

Creating Graphical Abstracts for Academic Manuscripts

Dr. Cédric Scherer

ZALF Abstract Workshop

March 29th, 2025



Welcome!



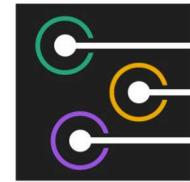
Hi, I am Cédric.

I am an independent specialist for infographics and data visualizations.

I craft charts and maps, develop workflows for efficient data communication, and teach data visualization and dashboard design.

hello@cedricscherer.com





CÉDRIC SCHERER
Data Visualization & Information Design



Consulting

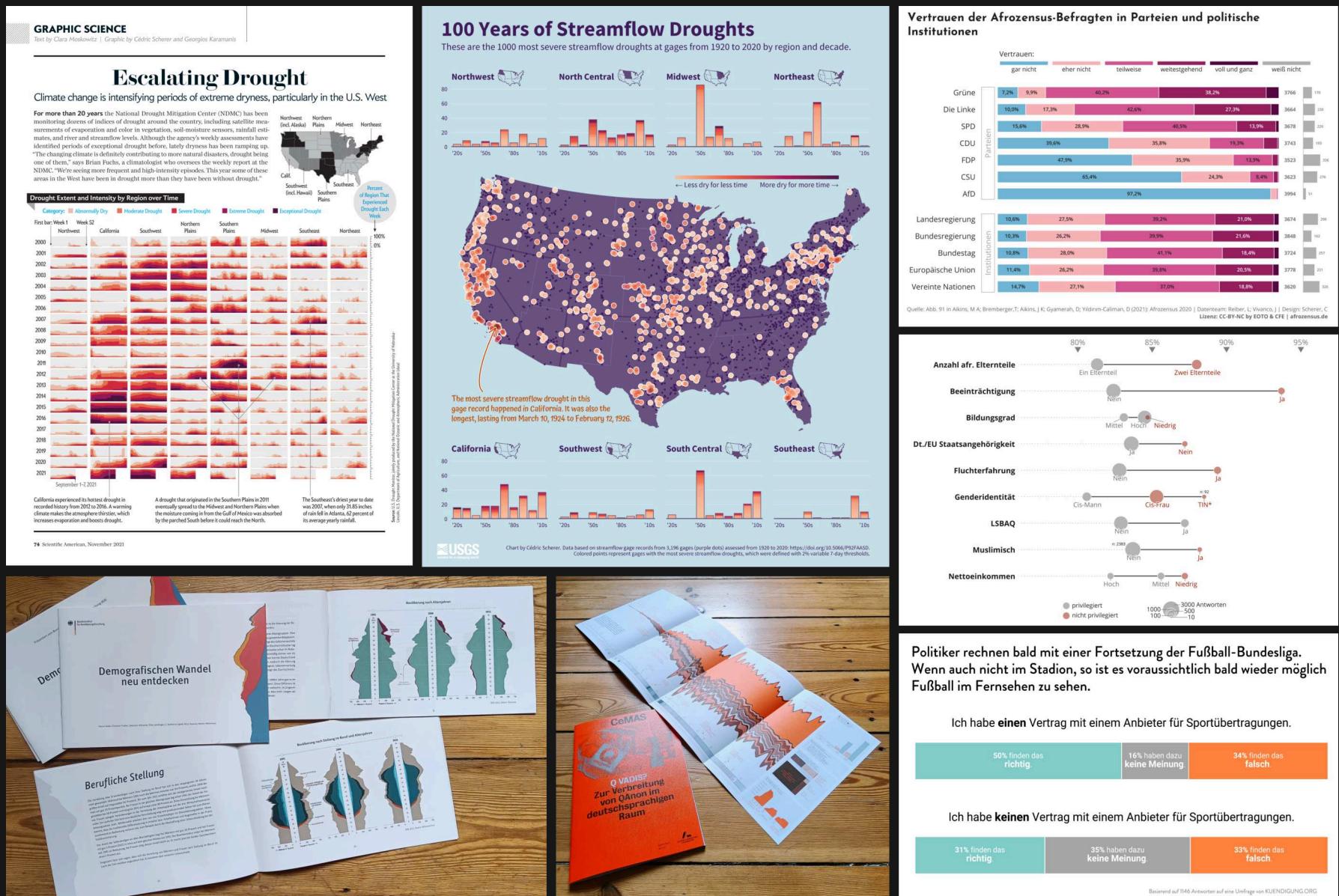


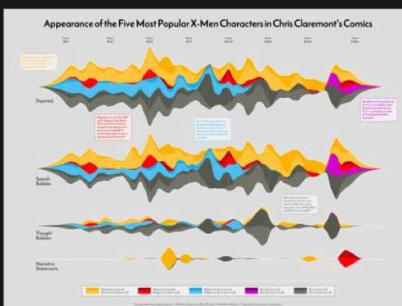
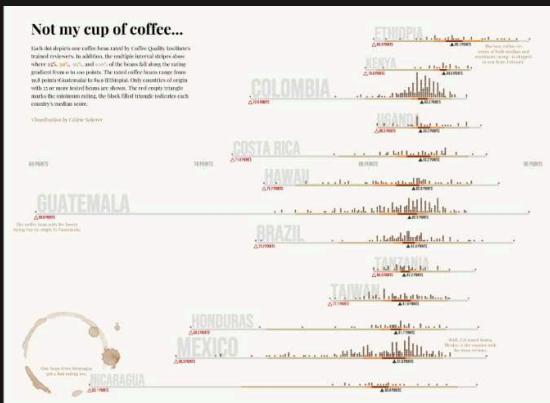
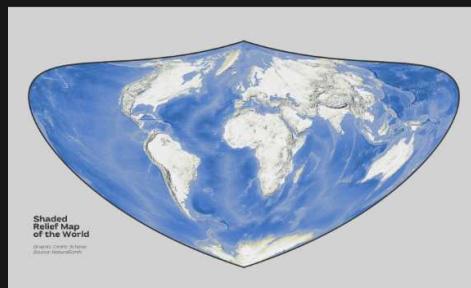
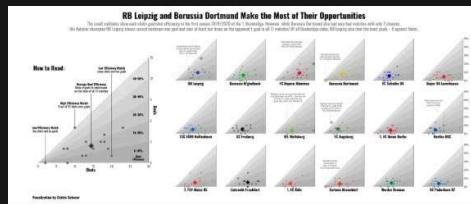
Coaching



Coding

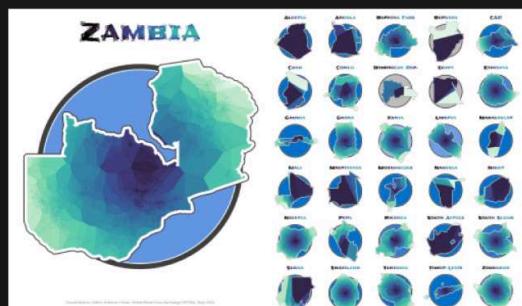
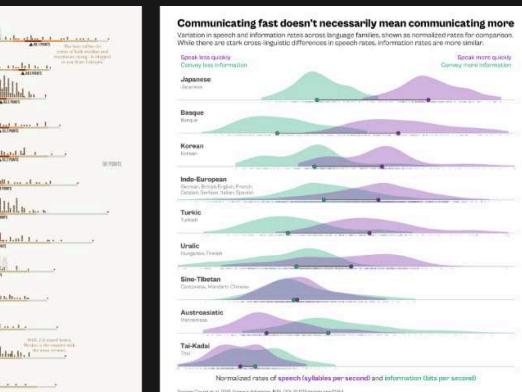




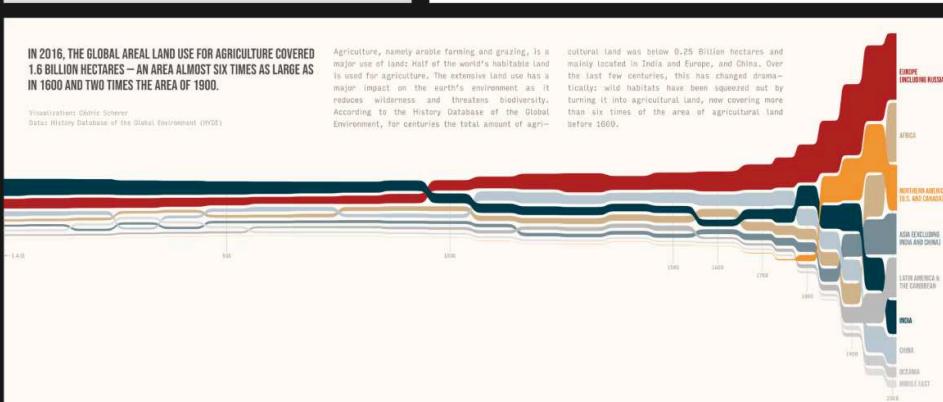


IN 2016, THE GLOBAL AREAL LAND USE FOR AGRICULTURE COVERED 1.6 BILLION HECTARES – AN AREA ALMOST SIX TIMES AS LARGE AS IN 1800 AND TWO TIMES THE AREA OF 1900.

Visualization: Cédric Scherer
Data: History Database of the Global Environment (HYDE)

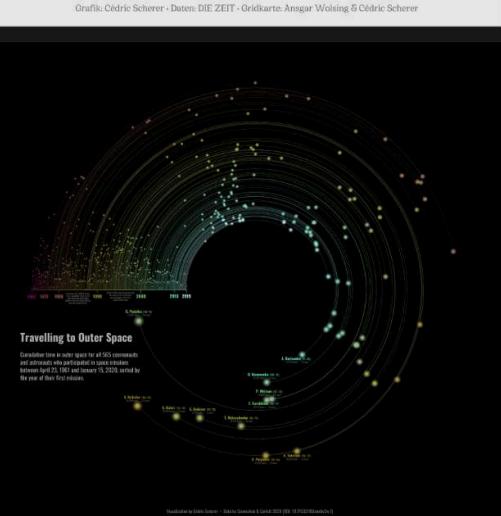
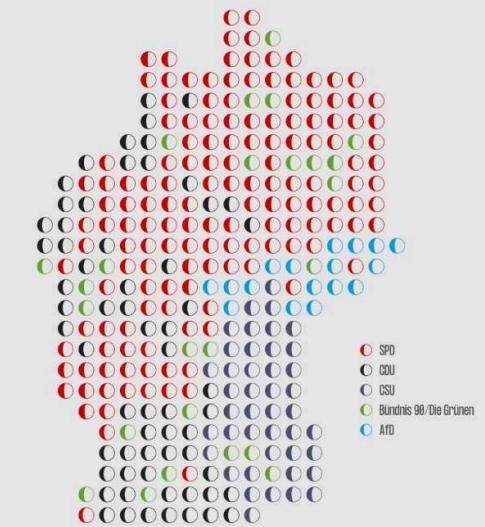


Agriculture, namely arable farming and grazing, is a major use of land. Half of the world's habitable land is used for agriculture. The extensive land use has a major impact on the earth's environment as it reduces wilderness and threatens biodiversity. According to the History Database of the Global Environment, for centuries the total amount of agricultural land was below 0.25 Billion hectares and mainly located in India and Europe, and China. Over the last few centuries, this has changed dramatically: wild habitats have been squeezed out by turning it into agricultural land, now covering more than six times the area of agricultural land before 1800.



Ergebnisse der Bundestagswahl 2021

Die stärksten Parteien nach Prozent der Zweitstimmen.



Information Design

is the process of presenting content in a way
that enhances understanding and communication



Typology of Information Graphics

Is the information **conceptual** or **measurable** ?

→ Type of information:

depict information schematically <> convert information into visual forms

Is the aim to **explore** or to **explain** the information?

→ Purpose of the graphic:

facilitate discovery <> communicate information



TYPOLOGY OF INFORMATION GRAPHICS

Type of information →

Conceptual

Purely conceptual information cannot be visualized, only illustrated.

Purpose of the graphic ↓

Explanatory

Measurable

Exploratory

Visualization

Infographics

Information graphics

Source: Koponen & Hildén, "Data Visualization Handbook" (2020), page 25



G.R.A.P.H.I.C. Guidelines

developed for infographics in general by Stones & Gent (2015)

- **G** – Get to know your audience
- **R** – Restrict use of colours
- **A** – Align elements
- **P** – Prioritise parts
- **H** – Highlight the heading
- **I** – Invest in imagery (wisely)
- **C** – Choose charts carefully



Graphical Abstracts

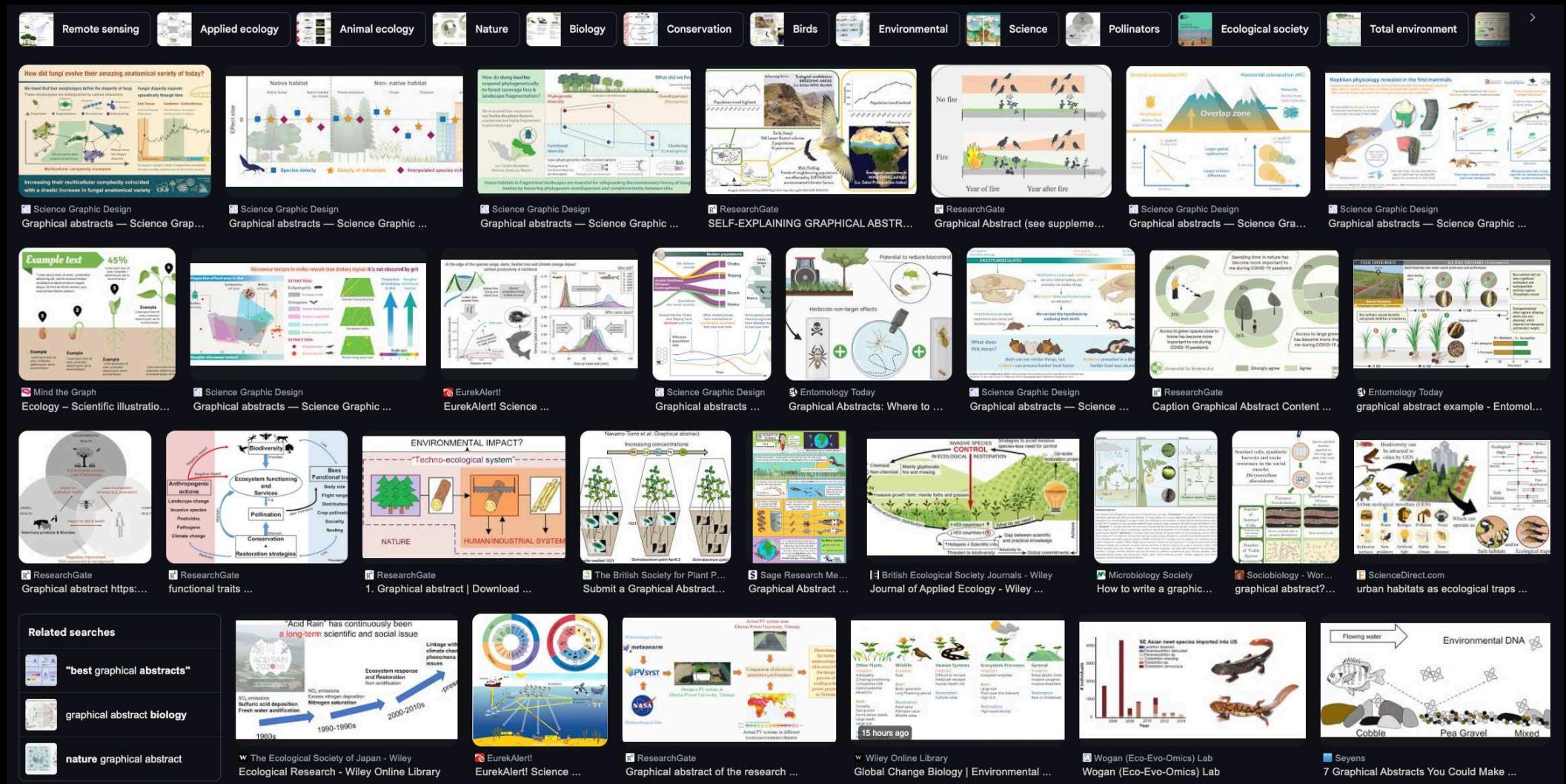
are single images that summarize the main message of a scientific article in a visual way



Graphical Abstracts

are not substitutes for the manuscripts and
should not provide the same level of detail





Guidelines from Elsevier

Authors must provide an **original image** that clearly represents the work described in the paper. [...]

Please note that, just as each paper should be unique, so **each graphical abstract should also be unique**.



Guidelines from Wiley

A graphical abstract, which **summarizes the main findings** of the article in a visual way, is designed to **give readers an immediate understanding** of the paper.

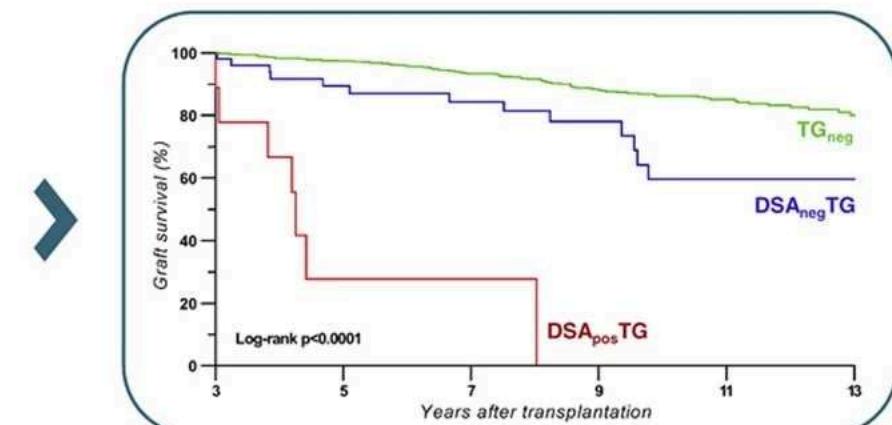
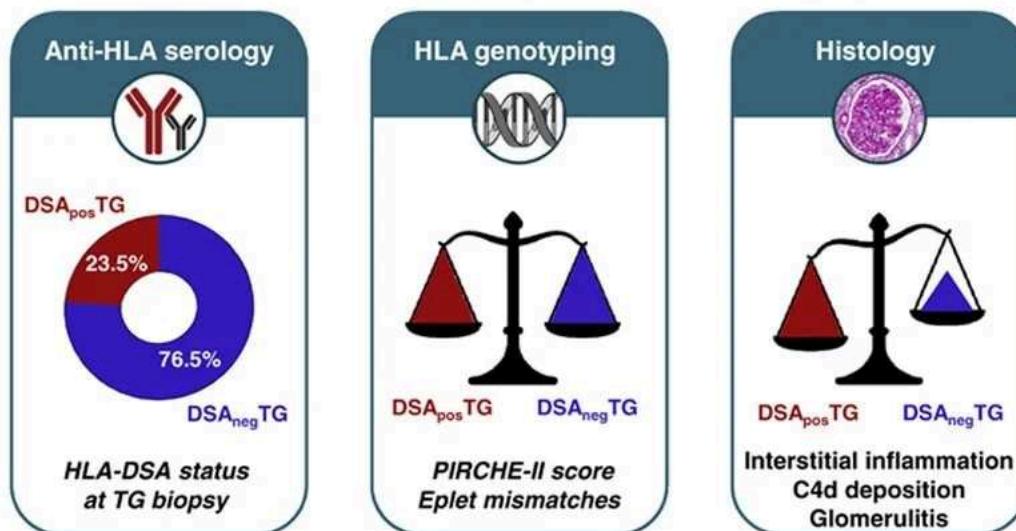
The selected graphical abstracts can be used to promote articles on the journal's social media (Twitter and Facebook), and the journal's homepage.



Risk factors, histopathological features and graft outcome of transplant glomerulopathy in the absence of donor-specific HLA antibodies.



Patients with Transplant Glomerulopathy (TG, N=98)



CONCLUSION:

TG often occurs in the absence of HLA-DSA and represents a different phenotype with better graft survival compared to TG in the presence of HLA-DSA. PIRCHE-II score and eplet mismatches did not associate with TG development.



Incidence of ESKD in US Native Hawaiians and Pacific Islanders

Setting & Participants

Healthcare Database Study



Population

3 US Pacific Island Territories



American Samoa



Guam



Northern Mariana Islands

50 US States



US Census Self-Reported Race



Residing in 3 US
Pacific Island Territories

Results

Annual Incident ESKD



Per million population

Native Hawaiian or Pacific Islander

941 pmp



Residing in 50 US States



Per million population

Native Hawaiian or Pacific Islander

921 pmp

Black

749 pmp

White

335 pmp

Asian

249 pmp

American Indian or Alaska Native

218 pmp

CONCLUSION: Native Hawaiian and Pacific Islanders have highest incidence of ESKD among all races in the United States.

Jie Xiang, Hal Morgenstern, Yiting Li, et al (2020)

@AJKDonline | DOI: 10.1053/j.ajkd.2020.01.008



Source: Example provided by Elsevier



How does sleep disturbance affect hemodialysis patients?

Kidney Medicine

Methods and Cohort

Adults on maintenance HD with OSA (**n = 36**)



Polysomnogram & Epworth Sleepiness Scale (ESS)



Interview to explore patient experience (**n = 26**)



Findings

Severity of sleep apnea did not affect patients' sleep duration, sleep efficiency or ESS.

However,

70% reported broken sleep

62% felt unrefreshed upon wakening

Themes from Interview



Broken sleep



Feeling unrefreshed



Impact of poor sleep



Having to "soldier on"

Conclusion: Sleep disturbance is common and has a profound impact on health and QoL of hemodialysis patients. The conflicting message between patient interview and self-reported questionnaires indicate a need for multidisciplinary approaches and improved patient communication to truly capture the health needs of individuals.

Reference: Chu G, Price E, Paech G, Choi P and McDonald V. Sleep apnea in maintenance hemodialysis: a mixed methods study. *Kidney Medicine*, 2020

Visual Abstract by Anna R Gaddy, MD @AnnaGaddy

Source: Example provided by Elsevier



TRIAL

Conduct of trial

Conduct of trial:

- 6% (6 of 101) already cancelled a trial due to lack of placebos
- 27% (27 of 101) adapted design of a trial due to lack of matching placebos



Corresponding author/Investigator

79 obtained placebos from other sources



28 obtained placebos from drug manufacturer

- 19 (68%) wanted to see study protocol

22 Investigators who obtained placebos from other sources (n=79) reported that they approached drug manufacturer unsuccessfully

- 7 could not provide
- 6 no interest
- 4 costs too high
- 3 patent expired
- 2 avoid conflict of interests

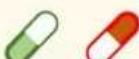
Other sources

- Hospital pharmacy (n=32)
- Other manufacturer (n=19)
- Other pharmacies (n=15)
- Others (n=13)^a

How to accomplish matching?

- Capsules (n=25)
- Saline (n=22)
- Similar or matching tablets (n=17)
- Other (n=15)^b

Placebos



\$ Median: 58,286 US\$ per trial
→ 10.3% of trial budgets (n=24)



- 21 of 102 investigators used non-matching placebos
- Only 1 publication labelled them correctly

Drug manufacturer/Industry



Hypothesis in the interest of drug manufacturer

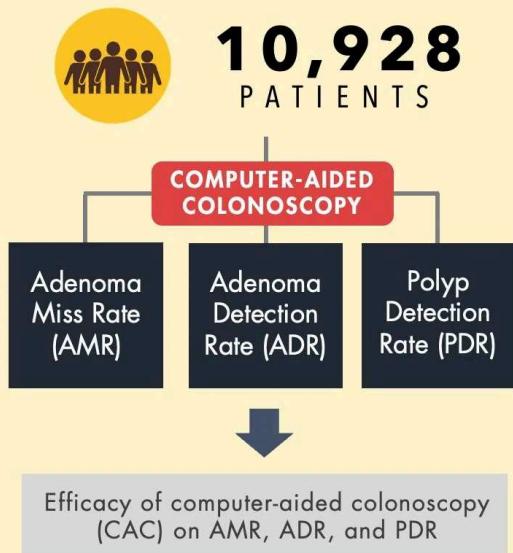
	Yes	No
49 of 101 (48%)	29 of 101 (28%)	
23 of 101 (23%)		unsure/no answer
Obtained drugs	47%	17%
Obtained placebos	37%	17%

Source: Example provided by Elsevier



WHAT IS THE EFFECT OF COMPUTER-AIDED COLONOSCOPY ON ADENOMA MISS RATES AND POLYP DETECTION?

SYSTEMATIC REVIEW
AND META-ANALYSIS
(14 RCTS)



↓ **65%**

Adenoma Miss Rate with CAC

OR, 0.35; 95% CI, 0.25-0.49,
 $P<0.001$, $I^2=50\%$

↓ **78%**

Sessile Serrated Lesion Miss Rate with CAC

OR, 0.22; 95% CI, 0.08-0.65,
 $P<0.01$, $I^2=0\%$

↑ **48%**

Polyp Detection Rate with CAC

OR, 1.48; 95% CI, 1.37-1.61,
 $P<0.04$, $I^2=68\%$

↑ **52%**

Adenoma Detection Rate with CAC

OR, 1.52; 95% CI, 1.39-1.67,
 $P<0.04$, $I^2=47\%$

↑ **93%**

Number of Adenomas >10mm Detected with CAC

OR, 1.93; 95% CI, 1.18-3.16,
 $P<0.01$, $I^2=0\%$

↑ **129%**

Number of Adenomas ≤10mm Detected with CAC

OR, 2.29; 95% CI, 1.97-2.26,
 $P<0.001$, $I^2=0\%$

CONCLUSION: The results of the present study demonstrate the promise of computer-aided colonoscopy in improving adenoma miss rates, adenoma detection rates, polyp detection rates across a spectrum of size and morphological lesion characteristics.

Shah S, Park N, Chehade NEH, et al. Effect of Computer-Aided Colonoscopy on Adenoma Miss Rates and Polyp Detection: A Systematic Review and Meta-Analysis. *Journal of Gastroenterology and Hepatology*, 2022; doi: 10.1111/jgh.16059

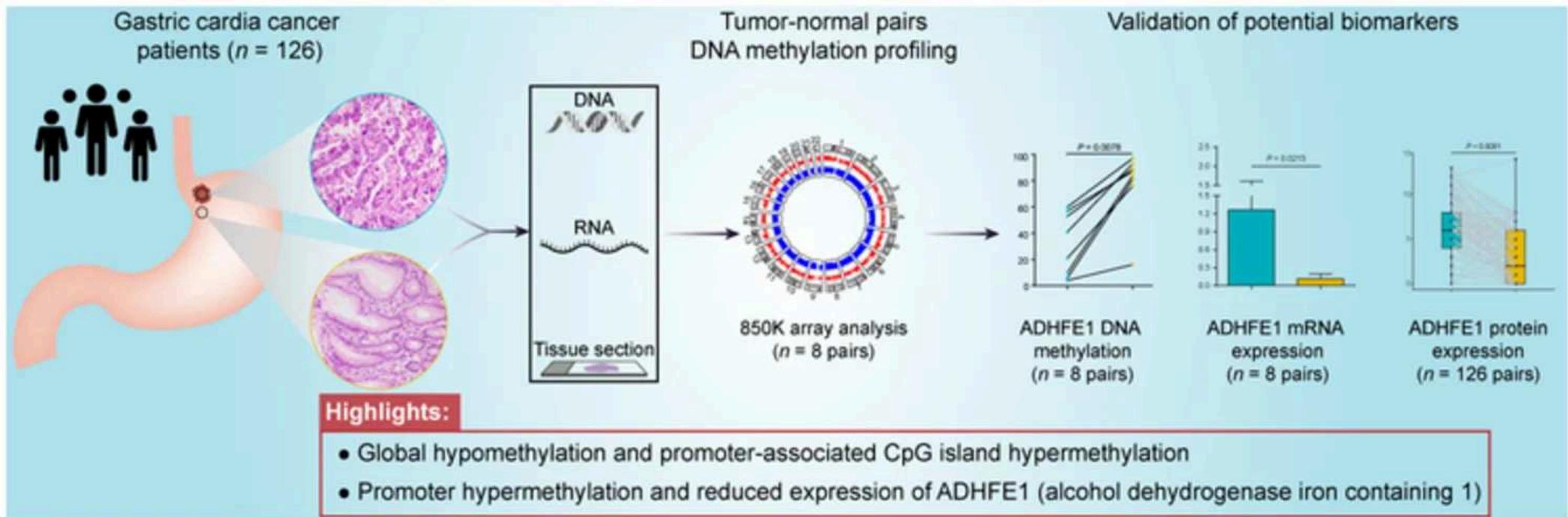
Visual Abstract by:
Enrik Aguilera @enrikke

JGH *Journal of Gastroenterology and Hepatology*



Source: Example from the [Guidelines for Graphical Abstracts of the Journal of Gastroenterology and Hepatology](#)





Source: Example from the [Guidelines for Graphical Abstracts of the Journal of Gastroenterology and Hepatology](#)



A well-designed graphical abstract...

- is an **advertisement for your paper**
- shows the key points, not the full story
- attracts interest by standing out in the TOC or image search
- helps readers decide if they want to read the entire article
- is distinct from figures and diagrams in the paper—
do not simply use a figure from your manuscript



Golden Rules

1. Focus on the Message
2. Guide the View with Visual Hierarchy
3. Show Just Enough Detail
4. Maintain a Unified Visual Language
5. Ensure Readability & Accessibility



Rule 1

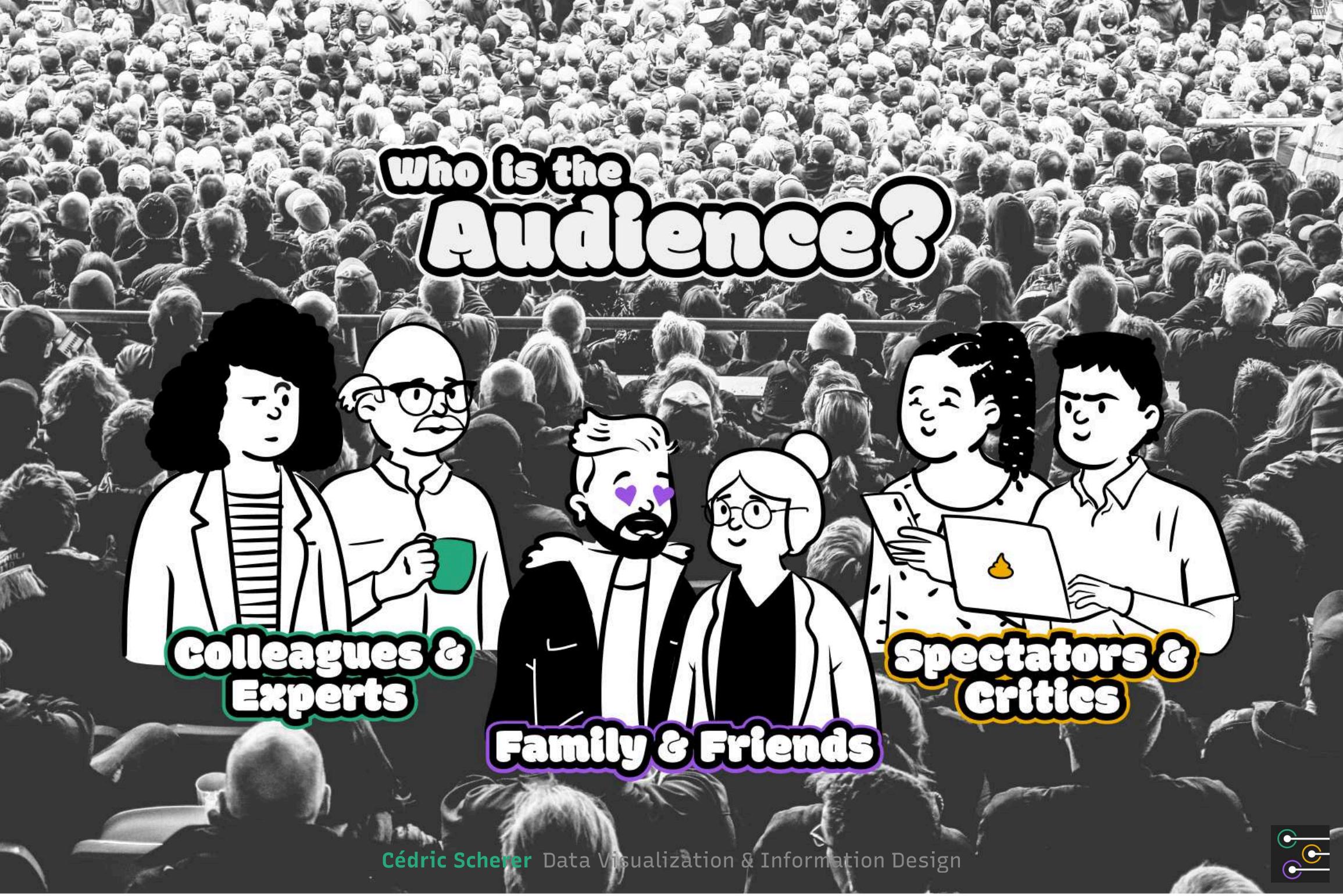
Focus on the Core Message



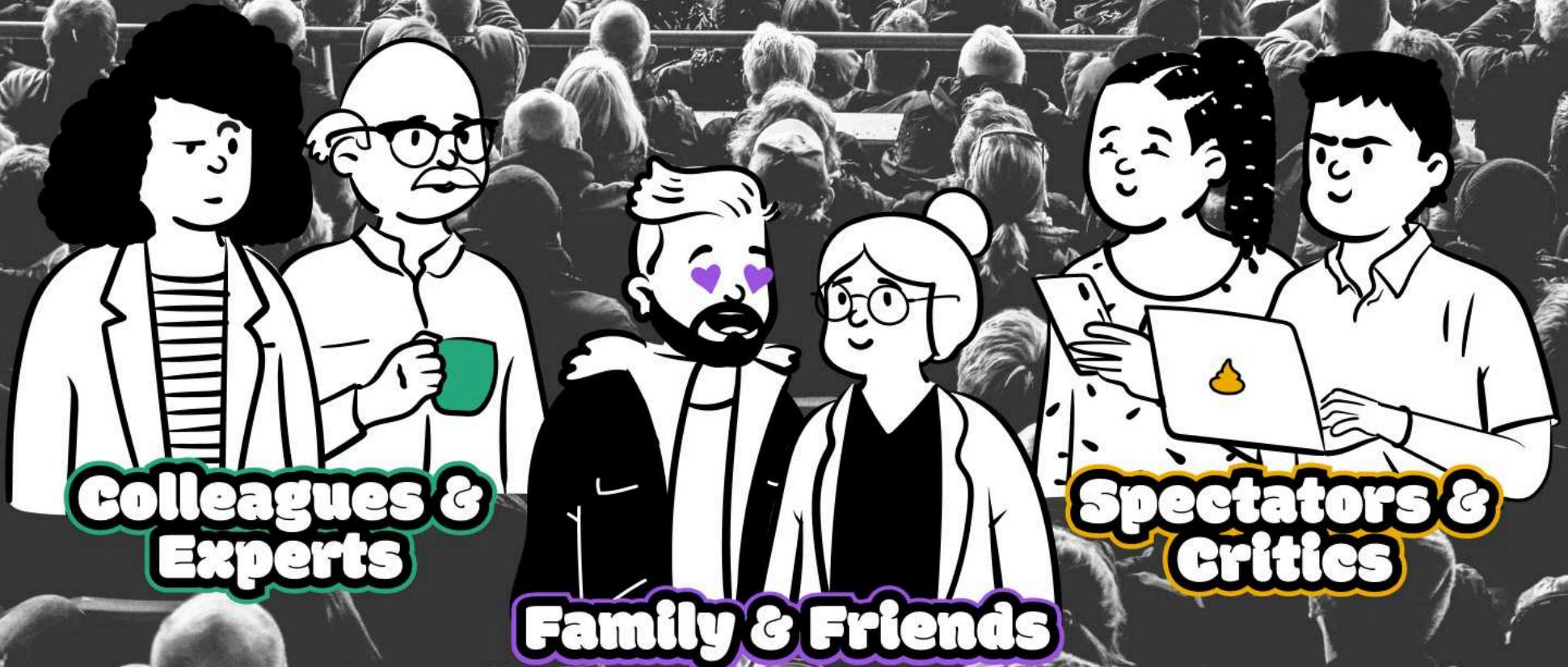
Audience (who)

