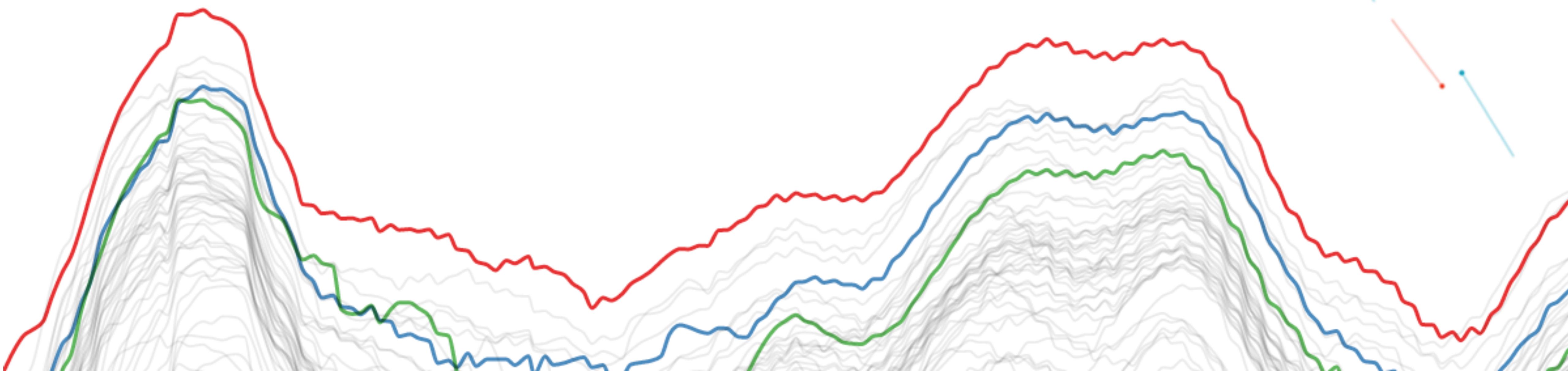


Visualización de la información

Fernando Becerra

f.becerra@udd.cl | [@fdo_becerra](https://twitter.com/fdo_becerra) | www.fernandobecerra.com

Magíster en Data Science, Universidad del Desarrollo

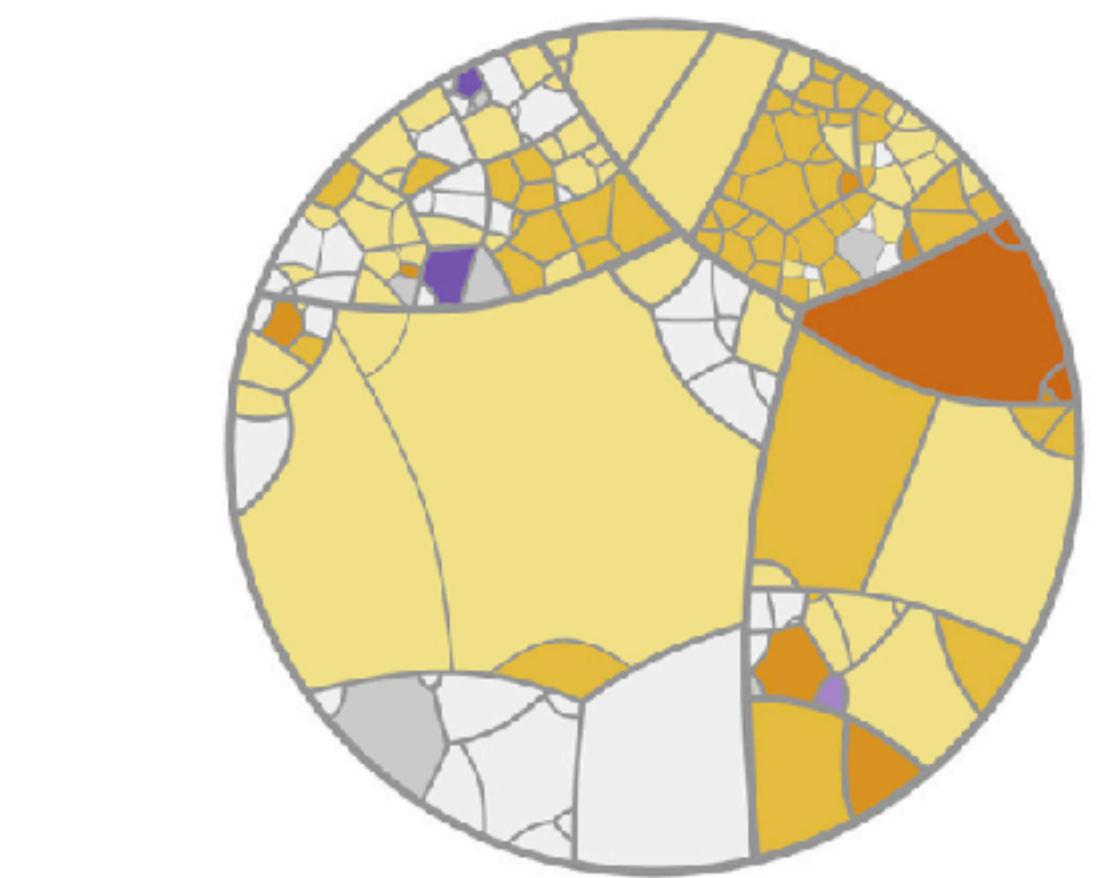


¿QUIÉN SOY?

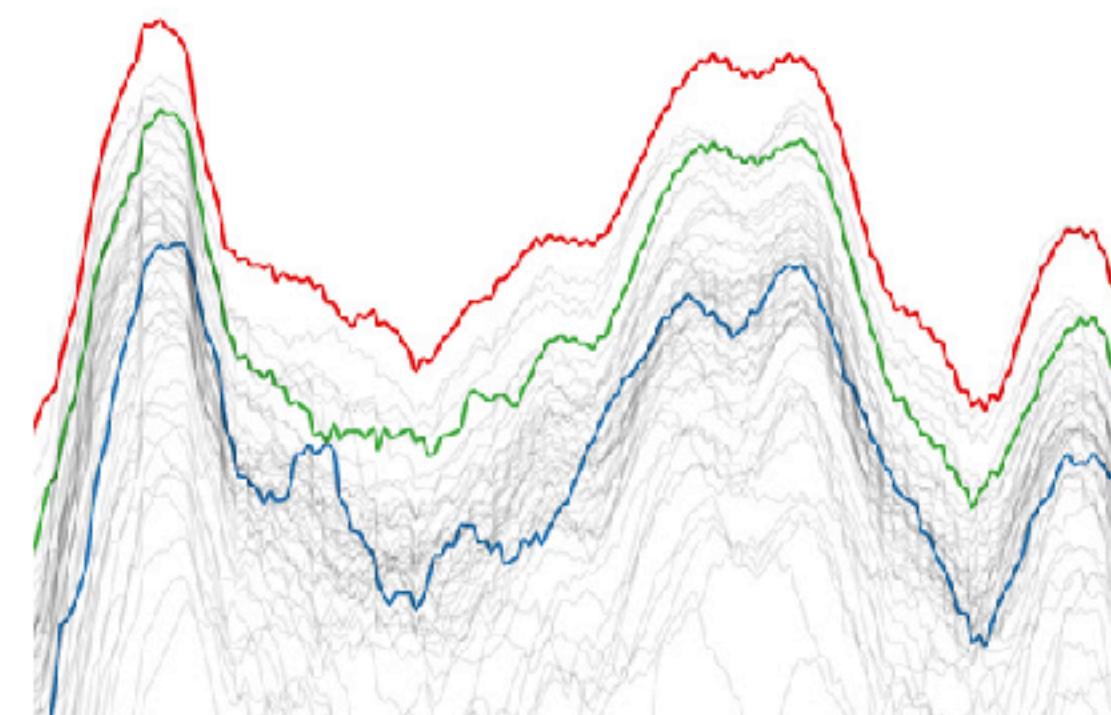
FERNANDO BECERRA

DATA ANALYSIS + VISUALIZATION

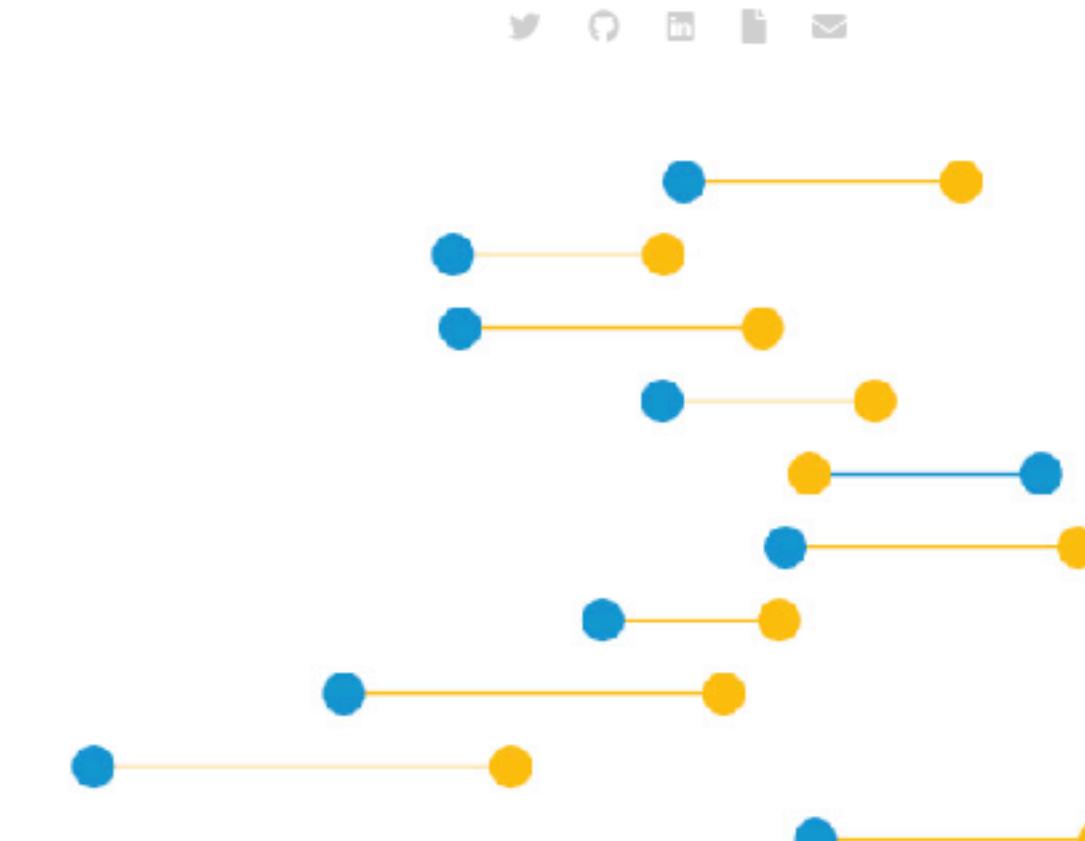
I'm an astrophysicist turned data analyst and data visualization developer. I've taught classes at Universidad de los Andes and Pontificia Universidad Católica de Chile. Before that, I got a Ph.D. in Astronomy & Astrophysics from Harvard University. My work is a mix of research, data science, analysis, and visualization and spans a wide range of topics such as sports, science, environment, education, government, and public policy. If you are interested in working together, feel free to [reach out](#).



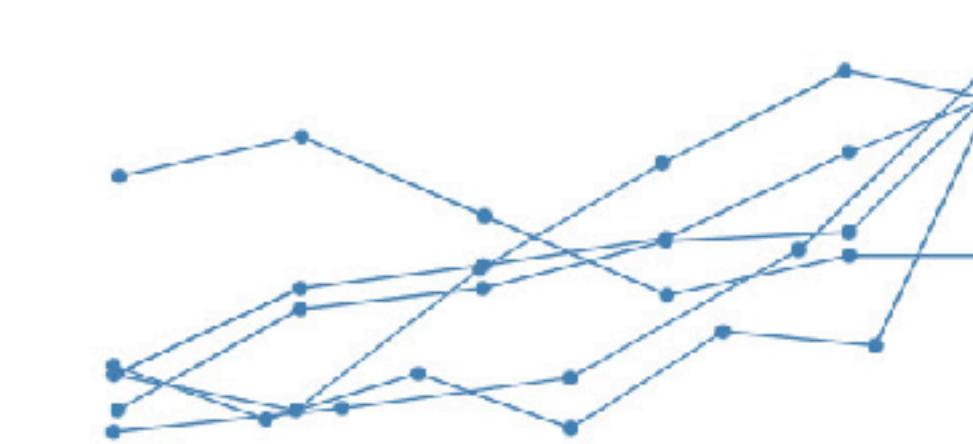
D3JS INTERACTIVE DATAVIZ
Inflation for Americans at each age
How does inflation affect Americans at different ages?



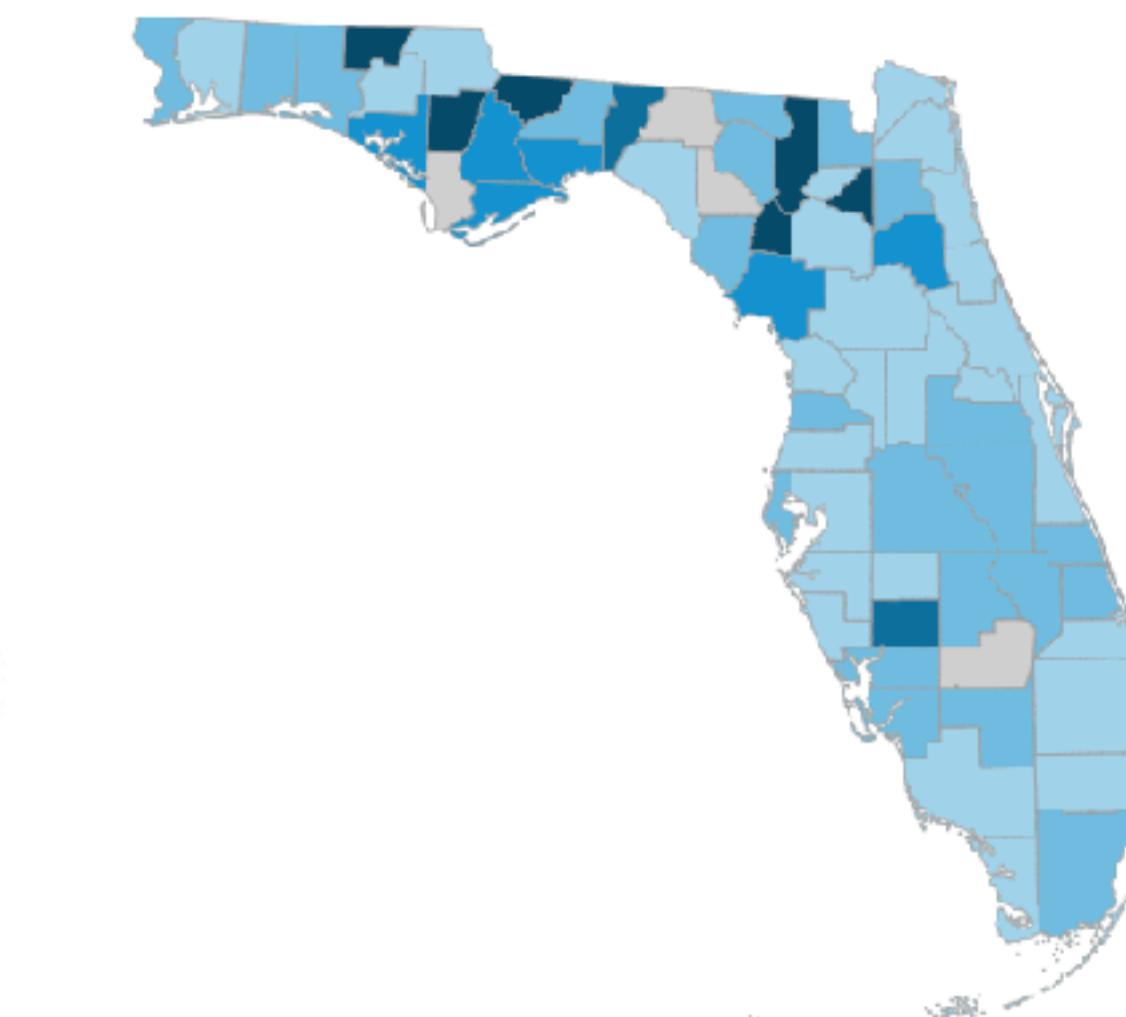
D3JS INTERACTIVE DATAVIZ
The COVID-19 toll in Chile
Visualizing Chile's COVID-19 cases and deaths



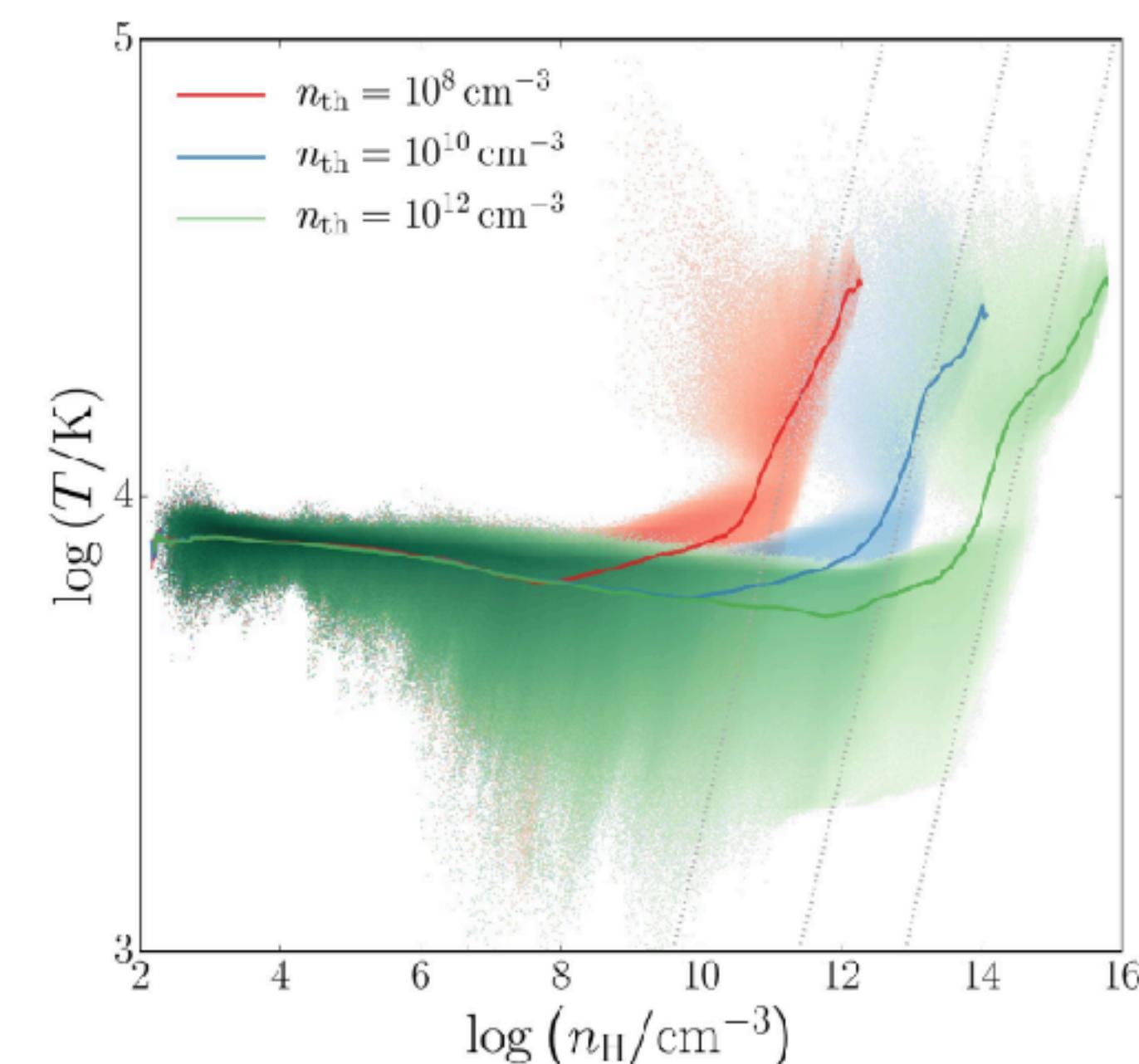
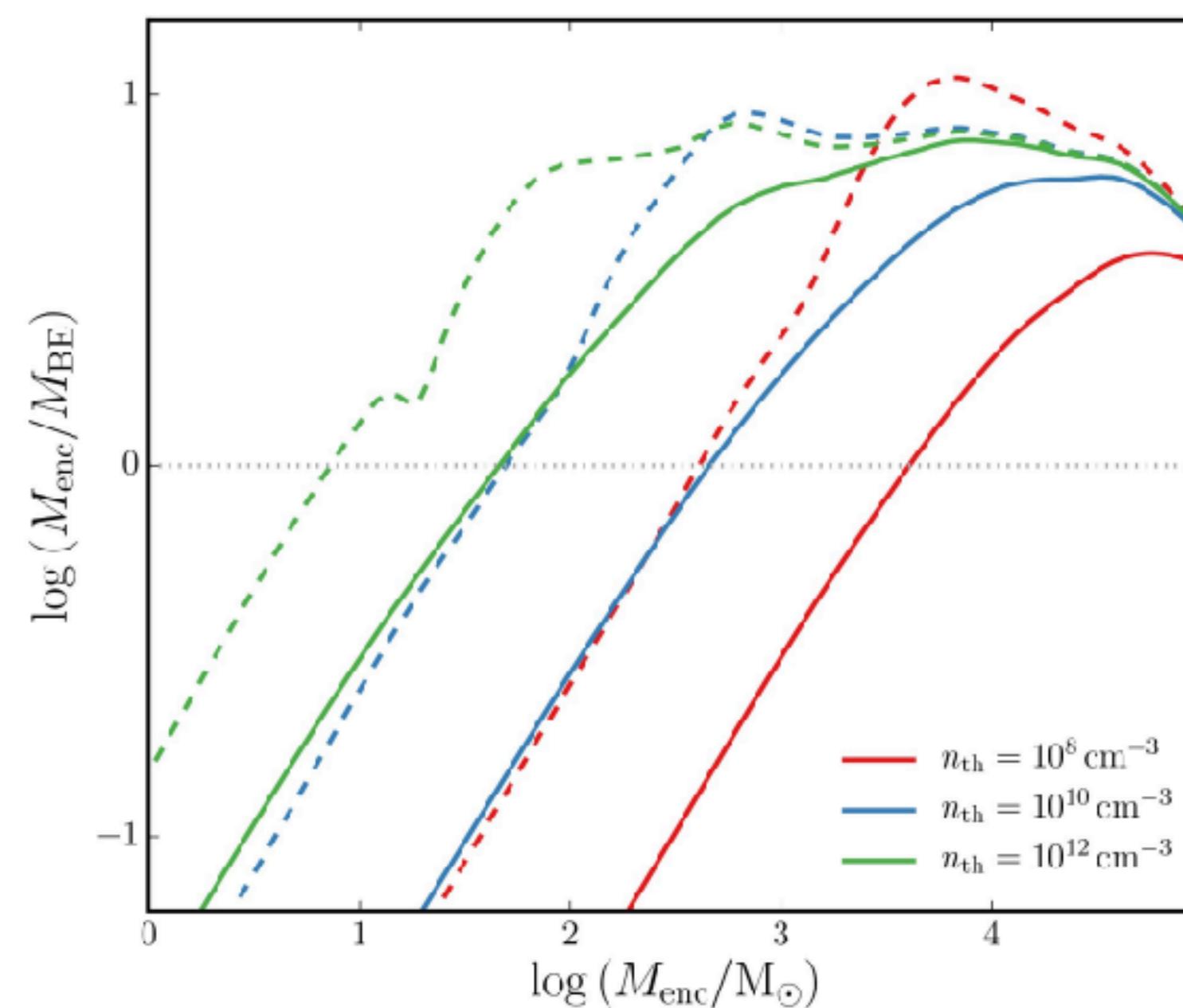
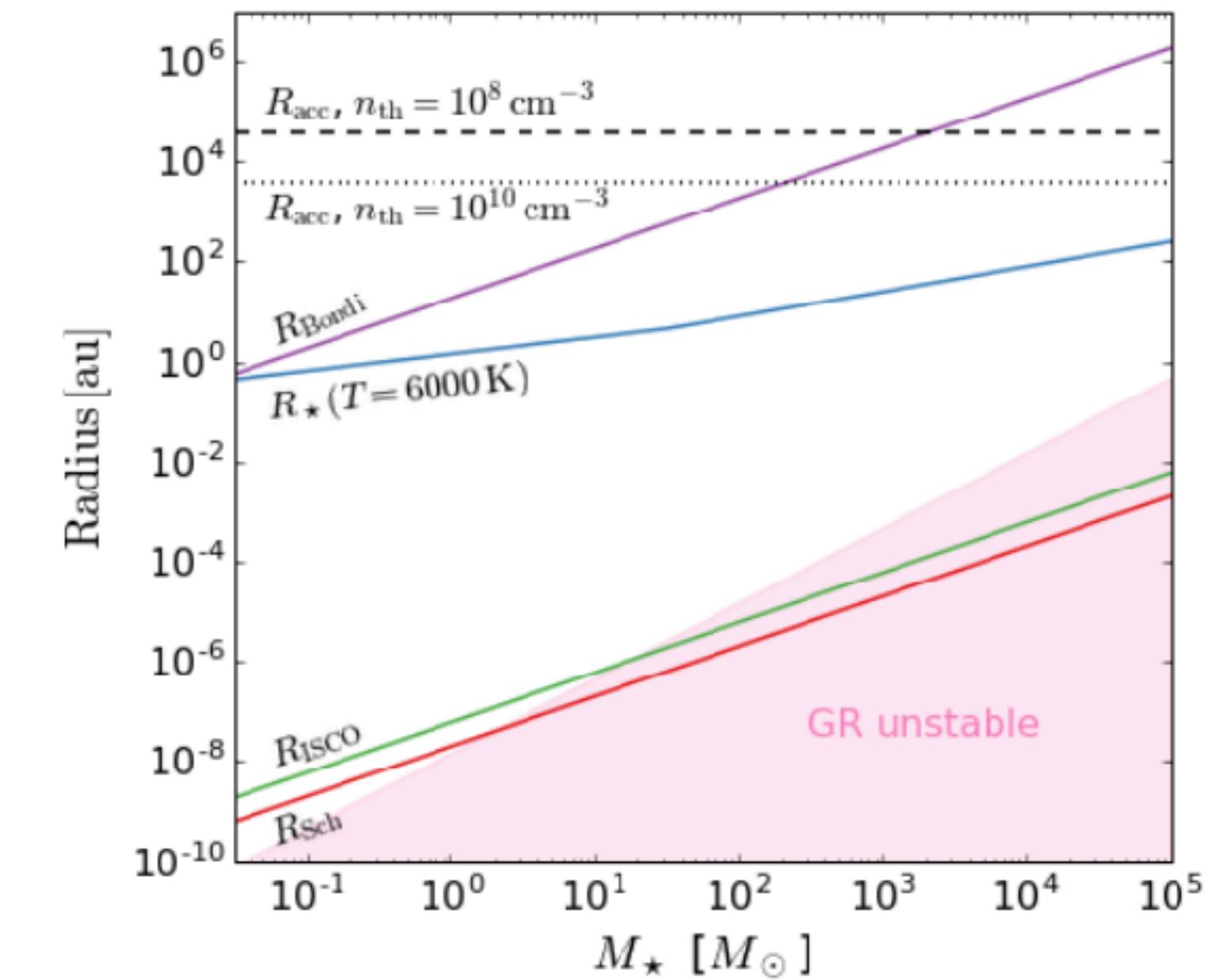
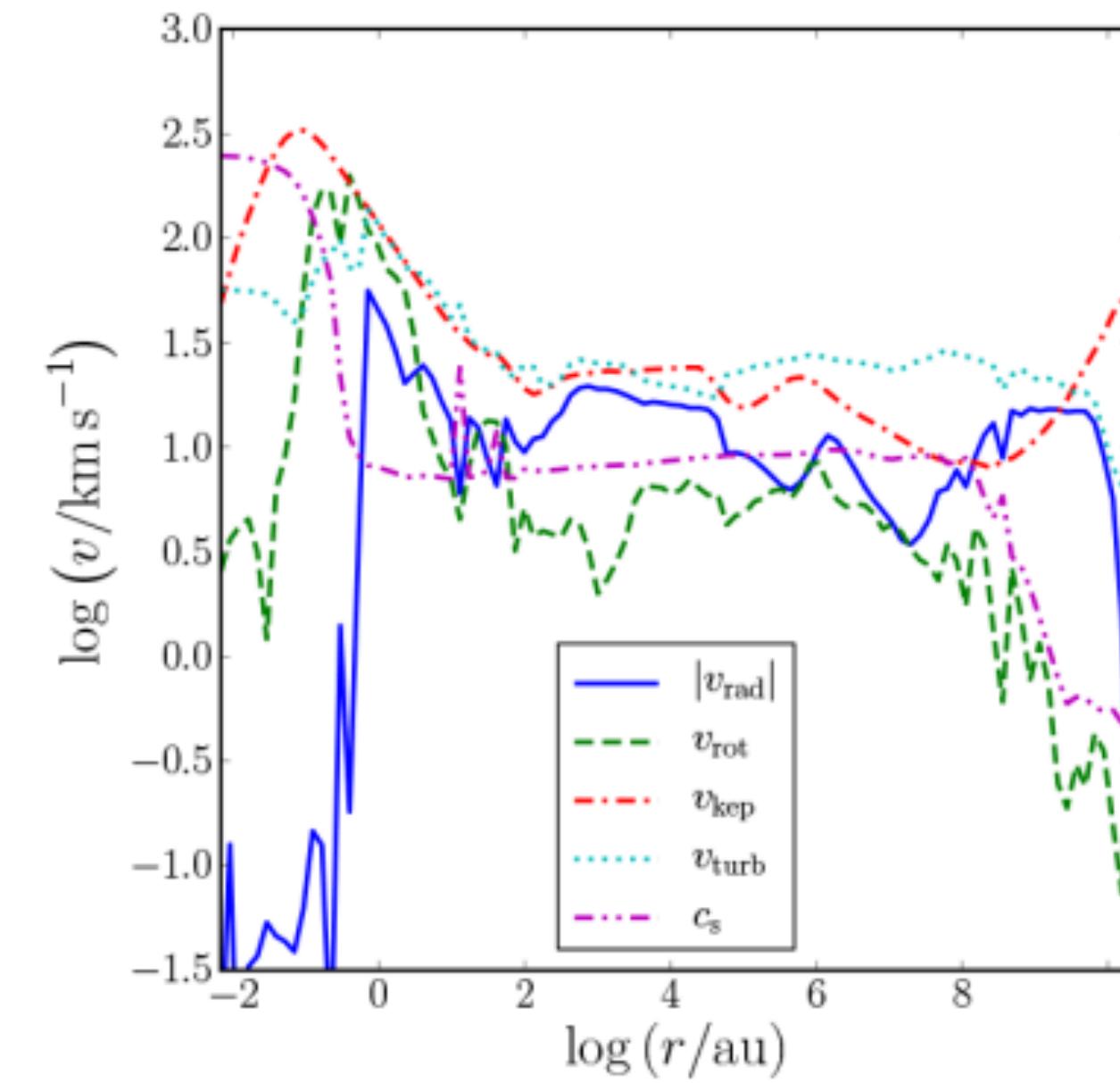
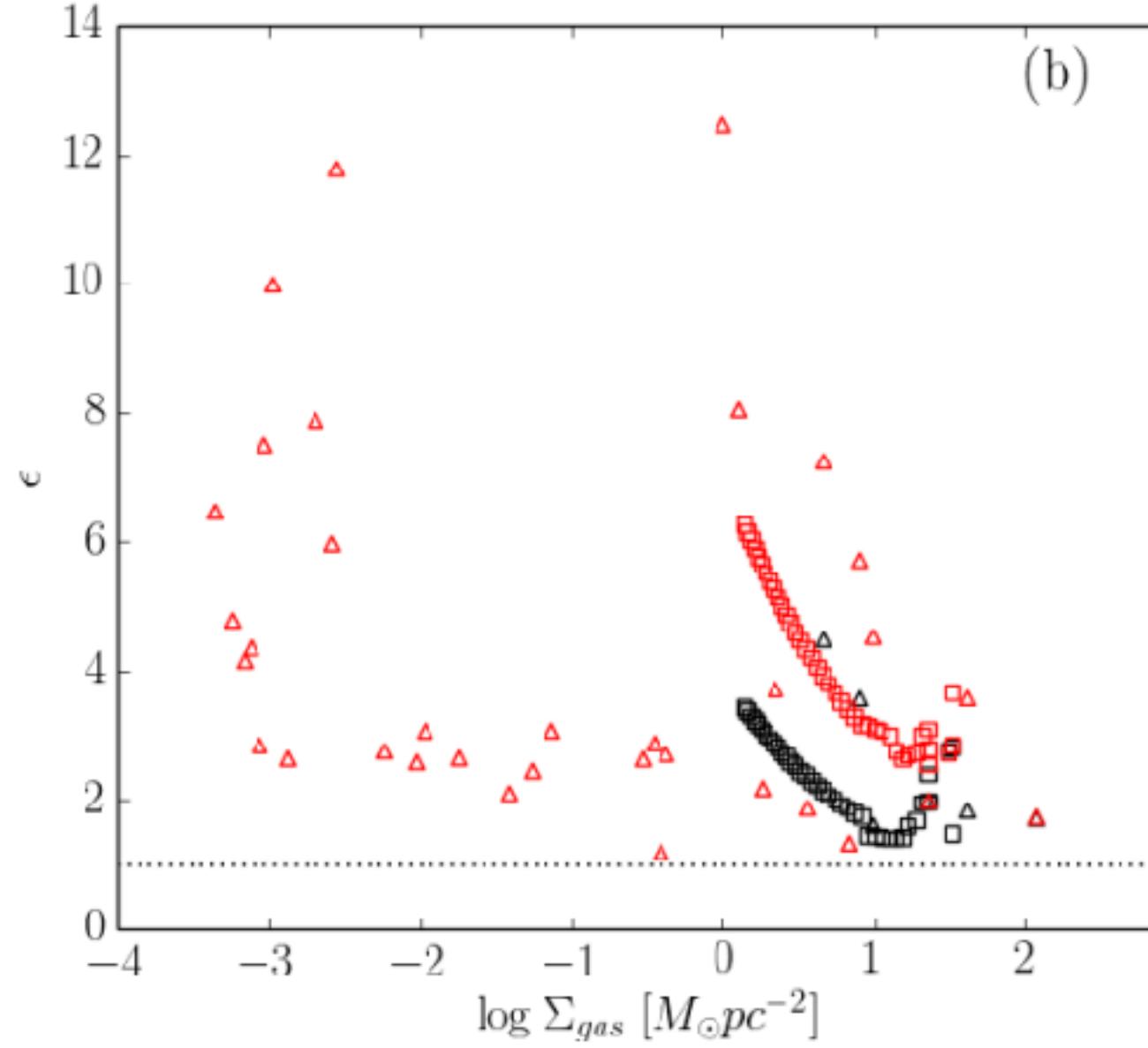
D3JS INTERACTIVE DATAVIZ
Beyond education outcomes
How equitably distributed are educational resources?

