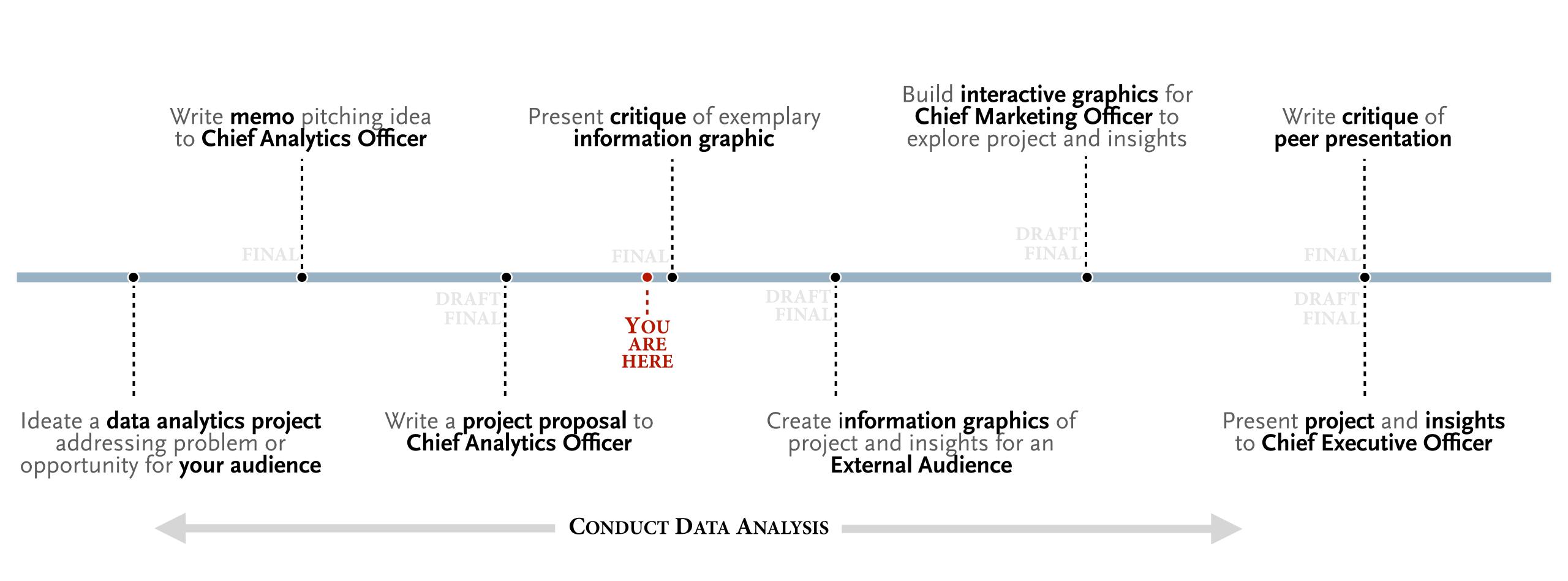
08 | Design mini-review; critiquing data-driven, visual narratives; encoding uncertainty, estimates, forecasts; pacing for attention



Scott Spencer | Columbia University

course overview | main course deliverables





design mini-review

design mini-review aligning	gand organizing information
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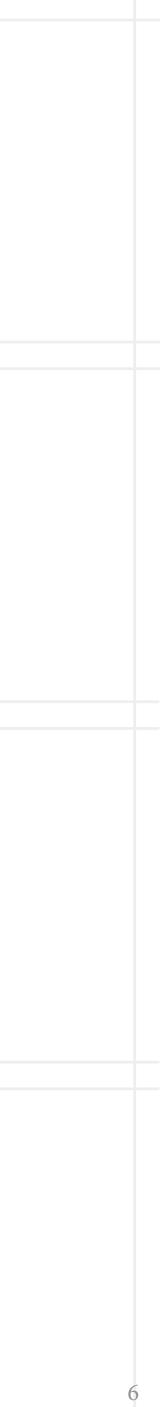
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design mini-review aligning and organizing information reduces cognitive load — <i>proximity</i>	
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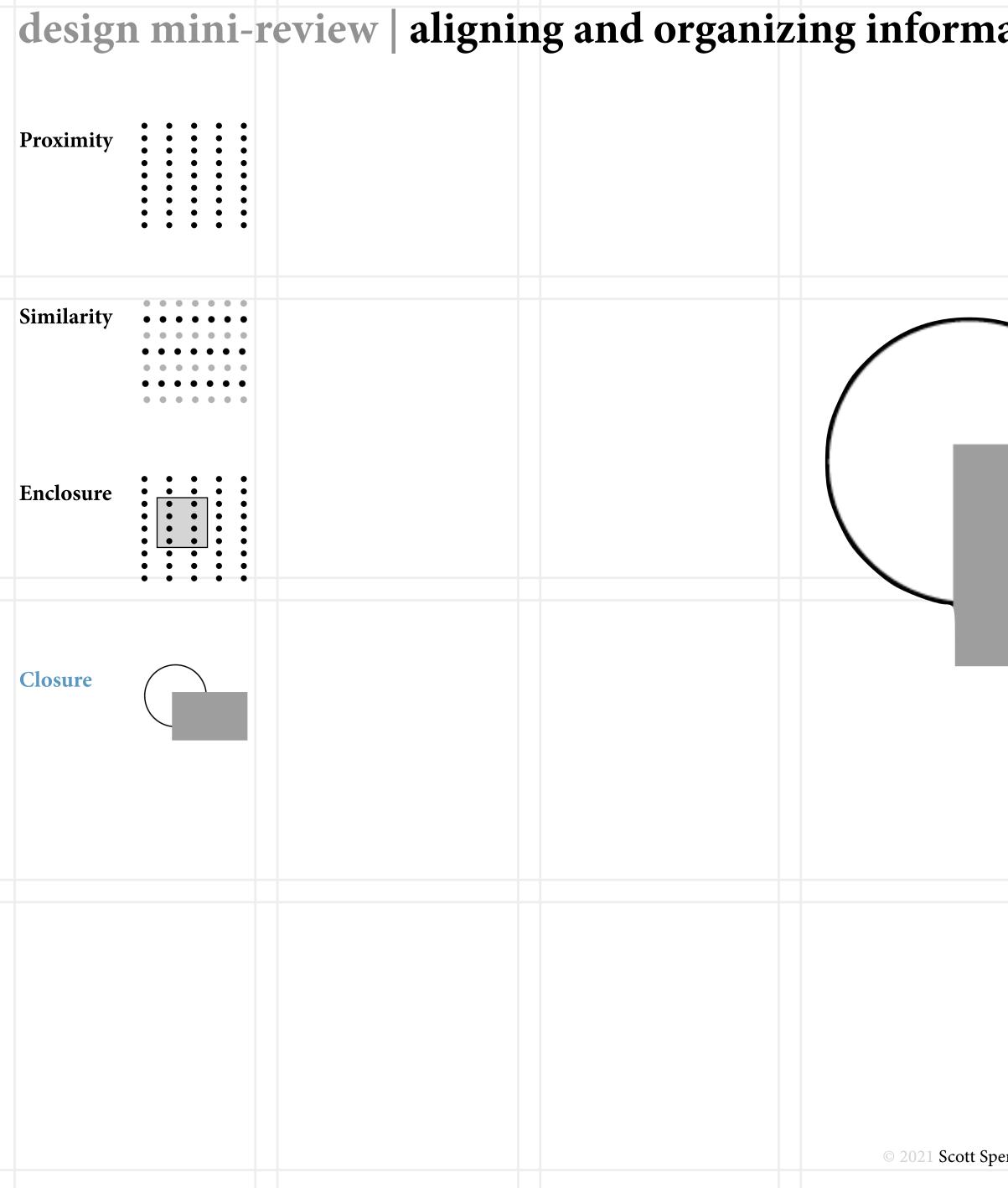
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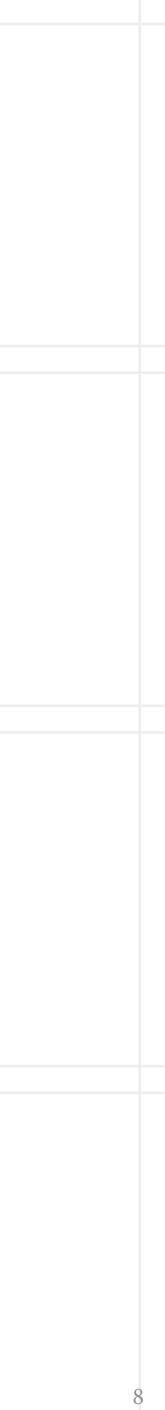


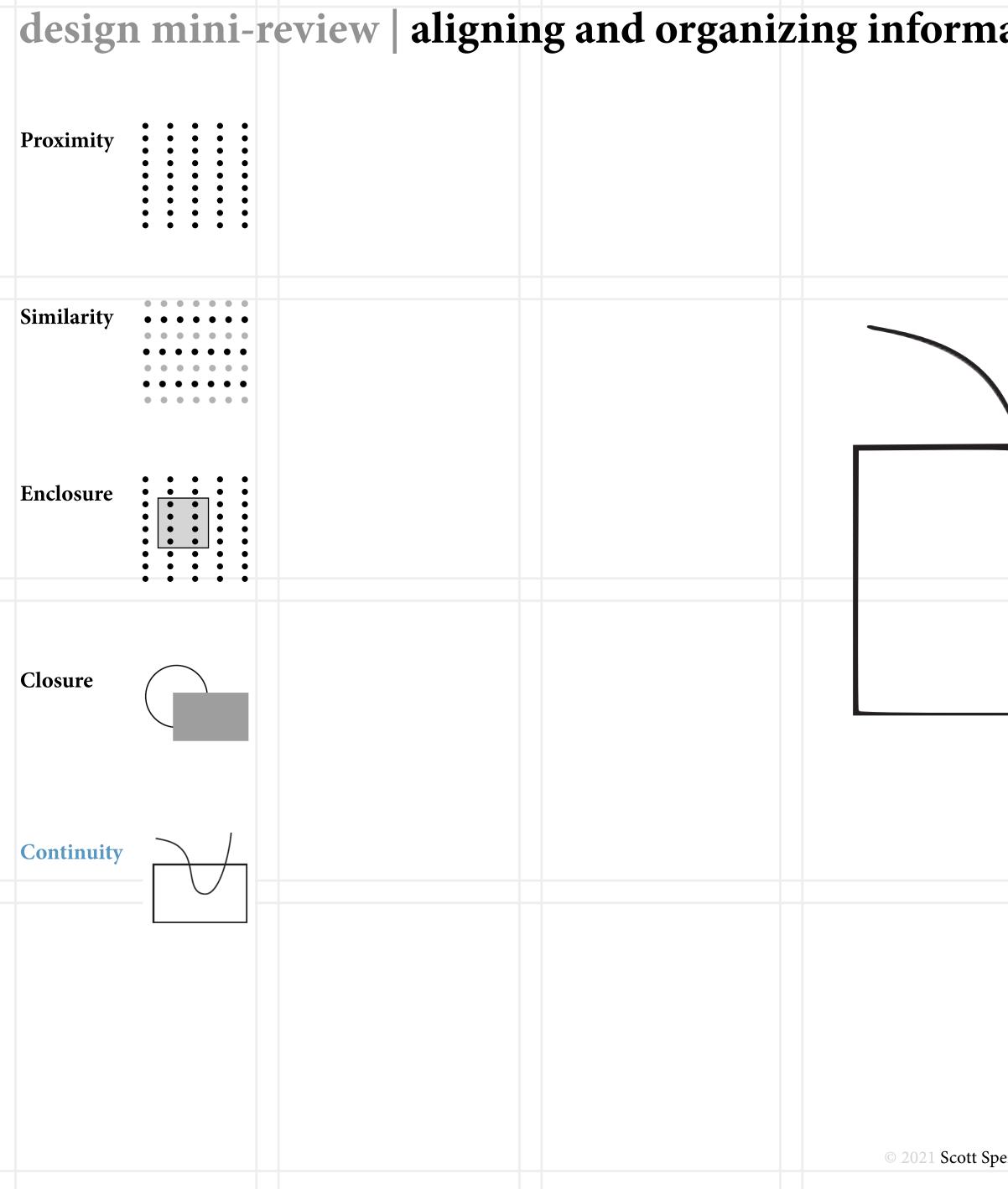
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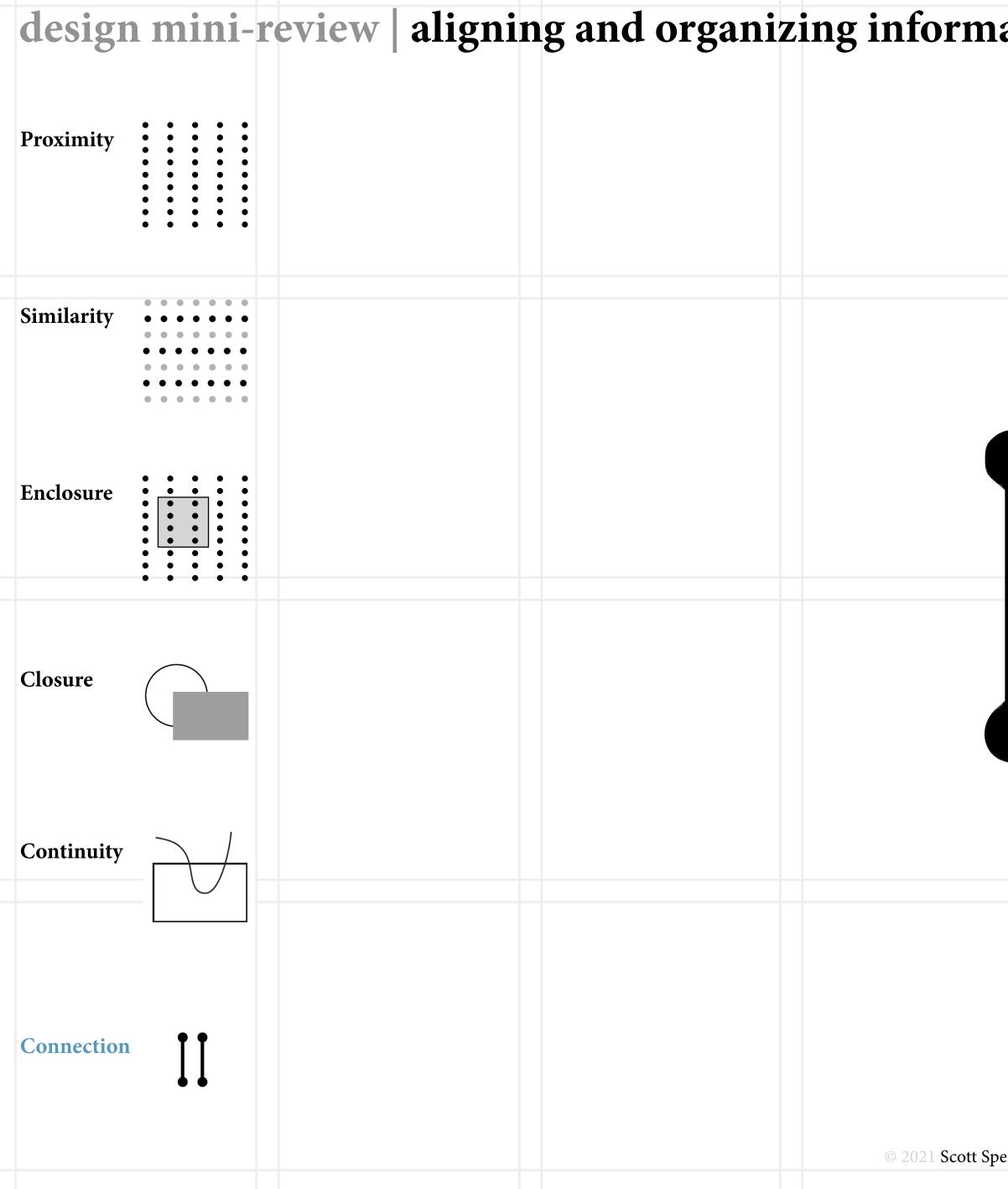
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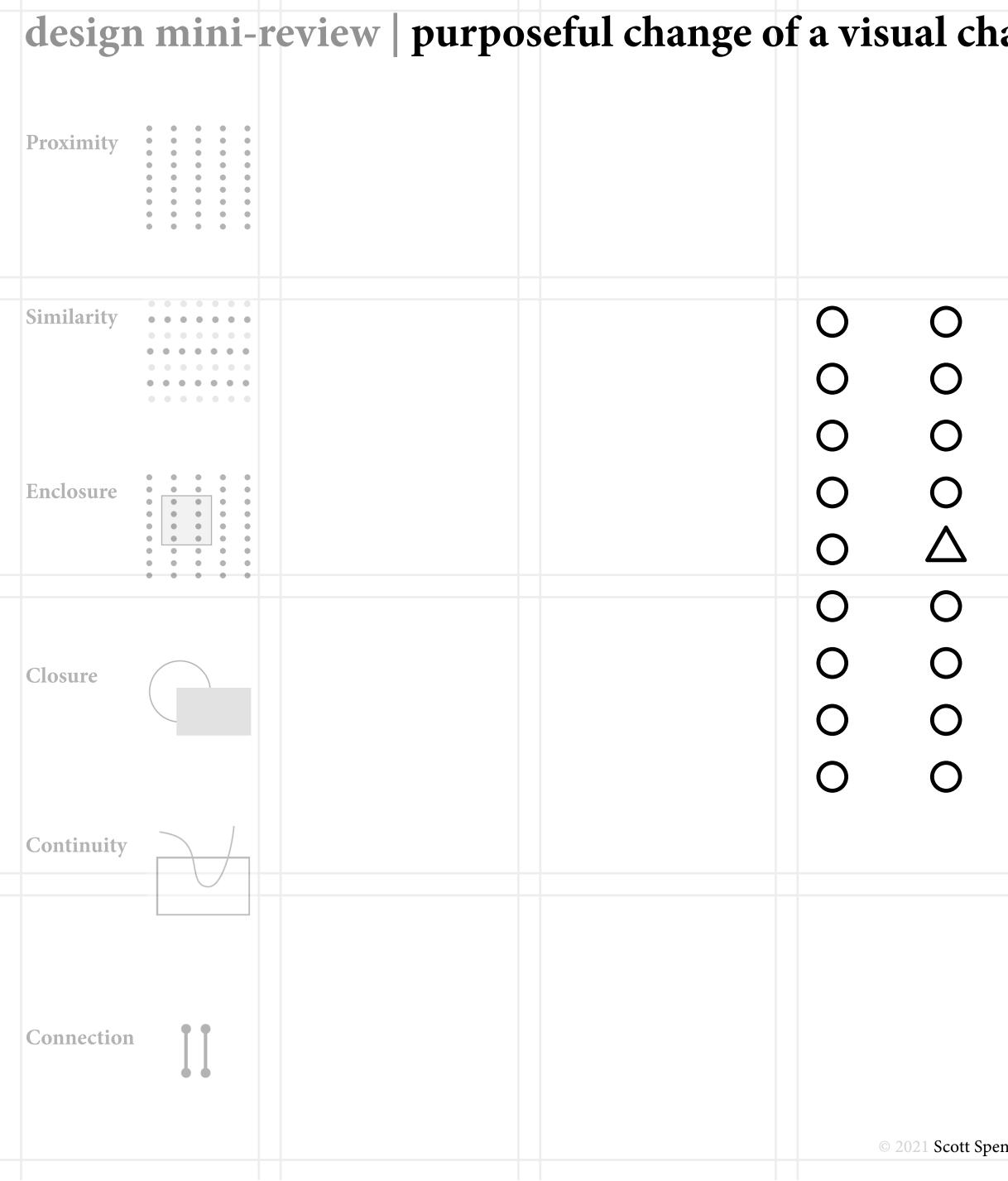