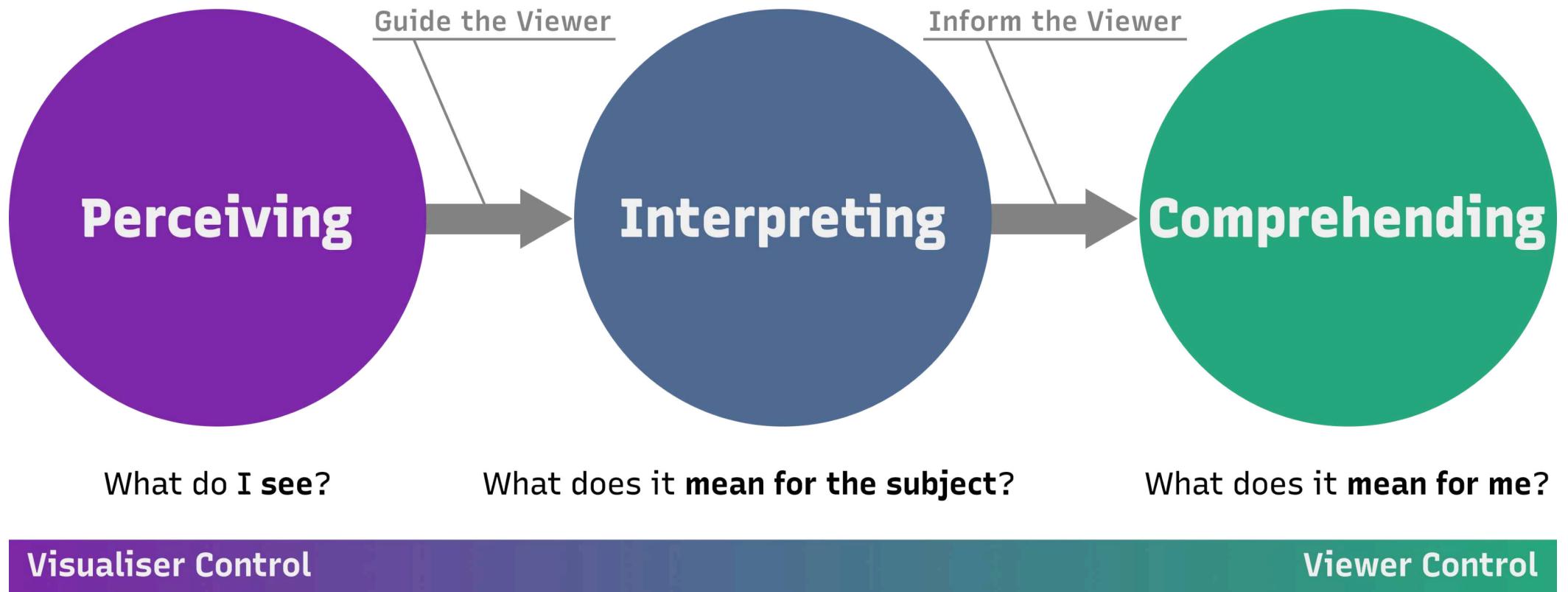
- To whom are you communicating?
- What do they already know?





Who is the Audience?





Scheme by Andy Kirk (modified)



Audience (who)

- To whom are you communicating?
- What do they already know?

Content (what)

- What do you want them to know or do?
- What tone do you want your communication to set?



The Big Idea

Imagine you have to condense your story to a **single sentence** to convey what's unique about your point and what's at stake

—what would you say?



Condensing Your Written Abstract



As the core message of the graphical abstract should be in line with the written abstract, “simply” condense your text to 50-80 words.



SENSE

inspirational

celebrating

spicy

warning

joyful

serious

TONE

cheering

DRIVING

lighthearted

educational

urgent



Audience (who)

- To whom are you communicating?
- What do they already know?

Content (what)

- What do you want them to know or do?
- What tone do you want your communication to set?

Evidence (how)

- What type of information best supports the message?
- Which level of detail is needed for credibility and clarity?



Focus on the Core Message



Checklist

- Identify the **one key message** before designing.
Avoid competing **focal points** that dilute the core idea.
- Remove **unnecessary parts** that do not support the message.



Focus on the Core Message

👍 Good

A graphical abstract highlighting the main conclusion with a clear and meaningful visual.

👎 Bad

An abstract cramming multiple findings into a single visual, making it hard to grasp the key point.



Your Turn!

Using “**The Three Little Pigs**” as an example, identify the core message that the story conveys.

What is the **key lesson** a viewer should immediately understand if this were a graphical abstract?



Rule 2

Guide the View with Visual Hierarchy



Guidelines from Elsevier

For ease of browsing, the **graphical abstract should have a clear start and end**, preferably “reading” from top to bottom or left to right.



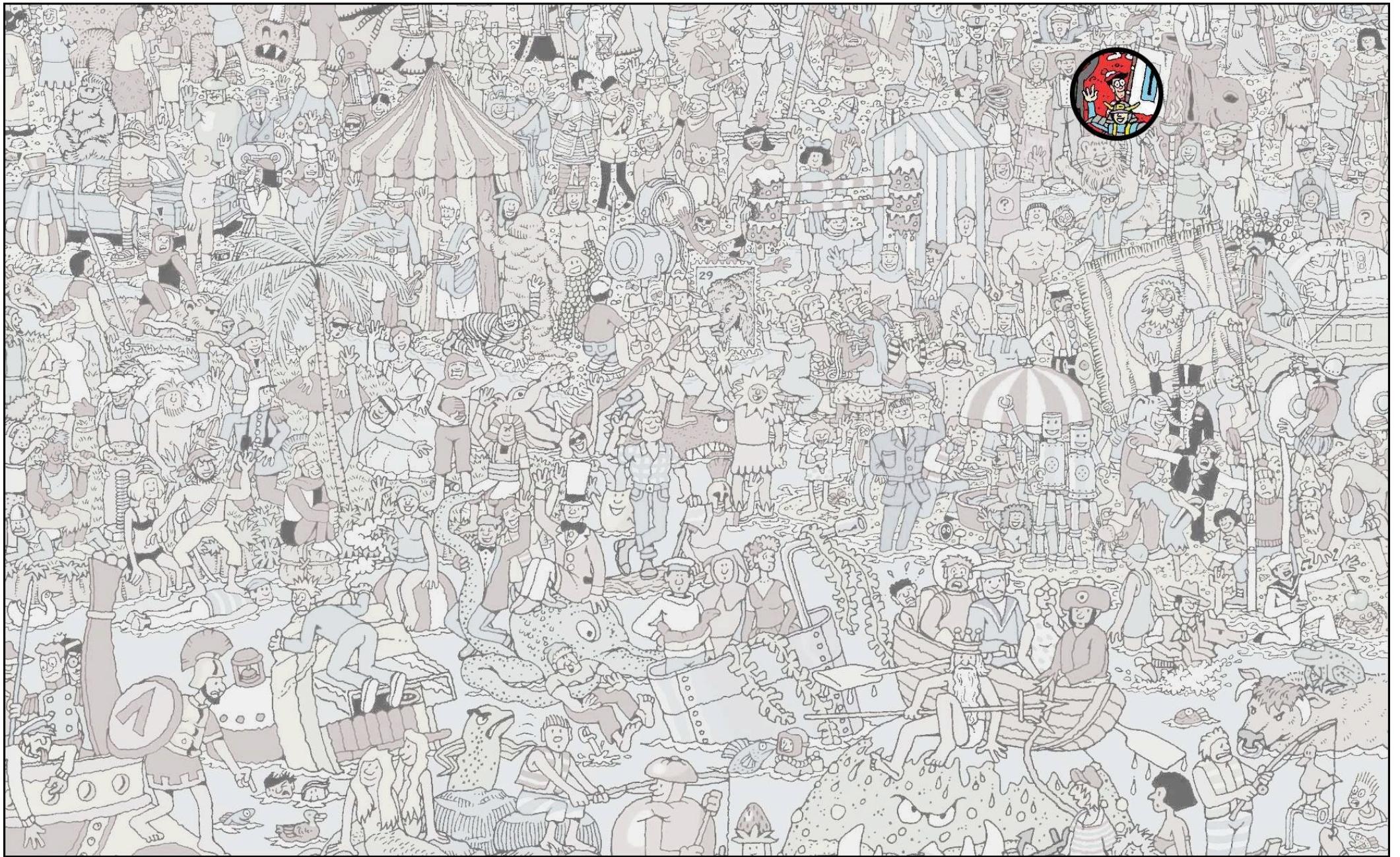
**Make your audience look
where you want them to look.**





Source: "Where's Waldo?" by Martin Handford © Kilburn & Strode LLP





Source: "Where's Waldo?" by Martin Handford © Kilburn & Strode LLP

Cédric Scherer Data Visualization & Information Design



5 3 7 2 0 9 4 8 1 3
9 4 5 4 3 5 2 5 4 6
1 0 4 5 8 2 6 8 5 0
7 3 2 9 6 0 2 5 9 1
4 8 2 1 0 7 0 2 4 3

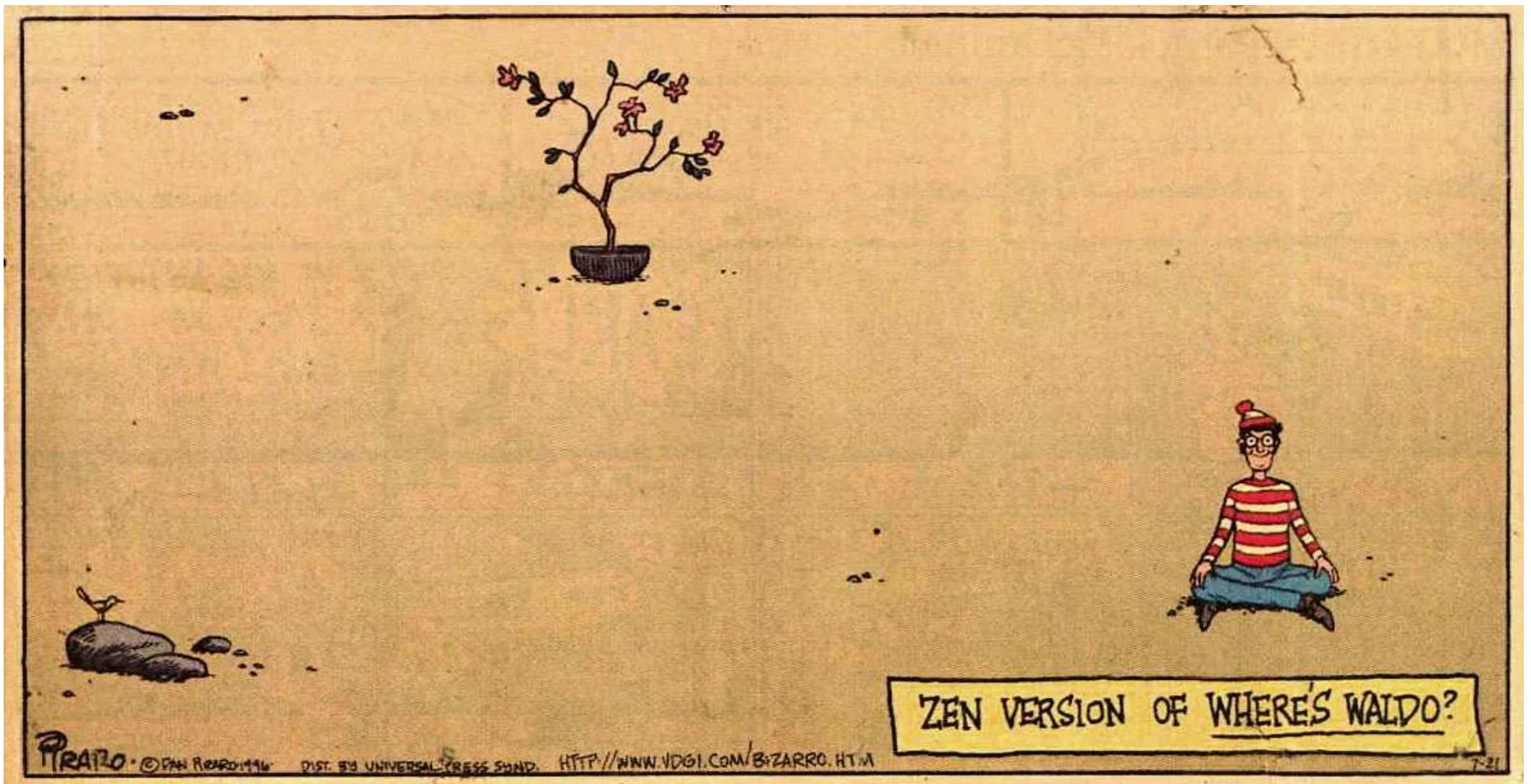


1 5 9 7 4 5 0 2 0 1
4 7 6 9 3 5 1 3 6 0
6 9 3 1 2 4 9 7 5 4
5 6 4 3 8 0 2 3 4 1
8 4 1 3 7 2 9 6 1 2



7	4	1	3	8	7	2	6	5	0
6	3	0	2	1	9	7	5	4	8
1	7	5	4	3	1	4	0	8	7
9	2	1	5	8	7	3	4	5	6
4	6	2	8	1	4	7	2	3	0





Source: Zen Version of "Where's Waldo?" by Dan Piraro



Iconic Memory

is a type of **sensory memory** that briefly retains visual information for a very short period.

Iconic memory operates at a pre-attentive level, meaning that it functions before conscious attention is directed toward the visual stimuli.

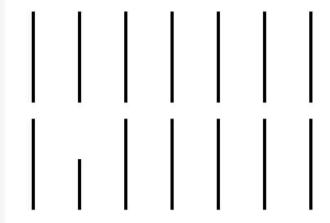


Preattentive Attributes

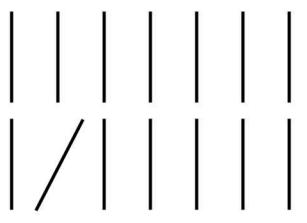
Visual properties that the human brain can instantly and subconsciously perceive.



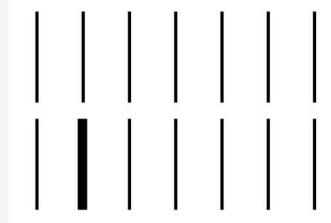
Length



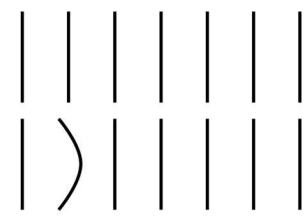
Orientation / Direction



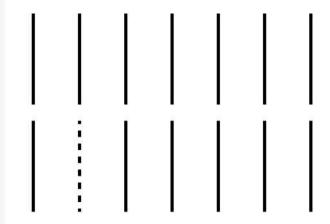
Width / Size



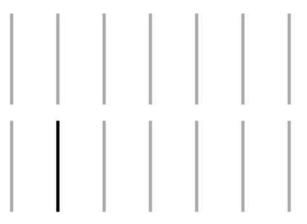
Curvature



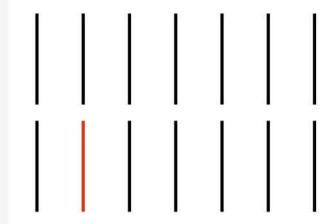
Shape / Linetype



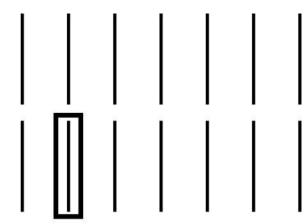
Intensity



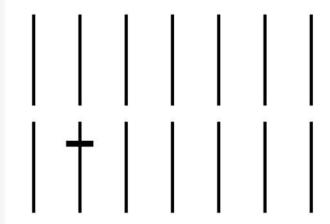
Hue



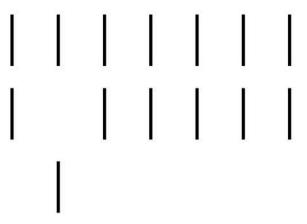
Enclosure



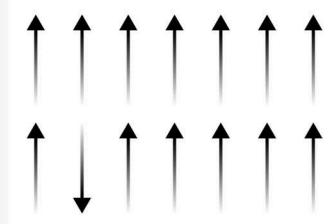
Added Marks



Position



Direction of Motion



Adapted from Stephen Few and others



Keep it simple

In his book [Information Visualization: Perception for Design](#), Colin Ware states:

“It is easy to spot a hawk in a sky full of pigeons, but as the variety of birds increases the hawk becomes harder to pick out.”

In other words, **the more things are made different, the less any of them stand out.**

So, it is *good practice* to start with figuring out an item of interest you want to emphasise, and then trying to make it the one thing that is different, thus leveraging your contrast strategically.

Source: Deya Milcheva (5rdata.com)



Keep it simple

← size, weight, type + spacing

← color + added mark

In his book Information Visualization: Perception for Design, Colin Ware states:

added mark

↑ spacing

“It is easy to spot a hawk in a sky full of pigeons, but as the variety of birds increases the hawk becomes harder to pick out.”

← position

↑ spacing

type + style

In other words, the more things are made different, the less any of them stand out.

↑ weight

style

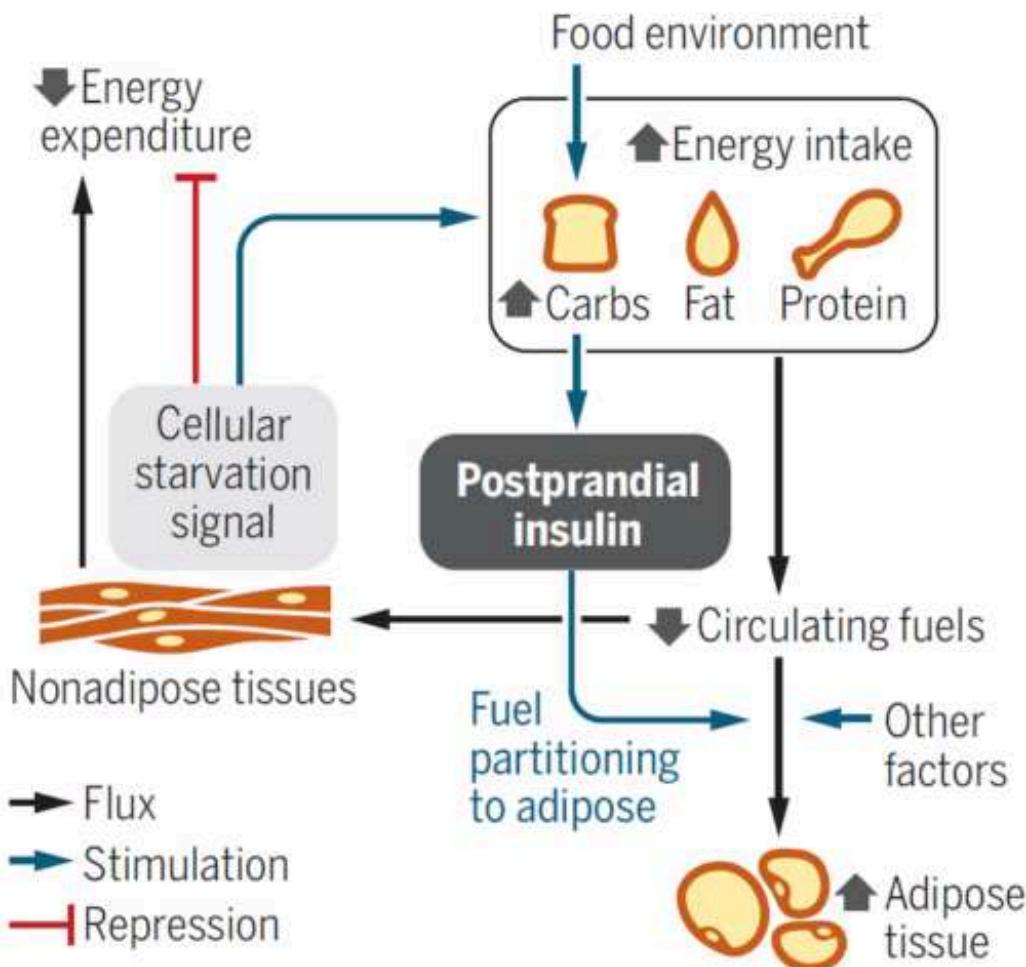
↑ spacing

So, it is good practice to start with figuring out an item of interest you want to emphasise, and then trying to make it the one thing that is different, thus leveraging your contrast strategically.

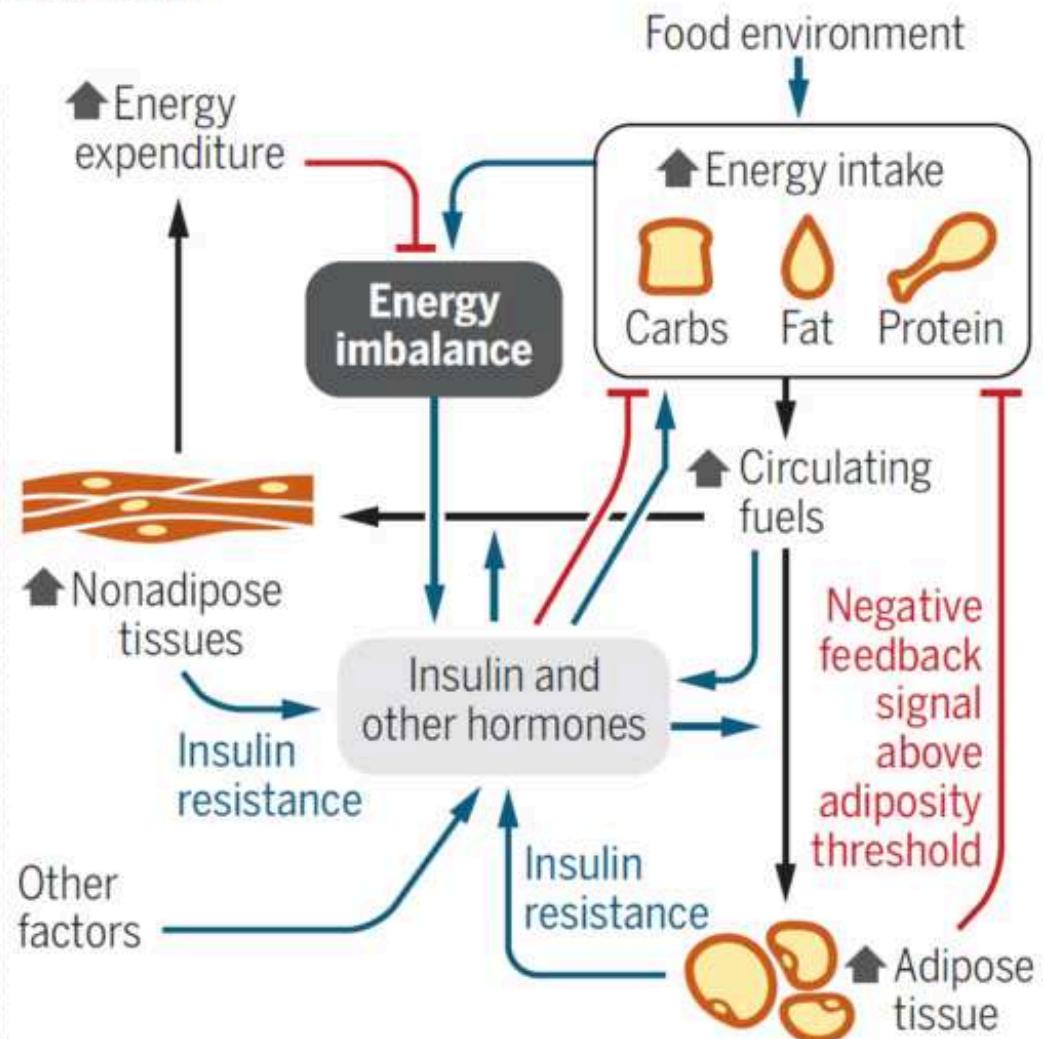
Source: Deya Milcheva (5rdata.com) ← size, color + spacing



Two models of body weight regulation



Carbohydrate insulin model

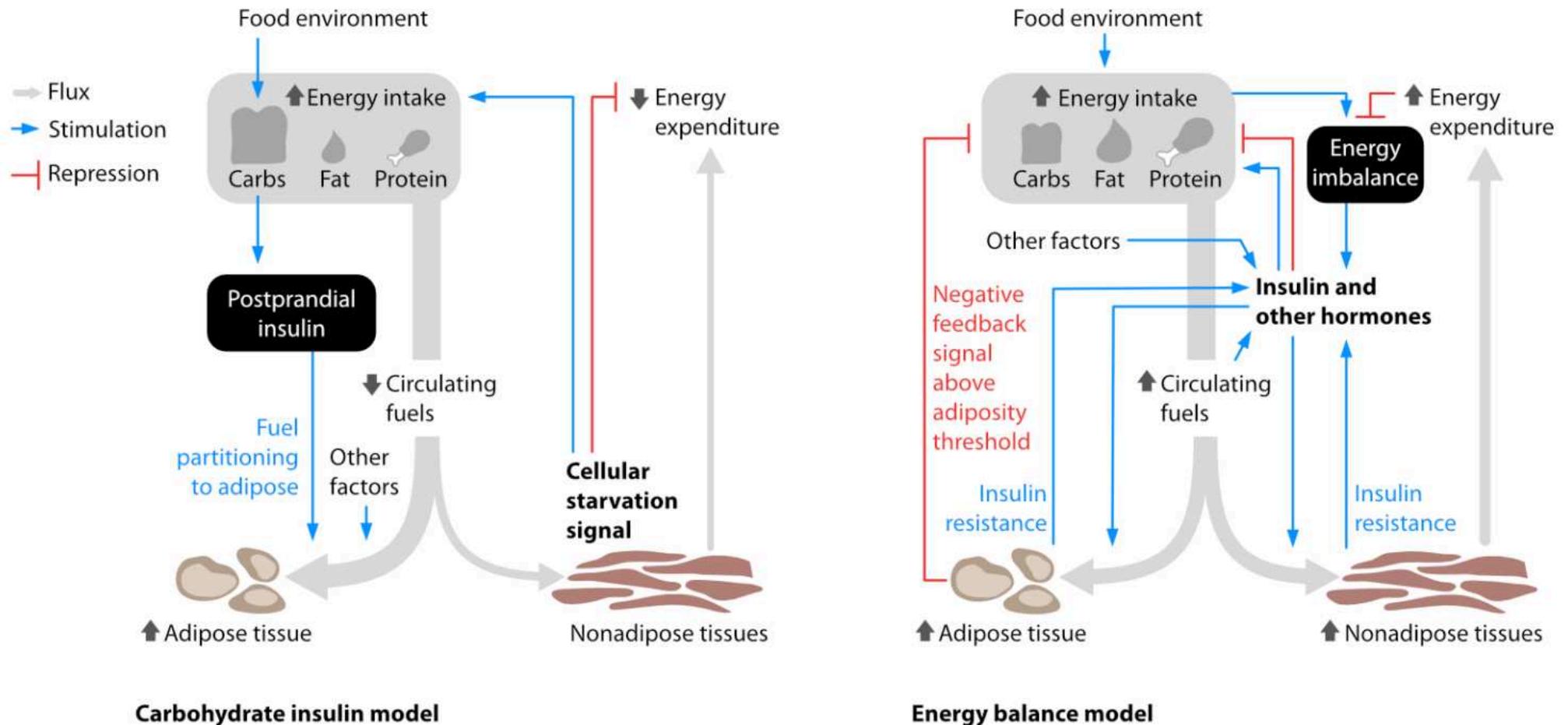


Energy balance model

Graphical Abstract from Speakman & Hall 201, *Science* 372:6542



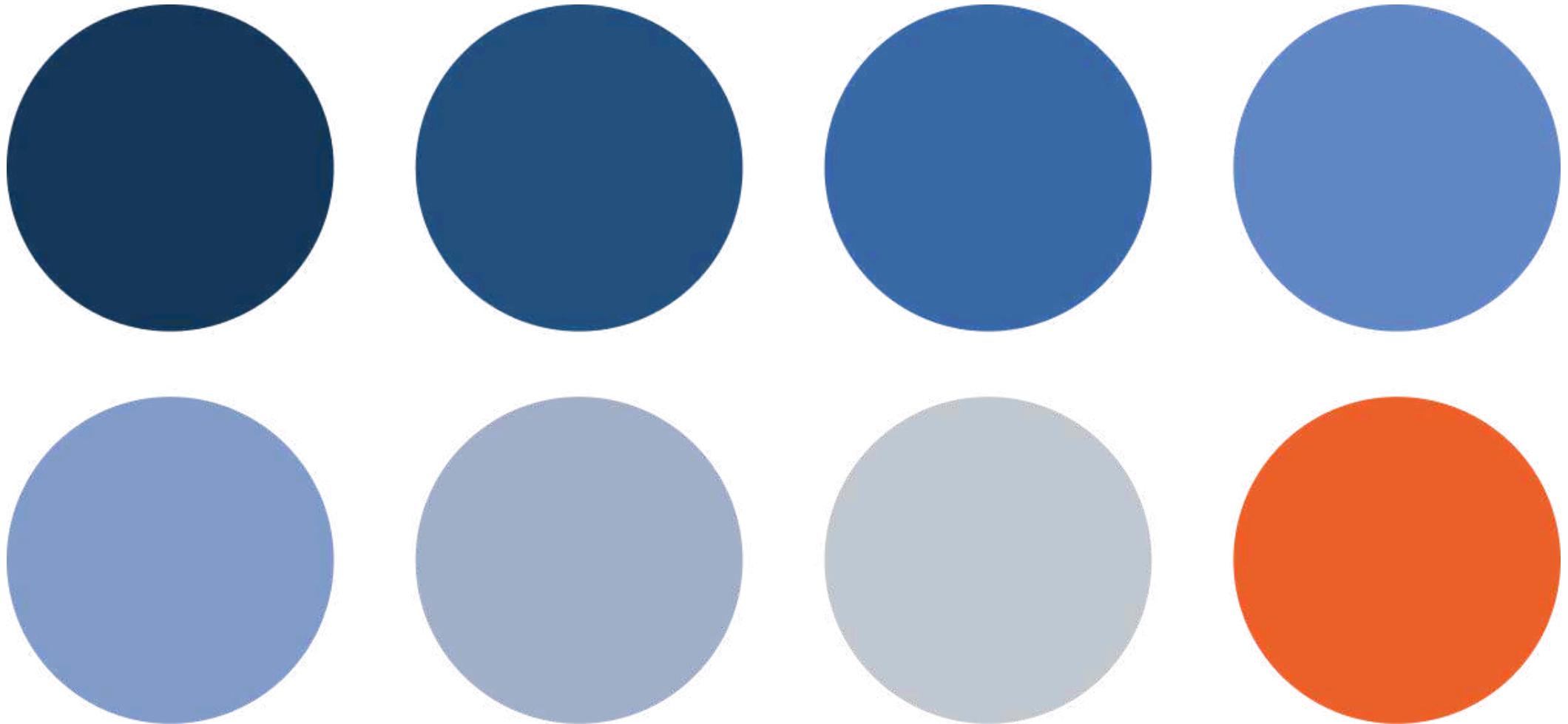
Two models of body weight regulation



Makeover of the Graphical Abstract from Speakman & Hall 201, *Science* 372:6542 by Susanne Berger