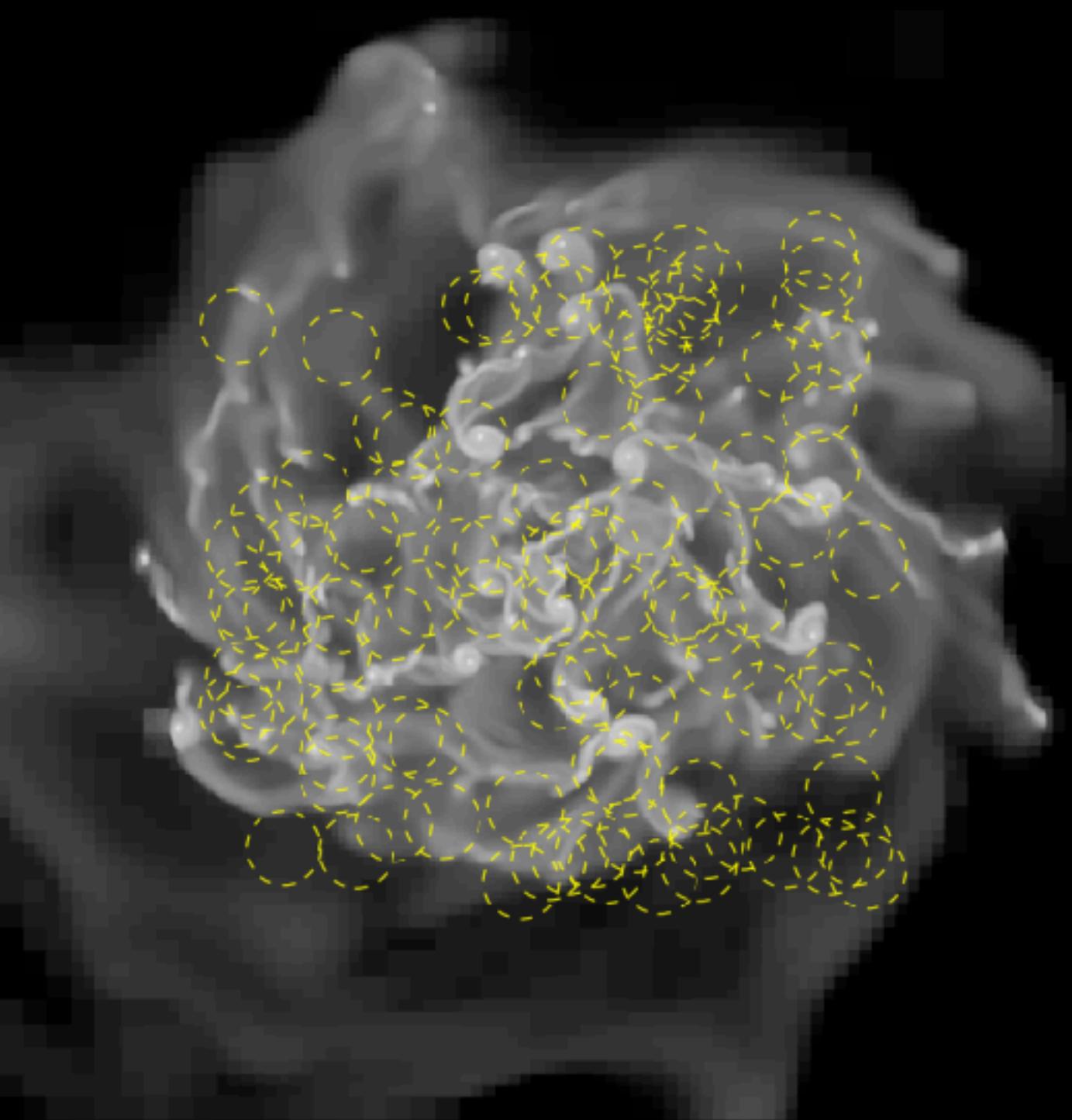
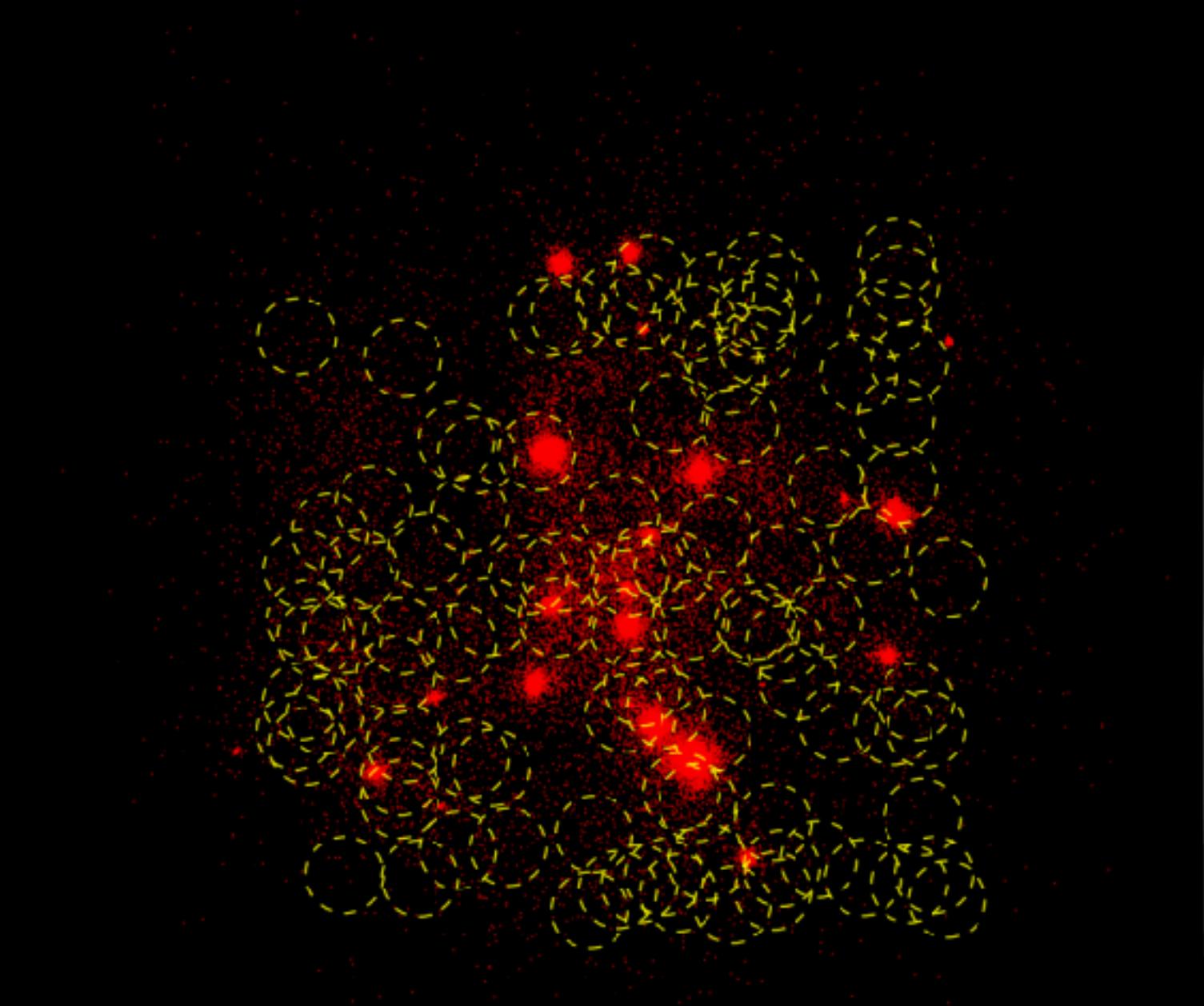
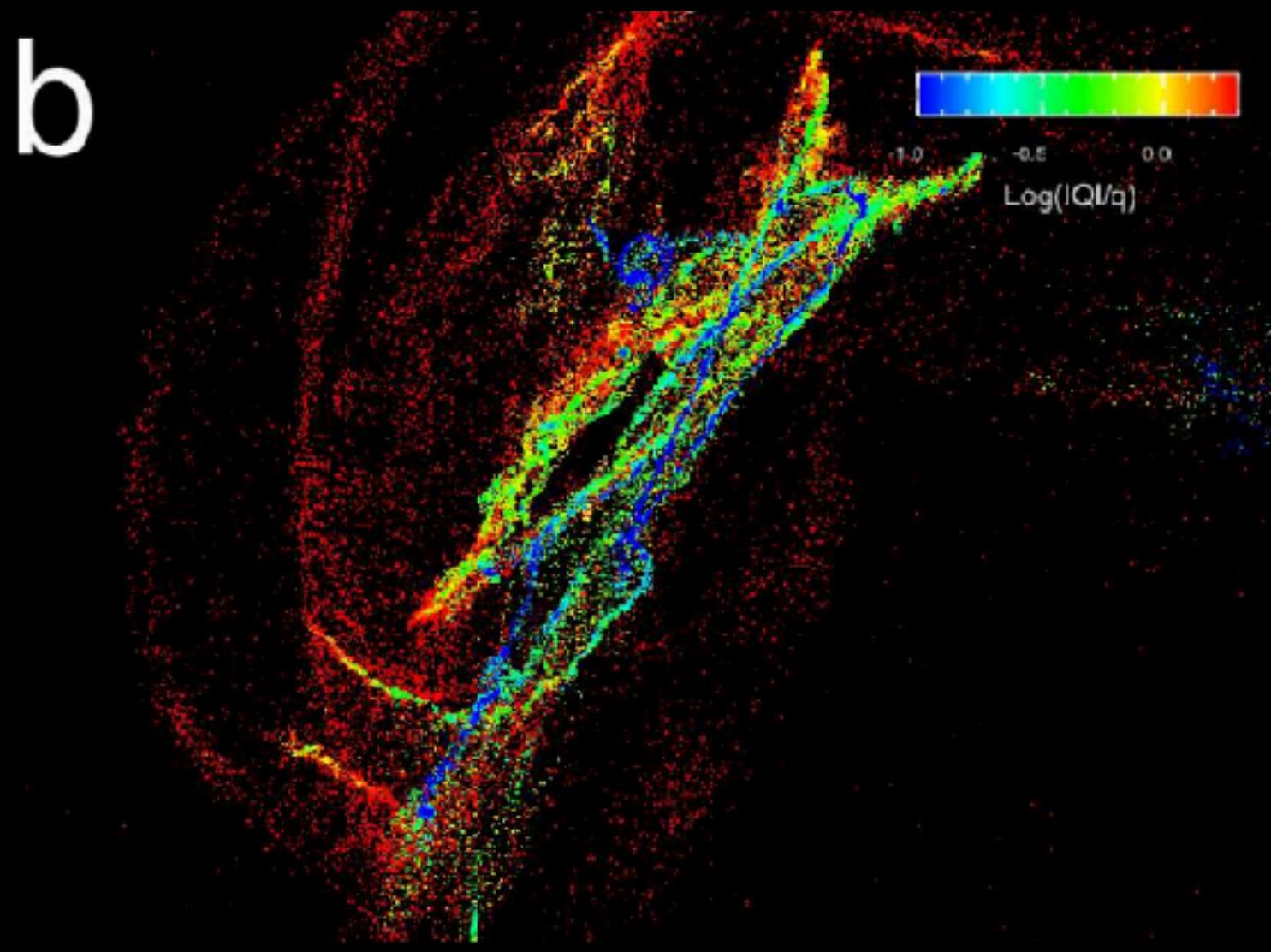
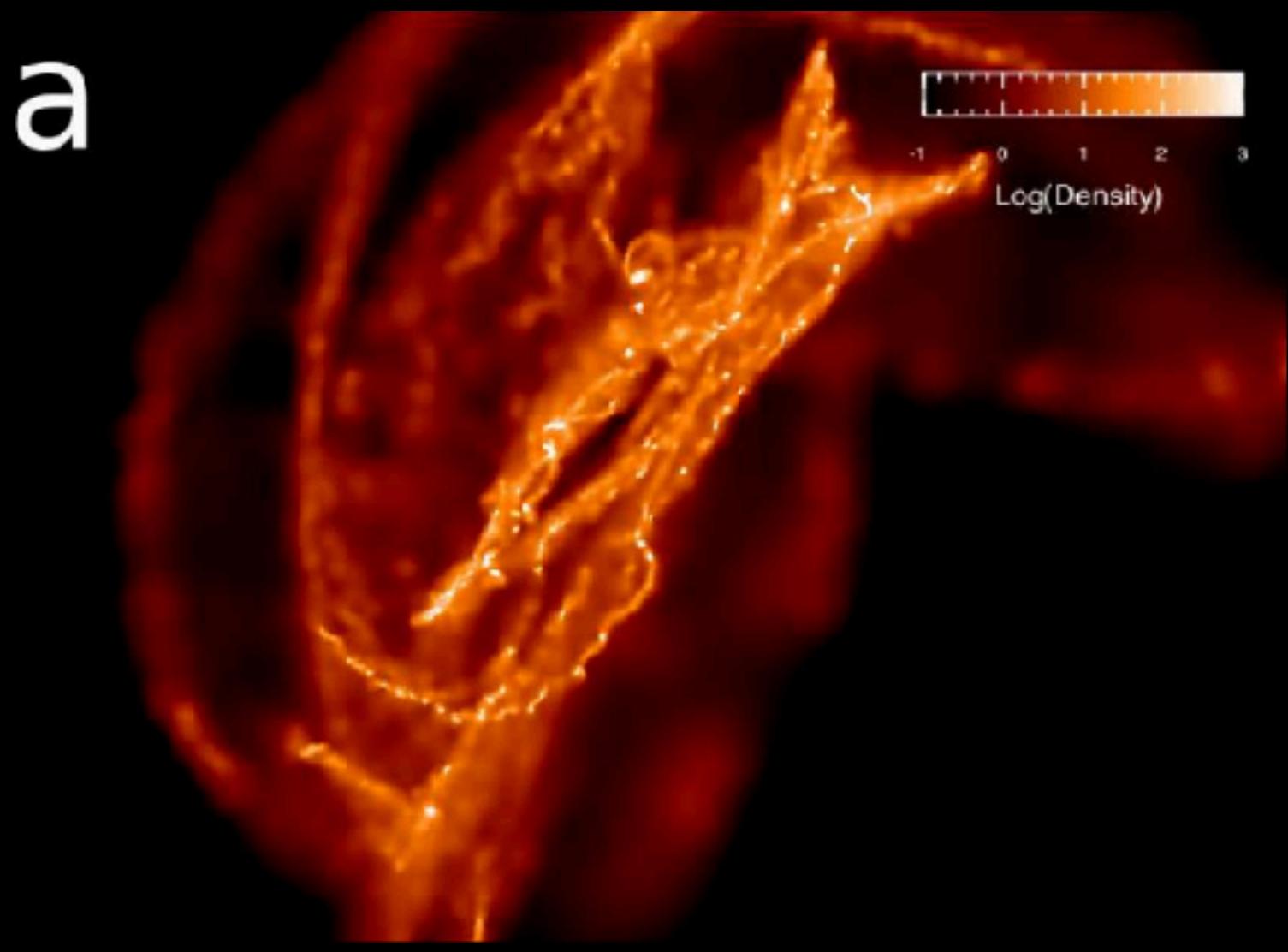


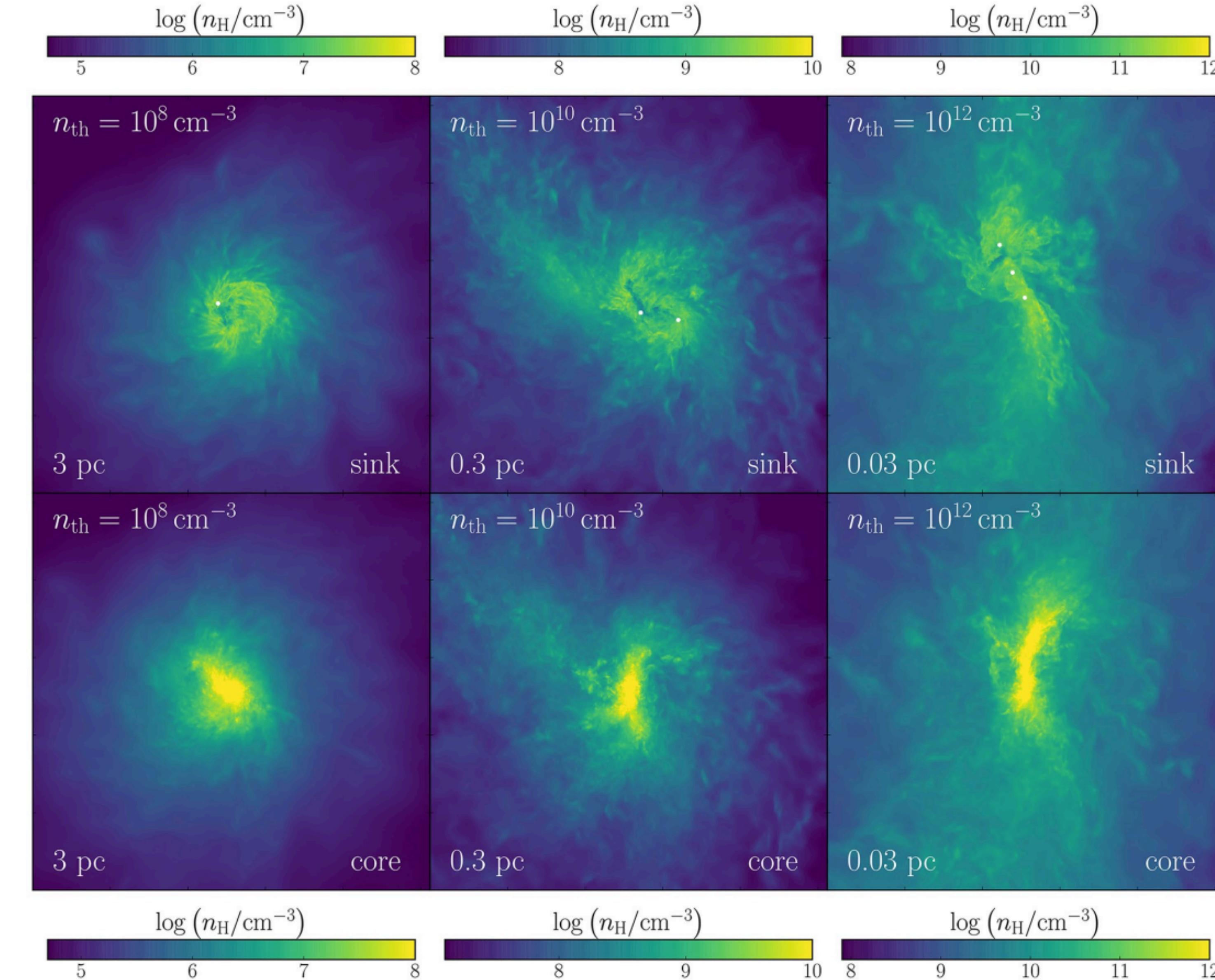
D3JS INTERACTIVE DATAVIZ
Giving dashboard
A snapshot of the many ways Americans give



D3JS INTERACTIVE DATAVIZ
The leaky pipeline of advanced placement test taking
<https://www.fernandobecerra.com/>
The gap between AP class enrollment and AP test taking



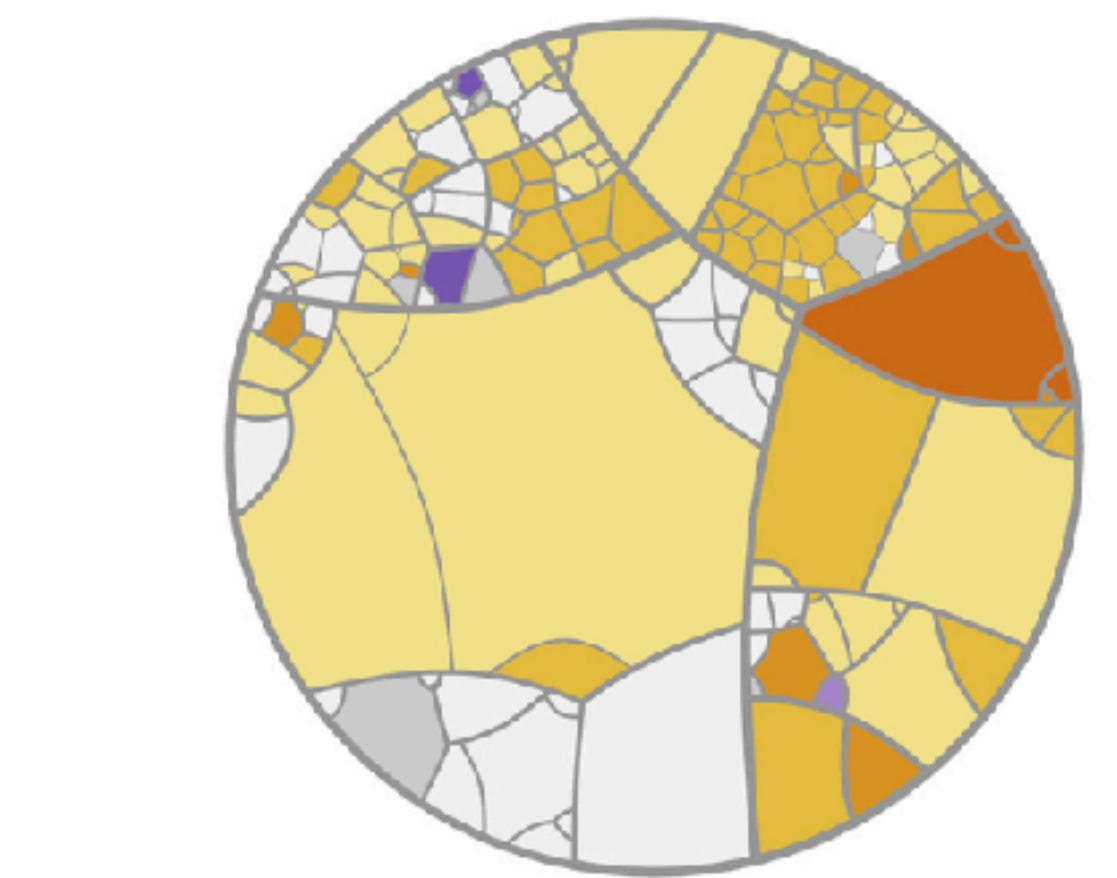




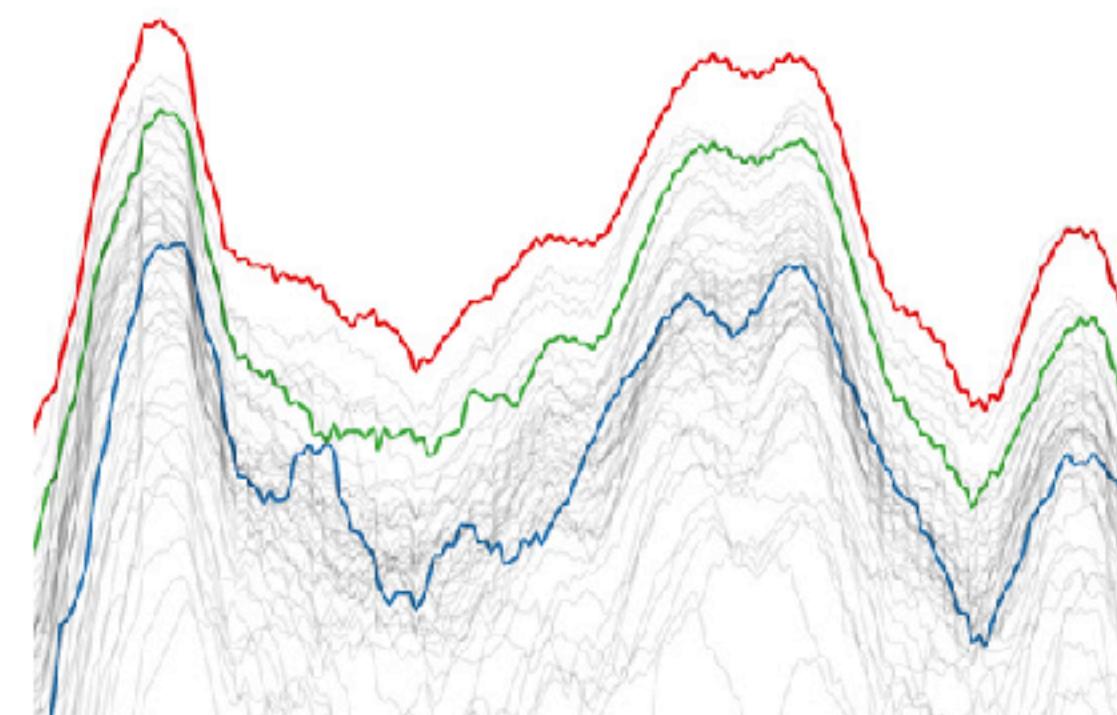
FERNANDO BECERRA

DATA ANALYSIS + VISUALIZATION

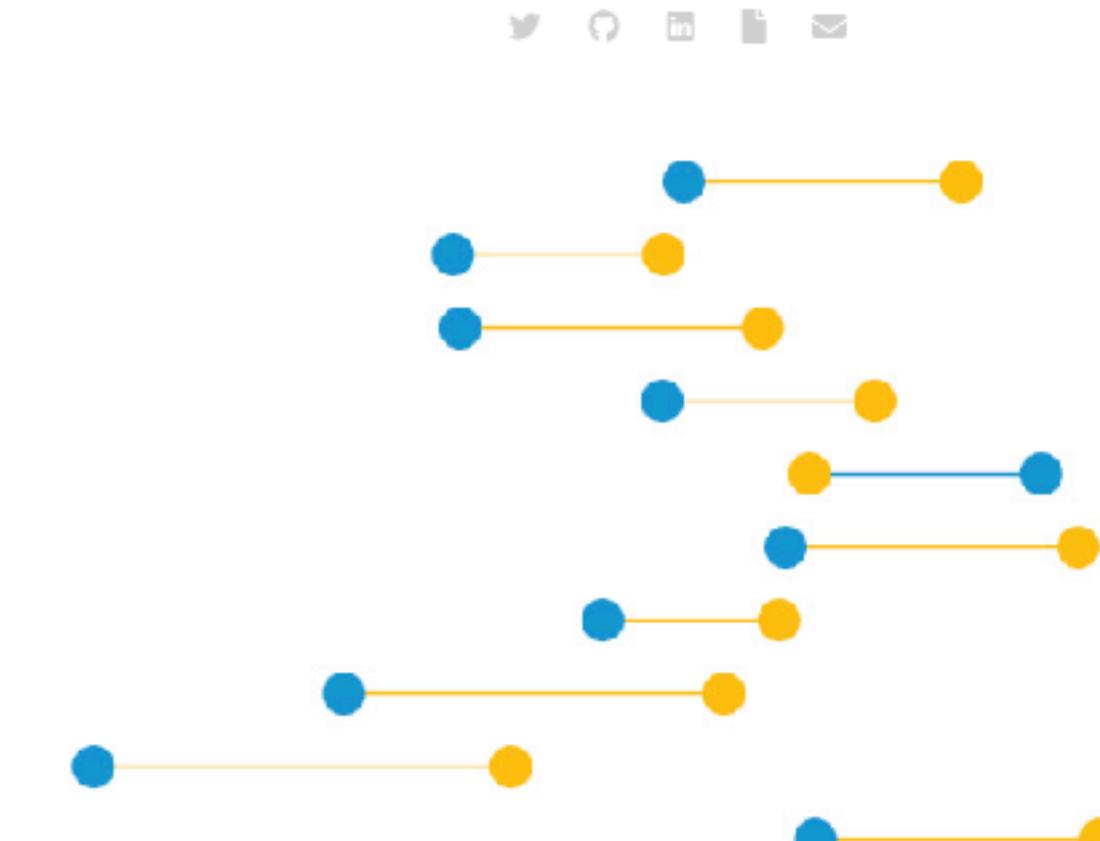
I'm an astrophysicist turned data analyst and data visualization developer. I've taught classes at Universidad de los Andes and Pontificia Universidad Católica de Chile. Before that, I got a Ph.D. in Astronomy & Astrophysics from Harvard University. My work is a mix of research, data science, analysis, and visualization and spans a wide range of topics such as sports, science, environment, education, government, and public policy. If you are interested in working together, feel free to [reach out](#).



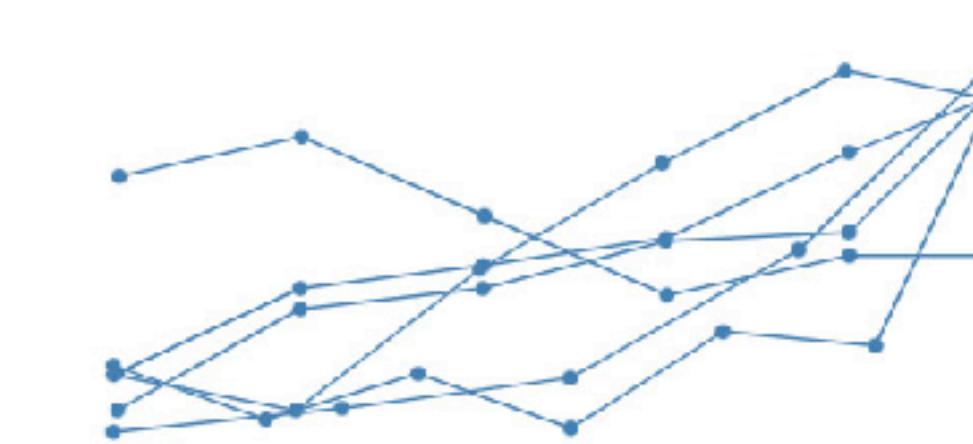
D3JS INTERACTIVE DATAVIZ
Inflation for Americans at each age
How does inflation affect Americans at different ages?



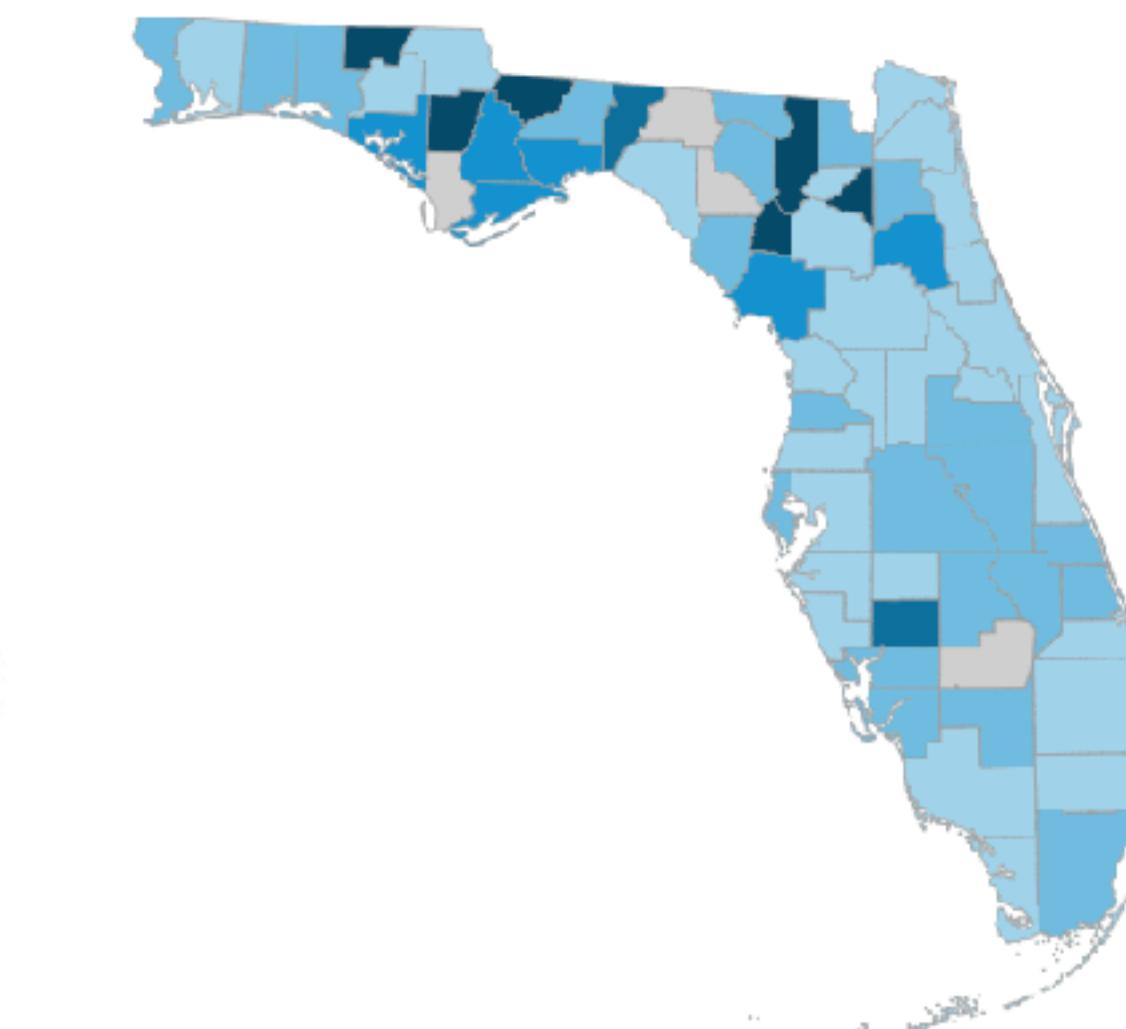
D3JS INTERACTIVE DATAVIZ
The COVID-19 toll in Chile
Visualizing Chile's COVID-19 cases and deaths



D3JS INTERACTIVE DATAVIZ
Beyond education outcomes
How equitably distributed are educational resources?



D3JS INTERACTIVE DATAVIZ
Giving dashboard
A snapshot of the many ways Americans give



D3JS INTERACTIVE DATAVIZ
The leaky pipeline of advanced placement test taking
<https://www.fernandobecerra.com/>
The gap between AP class enrollment and AP test taking



D3JS INTERACTIVE DATAVIZ
Give people paid holidays
What is more efficient at keeping people at home?

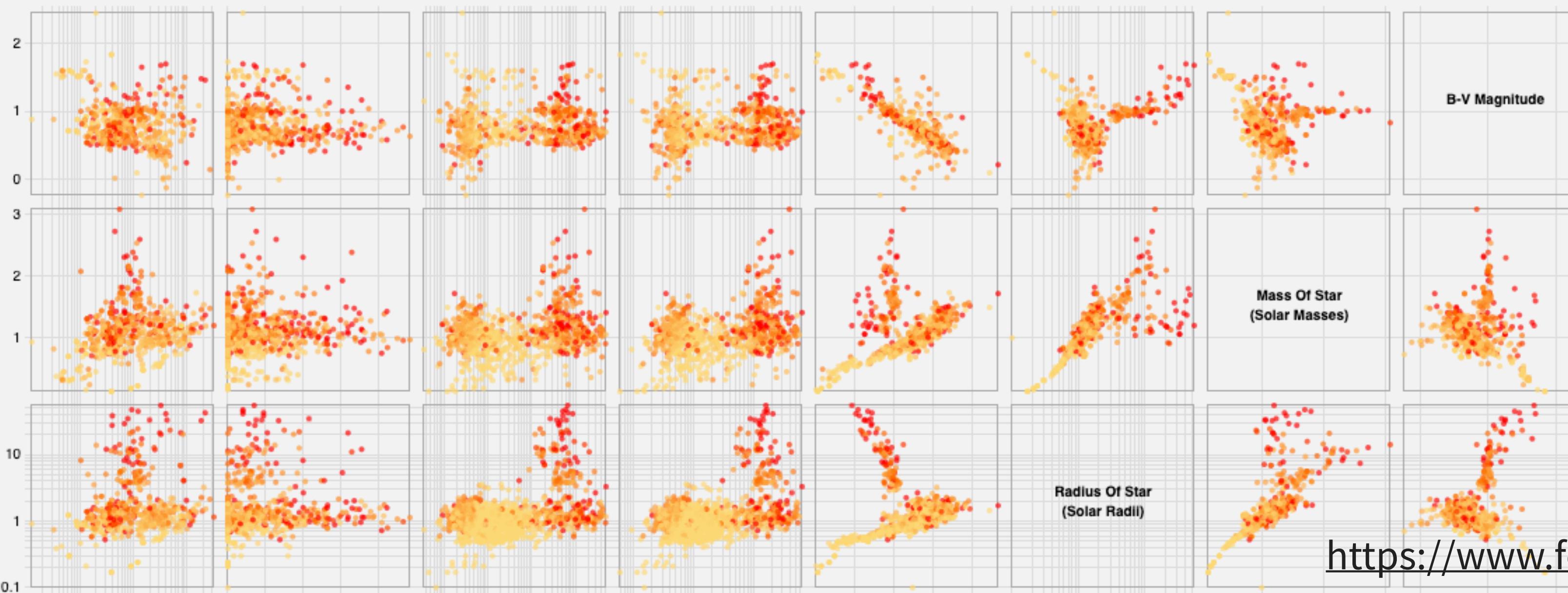
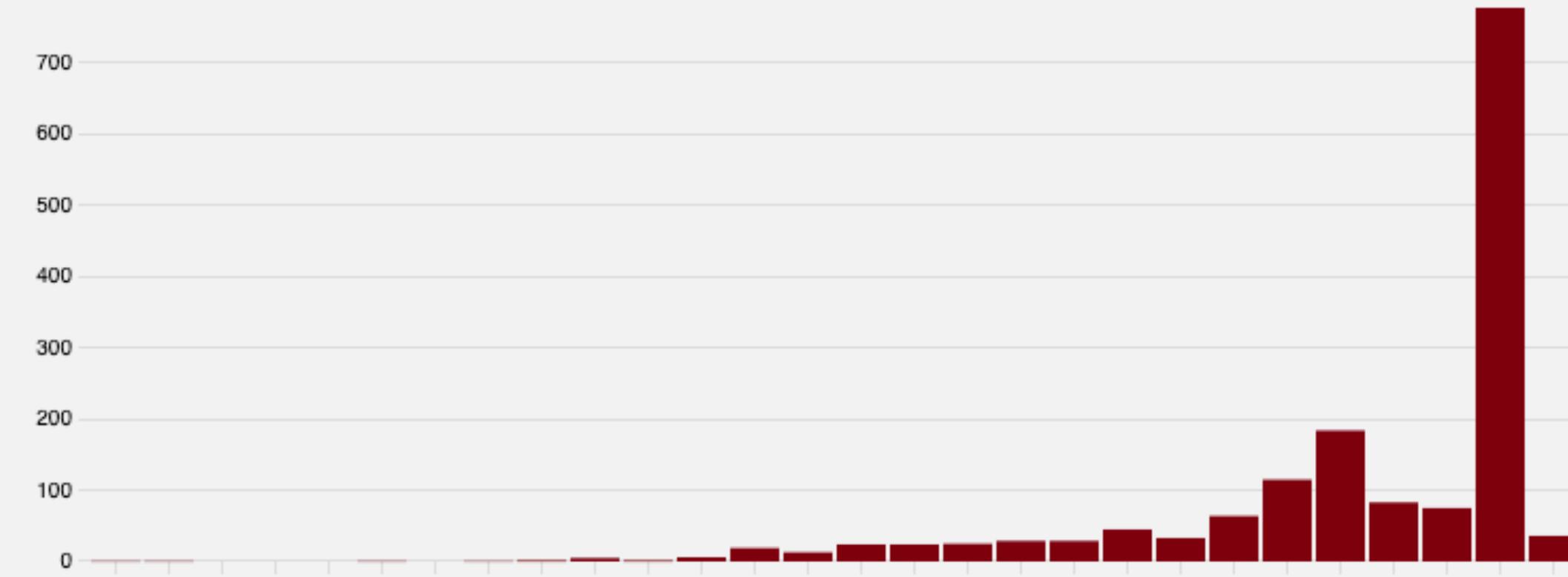


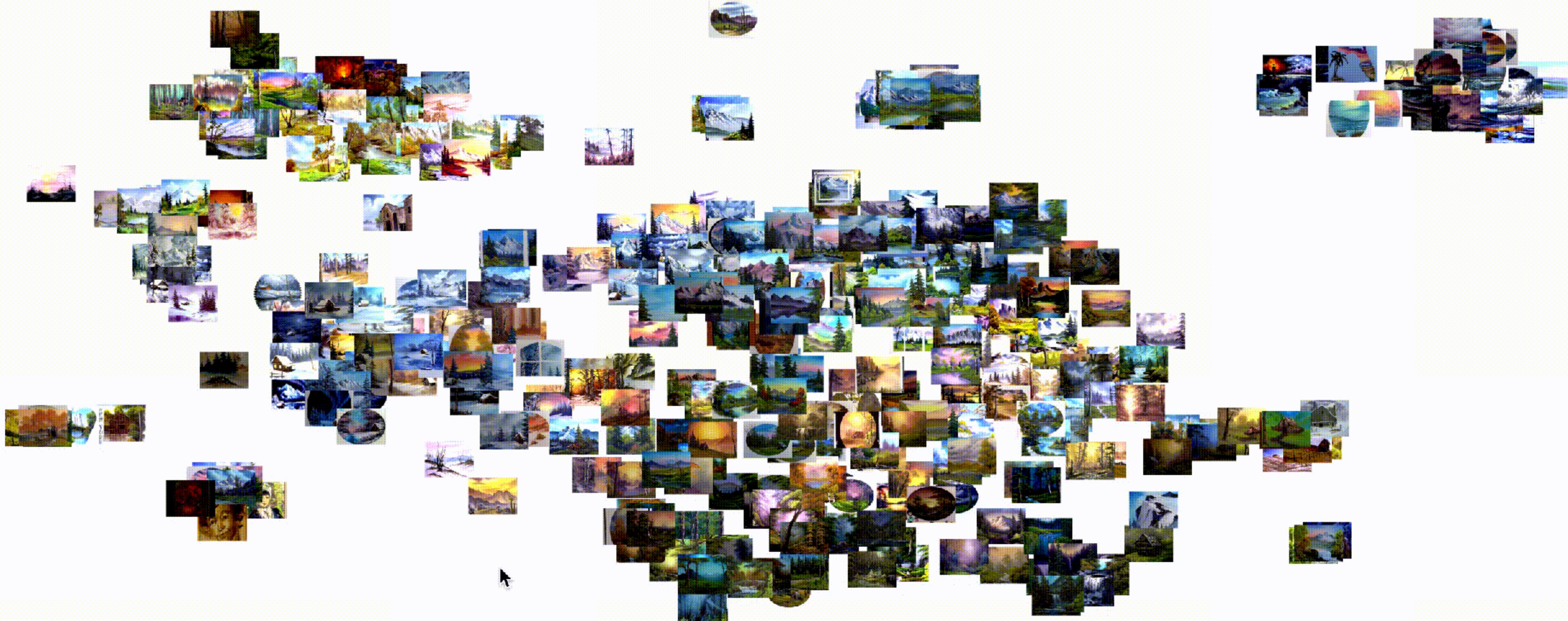
Ex²: Exoplanets Explorer

A visualization by [Fernando Becerra](#)

Exoplanets are planets orbiting a star beyond our Solar System. They have been discovered since 1988, but most of the first discoveries were huge gas giants orbiting close to their parent star. The launch of the [Kepler Space Telescope](#) opened a new window using a technique called the "transit" method, which allowed astronomers to confirm more than 1,000 exoplanets spanning a wide range of properties.

This visualization tool is intended to explore different exoplanets characteristics. The histogram on the right shows the number of planets discovered by year. Each bar is clickable, which will select the objects discovered that year and highlight them on the scatter plots below. These plots are color-coded by planet mass and include a brush tool to select and explore the properties of a subset of exoplanets across multiple panels.





barn beach bridge bushes cabin clouds fence flowers fog framed grass guest hills lake
mountains night ocean palm trees path river rocks snow steve ross sun trees waterfall



PALETTE

PICTORIAL ELEMENTS

Research has shown that experienced teachers are more effective than inexperienced teachers, and [addressing these inequities](#) can improve reading and math test scores.

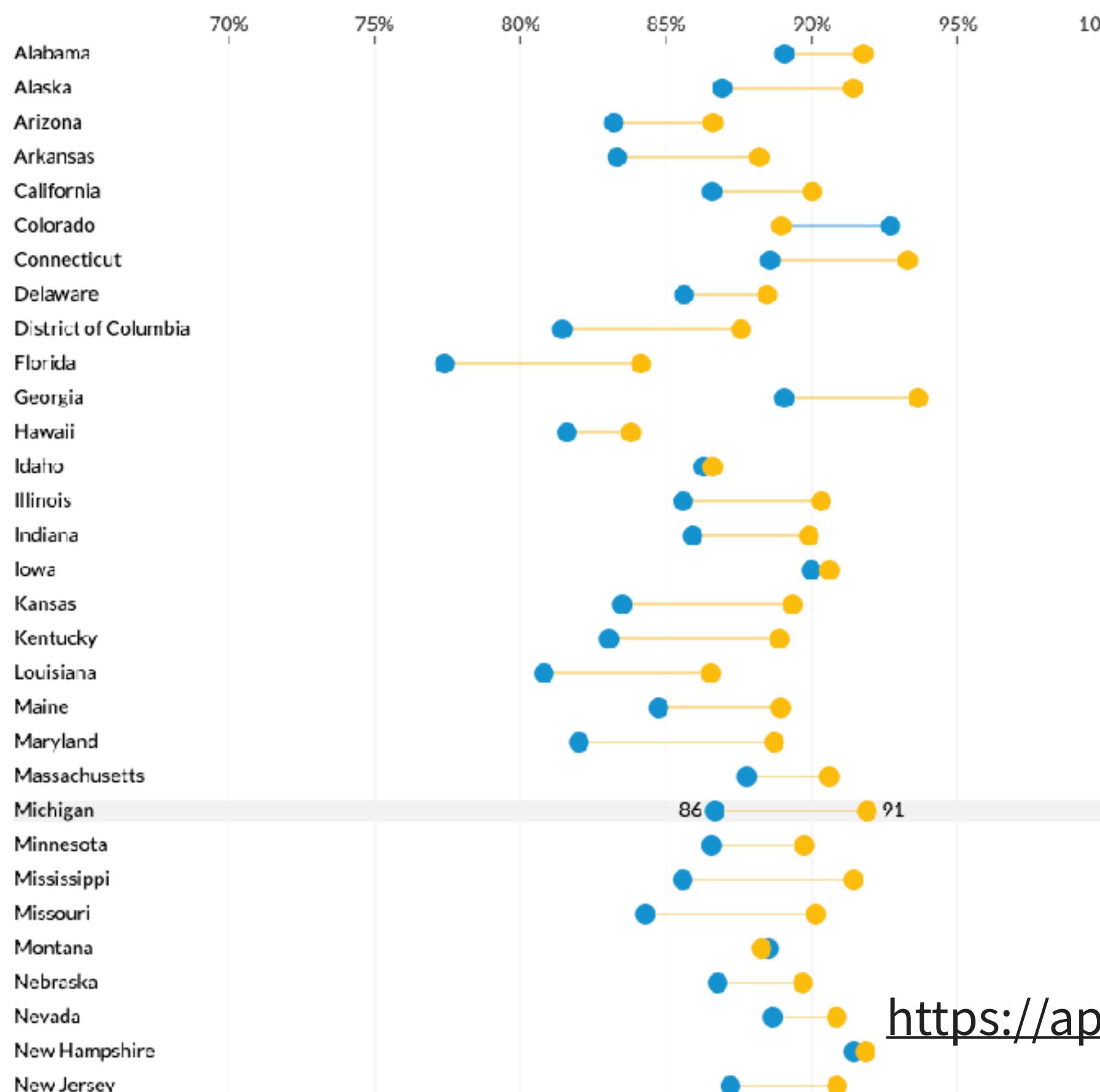
Below, we display the share of teachers who have more than two years of experience in students' schools.

