Information design for scientific figures

nature

Kelly Krause, Creative Director

7 Sept 2017 / LSU

Part 1

Introduction

Design of scientific figures

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Graphic design

Design for reading

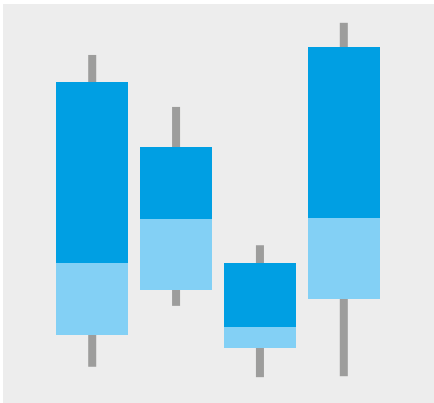
Information design

Design for learning

Design is not optional

Many readers will
scan your abstract and
browse your figures
to determine if your paper
is relevant to them.

Types of visual representations we will discuss



Data figures

Data figures published in peer-reviewed papers. Can include charts, graphs, imaging, and computer generated scientific models.

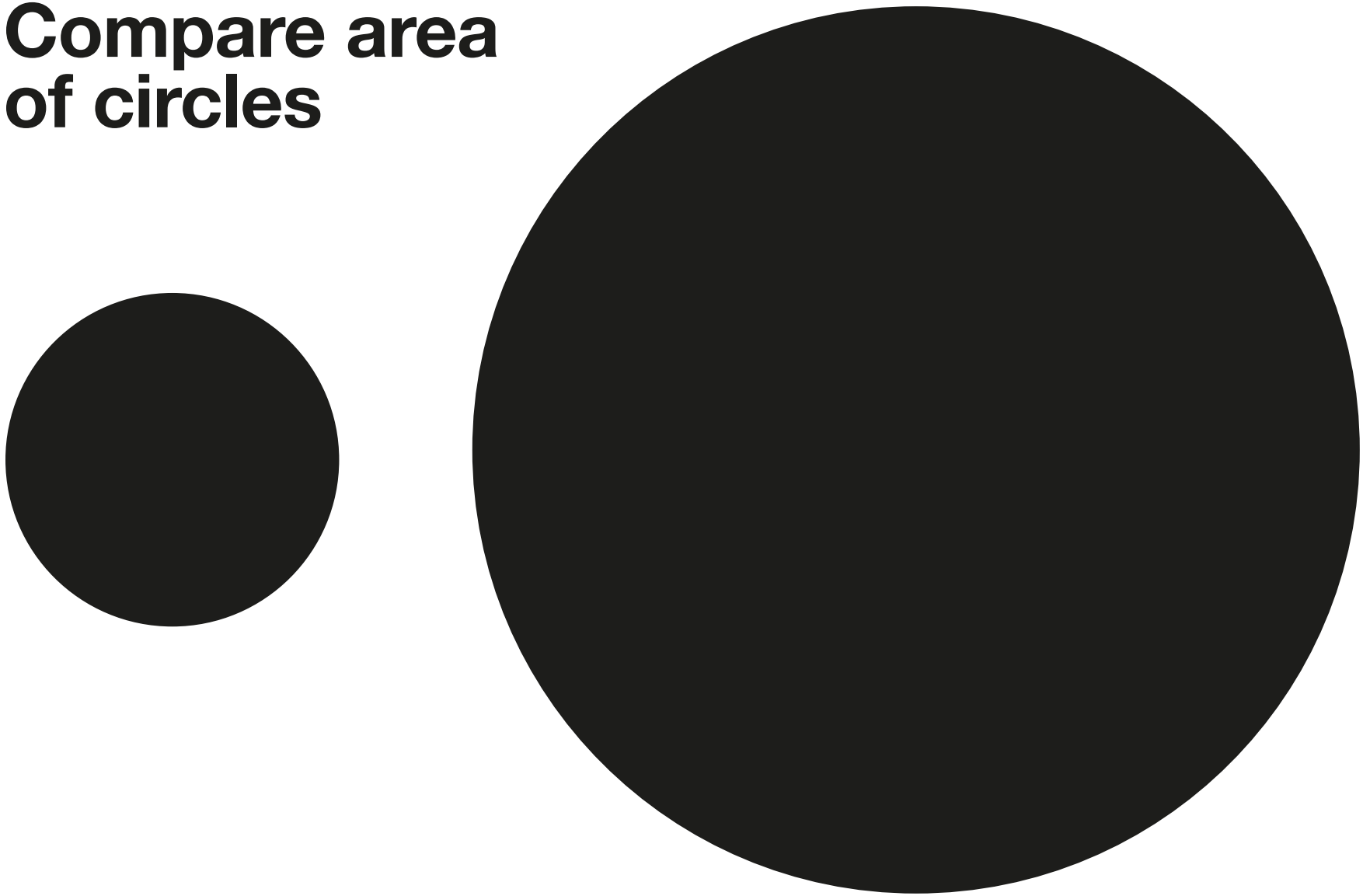
Figurative illustrations

Illustrated process or phenomenon. Can appear as summary figures in news and analysis pieces, press releases, grant applications, websites and posters.