Use Color for Emphasis



Creating Layouts

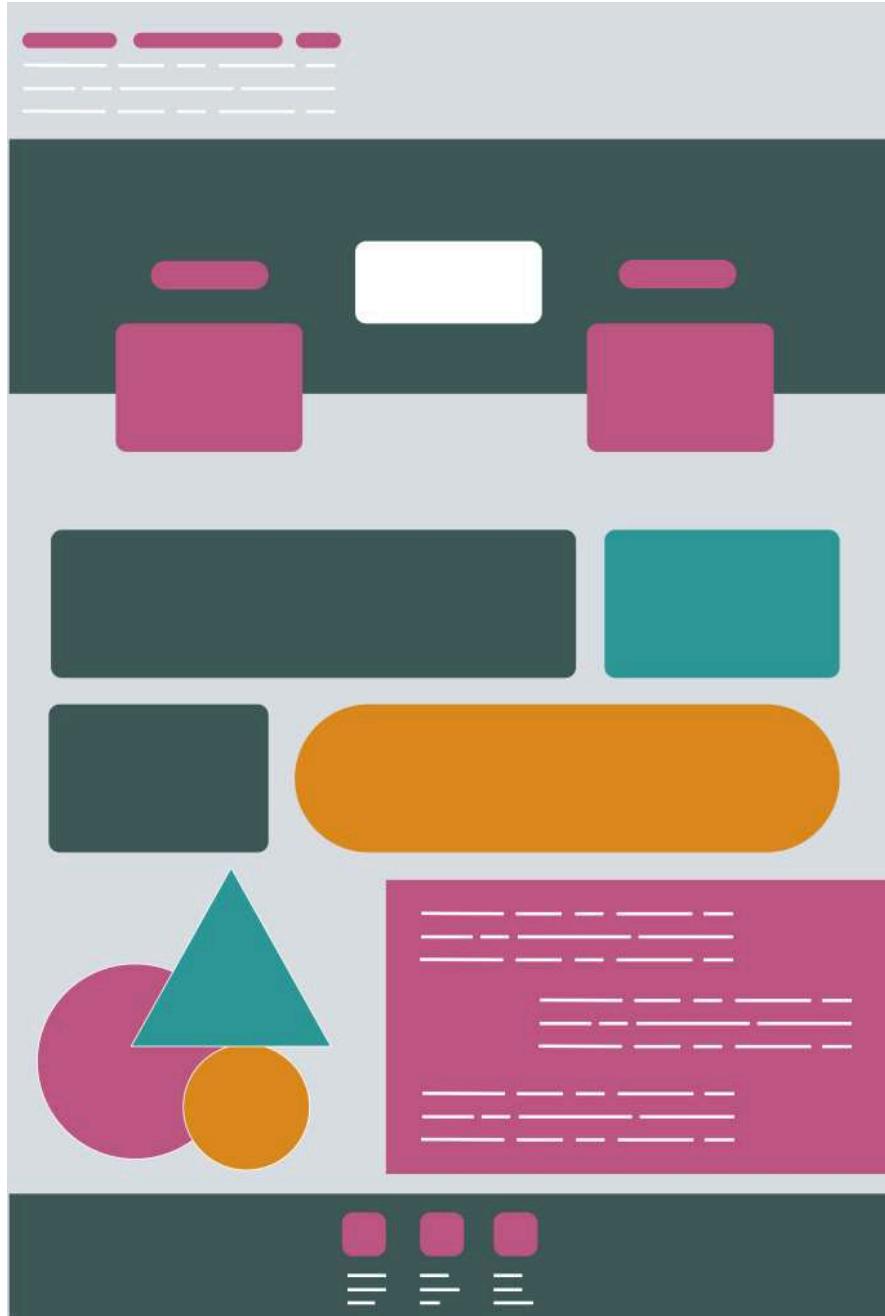


Main Principles of Graphic Design

- » **Unity**
- » **Variety**
- » **Hierarchy**

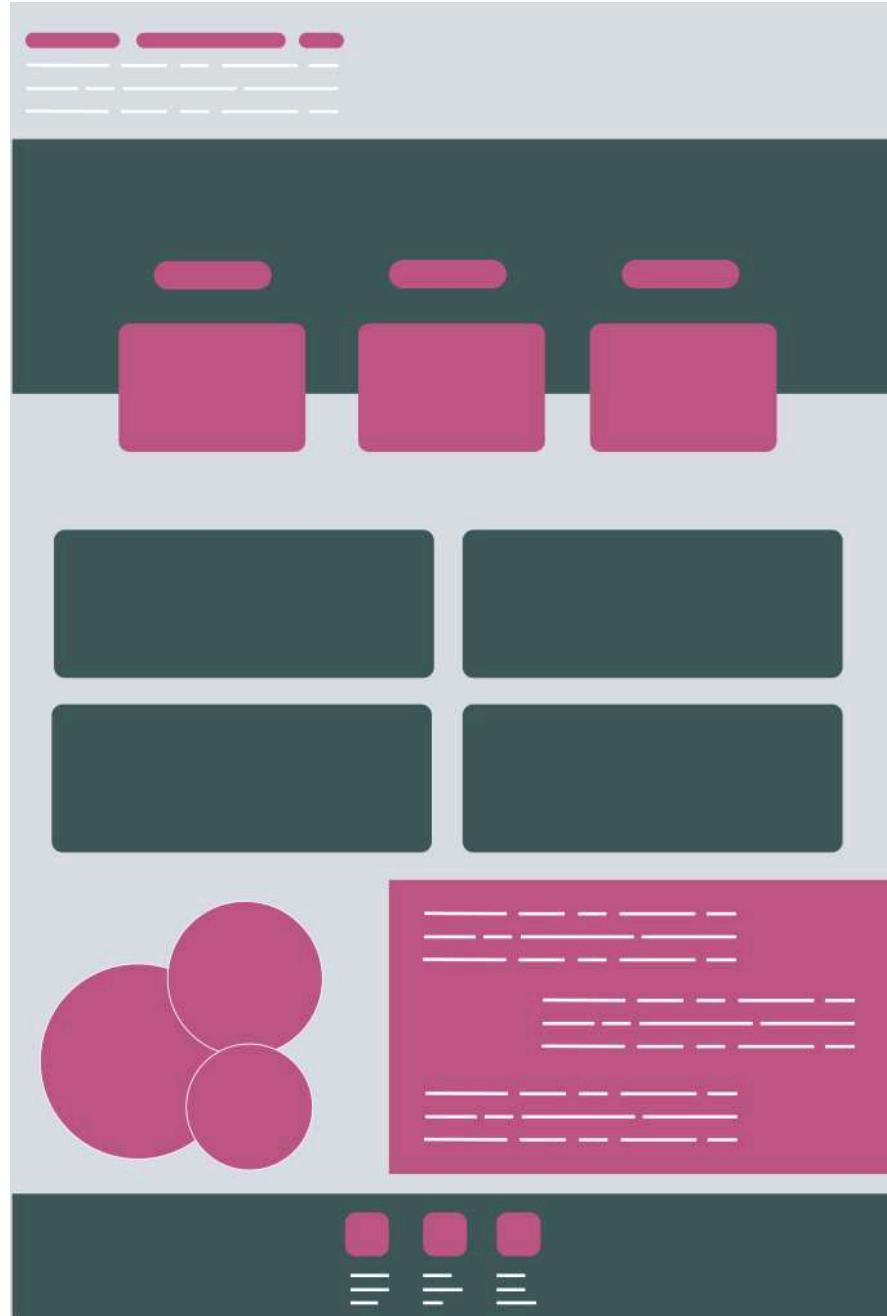
Good balance between **unity** and **variety** creates **hierarchy**.





Created by Lindsay Betzendahl

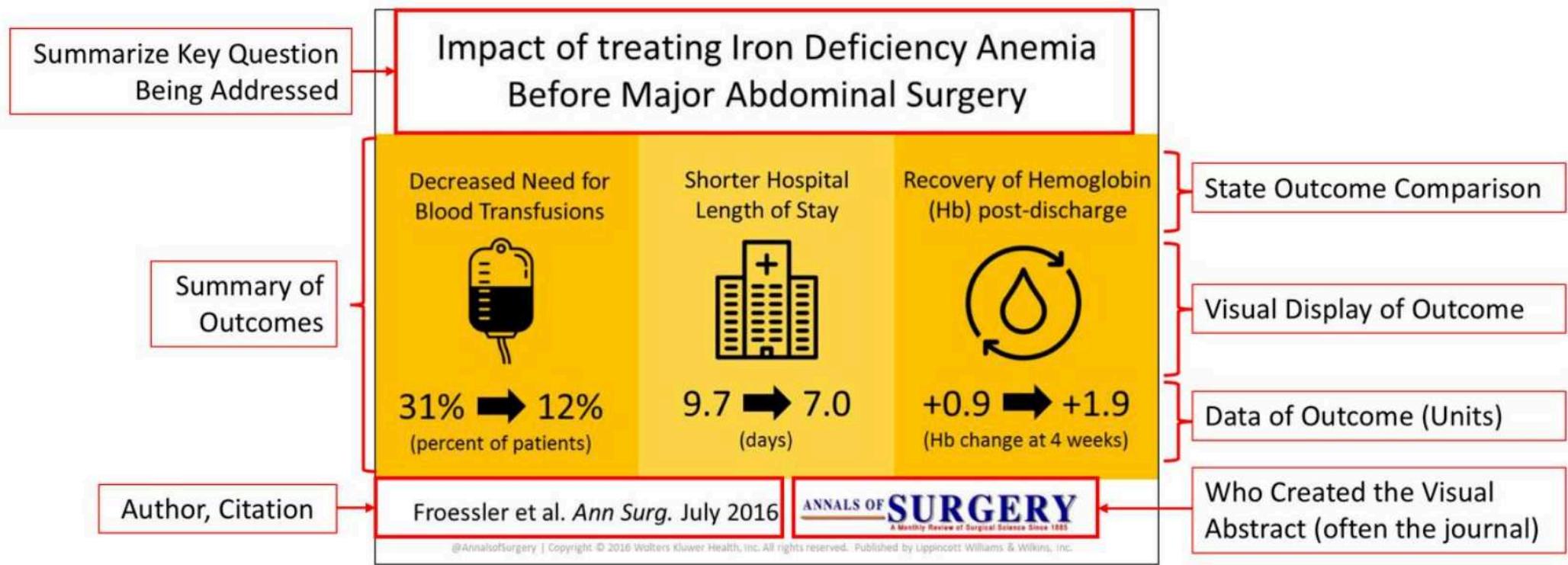
Cédric Scherer Data Visualization & Information Design



Created by Lindsay Betzendahl



COMPONENTS OF AN EFFECTIVE VISUAL ABSTRACT

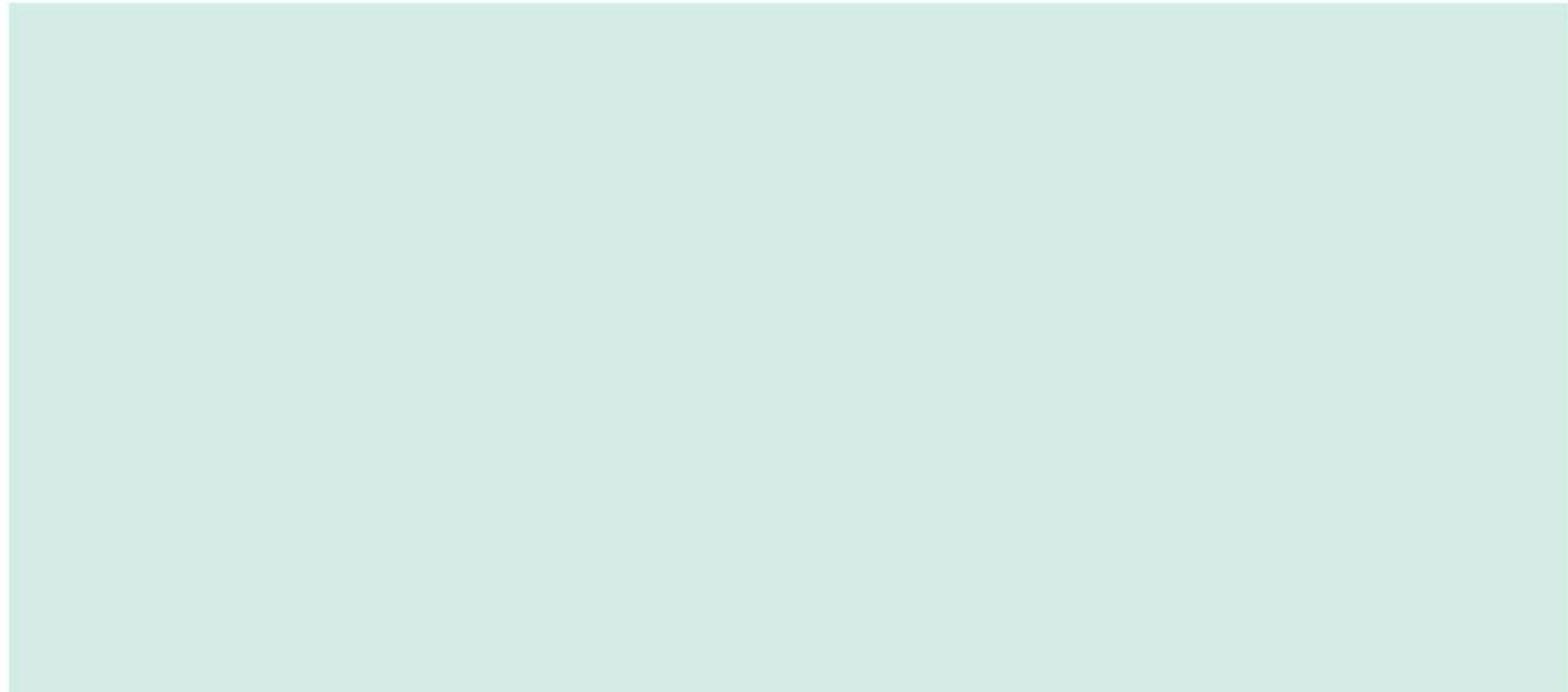


"What is a Visual Abstract" by Andrew M. Ibrahim in "[Use of a Visual Abstract to Disseminate Scientific Research](#)"



Core Message as a Bold Title

More background information on the research process, hypotheses, findings, and/or resulting recommendations and actions.

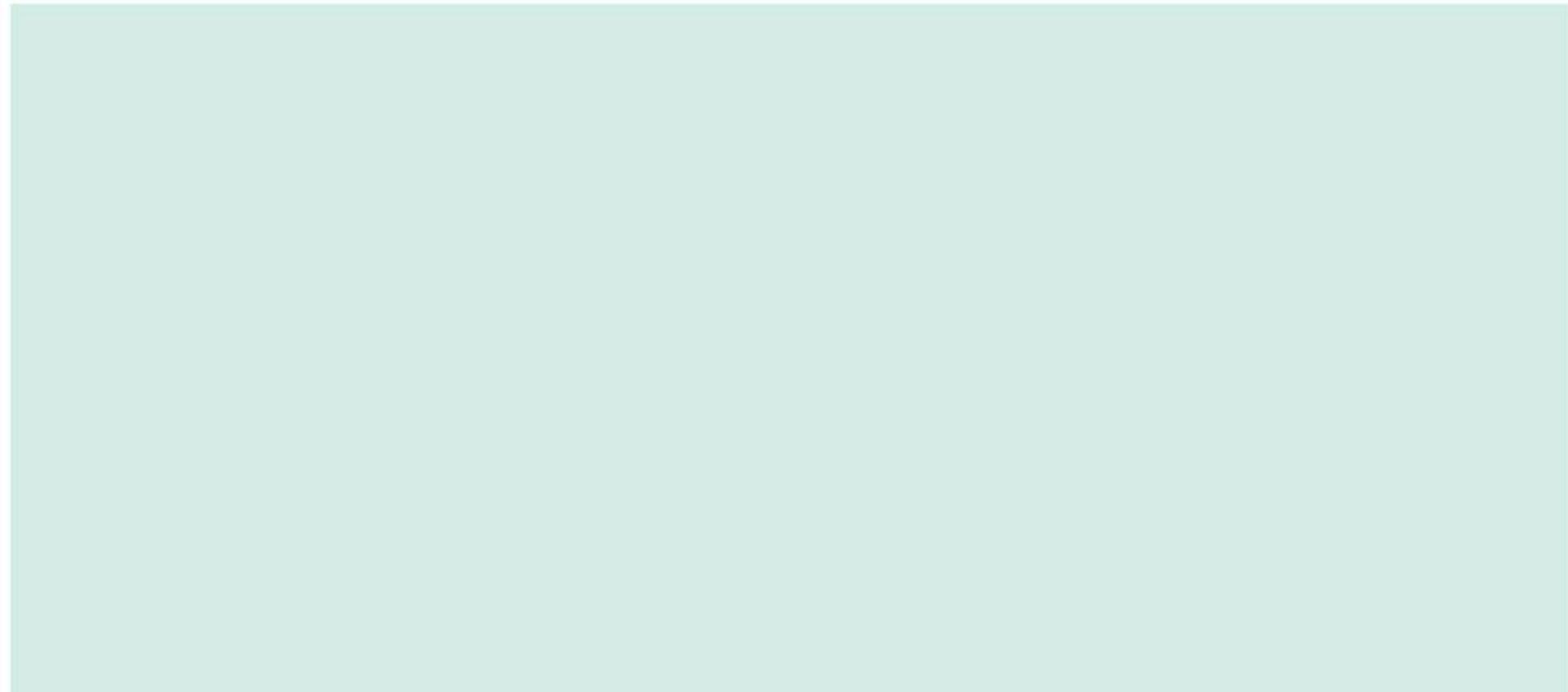


Additional information, often the study reference, a QR code and/or the journal logo



Research Question as a Bold Title

More background information on the research process, hypotheses, findings, and/or resulting recommendations and actions.

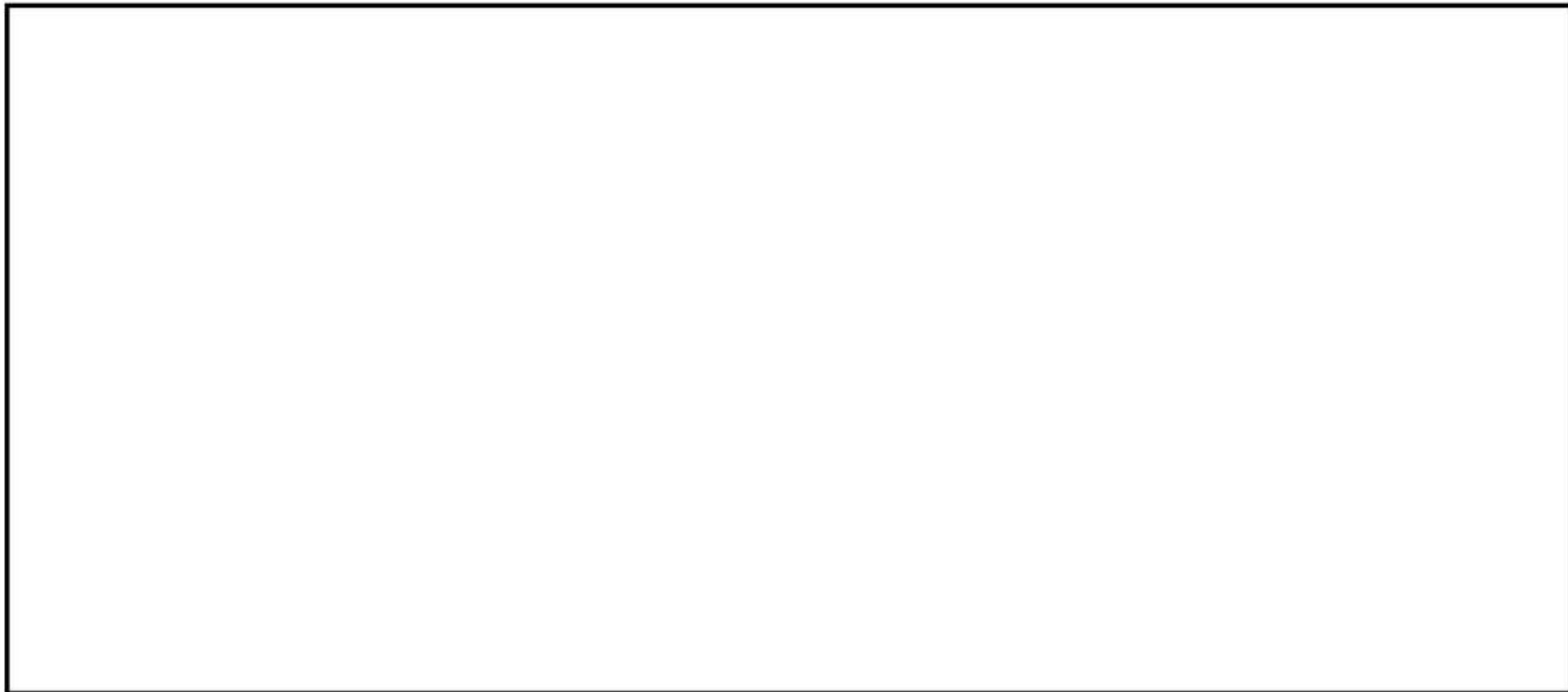


Conclusion as a text or even better a limited number of bullet points

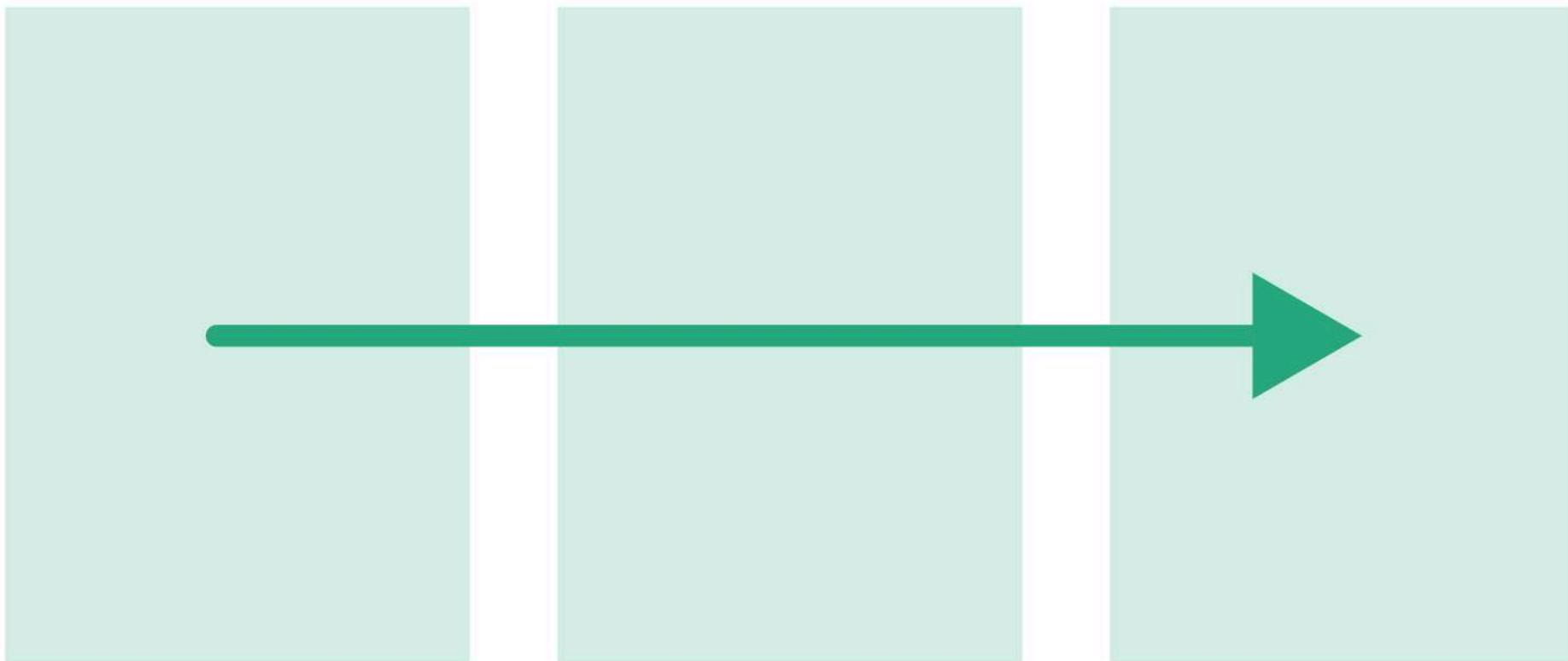


Core Message or Research Question

More background information on the research process, hypotheses, findings, and/or resulting recommendations and actions.