Show gap between ● Black students and ● White students

Mouse over a state to explore data by school district

Average share of teachers with more than two years of experience

EXPAND SCALE ON SORT BY GAP OFF

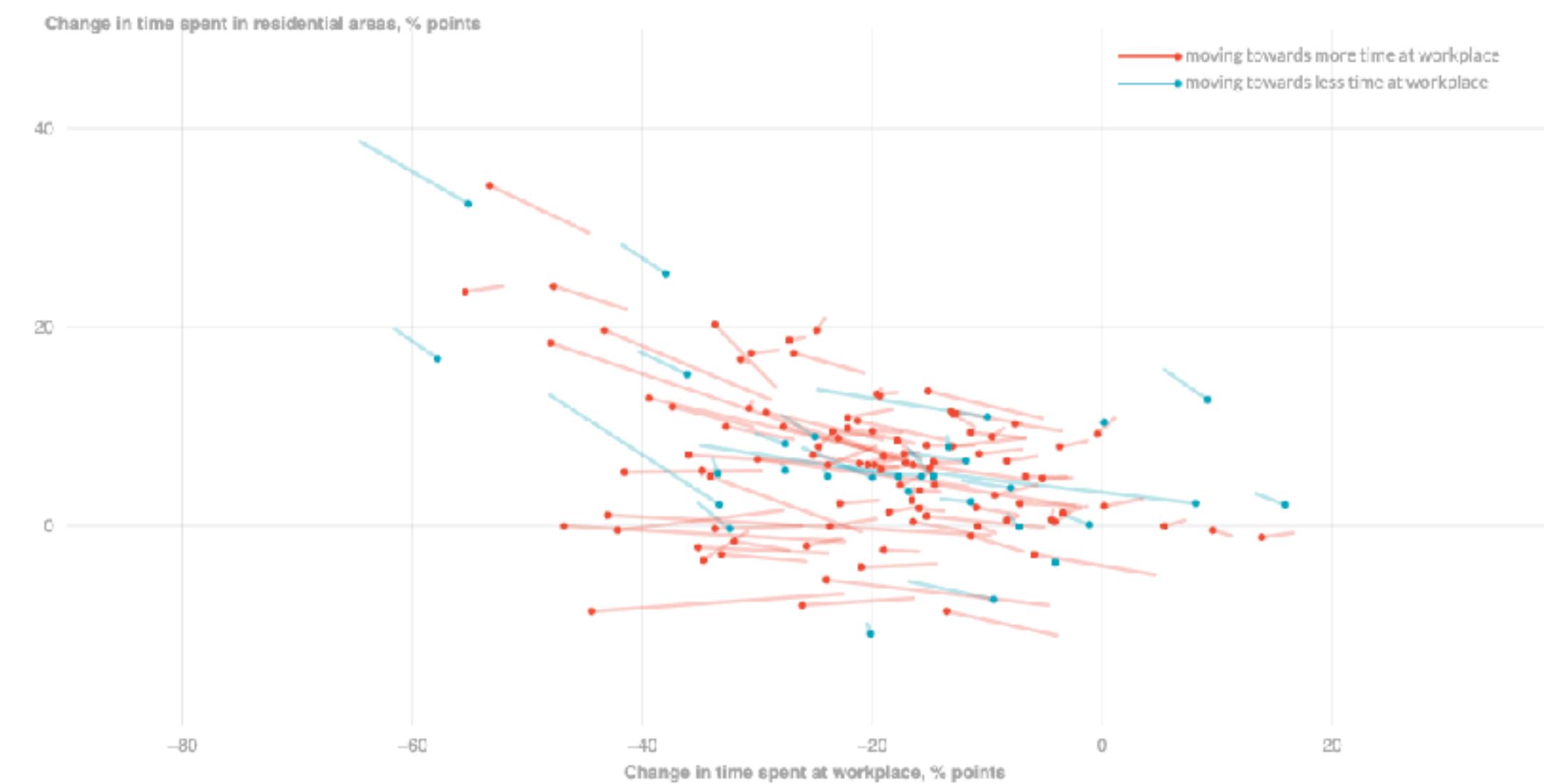


Holidays, not lockdowns, drive more people to stay home

After the initial full lockdown in March 2020, Christmas and Easter have driven the highest decline in time spent at work on average.

Change in time spent at workplace v change in time spent in residential areas

Week of May 01, 2021



Since the beginning of the pandemic governments have been enforcing lockdowns to keep people at home and control the spread of the virus. For most families, it is hard to stop working without appropriate economic incentives, and, eventually, are forced to go back to their workplaces as soon as the lockdown is over. The key to finding a way of forcing people staying home while getting paid might be more familiar than what you think and it is (un)surprisingly effective: holidays.

Data from Google's COVID-19 mobility reports show that the initial global lockdown of March 2020 dropped the time spent at workplaces more than 45% on average, compared to January 2020. Two months later countries started going back to normal, but since then they have been going back and forth between closing down and reopening again. Spikes in new cases drive governments to decree lockdowns, but as soon as restrictions are lifted people return to work and create an increase in time spent going back to the beginning of the cycle.

<https://www.fernandobecerra.com/covid-mobility/>

Average spending of 22-year-old households

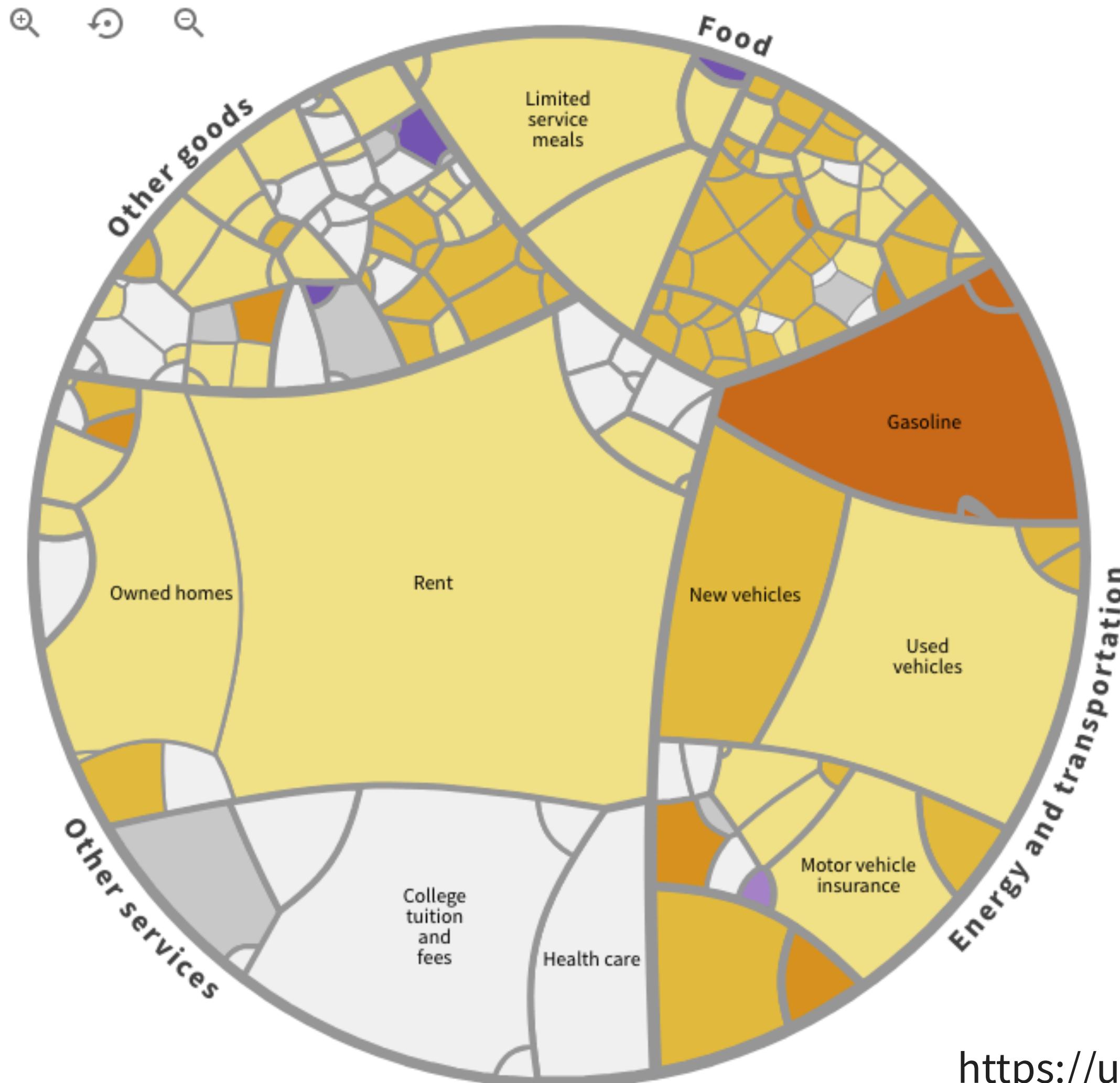
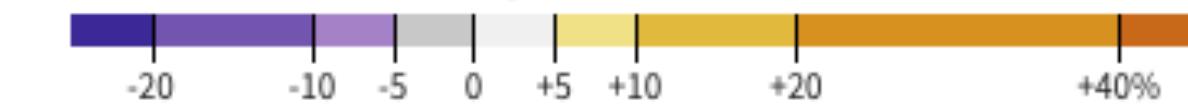


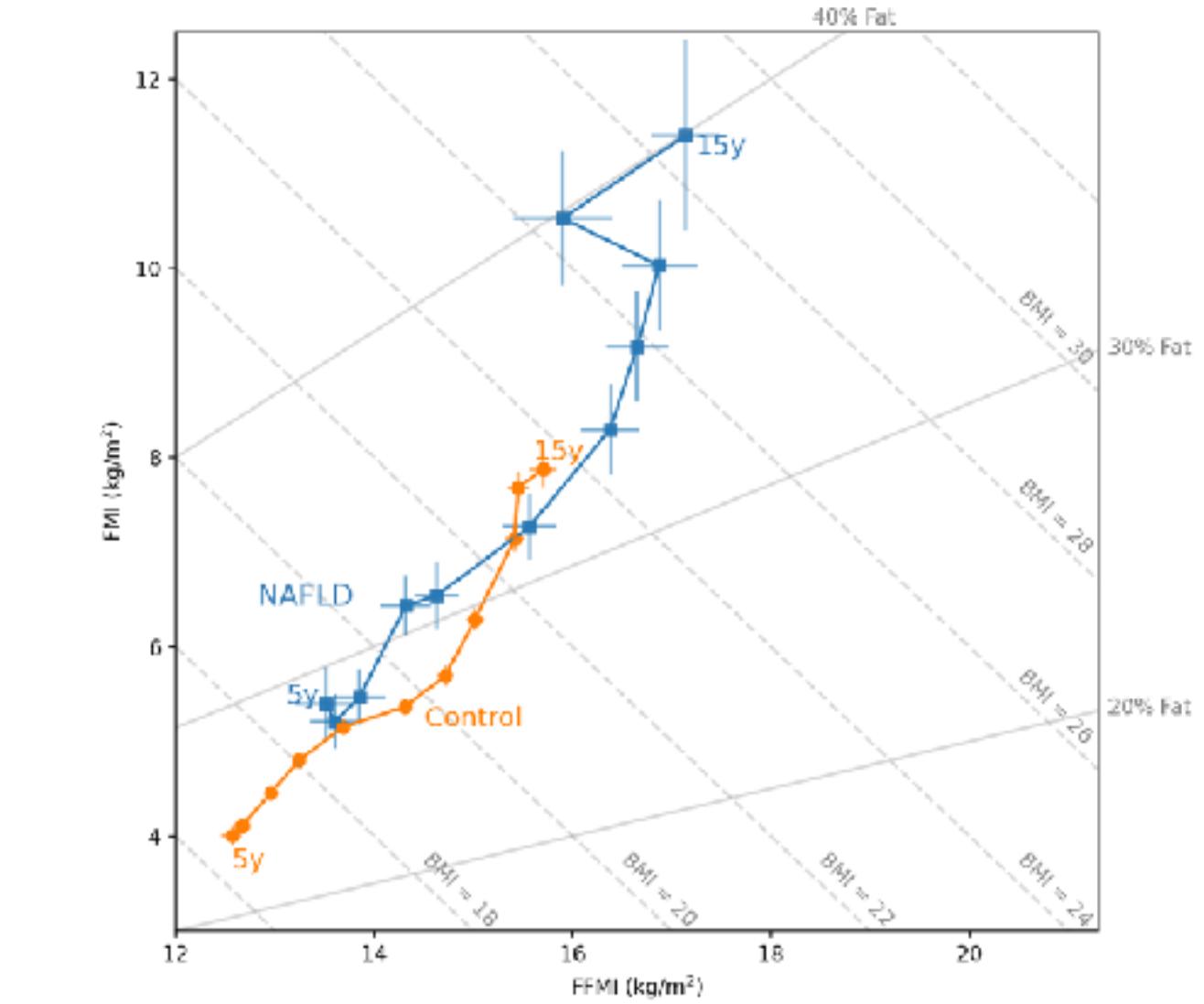
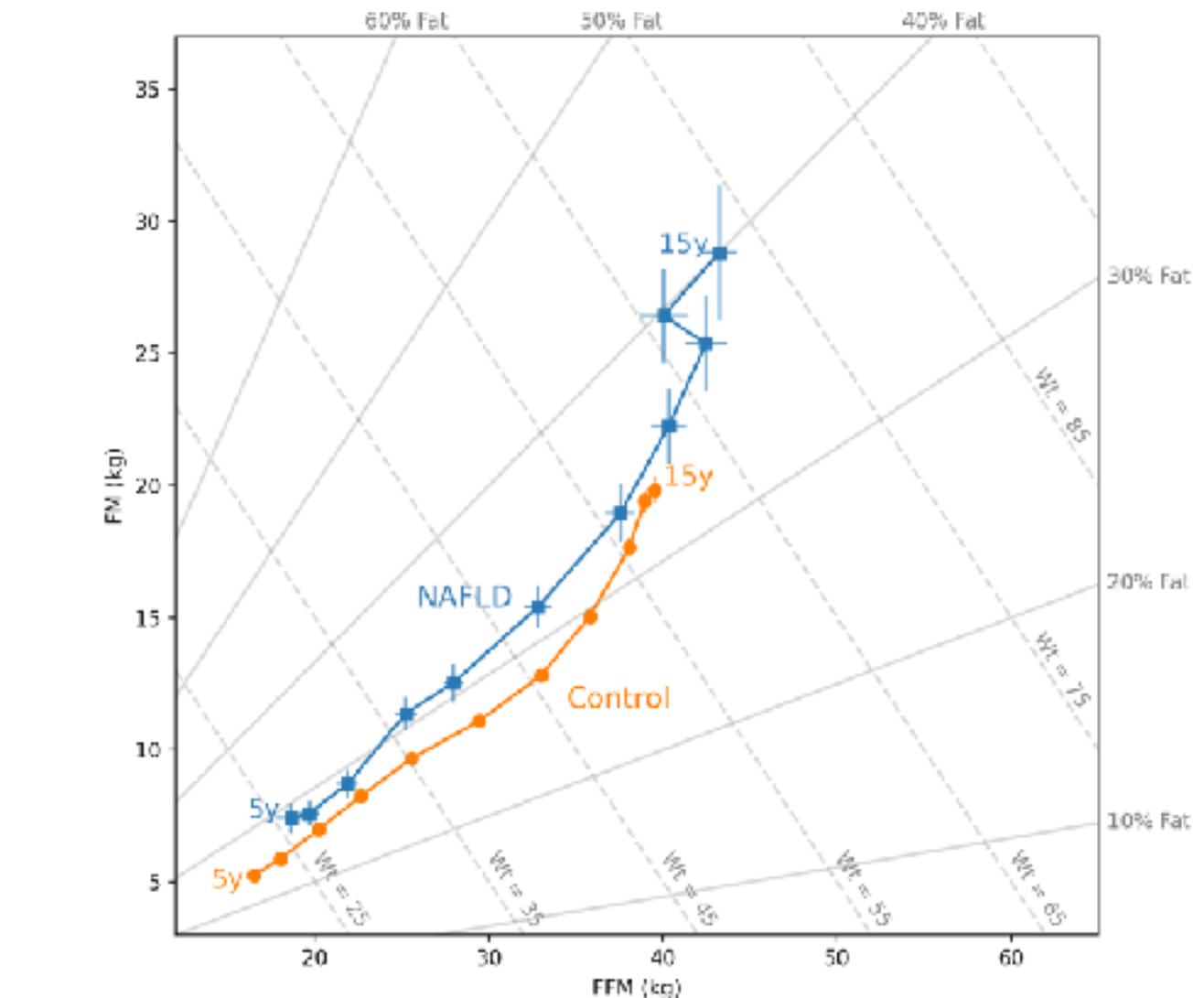
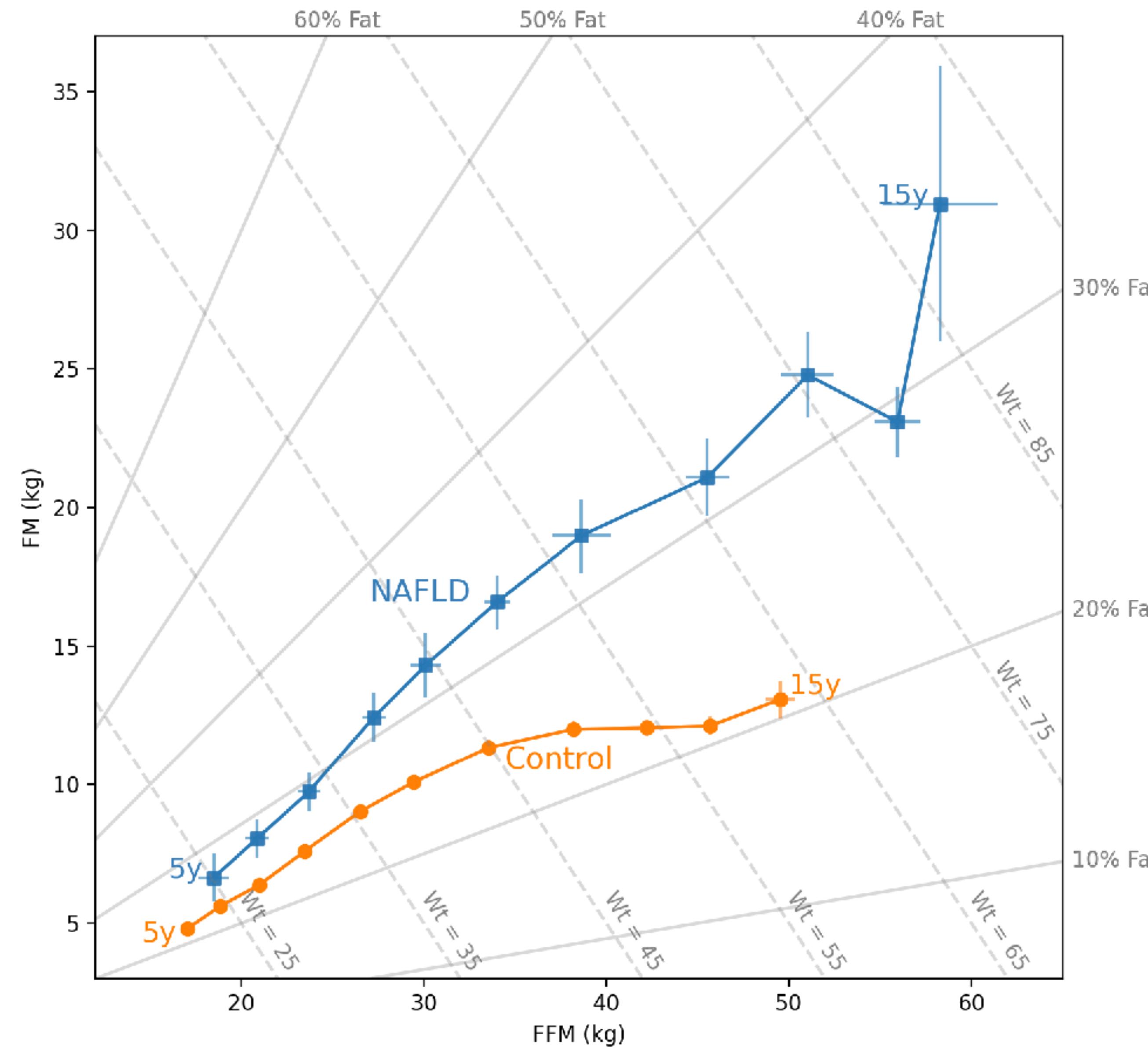
Total spending

The size of each shape represents average spending

Change in prices

Color represents change in prices, June 2021 to June 2022





Este curso

Objetivos

1. Entender los conceptos fundamentales dentro del campo de visualización de información
2. Aprender las técnicas y mejores prácticas para diseñar una visualización de datos
3. Desarrollar un pensamiento crítico frente a los gráficos que se ocupan día a día
4. Crear e implementar visualizaciones de datos en Python
5. Usar la visualización de datos como una forma de comunicar y contar una historia

Calendario

Fecha	Evento	Tema
viernes 18 de agosto	clase	Introducción a la visualización de datos
viernes 25 de agosto	clase	Qué, por qué y cómo
jueves 31 de agosto	entrega tarea #1	Crítica de visualizaciones
viernes 1 de septiembre	clase	Tipos de gráficos
viernes 8 de septiembre	clase	Color y composición
jueves 14 de septiembre	entrega tarea #2	Visualización estática de datos
viernes 15 de septiembre	clase	Storytelling
viernes 29 de septiembre	clase	Visualizaciones no convencionales
viernes 6 de octubre	última clase	Más allá de Python
viernes 13 de octubre	entrega proyecto final	Ensayo visual

Tarea #1

1. Individual.
2. Crítica de tres visualizaciones de este año: una buena, una mala, y una engañosa (a simple vista se ve bien, pero vista en detalle deja harto que desear).
3. Cosas que hacen bien, cosas que hacen mal, y qué le cambiarían.
4. Rúbrica puede ser encontrada acá.

Tarea #2

1. Individual.
2. Dado un grupo de datos, crear 3 visualizaciones distintas: dos clásicas (líneas, barras, dispersión, mapa de calor, torta, área) y una menos convencional
3. No necesariamente relacionadas al mismo tema
4. Rúbrica puede ser encontrada [acá](#)

Proyecto Final

1. Grupos de 3 ó 4 personas.
2. Dos opciones:
 - i. Notebook explicativo
 - ii. Dashboard
3. Ensayo visual: contar una historia apoyándose en gráficos.
4. Rúbrica puede ser encontrada acá.

Nota Final

0.2 x Tarea #1

+

0.3 x Tarea #2

+

0.5 x Proyecto final

Cada semana

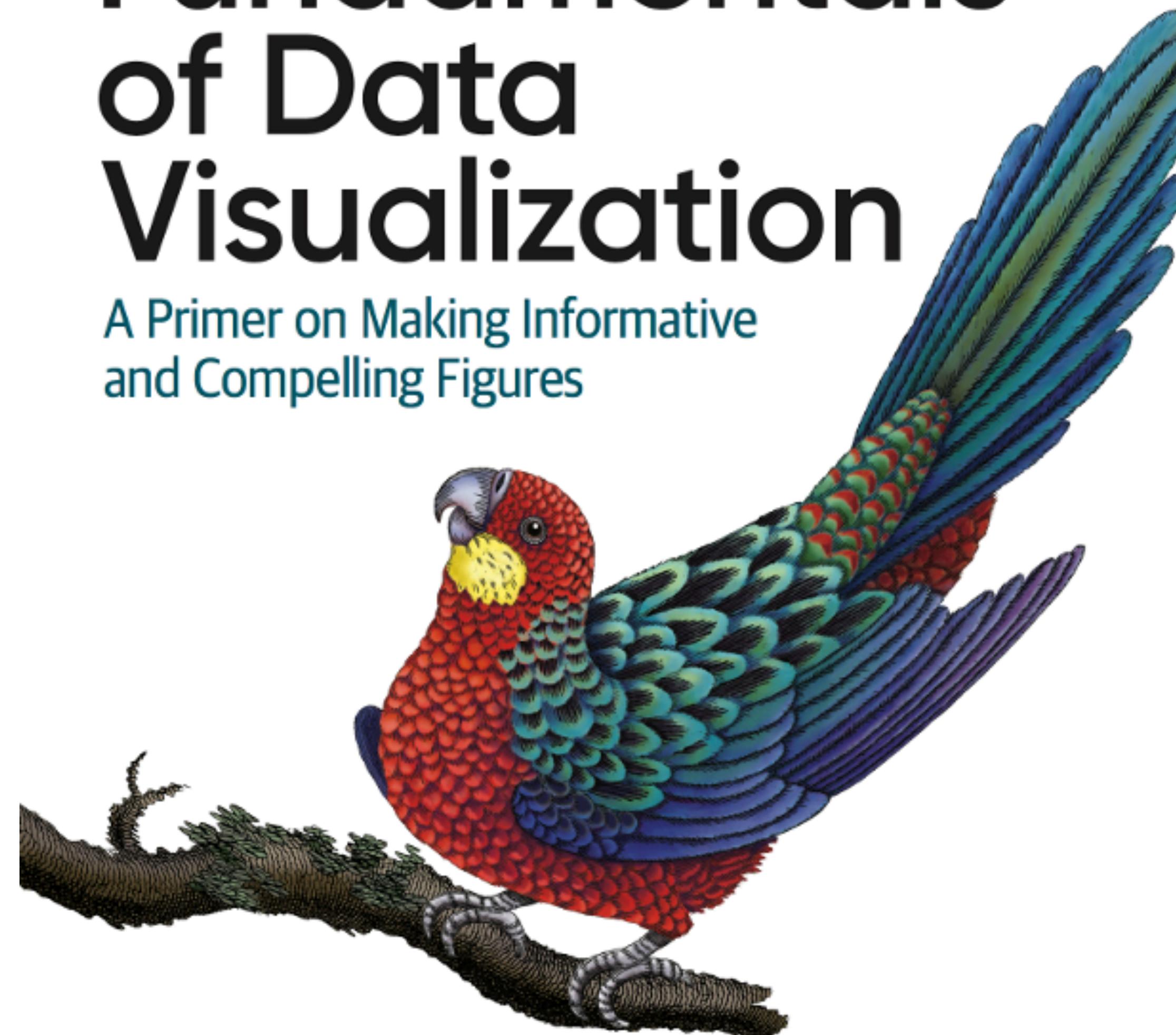
1. Estar al tanto de nuevas visualizaciones que hayan salido durante la semana.
2. Me las pueden enviar a mi correo becerrafernando@gmail.com o me etiquetan en Twitter @fdo_becerra para comentarlas en clases.

Bibliografía

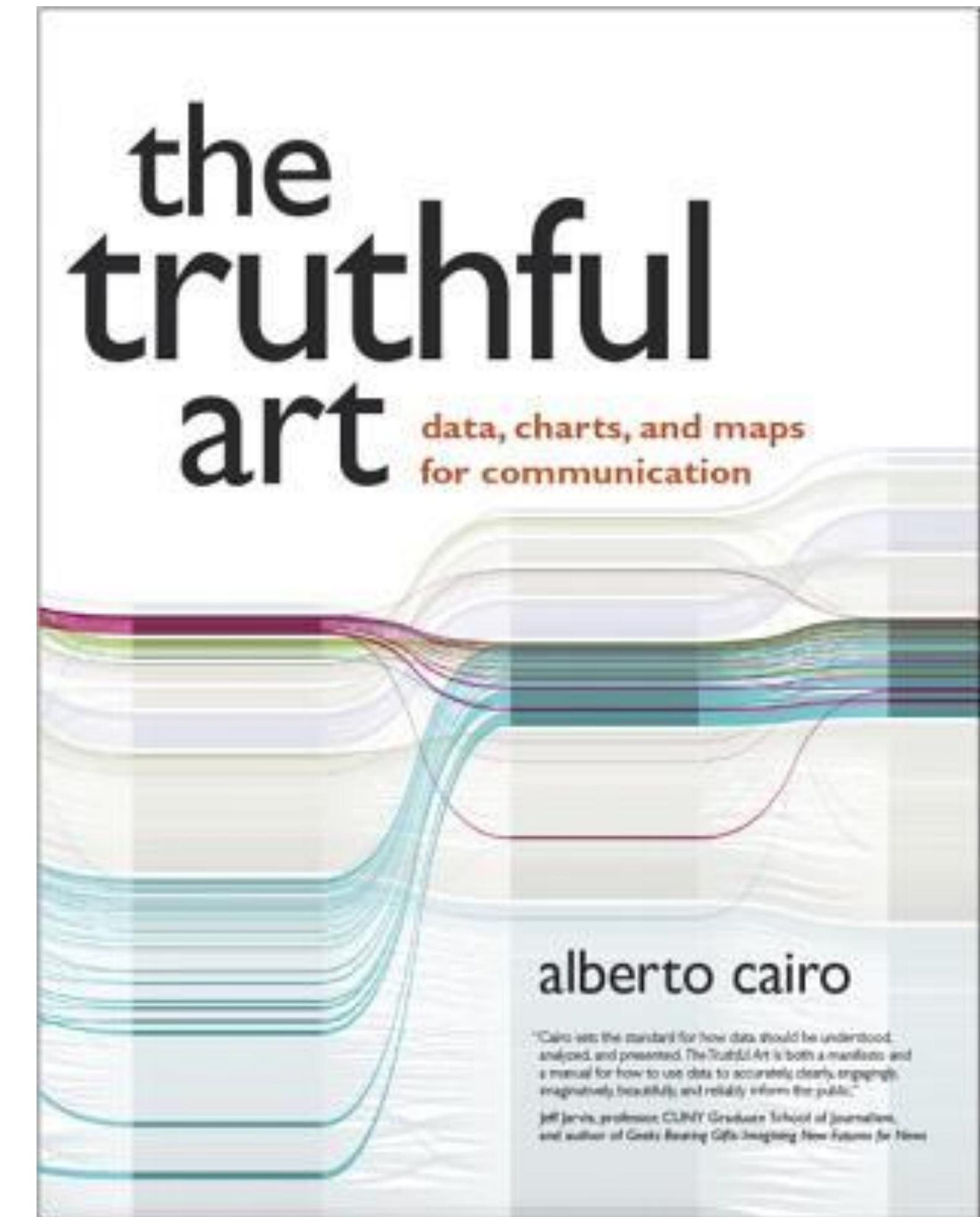
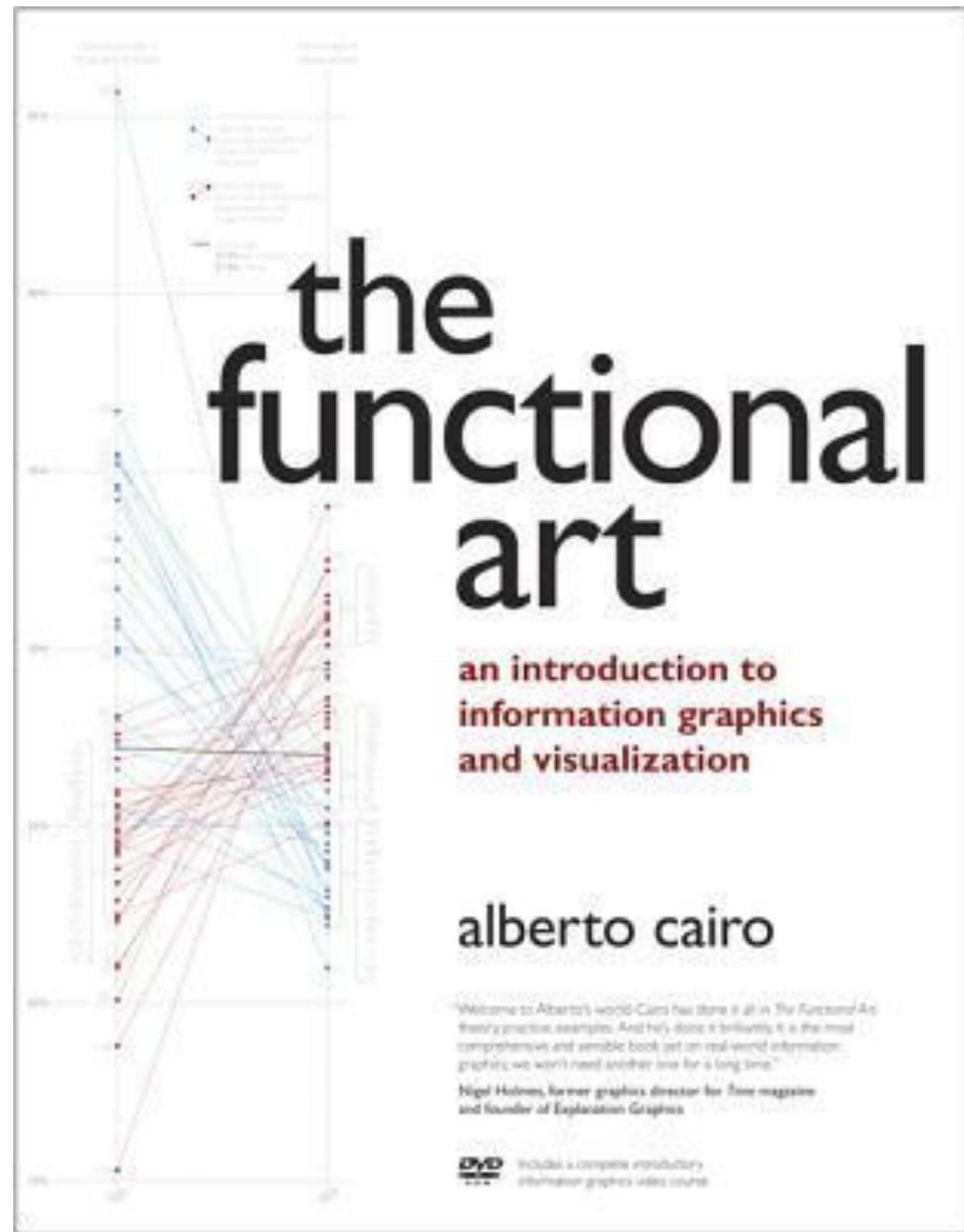
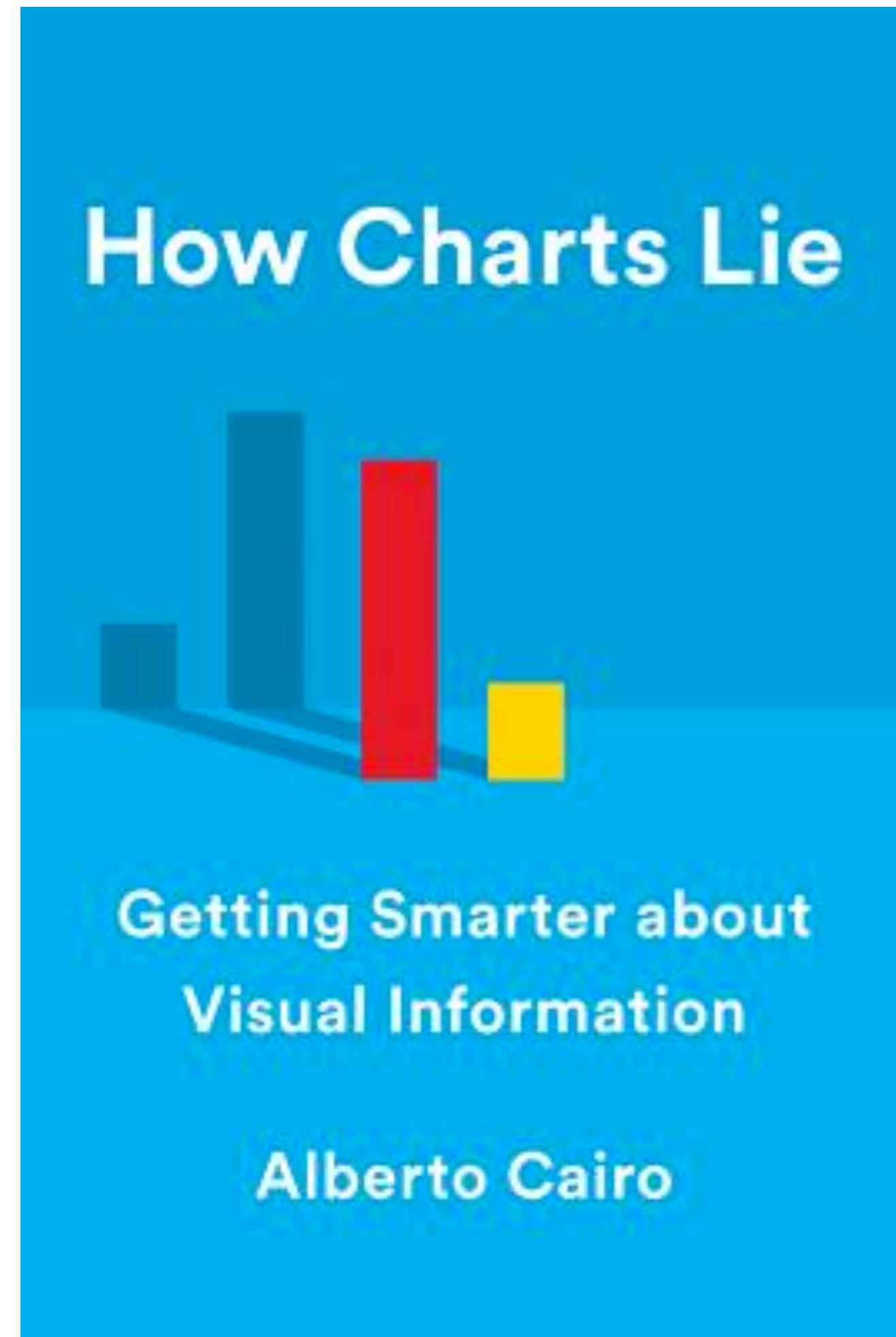
O'REILLY®