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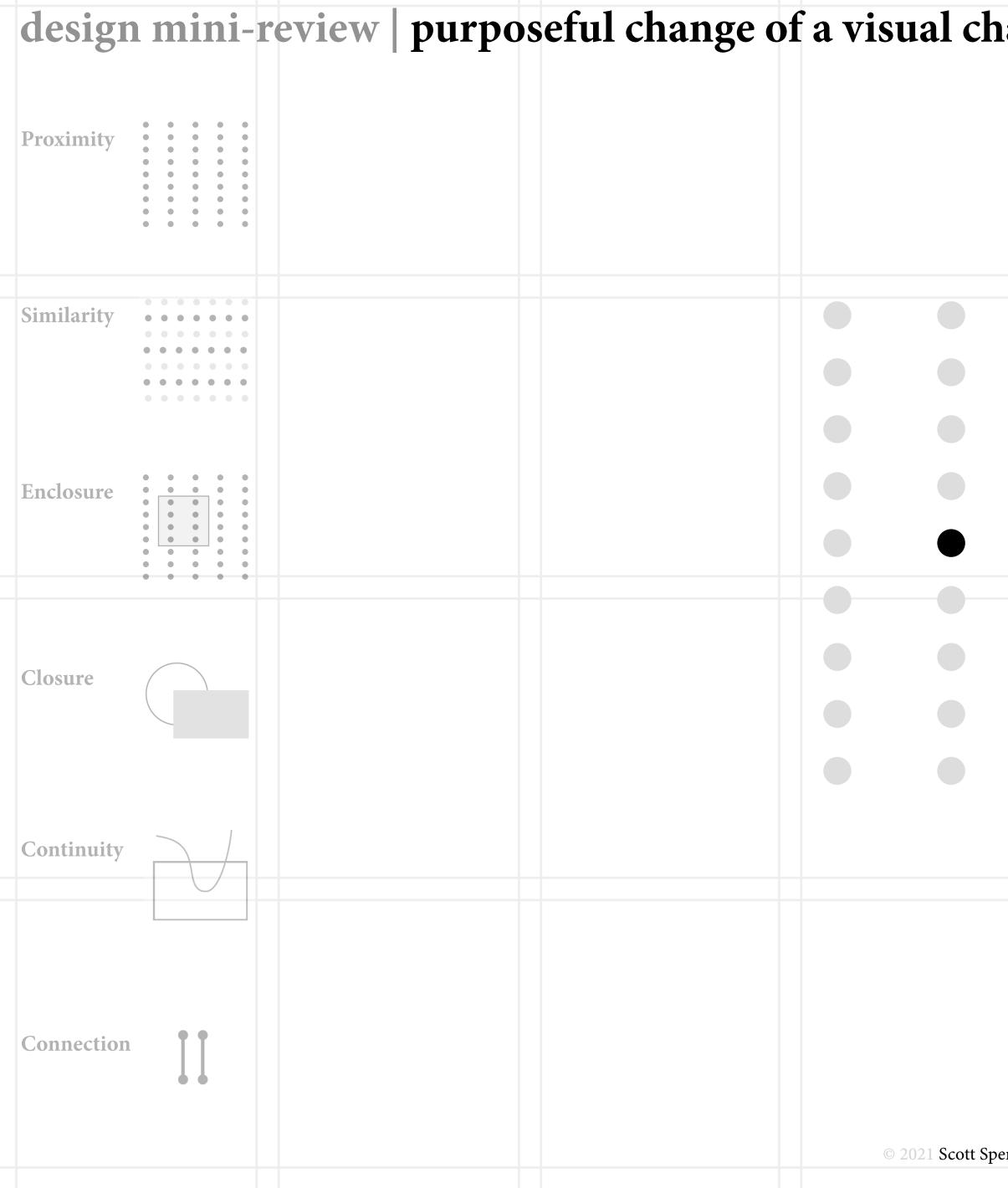
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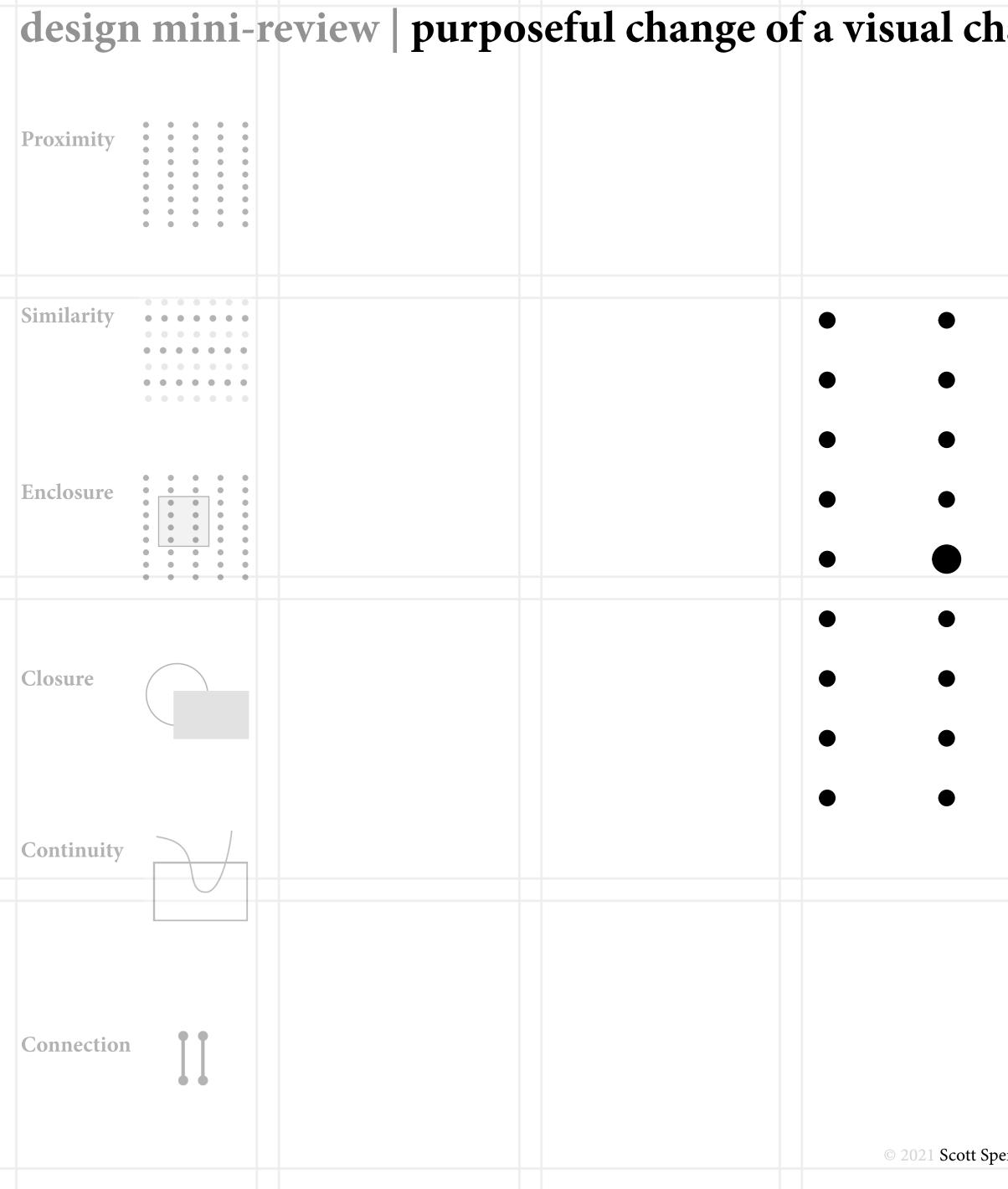
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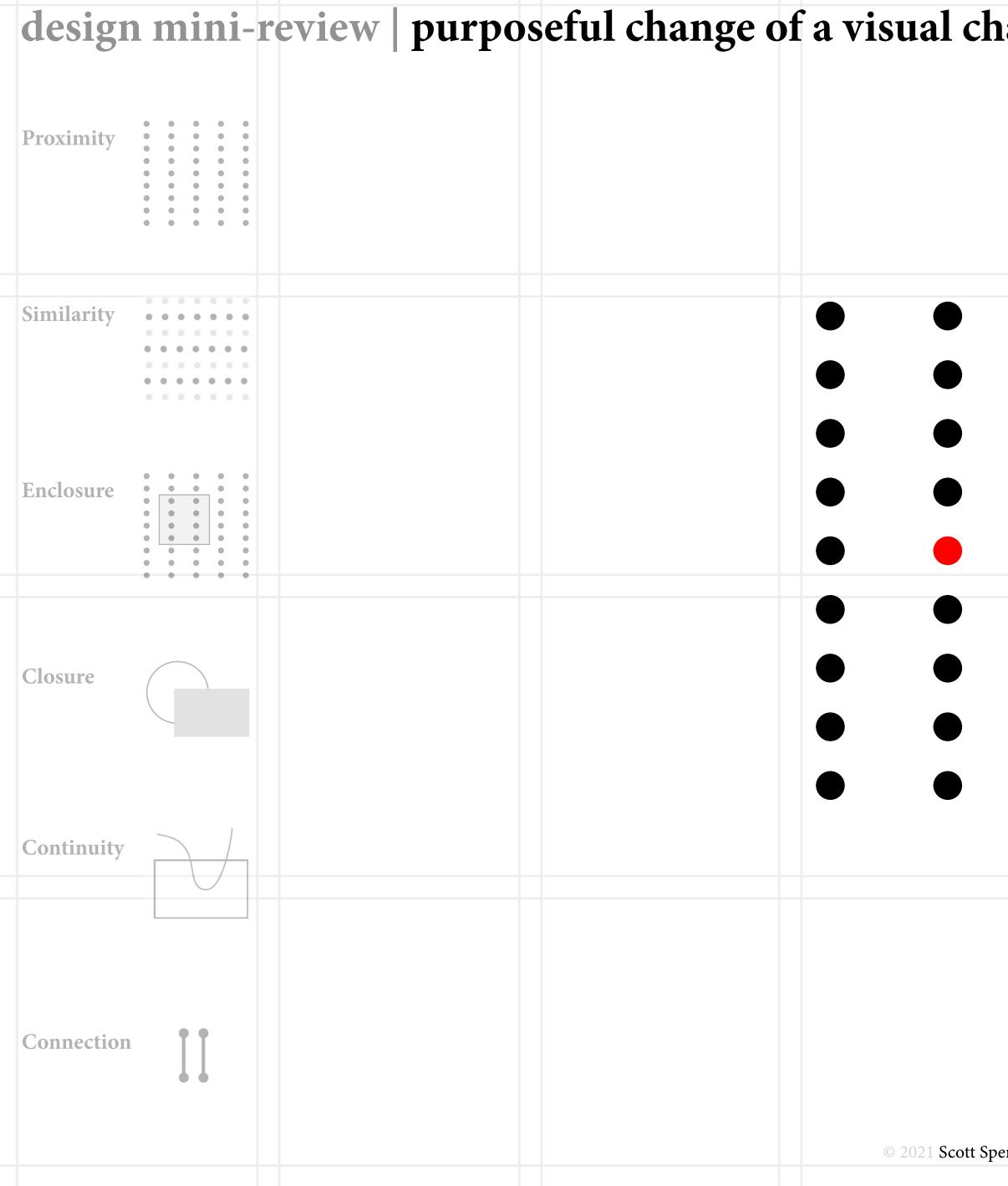
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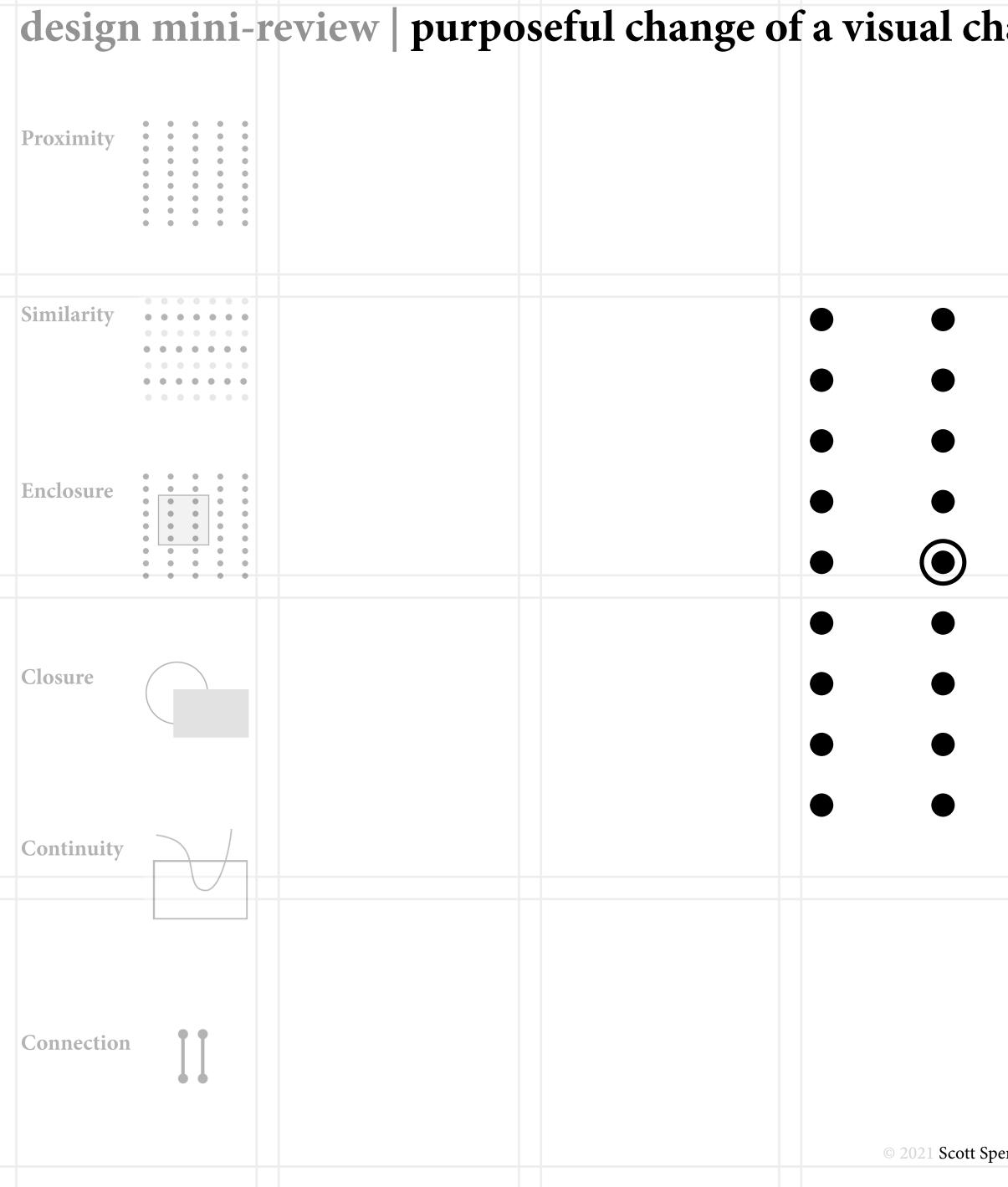
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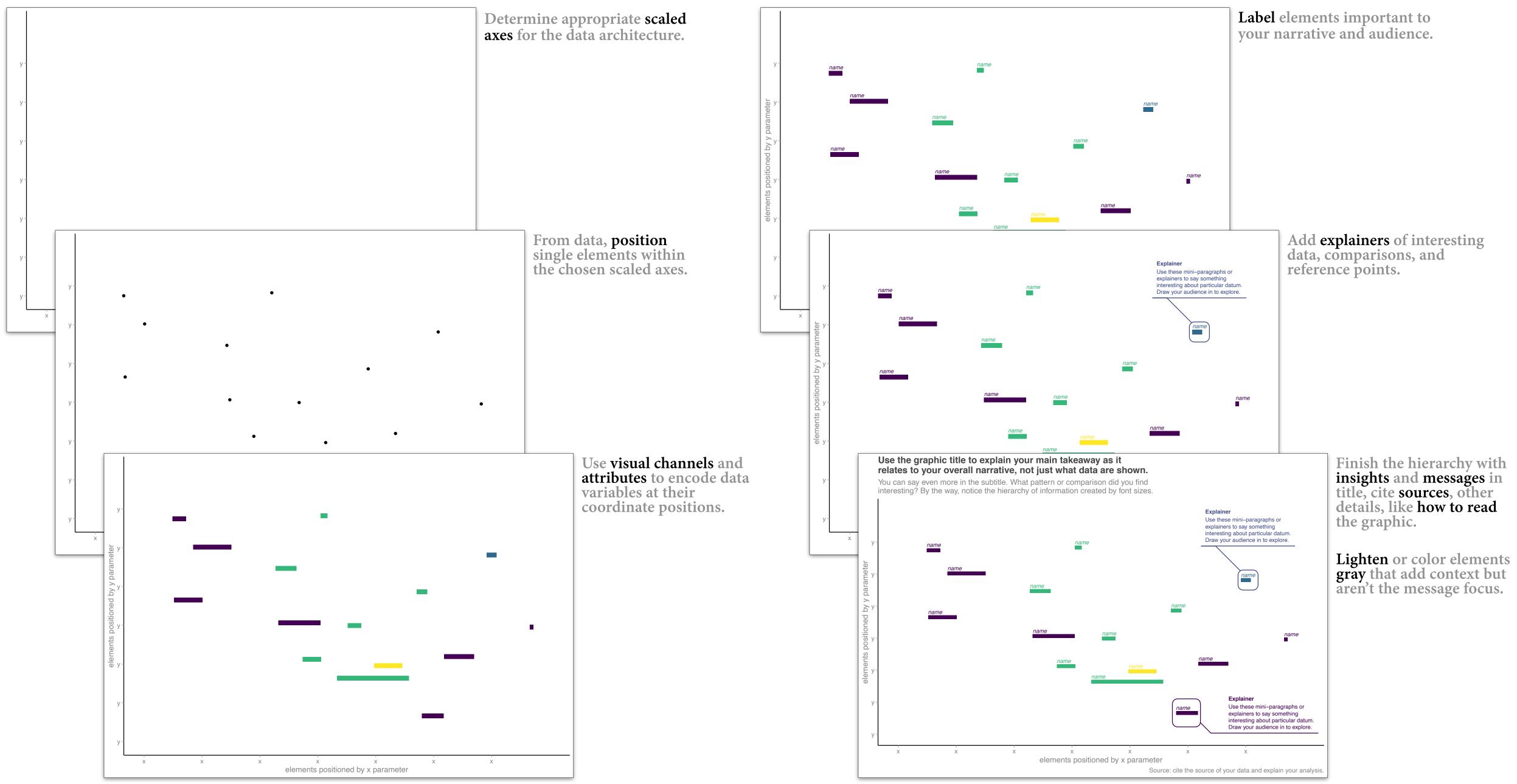