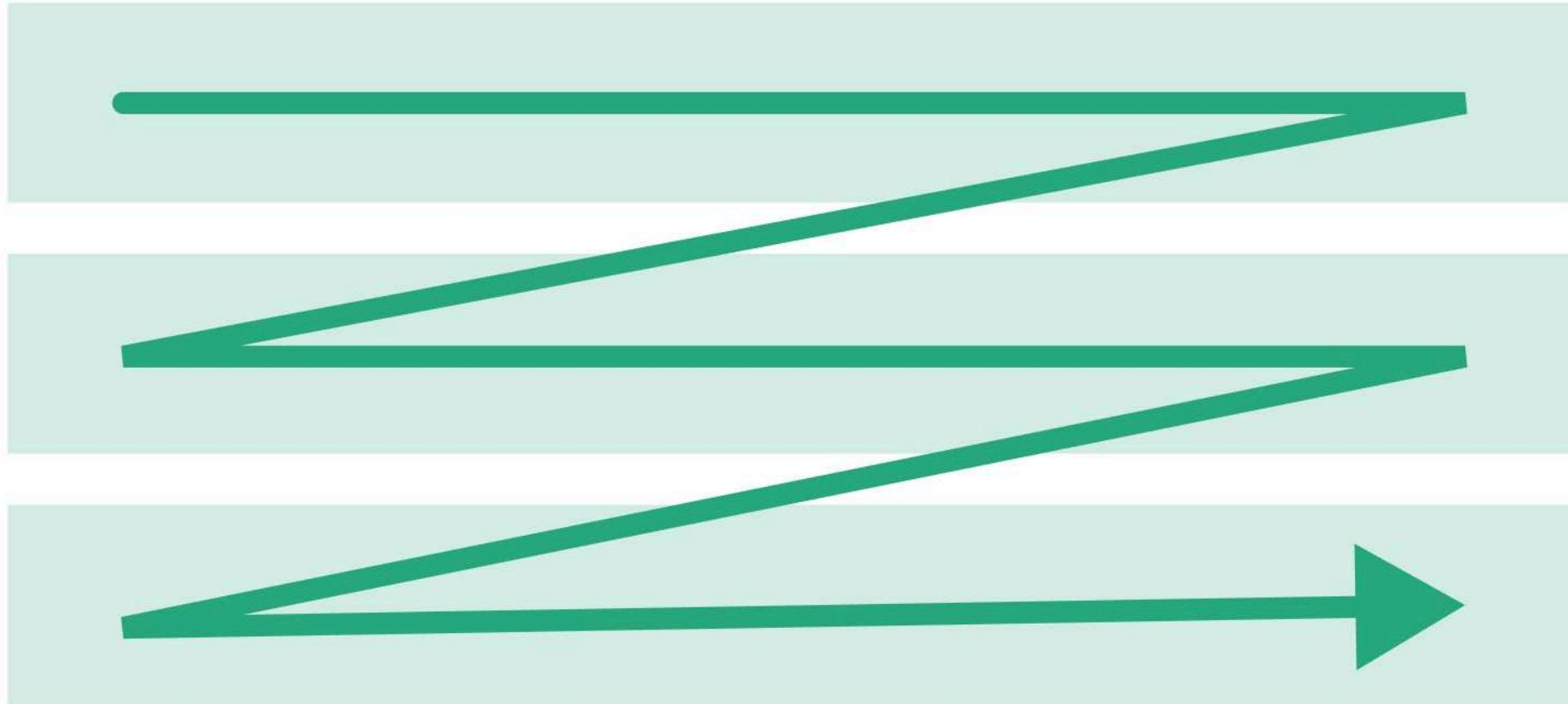
Layouts: Linear



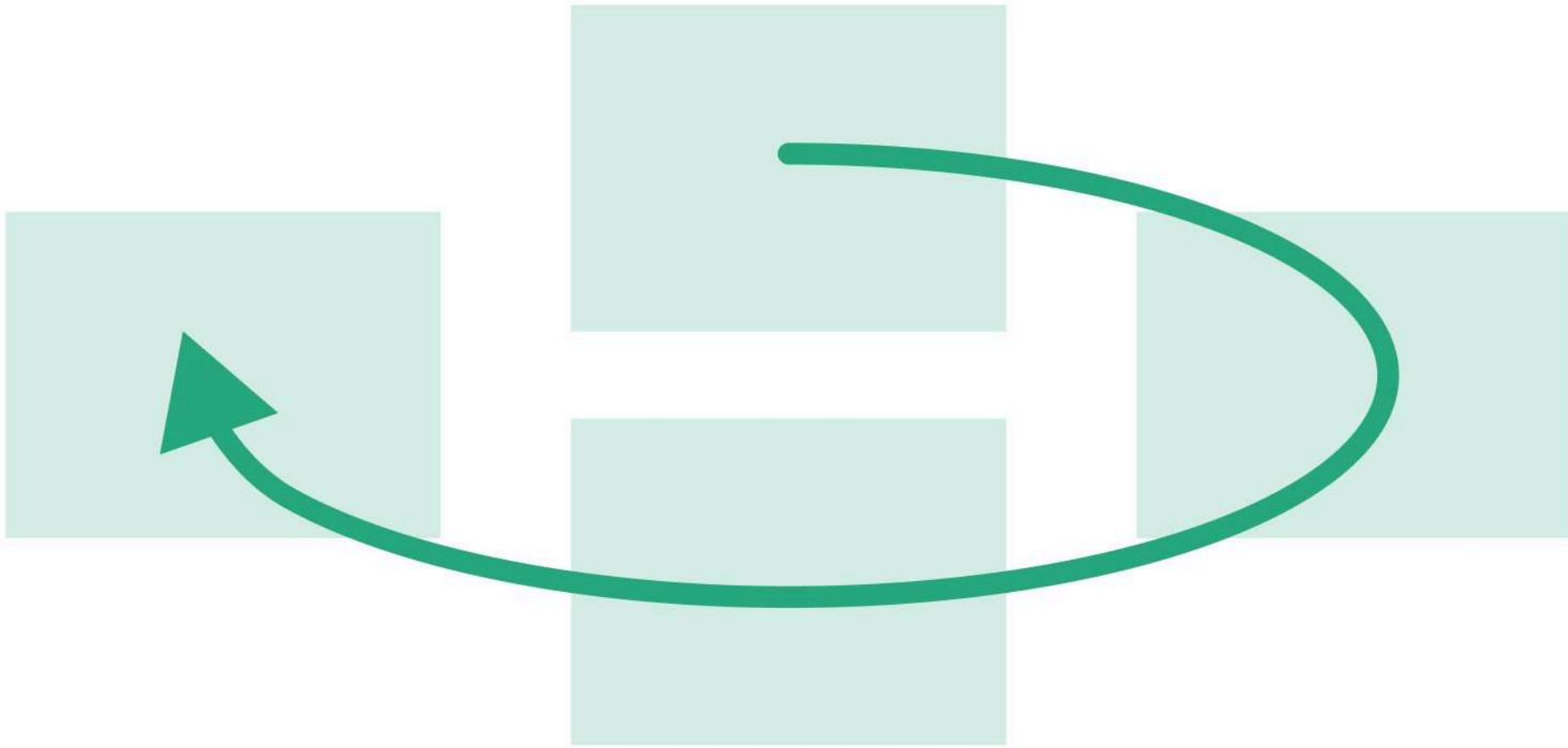
Layouts: Lead & Flow



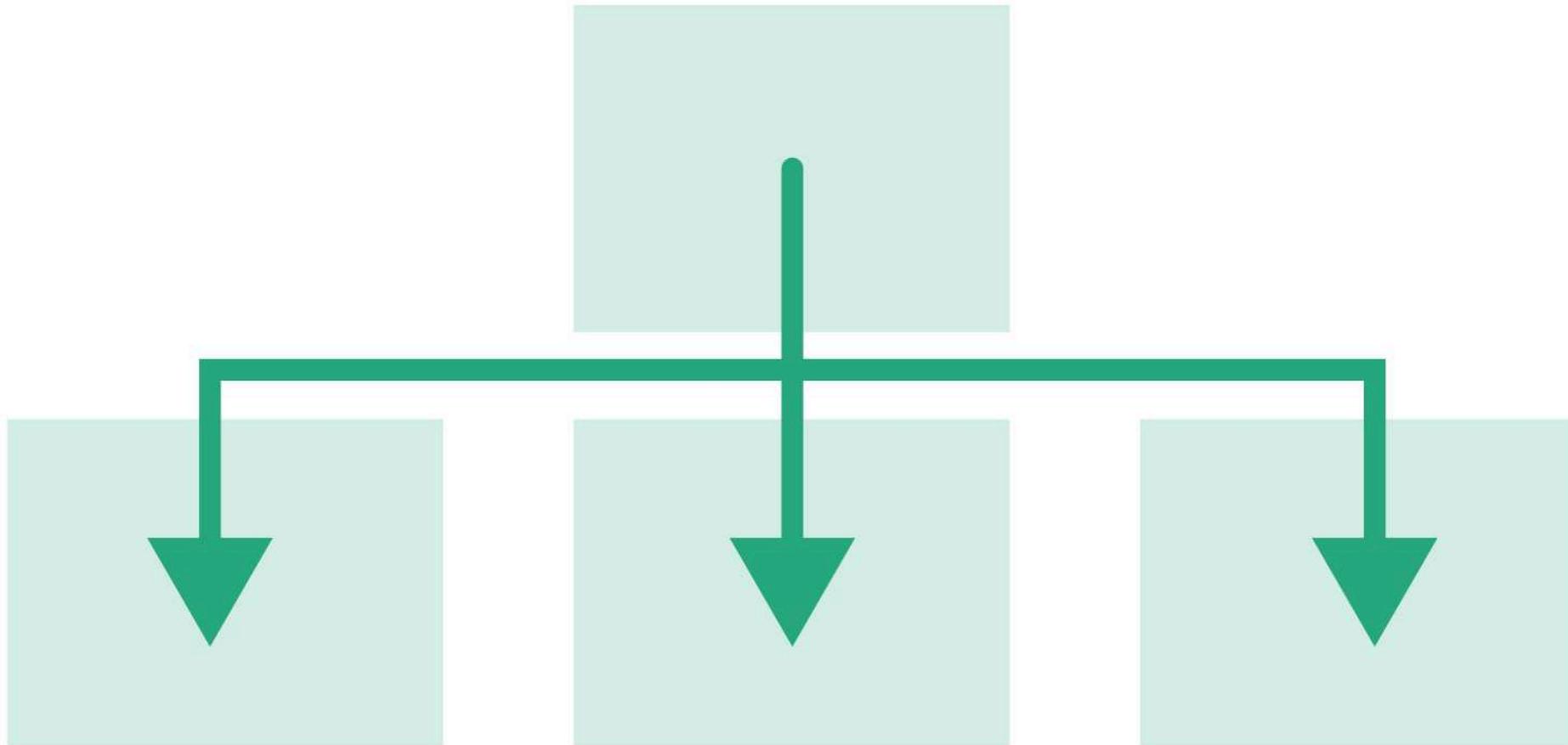
Layouts: Zig-Zag



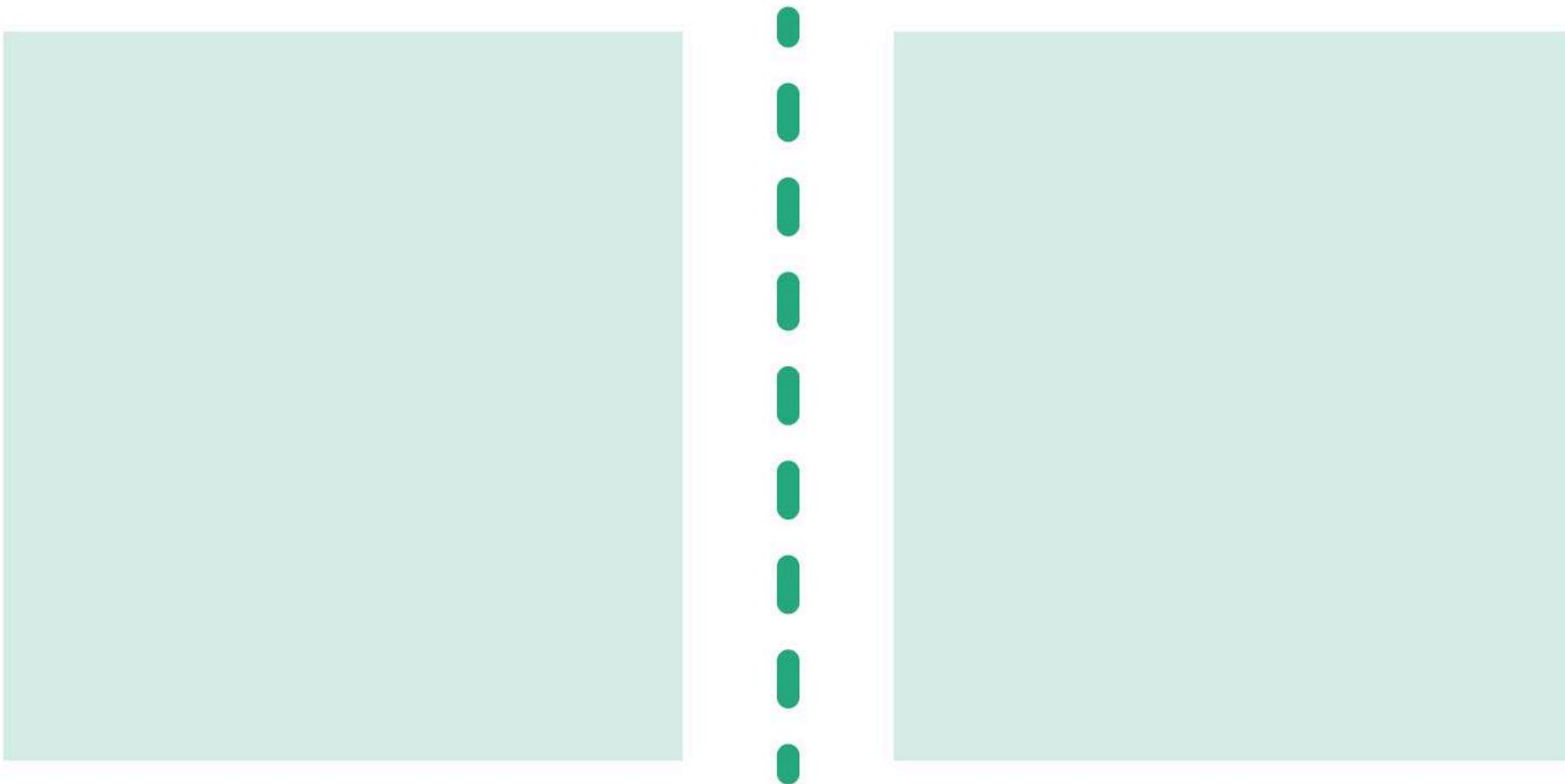
Layouts: circular



Layouts: Fork

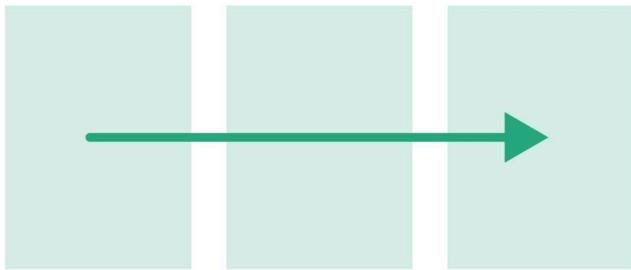


Layouts: Parallel

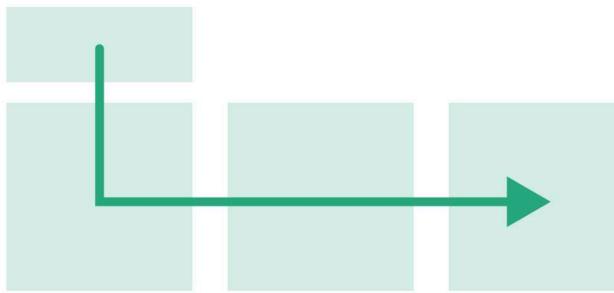


Layouts

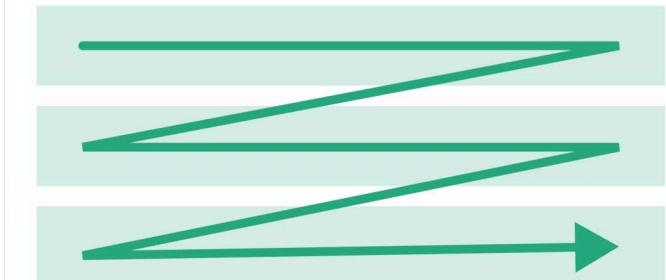
Linear



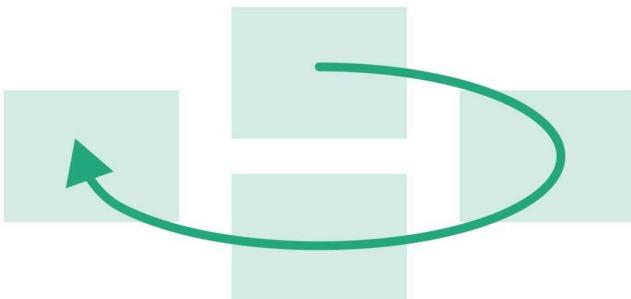
Lead & Flow



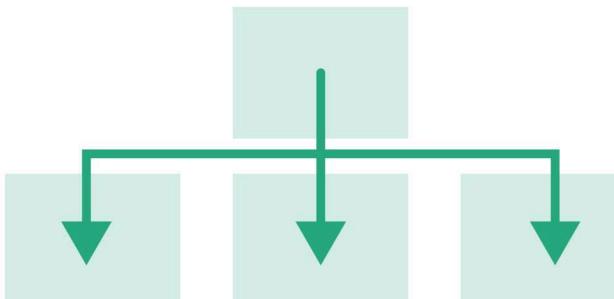
Zig-Zag



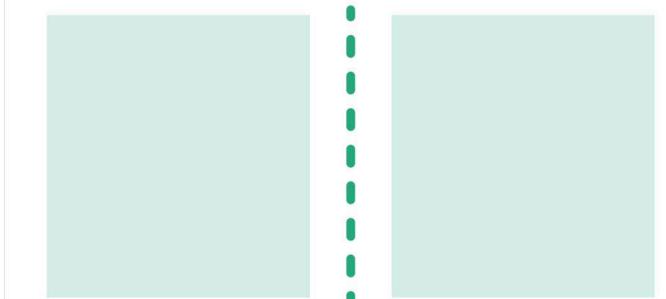
Circular



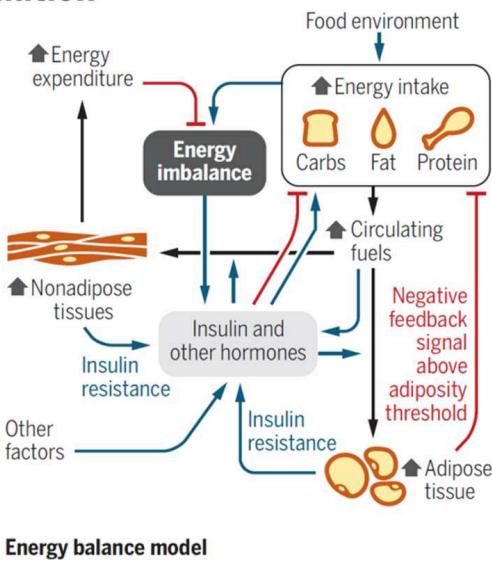
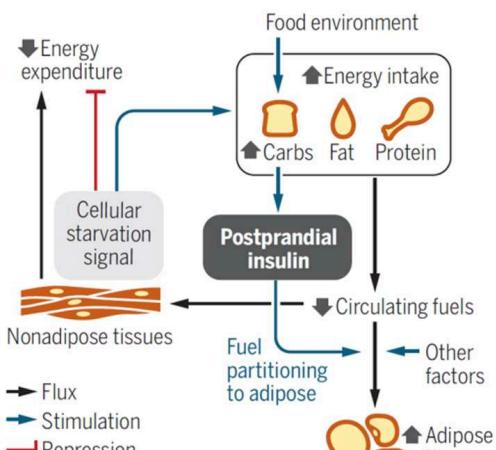
Fork



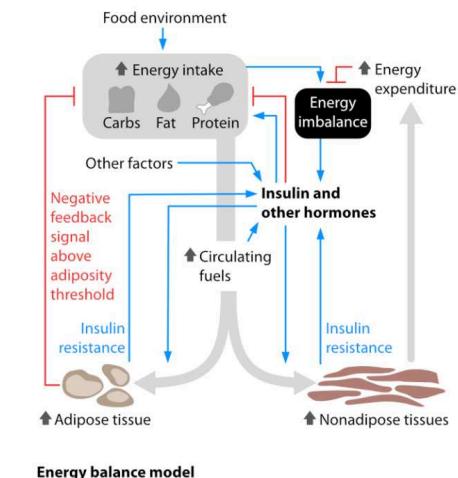
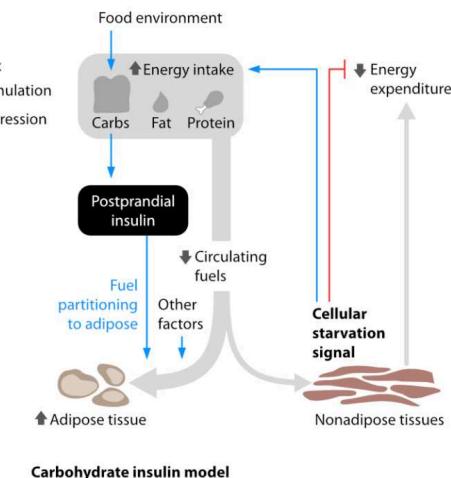
Parallel



Two models of body weight regulation



Two models of body weight regulation



Graphical Abstract from [Speakman & Hall 201, Science 372:6542](#) (left) and the makeover by [Susanne Berger](#) (right)



Guide the View with Visual Hierarchy



Checklist

- Use **size** and **boldness** to highlight key elements.
Arrange elements **logically** (e.g., left to right, top to bottom).
- Use **color** and **contrast** intentionally, not just as decoration.



Guide the View with Visual Hierarchy

Good

A clear key point (e.g., title or main finding in bold) and a structured flow.

Bad

Everything has the same size and color, making it unclear where to start.



Your Turn!

Break down the key moments of the “**The Three Little Pigs**” and arrange them with a clear visual flow.



Rule 3

Show Just Enough Detail



Audience (who)

- To whom are you communicating?
- What do they already know?

Content (what)

- What do you want them to know or do?
- What tone do you want your communication to set?

Evidence (how)

- What type of information best supports the message?
- Which level of detail is needed for credibility and clarity?



**Support the “Big Idea”
with the right evidence.**



The Elevator Pitch

Imagine that you have only **30 seconds** to explain the motivation of the study and why the findings are exciting to a stranger

—what would you say?

Iterate on the elevator pitch and ask yourself:

Would this extra detail make the pitch clearer or just longer?

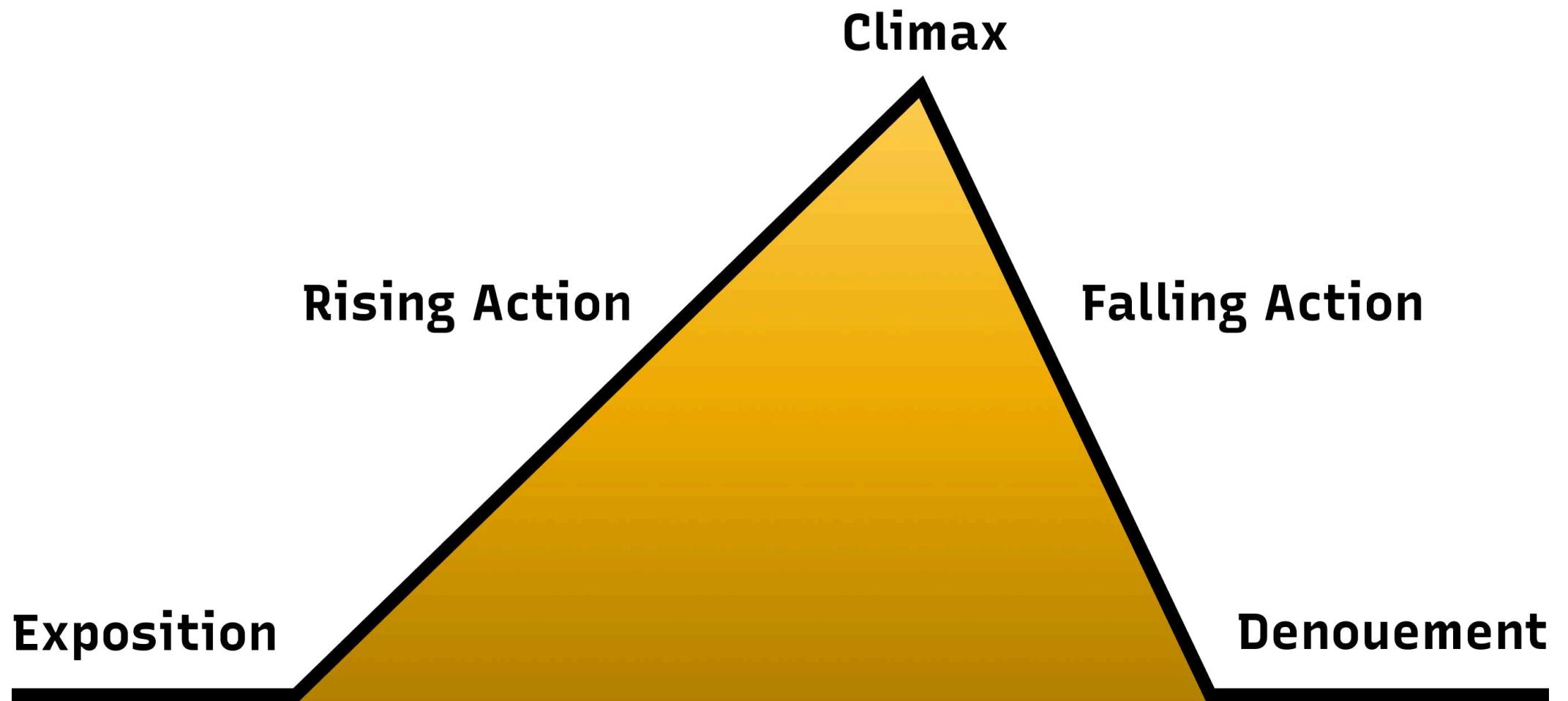


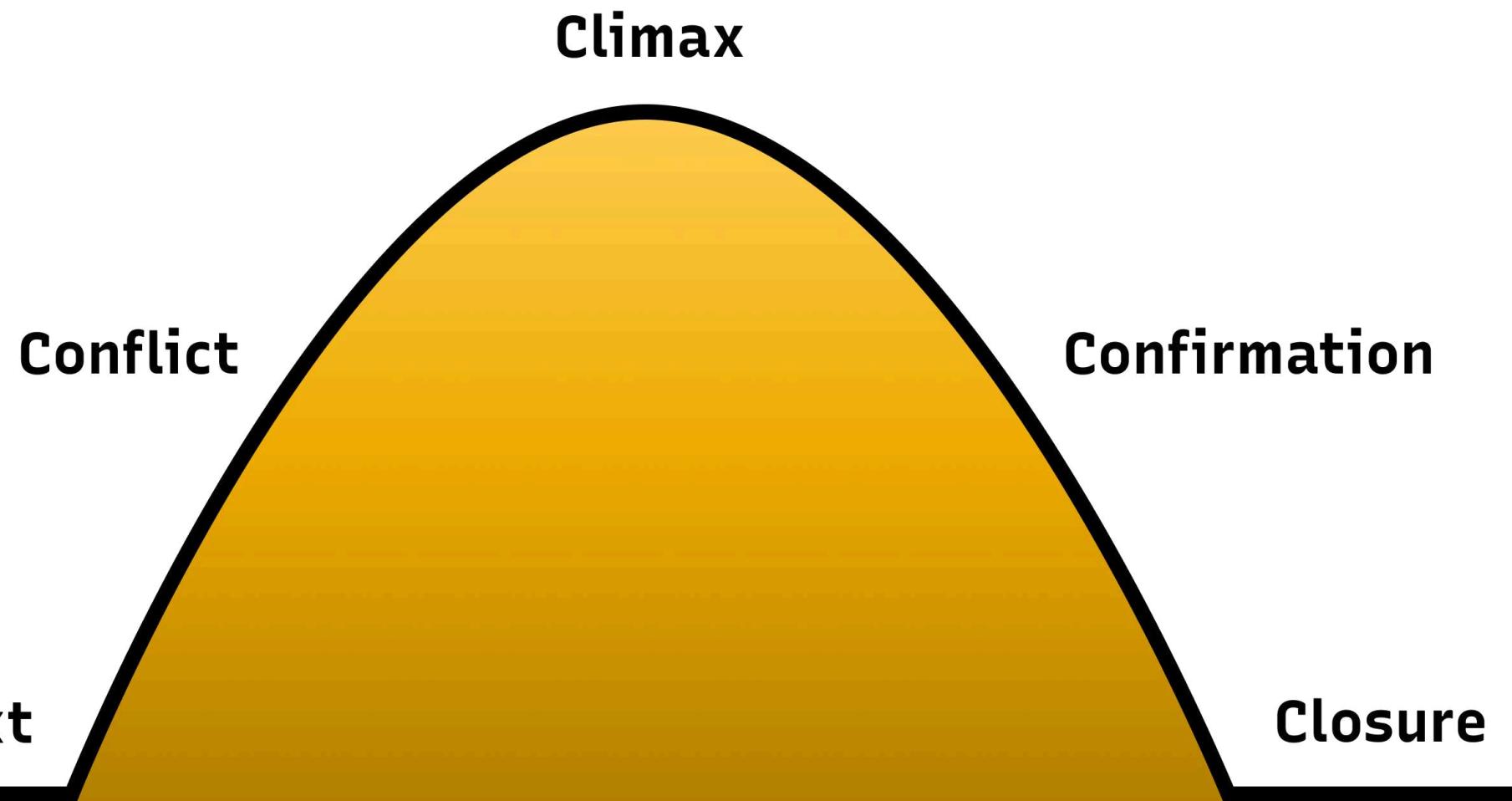
Storyboarding

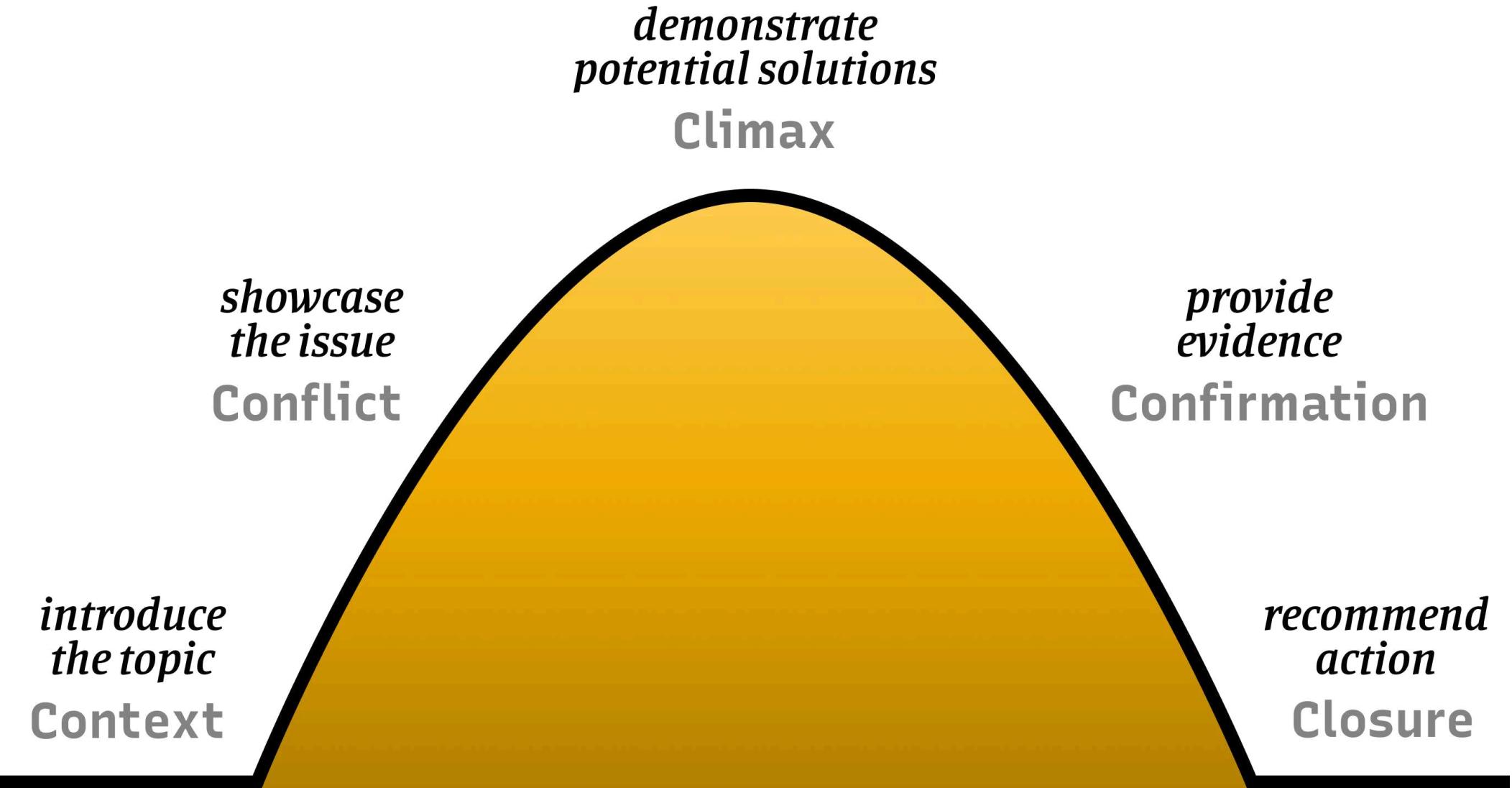
Based on your **elevator pitch**, create notes that contain steps to

1. introduce the topic
2. showcase the issue
3. demonstrate potential solutions (or explanations)
4. provide evidence
5. recommend action (or spark discussion)









Eliminating Visual Distractions



Guidelines from Elsevier

Try to reduce distracting and cluttering elements as much as possible.





clutter

also known as

"Chart Junk"

are visual elements that take up space
but do not increase understanding.

Even worse, they increase cognitive load.



"The larger the share of a graphic's ink devoted to data, the better."

E. Tufte (1983)



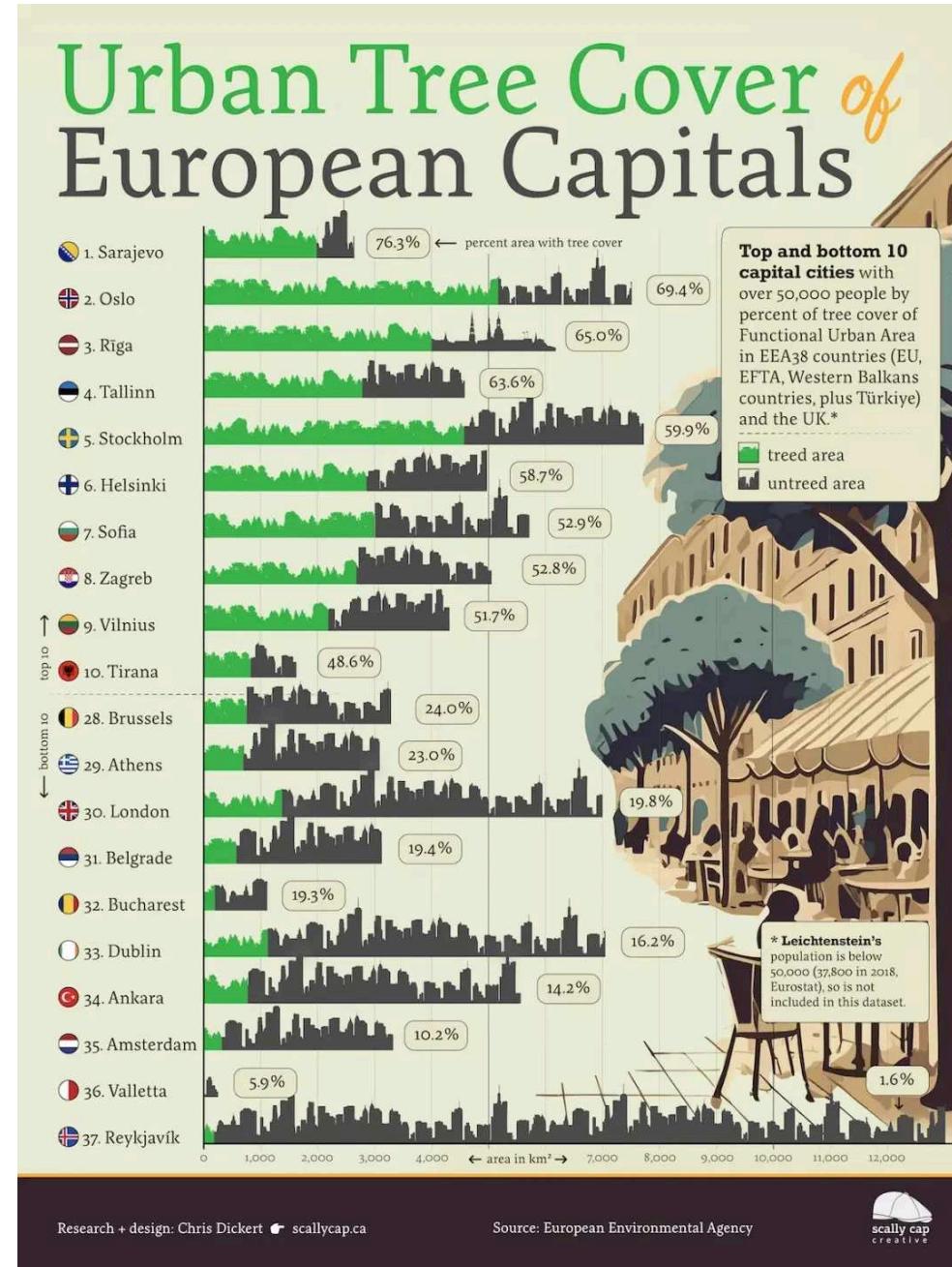
Chart junk



Found in "News that fit to print" by Arturo Perez-Reyes

Cédric Scherer Data Visualization & Information Design





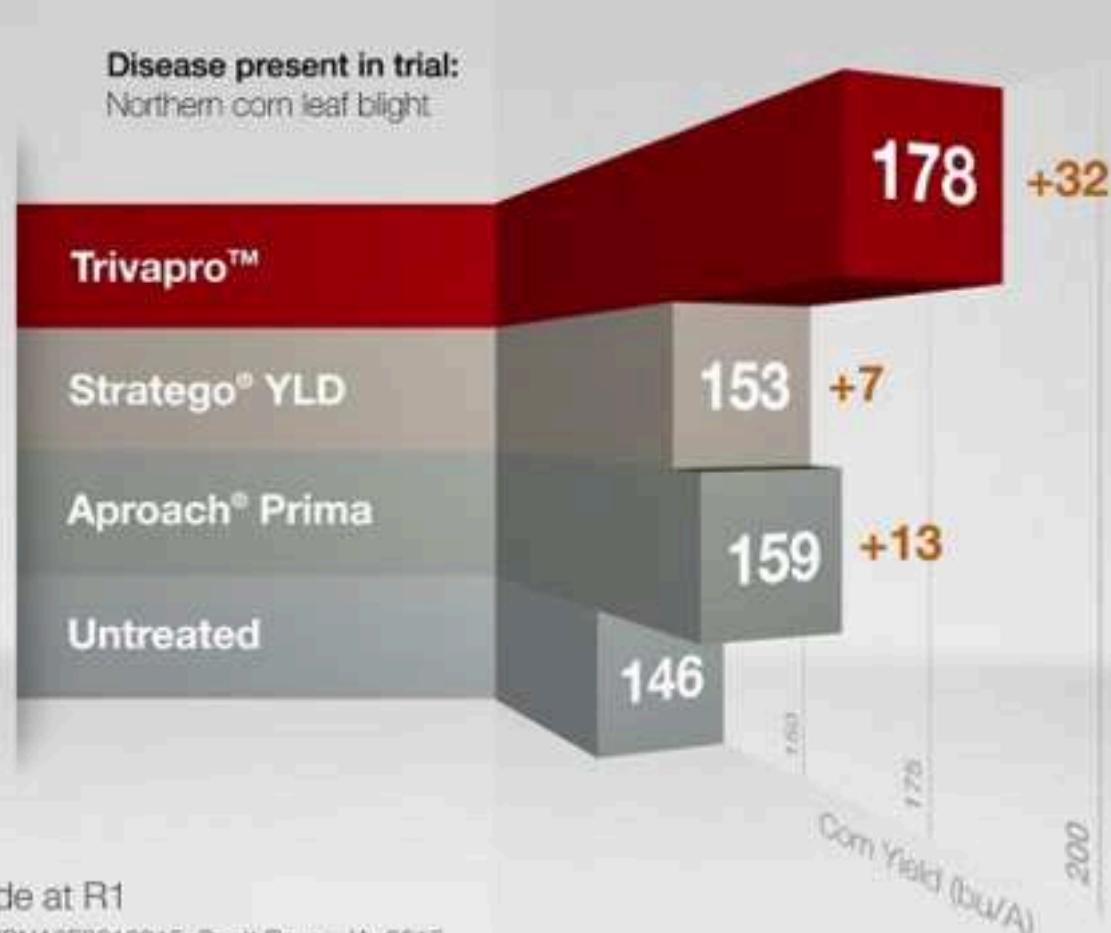
"Urban Tree Cover of European Capital Cities" by Chris Dickert

Cédric Scherer Data Visualization & Information Design



Trivapro corn yield response

In Boone, IA



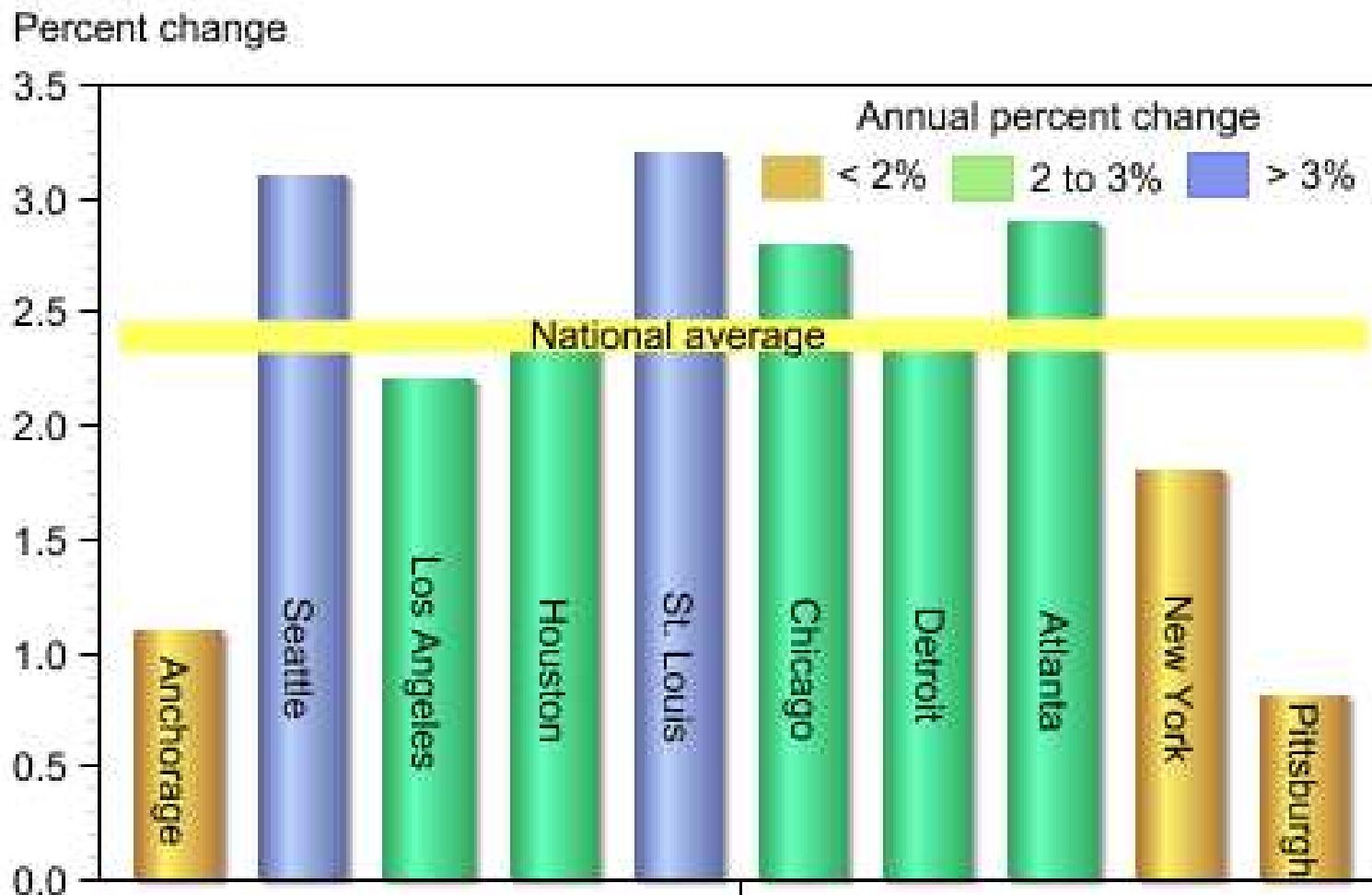
Source: Syngenta

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Annual grocery store inflation by city, 2014

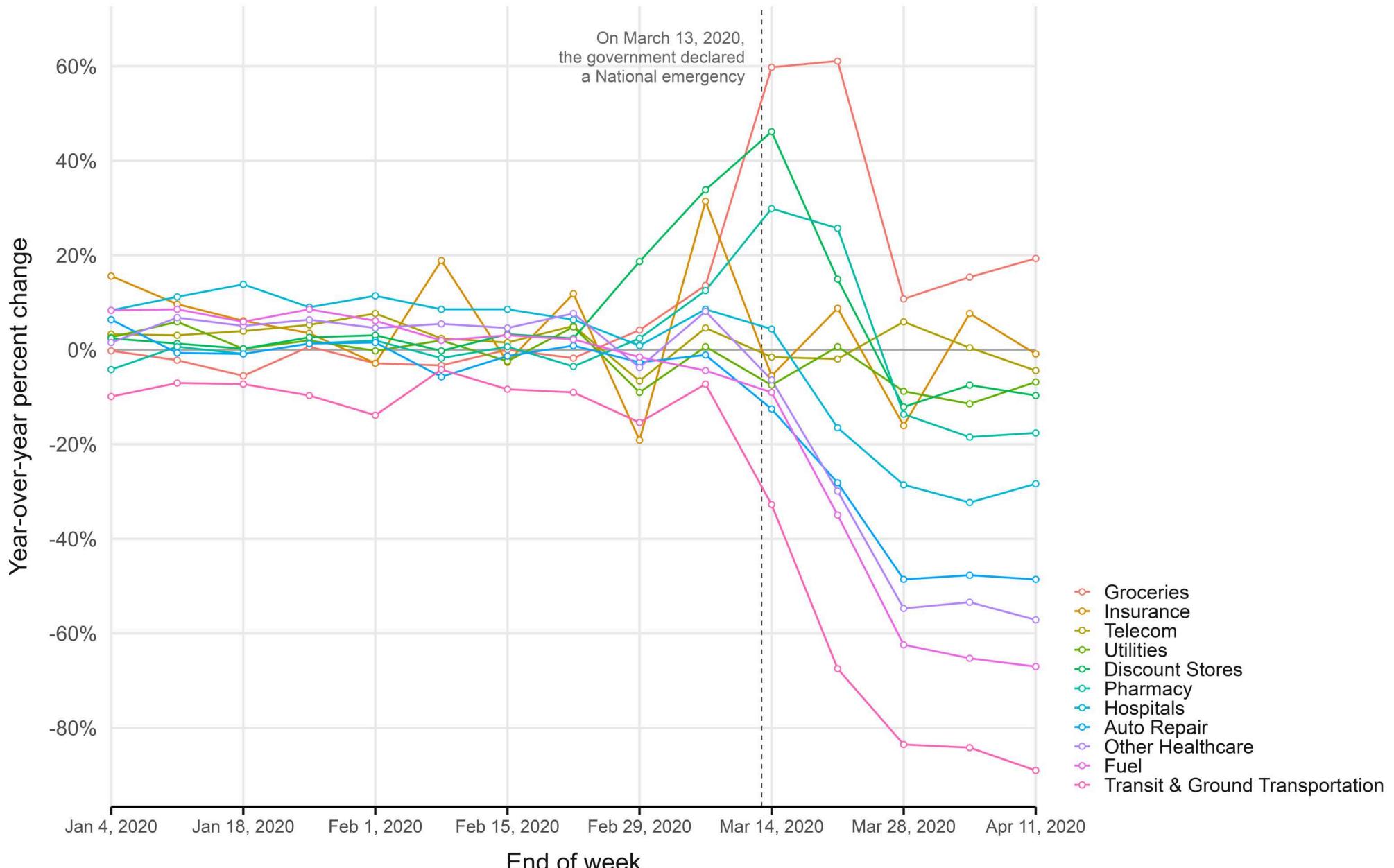
In 2014, food price inflation was higher in Seattle, St. Louis, Chicago, and Atlanta than in other metropolitan areas



Source: Calculated by ERS, USDA, using Bureau of Labor Statistics (BLS) data.