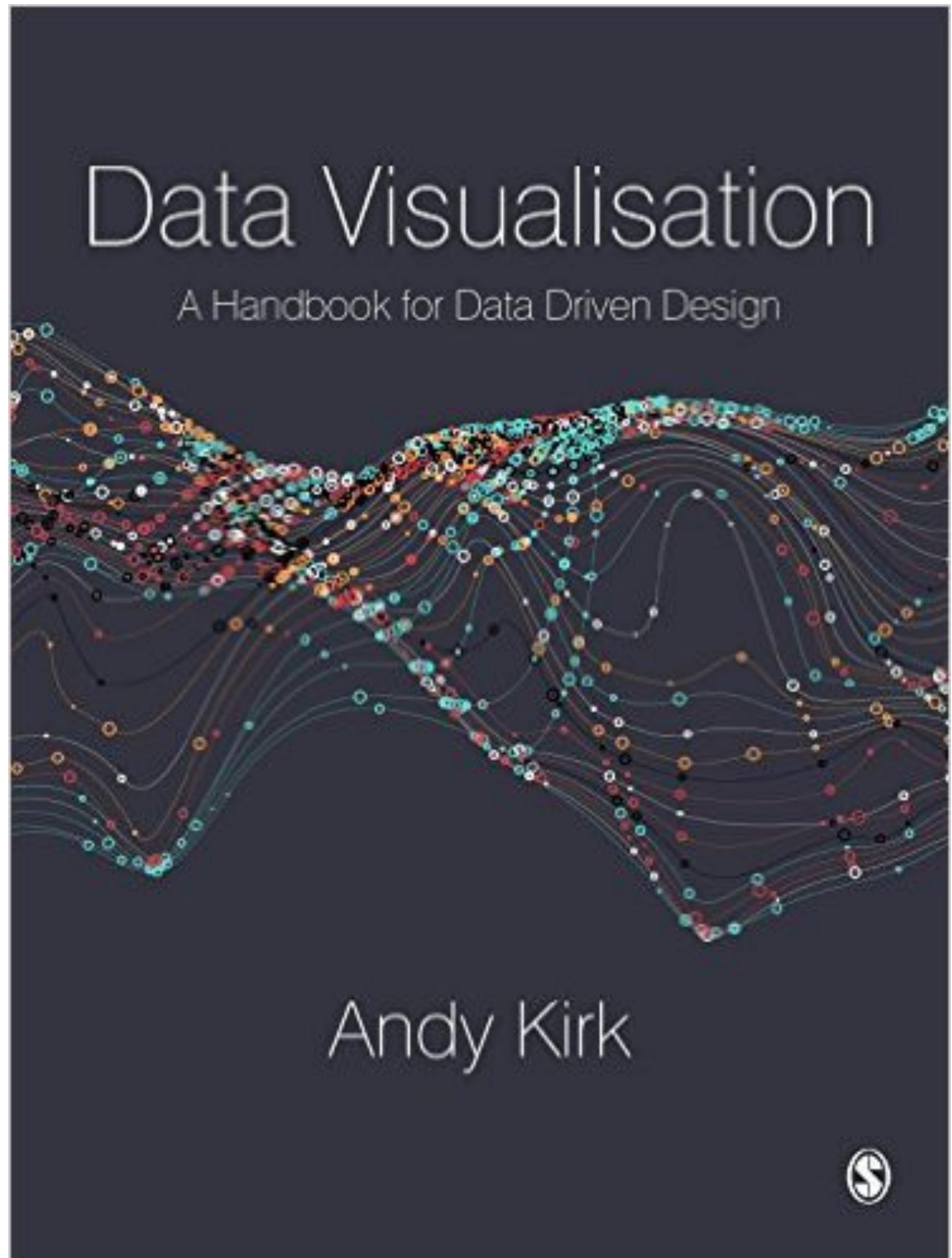
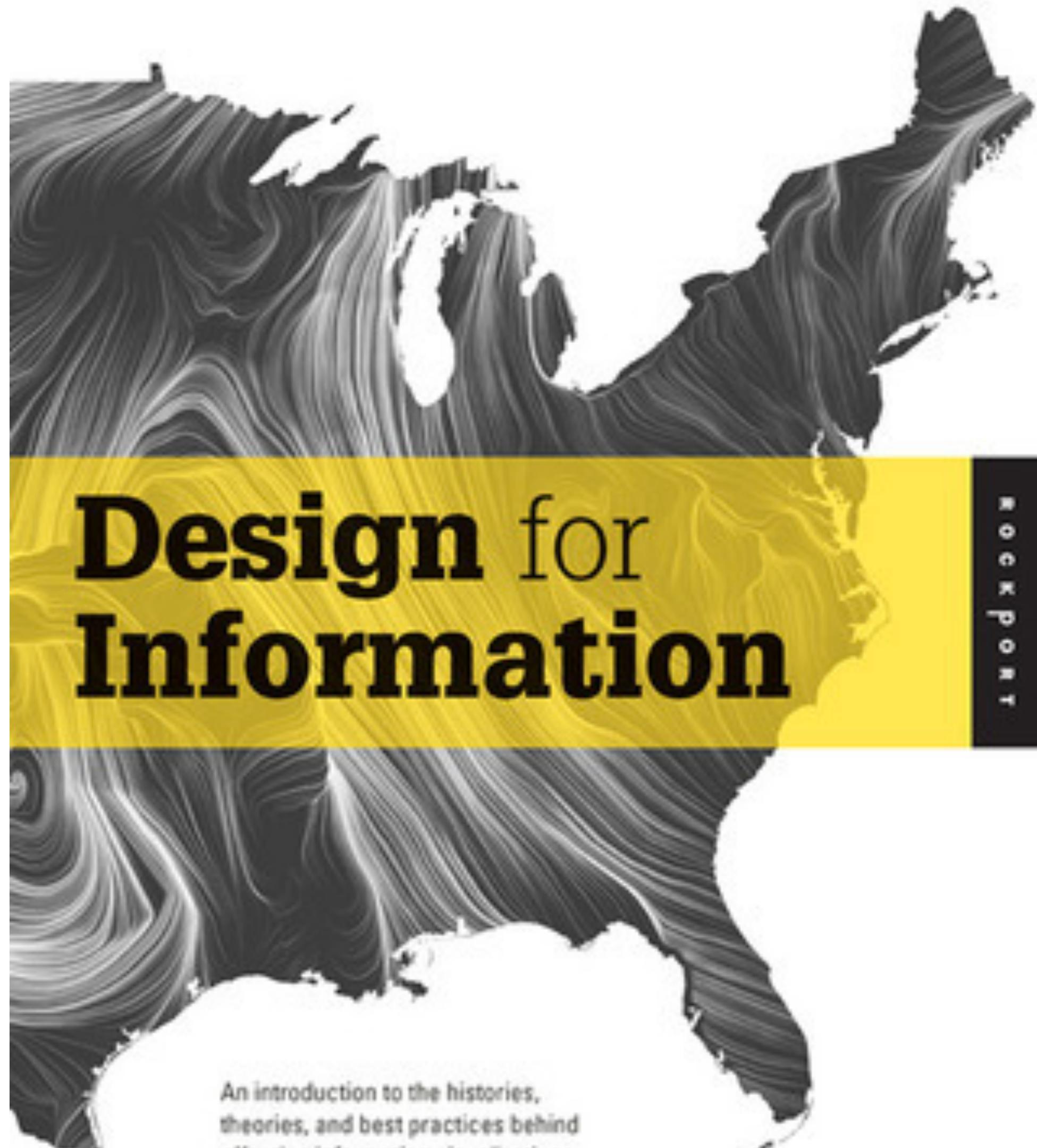
Fundamentals of Data Visualization

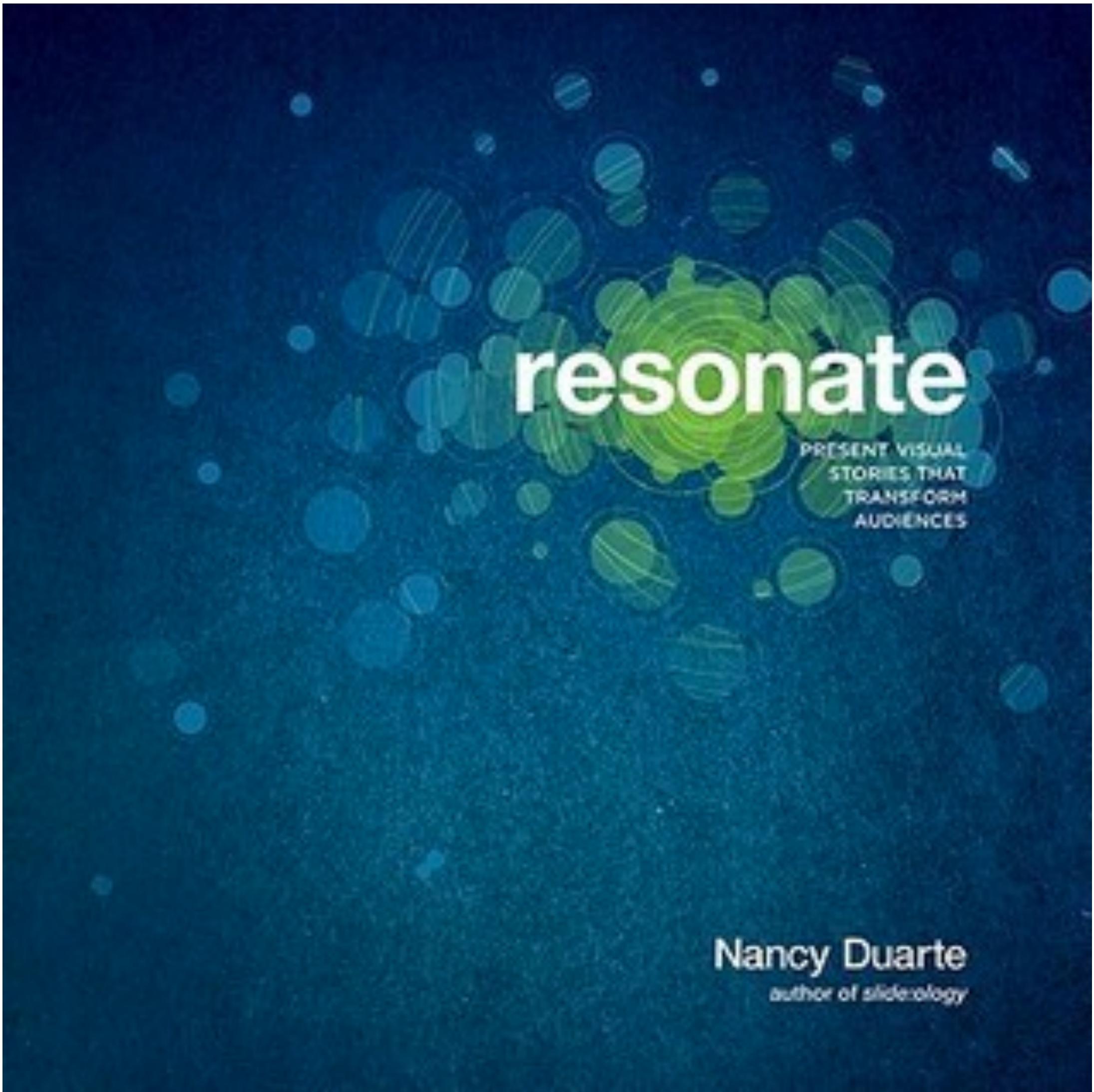
A Primer on Making Informative
and Compelling Figures

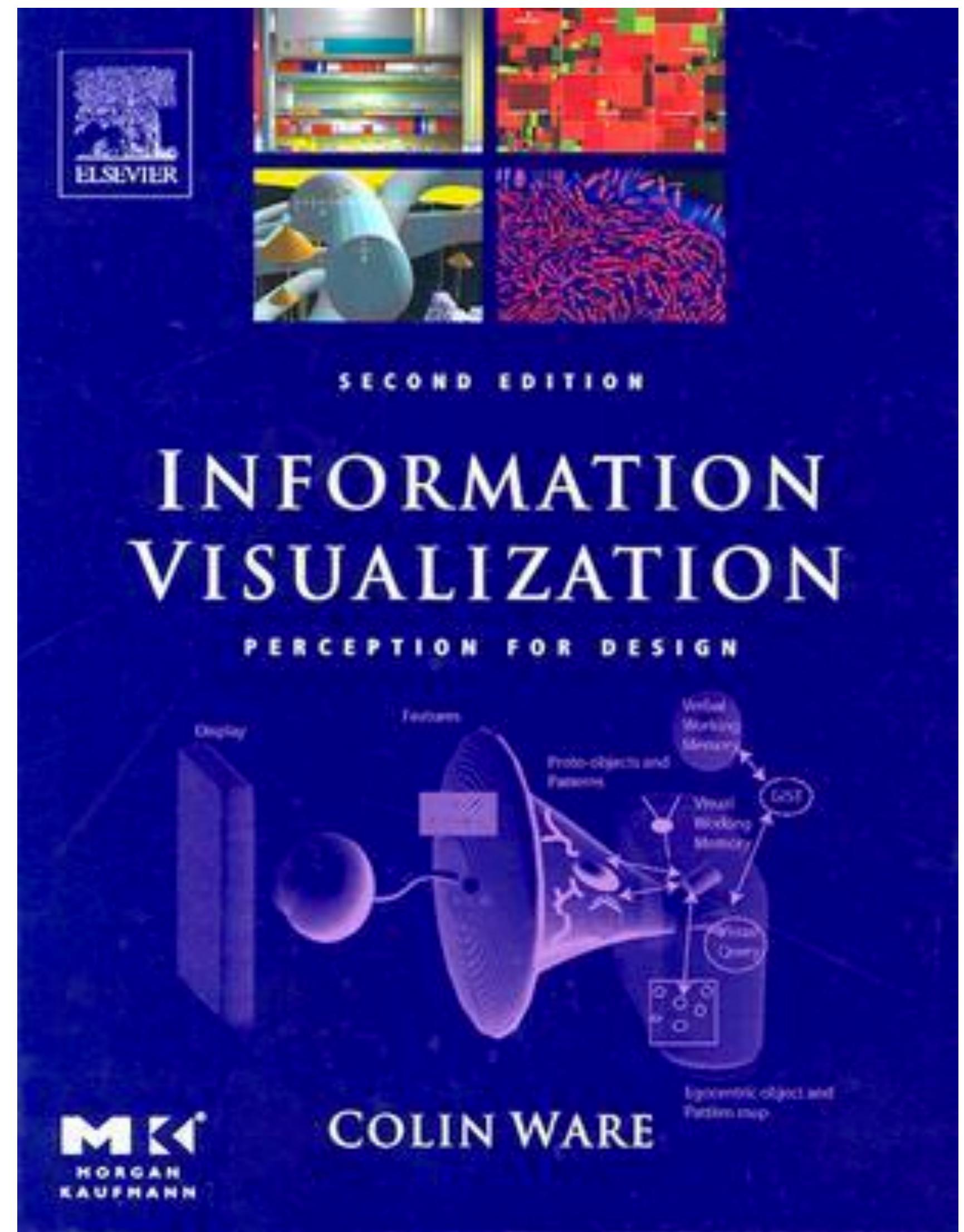


Claus O. Wilke









Narrative Visualization: Telling Stories with Data

Edward Segel and Jeffrey Heer

Abstract—Data visualization is regularly promoted for its ability to reveal stories within data, yet these “data stories” differ in important ways from traditional forms of storytelling. Storytellers, especially online journalists, have increasingly been integrating visualizations into their narratives, in some cases allowing the visualization to function in place of a written story. In this paper, we systematically review the design space of this emerging class of visualizations. Drawing on case studies from news media to visualization research, we identify distinct genres of narrative visualization. We characterize these design differences, together with interactivity and messaging, in terms of the balance between the narrative flow intended by the author (imposed by graphical elements and the interface) and story discovery on the part of the reader (often through interactive exploration). Our framework suggests design strategies for narrative visualization, including promising under-explored approaches to journalistic storytelling and educational media.

Index Terms—Narrative visualization, storytelling, design methods, case study, journalism, social data analysis.

1 INTRODUCTION

In recent years, many have commented on the storytelling potential of data visualization. News organizations including the New York Times, Washington Post, and the Guardian regularly incorporate dynamic graphics into their journalism. Politicians, activists, and television reporters use interactive visualizations as a backdrop for stories about global health and economics [10] and election results [9]. A recent feature in The Economist [6] explores the proliferation of digital data and notes that visualization designers are “*melding the skills of computer science, statistics, artistic design and storytelling.*”

Static visualizations have long been used to support storytelling, usually in the form of diagrams and charts embedded in a larger body of text. In this format, the text conveys the story, and the image typically provides supporting evidence or related details. An emerging class of visualizations attempts to combine narratives with interactive graphics. Storytellers, especially online journalists, are increasingly integrating complex visualizations into their narratives.

Crafting successful “data stories” requires a diverse set of skills. Gershon and Page [12] note that effective story-telling “*require[s] skills like those familiar to movie directors, beyond a technical expert’s knowledge of computer engineering and science.*” While techniques from oration, prose, comic books, video games, and film production are applicable to narrative visualization, we should also expect this emerging medium to possess unique attributes. Data stories differ in important ways from traditional storytelling. Stories in text and film typically present a set of events in a tightly controlled progression. While tours through visualized data similarly can be organized in a linear sequence, they can also be interactive, inviting verification, new questions, and alternative explanations.

Currently most sophisticated visualization tools focus on data ex-

In this paper, we investigate the design of narrative visualizations and identify techniques for telling stories with data graphics. We take an empirical approach, analyzing visualizations from online journalism, blogs, instructional videos, and visualization research. After reviewing related work, we share five selected case studies which highlight varied design strategies and illustrate our analytic approach. We then formulate a design space constructed from an analysis of 58 examples. Our analysis identifies salient dimensions of visual storytelling, including how graphical techniques and interactivity can enforce various levels of structure and narrative flow. We describe seven genres of narrative visualization: magazine style, annotated chart, partitioned poster, flow chart, comic strip, slide show, and video. These genres can be combined with interactivity and messaging to produce varying balances of author-driven and reader-driven experiences. Finally, we discuss the implications of our framework, noting recurring design strategies, promising yet under-utilized approaches to integrating visualization with other media, and the potential for improved user interfaces for crafting data stories. By focusing on the graphical and interactive elements of narrative visualization, our approach gives less attention to the cognitive and emotional experience of the reader. We recognize the importance of these elements, however, and describe directions for future reader-centric research in our conclusion.

2 RELATED WORK

Storytelling and visual expression are integral parts of human culture; storytelling has even been referred to as “*the world’s second-oldest profession*” [12]. Without summarizing millennia of achievement, we describe a few of the key concepts informing narrative visualization.

Recursos

The Python Graph Gallery



Welcome to the Python Graph Gallery, a collection of hundreds of charts made with [Python](#). Charts are organized in about 40 sections and always come with their associated reproducible code. They are mostly made with [Matplotlib](#) and [Seaborn](#) but other library like [Plotly](#) are sometimes used. If you're new to python, this [online course](#) can be a good starting point.

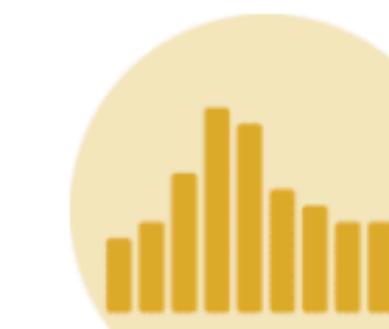
Distribution



Violin



Density



Histogram



Boxplot



Ridgeline

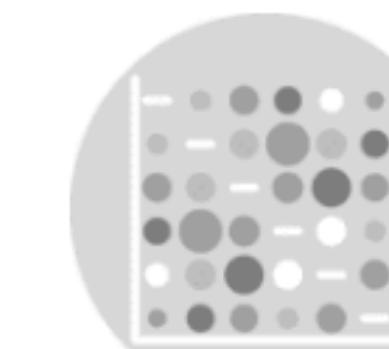
Correlation



Scatterplot



Heatmap



Correlogram



Bubble

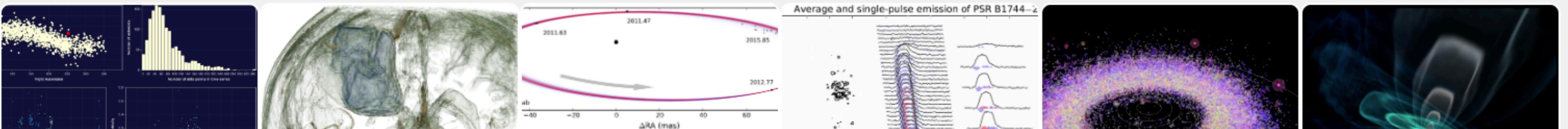
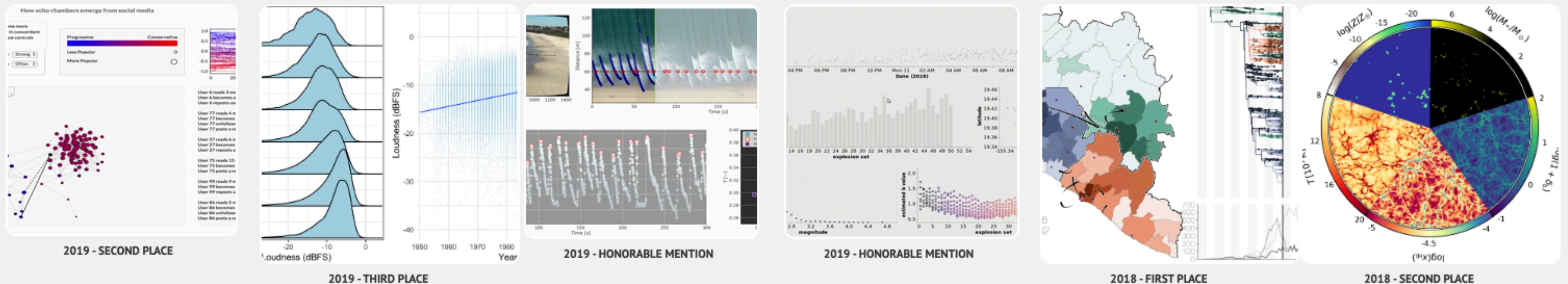
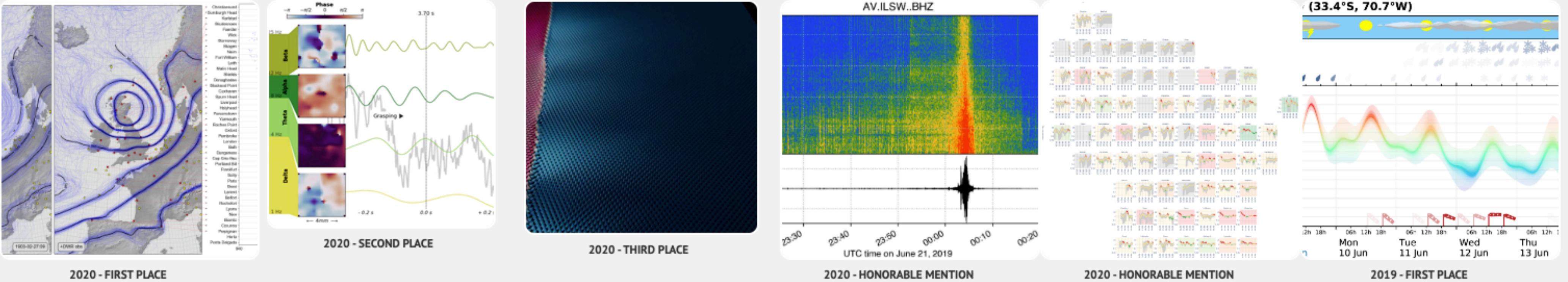


Connected Scatter



2D Density

Gallery



matplotlib

Cheat sheet
Version 3.5.0

Quick start

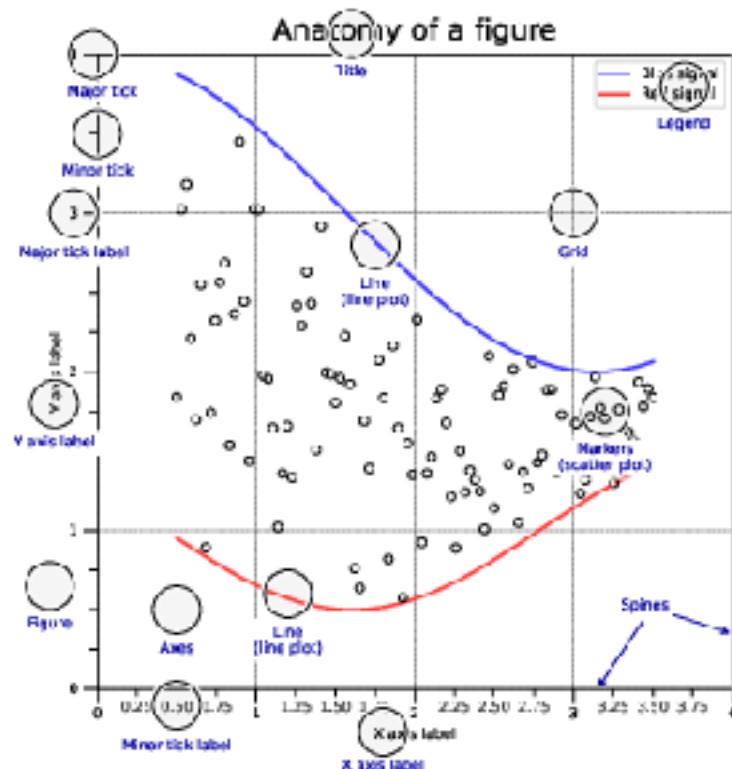
```
import numpy as np
import matplotlib as mp
import matplotlib.pyplot as plt

X = np.linspace(0, 2*np.pi, 100)
Y = np.cos(X)

fig, ax = plt.subplots()
ax.plot(X, Y, color='green')

fig.savefig("figure.pdf")
fig.show()
```

Anatomy of a figure



Subplots layout

```
subplot[s](rows,cols,...)
fig, axs = plt.subplots(3, 3)

G = gridspec(rows,cols,...)
ax = G[0,:]

ax.inset_axes(extent)

d = make_axes_locatable(ax)
ax = d.new_horizontal('10%')
```

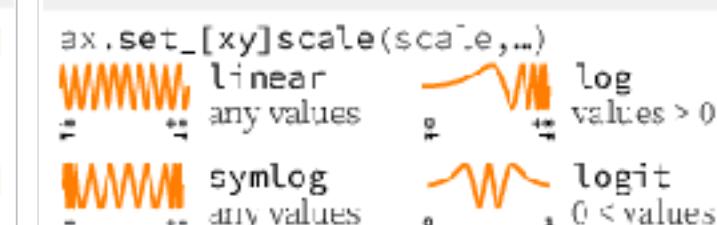
Getting help

- [matplotlib.org](#)
- [github.com/matplotlib/matplotlib/issues](#)
- [discourse.matplotlib.org](#)
- [stackoverflow.com/questions/tagged/matplotlib](#)
- [gitter.im/matplotlib](#)
- [twitter.com/matplotlib](#)
- [Matplotlib users mailing list](#)

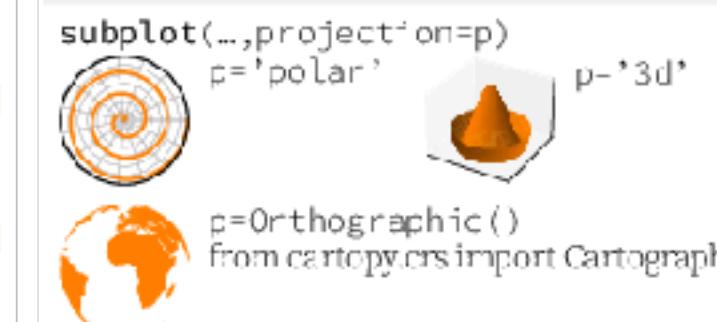
Basic plots



Scales



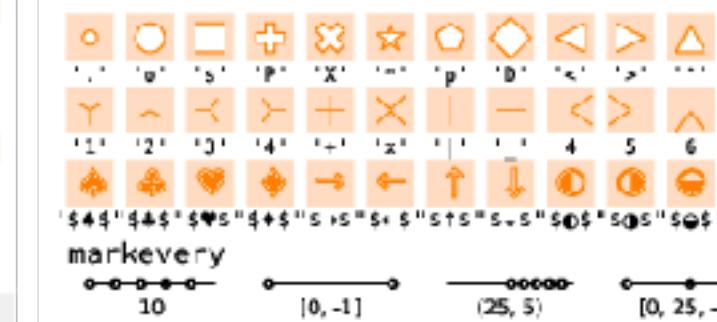
Projections



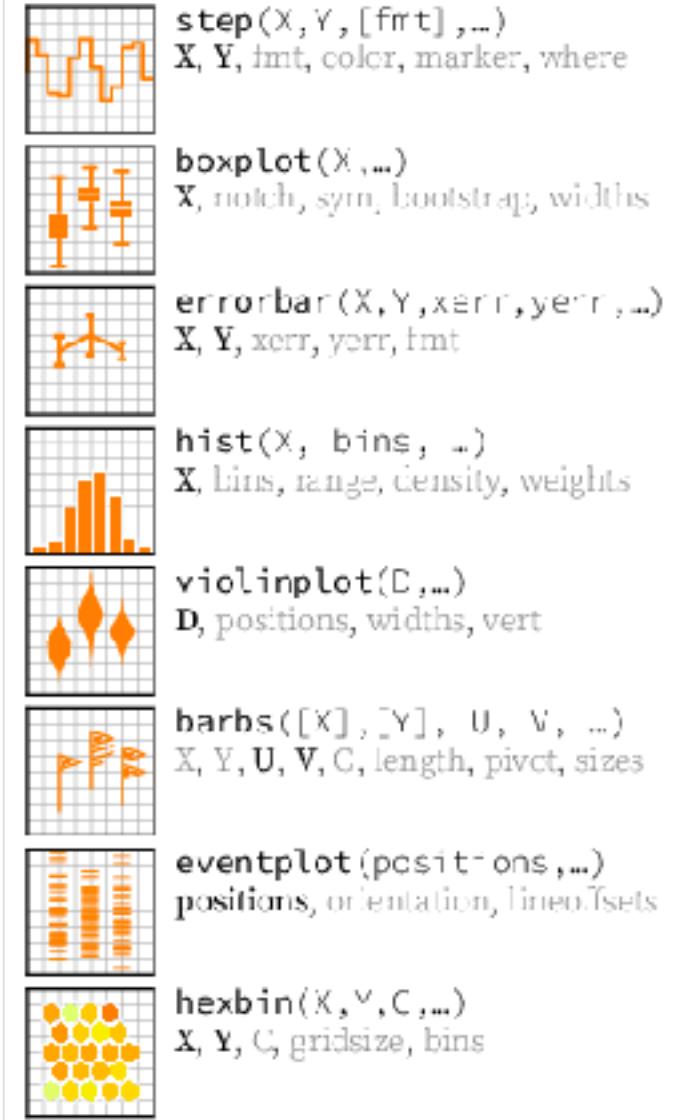
Lines



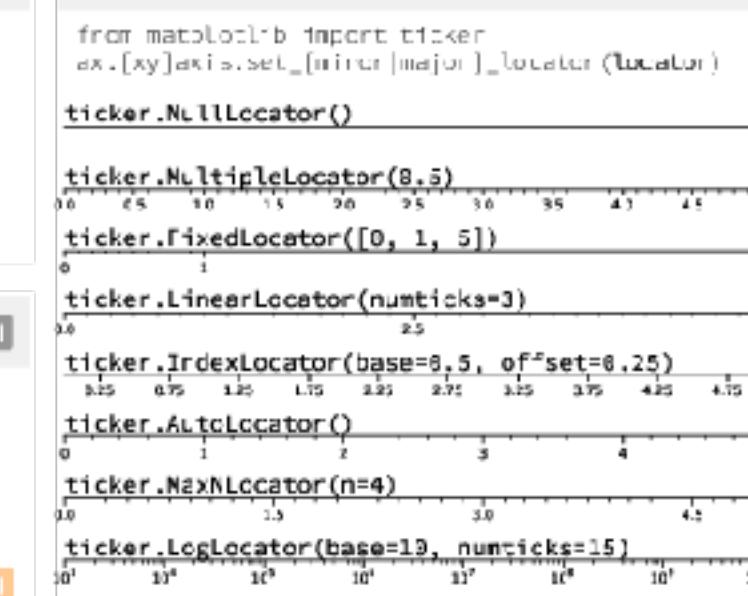
Markers



Advanced plots



Tick locators

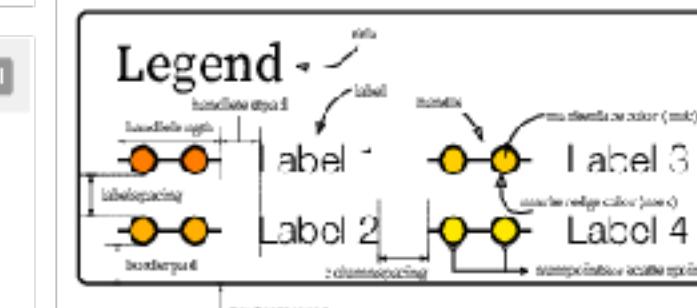


Tick formatters

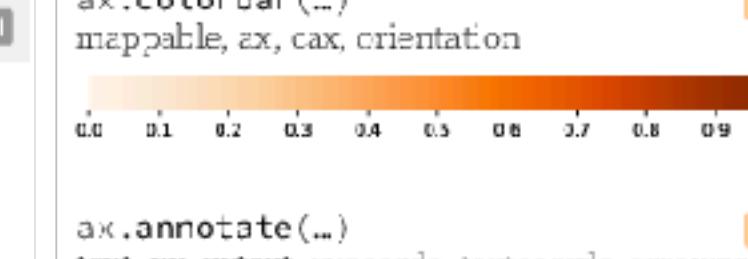


Ornaments

```
ax.legend(...)
handles, labels, loc, title, frameon
```

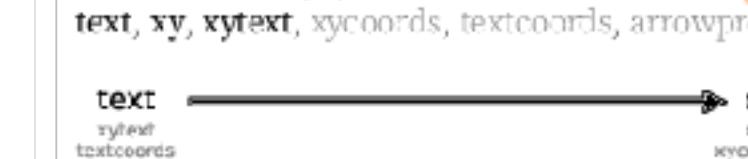


Legend



Colorbar

Annotate



Event handling

```
tig, ax = plt.subplots()
def on_click(event):
    print(event)
fig.canvas.mpl_connect(
    'button_press_event', on_click)
```

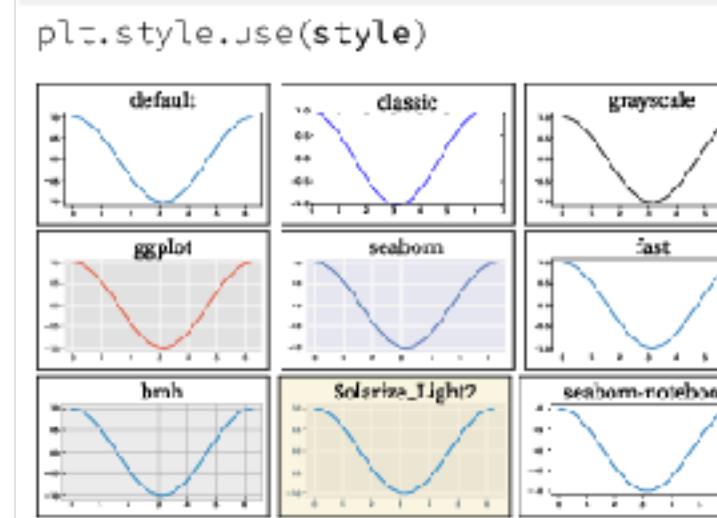
Animation

```
import matplotlib.animation as mpla

T = np.linspace(0, 2*np.pi, 100)
S = np.sin(T)
line, = plt.plot(T, S)

def animate(i):
    line.set_ydata(np.sin(T-i/50))
anim = mpla.FuncAnimation(
    plt.gcf(), animate, interval=5)
plt.show()
```

Styles



Quick reminder

```
ax.grid()
ax.set_xylim(vmin, vmax)
ax.set_xylabel(label)
ax.set_xticks(ticks, [labels])
ax.set_yticks(ticks, [labels])
ax.set_title(title)
ax.tick_params(width=10, ...)
ax.set_axis_on/off()
```

```
fig.suptitle(title)
fig.tight_layout()
plt.gcf(), plt.gca()
mpl.rc('axes', linewidth=1, ...)
[fig|ax].patch.set_alpha(0)
text.r'$\frac{-e^{i\pi}}{2^n}$'
```

Keyboard shortcuts

ctrl+s	Save	ctrl+w	Close plot
reset	Reset view	ctrl+f	Fullscreen 0/1
ctrl+shift+f	View forward	b	View back
p	Pan view	ctrl+p	Zoom to rect
x	X pan/zoom	y	Y pan/zoom
g	Minor grid 0/1	ctrl+g	Major grid 0/1
ctrl+x	X axis log/linear	ctrl+y	Y axis log/linear

Ten simple rules

1. Know Your Audience
2. Identify Your Message
3. Adapt the Figure
4. Captions Are Not Optional
5. Do Not Trust the Defaults
6. Use Color Effectively
7. Do Not Mislead the Reader
8. Avoid "Chartjunk"
9. Get the Right Tools
10. Get the Right Font

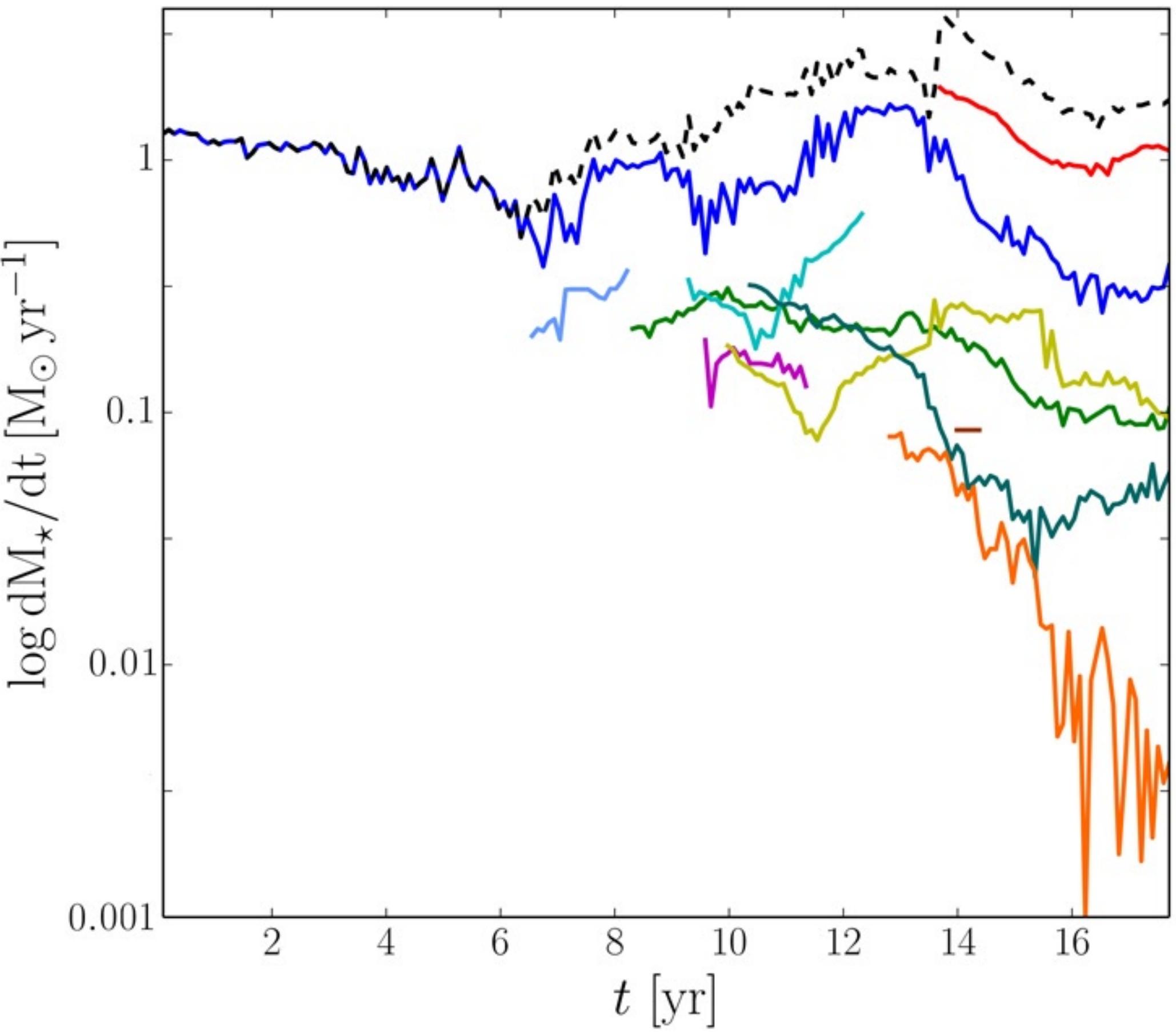
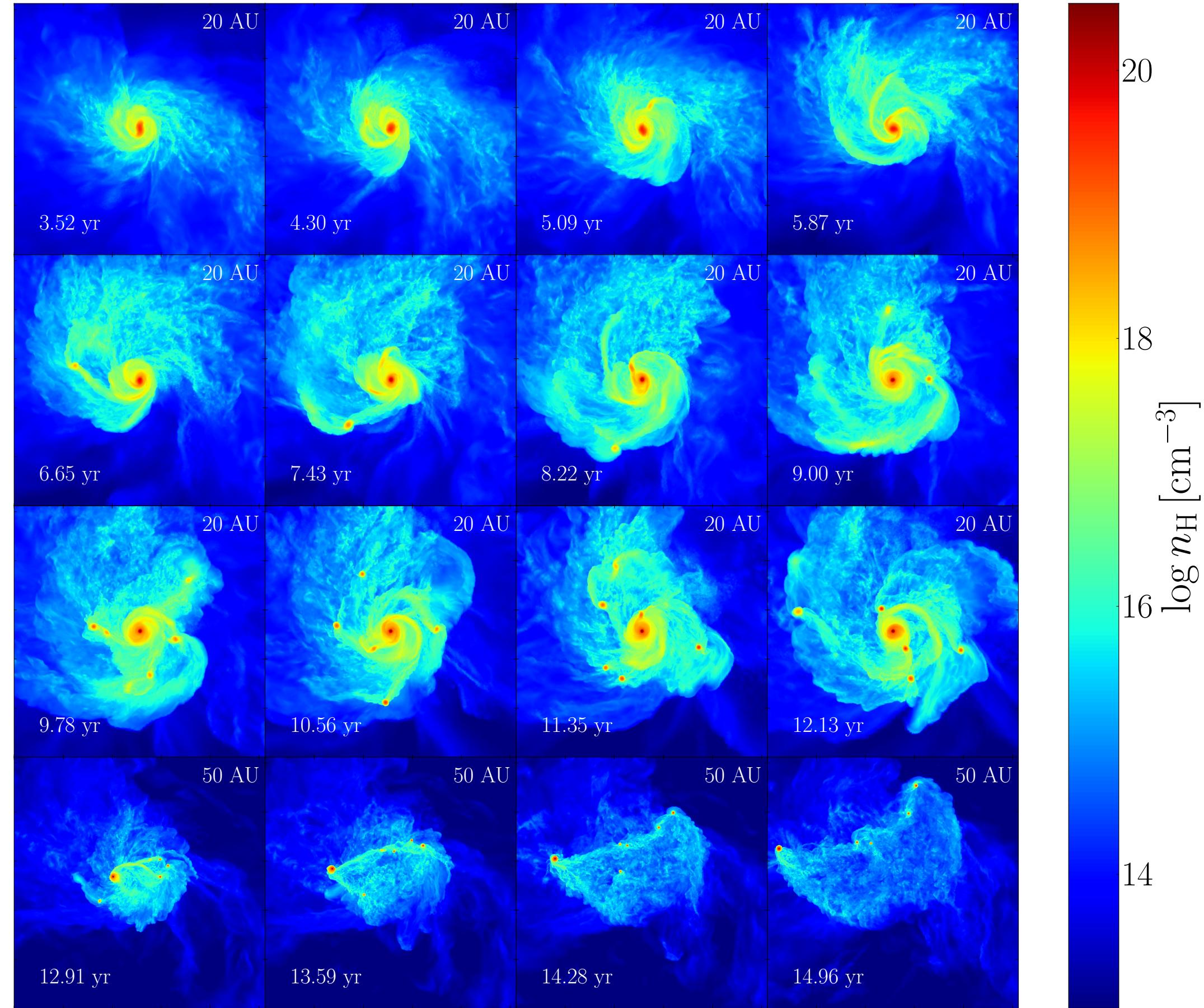
¿DUDAS?