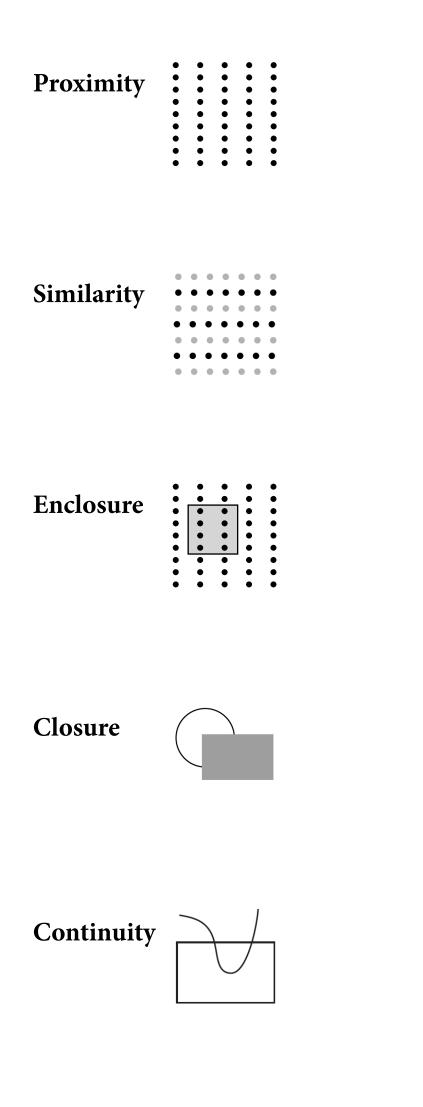
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Orientation	
Shape	
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Enclosure 1	7

design mini-review | layer the graphic, encode visual channels, annotate, and make hierarchies clear

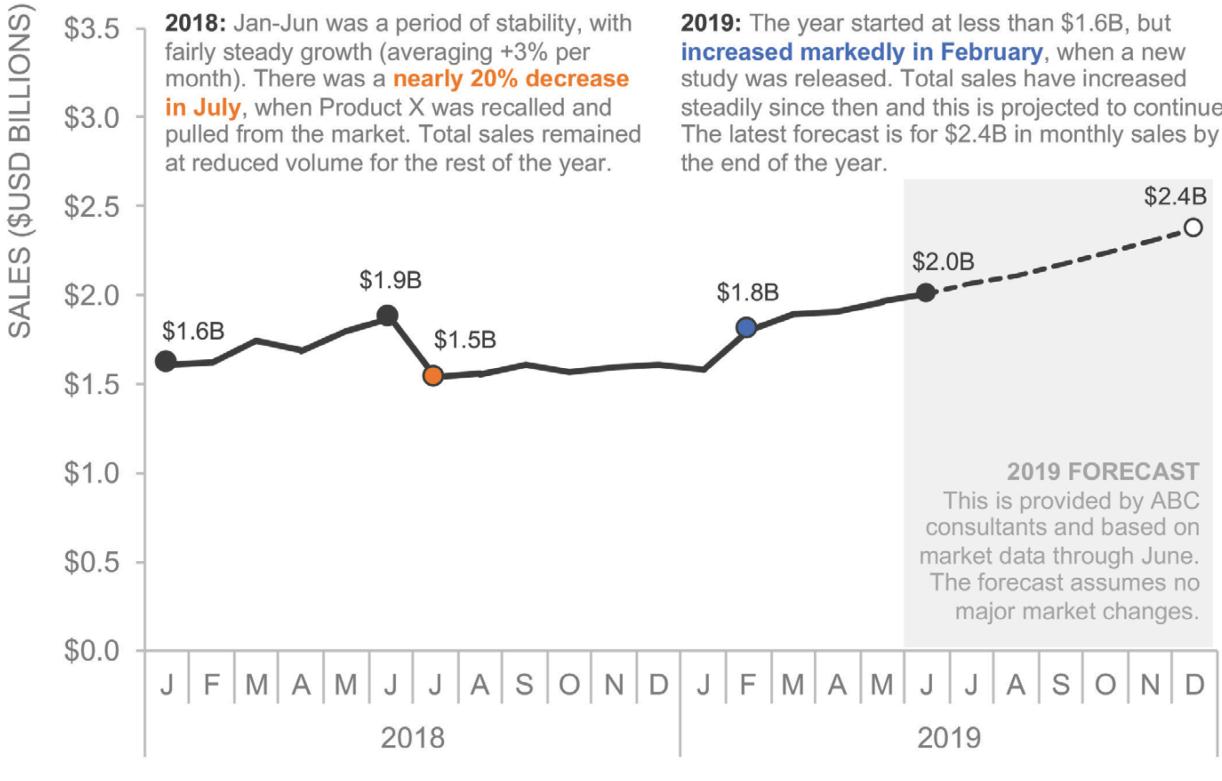


design mini-review what Gestalt principles are used in this data graphic? How is attention focused?



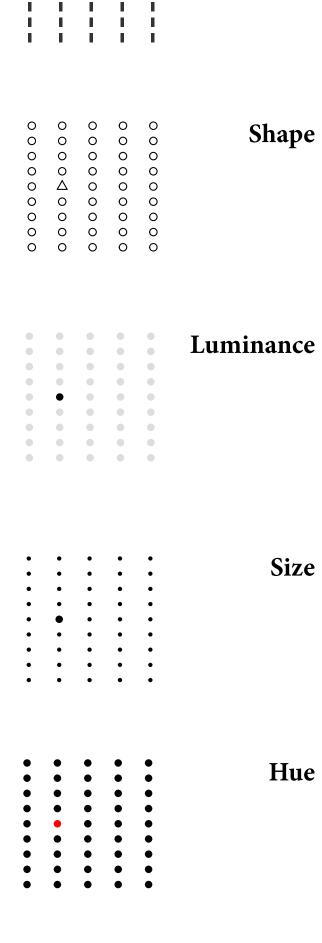
Connection

Market size over time



Example from: Knaflic, Cole Nussbaumer. *Storytelling with Data*: Let's Practice! Hoboken, New Jersey: John Wiley & Sons, Inc, 2019.

steadily since then and this is projected to continue. The latest forecast is for \$2.4B in monthly sales by





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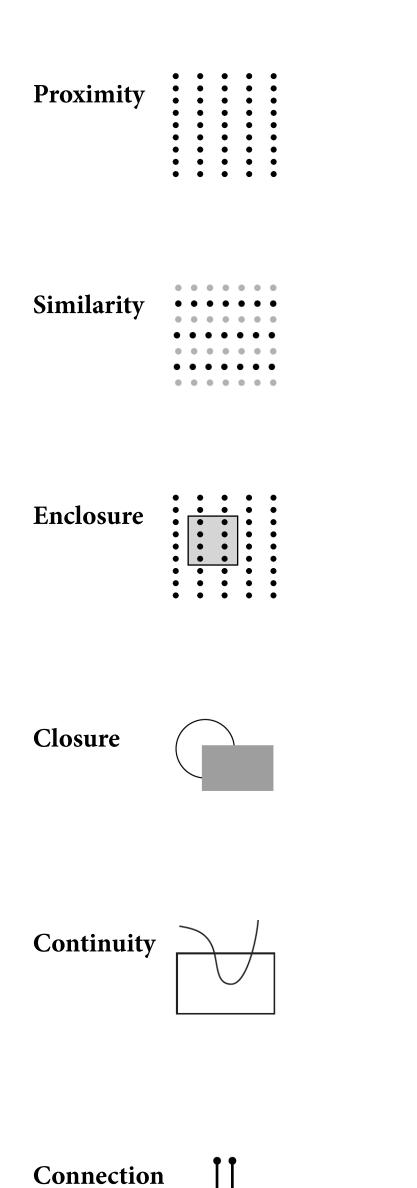


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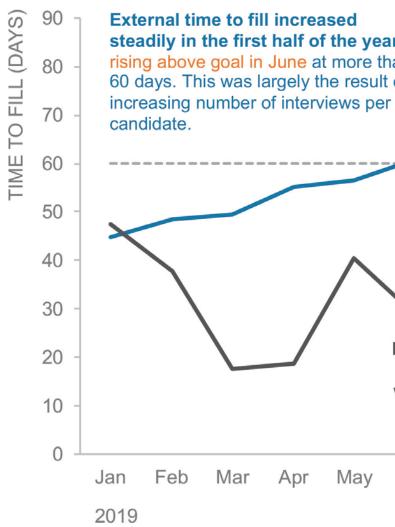
design mini-review | what Gestalt principles are used in this data graphic? How is attention focused?



Time to fill role discussion

Both External and Internal time to fill har factors—number of interviews, vacation constraints—can help us better plan for

Time to fill



LET'S DISCUSS: Should we put stricter How can we keep vacation schedules fro efficiency of internal transfer process in o

Example from: Knaflic, Cole Nussbaumer. Let's Practice! Hoboken, New Jersey: John

						C
n needed: where do we go from here?	ł	I	Ì	I		
ave varied in the past year. Understanding contributing schedules, and current internal transfer volume						
the future.		0 0 0 0 0 0 0 0 0	0 0 0 0 0 0	0 0 0 0 0 0	0 0 0 0 0 0	
External time to fill varied markedly in the second half of the year, above goal in Sep & Nov. Months with lower time to fill had fewer number of interviews per candidate, while longer of time to fill months had more interviews. Interviewer vacation schedules likely also Played a part.	0 0	00	00	0	0	
GOAL		•	•	•	•]
Internal External	•	•	•	•	•	
Internal time to fill consistently beat goal, with general increase in recent months. Months having lower internal time to fill coincide with those having fewer internal candidates placed. Time delays are experienced when there are more internal applicants. Further research is needed to better understand and remedy.	•	•	• • • • • • • •	• • • • • • • •	• • • •	
Jun Jul Aug Sep Oct Nov Dec	·	·	·	•	•	
r guidelines around maximum number of interviews? om impacting time to hire? What can we do to improve order to better handle higher volumes?	• • • • •					
. <i>Storytelling with Data:</i> Wiley & Sons, Inc, 2019.	• • •	• • • • • • • • • • • • • • • • • • • •	• • • • • • • • • • • • • • • • • • • •	• • • • •	• • • • •	



Shape



Size

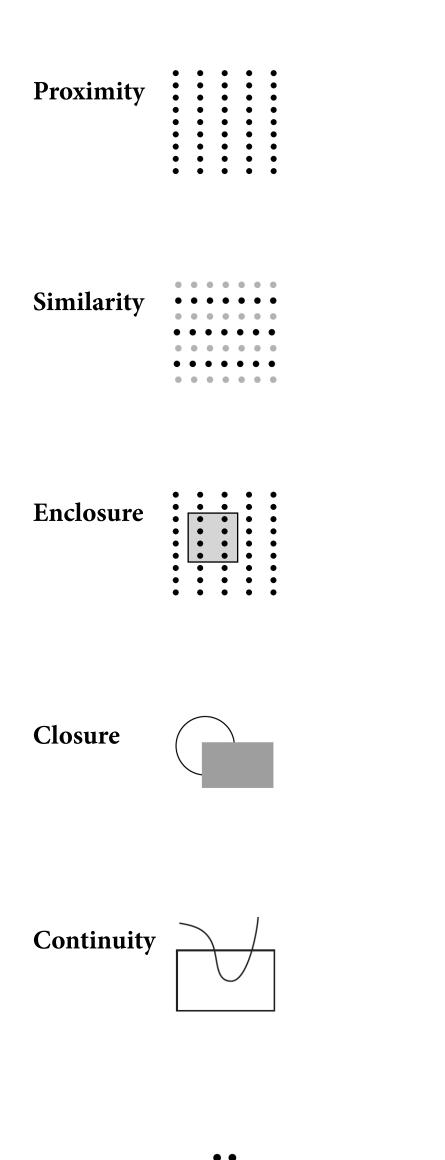
Hue



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design mini-review | what Gestalt principles are used in this data graphic? How is attention focused?



Connection

Action needed: invest in employee training

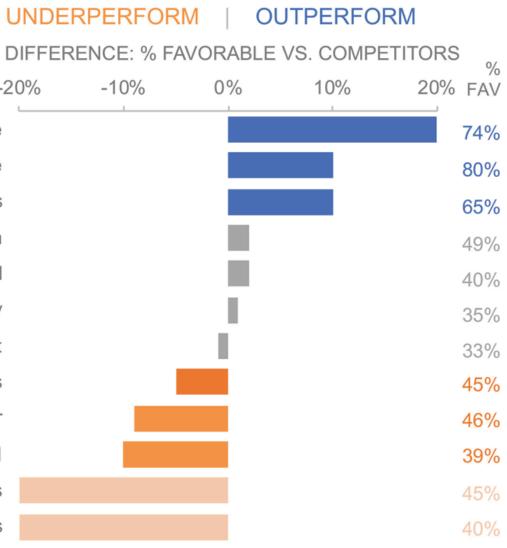
Back-to-school shopping: consumer sentiment

UNDERPERFORM

-20% -10% STORE OFFERS.. Items I can't find elsewhere A nice atmosphere The latest styles A wide selection The store is well-organized Latest technology Fast and easy checkout Friendly and helpful employees I can find what I'm looking for I can find the size I need Good promotions Lowest sales prices

Data Source: 2019 Back-to-School shopping survey (represents 21,862 survey responses). Additional survey and methodology details available upon request. Reach out to Insights Team.

Example from: Knaflic, Cole Nussbaumer. Let's Practice! Hoboken, New Jersey: John



THE GOOD NEWS:

We're beating the competition when it comes to the latest styles that people can't find elsewhere and store atmosphere.

WE CAN IMPROVE:

We score low and lower than the competition in areas related to **helpful employees** and customers being able to find what they are looking for. We also score lower than the competition on promotions/sales, but don't recommend focusing here.

RECOMMENDATION: Invest in employee training to improve customer experience.

Storyte	elling wa	ith D	ata:
<i>Storyte</i> Wiley 8	x Sons,	Inc,	2019.



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Shape



Size

Hue



a framework for critiquing data-driven, visual narratives

criticism for visuals, information graphics — *our* working definition

information graphic : *a data-driven*, *visual narrative*



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criticism for data-driven, visual narratives, visualization criticism is critical thinking about data visualization

Establish the purpose of the critique

When reviewing someone else's document, center yourself on the purpose that was agreed upon, such as clarity, accuracy, or correctness. Should this purpose be multiple, review one aspect at a time, focusing on content first.

Be objective, well-reasoned

Typos are usually more conspicuous than reasoning flaws, but also less important. Each statement should be objective, delivered in neutral language, and backed up by theoretical reasoning or empirical evidence.

Offer alternative solutions

In your comments—help, don't judge. A critique must serve the goal. Simply pointing to problems is not enough. The critic must state an alternative solution in a way that is clear and complete enough to provide a basis for improvement.

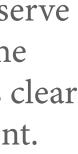
Structure the review

First, provide a **global assessment**, to place further comments in proper perspective. As a rule, point out the weaknesses, to prompt improvements, but also the **strengths**, to increase the authors' willingness to revise the document and to learn.

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criticism for data-driven visual narratives, using theory and experiment, identify issues and suggest solutions

Does the information graphic seem designed to communicate Audience? with an *identified* or *particular* audience? If so, who?

> Do you see a purpose? If so, is it trying to inform, entertain, or *persuade the audience to act*? Something else? Purpose?

> > Encoding, decoding?

What data are encoded? How? Any issues of perception in decoding? Most important measures encoded with most accurately decoded *visual channels* and their *attributes*?

Comparison or change?

Does the information graphic show *comparisons* or change? Would other context help with meaning?

Narrative?

Color, coherency?

Does it use *messages*, stated first, within a narrative? If so, what structure? An *arc*? With *examples*? *Metaphors*?

Is color used? If so, for what purposes are its hue, chroma, or luminance used? How might other uses help?



Does it layer information as a hierarchy? If so, how does that hierarchy separate information? Are data encodings explained? If so, how?

Layering, | layout?

How is the information organized? Can a grid, negative space, or Gestalt principles — *proximity*, *similarity*, *enclosure*, *closure*, *continuity*, *connection* — help simplify or focus attention?

Credibility, | Are data sources identified, explained? **transparency?** Limitations, issues, exceptions discussed?









criticism for visuals, example — a very basic critique of Scarr's Hazy days.

Audience?	Published in a newspaper. An external, general audience readers of the South China Morning Post.
Purpose?	• To inform or raise awareness through exploration. No e
Data encodings, decodings?	Scarr uses multiple visual channels. A heat map encodes the y-axis, hour is aligned on the x-axis, enabling compa pollution index. Wind direction is encoded alongside ea end. But wind direction continually shifts. And data on experiment with placing an oriented line segment inside
Comparison or change?	Encodings are arranged to allow overall comparisons of points to a few specific, interesting patterns.
Narrative?	No narrative is developed. Perhaps placing this informa pollution in Hong Kong, or in the context of people's liv
Color, coherency?	Only shades of gray encode data, and especially for enco palette also serves as a visual metaphor as we think of po blue skies. Would a blue-to-gray encoding strengthen the
Hierarchy, layering, layout?	Scarr uses typography effectively — especially font sizin hierarchy that guides the audience's eyes through the gra space plus the heat maps direct the audience's view towa the graphic uses negative space, and carefully separates understanding the information. Mini-explainers are par
Credibility, transparency?	Provides explicit citations to the underlying data — Env Kong Observatory — <i>and</i> explains missing data encoding

Scarr, Simon. "Hazy days" South China Morning Post, December 17, 2012, sec. Infographics. https:// multimedia.scmp.com/culture/article/SCMP-printedgraphics-memory/lonelyGraphics/201212A230.html.

Overall assessment: Scarr's information graphic succeeds for its general audience and purpose, which is primarily to allow exploration of the data. Its use of white space is particularly helpful as an example to our own work. The graphic may become stronger with messaging in the title, rather than just description, encoding wind by the hour, and adding narrative from either a historical perspective, or to show its correlation with something about people's lives. Other purposes would need better narrative and a call to action.

ce. Primary audience are the population of

explicit call-to-action of its audience.

es each cell as an hour of the year. Day is aligned on parisons across either. Luminosity represents airach day by orienting a line segment with an arrow each hour likely exists. Perhaps we could le each square as a layer, creating a vector field?

