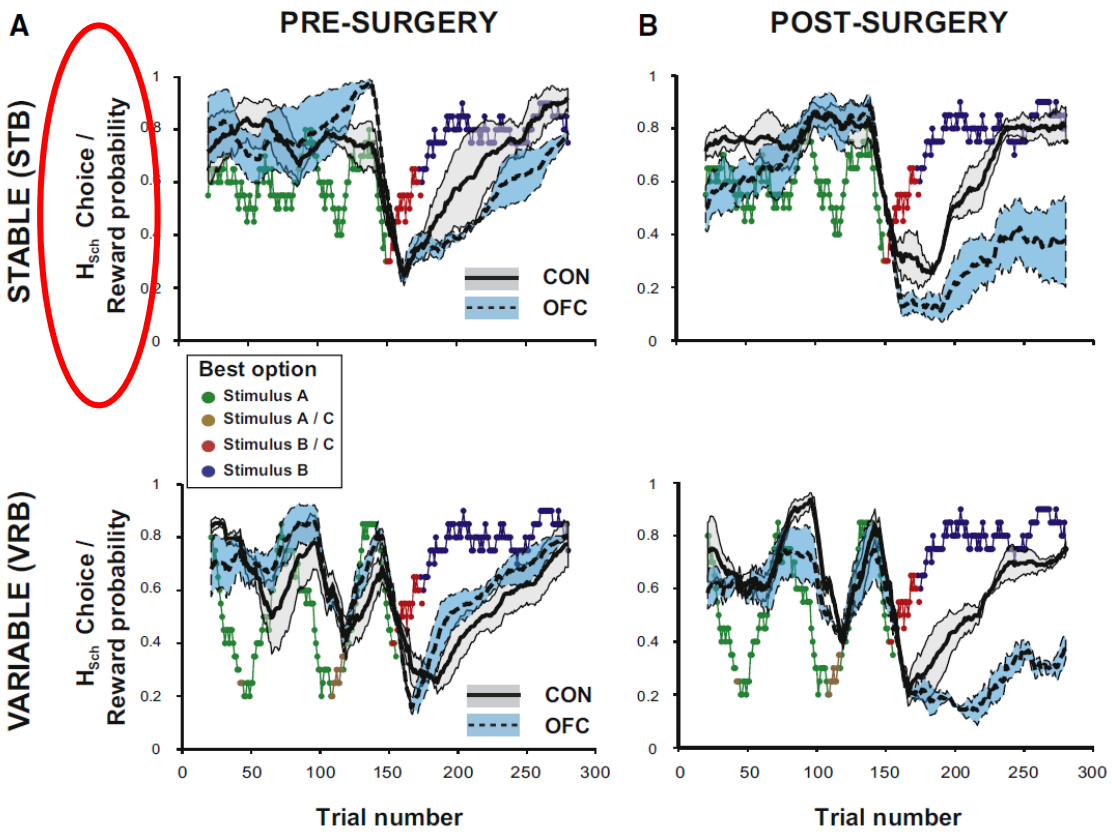


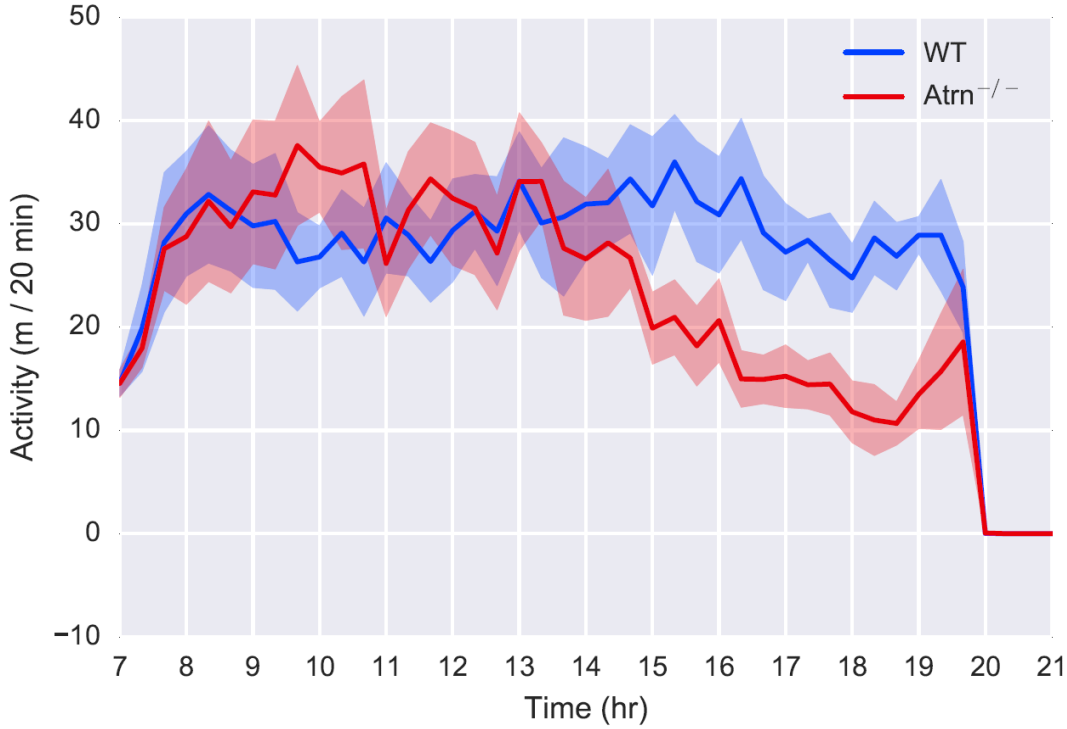
No pie charts or 3D charts to compare quantities

Rule 8: Avoid “Chartjunk”