Visualización de datos

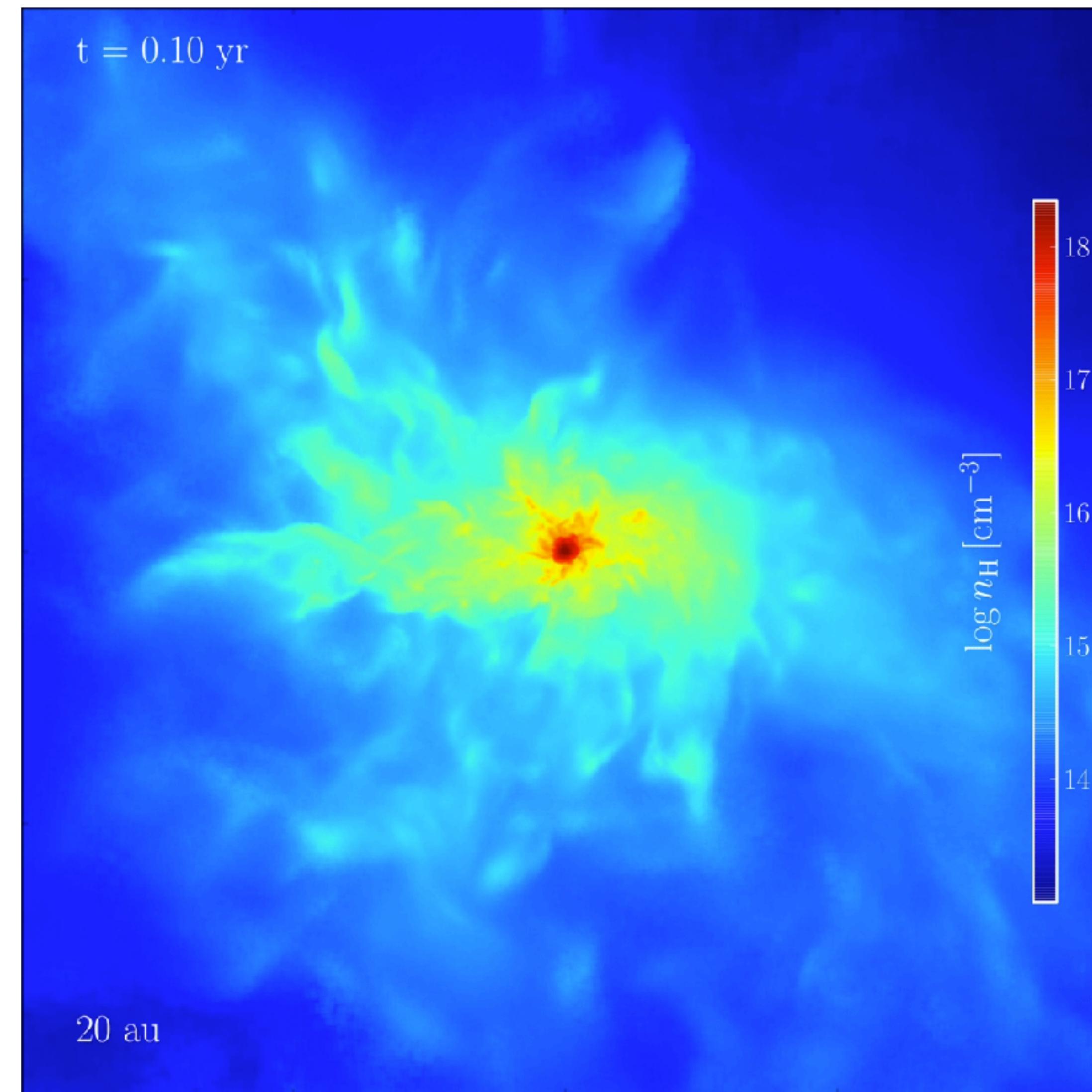
Visualización

1. Formación de imágenes mentales de forma visual
2. El acto o proceso de interpretar en términos visuales o poner en forma visible para transmitir información a través de la representación gráfica de los datos

Transmitir información a través de la representación gráfica de los datos

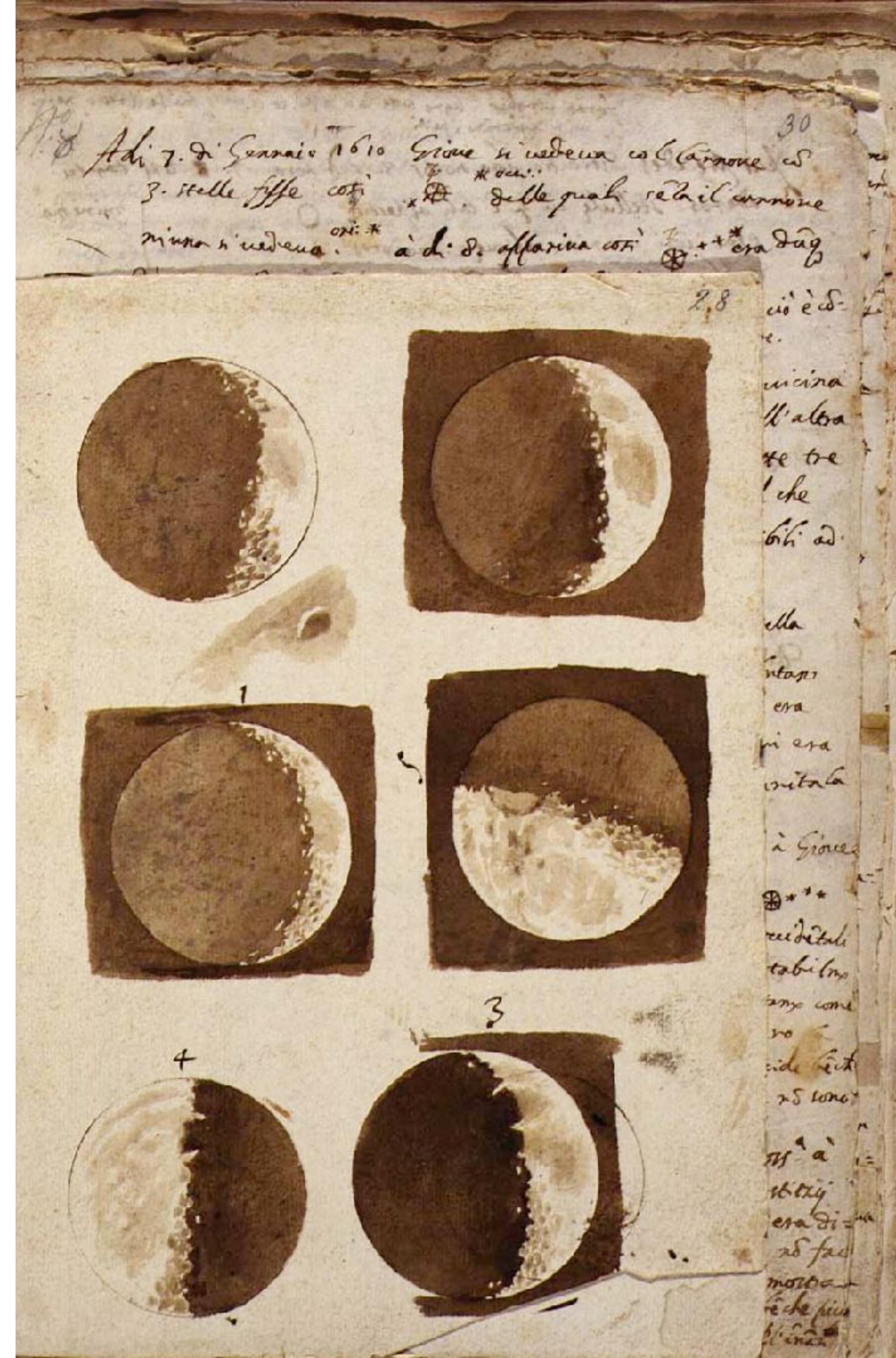


Transmitir información a través de la representación gráfica de los datos



Objetivos de la visualización

- 1. Guardar o grabar información**
- 2. Analizar (explorar) datos**
- 3. Comunicar (explicar) a otr@s**



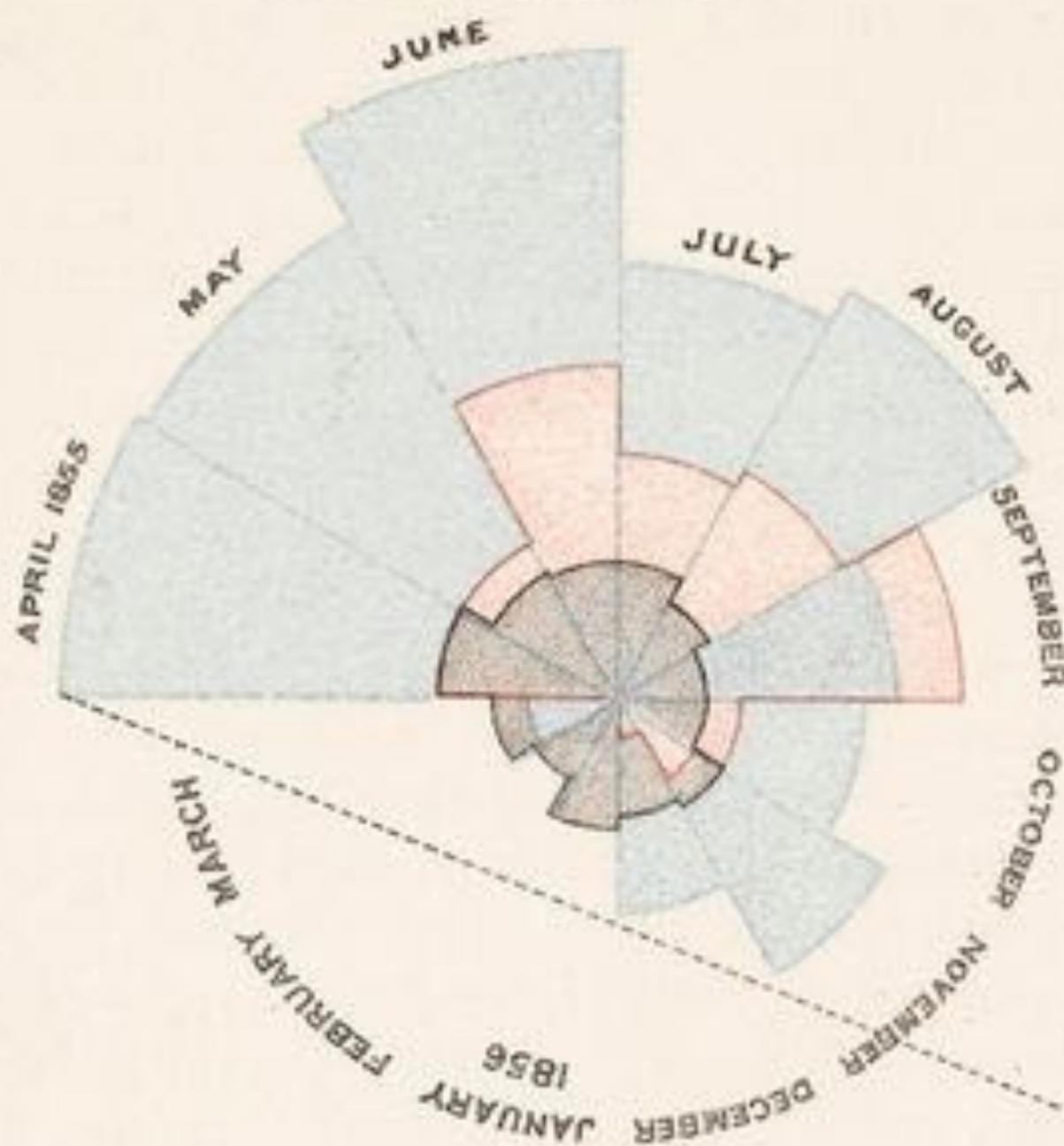
Galileo Galilei, 1610



John Snow, 1854

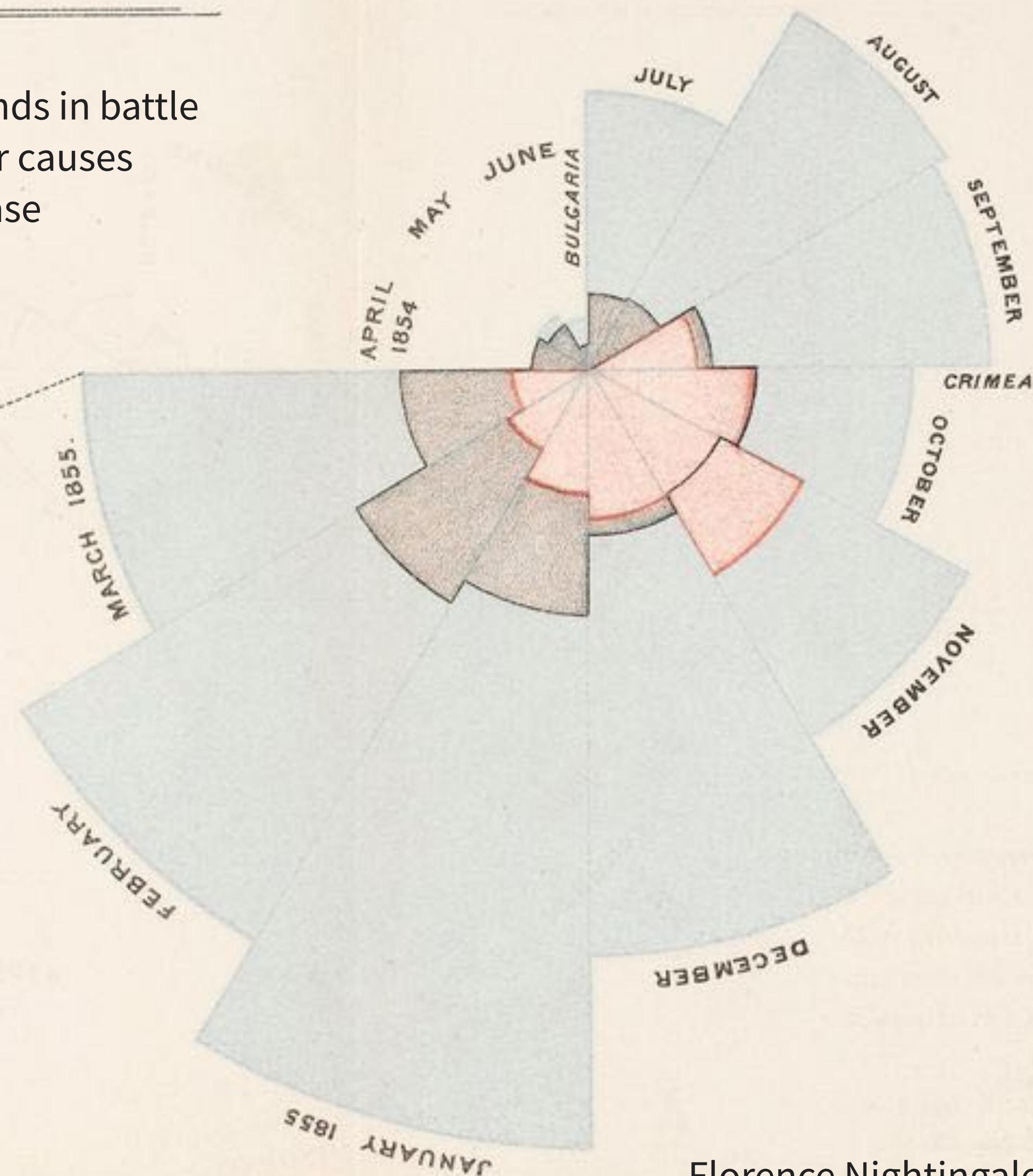
DIAGRAM OF THE CAUSES OF MORTALITY
IN THE ARMY IN THE EAST.

2.
APRIL 1855 TO MARCH 1856.



■ Wounds in battle
 Other causes
 Disease

1.
APRIL 1854 TO MARCH 1855.



The Areas of the blue, red, & black wedges are each measured from the centre as the common vertex.

The blue wedges measured from the centre of the circle represent area for area the deaths from Preventible or Mitigable Zymotic diseases, the red wedges measured from the centre the deaths from wounds, & the black wedges measured from the centre the deaths from all other causes.

The black line across the red triangle in Nov^r 1854 marks the boundary of the deaths from all other causes during the month.

In October 1854, & April 1855, the black area coincides with the red; in January & February 1855, the blue coincides with the black.

The entire areas may be compared by following the blue, the red & the black lines enclosing them.

Florence Nightingale, 1856

Carte Figurative des pertes successives en hommes de l'Armée Française dans la Campagne de Russie 1812-1813.
Dessinée par M. Minard, Inspecteur Général des Ponts et Chaussées en retraite

Paris, le 20 Novembre 1869

Les nombres d'hommes perdus sont représentés par les largures des zones colorées à raison d'un millimètre pour dix mille hommes; ils sont de plus écrits en trèves des zones. Le rouge désigne les hommes qui ont été en Russie; le noir ceux qui en sortent. — Les renseignements qui ont servi à dessiner la carte ont été puisés dans les ouvrages de M. M. Chiers, de Segur, de Fezenac, de Chambray et le journal médical de Jacob, pharmacien de l'Armée depuis le 28 Octobre.

Pour mieux faire juger à l'œil la diminution de l'armée, j'ai supposé que les corps du Prince Sébastien et du Maréchal Davout, qui avaient été détachés sur Minsk et Mohilow et qui rejoignirent Orosba en Wilcisk, avaient toujours marché avec l'armée.

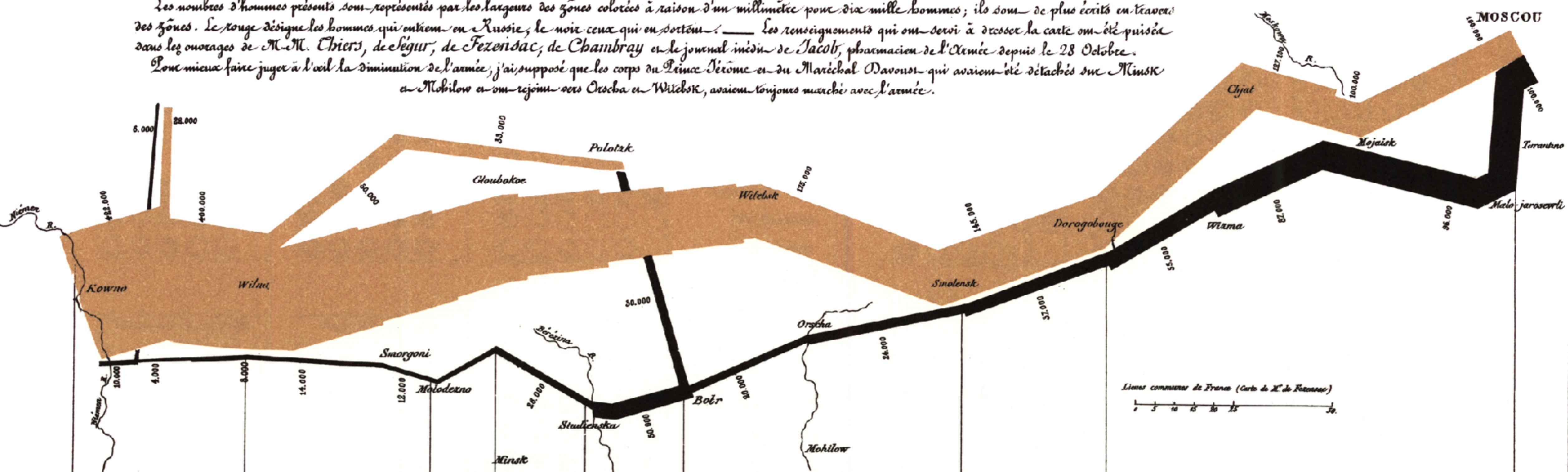


TABLEAU GRAPHIQUE de la température en degrés du thermomètre de Réaumur au dessous de zéro.

Les cosaques passent au galop
le Niemen gelé.

- 26° le 7 X.^{bre}
- 30° le 6 X.^{bre}
- 24° le 1^{er} X.^{bre}

- 20° le 28 9.^{bre}
- 11°
- 21° le 14 9.^{bre}
- 9° le 9 9.^{bre}

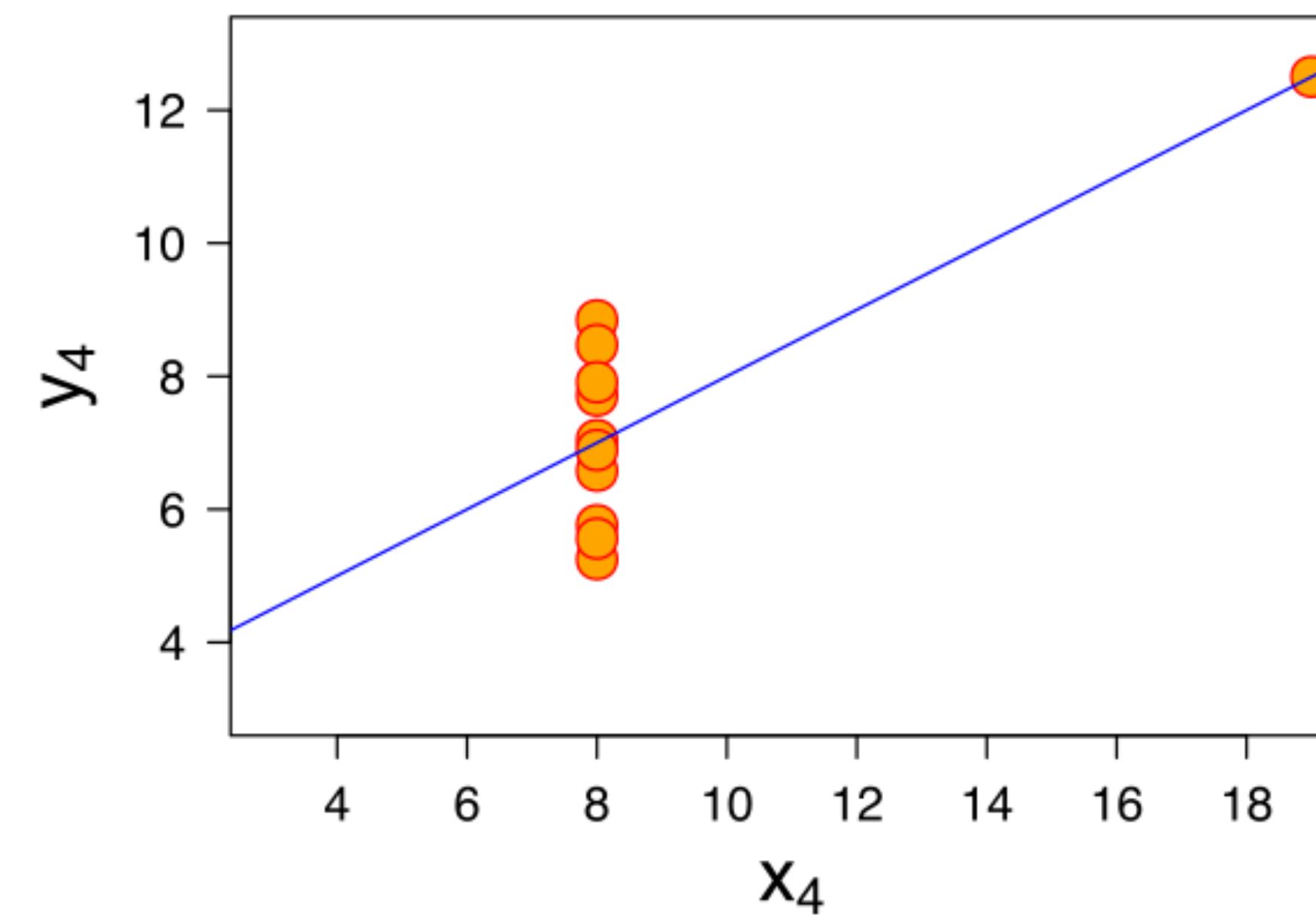
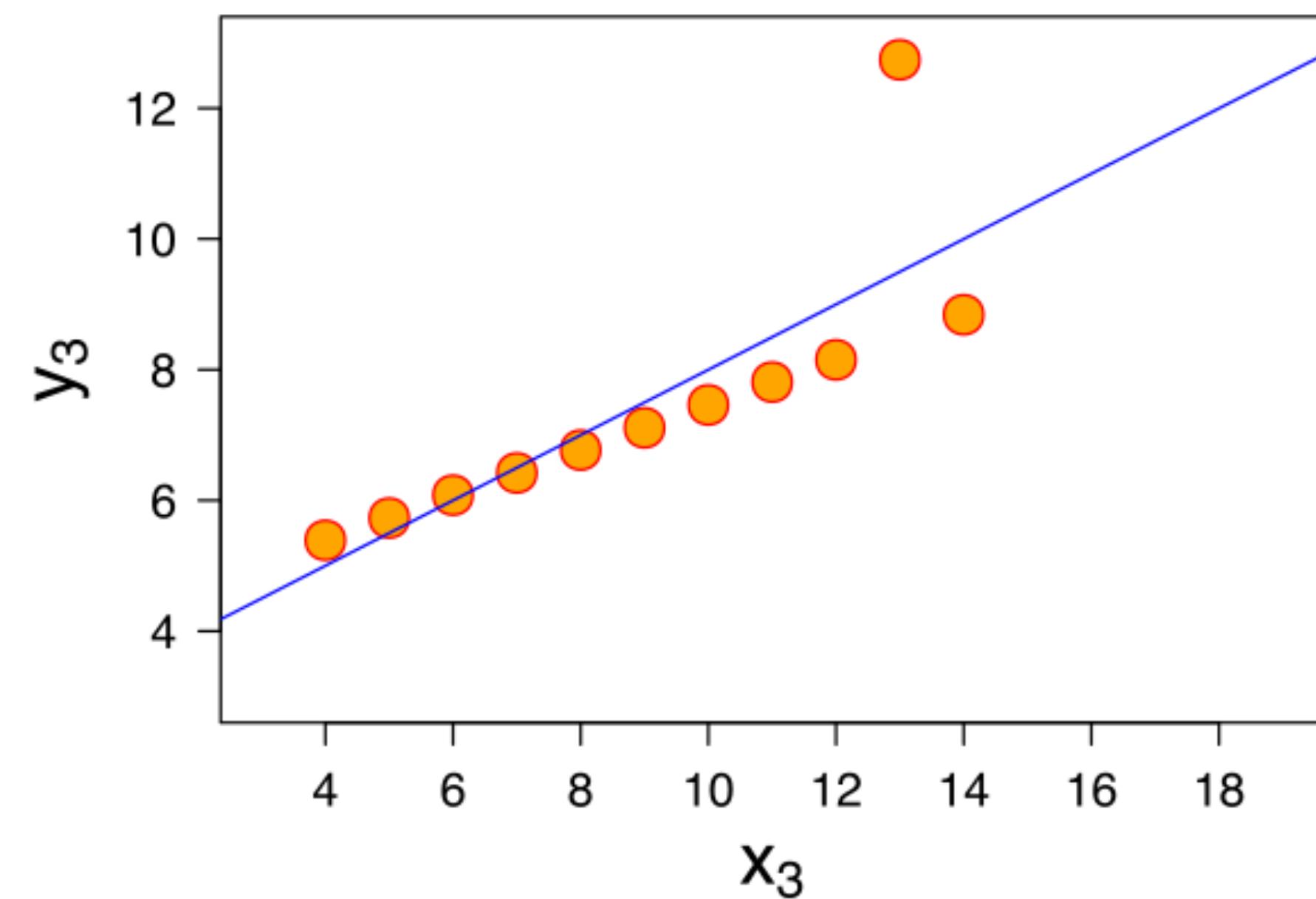
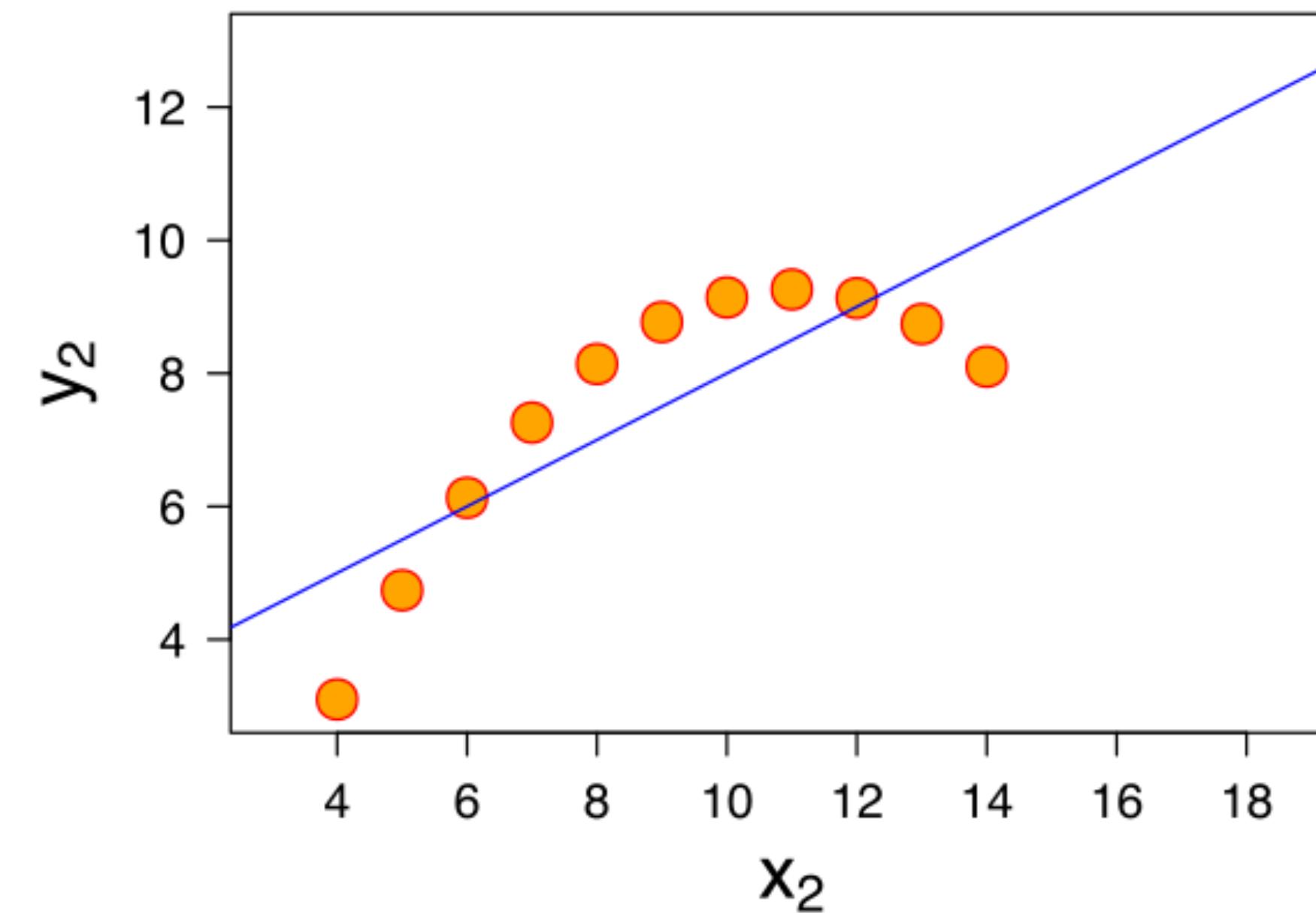
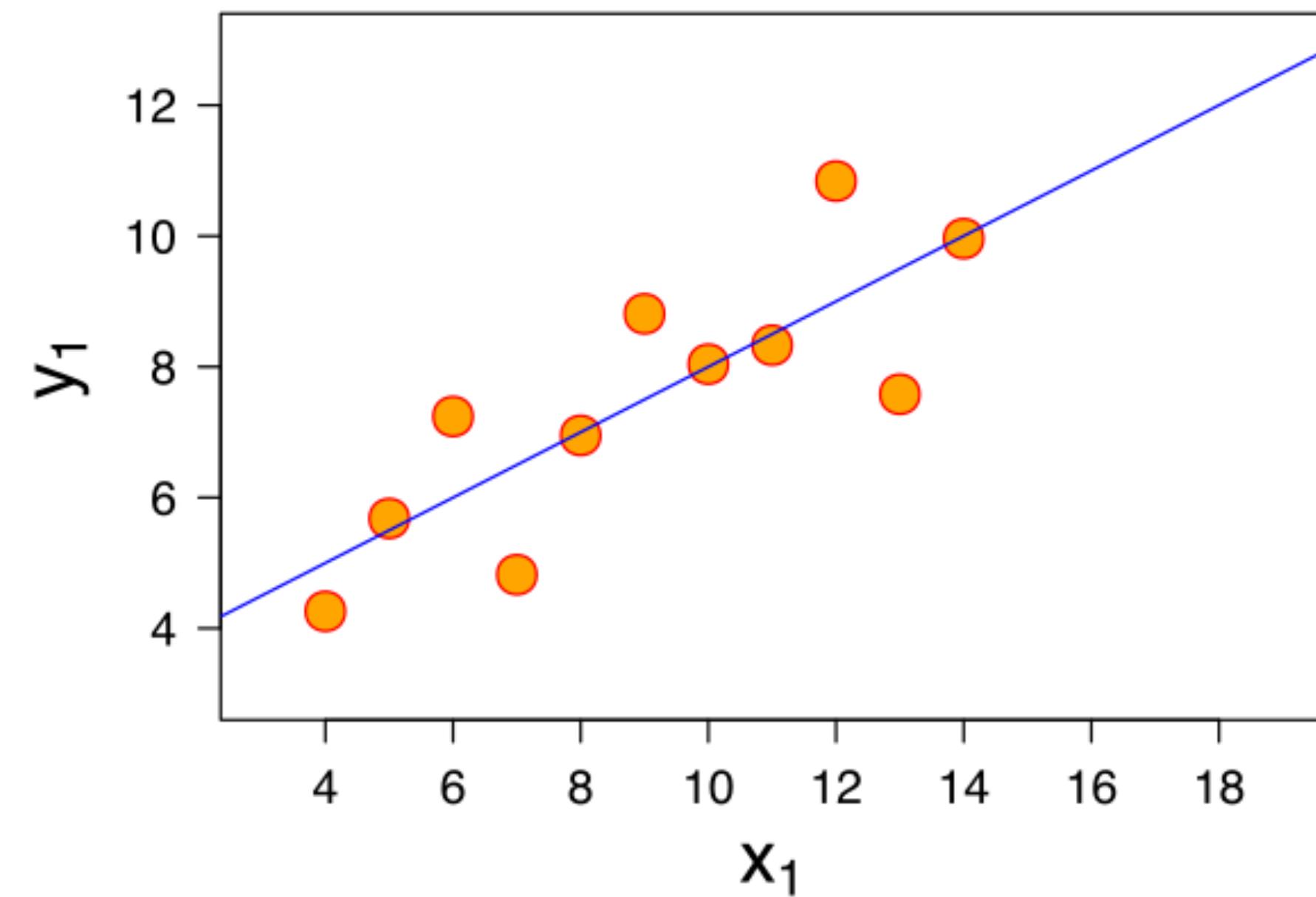
Pluie 24 8.^{bre}

Étre 18 8.^{bre}
10
15
20
25
30 degrés

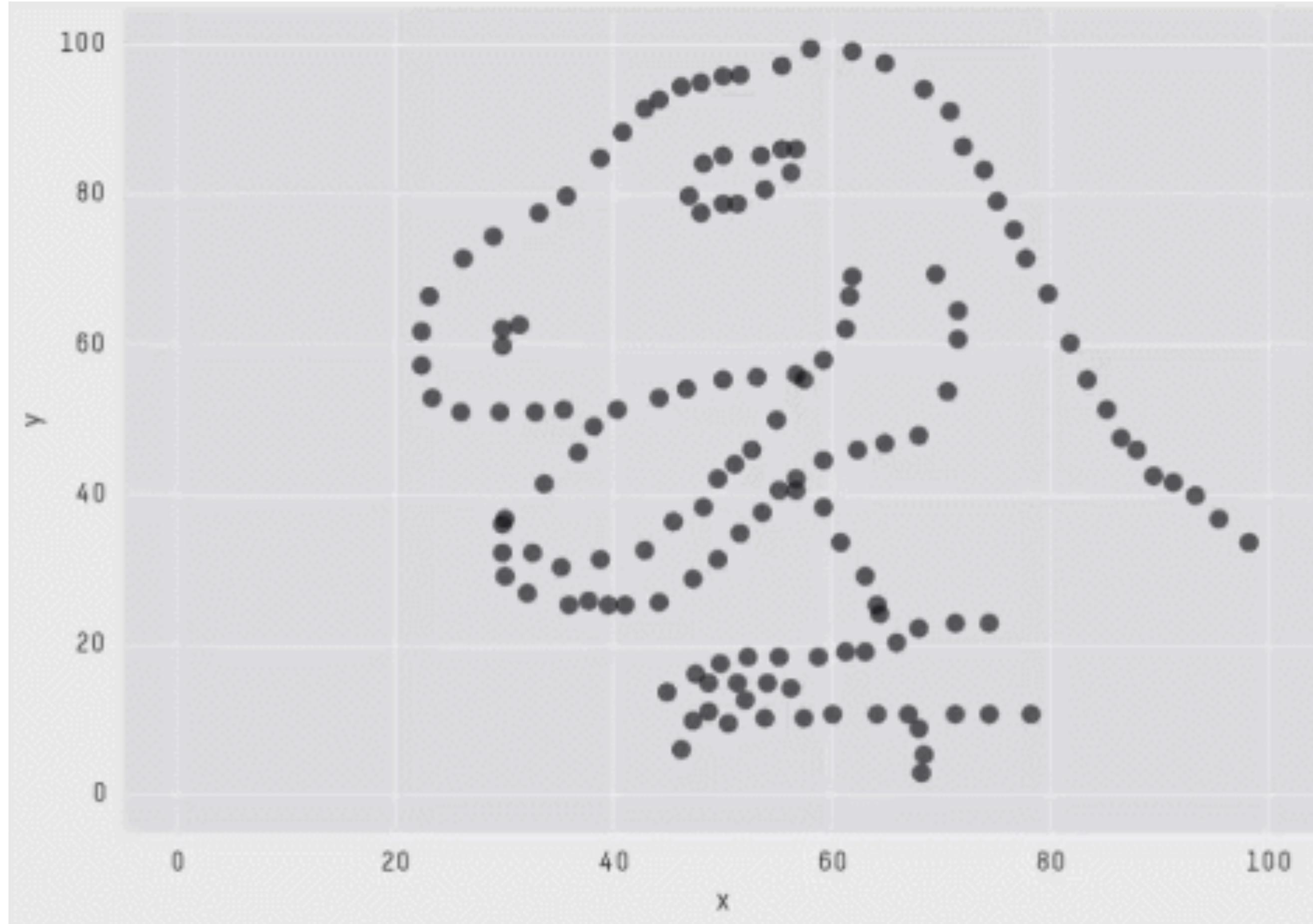
¿Por qué visualizar los datos?