Part 2

Best practice for data figures

Compare area of circles



Compare length of bars

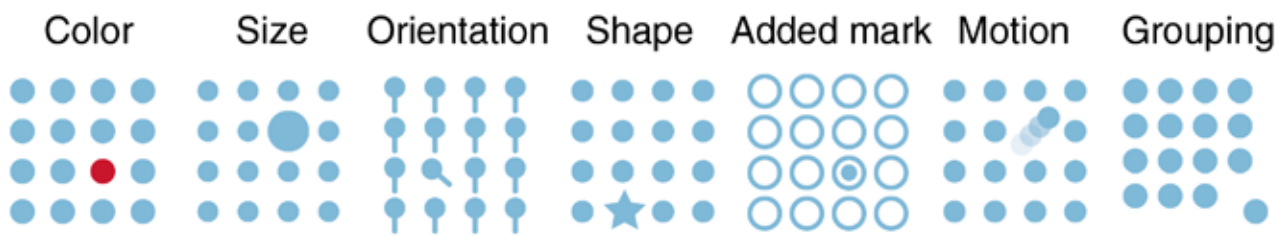
Relative magnitude estimation [Mackinlay 86]

What is encoded

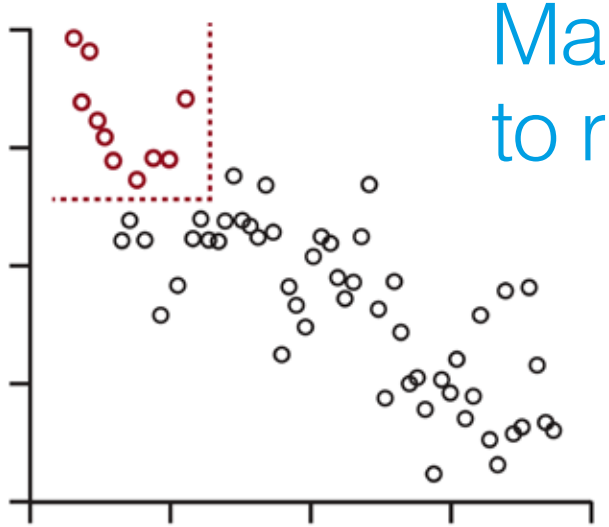
must be decoded

Salience

Setting an object apart from its surroundings to create contrast



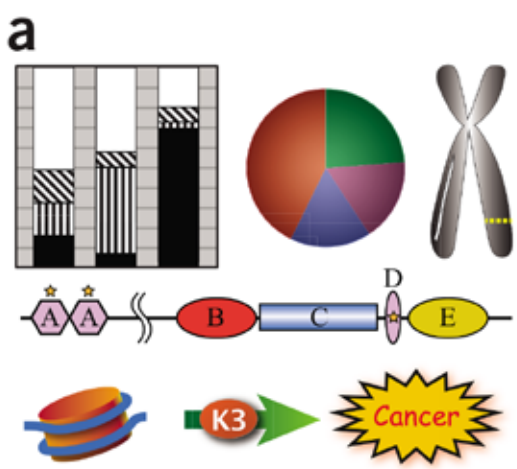
Color name	RGB (1–255)
Black	0, 0, 0
Orange	230, 159, 0
Sky blue	86, 180, 233
Bluish green	0, 158, 115
Blue	0, 114, 178
Vermillion	213, 94, 0

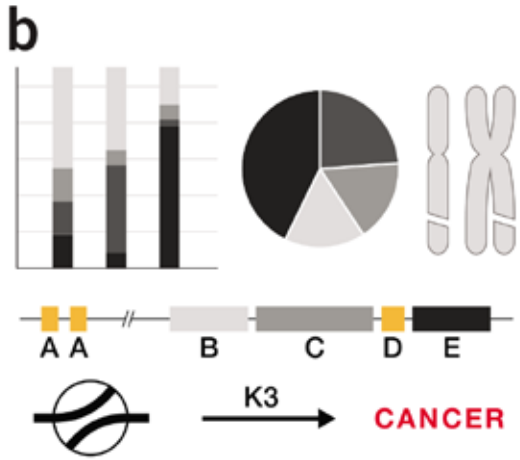


Map salience to relevance

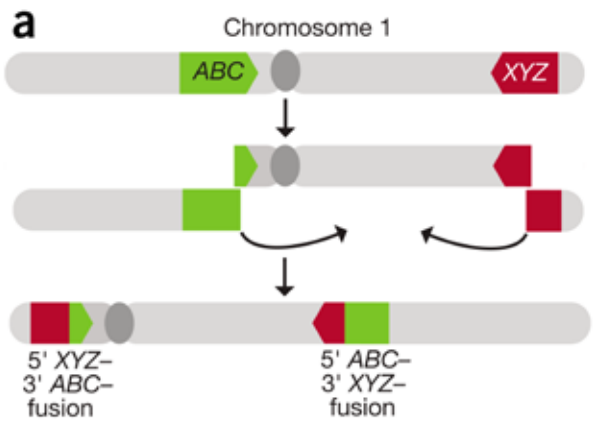
Simplify and edit

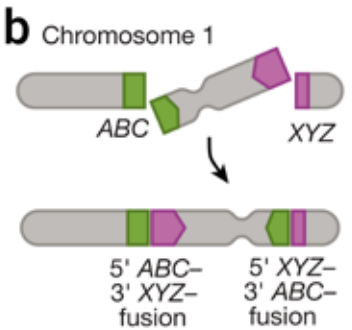
Like good writing, figures are better when clear and concise