Change in spending by essential category



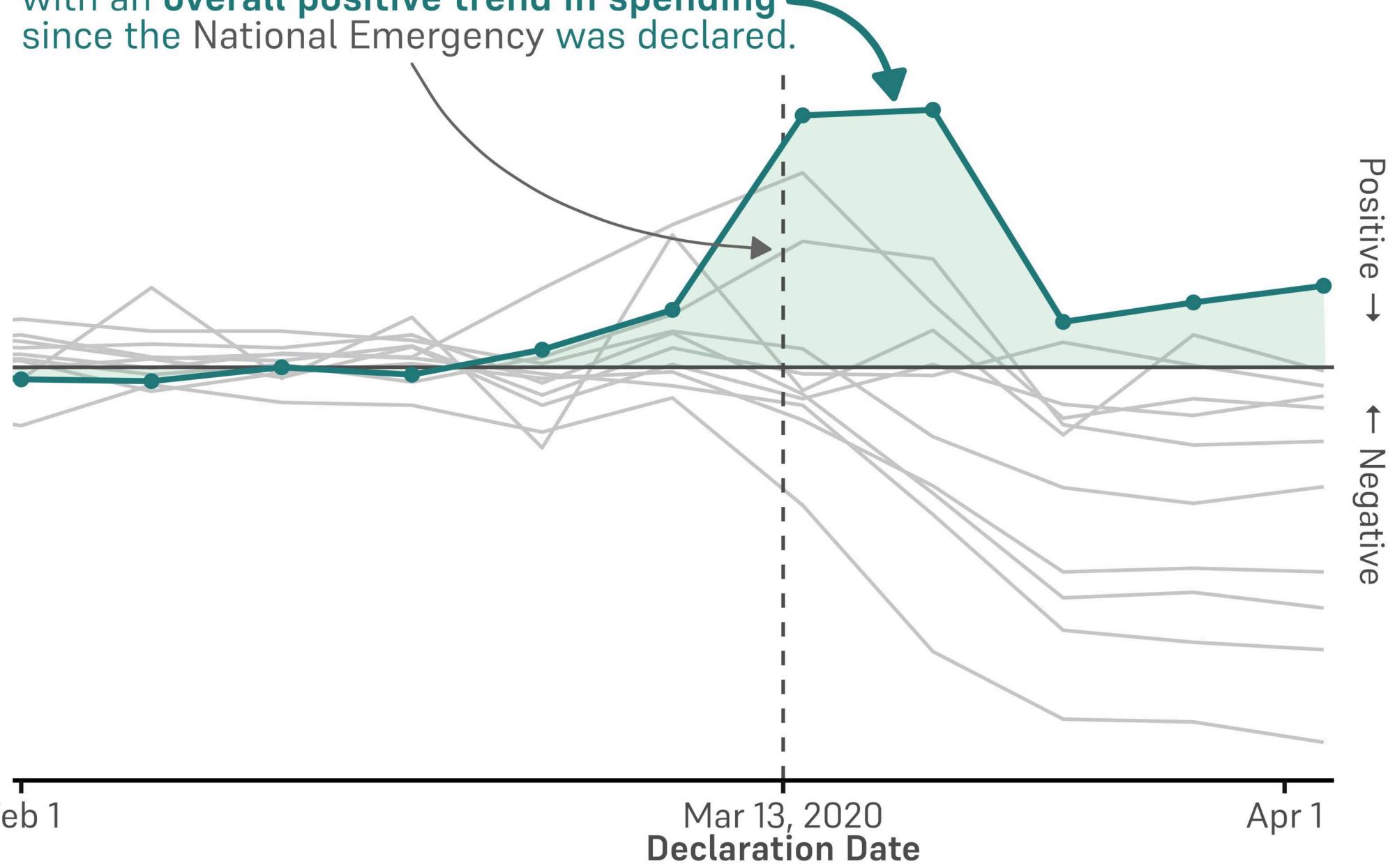
Your Turn!

Discuss why the visualization is unsuitable for a graphical abstract.

- Identify the main message of the graphic.
- What are unnecessary details?
- Which elements are distracting or even confusing?
- How could we adjust the chart to emphasize the main message?

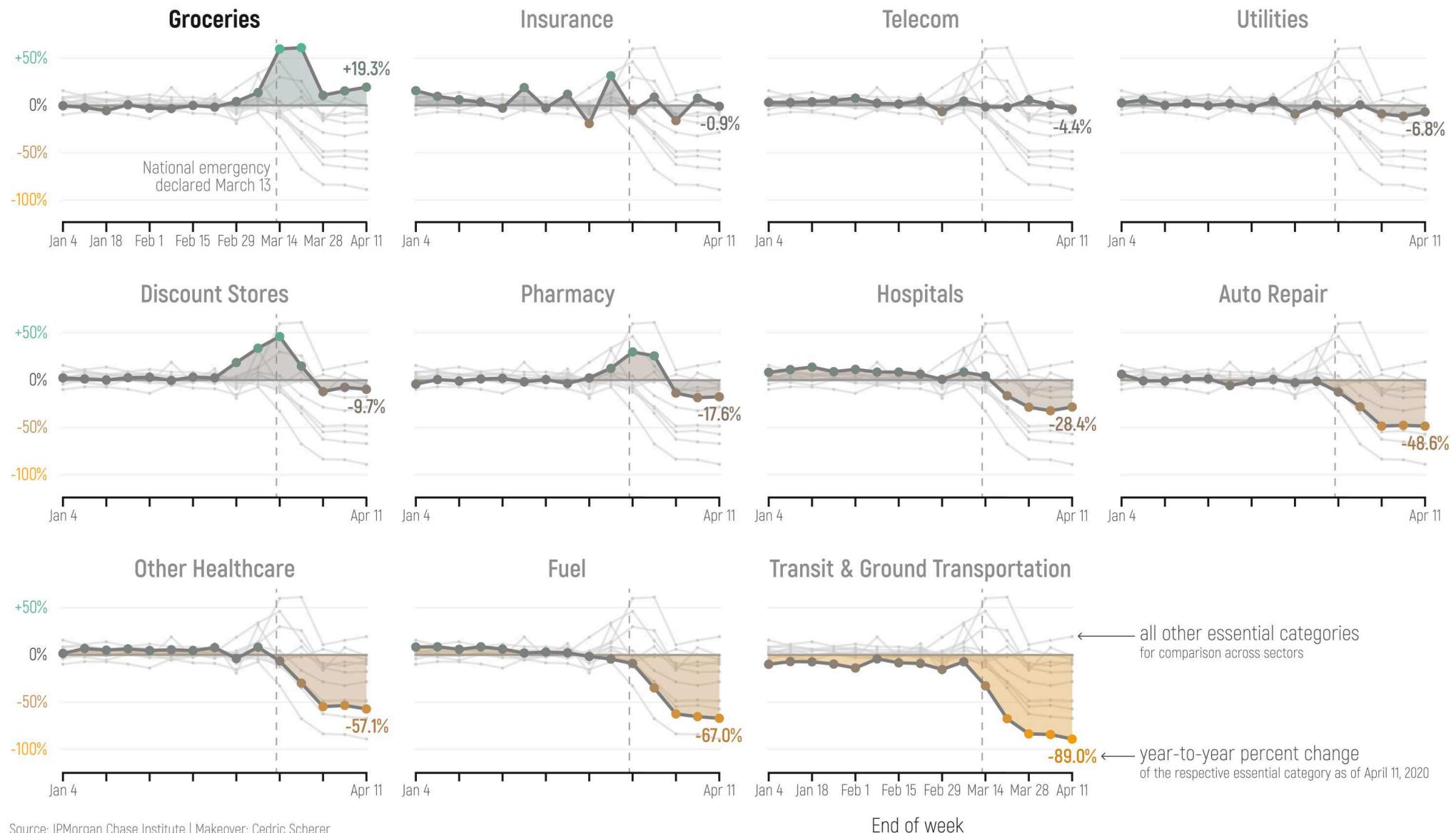


Groceries are the only essential category with an **overall positive trend in spending** since the National Emergency was declared.



Grocery sales were the only essential category to rise since the National Emergency

All other essential categories experienced negative trends in year-over-year percent changes in spending after the National Emergency was declared.



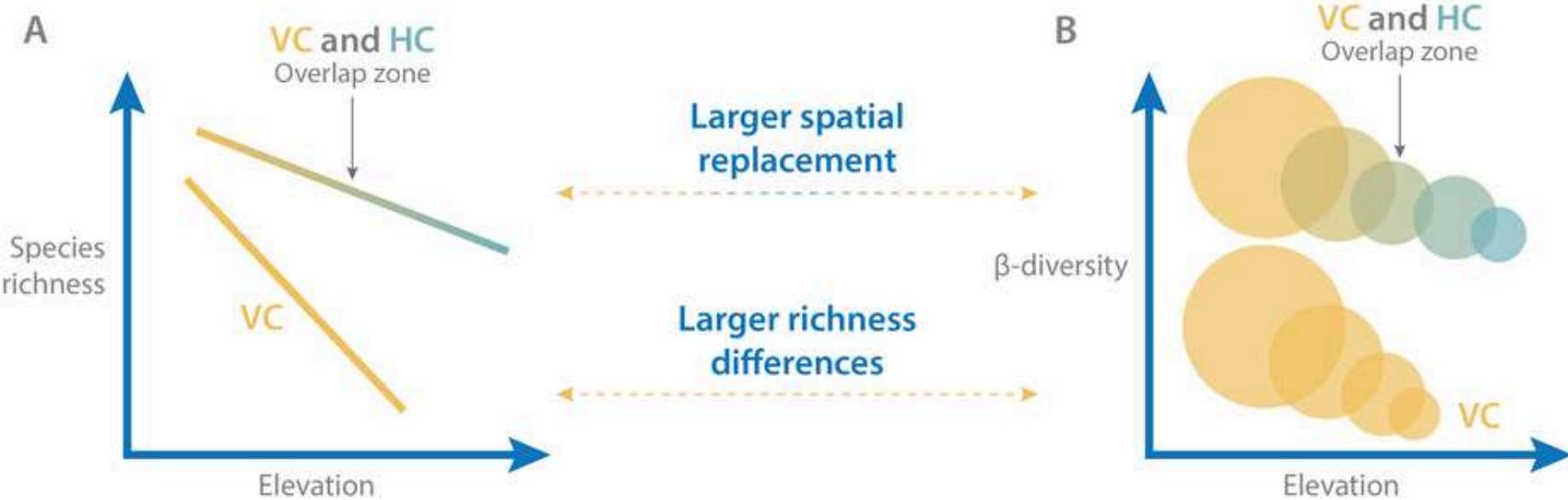
Source: JPMorgan Chase Institute | Makeover: Cedric Scherer



Vertical colonization (VC)



Horizontal colonization (HC)



Joaqui et al. (2021) *Journal of Biogeography* 48:1284-1295

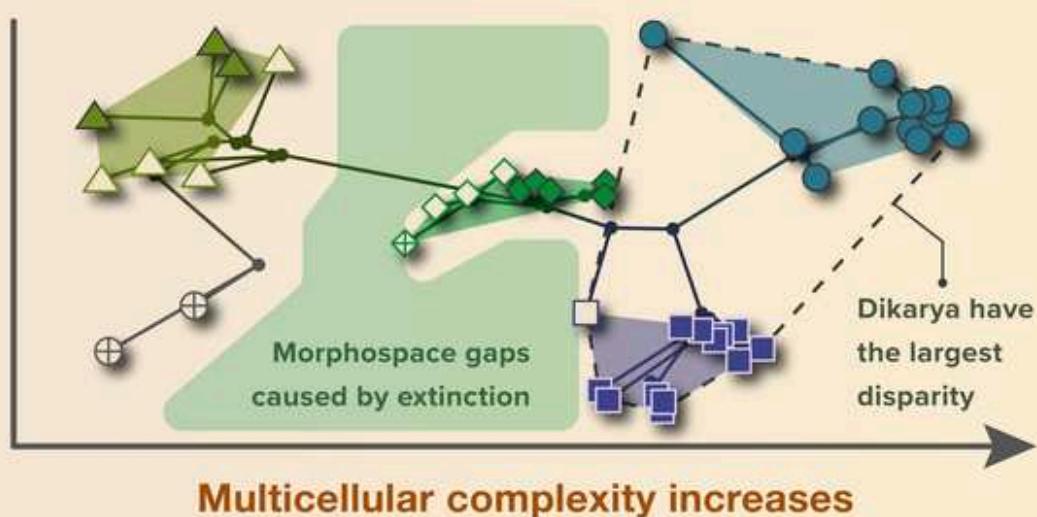
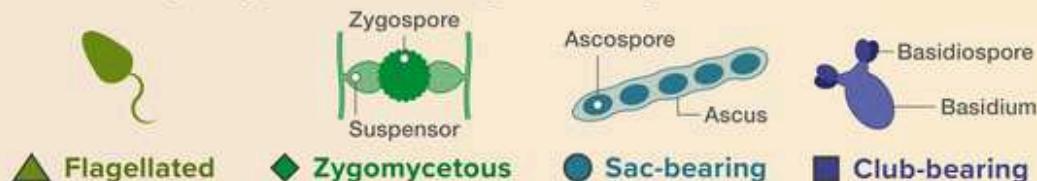
Cédric Scherer Data Visualization & Information Design



How did fungi evolve their amazing anatomical variety of today?

We found that four morphotypes define the disparity of fungi

These morphotypes are distinguished by cellular characters



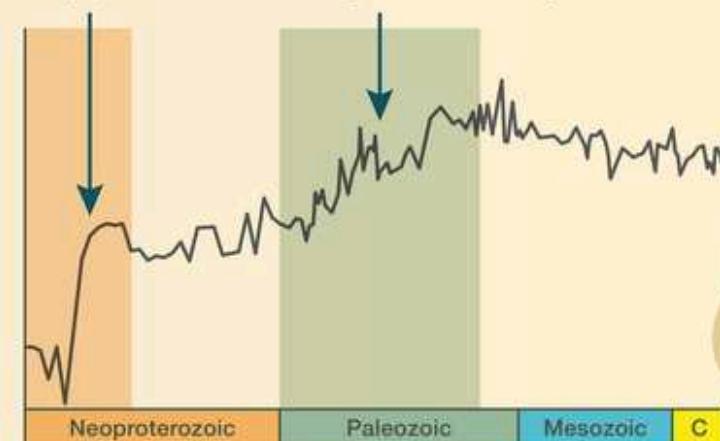
Fungal disparity expands episodically through time

End-Tonian

First multicellular body plans

Cambrian- Carboniferous

Diversification of complex fruiting bodies in Dikarya



Increases in disparity relate to **organismal complexity**, not gene number, genome size or taxonomic diversity

Increasing their multicellular complexity coincided with a drastic increase in fungal anatomical variety



Show Just Enough Detail



Checklist

- Keep visuals **clean and minimal**—remove excess labels, text, and decorative elements.
Use **simplified illustrations** rather than complex images.
- Provide only **essential data**, not full datasets or detailed metrics.



Show Just Enough Detail

Good

A streamlined figure highlighting one key trend with meaningful titles and labels.

Bad

A crowded visual with too many arrows, labels, and unrelated details.



Your Turn!

Decide which details are essential to transport the key message of **“The Three Little Pigs”**. What are unnecessary details one can exclude?

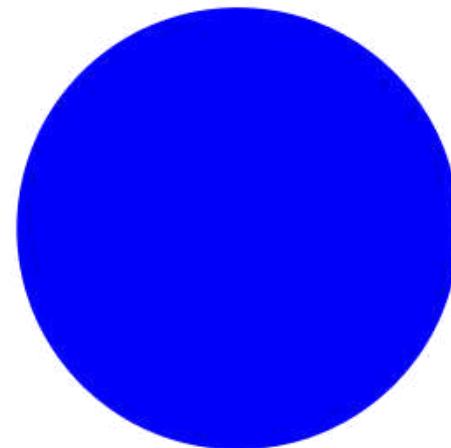
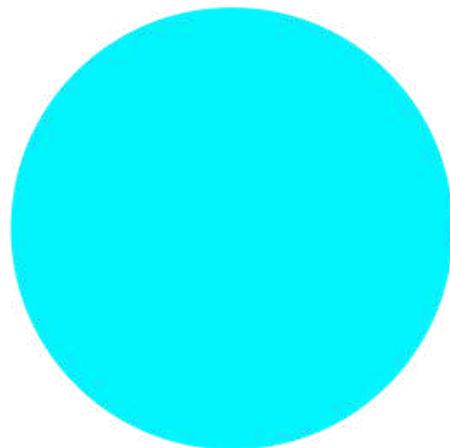
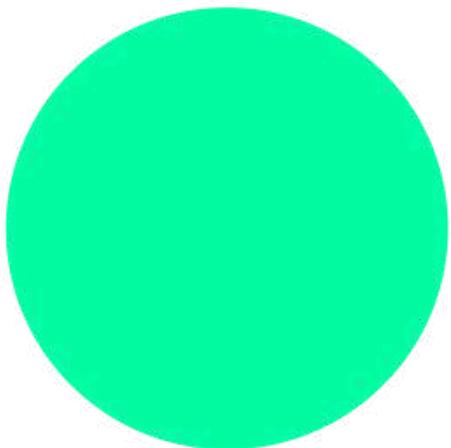
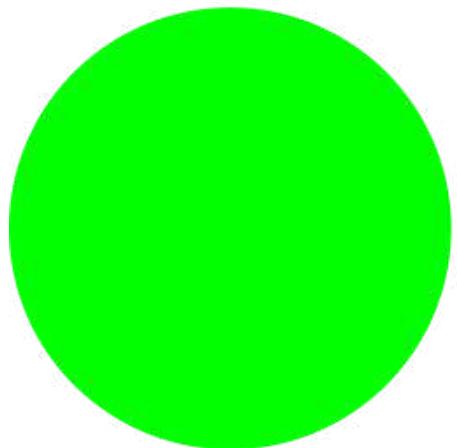
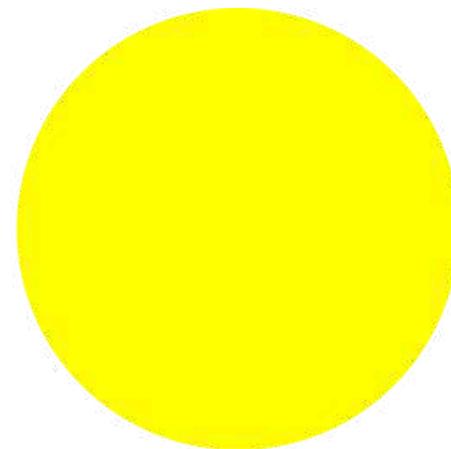
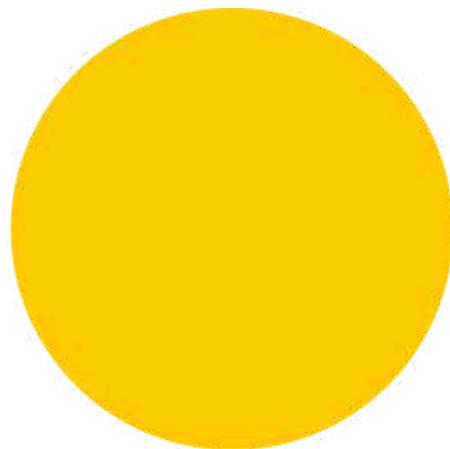
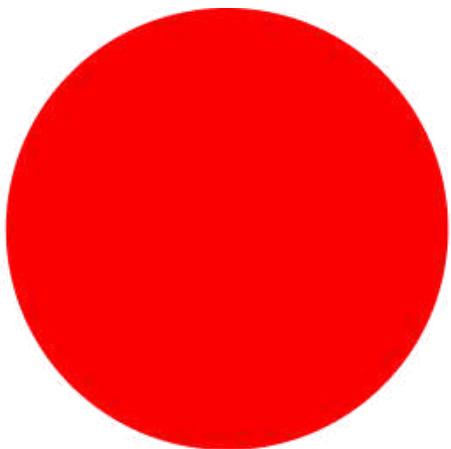
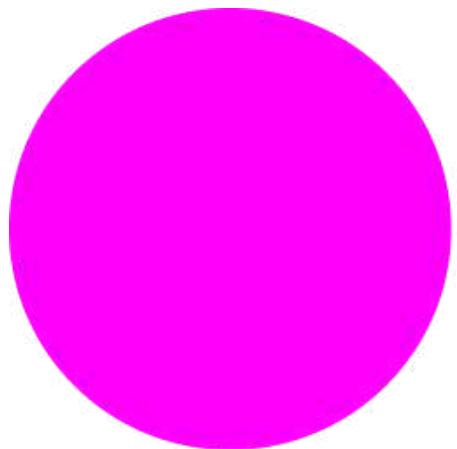


Rule 4

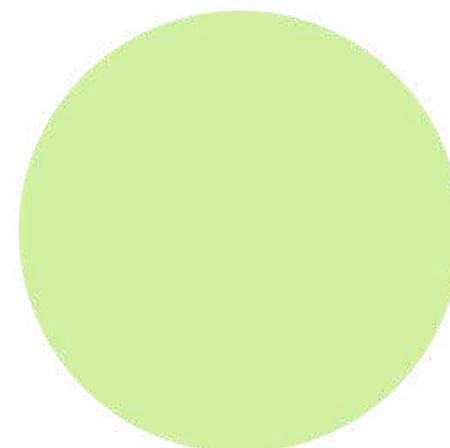
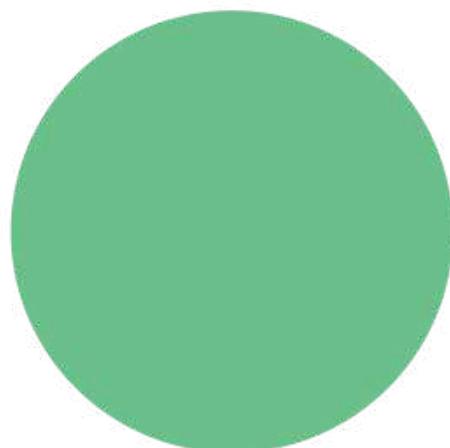
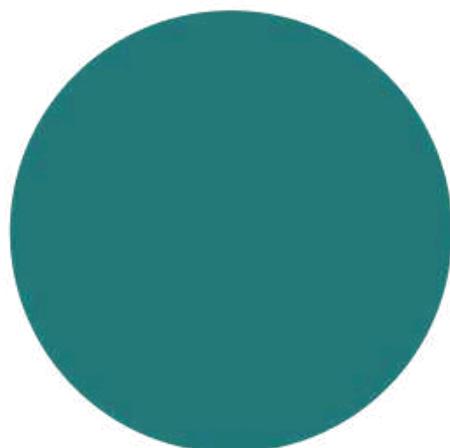
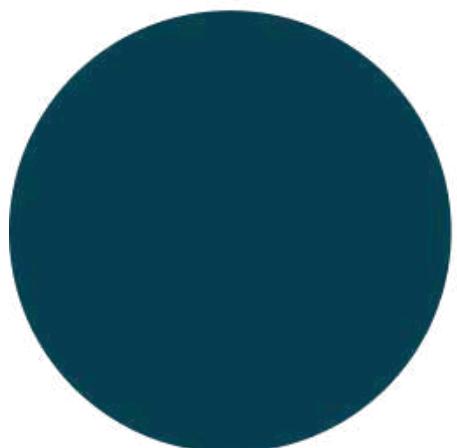
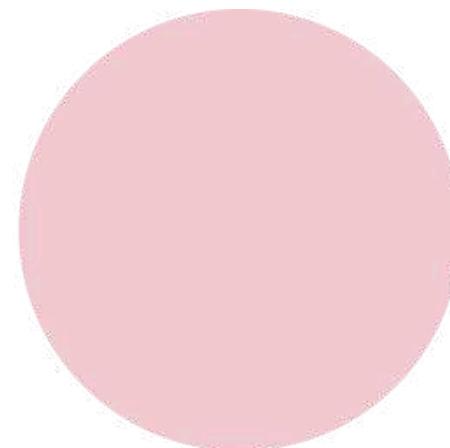
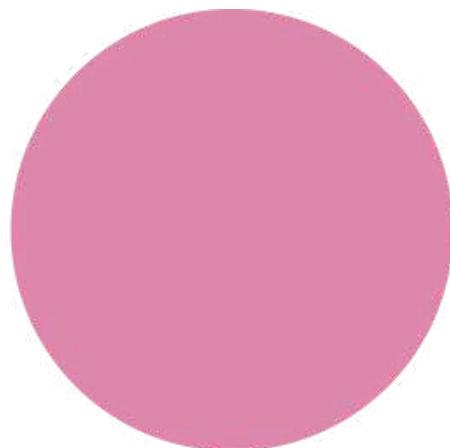
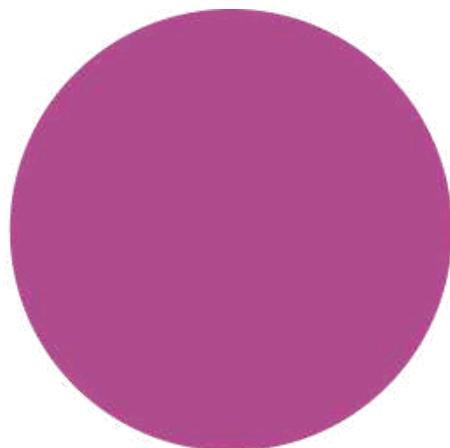
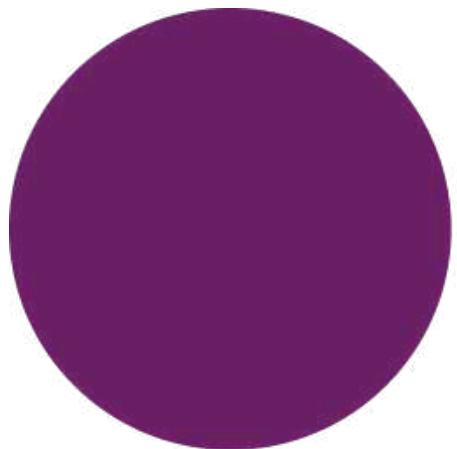
Maintain a Unified Visual Language



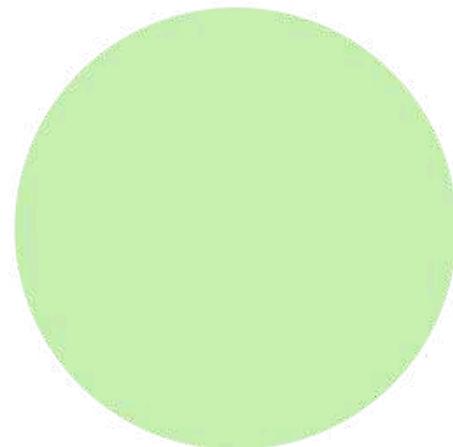
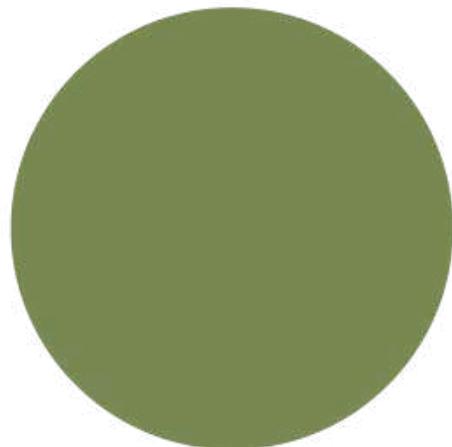
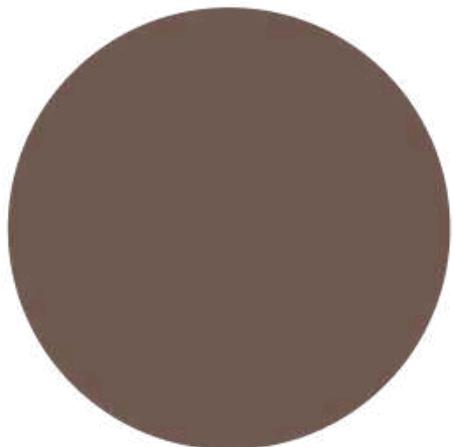
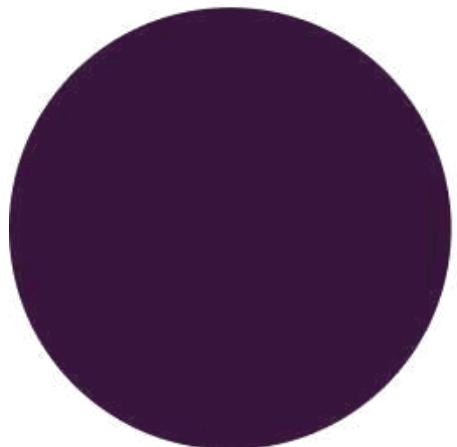
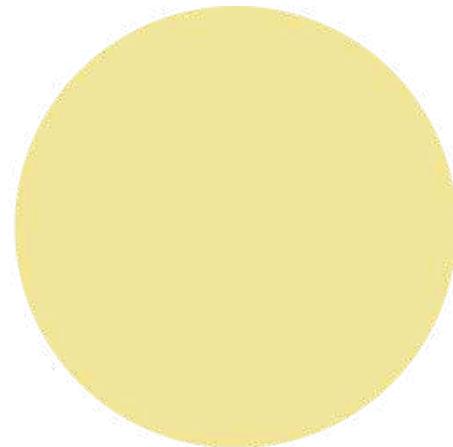
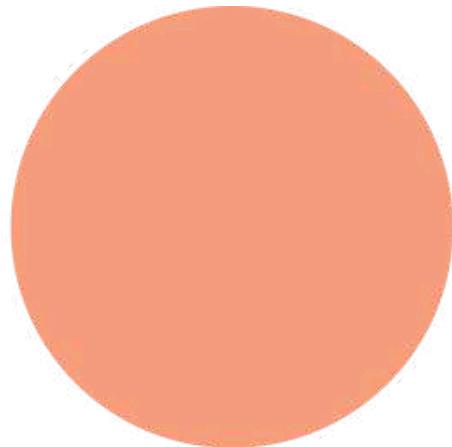
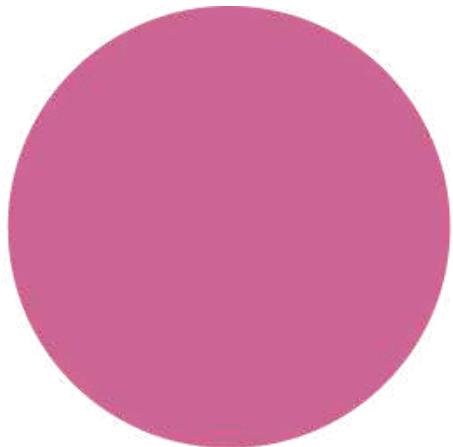
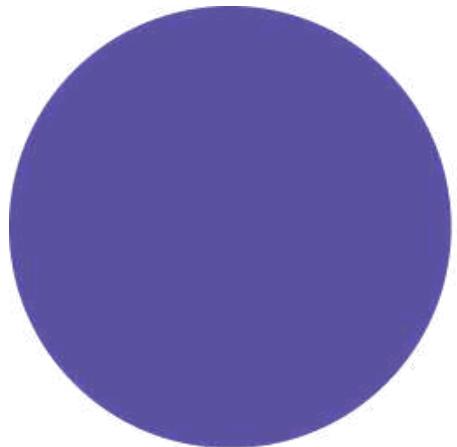
Avoid Extreme Colors