	Set A		Set B		Set C		Set D	
	X	Y	X	Y	X	Y	X	Y
0	10	8.04	10	9.14	10	7.46	8	6.58
1	8	6.95	8	8.14	8	6.77	8	5.76
2	13	7.58	13	8.74	13	12.74	8	7.71
3	9	8.81	9	8.77	9	7.11	8	8.84
4	11	8.33	11	9.26	11	7.81	8	8.47
5	14	9.96	14	8.10	14	8.84	8	7.04
6	6	7.24	6	6.13	6	6.08	8	5.25
7	4	4.26	4	3.10	4	5.39	19	12.50
8	12	10.84	12	9.13	12	8.15	8	5.56
9	7	4.82	7	7.26	7	6.42	8	7.91
10	5	5.68	5	4.74	5	5.73	8	6.89
mean	9.00	7.50	9.00	7.50	9.00	7.50	9.00	7.50
std	3.32	2.03	3.32	2.03	3.32	2.03	3.32	2.03
corr	0.82		0.82		0.82		0.82	
lin. reg.	$y = 3.00 + 0.500x$		$y = 3.00 + 0.500x$		$y = 3.00 + 0.500x$		$y = 3.00 + 0.500x$	

Anscombe, 1973



Anscombe, 1973



X Mean: 54.2659224
Y Mean: 47.8313999
X SD : 16.7649829
Y SD : 26.9342120
Corr. : -0.0642526

Diseño

Actividad

Crea al menos 3 formas de visualizar estas dos cantidades:

42

23



$$\begin{array}{r} 42 \\ + 23 \\ \hline 65 \end{array}$$

Fijación de diseño

Adherencia ciega a un conjunto de ideas o conceptos

1. writing, number notation

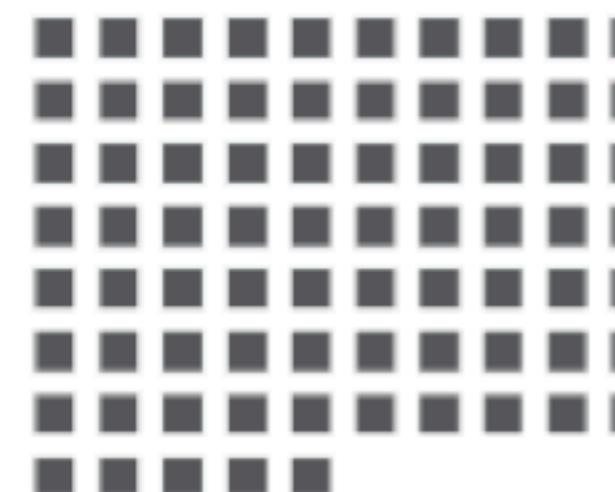
75, 37

a

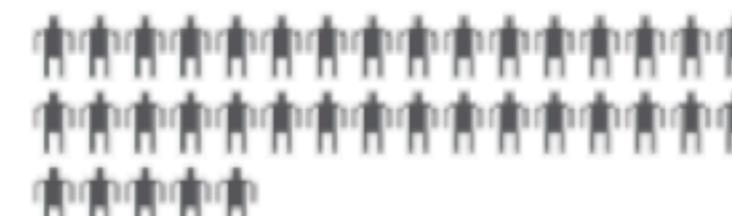
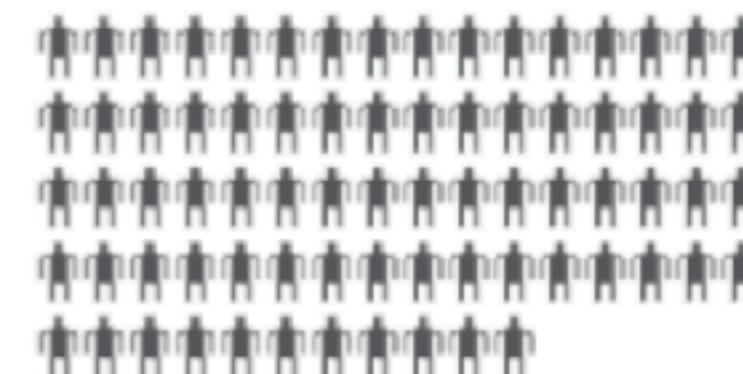
b



2. squares



3. repeated icon



4. hundreds, tens, units, decimals...

represented by squares



5. bars



6. line graph

28. gray tones



29. color scale

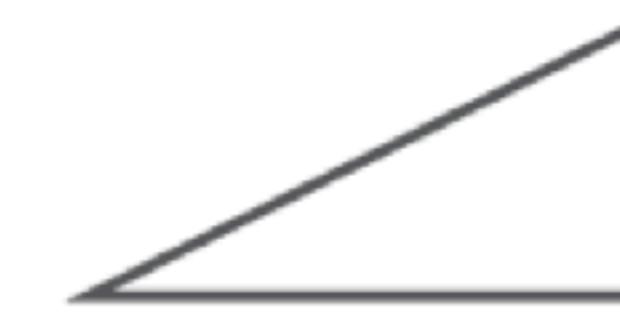


30.

geometric proportions

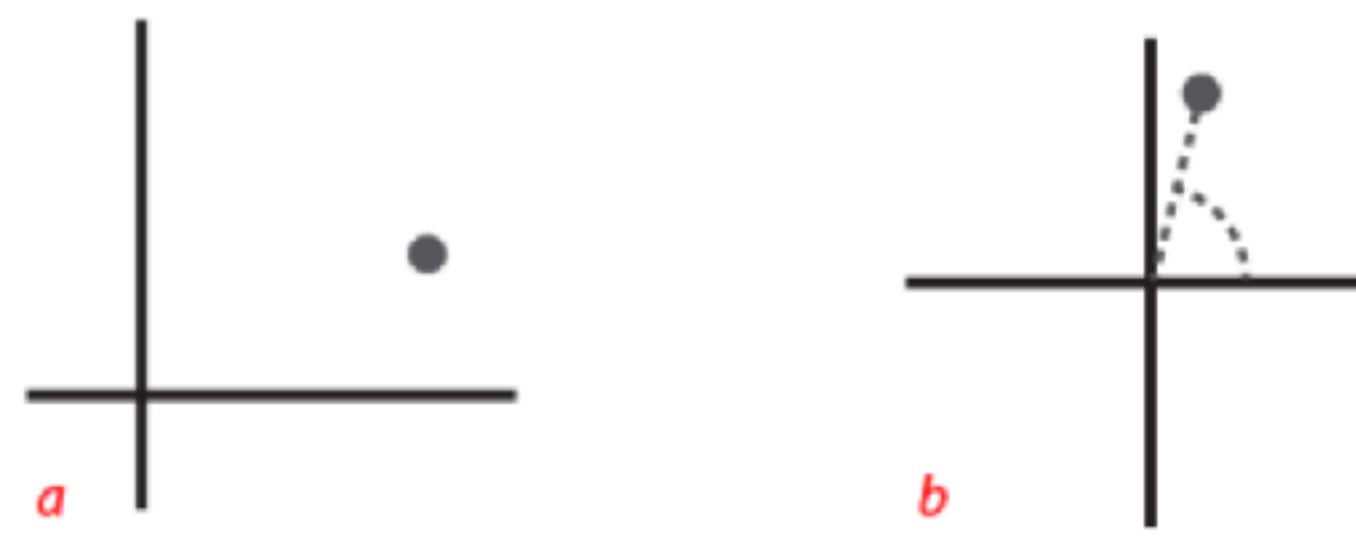


31. horizontal/vertical proportions



Useful if the first value represents a horizontal distance, and the second value a vertical one.

32. coordinates



a cartesian and *b* polar

34. geographic coordinates

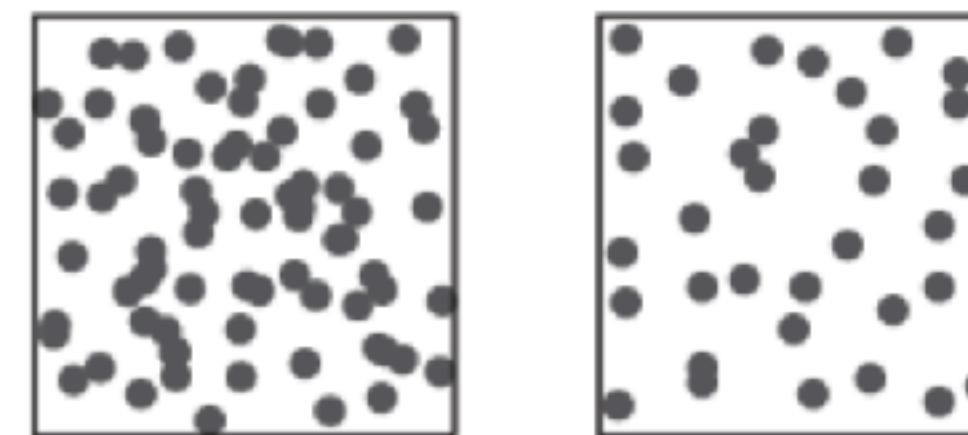


a longitude, latitude *b* latitude, longitude

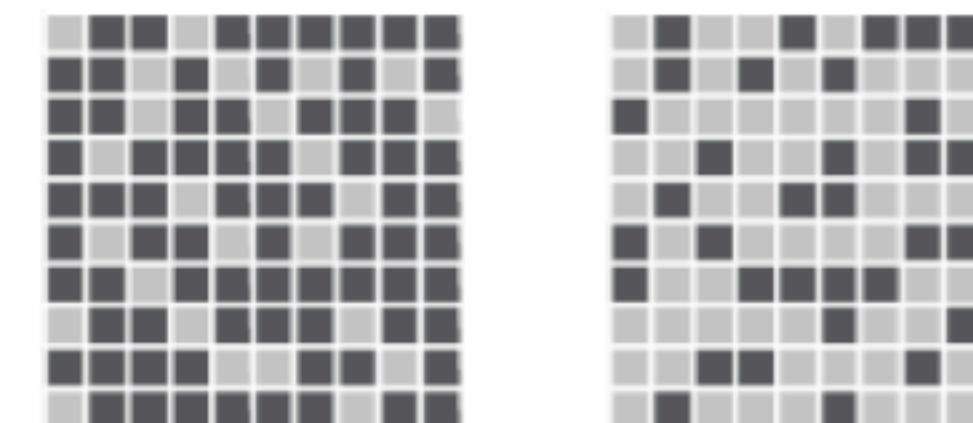
35. values associated to countries



36. density

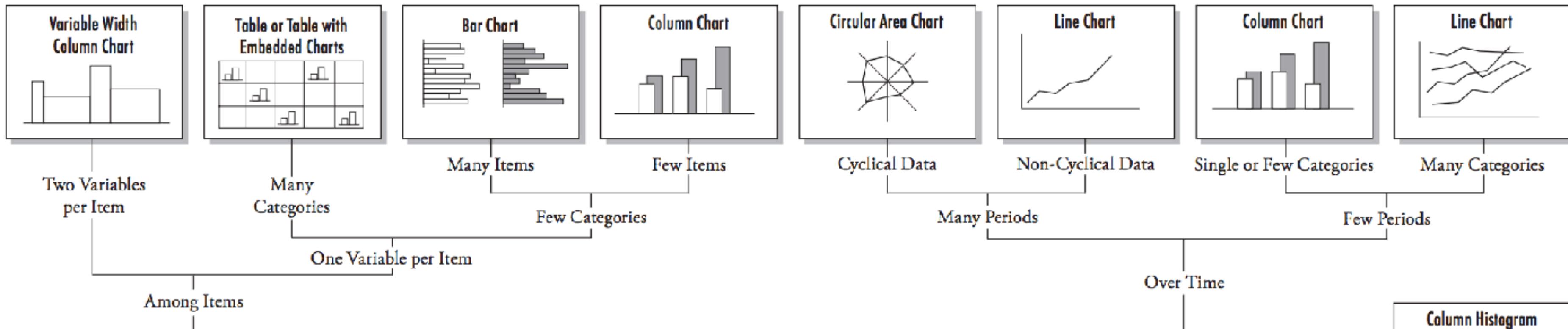


37. percentages / density



Combination of 12 and 36.

Tipos de gráficos



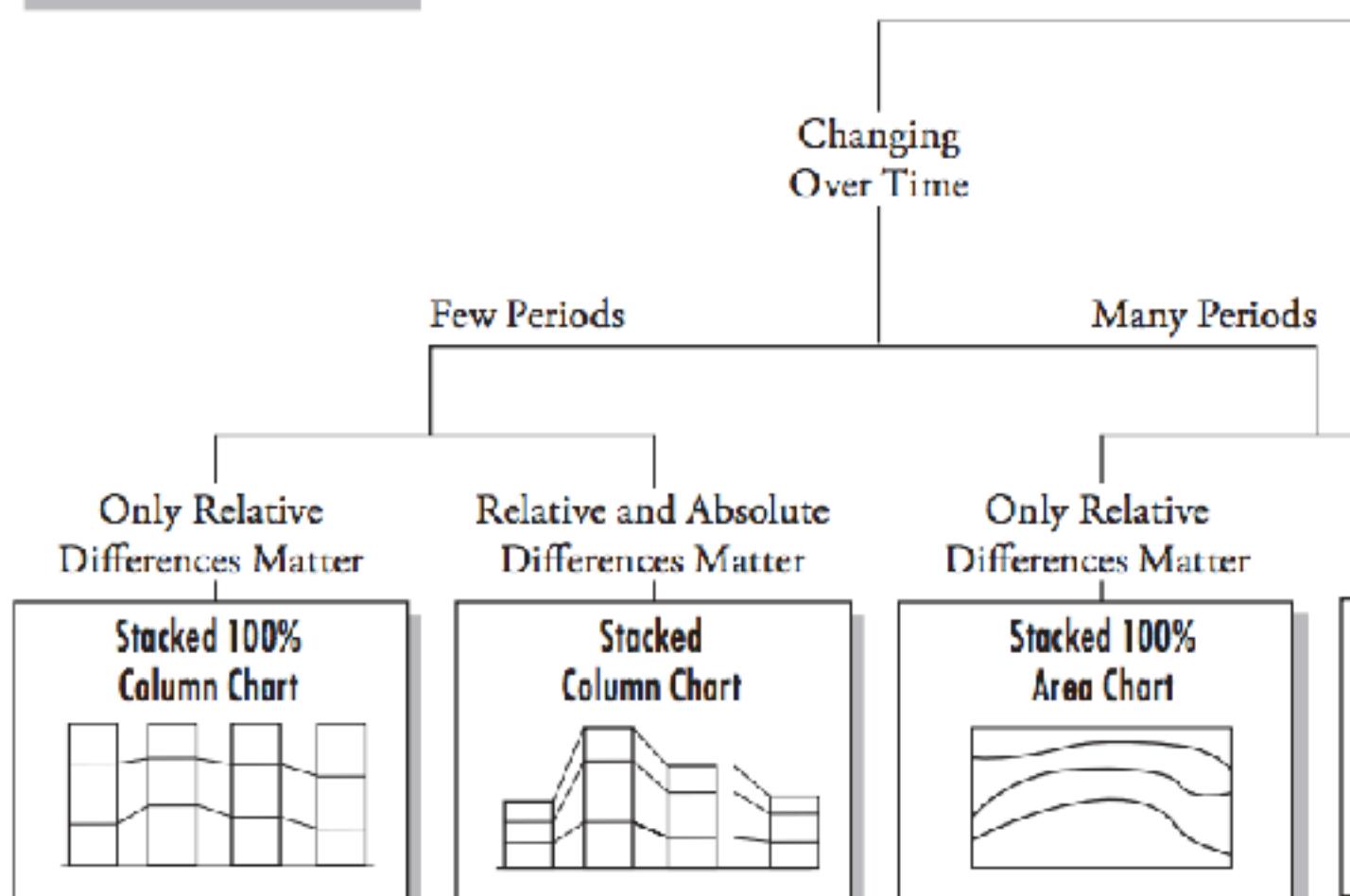
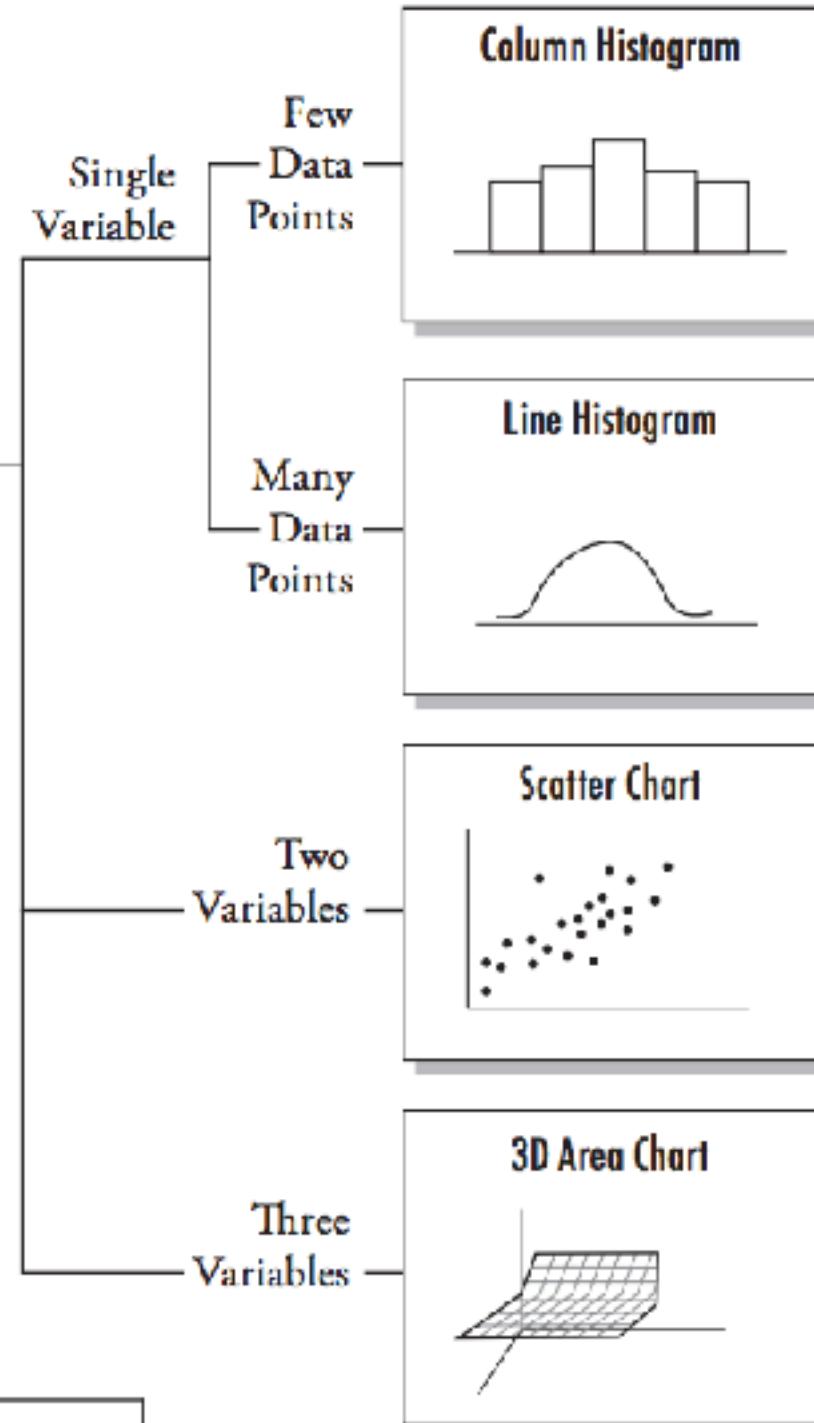
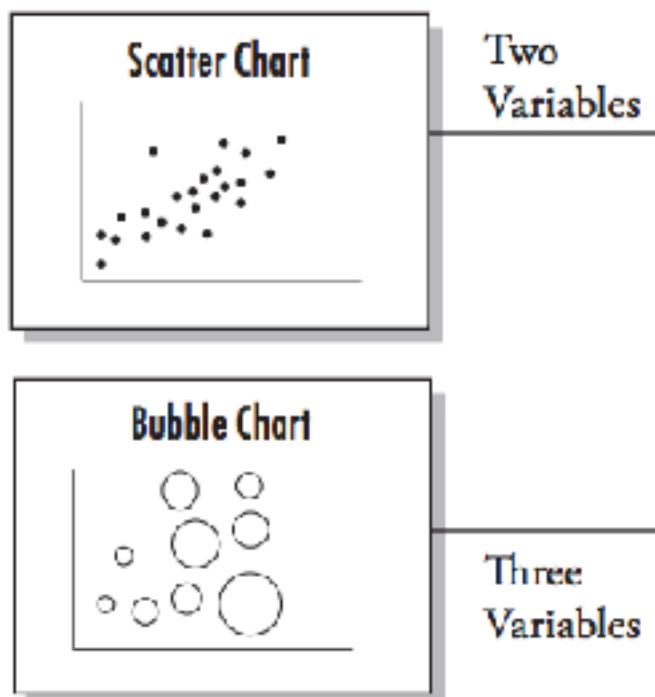
Comparison

Relationship

What would you like to show?

Distribution

Composition



Visual vocabulary

Designing with data

There are so many ways to visualise data - how do we know which one to pick? Use the categories across the top to decide which data relationship is most important in your story, then look at the different types of chart within the category to form some initial ideas about what might work best. This list is not meant to be exhaustive, nor a wizard, but is a useful starting point for making informative and meaningful data visualisations.

© graphic: Alan Smith; Data: Campbell, Ian Bell, Tim Bowes, Graham Burwell, Billy Dorenbosch-Brown, David Helfgott, Martin Gaha
Inspired by the original 'Chart Vocabulary' by Steve Krikke and Kaspar Rohrhuber



ft.com/vocabulary

Deviation

Emphasise variations (+/-) from a fixed reference point. Typically the reference point is zero, but it can be a target or an average. Can also be used to show outliers (positive/negative).

Example FT uses:
Trade surplus/deficit, climate change

Diverging bar



A simple standard bar chart that can handle negative and positive magnitude values.

Diverging stacked bar



Perfect for presenting survey results which involve sentiment (eg. disagree/agree/neutral/agreed).

Spline



Splits a single value into two contrasting components (eg. max/min/etc.).

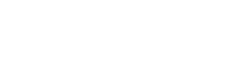
Example FT uses:
Surplus/deficit filled line



The shading of these charts allows a balance to be shown - either against a baseline or between two series.

Example FT uses:
Trade surplus/deficit, climate change

X1 heatmap



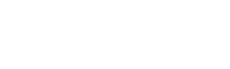
A good way of showing the address between 2 categories of data, less effective at showing fine differences in amounts.

Slope



Perfect for showing how much has changed over time or rate of change.

Lollipop



Lollipop draws more attention to the data value than standard scatter plot and can also show rank and value effectively.

Bump



Effective for showing changing rankings across multiple dates.

For large datasets, consider grouping lines using color.

Frequency polygons



For displaying multiple distributions of data. Like regular line chart, best limited to a maximum of 3 or 4 distincts.

Breslow



Used to emphasize individual points in a distribution. Points can be added to an additional variable. Best with medium-sized datasets.

Correlation

Show the relationship between two or more variables. Be mindful that unless you tell them otherwise, many readers will assume the relationships you show them to be causal (ie. one causes the other).

Example FT uses:
Wealth distribution, income tables, constituency election results

Scatterplot



The standard way to show the relationship between two continuous variables, each of which has its own axis.

Dot plot



A good way of showing the relationship between an amount (columns) and a rate (dots).

Connected scatterplot



Usually used to show the relationship between 3 variables that hasn't changed over time.

Barcode plot



Like dot plots, good for displaying all the data in a table. They work best when highlighting individual values.

Dot strip plot



Data placed in order on a strip see a square-efficient method of laying out data across multiple categories.

Dot



Good for showing individual values in a distribution, can be a problem when too many dots have the same value.

Dot matrix



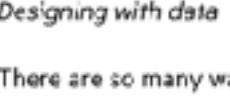
A good way of showing the relationship between an amount (columns) and a rate (dots).

Boxplot



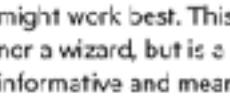
Summarise multiple distributions by showing the median (center) and range of the data.

Violin plot



Similar to a box plot but more effective with complex distributions that cannot be summarised by a single value.

Population pyramid



A standard way for showing the age and sex breakdown of a population distribution; alternatively, back-to-back histograms.

Cumulative curve



A good way of showing how unequal something is. A ratio is always compared to frequencies, as it is an average measure.

Ranking

Use when there is an ordered list or more important than when they occur. The shape (or 'skew') of a distribution can be a reasonable way of highlighting the lack of uniformity or equality in the data.

Example FT uses:
Wealth distribution, income tables, constituency election results

Bar chart



Standard bar charts show the ranks of different categories, usually in descending order.

Stacked bar



Standard bar charts show the ranks of different categories, usually in descending order.

Dot plot



Dot plot is a good way of showing the range of multiple data series.

Dot



Dot plot is a good way of showing the range of multiple data series.

Dot matrix



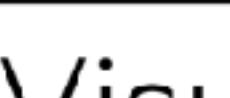
Dot matrix is a good way of showing the range of multiple data series.

Dot



Dot plot is a good way of showing the range of multiple data series.

Dot



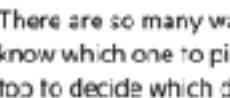
Dot plot is a good way of showing the range of multiple data series.

Dot



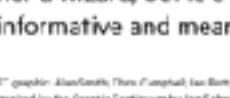
Dot plot is a good way of showing the range of multiple data series.

Dot



Dot plot is a good way of showing the range of multiple data series.

Dot



Dot plot is a good way of showing the range of multiple data series.

Distribution

Use when there is an ordered list or more important than when they occur. The shape (or 'skew') of a distribution can be a reasonable way of highlighting the lack of uniformity or equality in the data.

Example FT uses:
Income distribution, population, age/age distribution, revealing inequality

Histogram



Histograms are good for showing the shape of a distribution, especially if the data is skewed.

Line



Line chart is good for showing the shape of a distribution, especially if the data is skewed.

Column



Column chart is good for showing the shape of a distribution, especially if the data is skewed.

Stacked column/bar



Stacked column chart is good for showing the shape of a distribution, especially if the data is skewed.

Marimekko



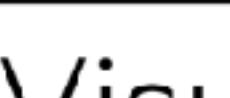
Marimekko is good for showing the shape of a distribution, especially if the data is skewed.

Dot



Dot plot is a good way of showing the shape of a distribution, especially if the data is skewed.

Dot



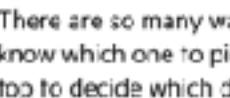
Dot plot is a good way of showing the shape of a distribution, especially if the data is skewed.

Dot



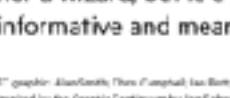
Dot plot is a good way of showing the shape of a distribution, especially if the data is skewed.

Dot



Dot plot is a good way of showing the shape of a distribution, especially if the data is skewed.

Dot



Dot plot is a good way of showing the shape of a distribution, especially if the data is skewed.

Change over Time

Use when there is an ordered list or more important than when they occur. The shape (or 'skew') of a distribution can be a reasonable way of highlighting the lack of uniformity or equality in the data.

Example FT uses:
Share price movements, economic time series, seasonal changes in market

Line



Line chart is good for showing the shape of a distribution, especially if the data is skewed.

Column



Column chart is good for showing the shape of a distribution, especially if the data is skewed.

Stacked column/bar



Stacked column chart is good for showing the shape of a distribution, especially if the data is skewed.

Marimekko



Marimekko is good for showing the shape of a distribution, especially if the data is skewed.

Dot



Dot plot is a good way of showing the shape of a distribution, especially if the data is skewed.

Dot



Dot plot is a good way of showing the shape of a distribution, especially if the data is skewed.

Principios de diseño

Edward Tufte - Principios de diseño

1. Integridad gráfica
2. El factor mentira
3. Maximiza el radio datos/tinta
4. Evita basura gráfica

OBAMACARE ENROLLMENT

7,066,000

6,000,000

AS OF
MARCH 27

MARCH 31
GOAL

SOURCE: HHS



channel

mediamatters.org

IE IN SECOND PLACE WITH \$26.5 MIL, WHILE "MUPP DOW FUT 16,325.00

JOB LOSS BY QUARTER



FOX
NEWS
.COM

SOURCE: BLS

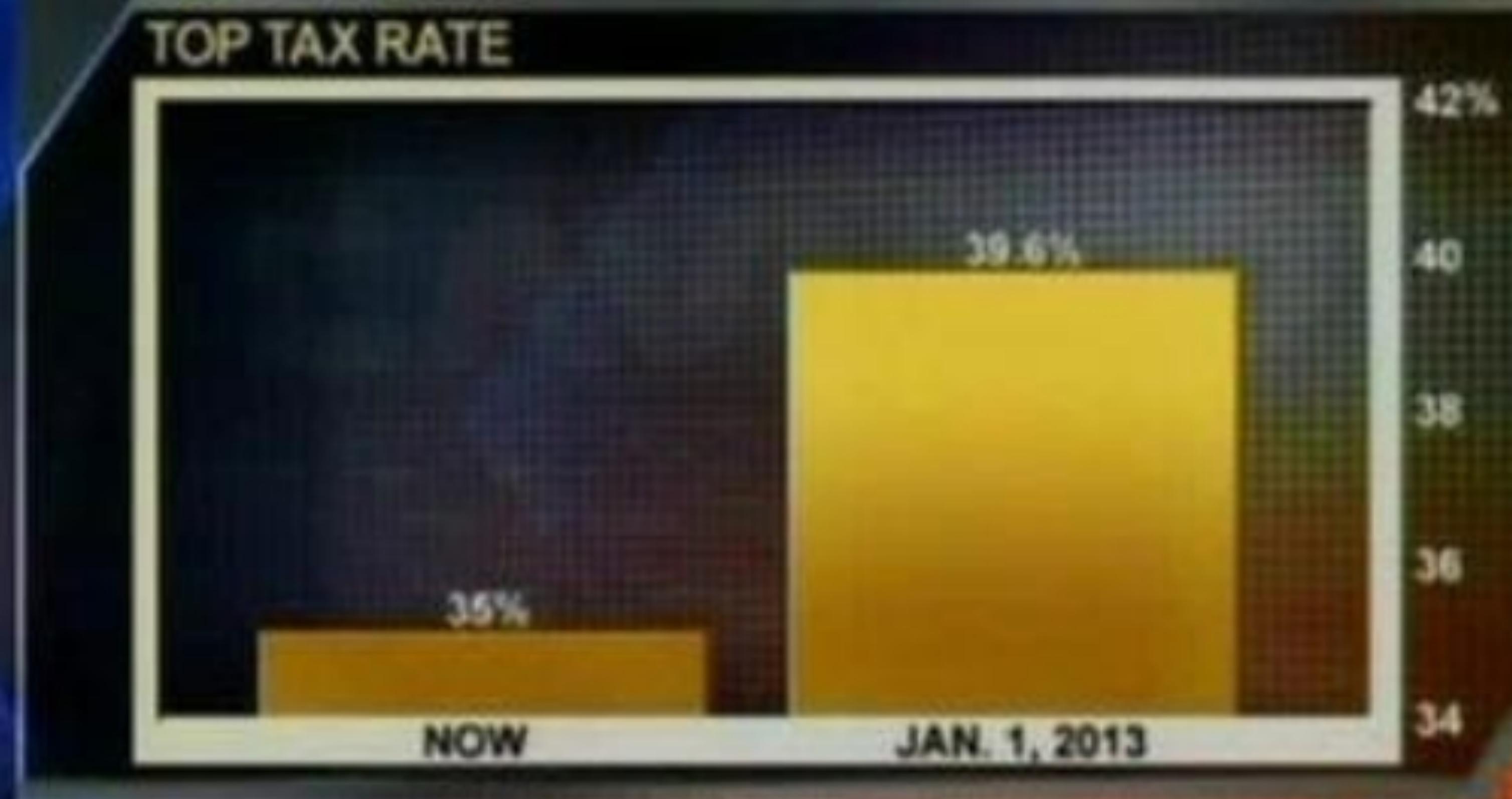
AMERICA'S
NEWSROOM

N FAIRFAX, VA... BYRD WAS ADMITTED TO THE HOSPITAL

S&P 3.08

IF BUSH TAX CUTS EXPIRE

TOP TAX RATE



8:01 p ET

FOX
BUSINESS

TOP STORIES

TECHNOLOGY

CONSUMER

WITH THE JUSTICE DEPARTMENT AND ACQUIRES FULL T

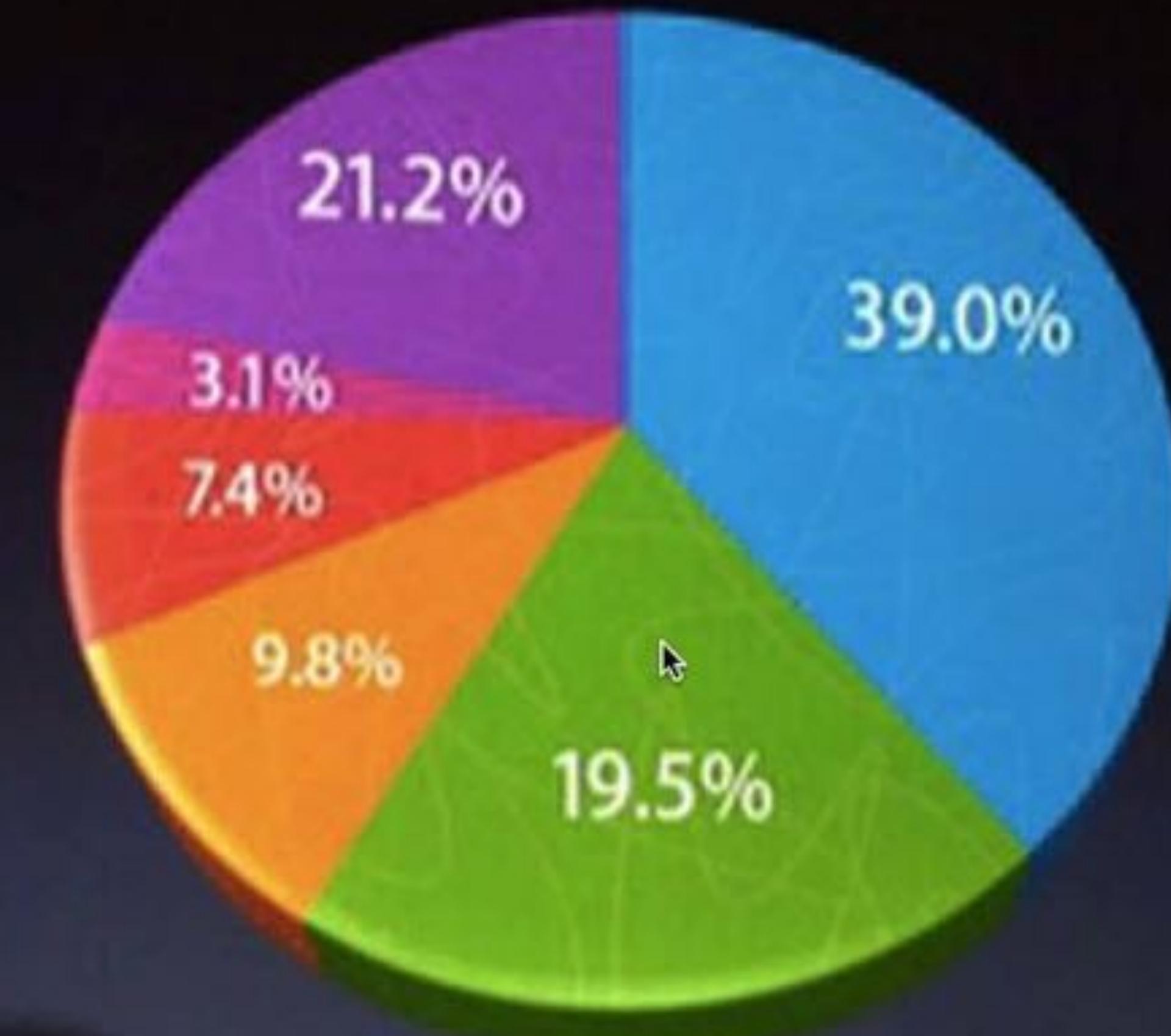
DOW 13008.68 ▲ 64.33

S&P 1379.32 ▲ 5.98

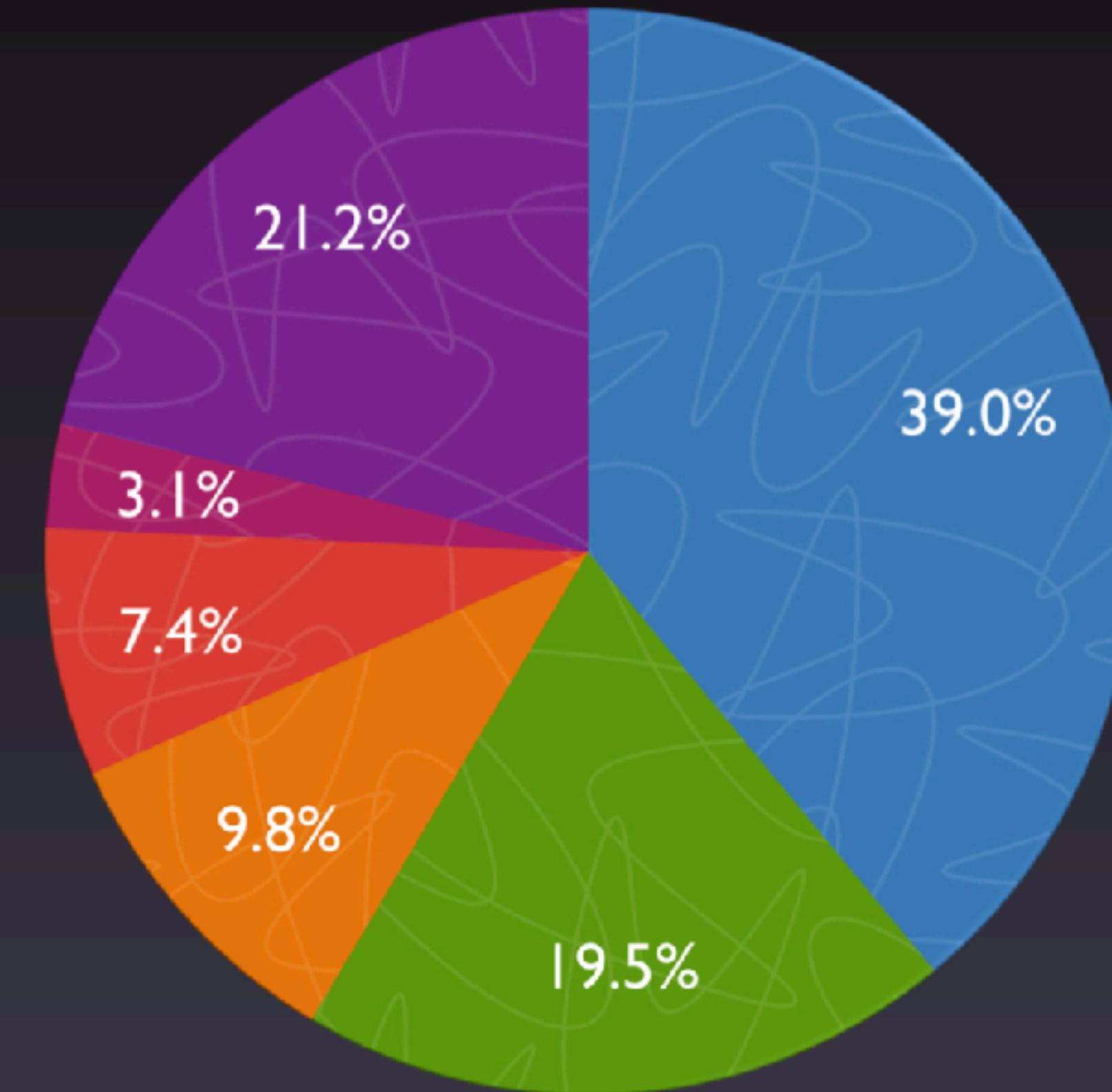
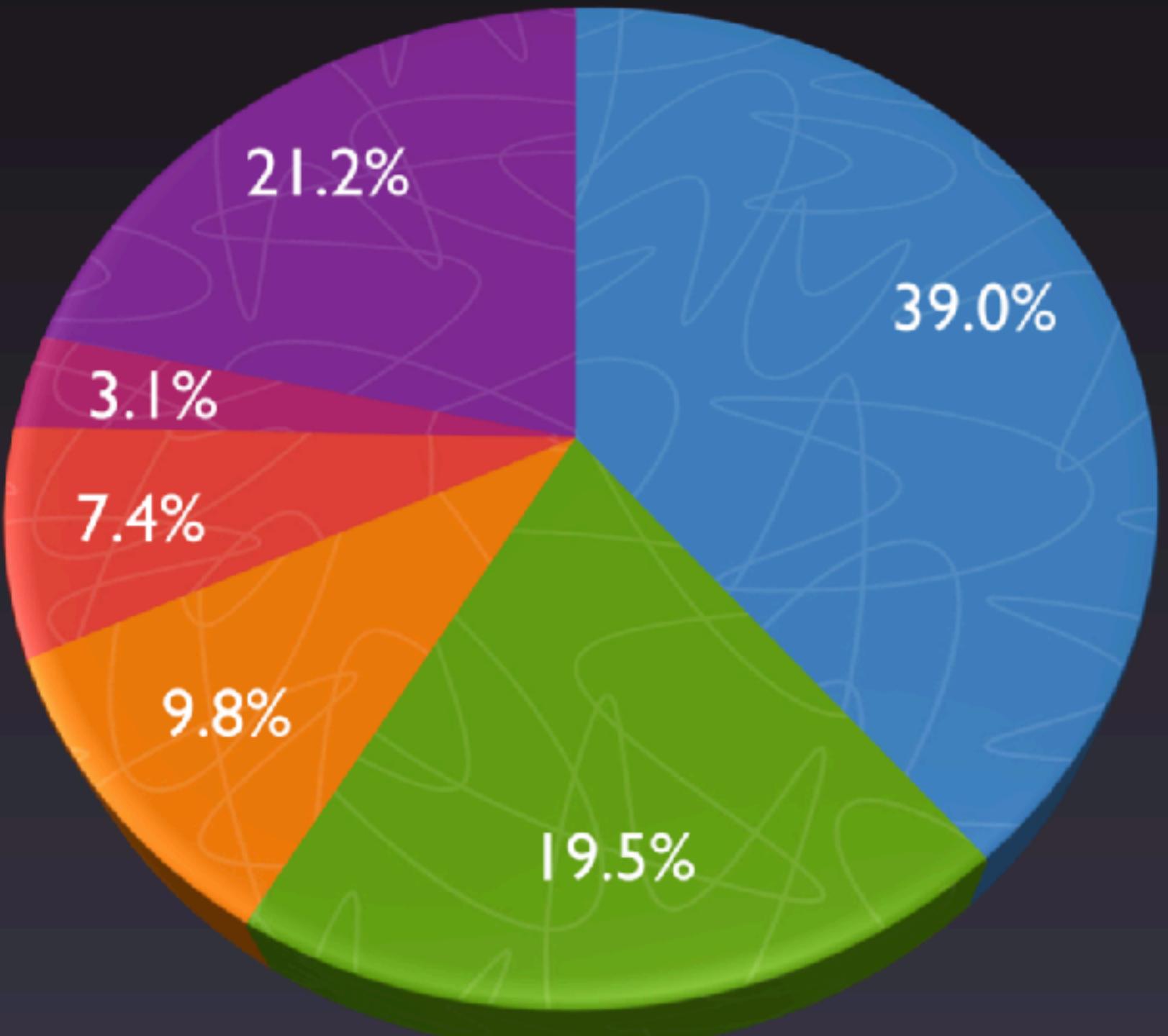
NASDAQ 2939.52 ▲ 6.32