resist decoration

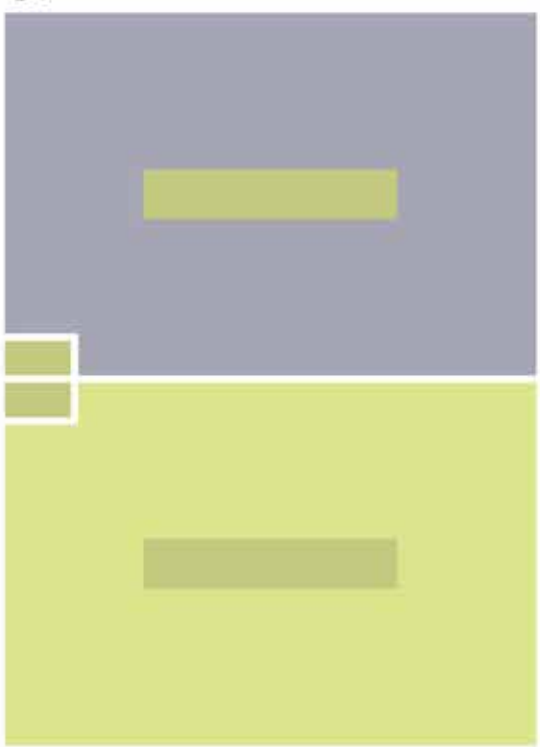




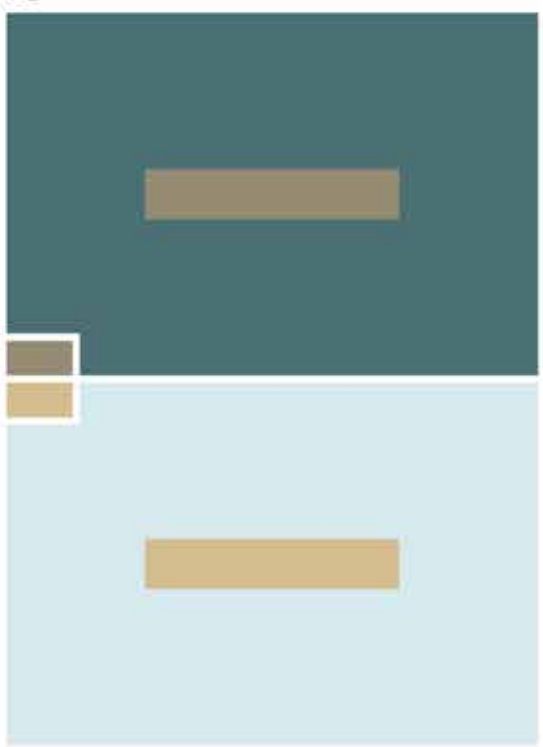
remove redundant elements

Color

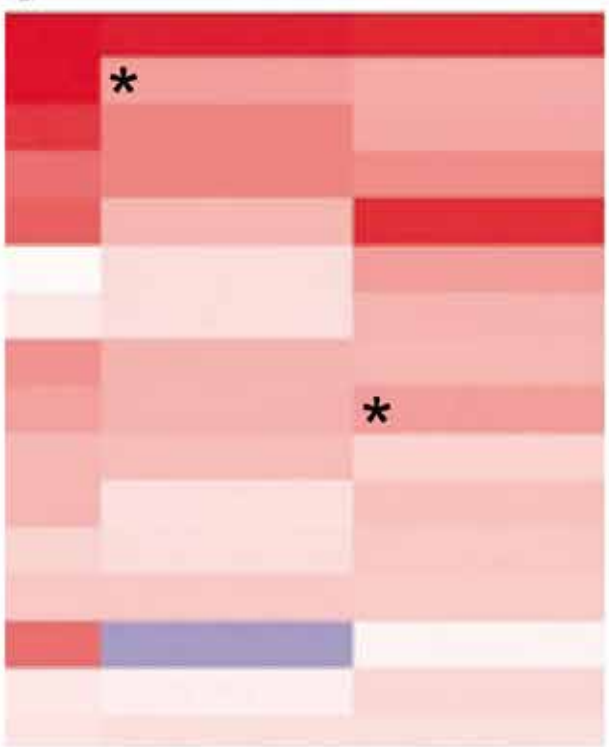
is subjective



same color looks different



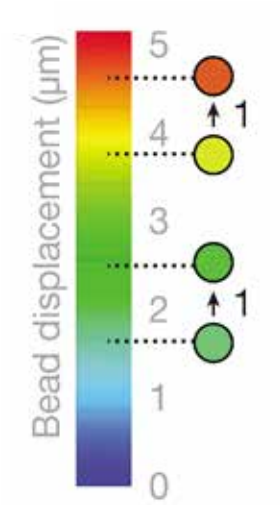
different color looks the same



same color looks different

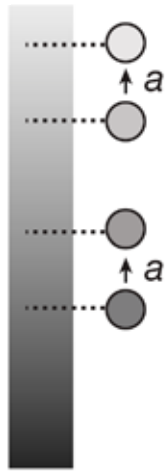