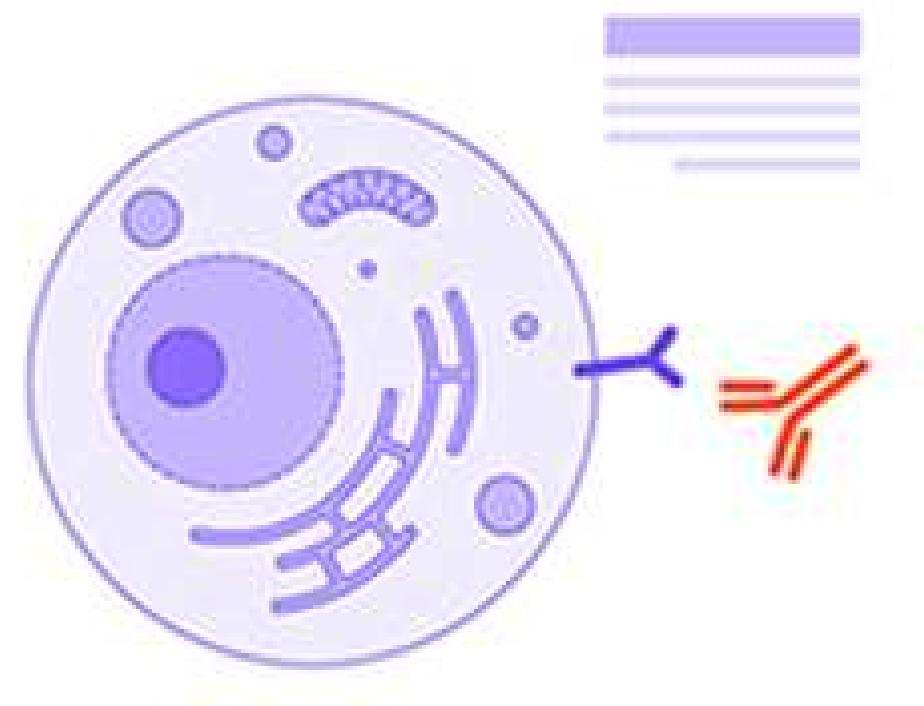
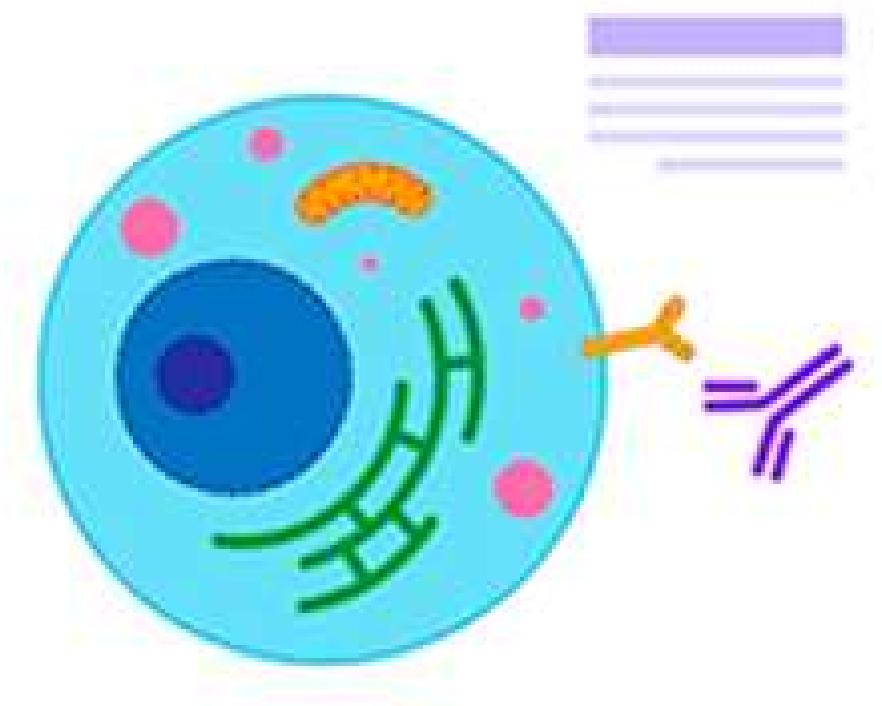
Use Color Shades



Use Color Shades



Limit Your Colors



Source: [Catalyzing Science](#)



Aa

Heureka!

Aa

Heureka!

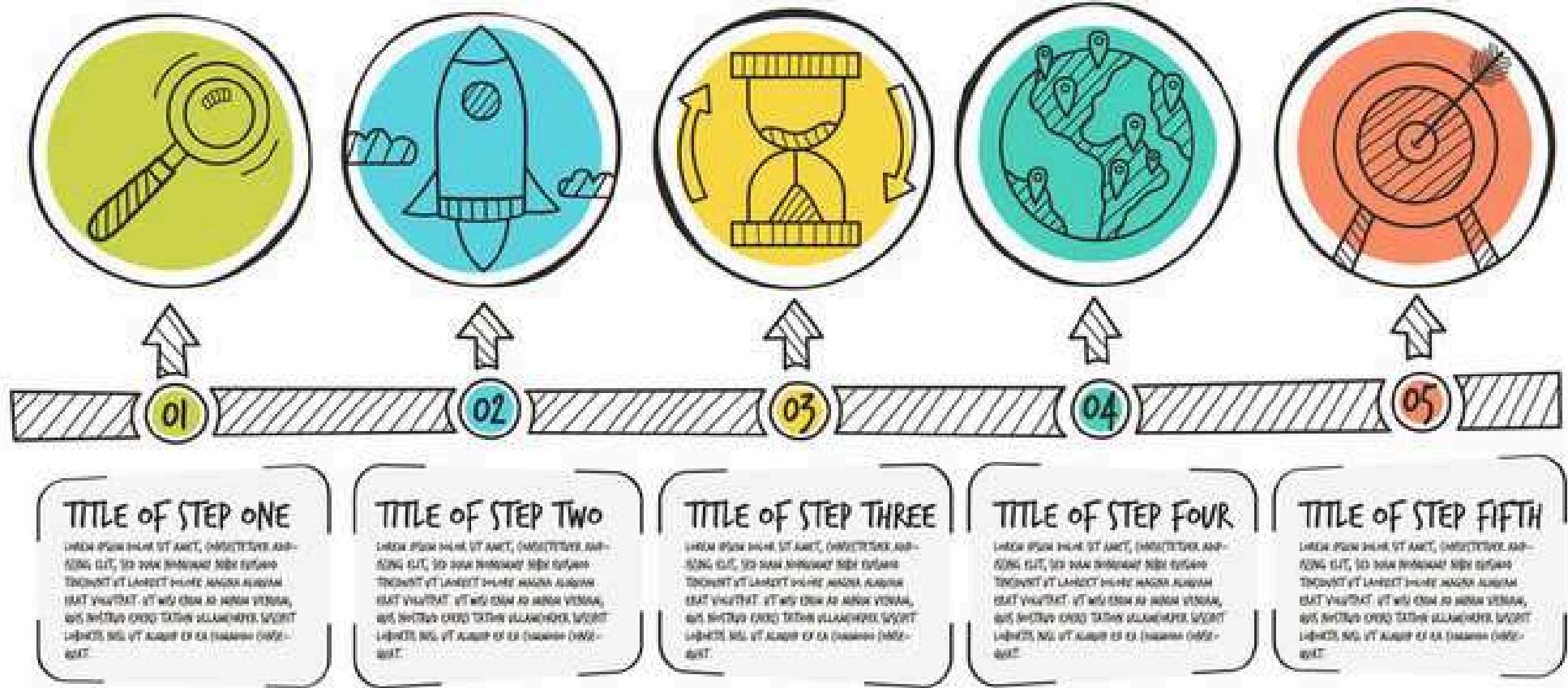


Typefaces

If not requested by the journal, avoid serif typefaces.

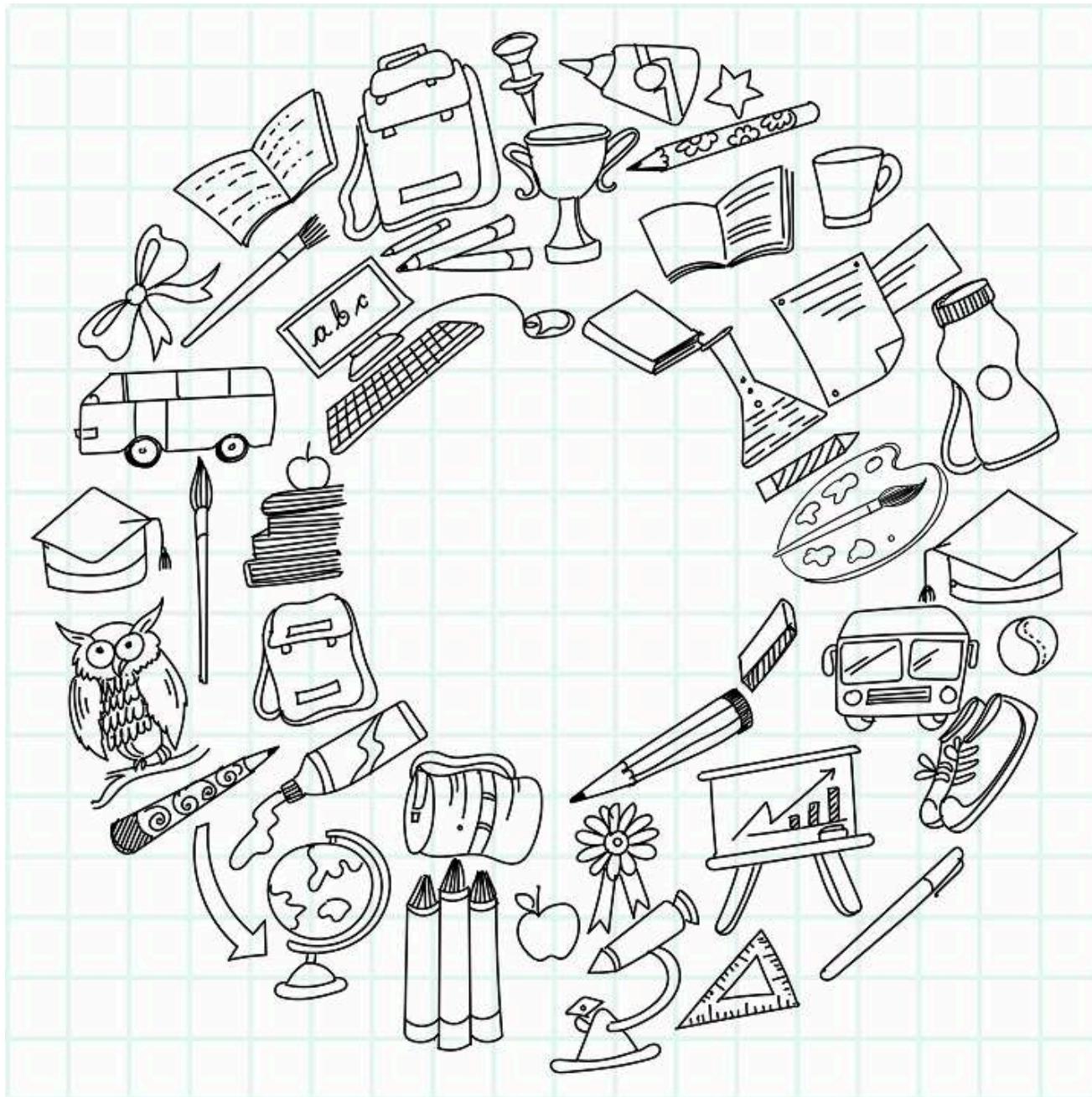
Make use of a **sans serif typeface** as they are often simpler, easier to read, and appear more modern.





Source: Adobe Stock





Source: freepik

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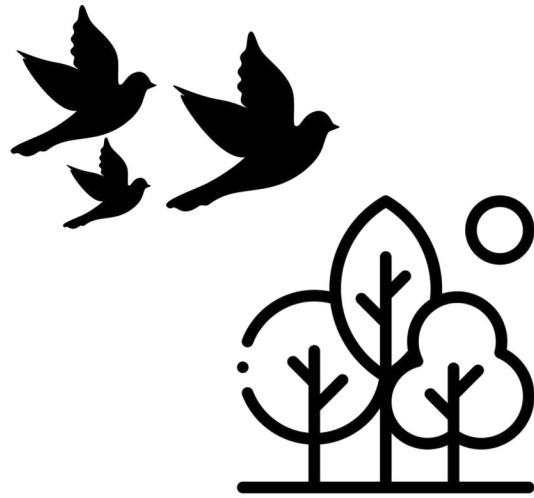


Illustration Style

Whilst **drawn illustrations that resemble cartoon figures** may be appropriate for young audiences and light hearted subject matter, **be careful with their use in a scientific context.**



Avoid a Mix of Different Styles



OR

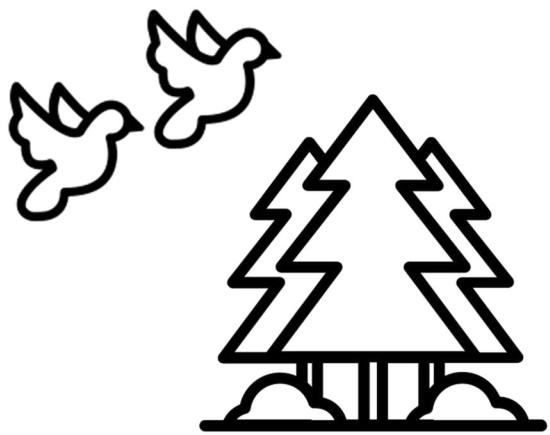


**observe
15 minutes**

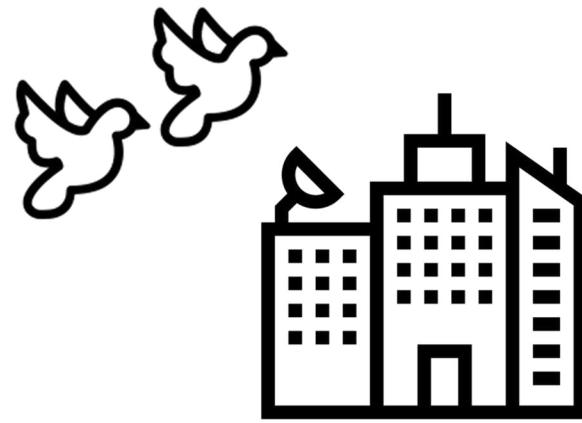


Icons from Freepik

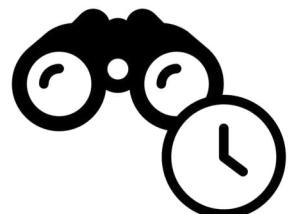
Avoid a Mix of Different Styles



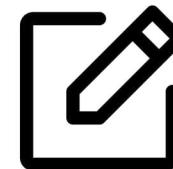
OR



15 minutes
observation



occurrence
data

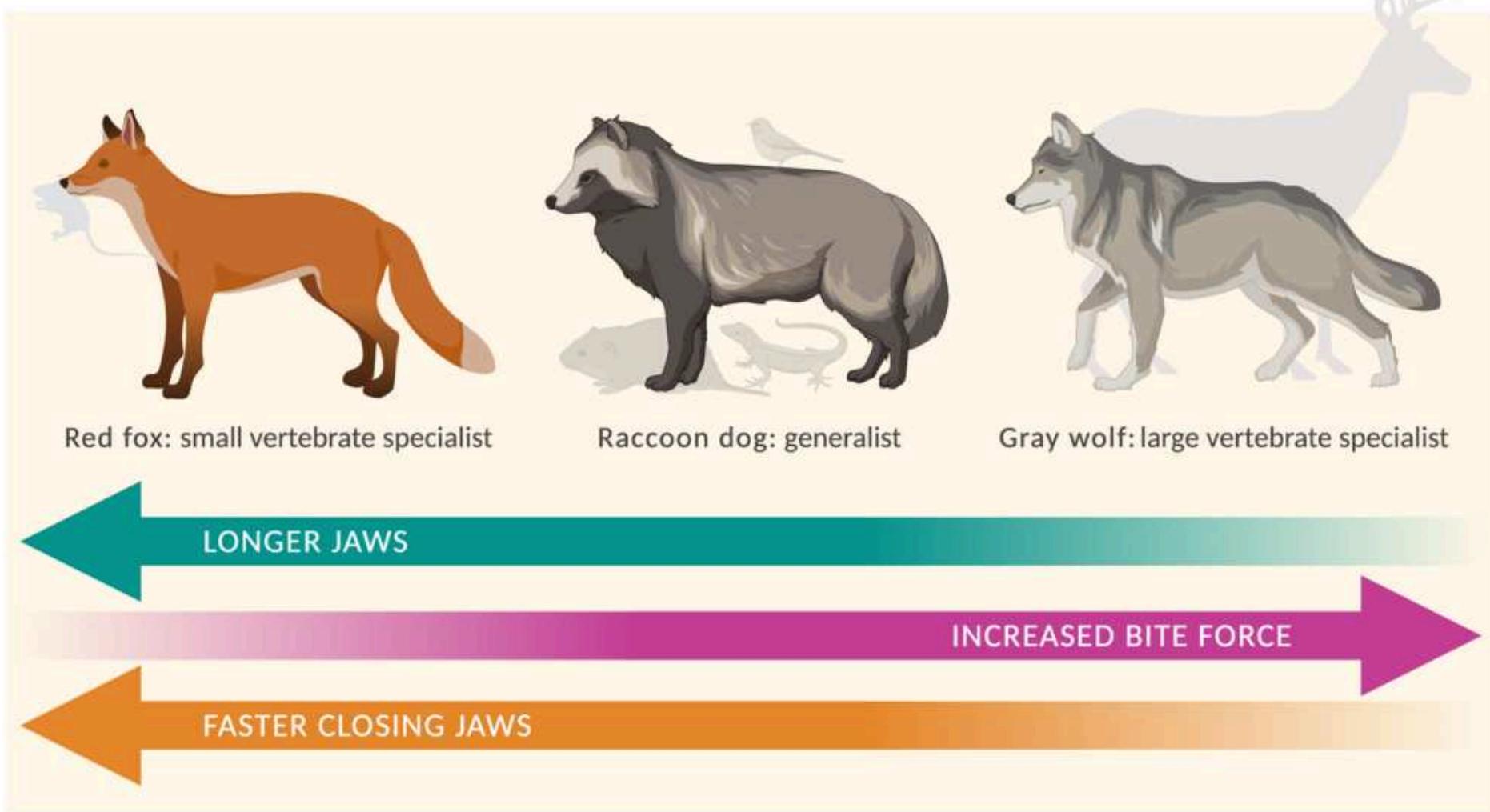


Icons from Freepik, Flaticon, and Icons8

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THE SKULLS OF CANIDS CAN TELL US WHAT THEY EAT...



Graphical abstract for Slater et al., 2009. Implications of predatory specialization for cranial form and function in canids. *Journal of Zoology*. doi: 10.1111/j.1469-7998.2009.00567.x

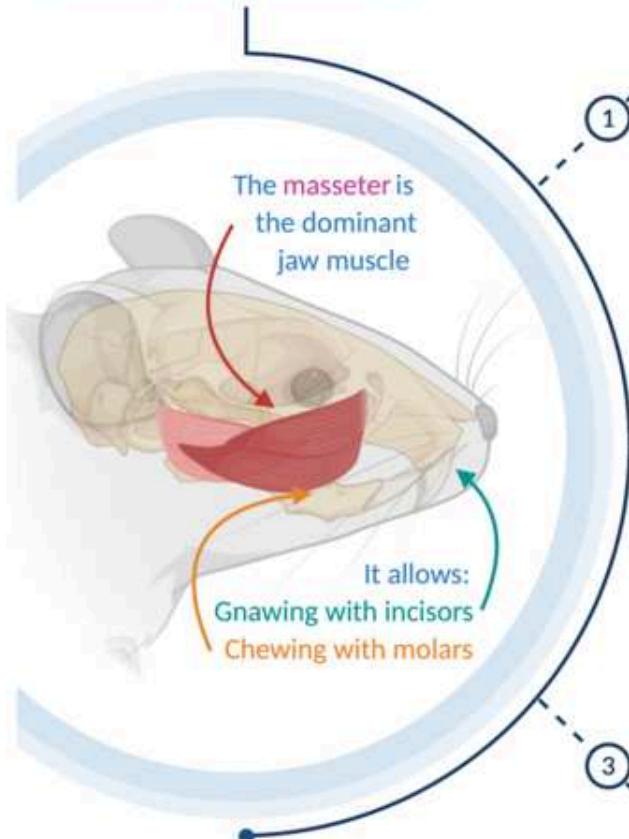
Slater et al. (2009) *Journal of Zoology* 278:181-188

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RODENTS

Have three different jaw muscle configurations



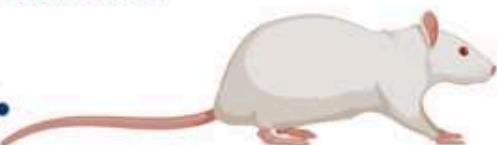
They are determined by how the masseter expands anteriorly



Hystricomorph condition



Myomorph condition



Are these different configurations better for gnawing or chewing?

MORE EFFICIENT FOR INCISOR GNAWING



Ideal for a diet of nuts and seeds

MORE EFFICIENT FOR MOLAR CHEWING



Ideal for a diet of grass

EFFICIENT FOR INCISOR GNAWING AND MOLAR CHEWING



Ideal for a generalist diet

Graphical abstract for Cox et al., 2012.

Functional evolution of the feeding system in rodents.
PLoS ONE. doi: 10.1371/journal.pone.0036299

Graphical abstract designed by Nuria Melisa Morales Garcia.
Twitter: @NuriaMelisaMor1

Cox et al. (2012) *PLoS ONE* 7(8):e4188

Cédric Scherer Data Visualization & Information Design



Maintain a Unified Visual Language



Checklist

- Ensure **consistent fonts and icon styles**.
Choose a **limited color palette** that enhances readability.
- Avoid **mixing** different illustration styles and palettes.



Maintain a Unified Visual Language

Good

A well-balanced design where all icons, fonts, and colors match.

Bad

A colorful mix of pixel-art icons, 3D effects, and hand-drawn sketches.



Your Turn!

Choose a consistent visual style for the **pigs**,
wolf, and **houses**.

Decide on a suitable color palette and typeface.



Rule 5

Ensure Readability and Accessibility



Aa

Heureka!

1I1

Aa

Heureka!

1I1



Aa

Heureka!

1ll

Aa

Heureka!

1||



Alignment

- Ensure **consistent alignment of elements** to create visual harmony.
- **Text should typically be left-aligned** for easy reading, especially for longer paragraphs.
- Allow for **sufficient white space** between elements.
- Pay attention to **box sizing and alignment**, especially in multi-column or -row designs.



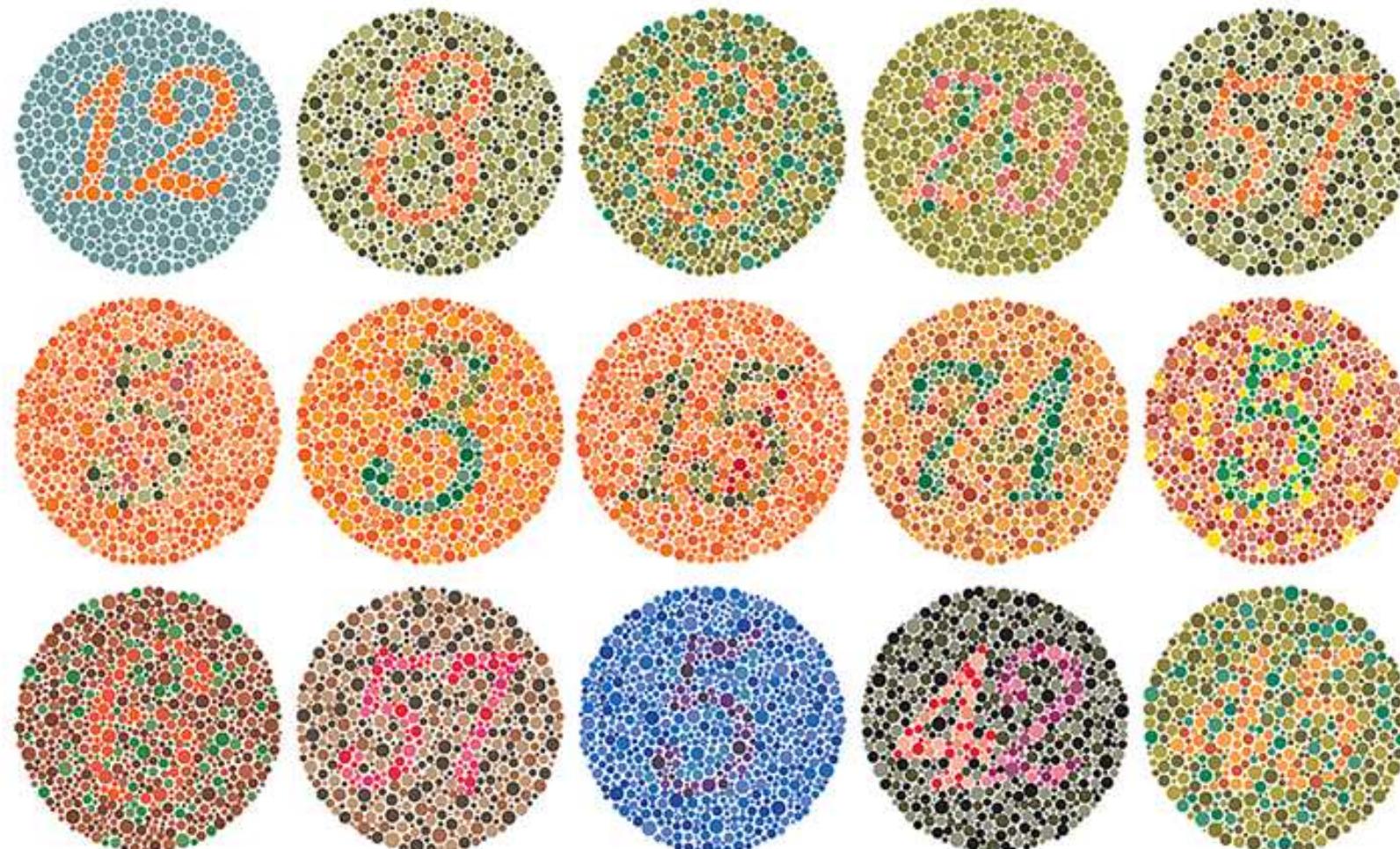
If used carelessly,
justified alignment can result in large gaps between words and letters.