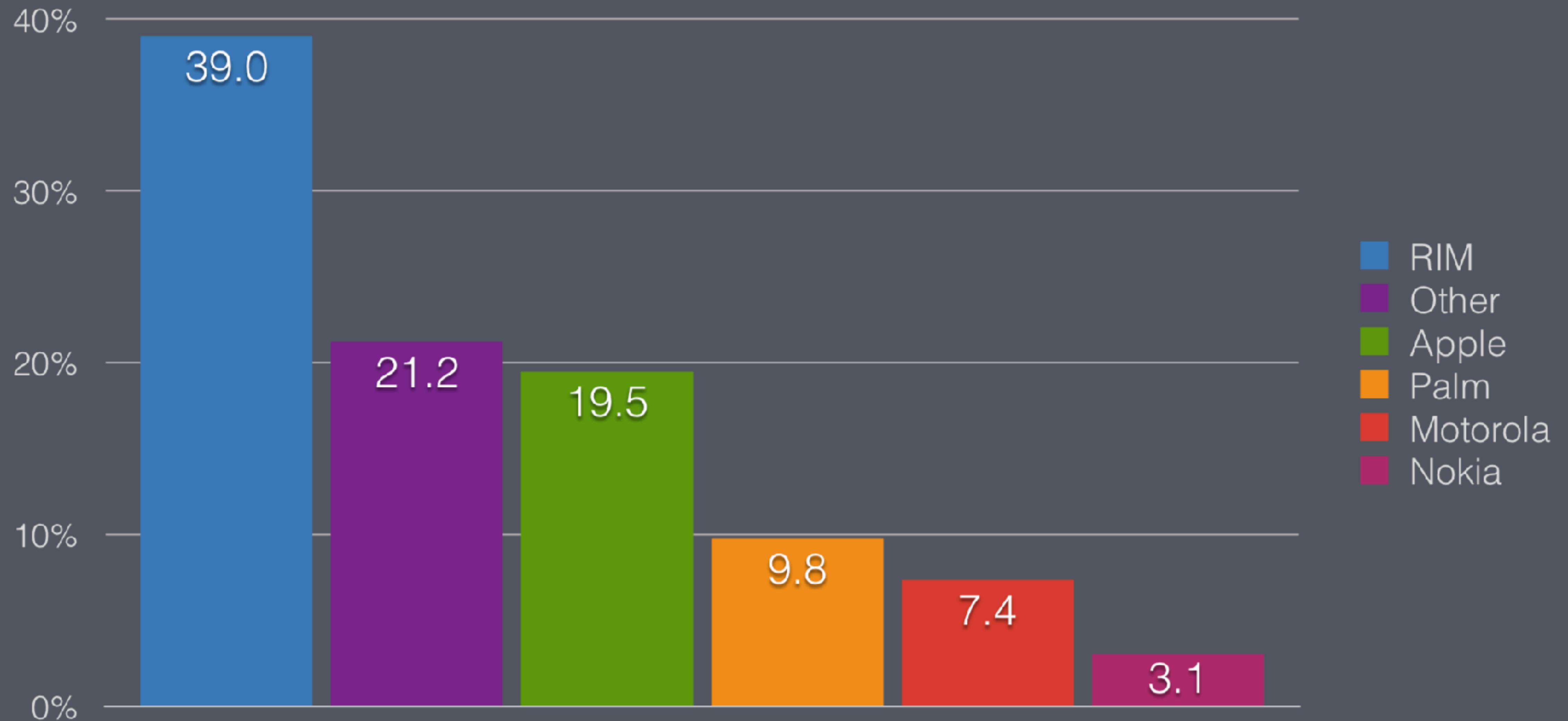
U.S. SmartPhone Marketshare

- RIM
- Apple
- Palm
- Motorola
- Nokia
- Other



- RIM
- Apple
- Palm
- Motorola
- Nokia
- Other





DELINCUENCIA

Victimas violentas (Personas victimizadas por delitos en 12 meses)

30,7%

2010

22,8%

2013

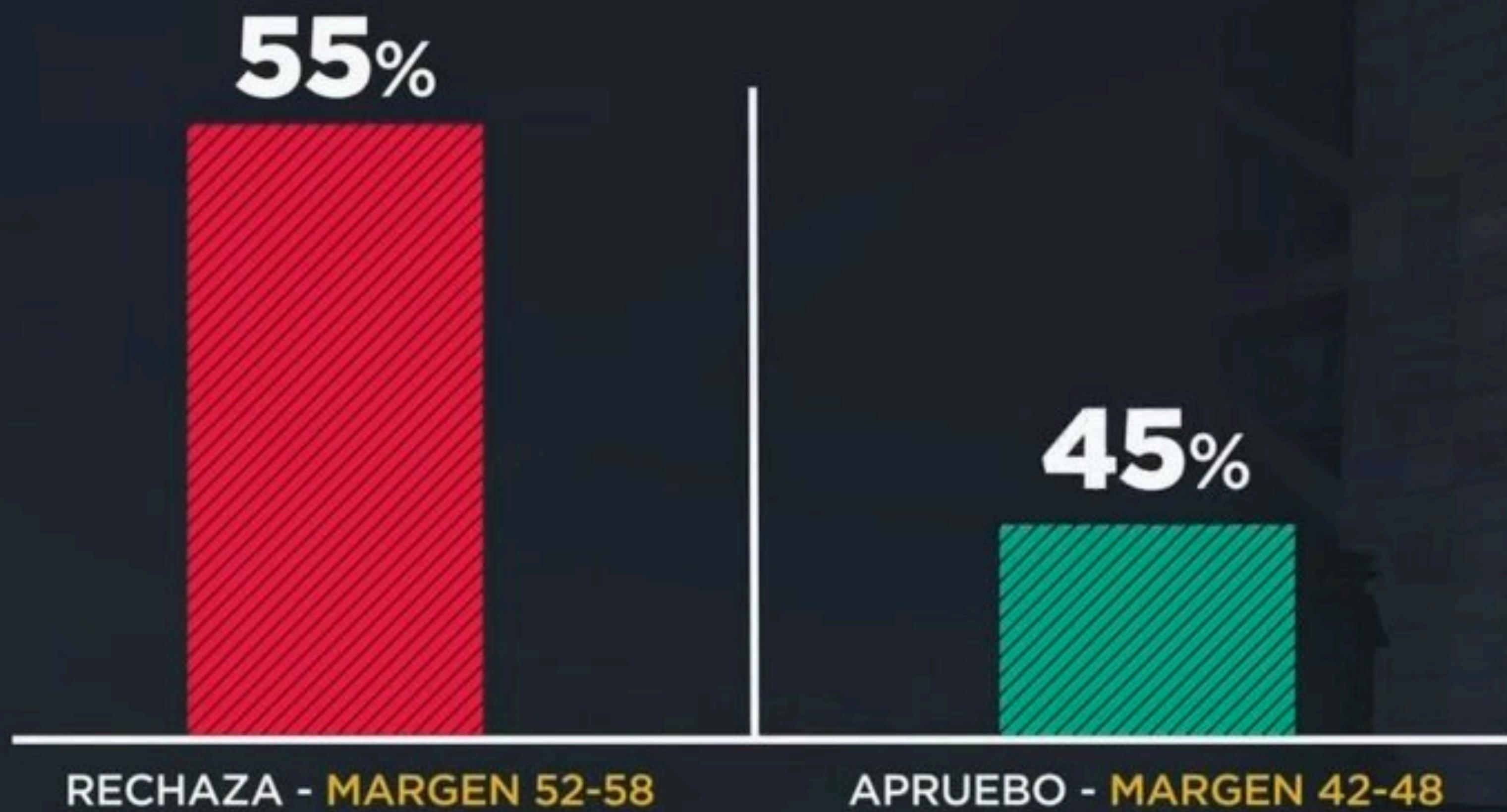
27,3%

2016



PERSPECTIVA PLEBISCITO DE SALIDA BASE 100%

12 AGOSTO



CADEM
RESEÑA
ESTRÁTÉGICA

VOCALES
DE MESA



NACIONAL

HOMBRE ASESIÓ A SU PAREJA DE 27 AÑOS EN LA COMUNA DE LO ESPEJO



21:30

[Meganoticias.cl](#)



@meganoticiascl



Meganoticiascl



Meganoticiascl

ALTERNATIVAS PLEBISCITO DE SALIDA

AGOSTO



50%



RECHAZO + RECHAZO PARA UNA NUEVA

45%



APRUEBO + APRUEBO PARA REFORMAR

FUENTE: CA

VOCALES
DE MESA



NACIONAL

BALANCE FIN DE SEMANA LARGO: 246 MIL VEHÍCULOS SALIERON DE LA CAPITAL



21:31

Meganoticias.cl

@meganoticiascl

Meganoticiascl

@Meganoticiascl





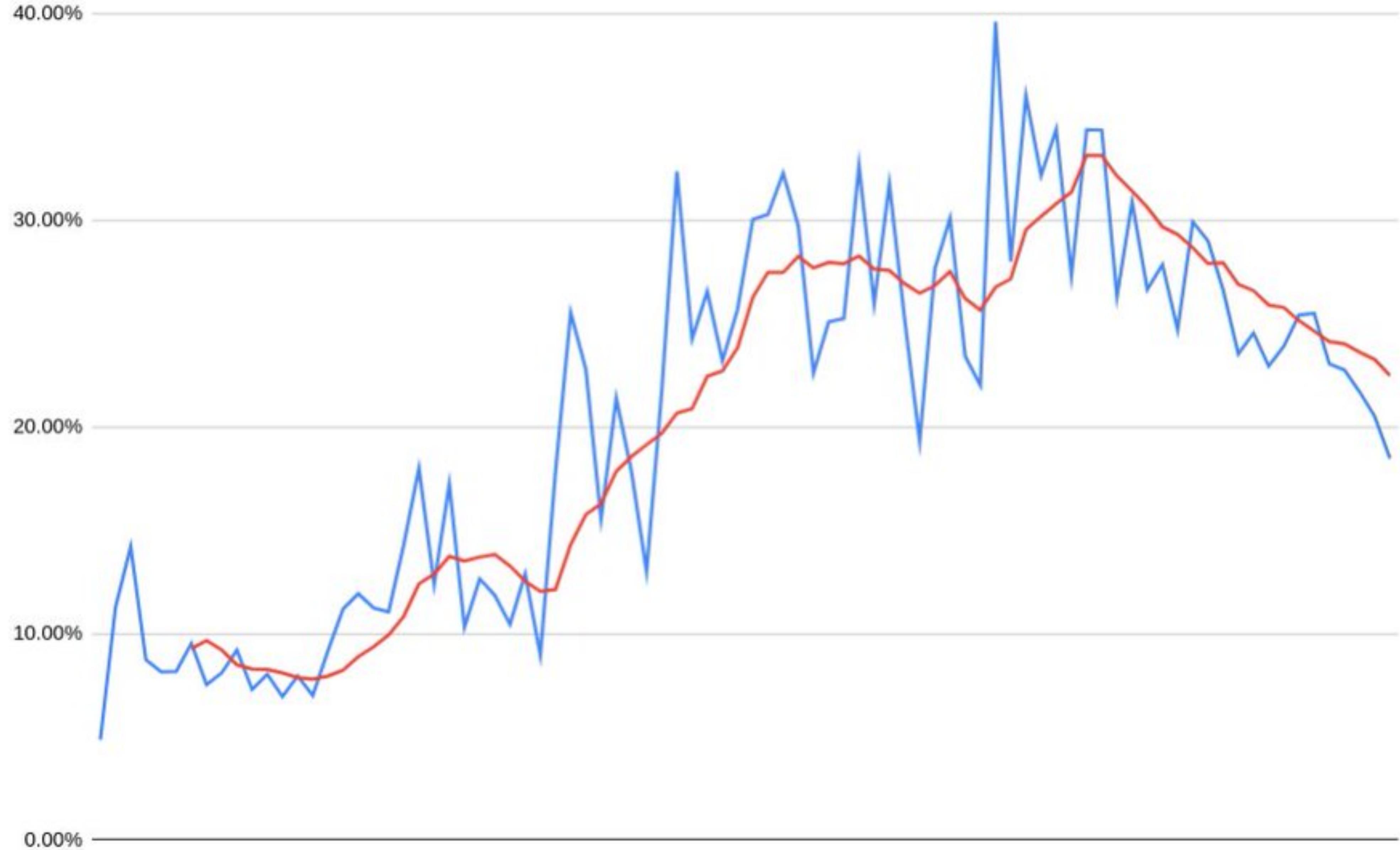
Tasa de Positividad Nacional



www.gob.cl/coronavirus

NUEVO BALANCE DE COVID-19 EN CHILE

T13 10:47 SANTIAGO 6° 12°

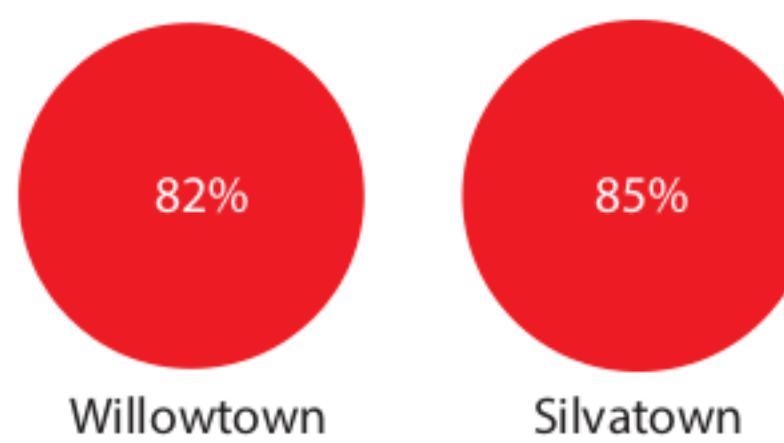


Correct versions

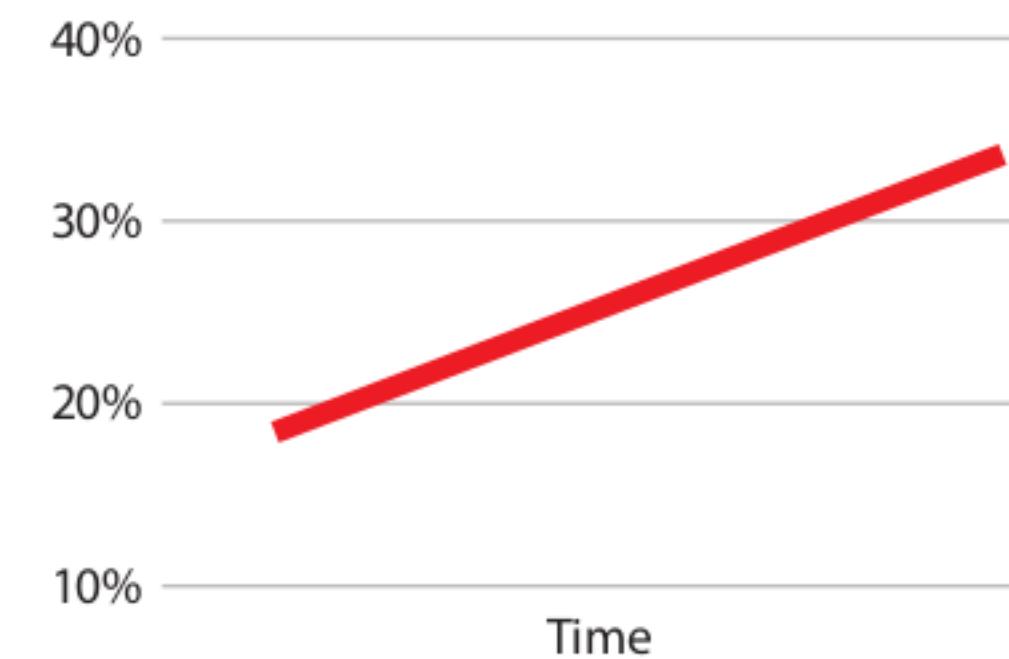
Percentage of population with access to safe drinking water



Percentage of population with access to safe drinking water

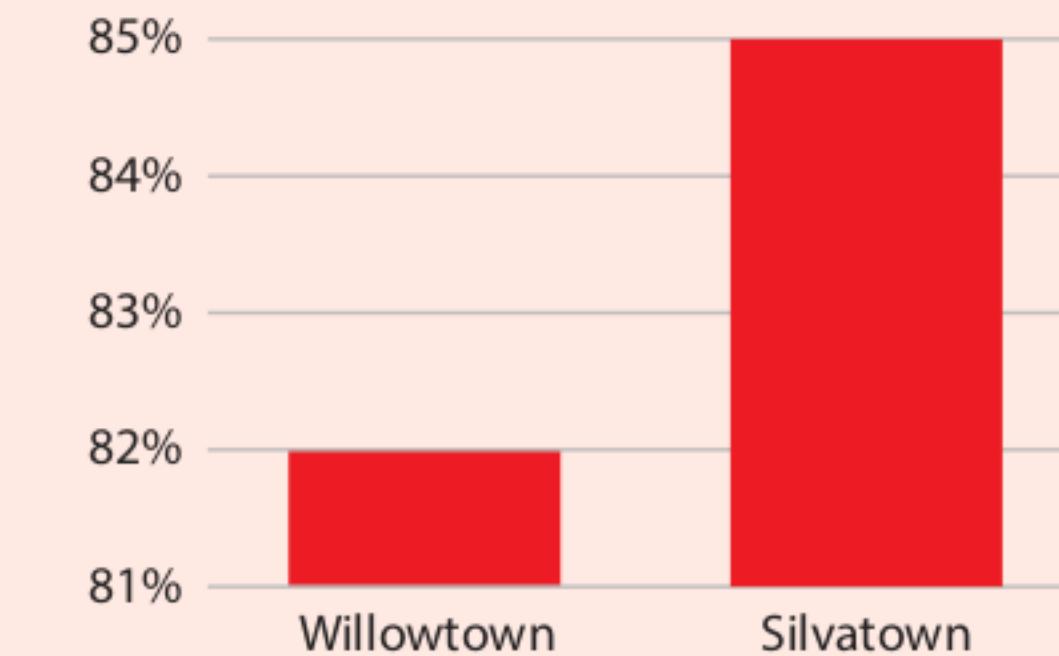


Access to safe drinking water by minority ethnic group



Deceptive versions

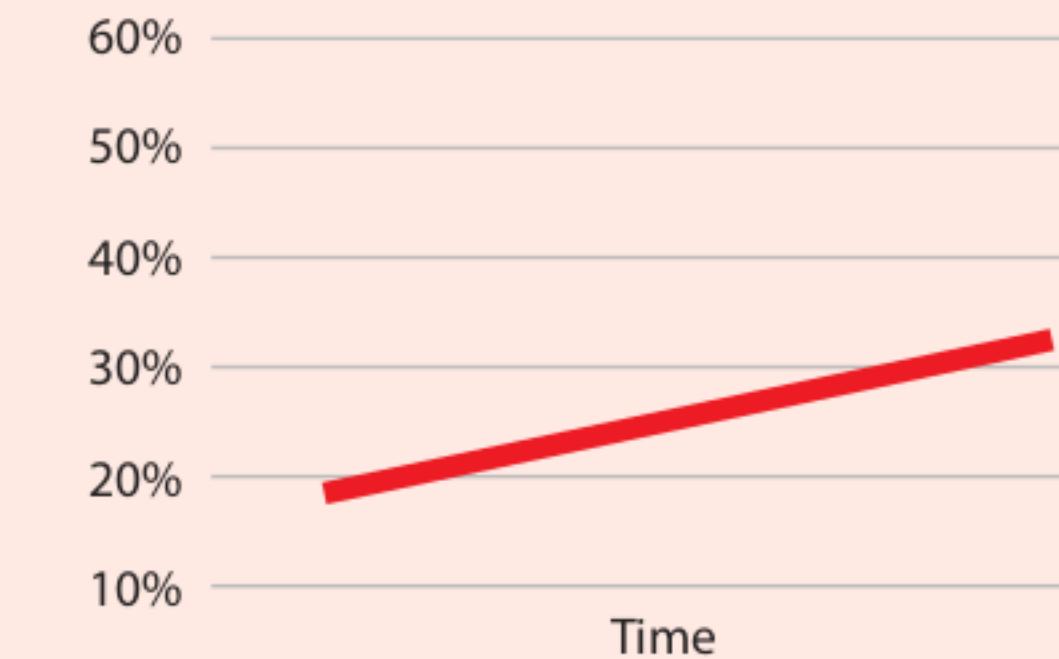
Percentage of population with access to safe drinking water



Percentage of population with access to safe drinking water



Access to safe drinking water by minority ethnic group



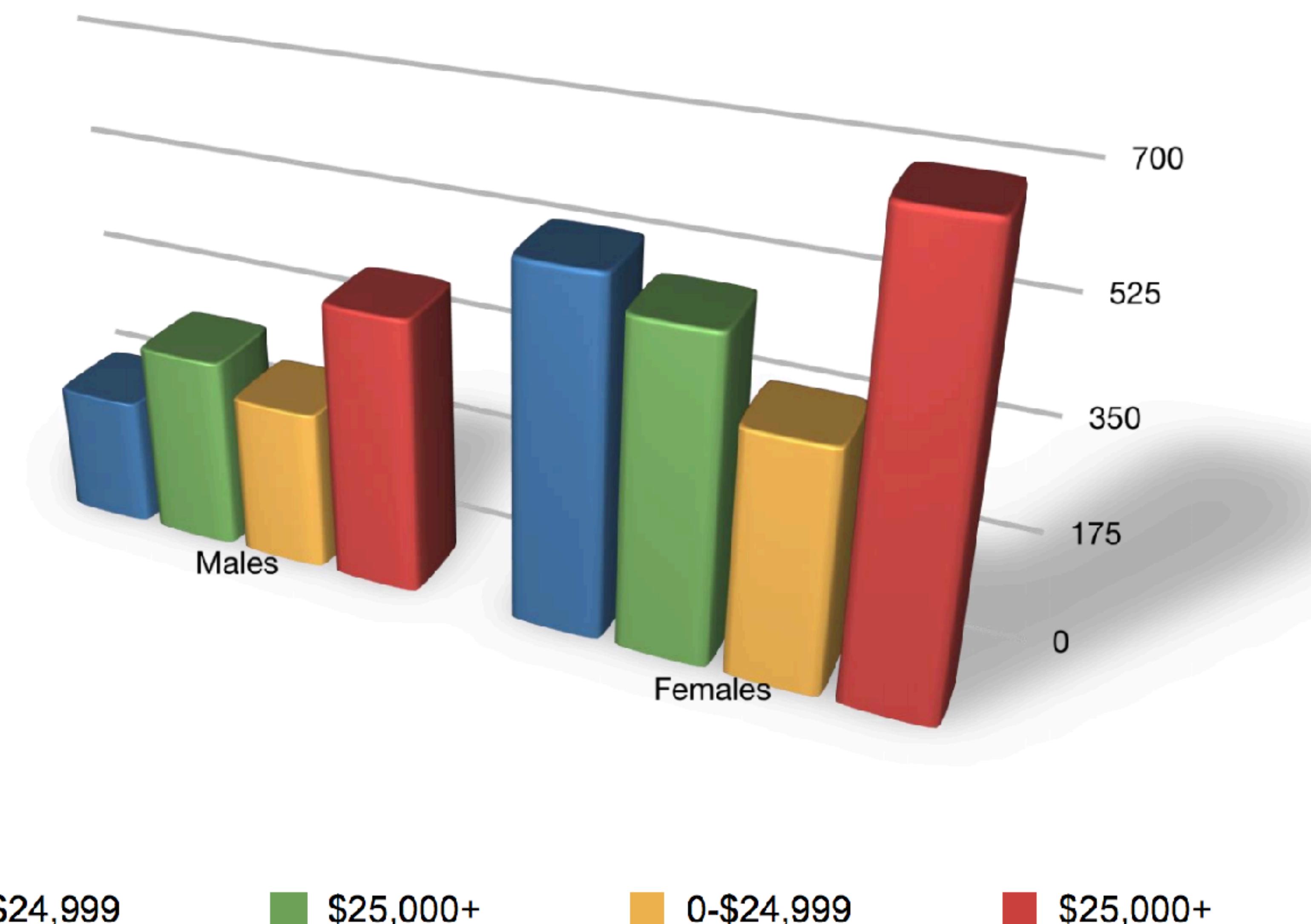
How Charts Lie



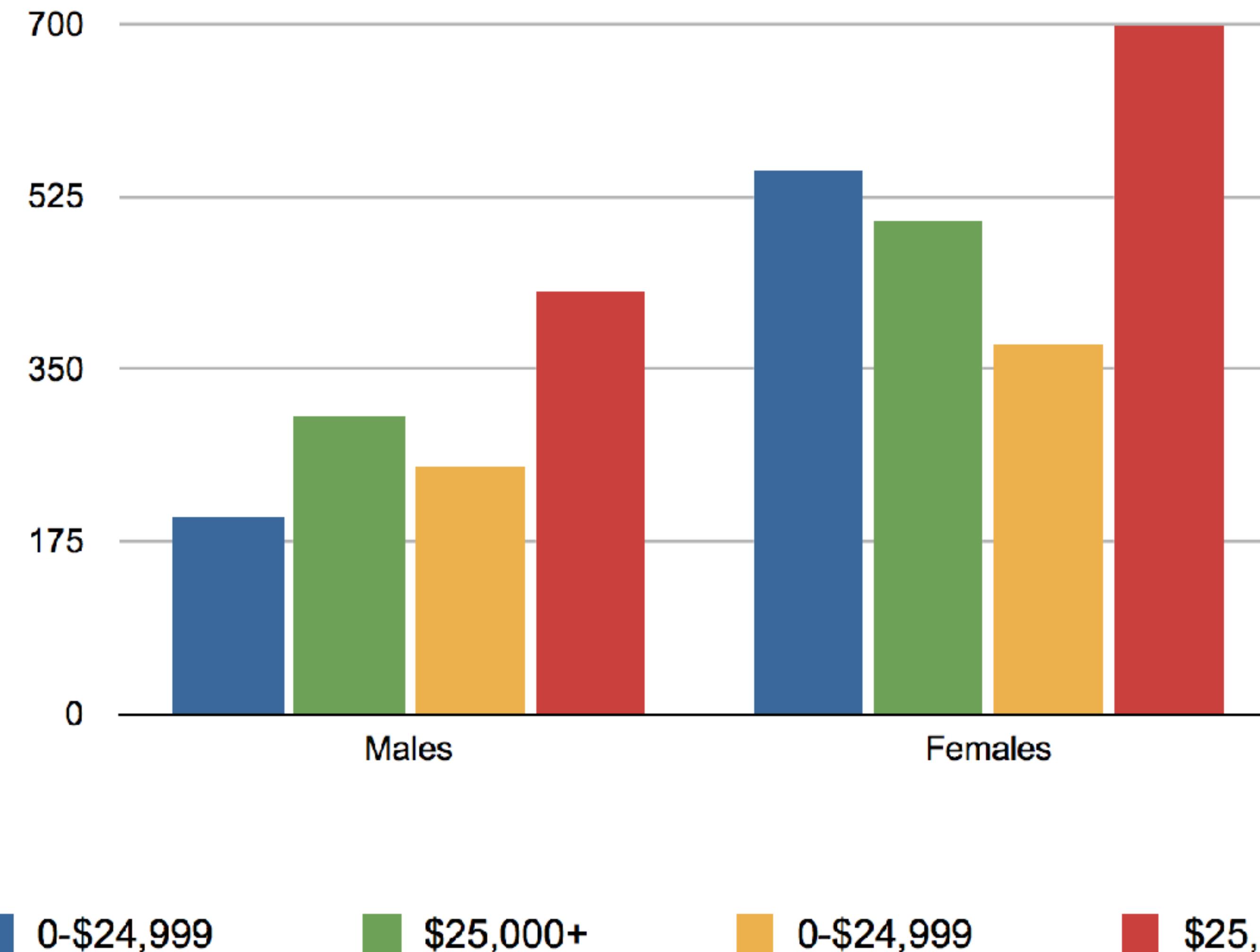
Getting Smarter about
Visual Information

Alberto Cairo

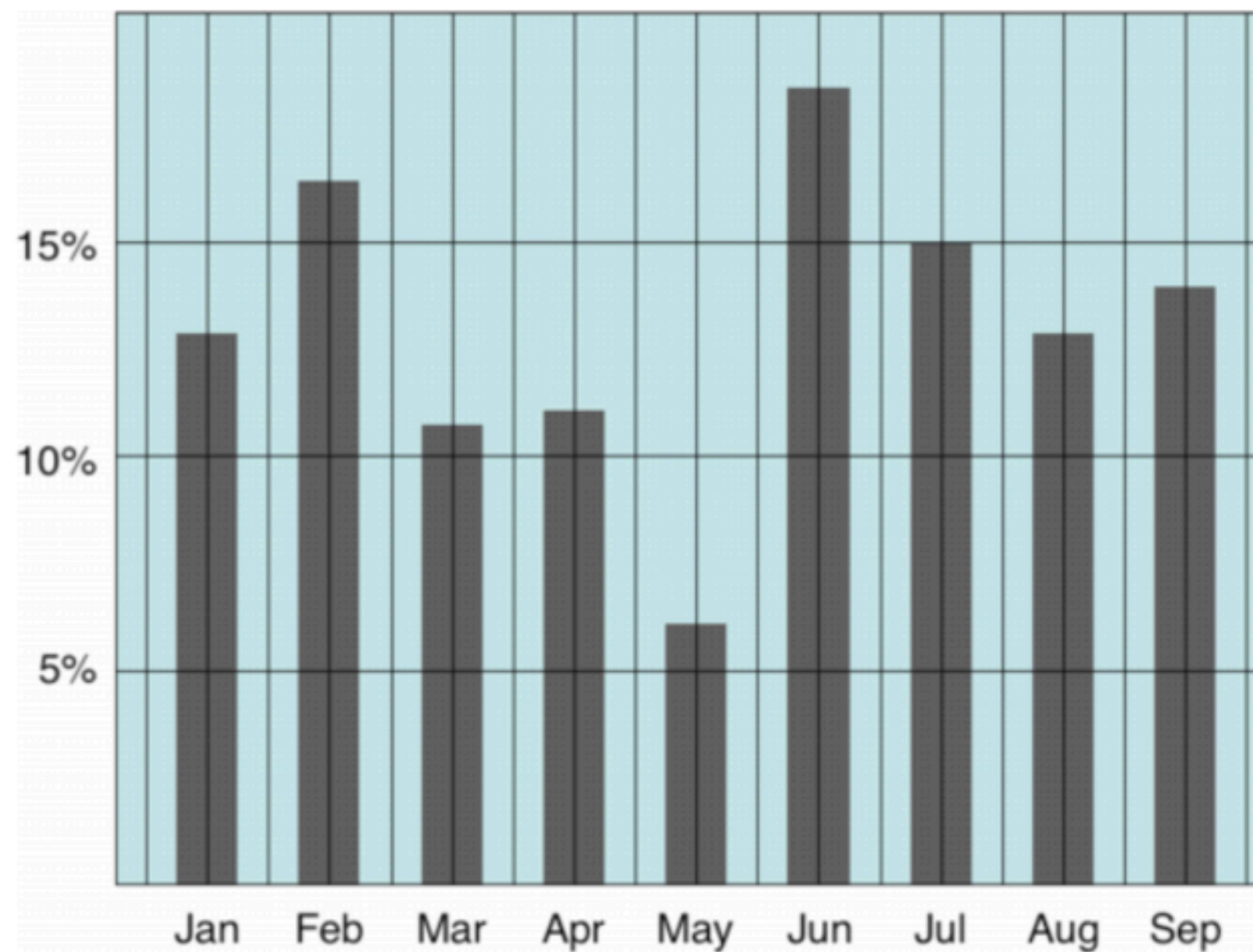
Radio datos/tinta = Tinta en datos / Tinta total usada en el gráfico



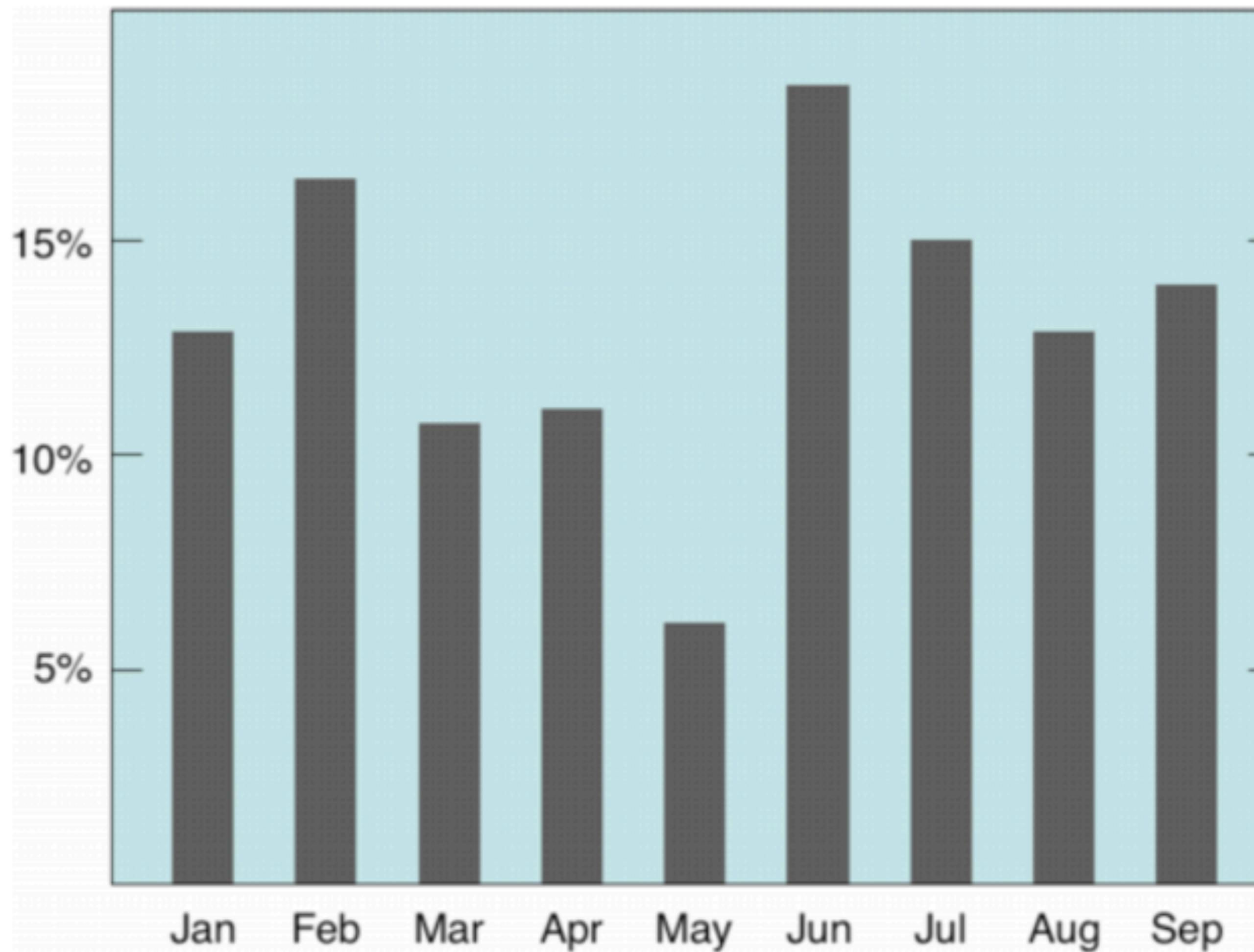
Radio datos/tinta = Tinta en datos / Tinta total usada en el gráfico