Color

can misrepresent data

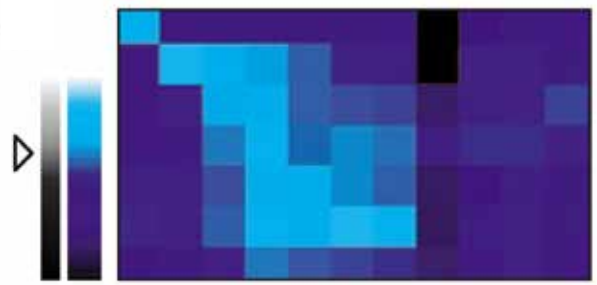


Avoid the rainbow

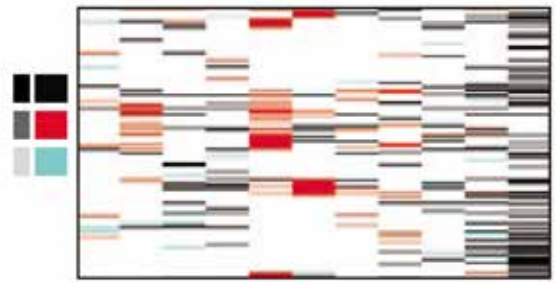
Shifts shown in circles do not match change in value



Gradation from 10-90% black produces even transitions



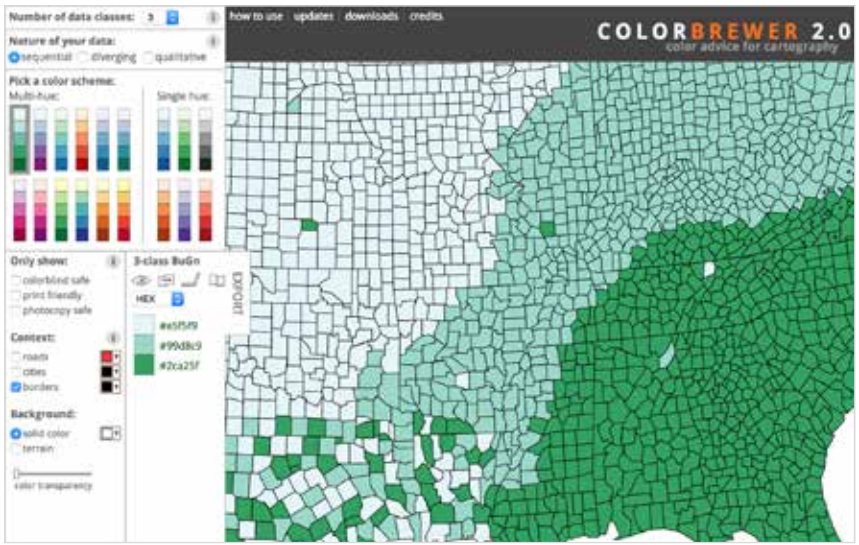
Color scales with sharp transitions can exaggerate data ranges.