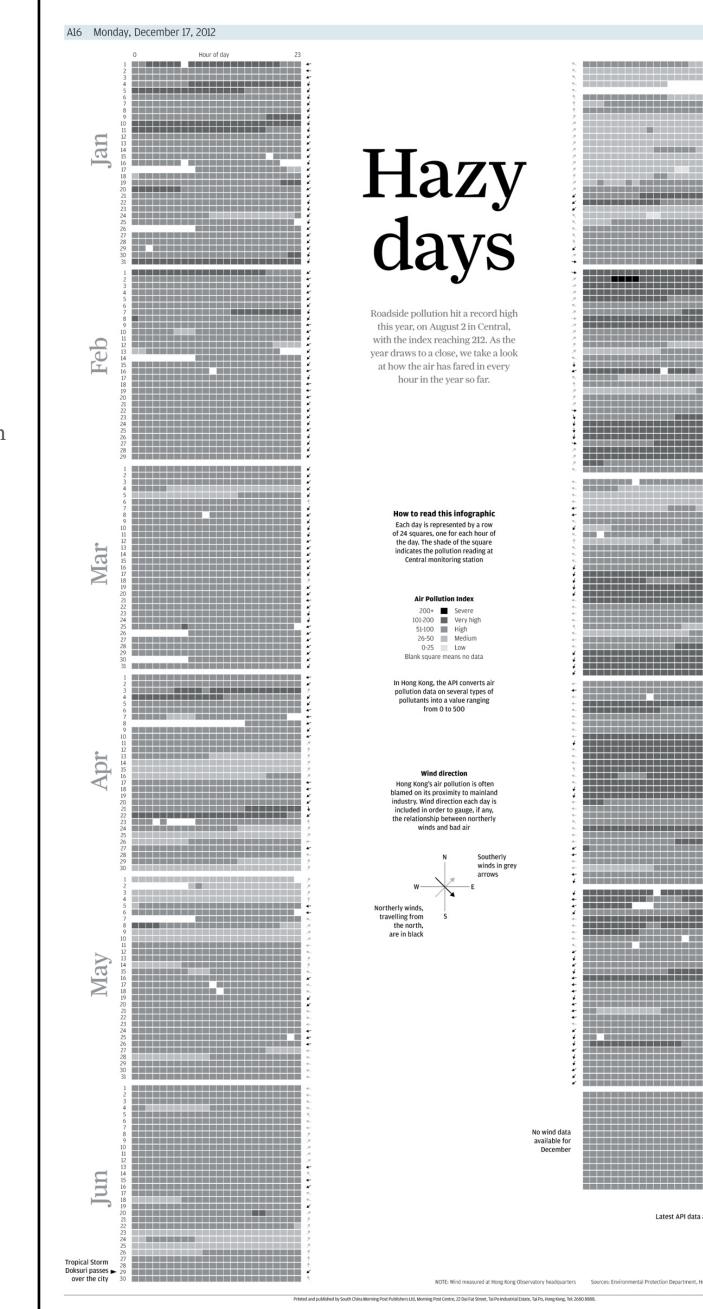
pollution by day or hour, and the graphic

ation graphic into a historical context of ves, would help develop a narrative.

oding pollution on a heat map. Notice the gray collution as physically graying our otherwise he metaphor?

ng, bold, leading, and white space — to create a raphic, starting at the title, *Hazy days*, and negative ards the encoding explanations. Almost half of types of information to reduce cognitive load in ragraph-aligned towards the side it refers to.

vironmental Protection Department, Hong ngs: "no wind data available…"





South China Morning Post		
	Computer 4 d problem causes 5 suspension in 6 data recording	
	9 10 11 12 14 15 16 17 18	
	10 20 21 Severe Typhoon 22 Vicente hits 24 Hong Kong and 25 briefly clears 26 the air 28 29	
	Worst roadside Worst roadside air pollution in 10 years	
	Aug 900112 11213	
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	 Nearby Typhoon Vearby Typhoon Further Typhoon Strong winds which briefly lower the API Nearby Typhoon 	
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	SCMP graphic: Simon Scarr	

Audience?

Purpose?

Data encodings, decodings?

Comparison or change?

Narrative?

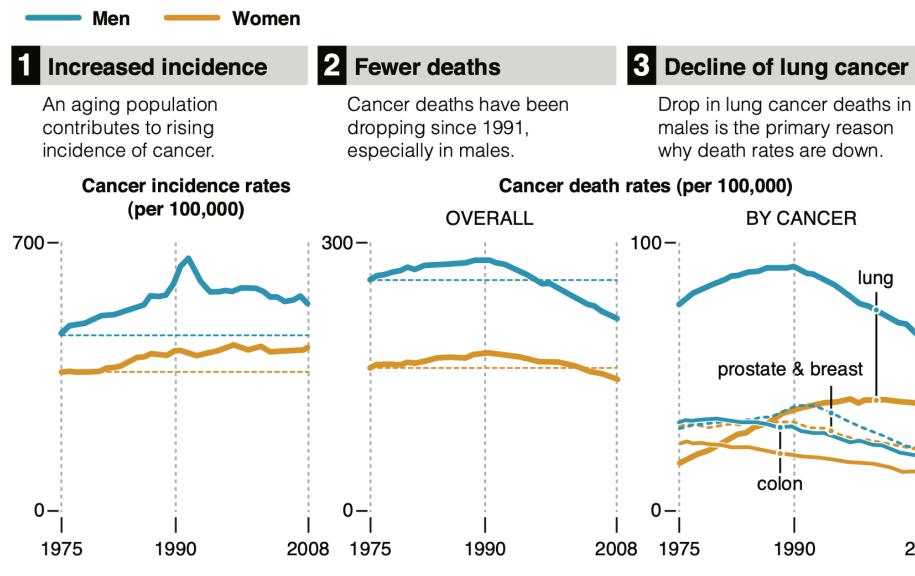
Color, coherency?

Hierarchy, layering, layout?

Credibility, transparency?

WHERE THERE'S SMOKE—THERE'S CANCER

Cancer rates are up, but mortality is down. New diagnostics and treatments are responsible for part of this trend. But the greatest single contributing factor is the decline in smoking-rates are at their lowest level in 50 years.

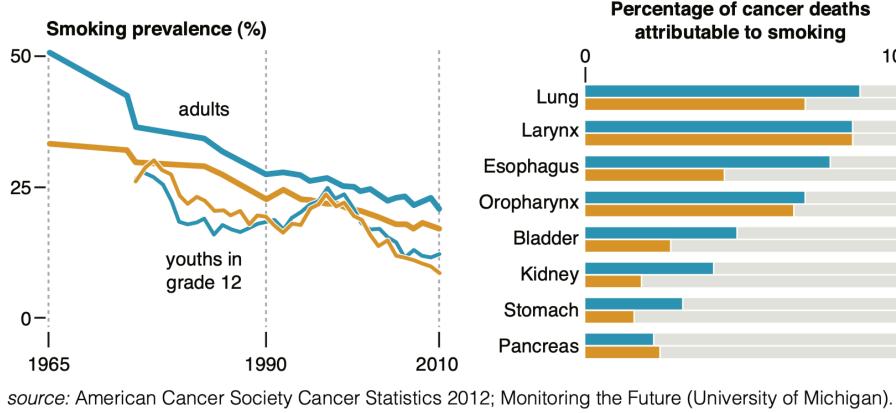


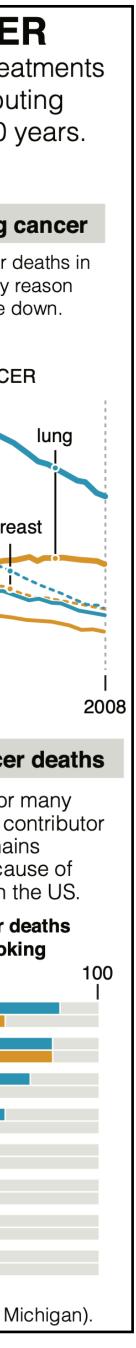
4 Decline in smoking

Since the 1964 first Surgeon General's report, smoking rates have been dropping. By 2010, the rate among males was down to 20%, from 50% at its peak. Among youths, rates have been on an even steeper decline since 1997.



Smoking is a major risk factor for many types of cancer and significant contributor to cancer-related deaths. It remains the single largest preventable cause of disease and premature death in the US.





Krzywinski, Martin, and Alberto Cairo. "Storytelling." Nature Publishing Group 10, no. 8 (August 2013): 687-687.

Audience?

Purpose?

Data encodings, decodings?

Comparison or change?

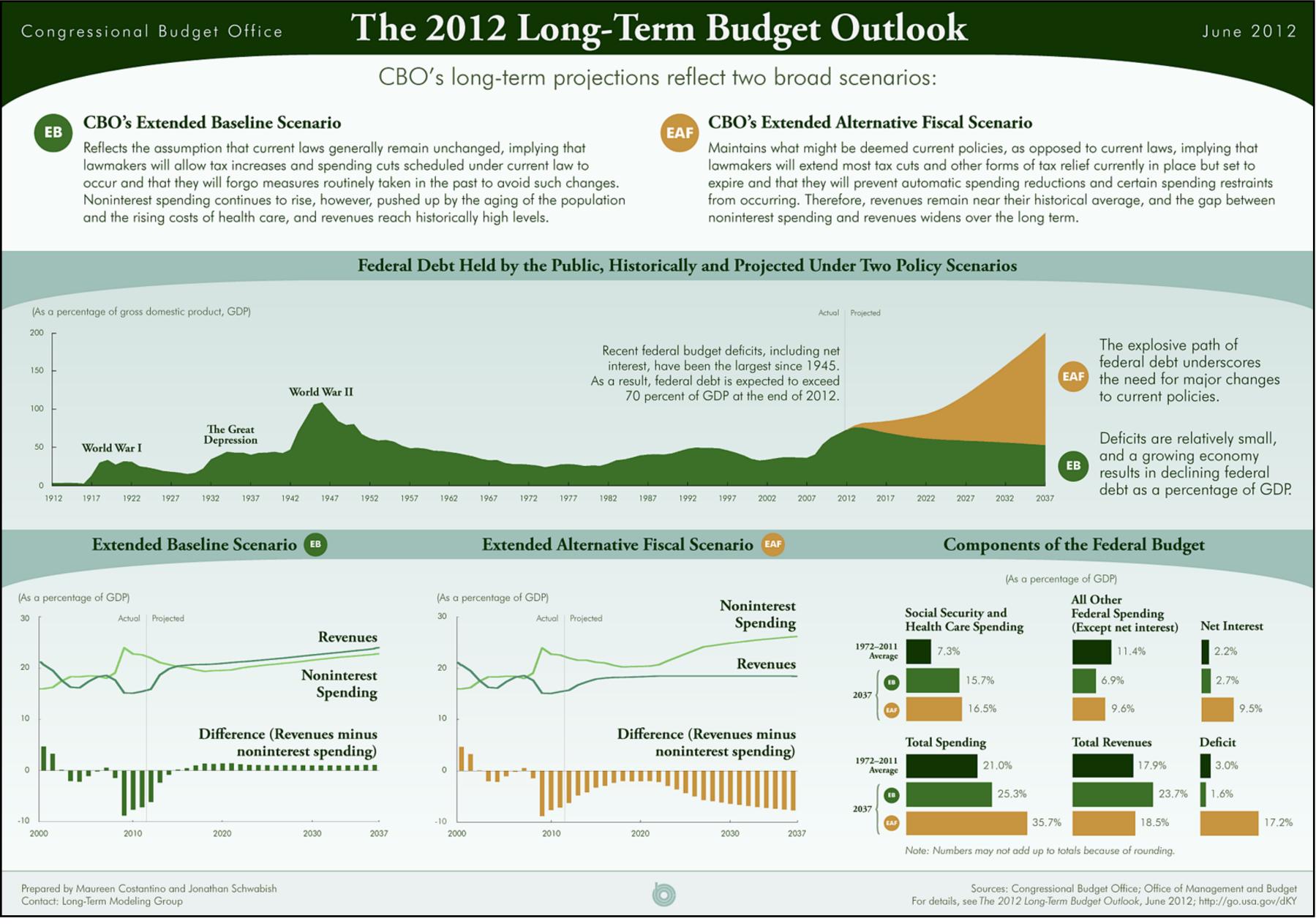
Narrative?

Color, coherency?

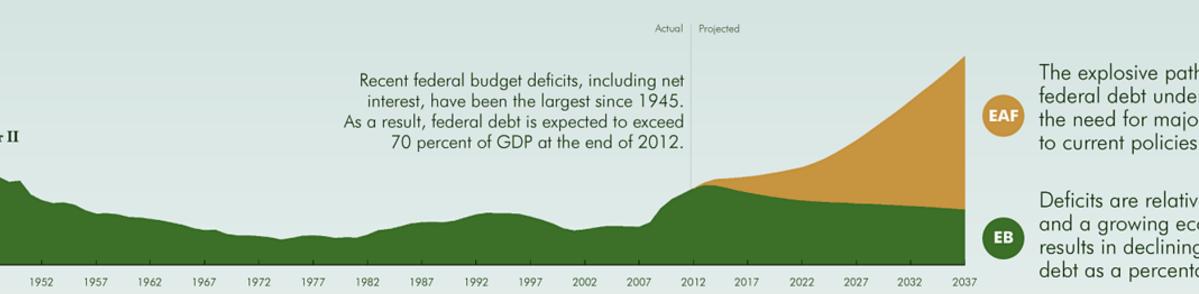
Hierarchy, layering, layout?

Credibility, transparency?

Reflects the assumption that current laws generally remain unchanged, implying that lawmakers will allow tax increases and spending cuts scheduled under current law to occur and that they will forgo measures routinely taken in the past to avoid such changes. Noninterest spending continues to rise, however, pushed up by the aging of the population







Schwabish, Jonathan, Maureen Costantino. "The 2012 Long-Term Budget Outlook: Infographic." Congressional Budget Office, June 5, 2012. <u>https://www.cbo.gov/</u> publication/43289.

Audience?

Purpose?

Data encodings, decodings?

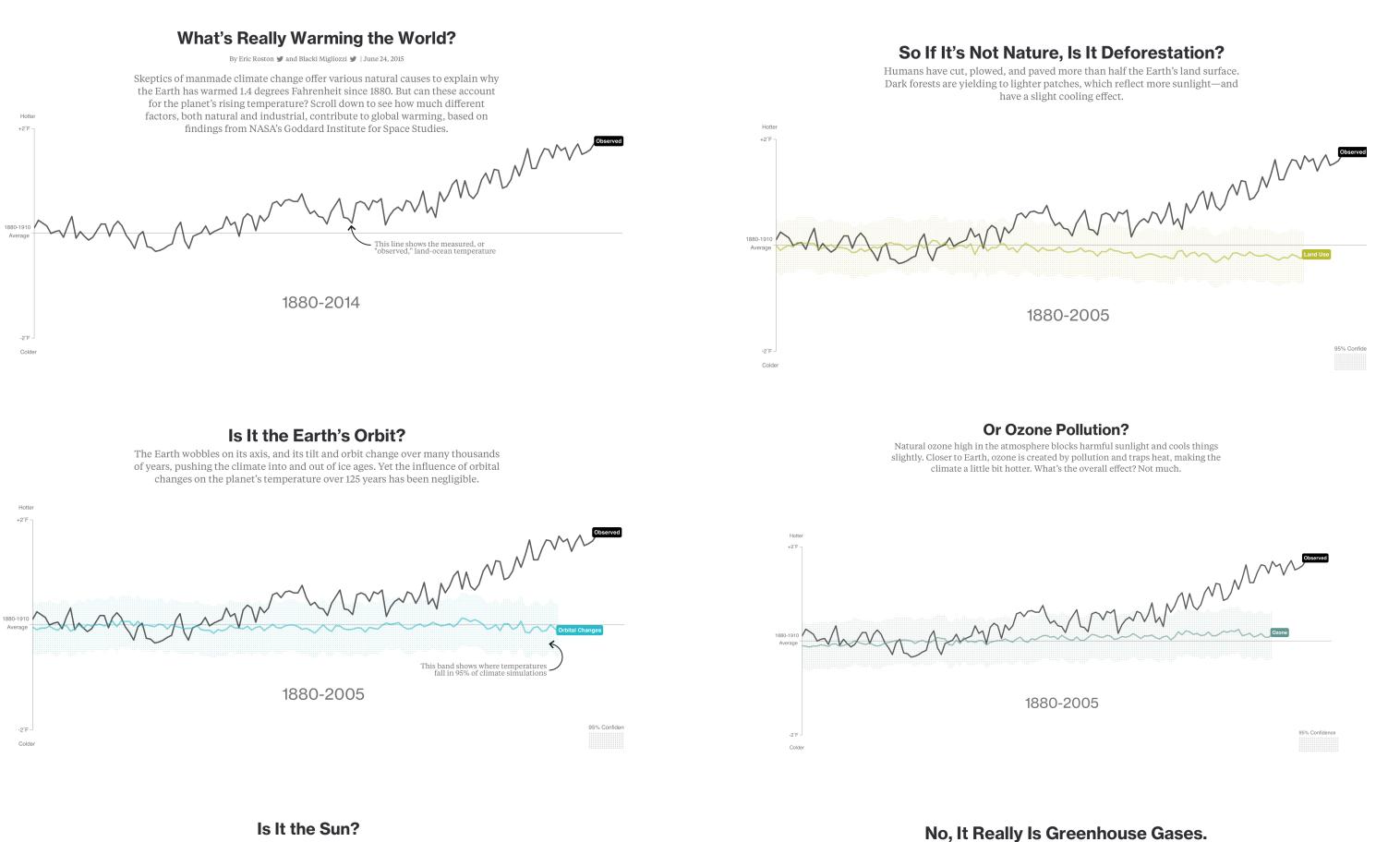
Comparison or change?