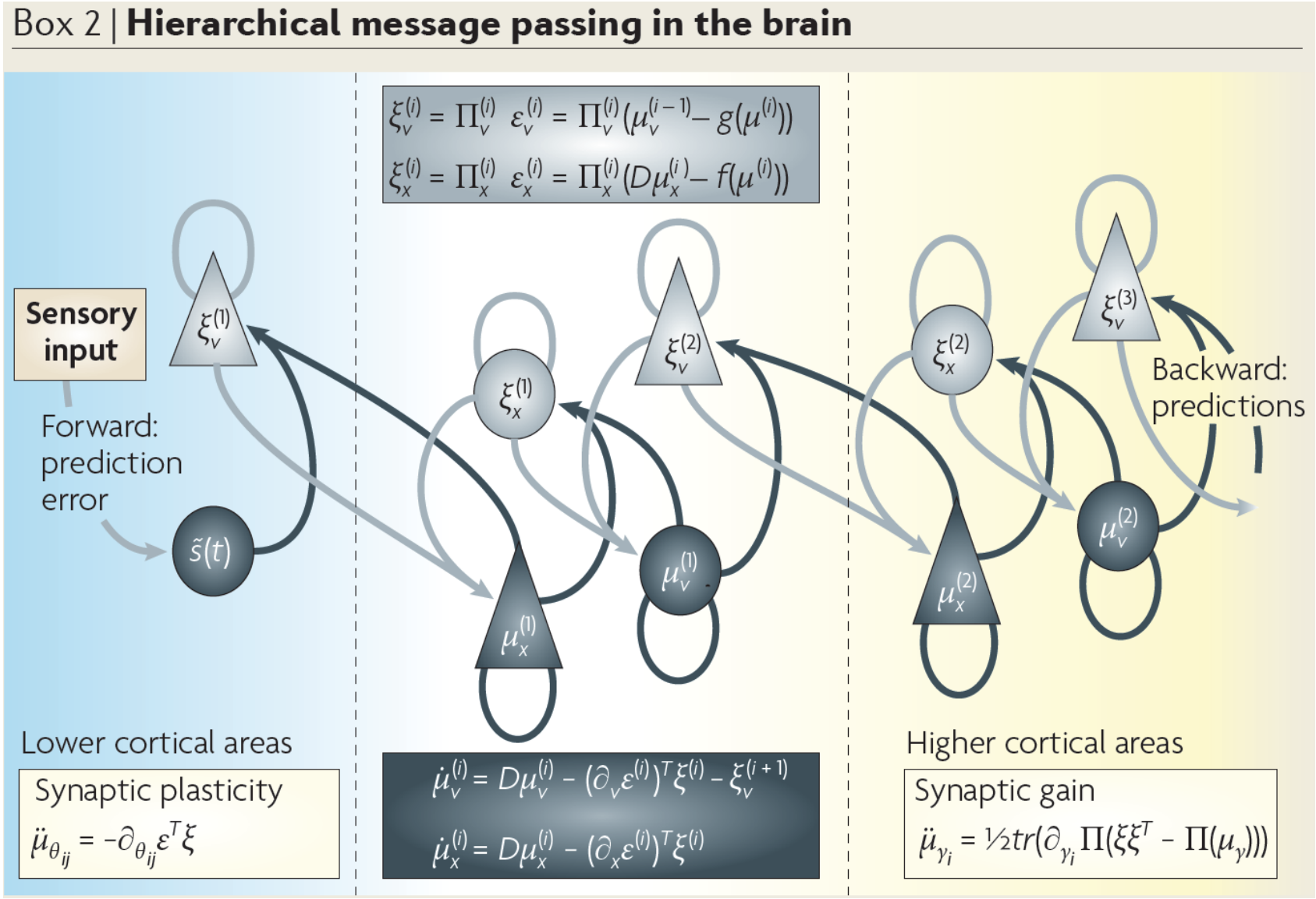








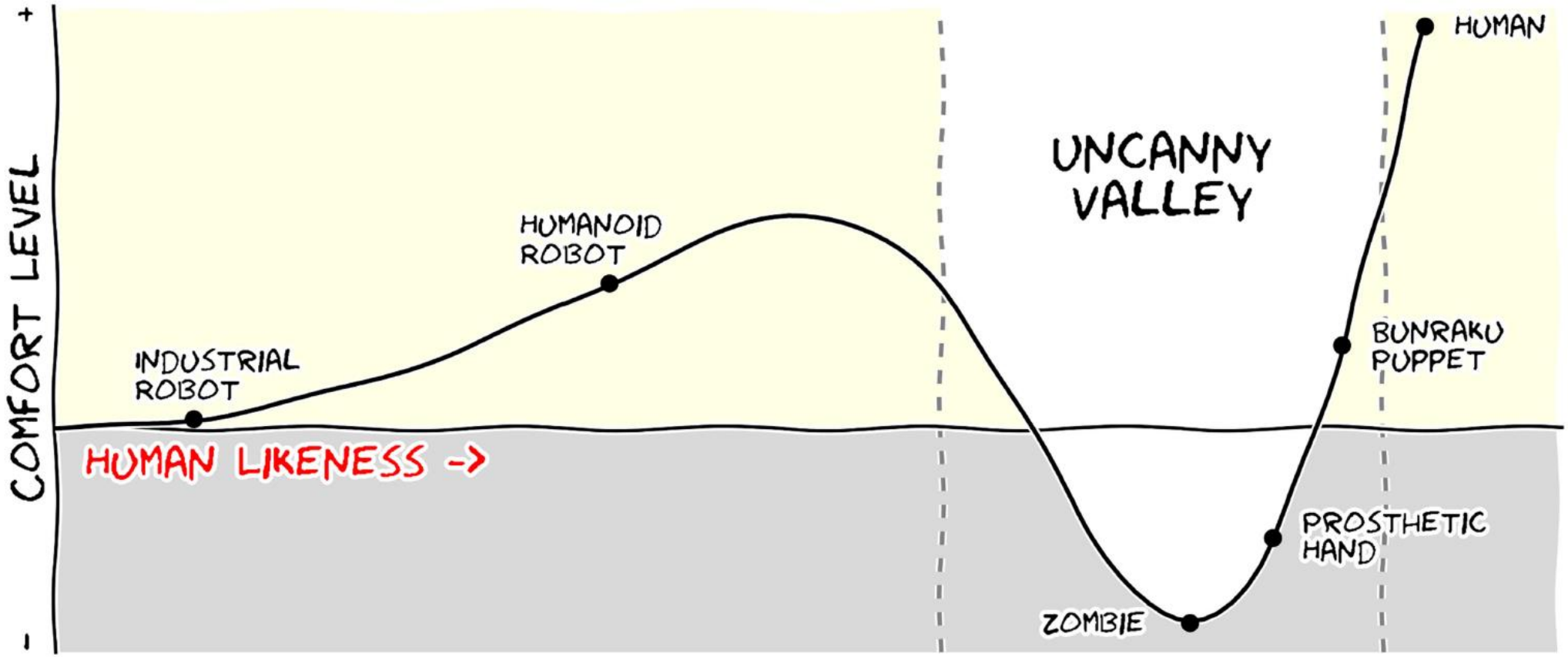
Walton, Behrens et al., 2010, *Neuron*



Friston, 2010, *Nature Reviews Neuroscience*

Rule 9: Message trumps beauty