When colors have uneven saturation, data can be underrepresented

Color

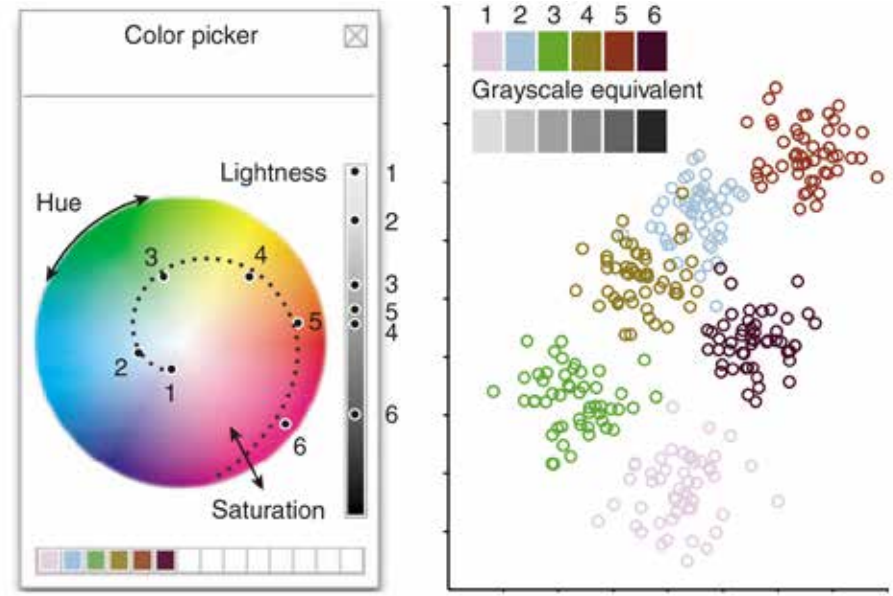
choosing a color palette



When mapping color to quantitative data: seek help

Experts have done the work for you

colorbrewer2.org
colorusage.arc.nasa.gov/ColorTool.php

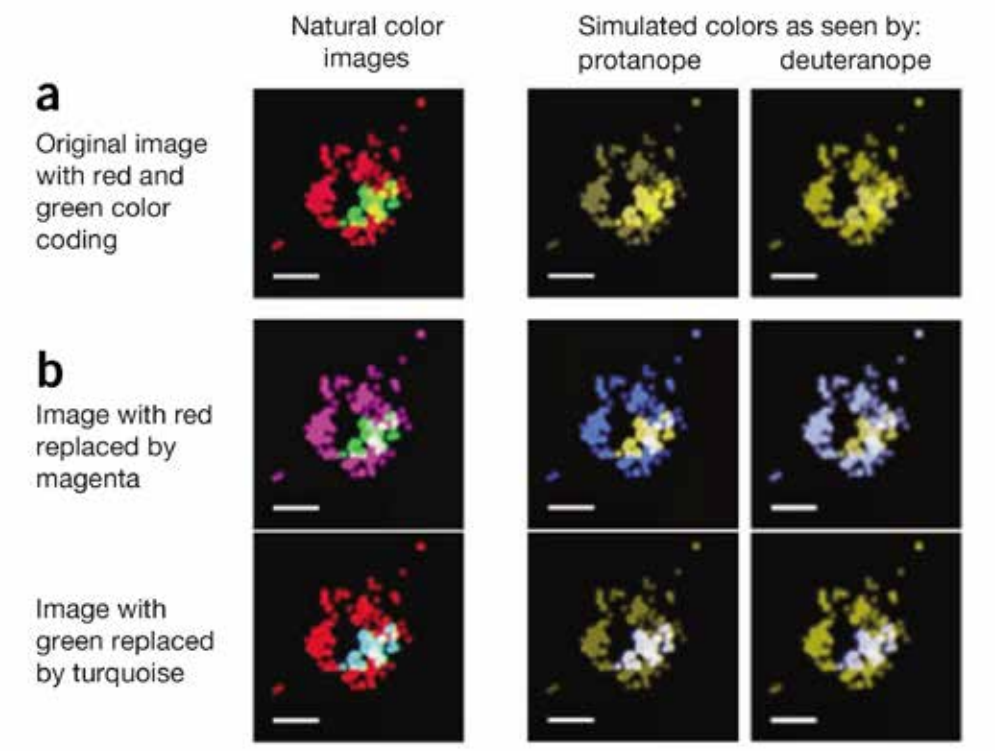


For categorical data: do it yourself

Spiral technique: use a color picker to select a palette that varies in hue, saturation and brightness.

Color

blindness



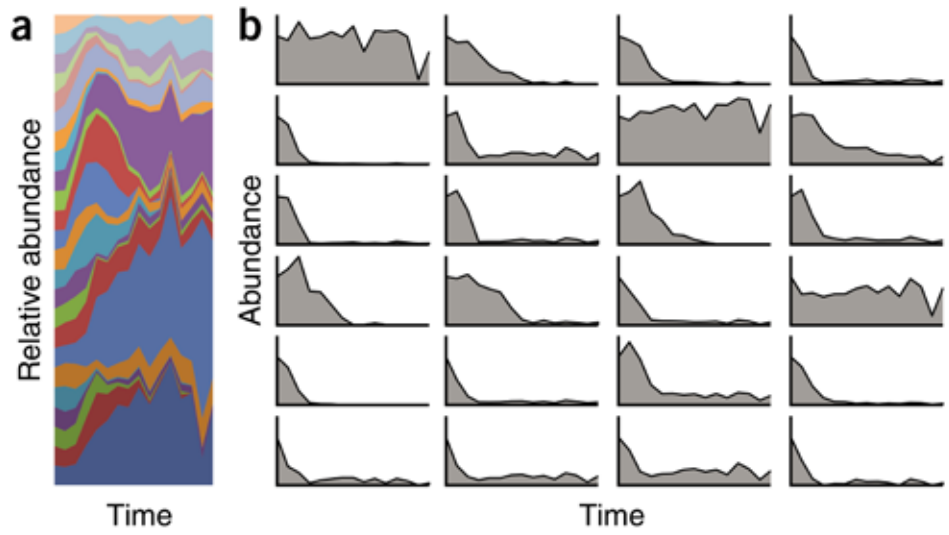
Avoid red and green combinations

Color	Color name	RGB (1–255)	CMYK (%)	P	D
	Black	0, 0, 0	0, 0, 0, 100		
	Orange	230, 159, 0	0, 50, 100, 0		
	Sky blue	86, 180, 233	80, 0, 0, 0		
	Bluish green	0, 158, 115	97, 0, 75, 0		
	Yellow	240, 228, 66	10, 5, 90, 0		
	Blue	0, 114, 178	100, 50, 0, 0		
	Vermillion	213, 94, 0	0, 80, 100, 0		
	Reddish purple	204, 121, 167	10, 70, 0, 0		