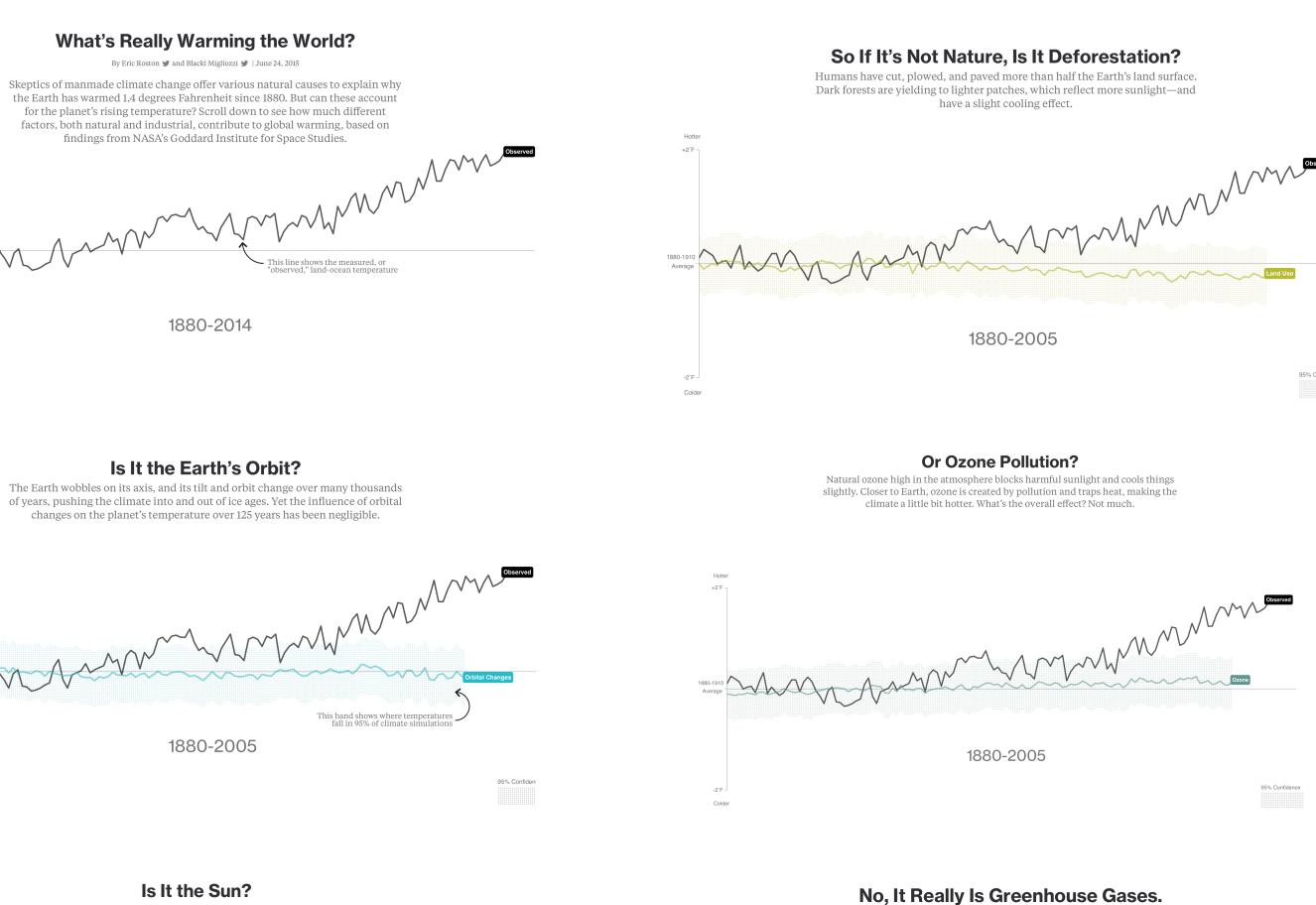
Narrative?

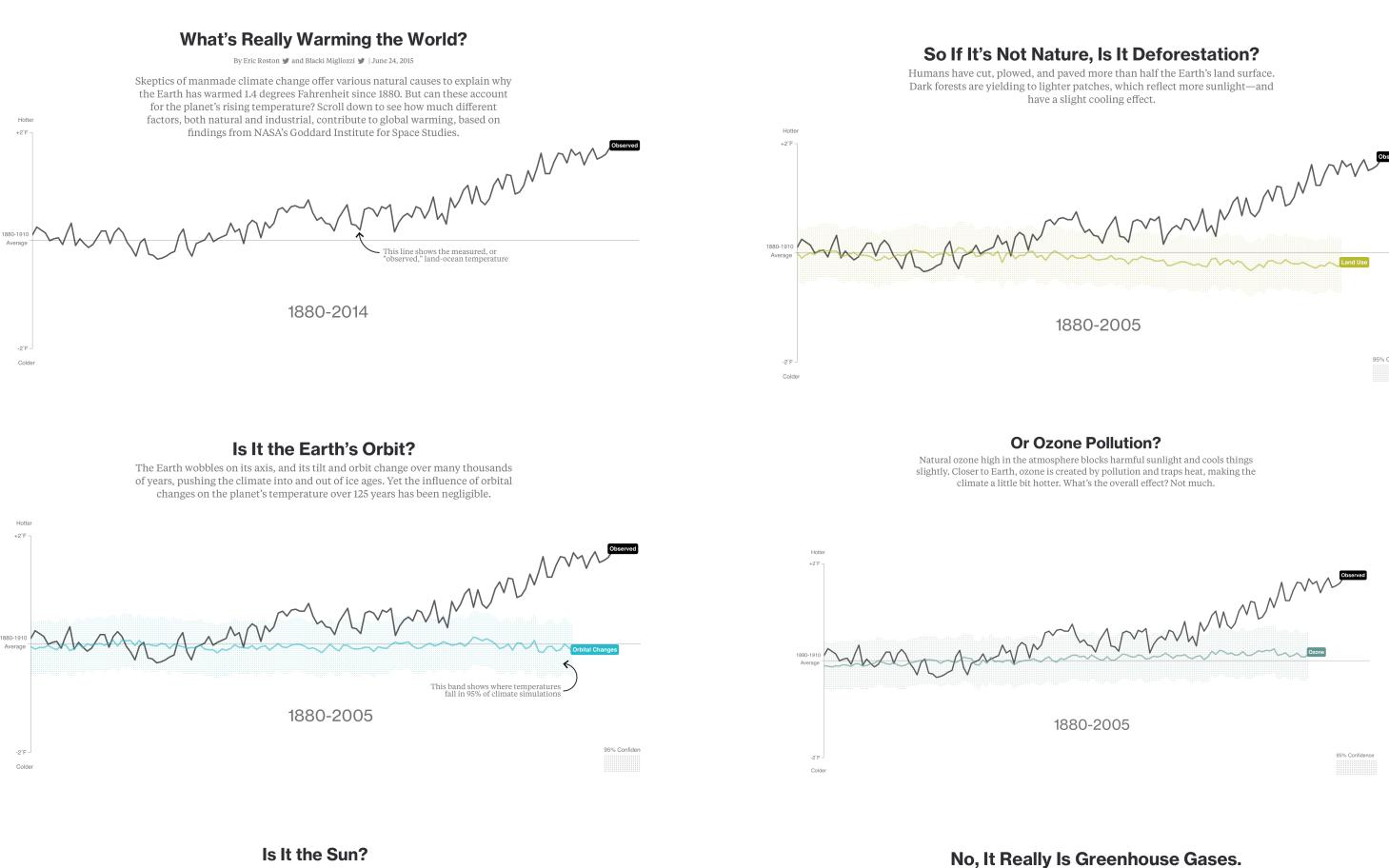
Color, coherency?

Hierarchy, layering, layout?

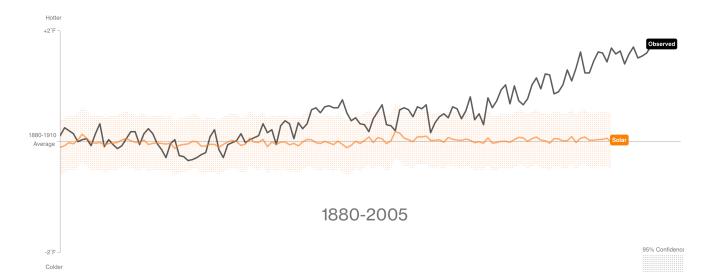
Credibility, transparency?



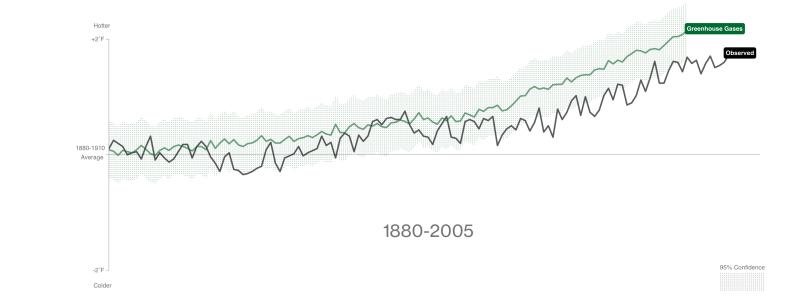








The sun's temperature varies over decades and centuries. These changes have had little effect on the Earth's overall climate.



Atmospheric CO₂ levels are 40 percent higher than they were in 1750. The green

line shows the influence of greenhouse gas emissions. It's no contest.

Roston, Eric, and Blacki Migliozzi. "What's Really Warming the World?" Bloomberg, June 24, 2015, Businessweek edition. <u>https://www.bloomberg.com/</u> graphics/2015-whats-warming-the-world/.

Audience?

Purpose?

Data encodings, decodings?

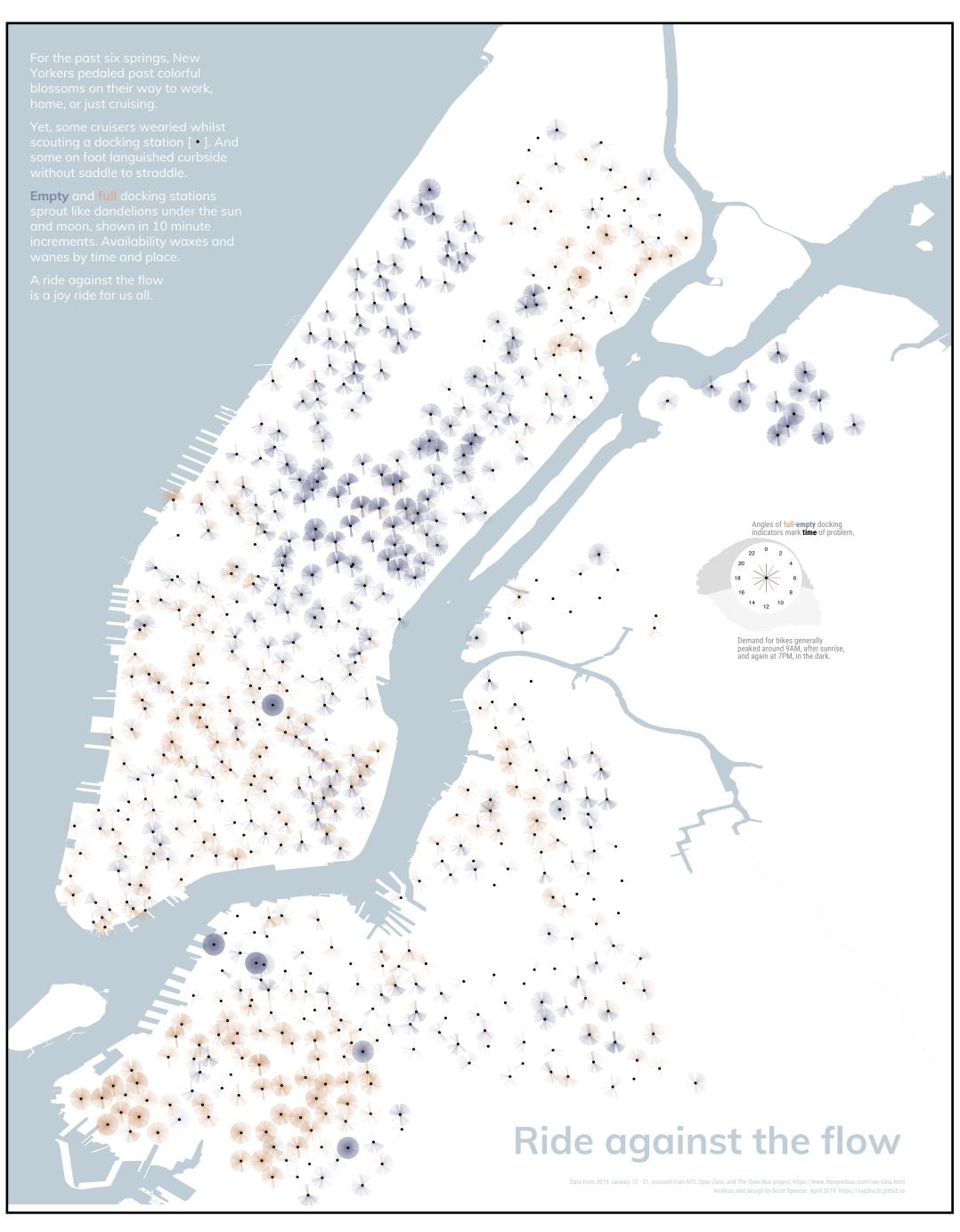
Comparison or change?

Narrative?

Color, coherency?

Hierarchy, layering, layout?

Credibility, transparency?







Spencer, Scott. *Ride Against the Flow*. 2019. Kantar IIB Awards. <u>https://www.informationisbeautifulawards.com/</u> showcase/4367-ride-against-the-flow.

criticism for data-driven, visual narratives, practicing critiques — goals for your data-driven, visual narratives

Audience?	An external, general
Purpose?	Decide on your purp your audience's atter
Data encodings, decodings?	Encode your data, st we've discussed. Dat
Comparison or change?	Encode data to show
Narrative?	Think about your na use explainers or lab
Color, coherency?	Purposefully use col
Hierarchy, layering, layout?	Your titles, headers, in typography (size,
Credibility, transparency?	Cite your sources, be Consider whether ve

audience. Categorically, who are this mixed audience?

pose; be specific. *E.g.*, Advertising? Public relations? Investor interest? Get ention, help them understand, and be able to act on your message's purpose.

tatistics, and modelling estimates using best practices ta encodings should directly support your main messages.

w comparisons or change, add data as context to impart meaning.

arrative arc, and how change drives your narrative forward. Do you bels and mini paragraphs on your data graphics to help your audience?

lor for encodings and linking data encodings to textual narrative.

mini-paragraphs, and text should use messages, not just information. Use best practices bold, color, spacing, etc) and grid alignment to focus your audience on your messages.

briefly mention any important elements of your analysis. you need to explain any limitations or exceptions.

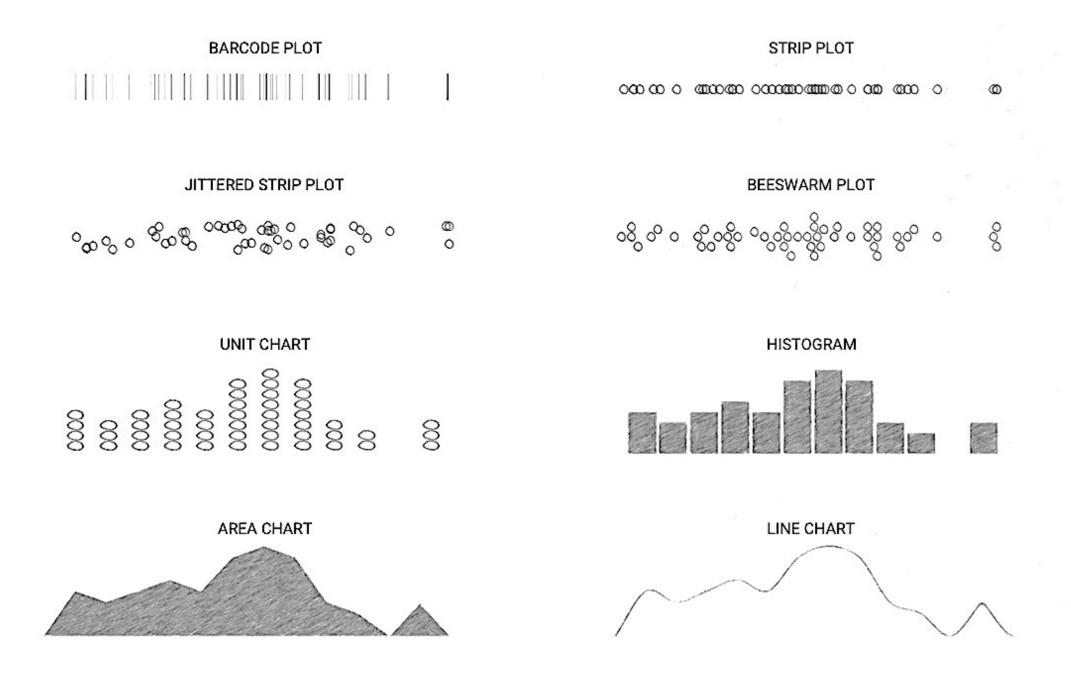


help your colleagues — group ideating

encoding uncertainty, estimates, forecasts

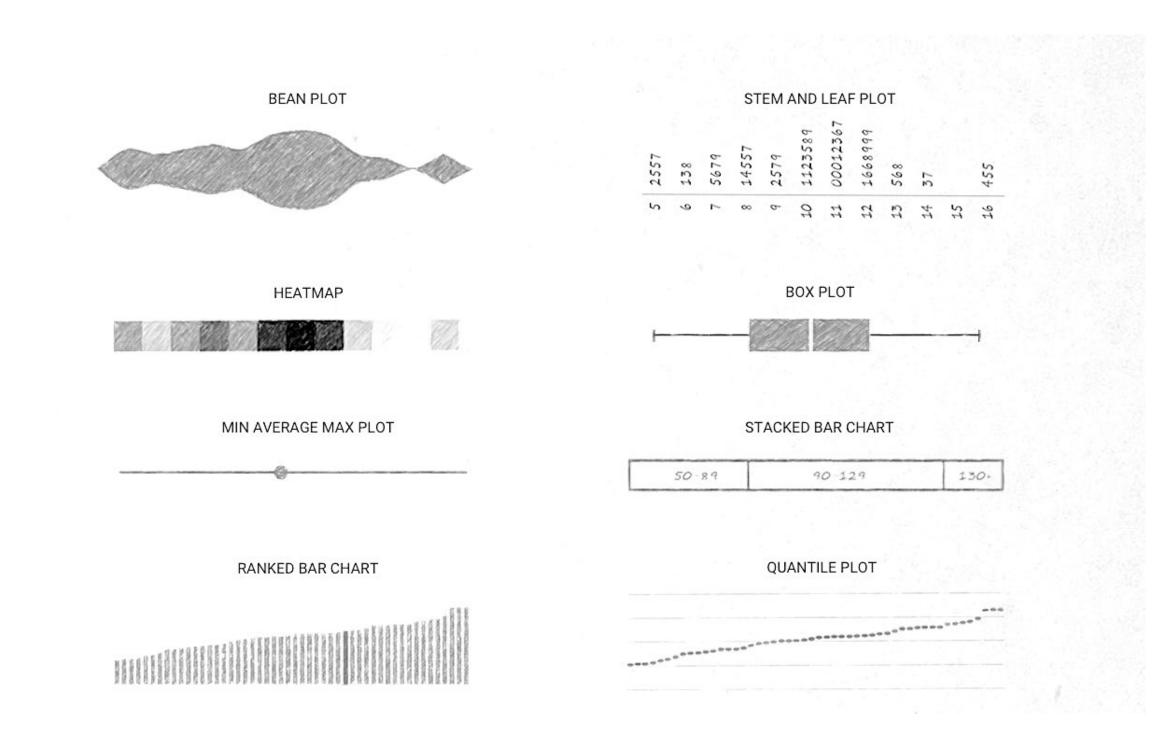
encoding uncertainty, estimates, forecasts, distinguish measurements from estimates

Measurements are observed. Examples of common visual encodings for variation in measures ...



Cherdarchuk, Joey. "Visualizing Distributions." Business. Dark Horse Analytics (blog), November 8, 2016. https://www.darkhorseanalytics.com/blog/visualizing-distributions-3.

... but estimates are not observed measures — they are modeled from measures — be clear about distinguishing them with your encodings and annotations.