Source: balsamiq.com

Cédric Scherer Data Visualization & Information Design



Design with the Colorblind in Mind

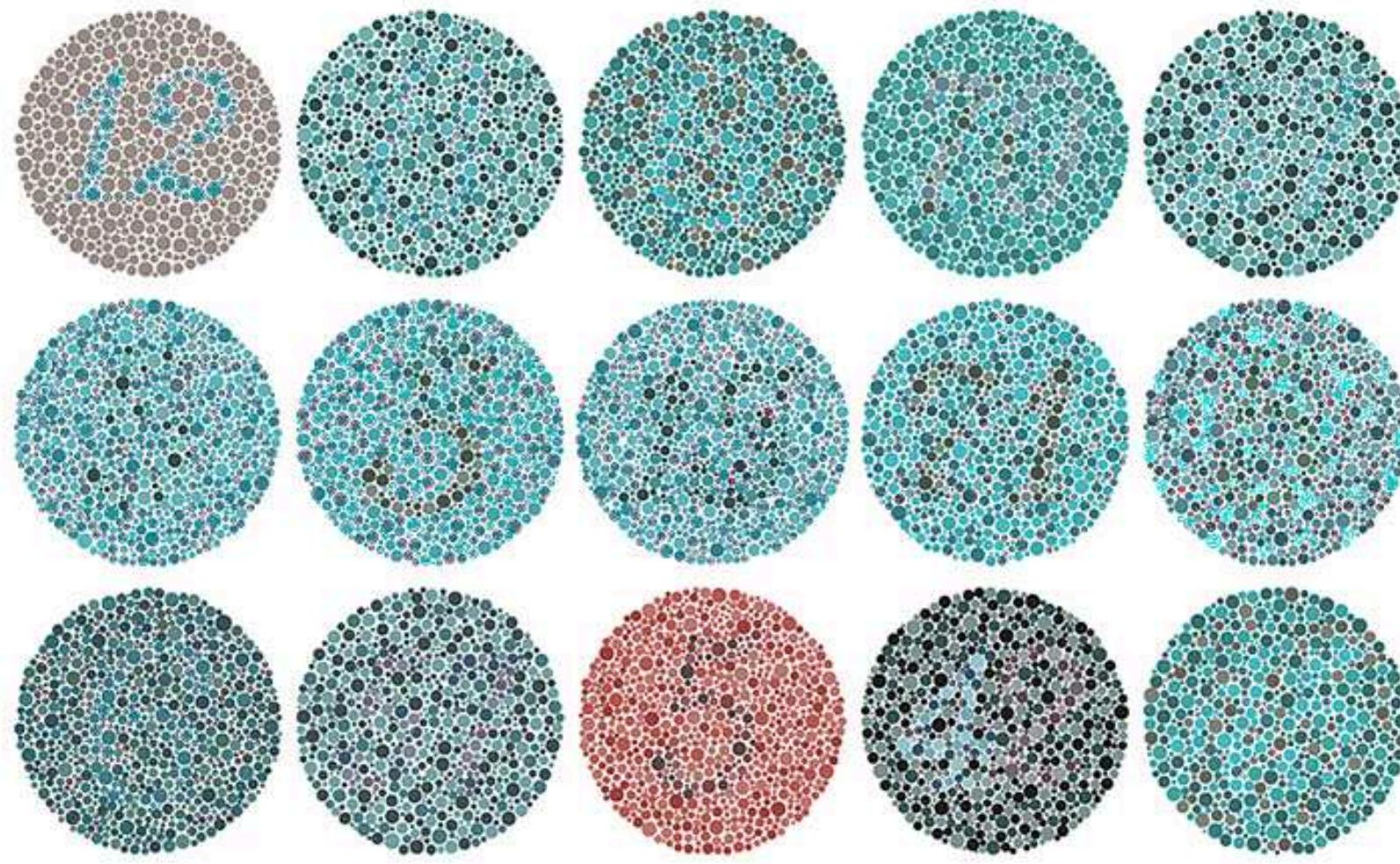


Source: Sarjak Thakkar

Cédric Scherer Data Visualization & Information Design



Design with the Colorblind in Mind

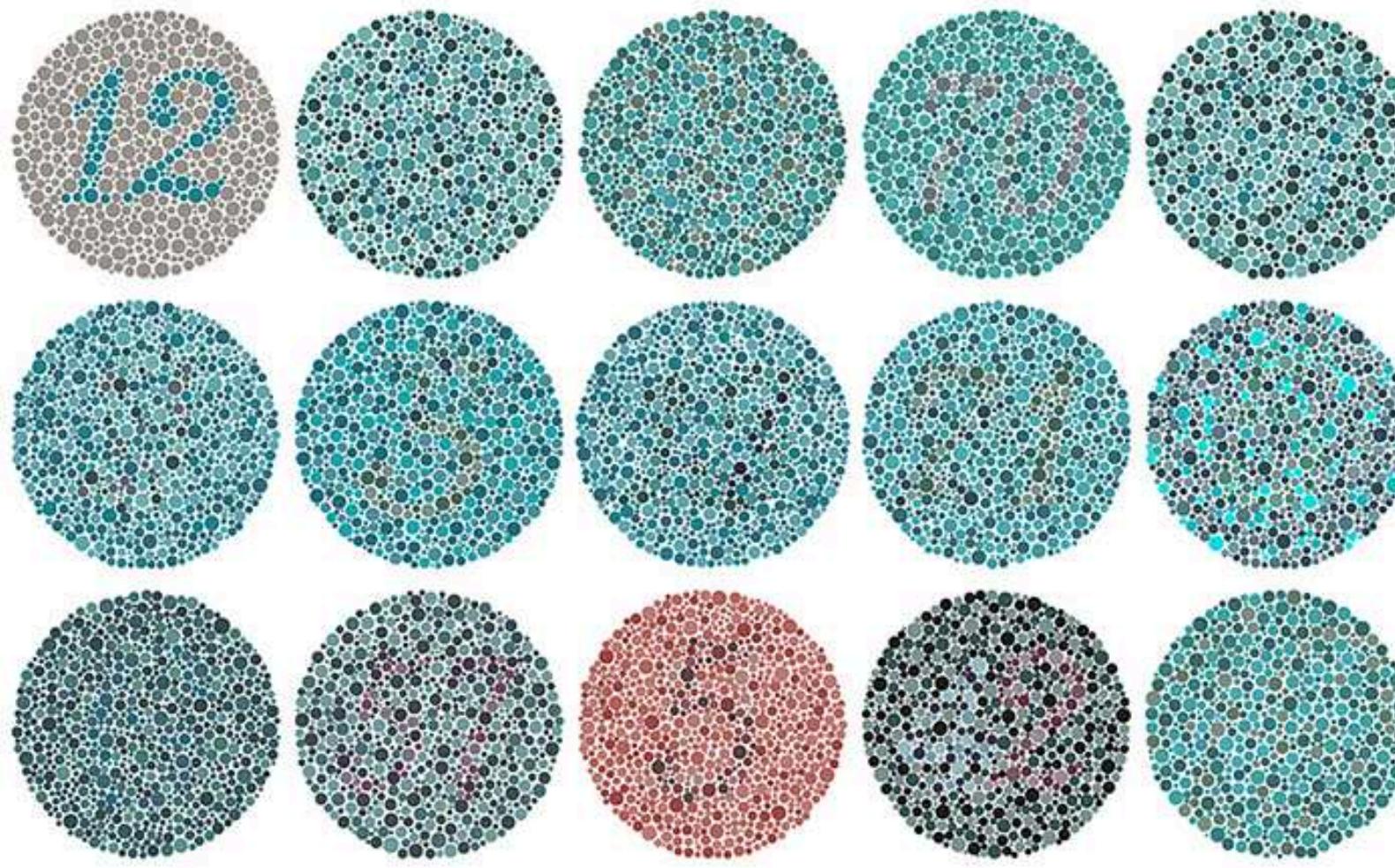


Source: Sarjak Thakkar

Cédric Scherer Data Visualization & Information Design



Design with the Colorblind in Mind



Source: Sarjak Thakkar

Cédric Scherer Data Visualization & Information Design



Design with the Colorblind in Mind

original



deuteranomaly



protanomaly



tritanomaly



Source: "Fundamentals of Data Visualization" by Claus O. Wilke

Cédric Scherer Data Visualization & Information Design

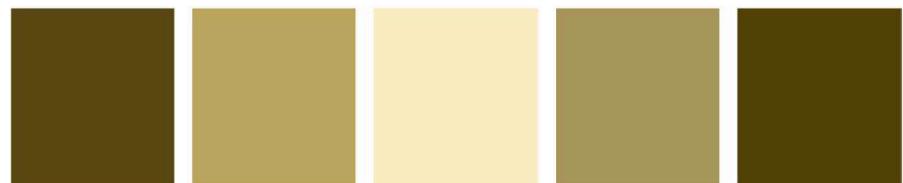


Design with the Colorblind in Mind

original



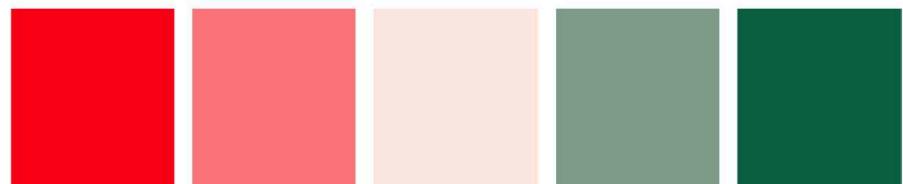
deuteranomaly



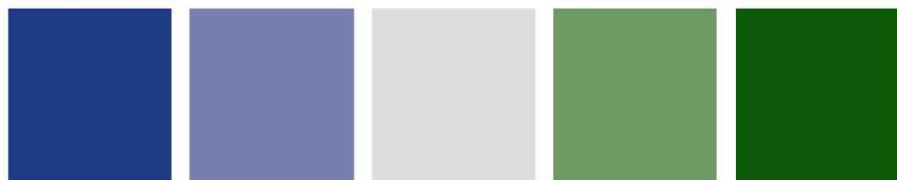
protanomaly



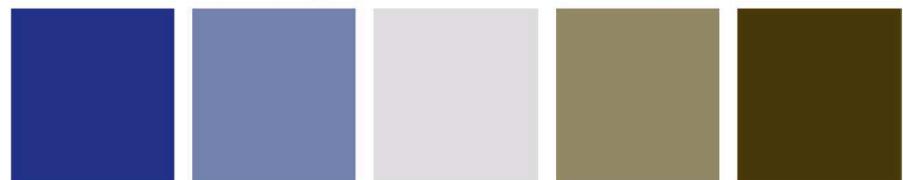
tritanomaly



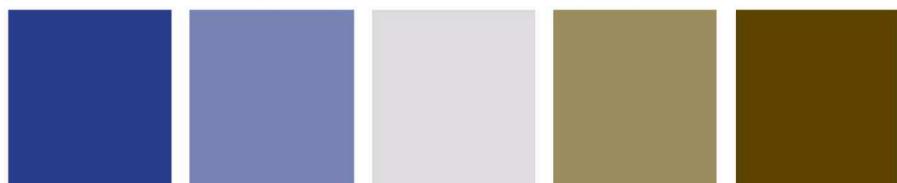
original



deuteranomaly



protanomaly



tritanomaly



Source: "Fundamentals of Data Visualization" by Claus O. Wilke

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Don't Trust Color Palettes—Test Them!

- [SimDaltonism](#)
- [ColourSimulations](#)
- [Coblis](#)
- [Color Oracle](#)
- [Vischeck](#)
- [colorBlindness package for R](#)



Natural Increase in the World

Birth / Death Ratio
0,6 11,4 -6,42 35,65

Natural Increase
35,65



Contribution to the SWDchallenge by Alex Varlamoff – tested with a color-blindness simulator

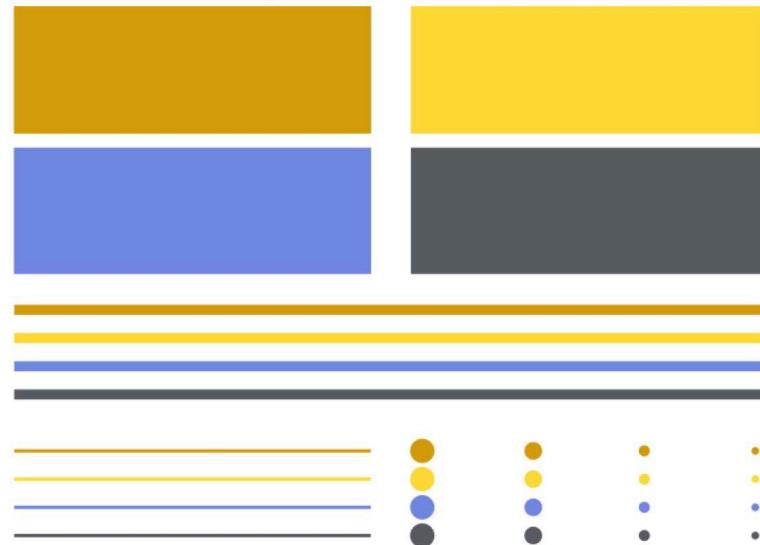
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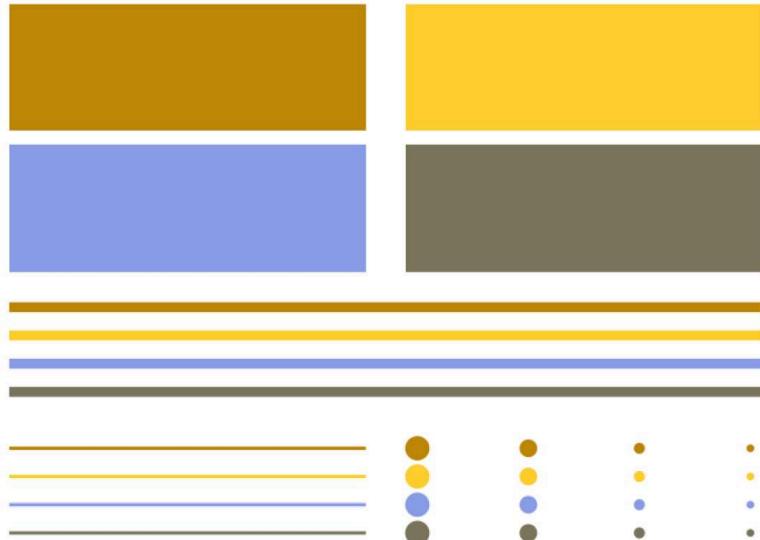
original



deuteranomaly



protanomaly



tritanomaly



Source: "Fundamentals of Data Visualization" by Claus O. Wilke

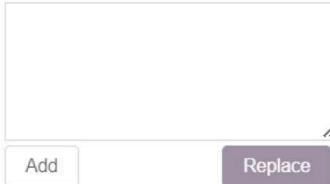


VIZ PALETTE

By: Elijah Meeks
& Susie Lu

PICK

Use Chroma.js



Use Colorgorical

Use ColorBrewer

EDIT

4 Colors

- ≡ 1 ● #2a9571 [🔗](#)
- ≡ 2 ● #8fb9bf [🔗](#)
- ≡ 3 ● #dfb468 [🔗](#)
- ≡ 4 ● #4b8cd8 [🔗](#)

Add

hex rgb

hsl

GET

hex rgb

hsl

String quotes

Object with metadata

```
[ "#2a9571",
  "#8fb9bf",
  "#dfb468",
  "#4b8cd8" ]
```

COLORS IN ACTION

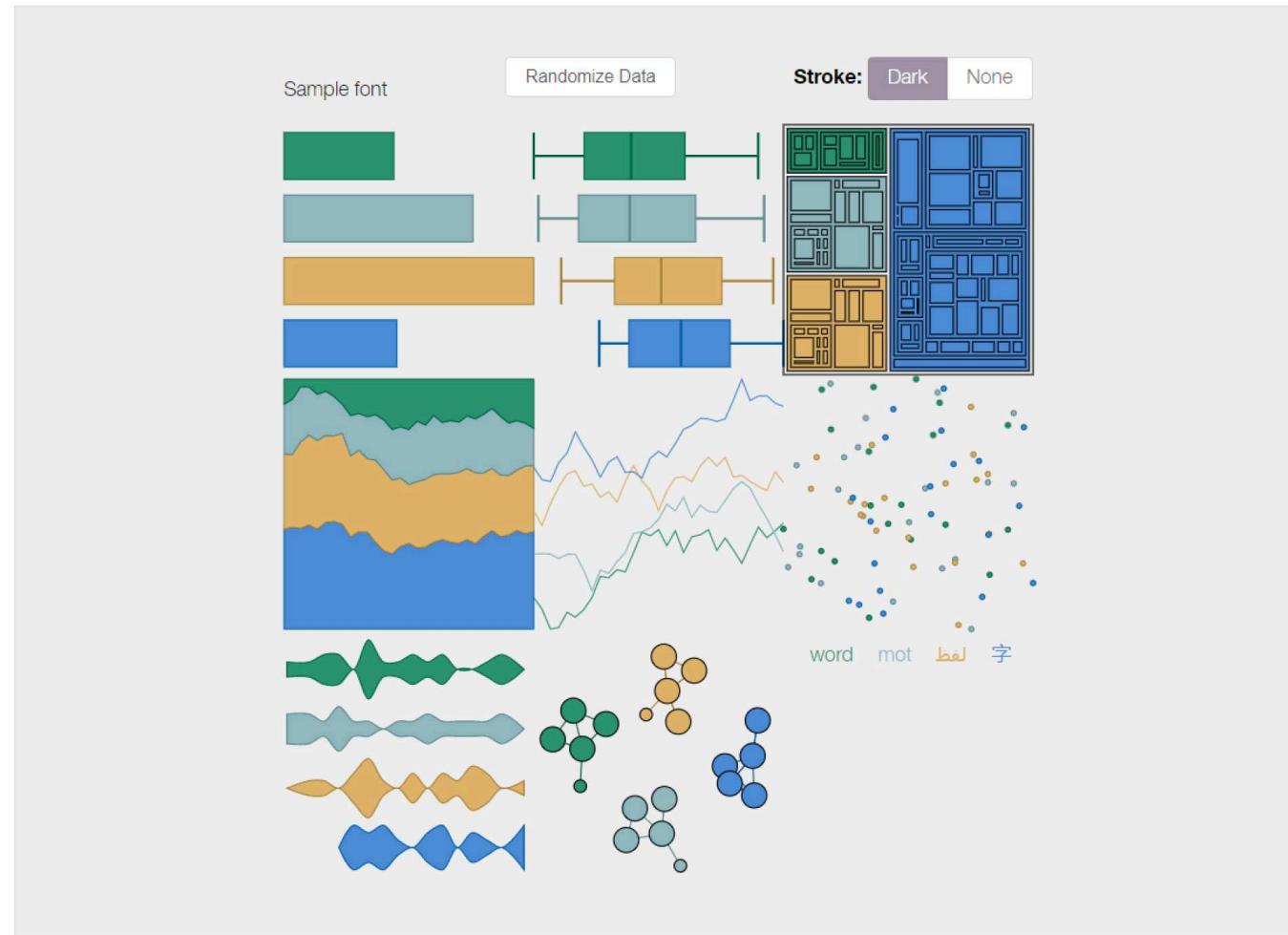
Background color: #eeeeee [🔗](#)

Font color: ● #212121 [🔗](#)

Charts made with [Semiotic](#)

Color Population:

No Color Deficiency - 96% Deuteranomaly - 2.7% Protanomaly - 0.66% Protanopia - 0.59% Deuteranopia - 0.56% Greyscale



The [VizPalette](#) tool tests color palettes for legibility for different chart types, line weights, backgrounds, and font colors.

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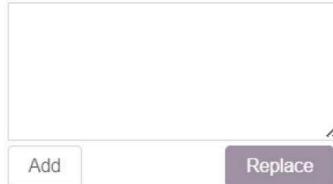


VIZ PALETTE

By: Elijah Meeks
& Susie Lu

PICK

Use Chroma.js



Use Colorgorical

Use ColorBrewer

EDIT

4 Colors

- ≡ 1 ● #2a9571 [🔗](#) ×
- ≡ 2 ● #8fb9bf [🔗](#) ×
- ≡ 3 ● #dfb468 [🔗](#) ×
- ≡ 4 ● #4b8cd8 [🔗](#) ×

[Add](#)

hex rgb

hsl

GET

hex rgb

hsl

String quotes

Object with metadata

```
[ "#2a9571",
  "#8fb9bf",
  "#dfb468",
  "#4b8cd8" ]
```

COLORS IN ACTION

Background color: #eeeeee [🔗](#)

Font color: ● #212121 [🔗](#)

Charts made with [Semiotic](#)

Color Population:

No Color Deficiency - 96%

Deuteranomaly - 2.7%

Protanomaly - 0.66%

Protanopia - 0.59%

Deuteranopia - 0.56%

Greyscale



The [VizPalette](#) tool tests color palettes for legibility for different chart types, line weights, backgrounds, and font colors.

Cédric Scherer Data Visualization & Information Design



VIZ PALETTE

By: Elijah Meeks
& Susie Lu

PICK

Use Chroma.js



Use Colorgorical

Use ColorBrewer

EDIT

4 Colors

- ≡ 1 ● #2a9571
- ≡ 2 ● #8fb9bf
- ≡ 3 ● #dfb468
- ≡ 4 ● #4b8cd8

Add

hex rgb

hsl

GET

hex rgb

hsl

String quotes
 Object with metadata
["#2a9571",
 "#8fb9bf",
 "#dfb468",
 "#4b8cd8"]

COLORS IN ACTION

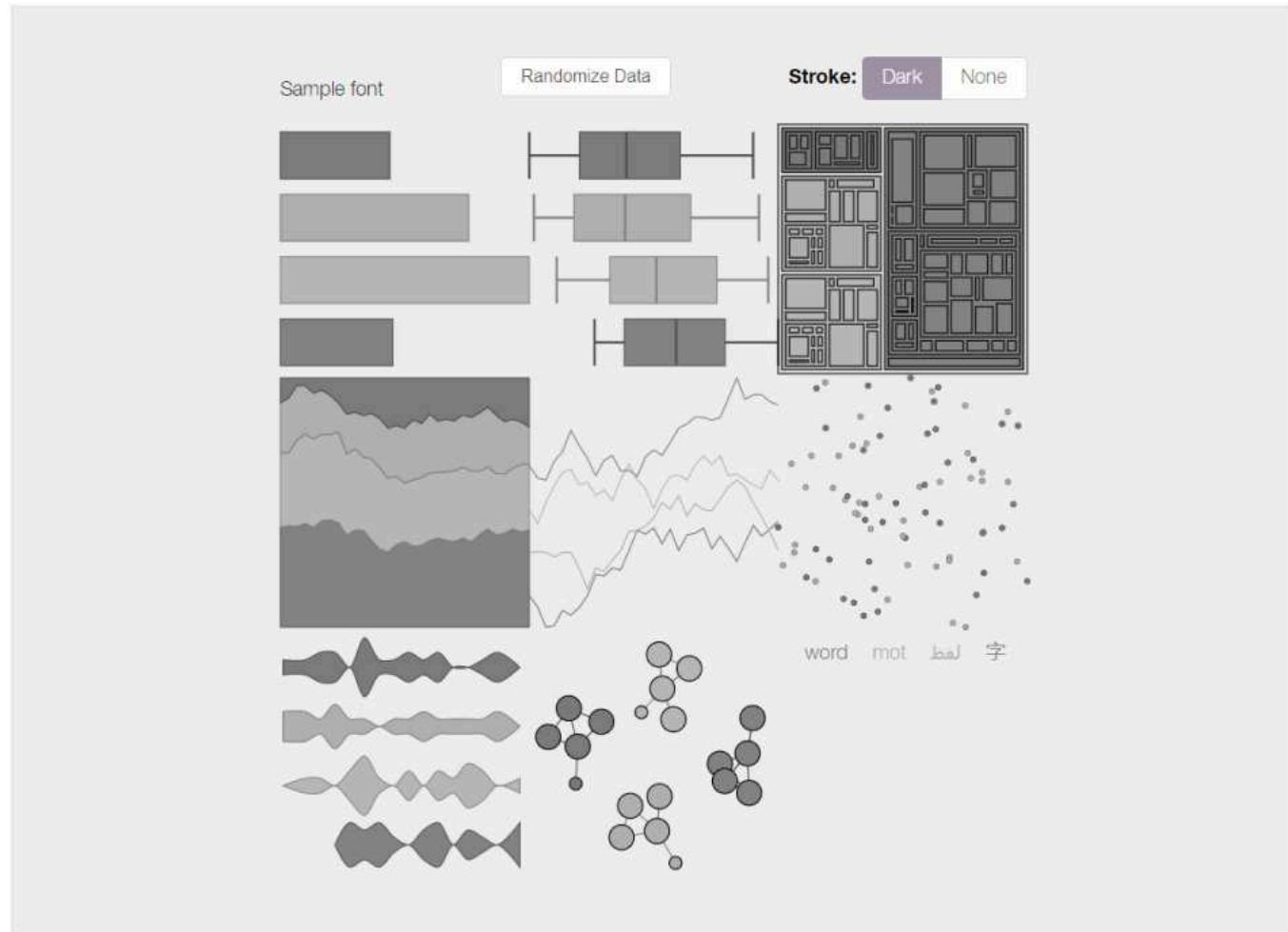
Background color: #eeeeee

Font color: ● #212121

Charts made with [Semiotic](#)

Color Population:

No Color Deficiency - 96% Deuteranomaly - 2.7% Protanomaly - 0.66% Protanopia - 0.59% Deuteranopia - 0.56% Greyscale



The [VizPalette](#) tool tests color palettes for legibility for different chart types, line weights, backgrounds, and font colors.

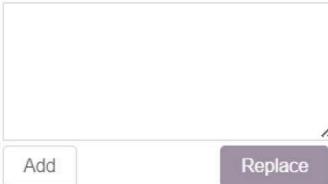


VIZ PALETTE

By: Elijah Meeks
& Susie Lu

PICK

Use Chroma.js



Add

Replace

Use Colorgorical

Use ColorBrewer

EDIT

4 Colors

- ≡ 1 ● #2a9571
- ≡ 2 ● #8fb9bf
- ≡ 3 ● #dfb468
- ≡ 4 ● #4b8cd8

Add

hex rgb

hsl

GET

hex rgb

hsl

- String quotes
 Object with metadata
- ```
["#2a9571",
 "#8fb9bf",
 "#dfb468",
 "#4b8cd8"]
```

Background color: ● #505050

Font color: #fefefe

Charts made with [Semiotic](#)

## COLORS IN ACTION

### Color Population:

No Color Deficiency - 96% Deuteranomaly - 2.7% Protanomaly - 0.66% Protanopia - 0.59% Deuteranopia - 0.56% Greyscale



The [VizPalette](#) tool tests color palettes for legibility for different chart types, line weights, backgrounds, and font colors.

**Cédric Scherer** Data Visualization & Information Design



# APCA Contrast Calculator

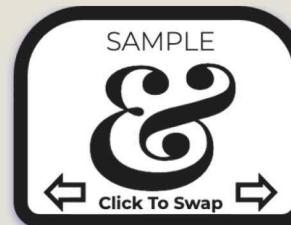
MYNDEX  
RESEARCH

## TEXT / ICON COLOR

#212121 • rgb(33, 33, 33)

212121

Click To Swap



CONTRAST  
Lc 103.1

## BACKGROUND COLOR

#ffffff • rgb(255, 255, 255)

ffffff

Click To Swap

All font sizes are in CSS px • Reference font shown with colors at actual size & weight

| USAGE                | 200                                  | 300 (Light)                                                                                                                                                                                                           | 400 (Normal)                                                                                                                                                                                                        | 500                                                                                                                                                                                                                   | 600                                                                                                                                                                                                                   | 700 (Bold)                                                                                                                                                                                                            |
|----------------------|--------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| SMALL BODY TEXT ONLY | 26px<br>The lazy afternoon frolicked | 18.5px<br>The lazy grey dog slept in the afternoon sun, but the frisky fox frolicked freely in the field of flowers without a care in the world.<br>The fox saw the slumbering dog tried to wake him, but the dog was | 15px<br>The lazy grey dog slept in the afternoon sun, but the frisky fox frolicked freely in the field of flowers without a care in the world.<br>The fox saw the slumbering dog tried to wake him, but the dog was | 14.5px<br>The lazy grey dog slept in the afternoon sun, but the frisky fox frolicked freely in the field of flowers without a care in the world.<br>The fox saw the slumbering dog tried to wake him, but the dog was | 13.5px<br>The lazy grey dog slept in the afternoon sun, but the frisky fox frolicked freely in the field of flowers without a care in the world.<br>The fox saw the slumbering dog tried to wake him, but the dog was | 12.5px<br>The lazy grey dog slept in the afternoon sun, but the frisky fox frolicked freely in the field of flowers without a care in the world.<br>The fox saw the slumbering dog tried to wake him, but the dog was |

The Myndex APCA Contrast Calculator displays modern contrast ratios for various combinations of text size and font weight



# APCA Contrast Calculator

MYNDEX  
RESEARCH

## TEXT / ICON COLOR

#848484 • `rgb(132,132,132)`

848484

Click To Swap

CONTRAST  
 $L_c 65.0$

## BACKGROUND COLOR

#ffffff • `rgb(255,255,255)`

ffffff

Click To Swap

All font sizes are in CSS px • Reference font shown with colors at actual size & weight

| USAGE            | 200         | 300 (Light)                                                                                                                      | 400 (Normal)                                                                                                                     | 500                                                                                                                                | 600                                                                                                                                | 700 (Bold)                                                                                                                         |
|------------------|-------------|----------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------|
| FLUENT TEXT OKAY | 46px<br>Sam | 32px<br>The lazy grey dog slept in the afternoon sun, but the frisky fox saw the slumbering flowers without a care in the field. | 22px<br>The lazy grey dog slept in the afternoon sun, but the frisky fox saw the slumbering flowers without a care in the field. | 19.5px<br>The lazy grey dog slept in the afternoon sun, but the frisky fox saw the slumbering flowers without a care in the field. | 17.5px<br>The lazy grey dog slept in the afternoon sun, but the frisky fox saw the slumbering flowers without a care in the field. | 15.5px<br>The lazy grey dog slept in the afternoon sun, but the frisky fox saw the slumbering flowers without a care in the field. |

The Myndex APCA Contrast Calculator displays modern contrast ratios for various combinations of text size and font weight



This is #000000 text on  
a #EA7439 background.

WCAG2 7.6:1 AAA  
APCA 58% AA

This is #FFFFFF text on  
a #EA7439 background.

WCAG2 1.7:1 X  
APCA 61% AAA

This is #B5B7F6 text on  
a #494583 background.

WCAG2 4.5:1 AAA  
APCA 52% AA

This is #FFFFFF text on  
a #A088F1 background.

WCAG2 2.9:1 X  
APCA 60% AAA

This is #027BB7 text on  
a #000000 background.

WCAG2 4.5:1 AAA  
APCA 30% X

This is #4693CB text on  
a #FFFFFF background.

WCAG2 3.3:1 AA  
APCA 61% AAA

Source: Lisa Charlotte Muth, [DataWrapper Blog](#)

Cédric Scherer Data Visualization & Information Design



# Ensure Readability and Accessibility



## Checklist

- Set text in a **large, readable typefaces**—do not make use of decorative or overly small text.  
Ensure **sufficient contrast** for readability.
- Design with the **colorblind** in mind—test your graphics with CVD simulators.



# Ensure Readability and Accessibility

## Good

High-contrast text readable at different sizes and large icons and shapes.

## Bad

Small, low-contrast text, icons, and shapes that become unreadable when resized.



# Useful Sources & Helpful Tools



# Sources for Icons & Illustrations



# PhyloPic

PHYLOPIC

Search for a group of organisms.



Free silhouette images of animals, plants, and other life forms, available for reuse under Creative Commons licenses.

## Latest Uploads

SEE MORE →



10,597 silhouette images in the database.

## Contribute

### Silhouettes

Anyone may upload silhouettes to **PHYLOPIC**.

- [Image Uploader](#)

### Engineering

Software engineers may access the data in **PHYLOPIC** using the API. They may also add features to the **PHYLOPIC** website.

- [API Recipes](#)
- [API Documentation](#)
- [Codebase](#)

### Donations

Keep **PHYLOPIC** online by making a donation to the web service fund, or to one of the many other projects **PHYLOPIC** relies on.

- [Make a donation](#)
- [Support the creator on Patreon](#)
- [Buy me a coffee](#)

## Quick Links

The most popular taxonomic groups on **PHYLOPIC**, as determined by actual traffic:

Drag and drop silhouette images here to start a collection.

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[phylopic.org](http://phylopic.org) (CC0 or attribution required)

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# PhyloPic

PHYLOPIC

coniferae



Home / Pan-Biota / ... / Pan-Coniferae / **Coniferae** JUSSIEU 1789 [DOYLE & AL. 2020] /  
Pan-Gnetophyta • Pinaceae • Cupressophyta

## Coniferae

SEE DETAILS ↓

VIEW LINEAGE →

### Silhouette Images

58 silhouette images in all.

Licenses  all  public domain ⓘ  free for commercial use ⓘ  
 no ShareAlike requirement ⓘ



Drag and drop silhouette images here to start a collection.

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# Bioicons

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[Star on Github](#)

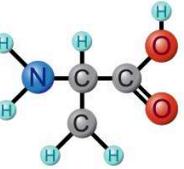
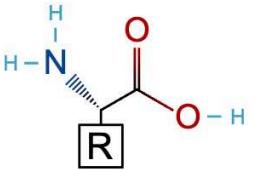
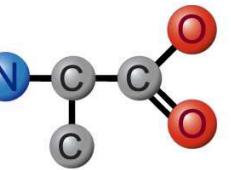
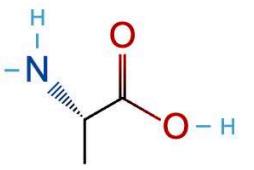
## bioicons

2737 icons CC 0 · CC by SA · MIT License Viewer by @simonduerr

Extensions Open on GitHub PDB2Vector Submit illustrations

Machine Learning Amino-Acids Animals Blood Immunology Cell culture Cell lines Cell types Chemistry  
Chemo- and Bioinformatics Computer hardware Epigenetics General items Genetics Human physiology Imaging  
Intracellular components Lab apparatus Microbiology Molecular modelling Nucleic acids Nanotechnology Plants Algae  
People-Other Peptides Receptors channels Safety symbols Scientific graphs Tissues Viruses Cell membrane  
Oncology Parasites Genomics Neuroscience Procedures

Search (Press "/" to Focus) All icons

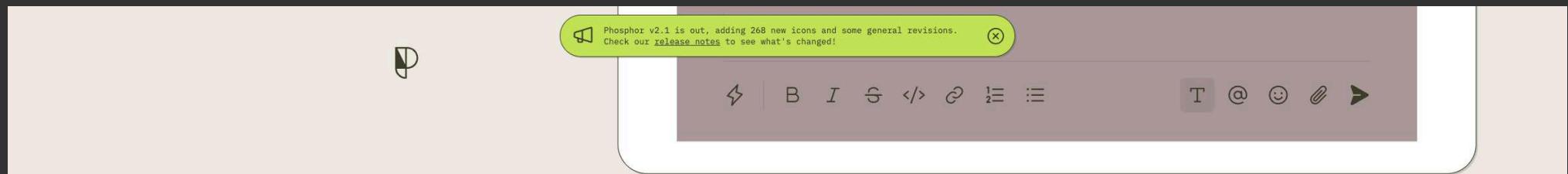
|                                                                                                                             |                                                                                                                            |                                                                                                                             |                                                                                                                                       |
|-----------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------|
| <br>Tensorflow<br>BSD Google Attribution? | <br>Jupyter<br>BSD Jupyter Attribution? | <br>PyTorch<br>BSD Facebook Attribution? | <br>alanine<br>CC0 B-Gideon-Bergheim Attribution? |
| <br>amino acid backbone chem             | <br>asparagine chem                    | <br>alanine pH                         | <br>alanine chem                                 |

User survey

[bioicons.com](http://bioicons.com)



# Phosphor Icons



Phosphor is a flexible icon family for interfaces, diagrams, presentations – whatever, really.

[Get started](#) [Explore icons](#)

[Download all \(9,072\)](#) [GitHub](#)  
[Figma plugin / library](#) [Request an icon](#)  
[Sketch plugin](#) [Donate / Patreon](#)  
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phosphoricons.com



# Phosphor Icons

The screenshot shows a grid of 42 icons from the Phosphor Icons library, categorized under the "nature" theme. The icons are arranged in seven rows and seven columns. Each icon is accompanied by its name in a small, gray font below it. The "bird" icon in the top row is highlighted with a white background and a thin gray border. The icons include: acorn, atom, avocado, binoculars, bird, bone, brain; bug, bug-beetle, bug-droid, butterfly, cactus, campfire, carrot; cat, cherries, clover, coffee-bean, cow, dna, dog; drop, drop-half, drop-half-bottom, drop-simple, drop-slash, egg, egg-crack; farm, feather, fire, fire-simple, fish, fish-simple, flame; flask, flower, flower-lotus, flower-tulip, grains, horse, island.

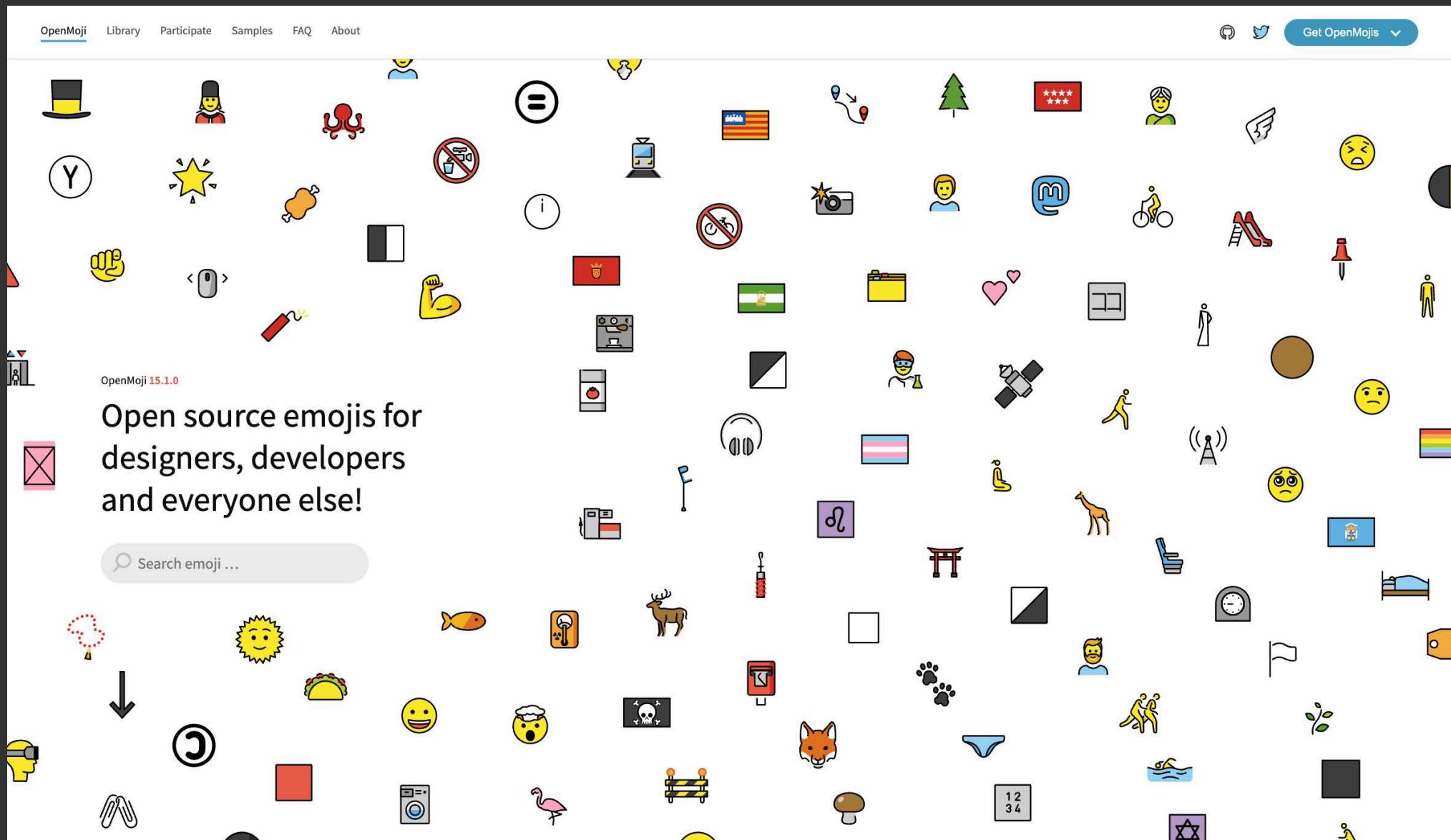
At the bottom left, there is a detailed view of the "bird" icon, showing its U+E72C code point and availability in v1.3+. It also provides download options for SVG, SVG Raw, and a link to the GitHub repository. At the bottom right, a modal window displays the "Tags" for the "bird" icon, including "React", "Web", "Vue", "Flutter", "Elm", and "Swift".