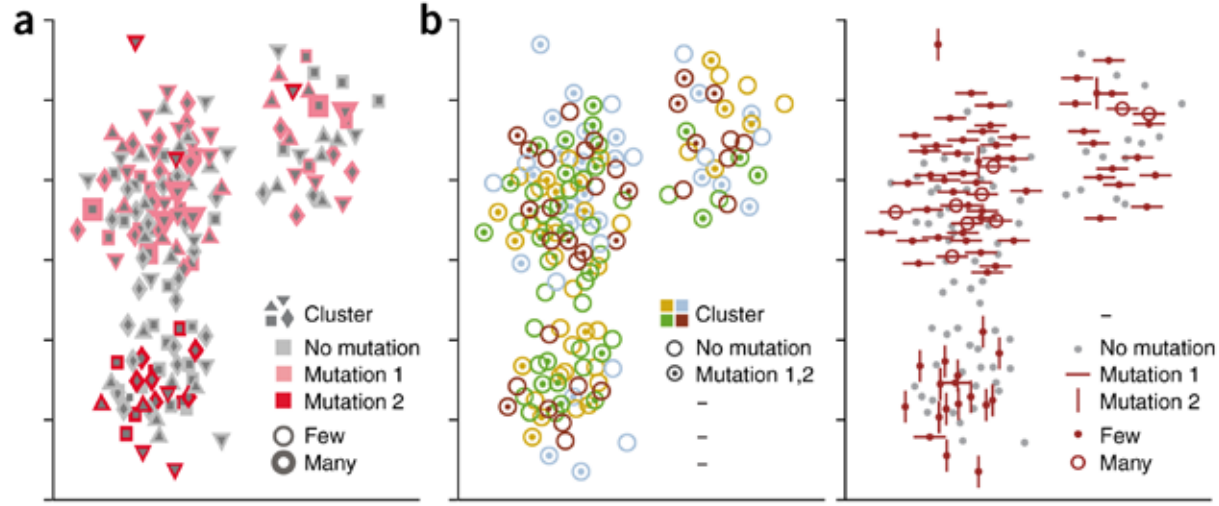
Colorblind friendly color palette

Data density

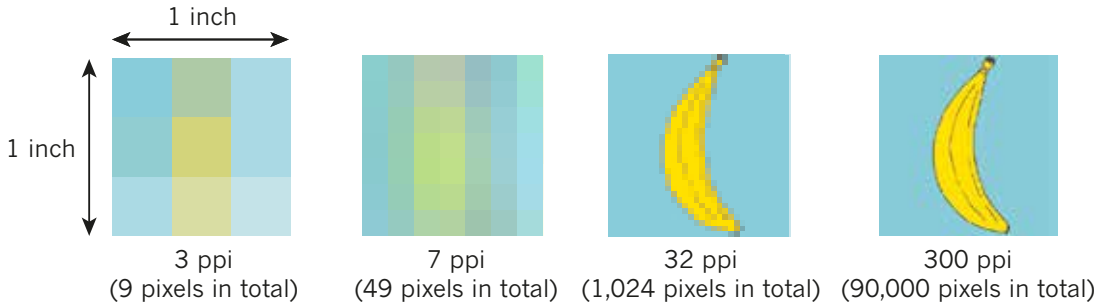
Avoid overlapping data. Use small multiples.



Avoid symbol overload. Use multiple views of the same data for clarity.



Resolution



Resolution is measured by calculating the number of pixels **within a linear unit** rather than area.

Adding pixels after an image is created is called **artificial enlargement.** Software will insert pixels with estimated data, not real data.

Capture images in the highest resolution possible from the beginning.

Plan for it in your experimental set-up.

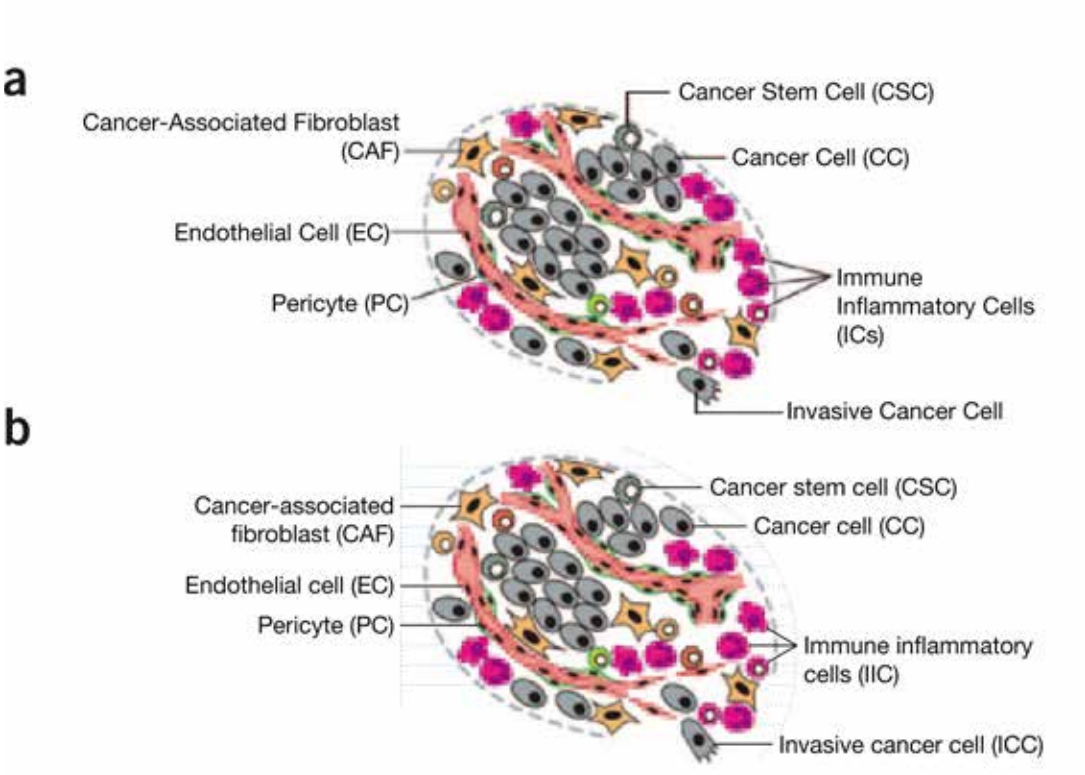
Resolution

Nature's print cover is 2516 x 3331 pixels.