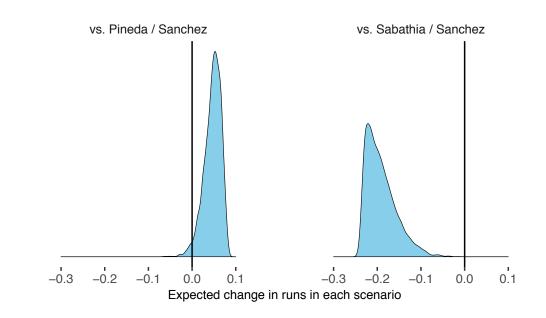




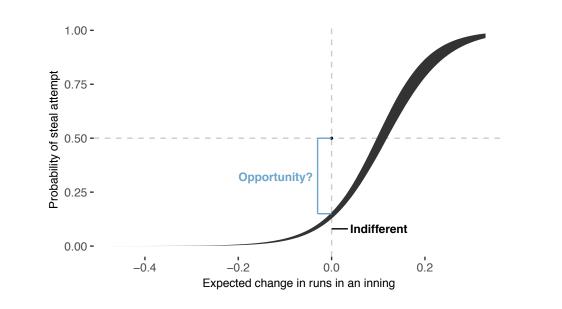
encoding uncertainty, estimates, forecasts, distinguishing measurements from estimates — examples

In a game against New York Yankees, should Milwaukee Brewers's Lorenzo Cain attempt to steal second base with no one else on base and two outs before the seventh inning, against Gary Sanchez as catcher and Michael Pineda as pitcher? What if against Sanchez and CC Sabathia as pitcher?

More specifically, how can we know the *expectation* that Cain's attempt in each situation increases the probability of expected runs that inning and by how much? Using Stan, I've coded a generative model that along with play outcomes considers various information (runner foot-speed, catcher pop-time) and player characteristics, like pitcher handedness. With the model, we have an answer that also shows the uncertainty. Given 2017 data, this model suggests Cain should steal against Pineda, not Sabathia:



Notably, we get these expectations without multiple trials of either scenario. More generally, this model suggests that on average team managers are too conservative, leaving runs unrealized:



The above is but one example of a more general approach that weighs probabilities of all possible outcomes to maximize expected utility. With broad implementation—jointly modeling the conditional probabilities of all relevant events—we can optimize decisions.

Spencer, Scott. Proposal to Scott Powers. "Proposal for Exploring Game Decisions" Informed by Expectations of Joint Probability Distributions." February 14, 2019.

Figure 1. Of the two scenarios, Cain should only attempt to steal against the Sanchez–Pineda duo.

Figure 2. When the change in expected runs is zero, managers should be indifferent to attempted steals, saying go half the time.

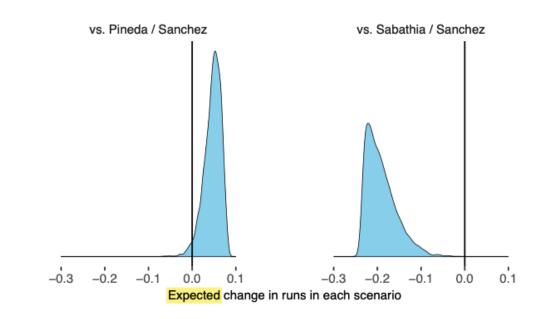
The **black band** represents the range of variation across managers' decisions. At the intersection of indifference, managers tend to say steal only 10 percent of the time, leaving opportunity.



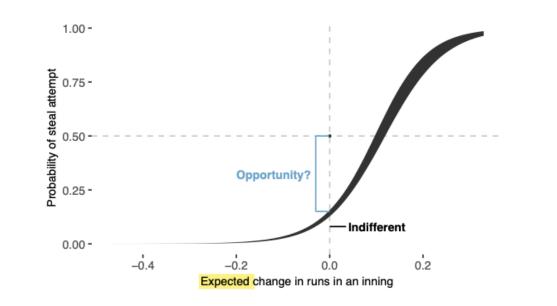
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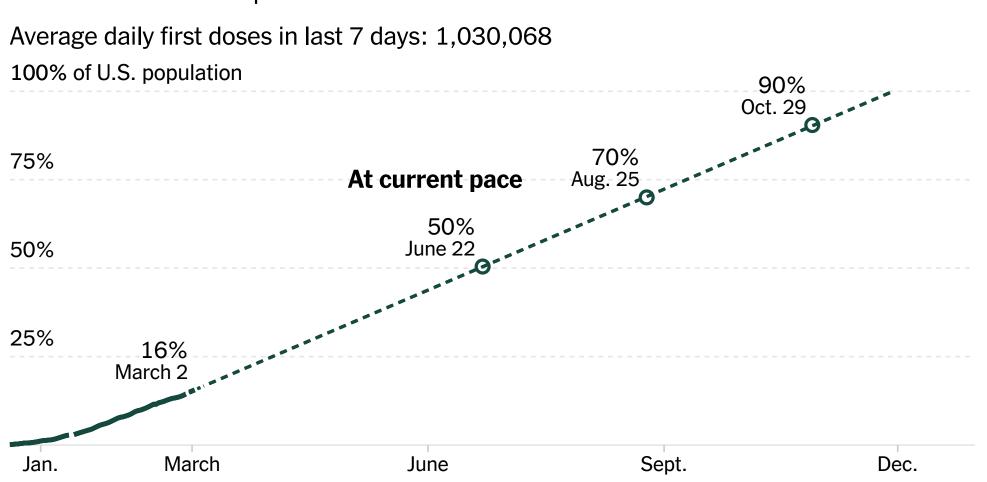
The **black band** represents the range of variation across managers' decisions. At the intersection of **indifference**, managers tend to say steal only 10 **percent** of the time, leaving opportunity.



The projection below only shows the share of the total population with at least one shot based on the current rate of vaccination, but it provides a rough indication of when the virus's spread could begin to stall.

When a given share of the U.S. population might be at least partially vaccinated

The current vaccination rate is based on average daily increase in first doses administered over the past week.



If the country maintains its current pace of administering first doses, about half of the total population would be at least partially vaccinated around late June, and nearly all around late October, assuming supply pledges are met and vaccines are eventually available to children.

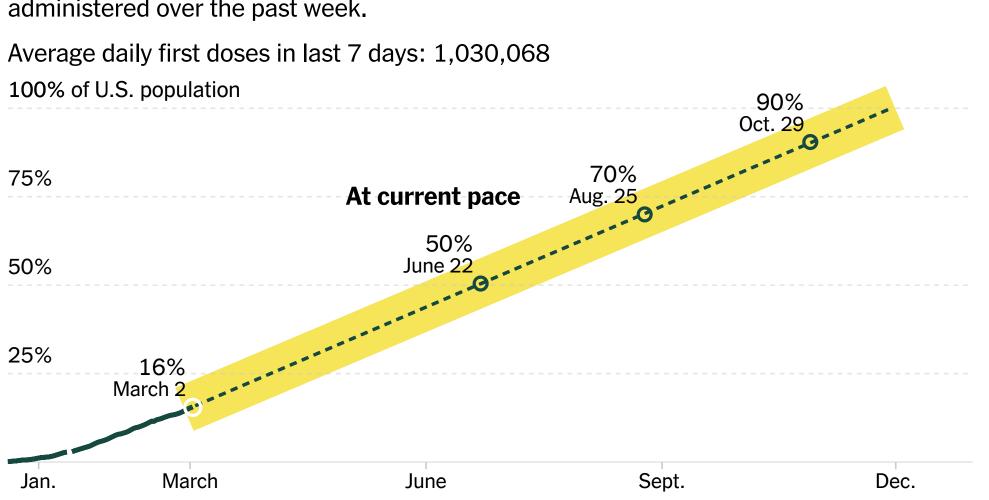
Source: Centers for Disease Control and Prevention | Note: Data from Dec. 20 to Jan. 12 are for all doses administered. Data for Jan. 13 is unavailable. Projections could change if additional vaccines are authorized.



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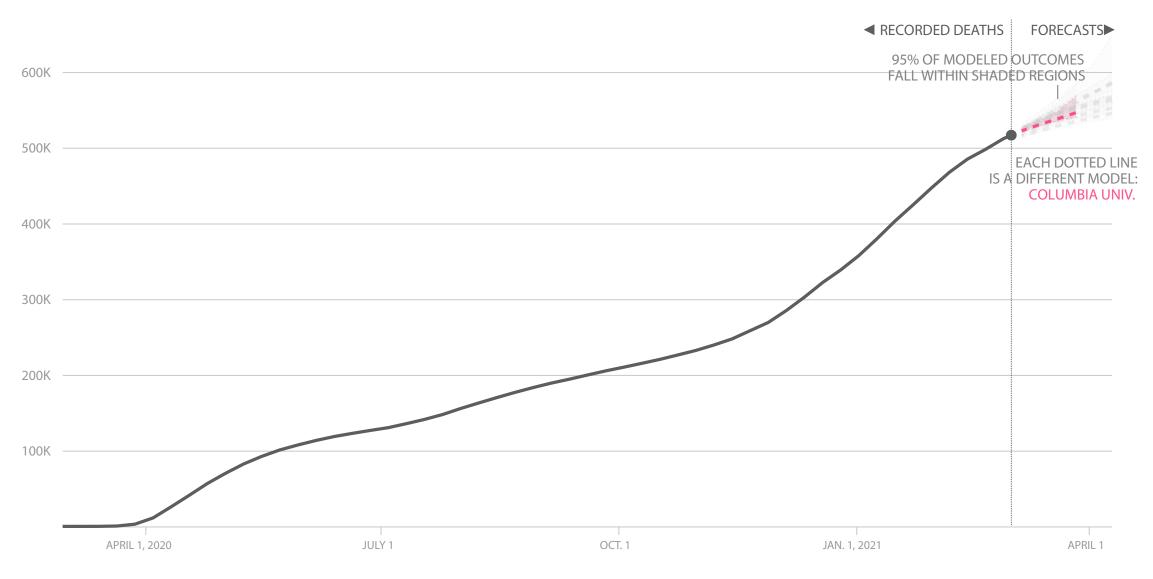
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Models predicting the potential spread of the COVID-19 pandemic have become a fixture of American life. Yet each model tells a different story about the loss of life to come, making it hard to know which one is "right." But COVID-19 models aren't made to be unquestioned oracles. They're not trying to tell us one precise future, but rather the range of possibilities given the facts on the ground.

One of their more sober tasks is predicting the number of Americans who will die due to COVID-19. FiveThirtyEight — with the help of data compiled by the COVID-19 Forecast Hub — has assembled 11 models published by scientists to illustrate possible trajectories of the pandemic's death toll. In doing so, we hope to make them more accessible, as well as highlight how the assumptions underlying the models can lead to vastly different estimates. Here are the models' U.S. fatality projections for the coming weeks.



Forecasts like these are useful because they help us understand the most likely outcomes as well as best- and worst-case possibilities — and they can help policymakers make decisions that can lead us closer to those best-case outcomes.

And looking at multiple models is better than looking at just one because it's difficult to know which model will match reality the closest. Even when models disagree, understanding why they are dierent can give us valuable insight.

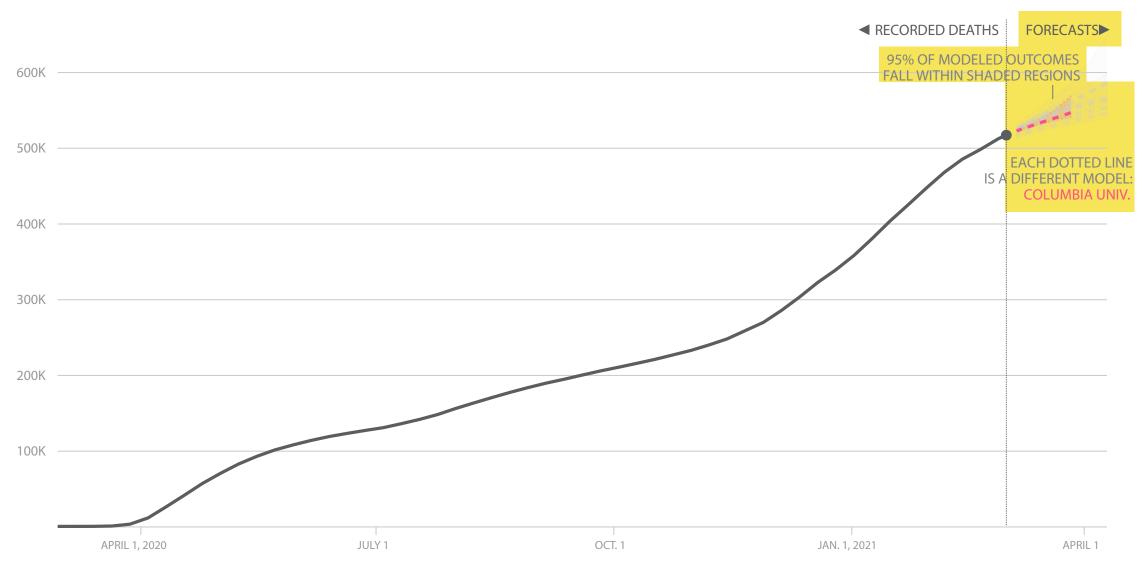
Best, Ryan, and Jay Boice. "*Where The Latest COVID-19 Models Think Were Headed — And Why They Disagree.*" News. FiveThirtyEight, March 2, 2021. <u>https://projects.fivethirtyeight.com/covid-forecasts/</u>.





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encoding uncertainty, estimates, forecasts, discretizing distributions to improve decisions — quantile dot plots

Probability density of Normal distribution

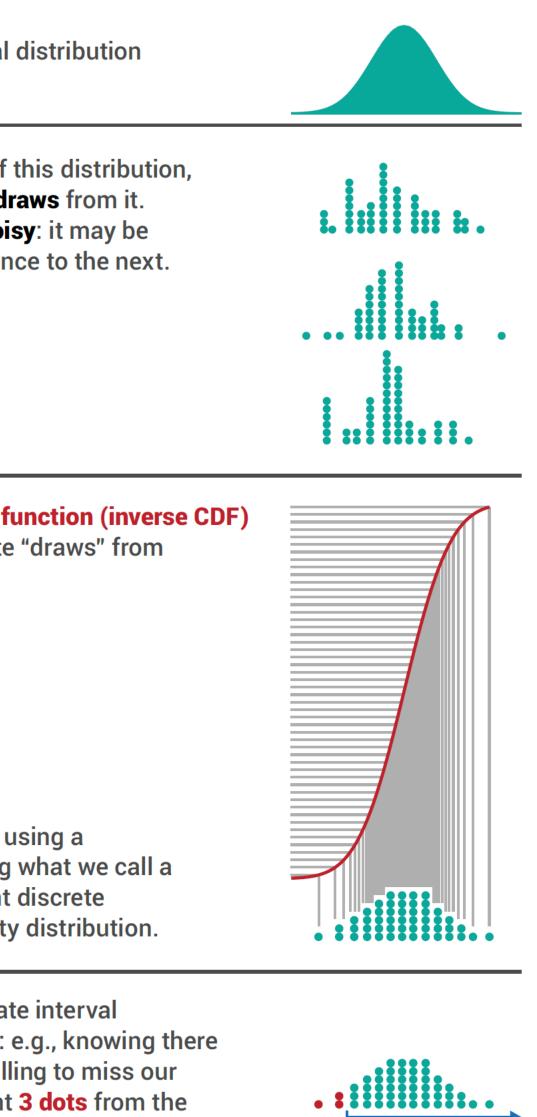
To generate a discrete plot of this distribution, we could try taking **random draws** from it. However, **this approach is noisy**: it may be very different from one instance to the next.

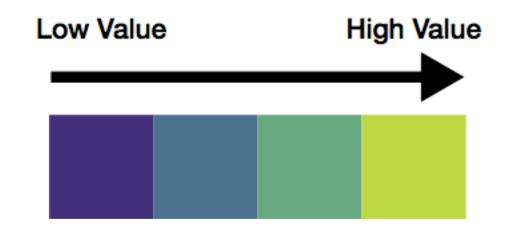
Instead, we use the **quantile function (inverse CDF)** of the distribution to generate "draws" from evenly-spaced quantiles.

We plot the quantile "draws" using a Wilkinsonian dotplot, yielding what we call a **quantile dotplot**: a consistent discrete representation of a probability distribution.

By using quantiles we facilitate interval estimation from frequencies: e.g., knowing there are 50 dots here, if we are willing to miss our bus 3/50 times, we can count 3 dots from the left to get a one-sided 94% (1 – 3/50) prediction interval corresponding to that risk tolerance.

Fernandes, M., Walls, L., Munson, S., Hullman, J., & Kay, M. (2018). *Uncertainty Displays Using Quantile Dotplots or CDFs Improve Transit Decision-Making*. A Conference on Human Factors in Computing Systems - CHI '18. doi:Â 10.1145/3173574.3173718

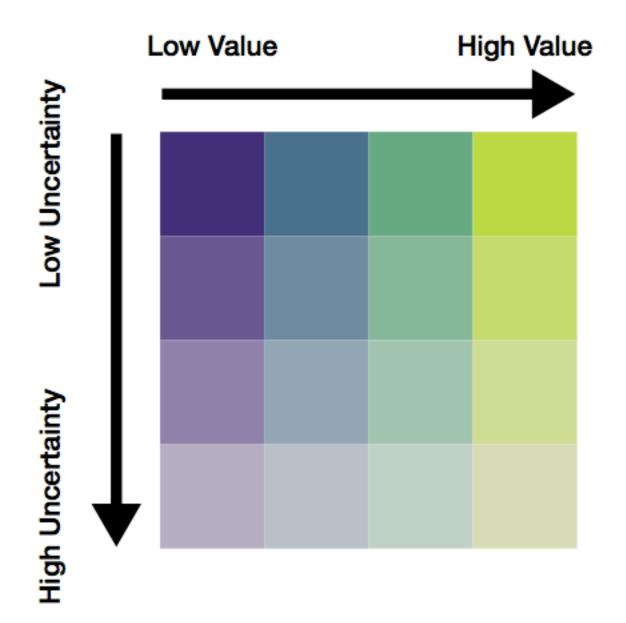




Correll, Michael, Dominik Moritz, and Jeffrey Heer. "Value-Suppressing Uncertainty Palettes." In *Proceedings of the 2018 CHI Conference on Human Factors in Computing Systems - CHI '18*, 1–11. Montreal QC, Canada: ACM Press, 2018.





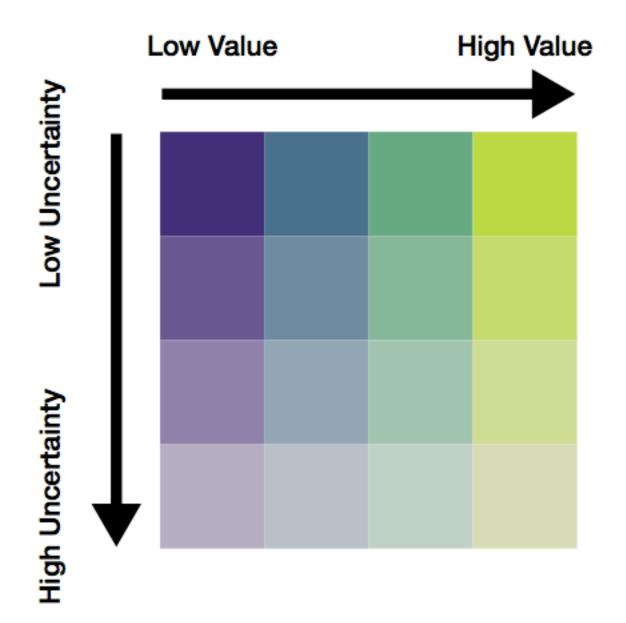


Correll, Michael, Dominik Moritz, and Jeffrey Heer. "Value-Suppressing Uncertainty Palettes." In Proceedings of the 2018 CHI Conference on Human Factors in Computing Systems - CHI '18, 1–11. Montreal QC, Canada: ACM Press, 2018.