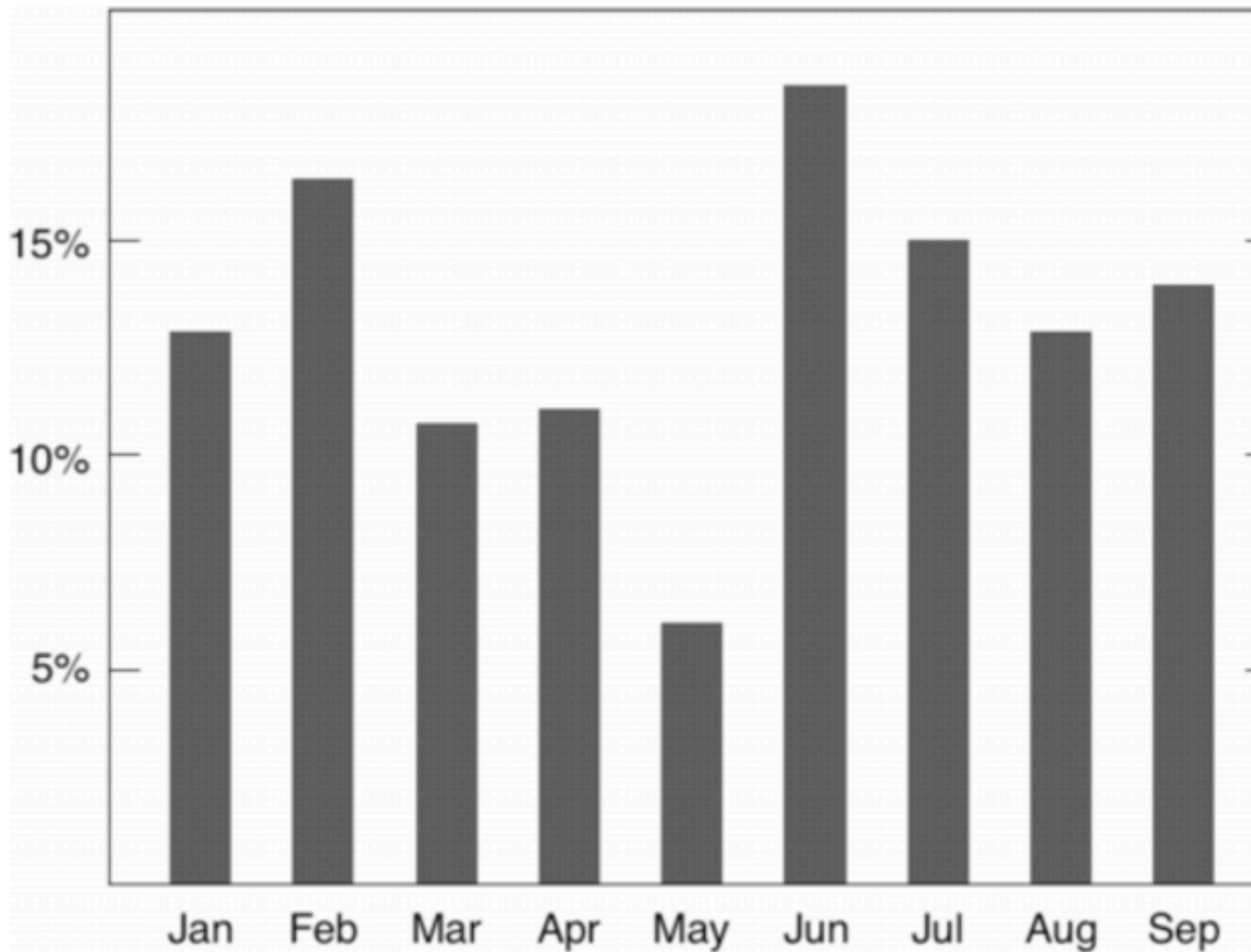
Evita basura gráfica



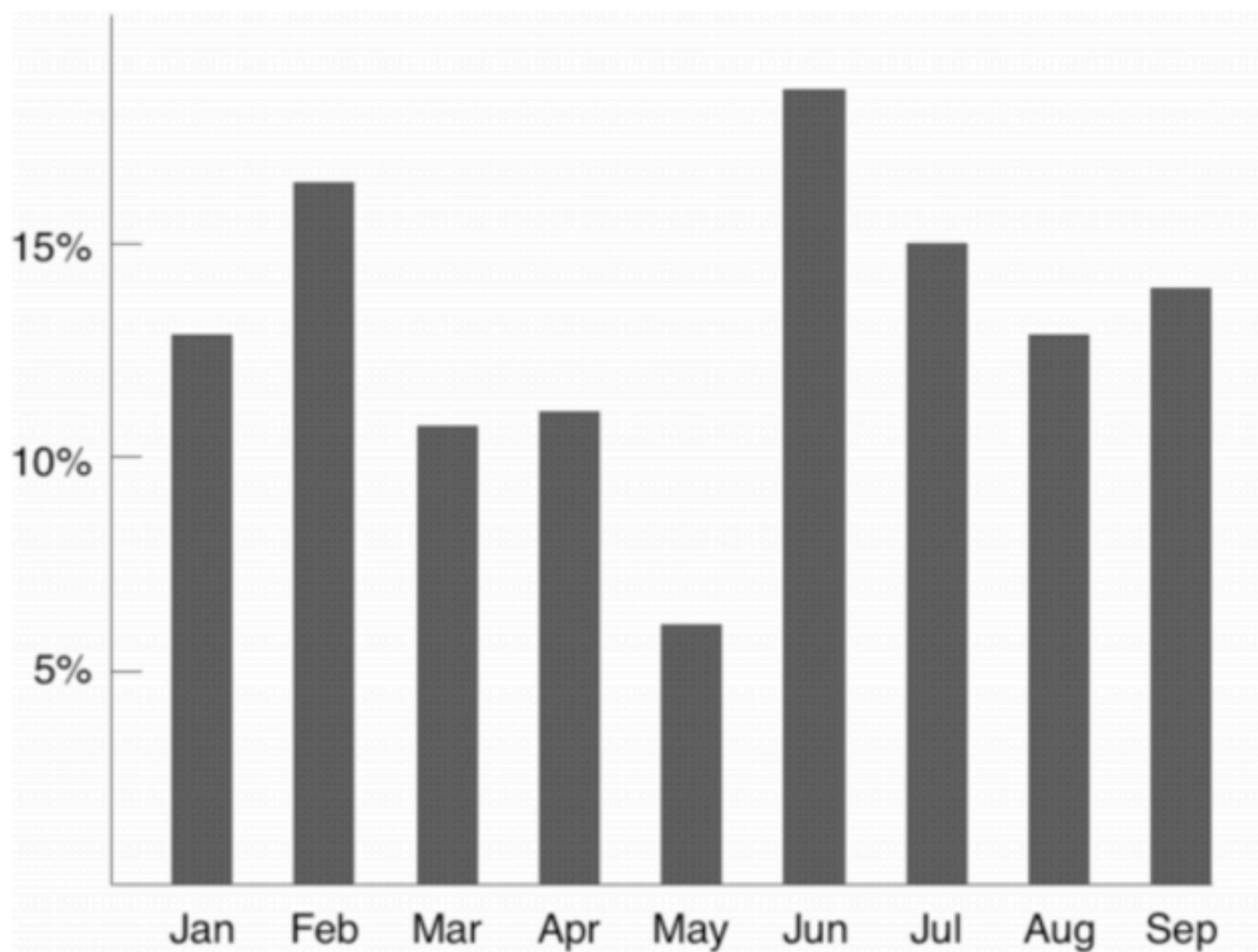
Evita basura gráfica



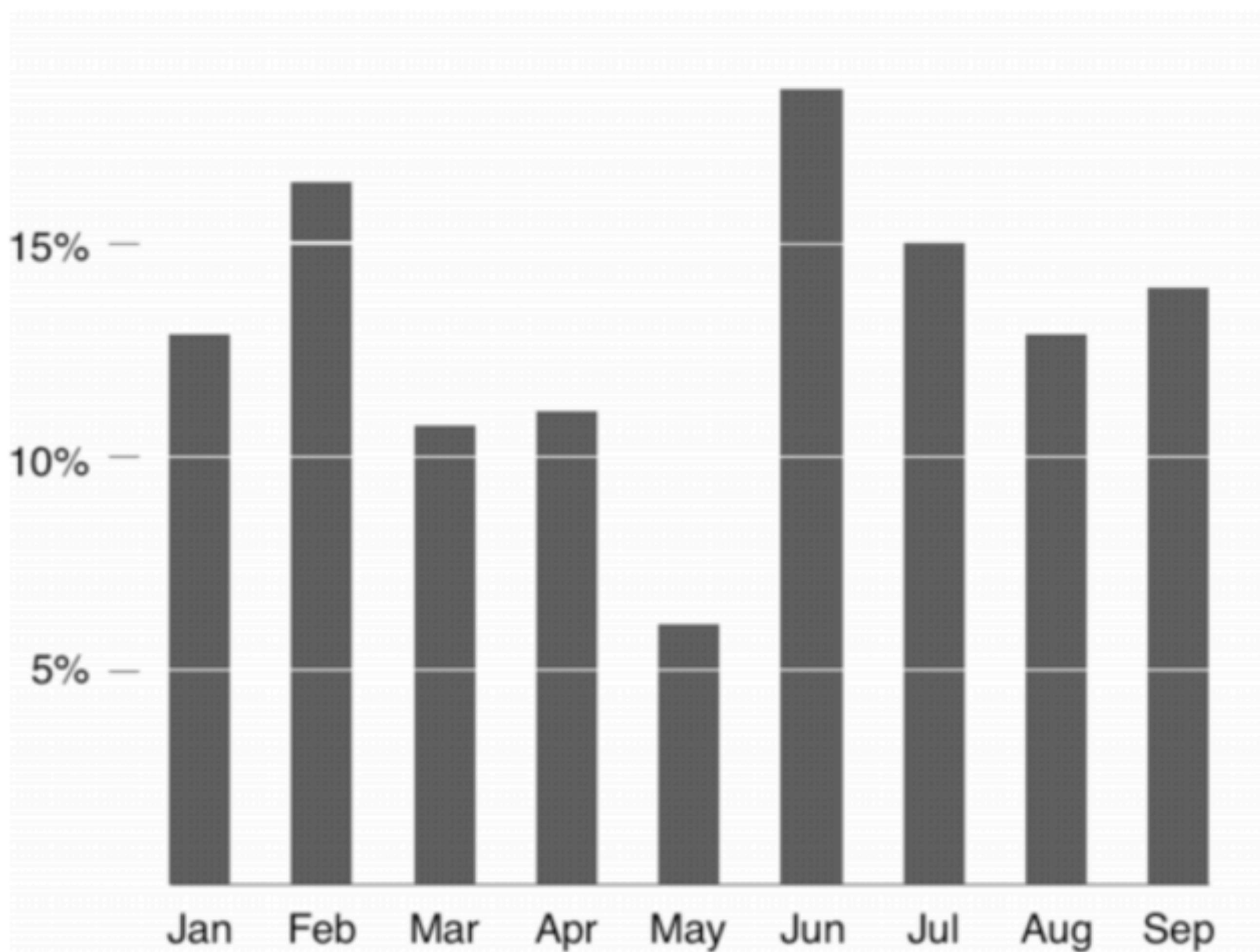
Evita basura gráfica



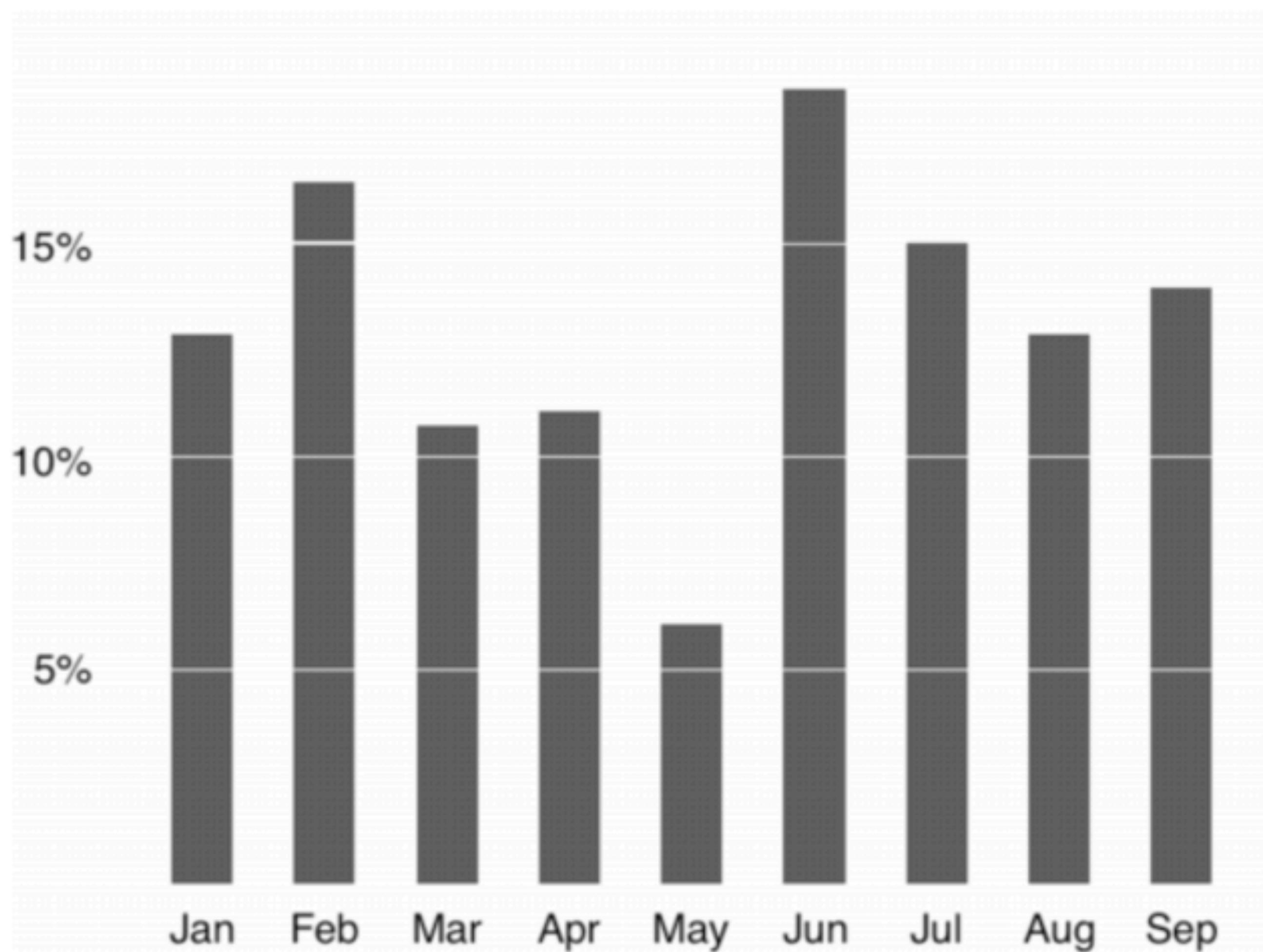
Evita basura gráfica



Evita basura gráfica



Evita basura gráfica

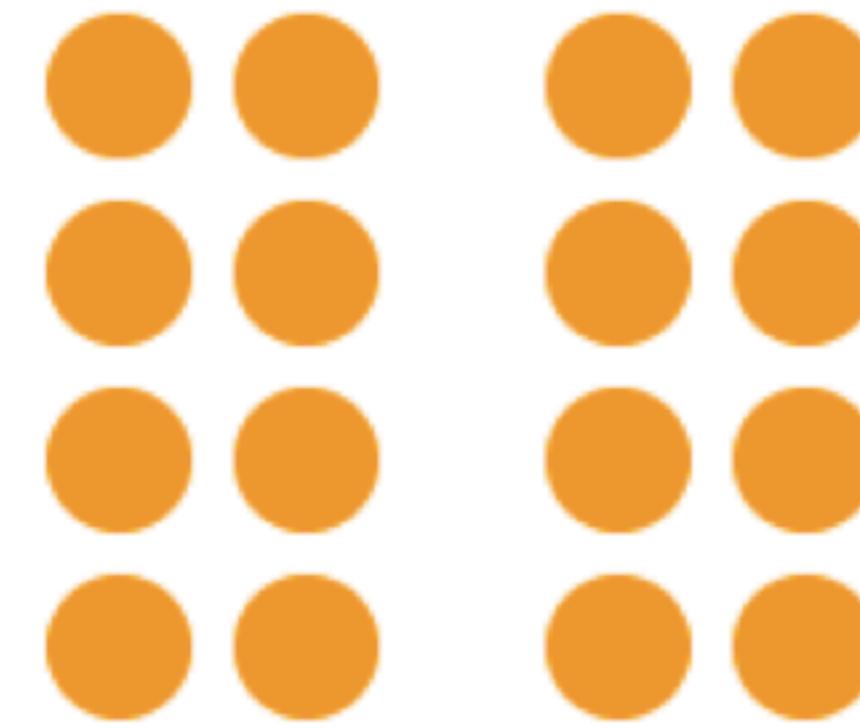
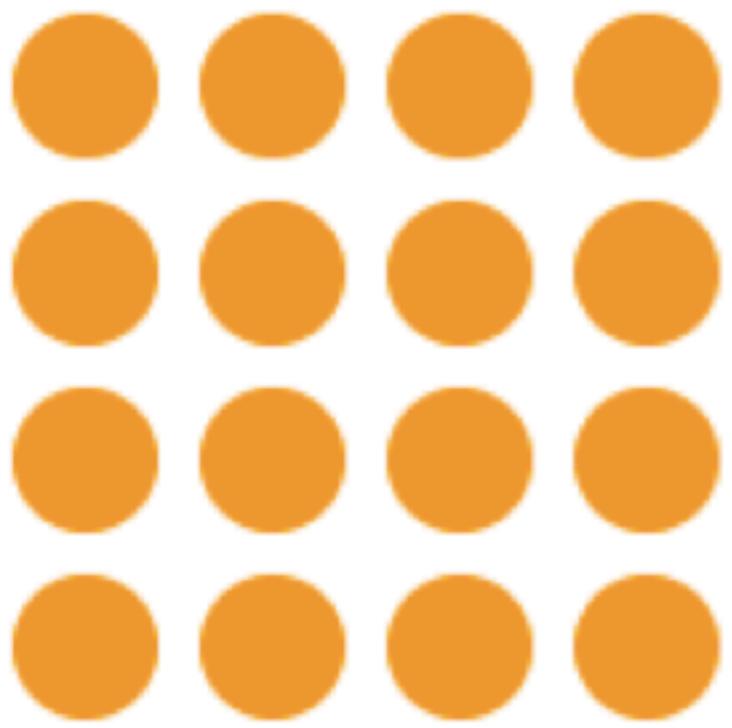


Principios de Gestalt

Principios de Gestalt

1. Proximidad
2. Similitud
3. Conexión
4. Encierro

Proximidad

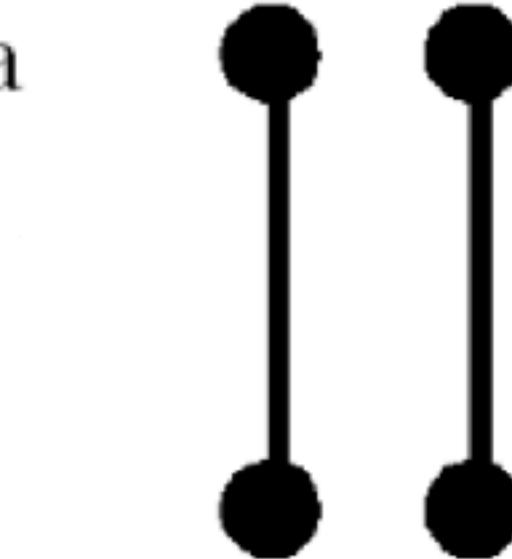


Similitud

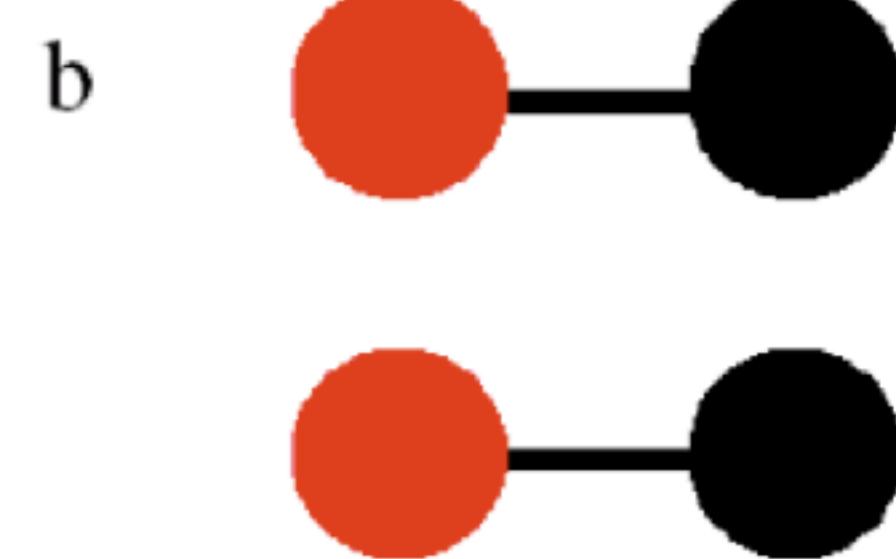
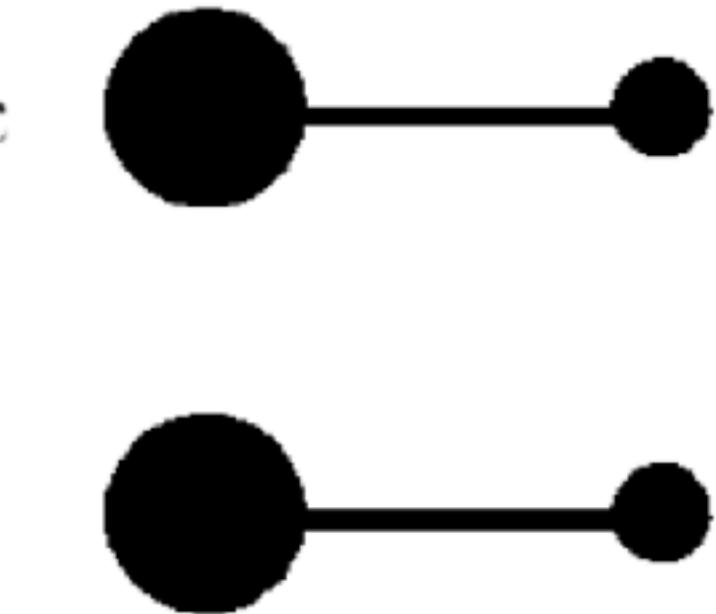


Conexión

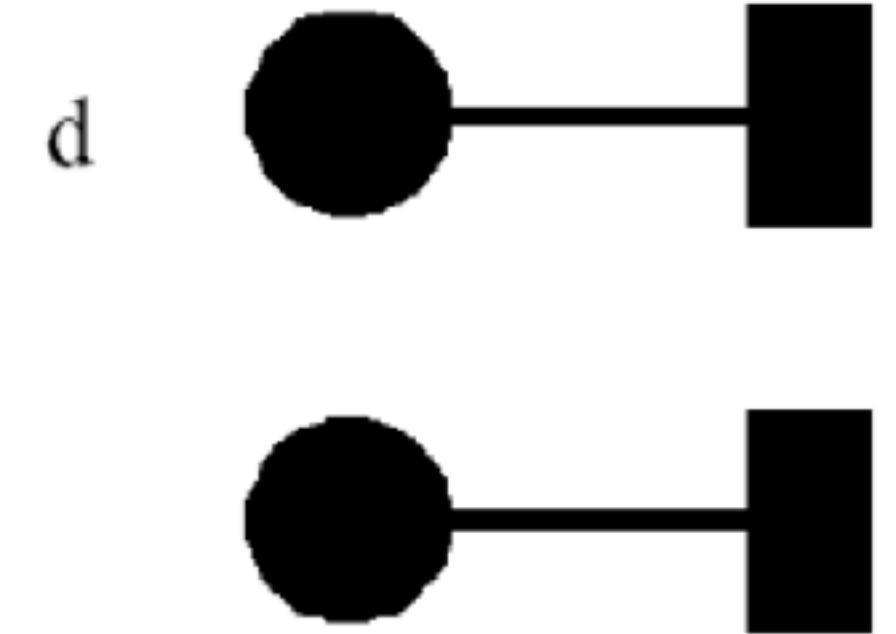
Proximity



Size



Color



Shape

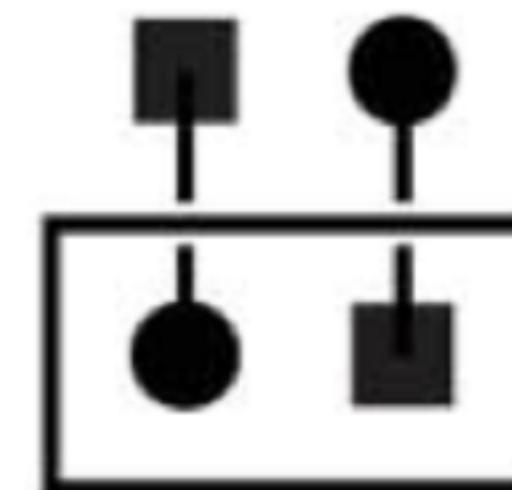
Encierro



Similarity



Connection



Enclosure

Show gap between

Black students

and

White students

Mouse over a state to explore data by school district

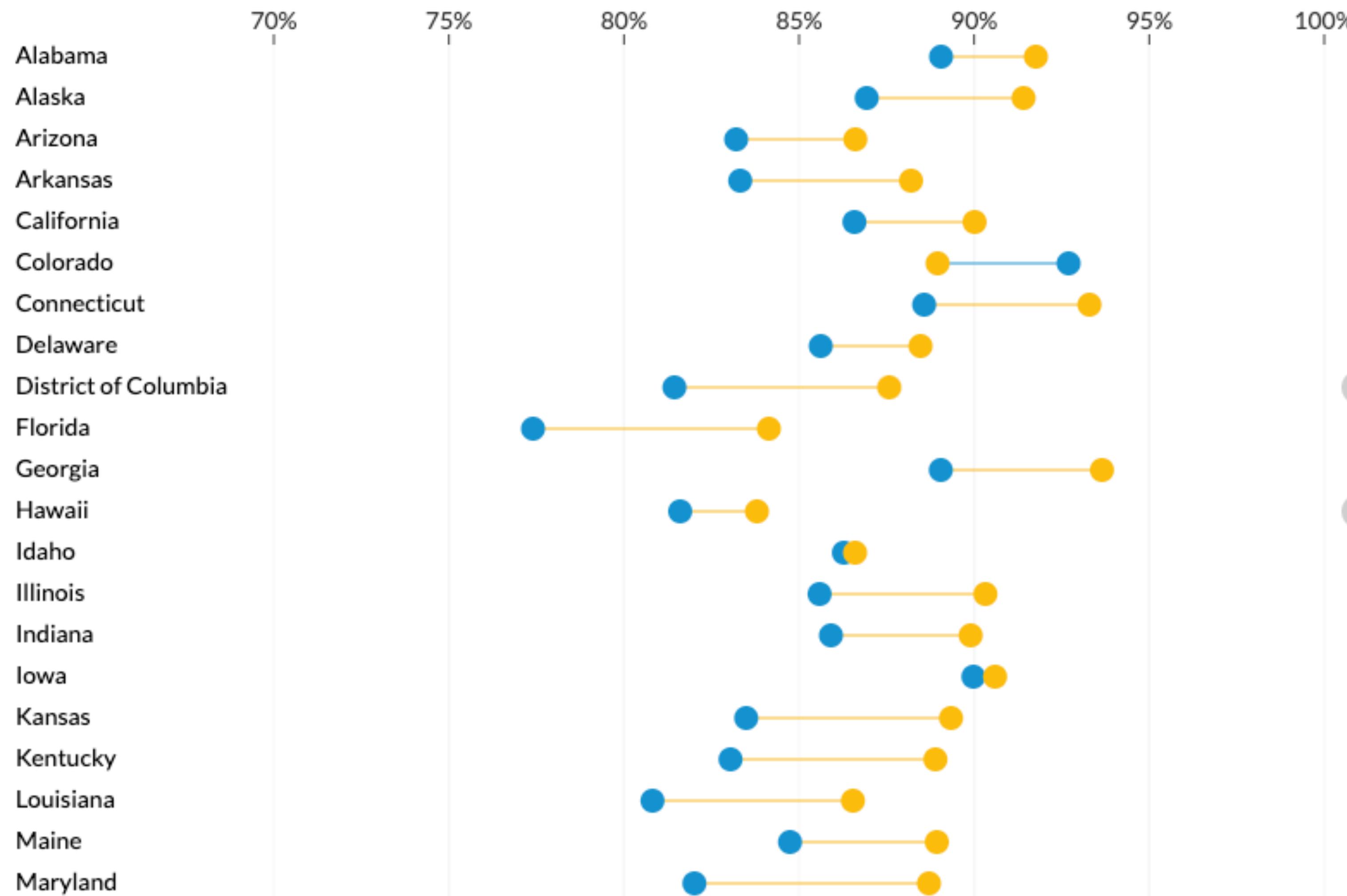
Average share of teachers with more than two years
of experience

EXPAND SCALE

ON

SORT BY GAP

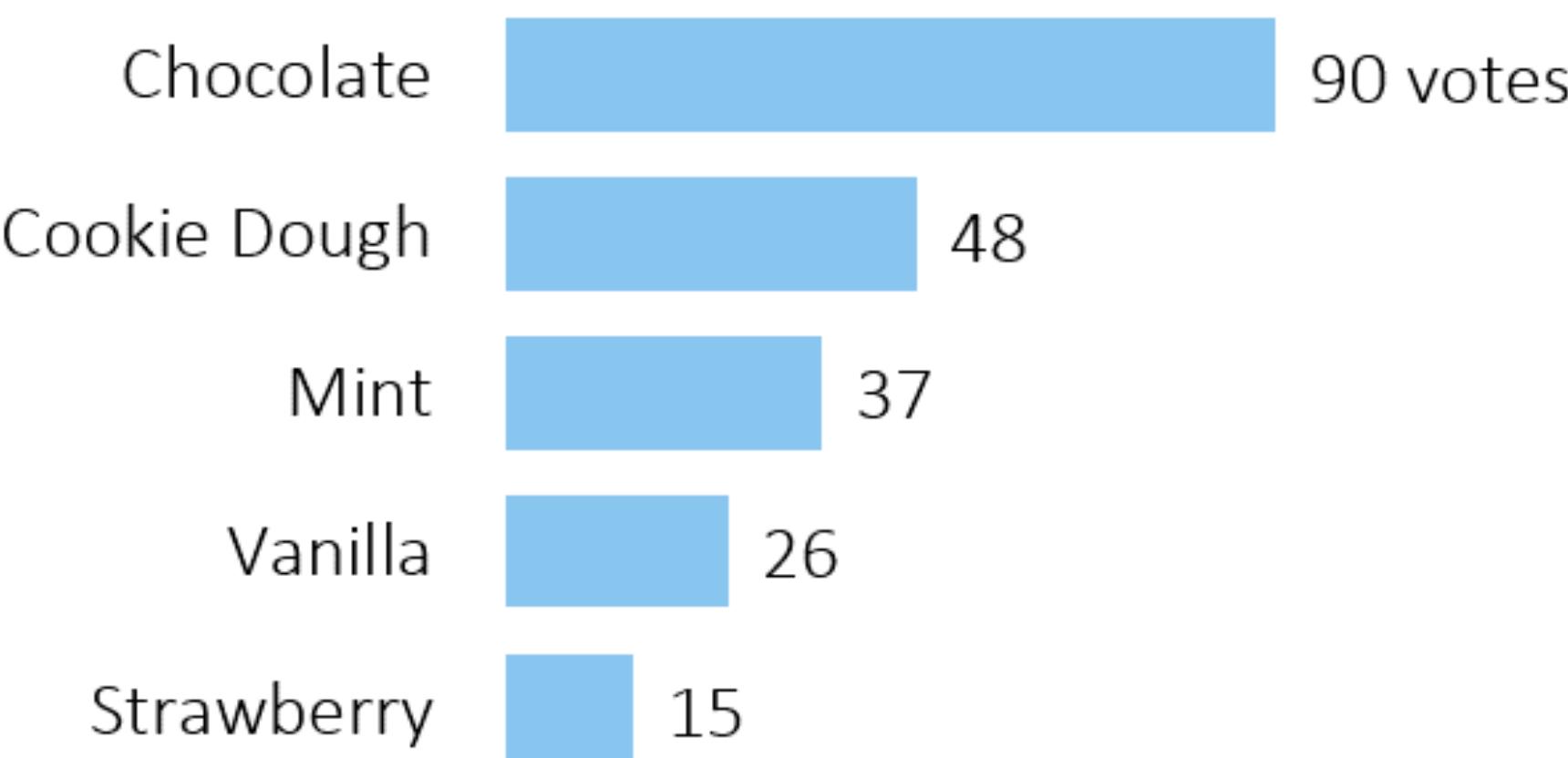
OFF



Mensaje

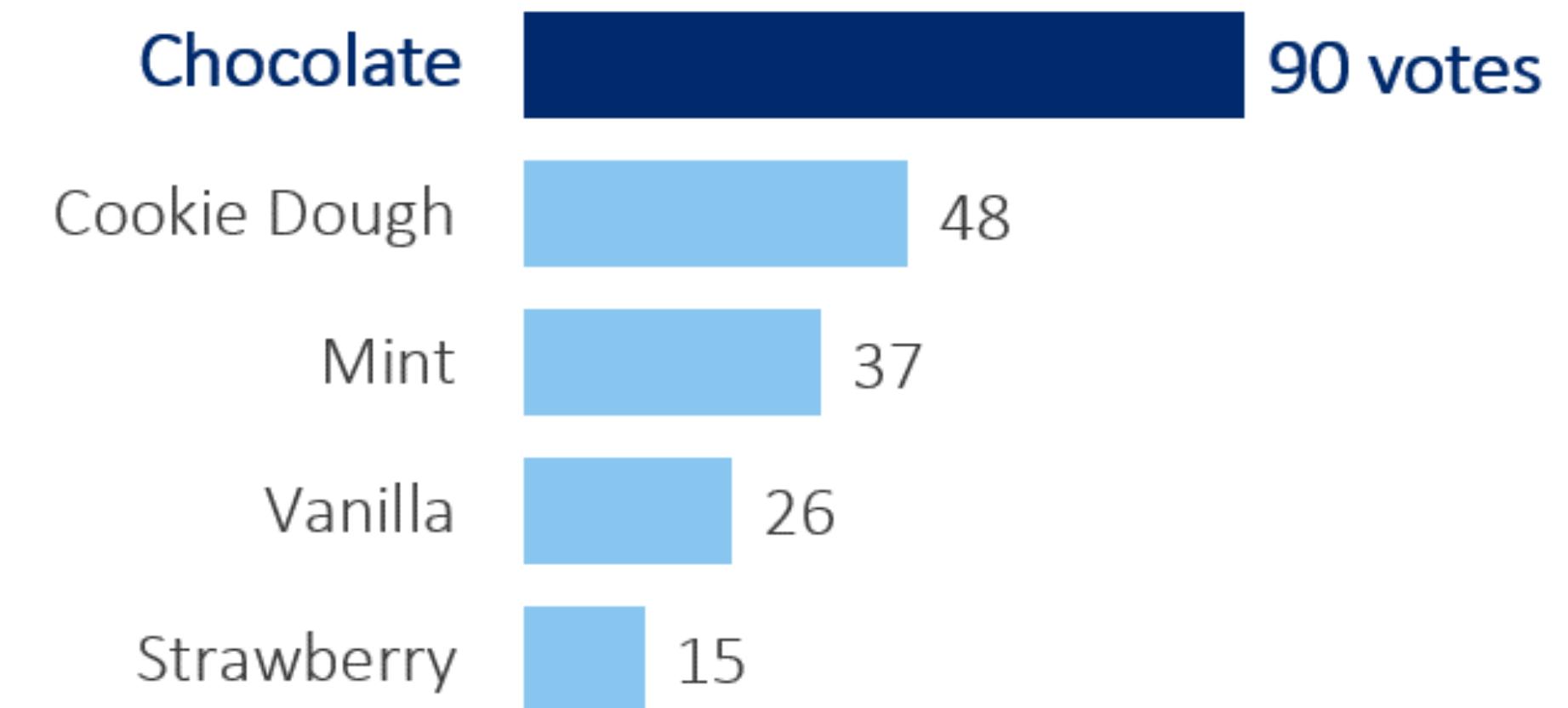
Título descriptivo y saturación

Ice cream flavor preferences based on 2014 survey of elementary school students (n=216)



or

Chocolate was most popular flavor
among elementary students surveyed



Source: 2014 survey of elementary school students (n=216)

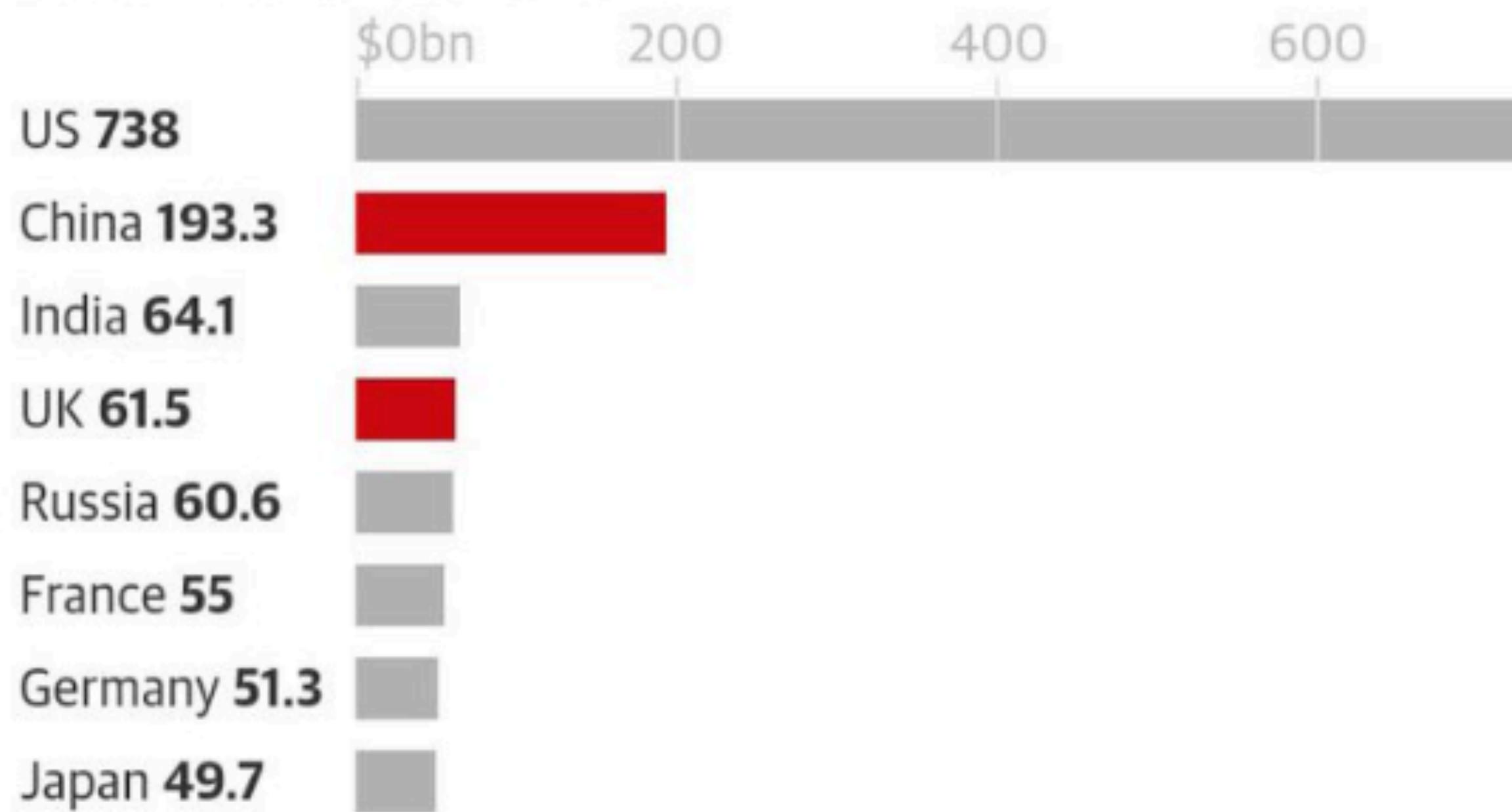


Mac
@GoodPoliticGuy

...

yea that's the main thing I noticed too

China's defence budget in 2020 was three times that of the UK



Guardian graphic | Source: IISS, the Military Balance 2021

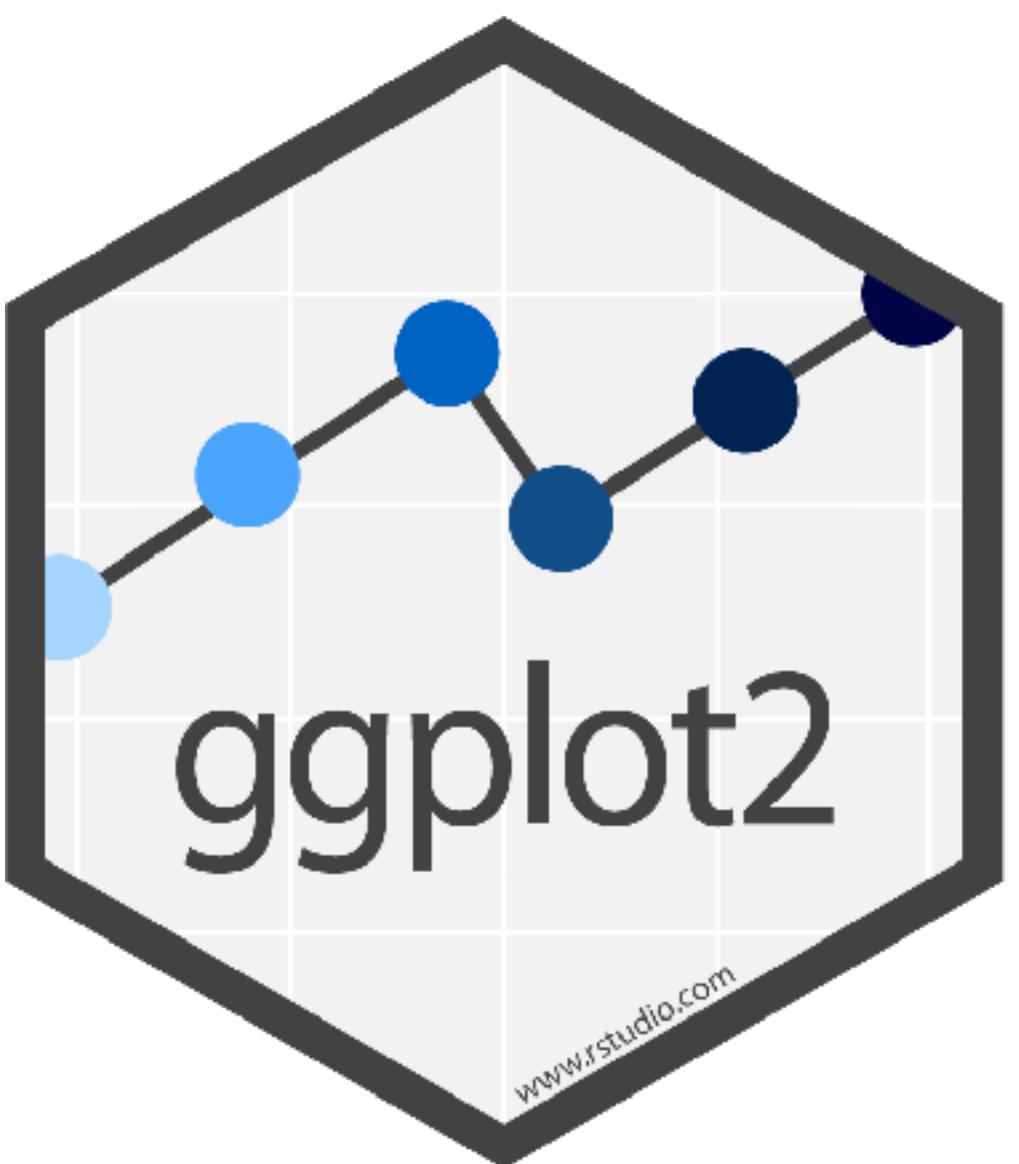
2:53 PM · Sep 20, 2021 · Twitter for iPhone

25.6K Retweets **958** Quote Tweets **254.7K** Likes

Herramientas

Datawrapper

RAWGraphs



Flourish





Power BI

+ tableau



Análisis y procesamiento



Visualización



Dashboard



Visualización en Python