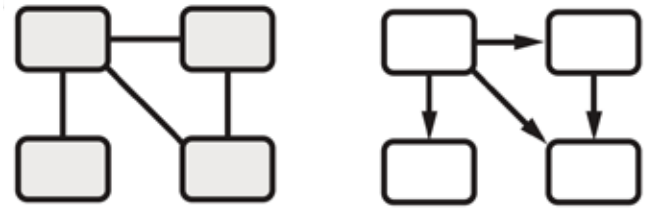
High resolution images are needed to properly communicate your research.

- journal covers
- press releases
- journalistic outputs
- websites

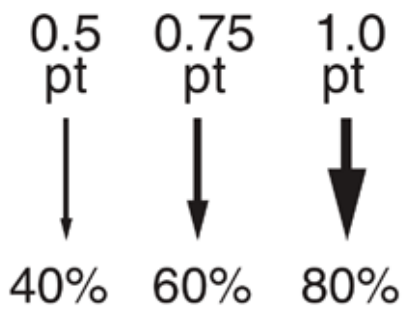
Labels and arrows



Use consistent line lengths and angles with uniform spacing. A grid is helpful.

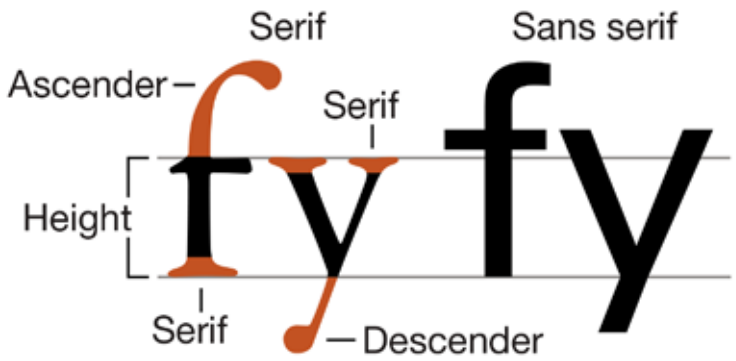


Use arrows when the relationship is directional, not simply as a pointer.



Ideal proportions for arrow heads

Typography



Helvetica

Arial

Times New Roman

Recommended fonts for legibility

Ensure good contrast

contrast

contrast

Size

7pt is ideal for print figures

Part 3

Tips for creating figurative illustrations

Figurative illustration: case study

Chronic effects of acute infections

Acute infection of mice with an intestinal pathogen leads to long-lasting inflammation that is maintained by intestinal microorganisms.

Figurative illustration

Purpose | *show immune response to intestinal antigens*

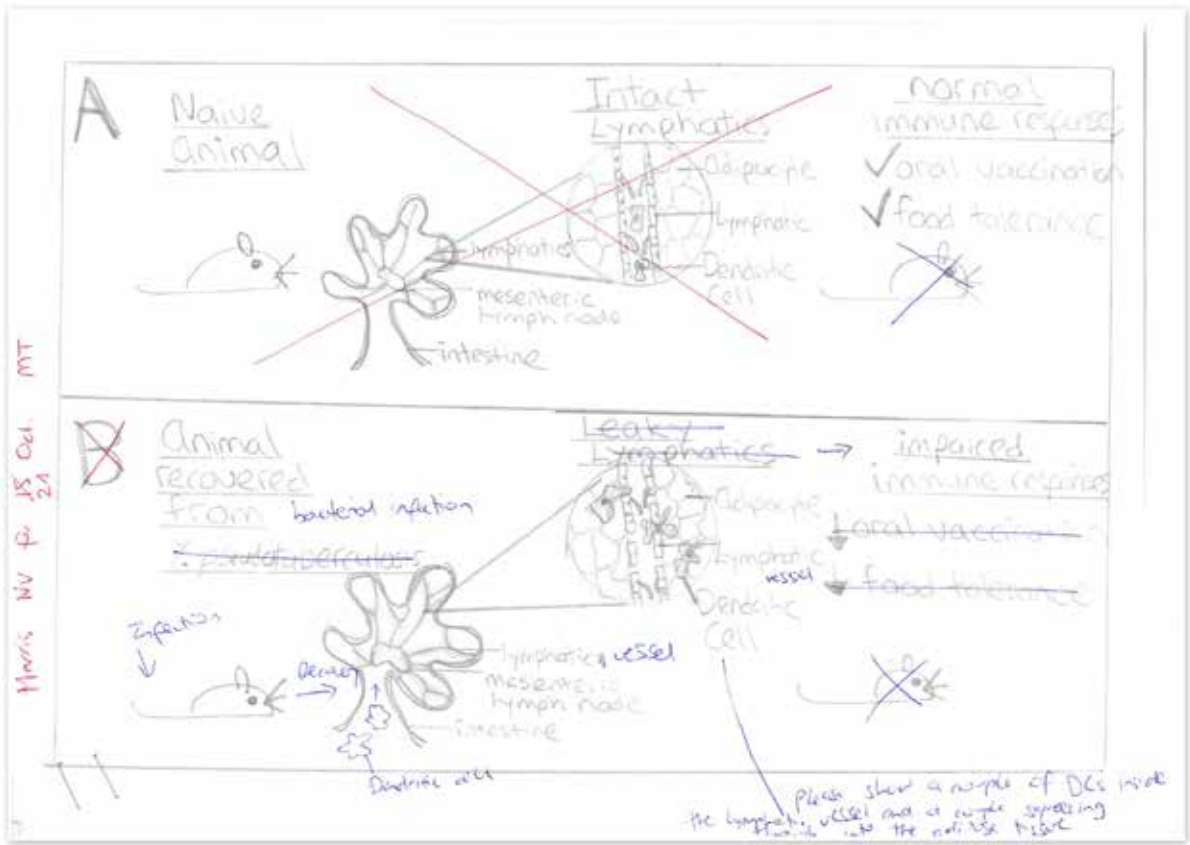
Key elements | *animal, intestines, lymphatics*