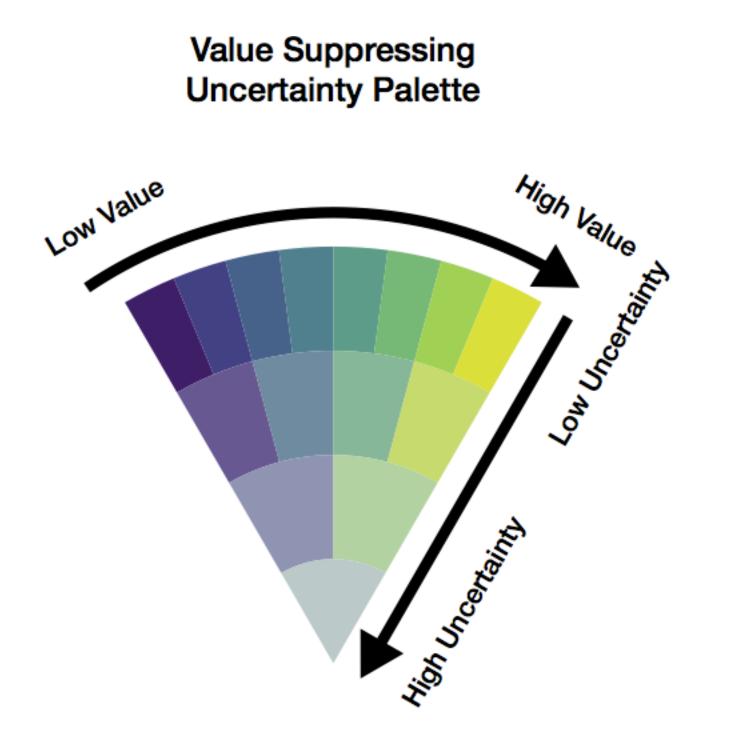




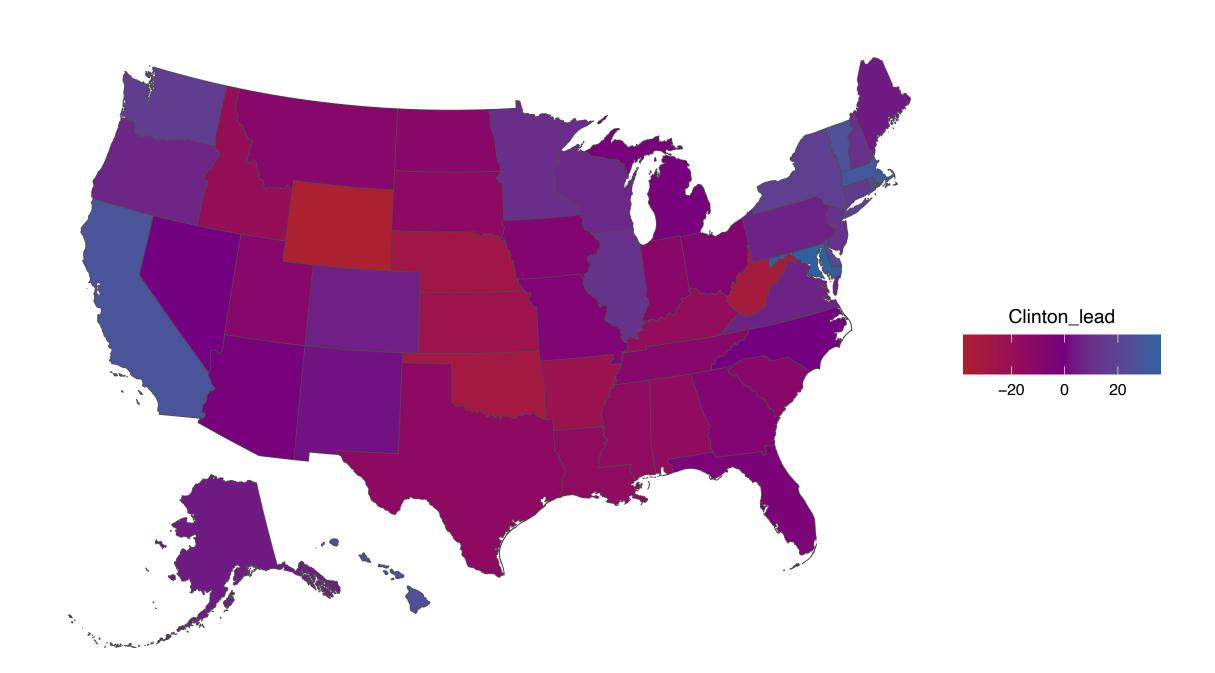


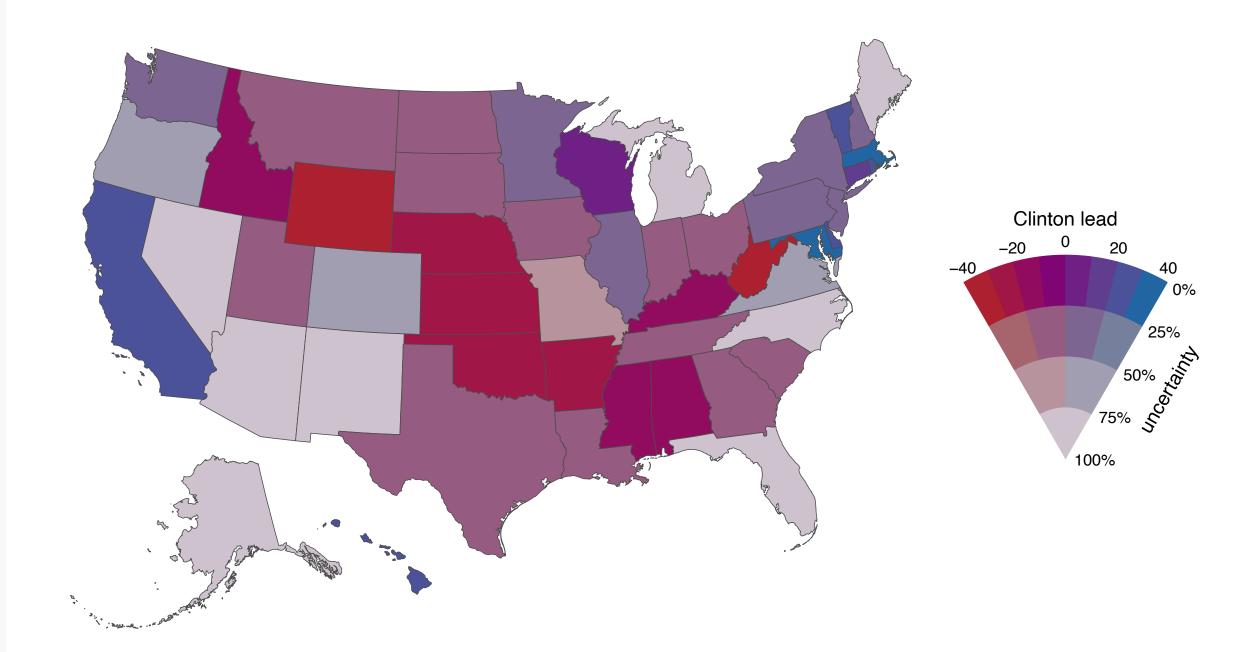


Correll, Michael, Dominik Moritz, and Jeffrey Heer. "Value-Suppressing Uncertainty Palettes." In *Proceedings of the 2018 CHI Conference on Human Factors in Computing Systems - CHI* '18, 1–11. Montreal QC, Canada: ACM Press, 2018.







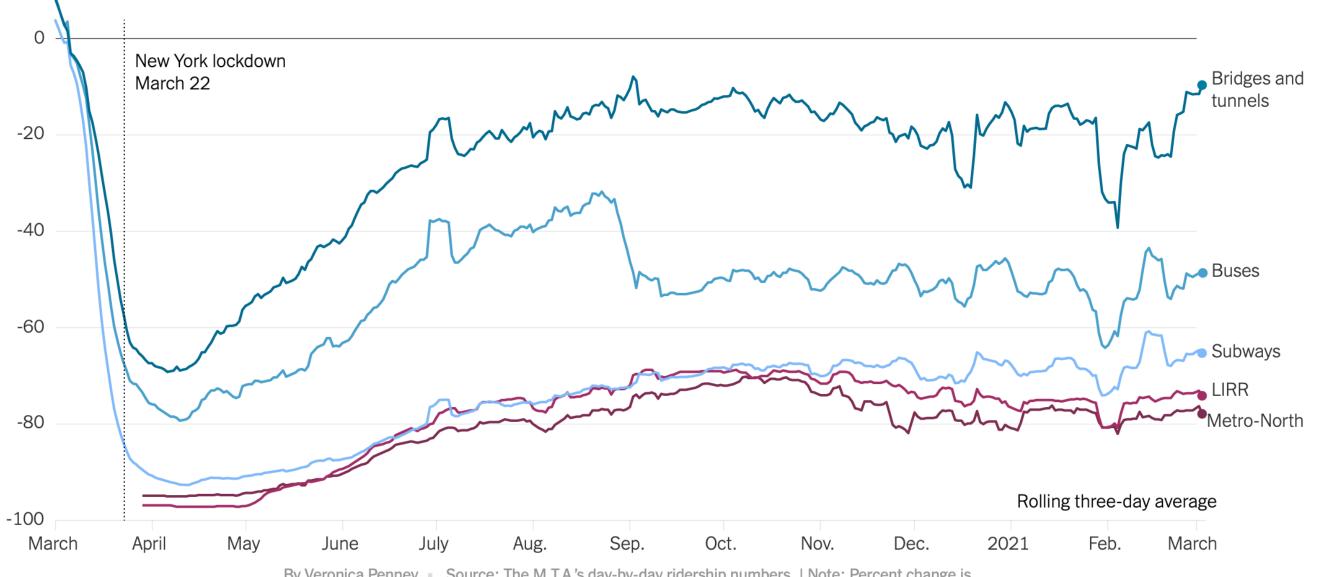






pacing for attention

pacing for attention, you can focus on consecutive layers of a graphic spatially (multiples)



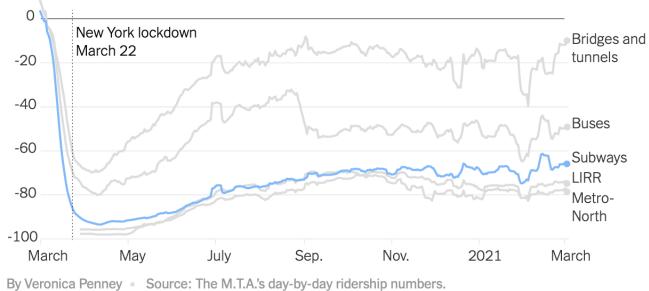
Percent decline from 2019 ridership

By Veronica Penney Source: The M.T.A.'s day-by-day ridership numbers. | Note: Percent change is calculated as a comparison to the preceding-year equivalent day, with the exception of the commuter rail systems, which are compared to the 2019 monthly weekday/Saturday/Sunday average.

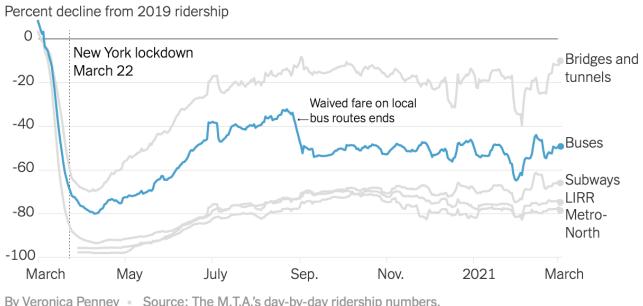
Penney, Veronica. "How Coronavirus Has Changed New York City Transit, in One Chart" New York Times, March 8, 2021, Climate sec. <u>https://www.nytimes.com/</u> interactive/2021/03/08/climate/nyc-transit-covid.html.

Subway Ridership Is Slow to Recover



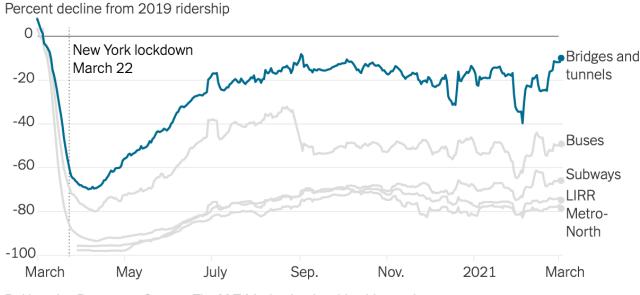






By Veronica Penney Source: The M.T.A.'s day-by-day ridership numbers.

Car Travel Is Near Pre-Pandemic Levels



By Veronica Penney Source: The M.T.A.'s day-by-day ridership numbers.





pacing for attention, you can also focus on consecutive layers of a graphic *temporally* — a grammar of animated graphics



A Grammar of Animated Graphics

Pedersen, Thomas Lin, and David Robinson. "Gganimate: A Grammar of Animated Graphics." Manual, 2021. <u>https://gganimate.com</u>.

Build up a plot, layer

Source: R/transition-layers.R

gganimate 1.0.5.9000

This transition gradually adds layers to the plot in t prior layers are kept for the remainder of the anim as the next layer enters.

```
transition_layers(
   layer_length = 1,
   transition_length = 1,
   keep_layers = TRUE,
   from_blank = TRUE,
   layer_order = NULL,
   layer_names = NULL
)
```

Arguments

layer_length	The proportional time to pause at each la
transition_length	The proportional time to use for the entra
keep_layers	Either an integer indicating for how many logical. In the case of the later, TRUE will (equivalent to setting it to Inf) and FALS enters.
from_blank	Should the first layer transition in or be p
layer_order	An alternative order the layers should appression appression arguments that references the layers independent of the layers and the layers independent of the layers argument of the layers argument of the layer of
layer_names	A character vector of names for each laye

Label variables

transition_layers makes the following variables a addition to the general ones provided by animate(

- transitioning is a boolean indicating whether
- previous_layer The name of the last layer the
- closest_layer The name of the layer the anim
- **next_layer** The name of the next layer the an
- **nlayers** The total number of layers

Object permanence

transition_layer does not link rows across data to be defined uniquely by each row and the enter and

		_
🕋 Getting Started Reference Talks News 🗸	Search	
ot, layer by layer	Contents	
	Arguments	
	Label variables	
layers to the plot in the order they have been defined. By default mainder of the animation, but they can also be set to be removed	Object permanence	
	See also	
	Examples	
onal time to pause at each layer before a new one enters		
onal time to use for the entrance of a new layer		
ger indicating for how many following layers the layers should stay on screen or a case of the later, TRUE will mean keep the layer for the remainder of the animation setting it to Inf) and FALSE will mean to transition the layer out as the next layer		
st layer transition in or be present on the onset of the animation		
e order the layers should appear in (default to using the stacking order). All other at references the layers index in some way refers to this order.		
ector of names for each layers, to be used when interpreting label literals		
e following variables available for string literal interpretation, in rovided by animate():		
an indicating whether the frame is part of the transitioning phase		
ne of the last layer the animation was showing		
of the layer the animation is closest to showing		
the next layer the animation will show		
er of layers		
ence		
nk rows across data to the same graphic element, so elements will ow and the enter and exit of the layer it belongs to.		





resources

References

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supplemental material

Audience?

Purpose?

Data encodings, decodings?

Comparison or change?

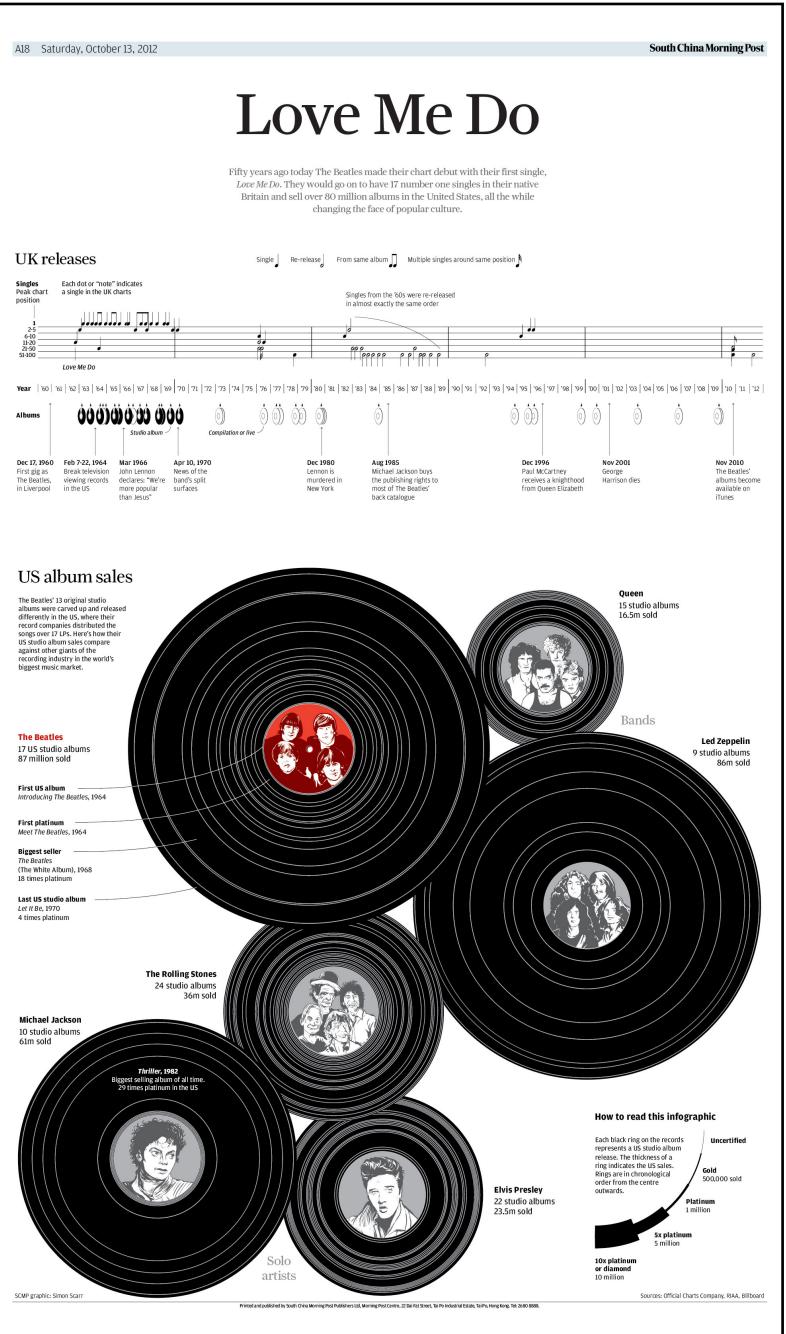
Narrative?