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# OpenMoji



openmoji.org

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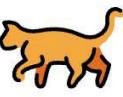
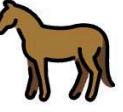
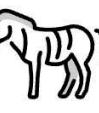
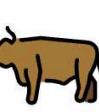
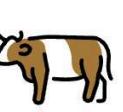
# OpenMoji

OpenMoji   Library   Participate   Samples   FAQ   About

nature

All OpenMojis   color   Best Match   All Emoji

activities  
animals-nature  
component  
flags  
food-drink  
objects  
people-body  
smileys-emotion  
symbols  
travel-places  
extras-openmoji  
extras-unicode

|                                                                                     |                                                                                     |                                                                                     |                                                                                      |
|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|
|    |    |    |    |
| raccoon<br>1F99D                                                                    | cat face<br>1F431                                                                   | cat<br>1F408                                                                        | black cat<br>1F408-200D-2B1B                                                         |
|    |    |    |    |
| lion<br>1F981                                                                       | tiger face<br>1F42F                                                                 | tiger<br>1F405                                                                      | leopard<br>1F406                                                                     |
|    |    |    |    |
| horse face<br>1F434                                                                 | moose<br>1FACE                                                                      | donkey<br>1FACF                                                                     | horse<br>1F40E                                                                       |
|  |  |  |  |
| unicorn<br>1F984                                                                    | zebra<br>1F993                                                                      | deer<br>1F98C                                                                       | bison<br>1F9AC                                                                       |
|  |  |  |  |

openmoji.org

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# Material Icons

The screenshot shows the Google Fonts icon library interface. The top navigation bar includes a search bar for 'Search icons' and a dropdown for 'Sort by Most popular'. On the left, there's a sidebar with various filters: 'Customize' (Fill, Weight, Grade, Optical Size), 'Icons' (Material Symbols, Outlined, etc.), 'Category' (AI, Actions), and 'FAQ'. The main content area displays a grid of icons categorized under 'UI actions', 'More UI', 'Checkmarks', 'Switches', 'Open In New', 'More Vert', 'More Horiz', 'Download', 'Apps', 'More Icons', 'More Buttons', and 'More Symbols'. Each icon has a preview and a link to its details page.

[fonts.google.com/icons](https://fonts.google.com/icons)



# The Noun Project

Home Icons Photos Pricing Apps & Plugins API Lingo ...

Log In Join



## Icons and Photos For Everything



Noun Project is the World's Most Diverse and Extensive Collection of Icons and Mission-Driven Photos.

[thenounproject.com](http://thenounproject.com) (attribution required)

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# The Noun Project

Home Icons Photos Pricing Apps & Plugins API Lingo ...

Log In Join

● × ■

Icons plant

Results for "plant" Related: ecology garden green greenery growth leaf nature

Icons (94,085) Icon Sets (3,206) Photos (14,843)

Filter by:  Solid  Line

thenounproject.com (attribution required)



# IconFinder

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Feather  
286 icons

Leto  
5,516 icons

The World in Pastel  
426 icons

Fluent Regular 24px  
1,565 icons

iconfinder.com (attribution required)



# IconFinder

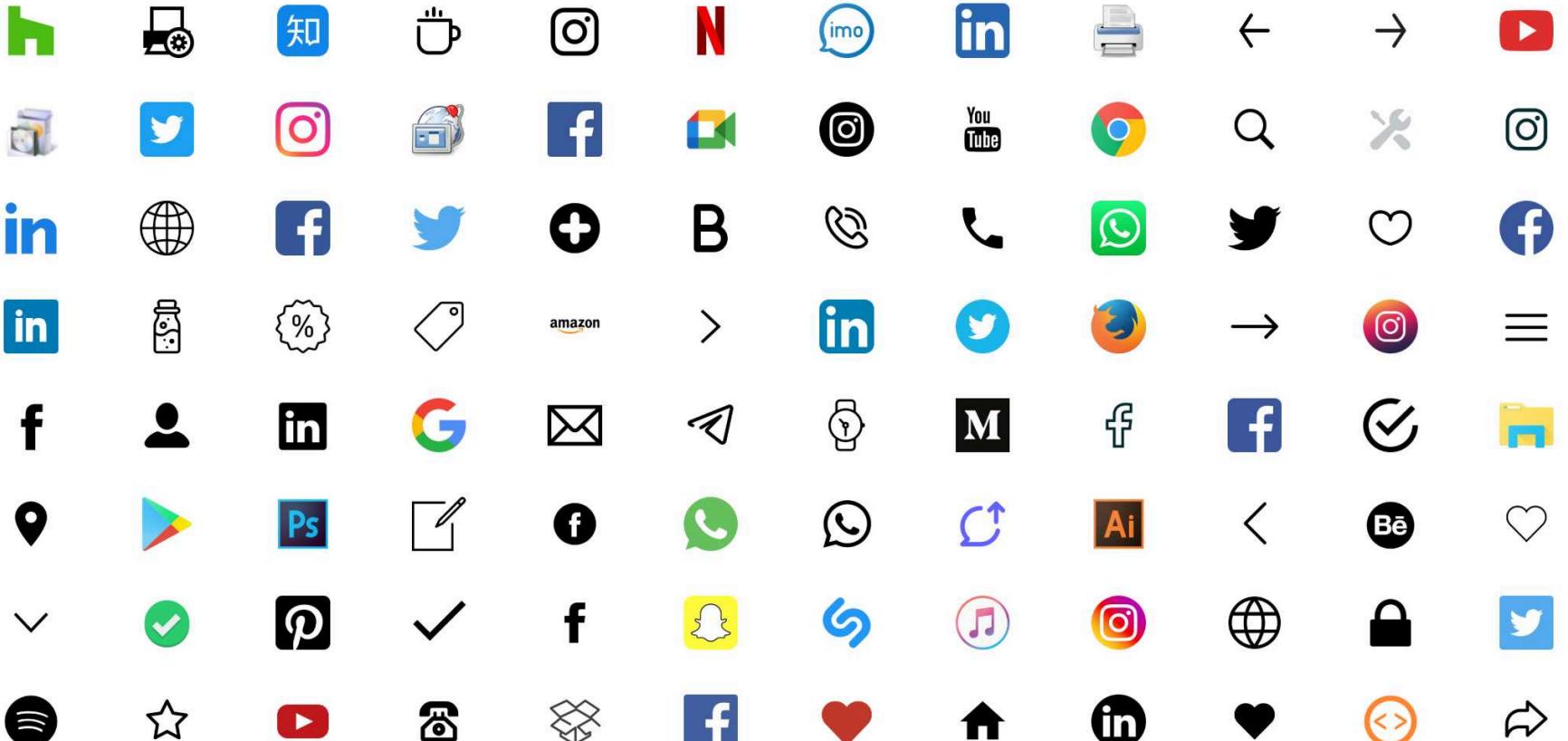
ICONFINDER Search 6M icons, 3D and illustrations... Icons 

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# IconFinder

agriculture

Icons

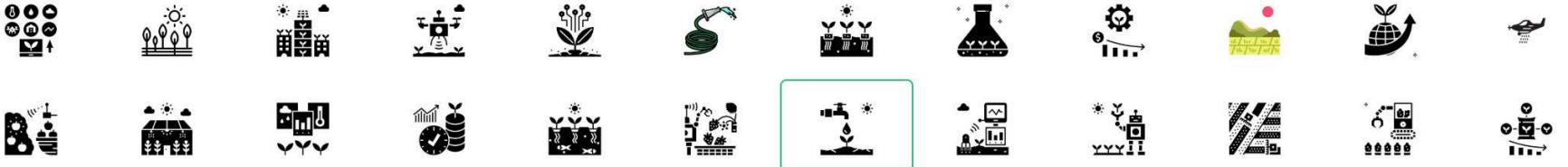
Sign in Sign up

Filters  Icons Illustrations 3D illustrations Stickers  Search settings  Most relevant

Free agriculture icons  
About 349 results in 0.008 seconds.

Staff picks   
All prices   
**Free**   
Premium   
All styles   
Solid   
Semi Solid   
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Filled Outline   
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Farm Farming Gardening Garden Plant Nature Future of farming Tool Tree



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Glyp family > Future Farming Glyp pack  
Irrigation Save Agriculture  
Future of farming Stress Water

Add to collection

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 Copy PNG to clipboard Alt + P  
 Copy Base64 PNG

Open in color editor



See all icons from Glyp



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Large icon packs of over 10k icons, so you can find visually consistent icons for all your designs

Icons Search icons... AI Search Popular now: settings, phone, camera, social media, calendar, messages, mail

Consistent Make your designs feel as a whole piece, not like a patchwork

Pixel-perfect Scalable, responsive, looking sharp and crisp on different devices

Versatile Over 45 diverse styles to cater to all design needs

Made by the best icon designers Iconic excellence by the industry's premier creatives

### Start your next project with our icons

Apple Android Windows Web Graphic

Made according to Apple guidelines. Filling in the gaps in the official packs

icons8.com ("free for a link")

Cédric Scherer Data Visualization & Information Design



# Icons8

The screenshot shows the Icons8 website interface. On the left, there's a sidebar with various filters: OS (Android, iOS, Windows, macOS), Technique (3D, Filled, Line, Hand-drawn), Colors (Multi, Duo, Mono, Gradient), Animation (Static, Animated), Style (All styles), Corners (Round, Sharp), Size (Small, Medium, Large), Aesthetic (Professional, Decorative, Games, Classic, Kids), Stroke (1, 1.4, 1.5, 2, 2.5, 3, 4, 6, 8, 10), Trendiness (Retro, 2000s, 2010s, 2020s, New), Author (Icons8, Guest artists), Request icon, and Help.

The main search bar at the top has the word "bug". Below it, there are buttons for "Icons", "AI", "Recolor", and "Detailed" (which is selected) or "Compact".

The main content area displays a grid of "Bug" icons. One specific icon in the center is highlighted with a larger preview window. This preview window shows a detailed view of a black beetle icon on a grid background. It includes a "Dotted" style indicator, a "Search in this style" input field, a "Download" button, a "Copy" button, and an "Add to collection" button. Below the preview are sections for "Edit" (Color, Background color, Padding, Position, Rotation) and "Add" (Text, Stroke, Subicon, Square).

Below the preview window, there are two tabs: "This icon in other styles" and "Related icons in the same style". Under "This icon in other styles", there are icons for Windows Metro, iOS, iOS Filled, Material Filled, Windows 10, Simple Small, Cute Outline, Dotted, iOS Glyph, Hand Drawn, Material Outlined, and Material Rounded. There's also a "Show 40 more" link. Under "Related icons in the same style", there are several other bug-related icons.

At the bottom of the page, there's a footer with the text "icons8.com ('free for a link')".



# Flaticon

FLATICON Authors Icons Stickers Interface icons Animated icons More ▾

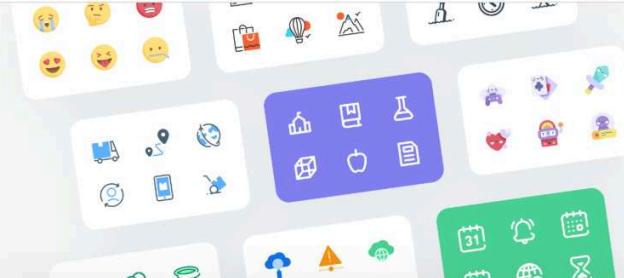
Icons Search for icons

Pricing Log in Sign up

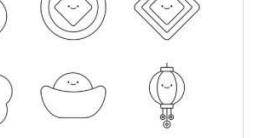
Free access 18.1M+ icons in PNG

The largest database of vector icons available for download: SVG, EPS, PSD and BASE 64 formats.

See popular icons



Trending Icon packs

|                                                                                     |                                                                                      |                                                                                       |                                                                                       |
|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
|    |    |    |    |
| Architecture Project<br>30 ICONS                                                    | Thanksgiving<br>30 ICONS                                                             | Party Hippo<br>20 ICONS                                                               | Emotional Intimacy<br>20 ICONS                                                        |
|   |   |   |   |
| Museum<br>85 ICONS                                                                  | Law And Justice<br>30 ICONS                                                          | Metaverse<br>30 ICONS                                                                 | Chinese New Year<br>22 ICONS                                                          |
|  |  |  |  |
| Winter<br>50 ICONS                                                                  | Press Media<br>20 ICONS                                                              | Bear Stickers<br>20 ICONS                                                             | Proclamacao Da Republica<br>20 ICONS                                                  |

flaticon.com (attribution required)

Cédric Scherer Data Visualization & Information Design



# Flaticon

FLATICON Authors Icons Stickers Interface icons Animated icons More ▾

Pricing Log in Sign up

Icons mushroom

Filters Colors Shape Sort by Recent Trending Editable strokes New ⓘ Non-expanded SVG files. Merchandising license ⓘ Icons licensed for merchandise.

Icons Stickers Animated icons Interface icons Group by: All icons

12,135 Mushroom Icons

flaticon.com (attribution required)



# Freepik

The Freepik homepage features a large banner at the top with a peacock feather background. The banner contains the text "All-in-one AI creative suite with the highest-quality assets" and "Explore and create unique, on-brand visuals—images, video, audio, and more." Below the banner is a search bar with "Search" and "Create" buttons. A sidebar on the left includes "All", "Create", and "Edit" buttons. A main content area displays several AI tools: "AI image generator", "AI video generator", "Reimagine", "Upscale", "Retouch", and "Background R". Below this is a call-to-action button "Sign up for free". The page also features sections for "Millions of assets ready to go" (Vectors, Photos, Illustrations, Icons, Videos, Templates, PSD, Mockups) and logos of companies trusted by Freepik.

FREEPIC AI Suite Images Icons Videos Audio NEW Templates Mockups 3D NEW More Pricing Sign in

All-in-one AI creative suite with the highest-quality assets

Explore and create unique, on-brand visuals—images, video, audio, and more.

Search Create

Search all assets

All Create Edit

AI image generator From words to images

AI video generator NEW Create stunning videos from text or images

Reimagine Variations with AI

Upscale Increase resolution and details

Retouch Replace details easily

Background R Erase any image

Get 10 daily free downloads and access to AI tools

Sign up for free

Millions of assets ready to go

Vectors Photos Illustrations Icons Videos Templates PSD Mockups

Trusted by millions of creative teams, marketers, and designers

airbnb Google nubank Ogilvy HELLO FRESH Coca-Cola snowflake

Creatives' faves

freepik.com (attribution required)



# Freepik

FREEPIC AI Suite Images Icons Videos Audio NEW Templates Mockups 3D NEW More Pricing Sign in

landscape

Sponsored results by iStock Get 20% off with code: FREEPIK20 Show more →

Filters

Applied filters Clear all x Static x Icons x

Asset type

Vectors Illustrations Photos Icons Videos PSD Templates Mockups 3D Models Fonts

Icon type New

Static Animated Sticker Interface

Color

Style

Stroke New ⓘ

Showing icons for landscape

Icons 80.5k Families Sort by: Most relevant ▾

The screenshot shows the Freepik website's search results for the term "landscape". The top navigation bar includes links for AI Suite, Images, Icons, Videos, Audio, Templates, Mockups, 3D, and More, along with Pricing and Sign in options. A search bar at the top contains the query "landscape". Below the search bar, a row of 15 small icons related to communication (e.g., people, phone, messaging) is displayed under the heading "Sponsored results by iStock". A promotional message offers a 20% discount with code "FREEPIK20" and a "Show more" link. The main search results are titled "Showing icons for landscape" and feature a grid of 80.5k icons. The results are sorted by relevance. The sidebar on the left contains various filtering options: Applied filters (Static, Icons), Asset type (Vectors, Illustrations, Photos, Icons, Videos, PSD, Templates, Mockups, 3D Models, Fonts), Icon type (New, Static, Animated, Sticker, Interface), Color, Style, and Stroke. The icons in the grid represent various landscape scenes, such as fields, mountains, forests, and sunsets.

freepik.com (attribution required)

Cédric Scherer Data Visualization & Information Design



# StorySet



Business Education Medical Technology People Multi-purpose

Plugin for Figma How It Works



## Awesome free customizable illustrations for your next project

Customize, animate and download our illustrations to make incredible landing pages, app or presentations!

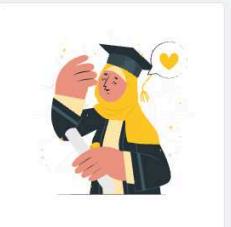
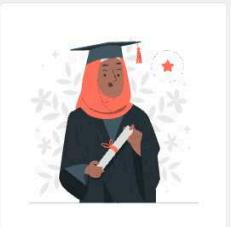
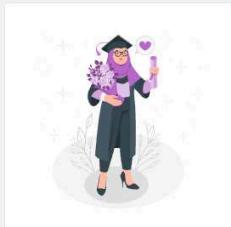
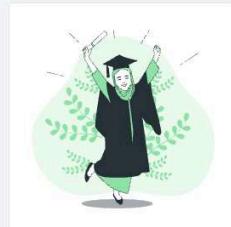
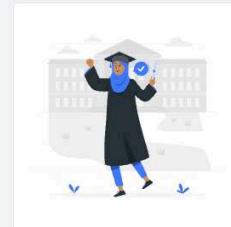
Search for an illustration



Order by Recent Popular

### STYLES

- All
- Rafiki
- Bro
- Amico
- Pana
- Cuate



### COLOR

Change color



### BACKGROUND

- Hidden
- Simple
- Detailed

storyset.com (attribution required | easily adjustable!)

Cédric Scherer Data Visualization & Information Design



# StorySet

storyset Business Education Medical Technology People Multi-purpose Search for an illustration Plugin for Figma How It Works

STYLES

All

Rafiki Bro Amico Pana Cuate

COLOR

Change color

BACKGROUND

Hidden Simple Detailed

Order by Recent Popular

The website features a dark header with the 'storyset' logo, navigation links for Business, Education, Medical, Technology, People, and Multi-purpose, a search bar, and links for Plugin for Figma and How It Works. Below the header is a sidebar with filters for STYLES (All, Rafiki, Bro, Amico, Pana, Cuate), COLOR (Change color), BACKGROUND (Hidden, Simple, Detailed), and ORDER BY (Recent, Popular). The main content area displays a 5x5 grid of 25 colorful illustrations. Each illustration depicts a different scene, such as a person walking through a forest, a group planting trees, a person meditating, people working on a globe, and a person working on a small building. The illustrations are vibrant and have a clean, modern aesthetic.

storyset.com (attribution required | easily adjustable!)

Cédric Scherer Data Visualization & Information Design



# Sources for Icons & Illustrations

- **PhyloPic** – CCO or attribution | SVG + PNG
- **BioIcons** – CC-BY | SVG
- **Phosphor Icons** – MIT license | SVG + PNG | customizable
- **OpenMoji** – open-source (CC BY-SA 4.0) | SVG + PNG
- **Material Icons** – open-source (Apache 2.0) | SVG + PNG
- **The Noun Project** – “free for a link” (CC-BY 3.0) | SVG + PNG 
- **Icons8** – attribution | PNG (free), SVG (paid) 
- **IconFinder** – attribution (CC-BY 3.0) | SVG + PNG
- **Flaticon** – attribution (CC-BY 4.0) | SVG + PNG
- **Freepik** – attribution (CC-BY 4.0) | SVG + PNG, AI 
- **StorySet** – attribution (CC-BY 4.0) | SVG + PNG | adjustable



# Tools for Visual Design



# Tools for Visual Design

- **PowerPoint** – Paid (included in Microsoft 365 subscription)
- **Google Slides** – Free
- **Figma** – Free (basic) | Paid (professional & organization plans)
- **Inkscape** – Free
- **Adobe Illustrator** – Paid (subscription)
- **Adobe InDesign** – Paid (subscription)
- **Lucidchart** – Free (basic) | Paid (individual & team plans)
- **draw.io** – Free
- **Miro** – Free (basic) | Paid (team & business plans)



# Figma

The Figma homepage features a large title "Figma Design" and a subtext explaining the tool's purpose: "Figma is a powerful, collaborative design tool for teams. Explore ideas and gather feedback, build realistic prototypes, and streamline product development with design systems. Figma Design is included in the Full seat on every plan." A floating graphic in the top right corner consists of three overlapping shapes: a blue semi-circle at the top, a red diamond in the middle, and a green cloud-like shape at the bottom, each containing a white plus sign.

Figma is a powerful, collaborative design tool for teams. Explore ideas and gather feedback, build realistic prototypes, and streamline product development with design systems. Figma Design is included in the Full seat on every plan.

The screenshot shows the Figma interface with a cooking app prototype. On the left is the sidebar with navigation options like "Overview", "Copy Iterations", "Design Crit Feedback", and "Archive". The main canvas displays three screens: a landing page with a cake image, a live video feed of a chef, and a profile card for "Floria". The right side shows the "Frame" panel with settings for position (X: 0, Y: 0), layout (W: 200, H: 200), appearance (100% fill, E4FF97 color), and stroke.

Figma webpage



# Tools for Data Visualization

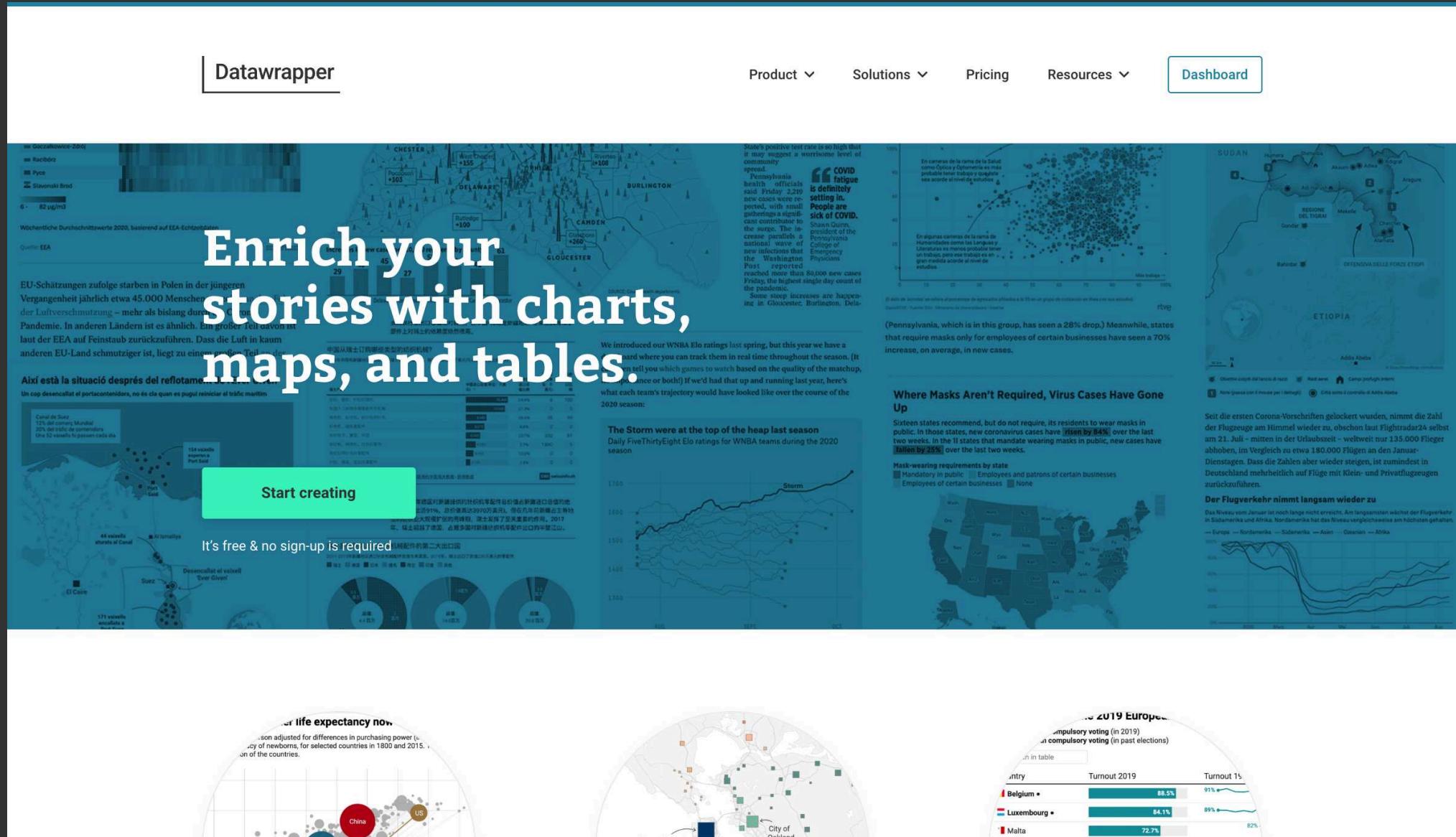


# Tools for Data Visualization

- **Datawrapper** – browser-based | interactivity
- **Flourish** – browser-based | interactivity & animation
- **RAWGraphs** – browser-based
- **Excel** and **Google Sheets**
- **R libraries**
  - **ggplot2** – flexible, customizable charts
  - **tidyplots** – quick, tidy-style plots
- **Python libraries**
  - **matplotlib** – most popular Python library for visualization
  - **plotnine** – like ggplot2 but for Python
  - **seaborn** – high-level interface for statistical plots
  - **altair** – declarative statistical visualization



# DataWrapper



DataWrapper webpage

Cédric Scherer Data Visualization & Information Design



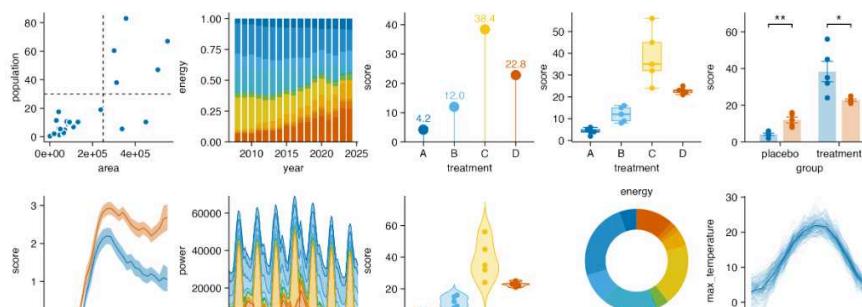
# tidyplots



*tidyplots* is an R package to generate publication-ready plots for scientific papers

[Get started](#)[Read preprint](#)

## Examples



[tidyplots webpage](#)



# tidyplots

**tidyplots cheatsheet**  
version 0.2.1

## Workflow

```
dataset → tidyplot → add → remove
```

→ adjust → theme → save\_plot

split\_plot

## Dataset

Observations

| Variables |           |      |     |        |       |
|-----------|-----------|------|-----|--------|-------|
| treatment | group     | dose | age | sex    | score |
| A         | placebo   | high | 23  | female | 2     |
| A         | placebo   | high | 45  | male   | 4     |
| B         | placebo   | low  | 23  | female | 9     |
| B         | placebo   | low  | 45  | male   | 8     |
| C         | treatment | high | 23  | female | 32    |
| C         | treatment | high | 45  | male   | 35    |
| D         | treatment | low  | 23  | female | 23    |
| D         | treatment | low  | 45  | male   | 25    |
| ...       | ...       | ...  | ... | ...    | ...   |

## Code

```
study |>
 tidyplot(x = group, y = score, color = dose) |>
 add_mean_bar(alpha = 0.4) |>
 add_sem_errorbar() |>
 add_data_points_beeswarm() |>
 add_title("My study") |>
 add_caption("Petterson et al.")
```

## Plot

## Add

### Raw data

add\_data\_ → points() → Example: add\_data\_points()

points() → labels()

### Summary statistics

add\_count\_ → bar() → Example: add\_count\_bar()

add\_sum\_ → dash() → Example: add\_sum\_line()

add\_mean\_ → dot() → Example: add\_mean\_value()

add\_median\_ → value() →

add\_sem\_ → line() →

add\_sd\_ → area() →

add\_range\_ →

add\_ci95\_ → errorbar() → Example: add\_sem\_errorbar()

### Dispersion

add\_boxplot() →

add\_violin() →

### Comparison

add\_test\_ → pvalue() → Example: add\_test\_pvalue()

pvalue() → asterisks()

### Distribution

add\_barstack() →

add\_pie() →

add\_areastack() →

add\_donut() →

### Proportion

Annotation

add\_title() → add\_annotation\_text()

add\_caption() → add\_annotation\_rectangle()

add\_annotation\_line()

add\_reference\_lines()

### ggplot2 code

add()

add(ggplot2::geom\_point())

### More

add\_heatmap() → add\_curvefit()

add\_histogram()

## Remove

### Axes

remove\_ → x\_axis\_ → y\_axis\_ → line() → ticks() → labels() → title()

Examples:

- remove\_x\_axis()
- remove\_x\_axis\_title()

### More

remove\_title() → remove\_legend()

remove\_caption() → remove\_legend\_title()

remove\_padding()

## Adjust

### Plot

adjust\_size() → adjust\_description()

adjust\_colors() → adjust\_padding()

adjust\_font() → adjust\_legend\_title()

adjust\_legend\_position()

### Axes

adjust\_x\_axis() → adjust\_y\_axis()

adjust\_x\_axis\_title() → adjust\_y\_axis\_title()

### Data labels

rename\_ → color\_labels() → Example: rename\_color\_labels()

reorder\_ → x\_axis\_labels() → Example: sort\_x\_axis\_labels()

sort\_ → y\_axis\_labels() → Example: reorder\_y\_axis\_labels()

reverse\_ →

## Color schemes

colors\_discrete\_

- friendly
- seaside
- apple

colors\_continuous\_

- viridis
- plasma
- mako

colors\_diverging\_

- blue2brown
- blue2red
- spectral

## Split plot

split\_plot(by, ncol, nrow, ...)

## Output

save\_plot("my\_plot.pdf")

view\_plot()

## Datasets

|               |                 |
|---------------|-----------------|
| animals       | energy_week     |
| climate       | gene_expression |
| dinosaurs     | spendings       |
| distributions | study           |
| energy        | time_course     |

## tidyplots cheatsheet



# ggplot2 Extensions: Chart Types

- **{geofacet}** – tile grid maps
- **{ggalluvial}** – alluvial plots
- **{ggalt}** – dumbbell, horizon, and lollipop charts, splines, ...
- **{ggbeeswarm}** – beeswarm plots and variants
- **{ggbraid}** – ribbons for alternating groups
- **{ggbump}** – bump charts
- **{ggdensity}** – improved density plots
- **{ggdist}** – uncertainty visualizations
- **{ggforce}** – several interesting layers (and more)
- **{ggpattern}** – pattern fills for layers



# ggplot2 Extensions: Chart Types (continued)

- **{ggpointdensity}** – density gradients for scatter plots
- **{ggraph}** – networks, graphs & trees
- **{ggridges}** – ridgeline plots
- **{ggsankey}** – sankey diagrams
- **{ggsignif}** – significance levels
- **{ggstar}** – more point shapes
- **{ggstream}** – stream graphs
- **{ggupset}** – upset graphs
- **{treemapify}** – treemaps



# ggplot2 Extensions: Utilities

- `{cowplot}` – combine ggplots
- `{ggannotate}` – point-n-click annotations
- `{ggblend}` – blend, compose, adjust layers
- `{ggfittext}` – scale text according to space
- `{ggfx}` – shaders and filters for layers
- `{ggh4x}` – facets, positions, and more
- `{ggtext}` – text rendering for theme elements + text layers
- `{lemon}` – axis lines (and a few layers)
- `{marquee}` – advanced Markdown rendering
- `{patchwork}` – combine ggplots
- `{scales}` – control scales



# ggplot2 Extensions: Themes

- `{ggdark}`
- `{ggsci}` (also color scales)
- `{ggtech}` (also color scales)
- `{ggthemes}` (also color scales)
- `{ggthemr}`
- `{hrbrthemes}` (also color scales)
- `{tvthemer}` (also color scales)



# ggplot2 Extensions: Color Palettes

- {colorspace}
- {jcolors}
- {MetBrewer}
- {nord}
- {rcartocolor}
- {RColorBrewer}
- {scico}
- {unikn}
- {viridis}
- {wesanderson}



# Wrap-up and Q&A



# A well-designed graphical abstract...

- is an **advertisement for your paper**
- shows the key points, not the full story
- attracts interest by standing out in the TOC or image search
- helps readers decide if they want to read the entire article
- is distinct from figures and diagrams in the paper—  
do not simply use a figure from your manuscript

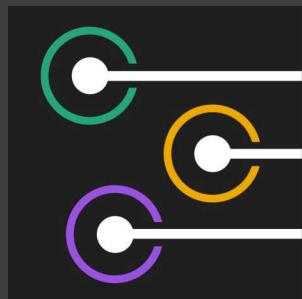


# Golden Rules

1. Focus on the Message
2. Guide the View with Visual Hierarchy
3. Show Just Enough Detail
4. Maintain a Unified Visual Language
5. Ensure Readability & Accessibility



# Thank You!



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 Buy Me A Coffee