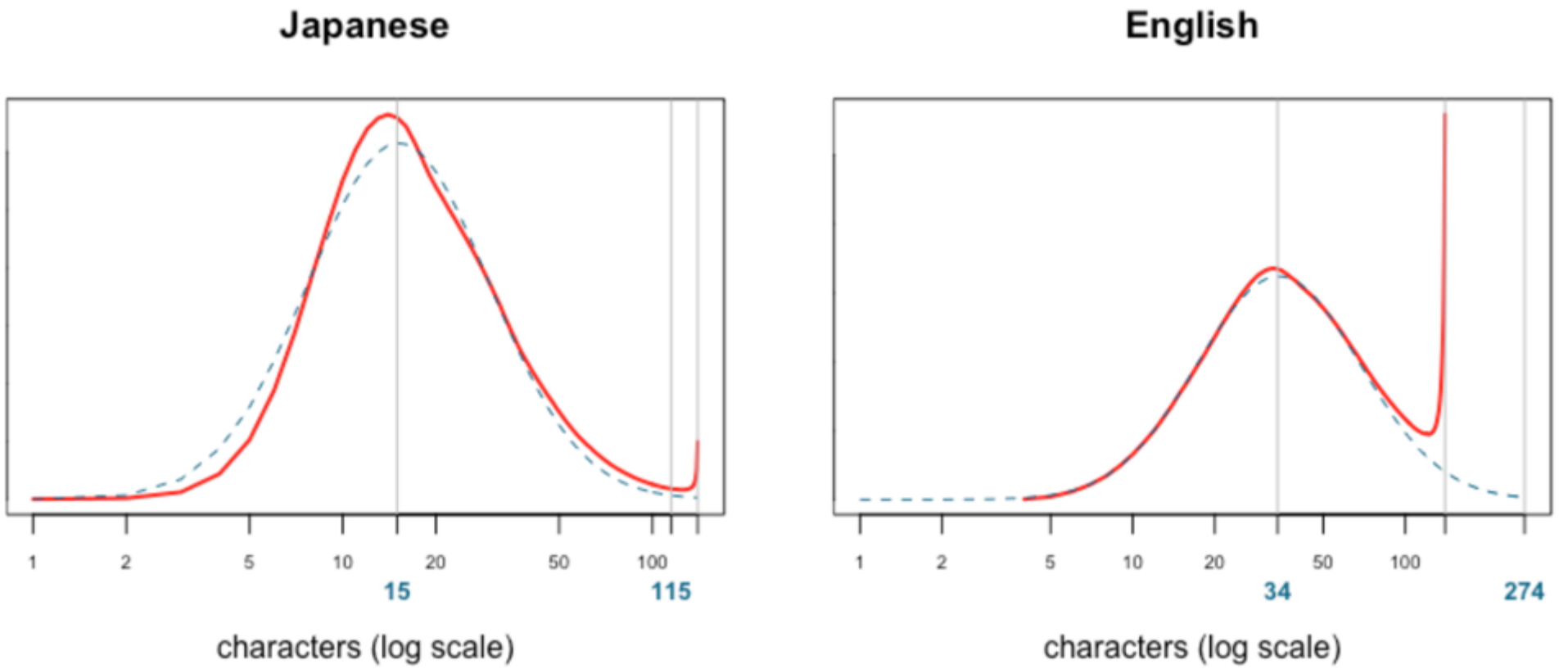
```
from matplotlib import pyplot as plt
plt.xkcd()
```



Rule 10: Get the right tool

- Matplotlib
- R
- Inkscape: professional vector graphics editor
- GIMP: for quick retouching
- ImageMagick
- D3.js
- Cytoscape
- Circos

Just for fun: why Twitter increased its character limit



The Tweet distribution

https://blog.twitter.com/engineering/en_us/topics/insights/2017/Our-Discovery-of-Cramming.html