Useful context | *intact vs. leaky lymphatics*

Details | *dendritic cell, inflamed node, leaky vessel*

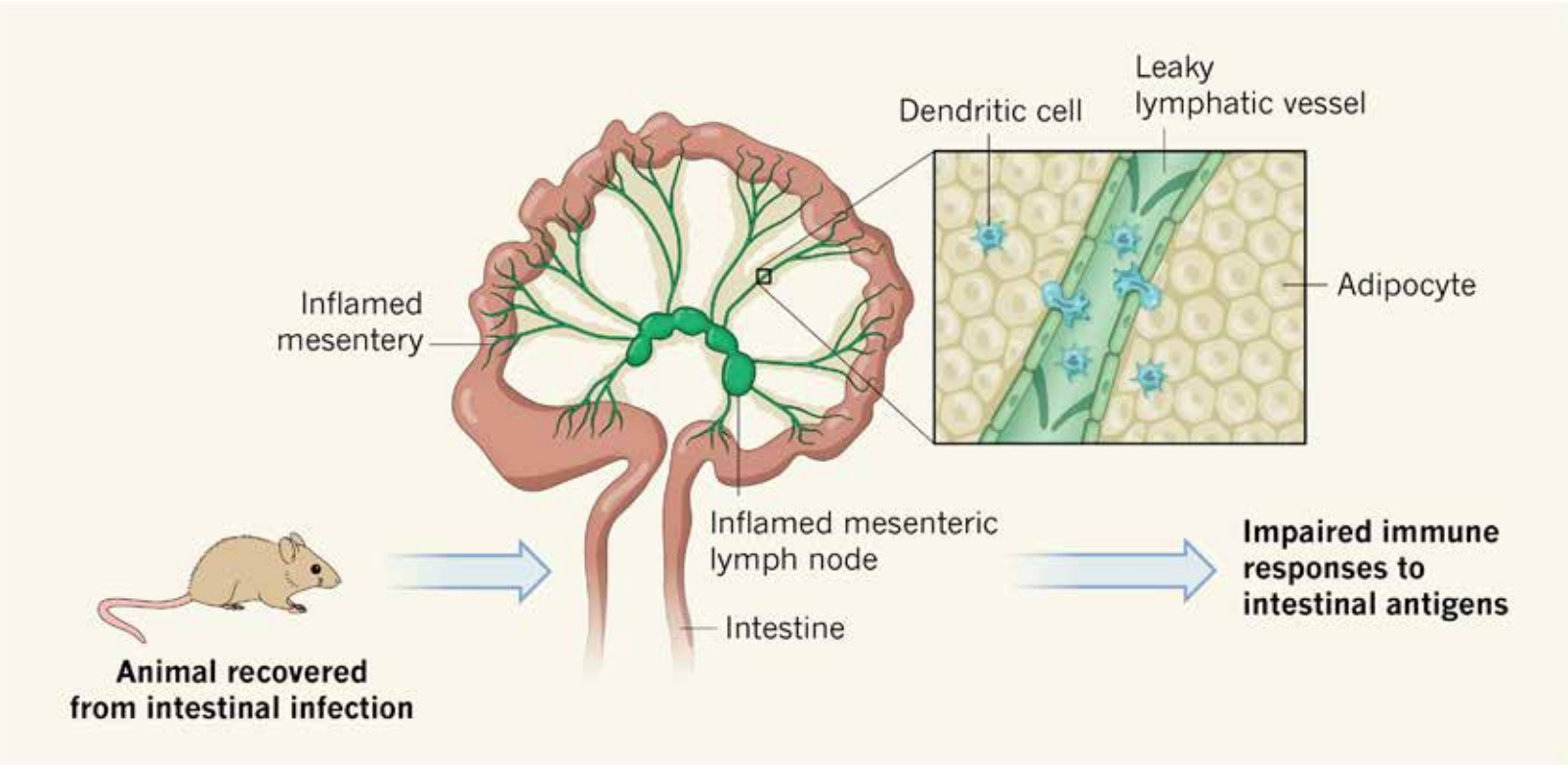
1. Establish information hierarchy

Figurative illustration



2. Sketch and refine

Figurative illustration



3. Artist creates in illustration software

Further reading

The collected Points of View

available here:

bit.ly/21kH6pO

$7.99

Many figures in this presentation are from the *Points of View* column in *Nature Methods*. Special thanks to Bang Wong and Martin Krzywinski.

Thank you

naturegraphics.tumblr.com

@kellybkrause