Color, coherency?

Hierarchy, layering, layout?

Credibility, transparency?

Britain and sell over 80 million albums in the United States, all the while



scott.spencer@columbia.edu

Scarr, Simon. "Love Me Do." South China Morning Post, October 13, 2012, sec. Infographics. https:// multimedia.scmp.com/culture/article/SCMP-printedgraphics-memory/lonelyGraphics/201210A114.html.

Audience?

Purpose?

Data encodings, decodings?

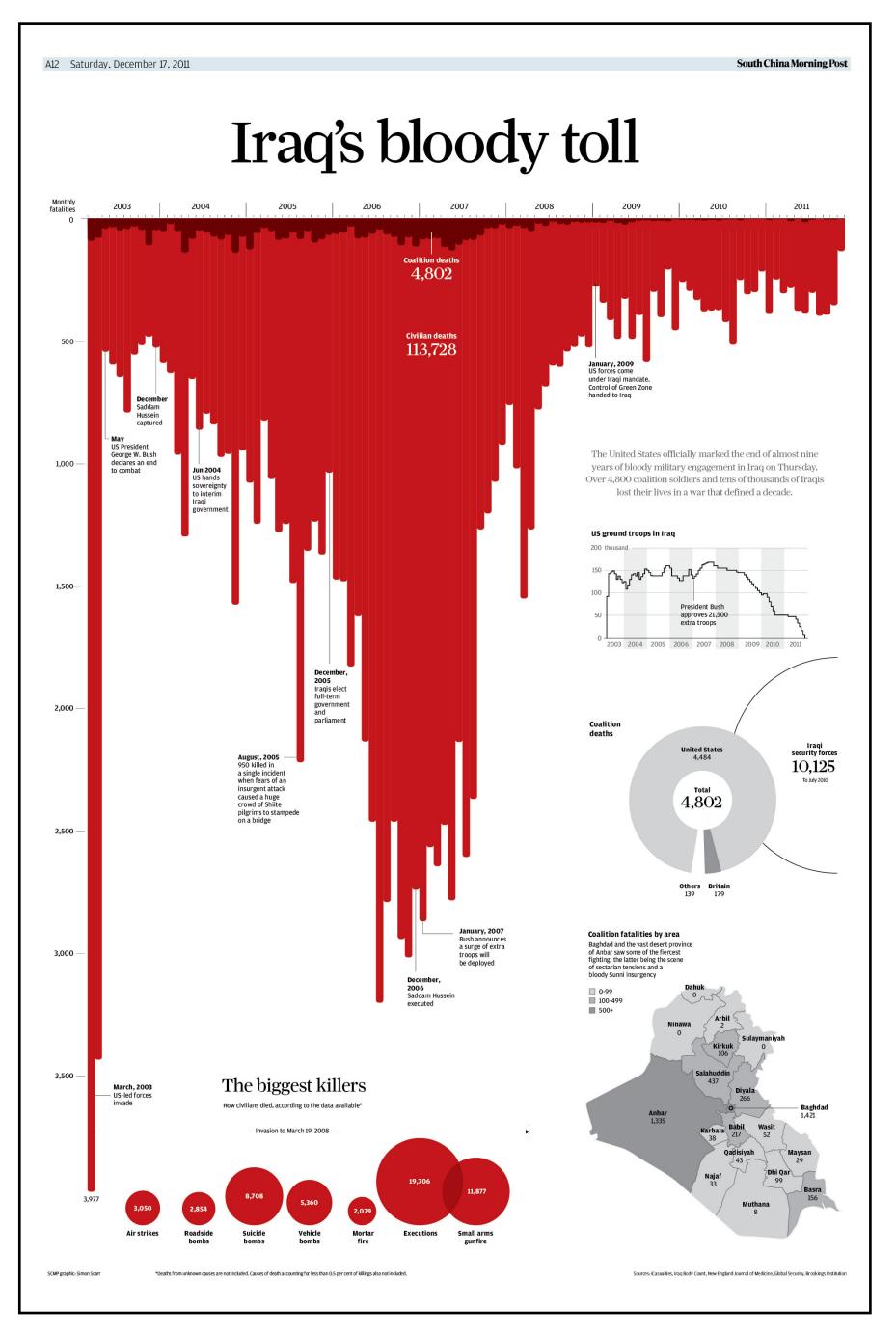
Comparison or change?

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Hierarchy, layering, layout?

Credibility, transparency?



Scarr, Simon. "Iraq's bloody toll." South China Morning Post, December 17, 2011, sec. Infographics. <u>https://</u> <u>multimedia.scmp.com/culture/article/SCMP-printed-</u> <u>graphics-memory/lonelyGraphics/201112A131.html</u>.

Audience?

Purpose?

Data encodings, decodings?

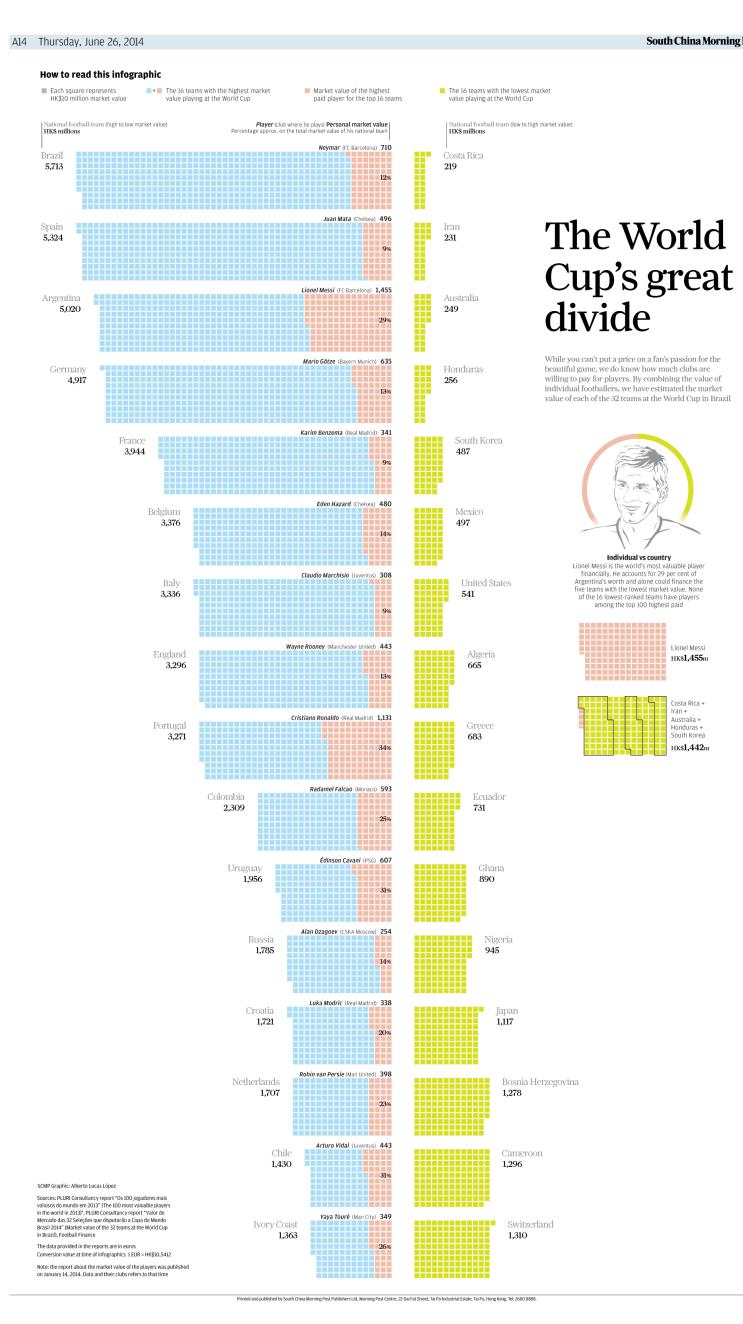
Comparison or change?

Narrative?

Color, coherency?

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South China Morning Post





HK\$1,455n

Honduras + South Korea нк\$**1,442**г



López, Alberto Lucas. "Infographic: The World Cup's Great Divide." South China Morning Post, June 26, 2014, sec. Infographics. <u>https://www.scmp.com/infographics/</u> article/1540818/world-cups-great-divide.

Audience?

Purpose?

Data encodings, decodings?

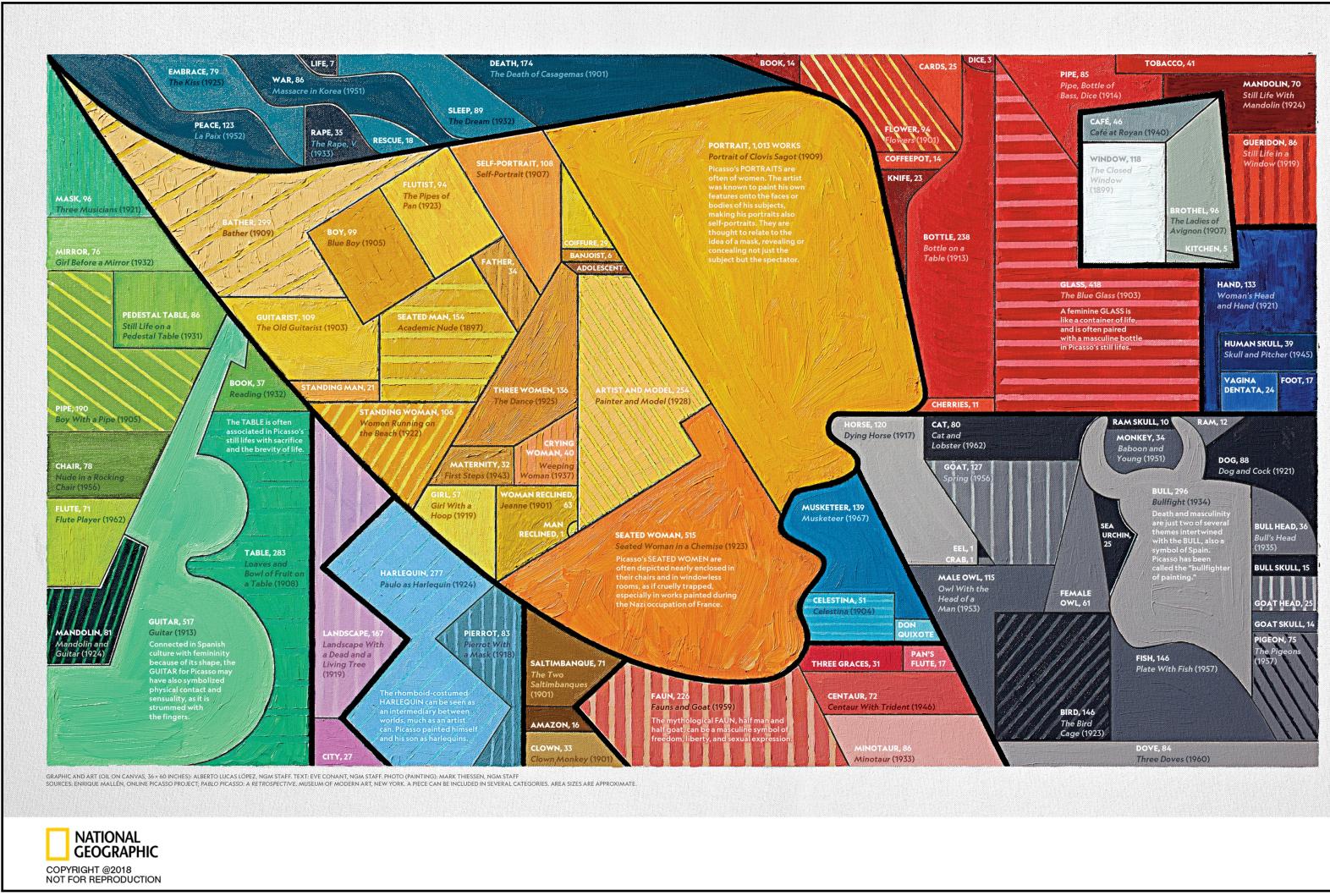
Comparison or change?

Narrative?

Color, coherency?

Hierarchy, layering, layout?

Credibility, transparency?

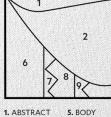


FRAMES OF MIND 'The artist is a receptacle for

emotions that come from all over the place: from the sky, from the earth, from a scrap of paper, from a passing shape, from a spider's web.'

Picasso drew inspiration from mythology, from war, from those who surrounded him, even-he proclaimed-from spiderwebs. The result is tens of thousands of works that seem to touch on countless topics. But many of the subjects that fascinated him, including death and sexuality, repeatedly surface in his art throughout the decades. Those recurring themes are grouped in a sampling of some 8,000 of Picasso's works, artistically rendered here. They can be found in portraits that radically blur the line between subject and painter, and in an array of arresting symbols such as the Minotaur, bottle, and harlequin.

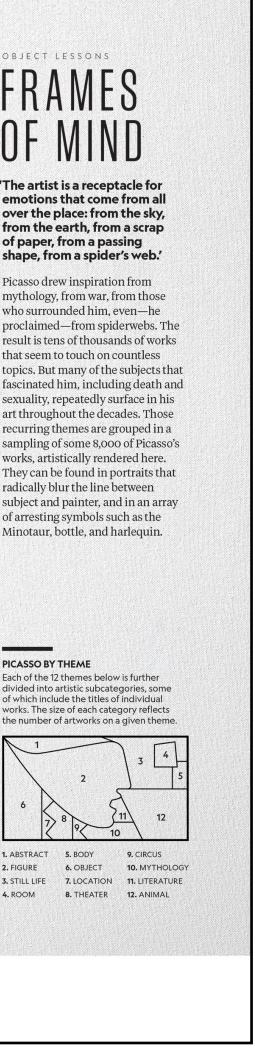
PICASSO BY THEME Each of the 12 themes below is further divided into artistic subcategories, some of which include the titles of individual works. The size of each category reflects the number of artworks on a given theme



2. FIGURE 6. OBJECT 3. STILL LIFE 7. LOCATION 11. LITERATURE 4. ROOM

© 2021 Scott Spencer / 🖓 https://ssp3nc3r.github.io





Kalb, Claudia, Paolo Woods, and Gabriele Galimberti. "Intense, Provocative, Disturbing, Captivating, Genius, Picasso." National Geographic Magazine, May 2018. National Geographic Archive 1995+.

Audience?

Purpose?

Data encodings, decodings?

Comparison or change?

Narrative?

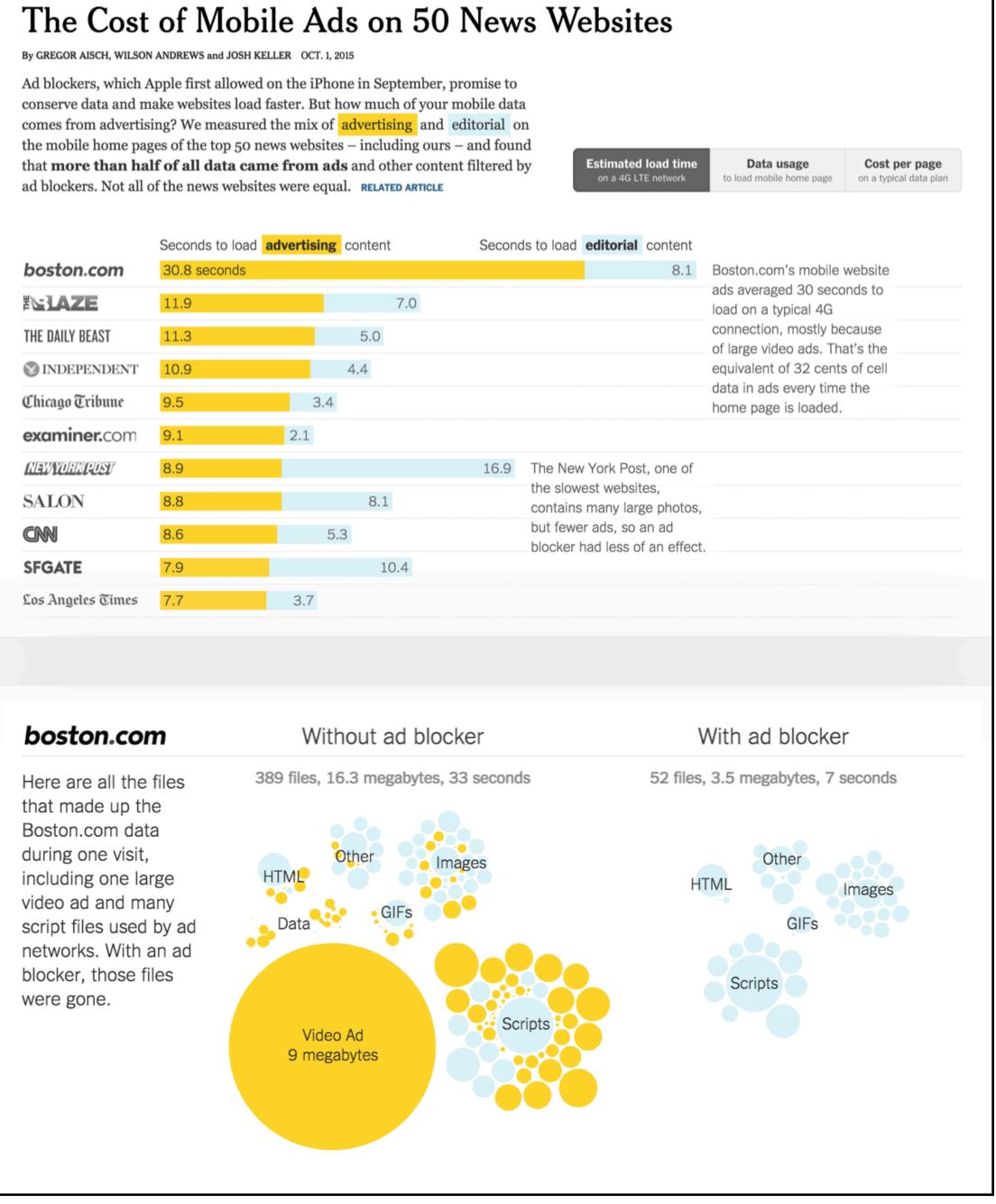
Color, coherency?

Hierarchy, layering, layout?

Credibility, transparency?

Estimated load time

	Seconds to load adv	ertising content	Secon	ds to load editoria	al content	
boston.com	30.8 seconds				8.1	Boston.com's mobile website
≝⊾LAZE	11.9	7.0				ads averaged 30 seconds to load on a typical 4G
THE DAILY BEAST	11.3	5.0				connection, mostly because of large video ads. That's the
INDEPENDENT	10.9	4.4				equivalent of 32 cents of cell
Chicago Tribune	9.5	3.4				data in ads every time the home page is loaded.
examiner.com	9.1	2.1				
NEWYORKROST	8.9		16.9			
SALON	8.8	8.1		the slowest webs contains many la		
CNN	8.6	5.3		but fewer ads, so blocker had less		•
SFGATE	7.9	10.4		2.501011021000		• • • • • • • • • • • • • • • • • • •
Los Angeles Times	7.7	3.7				



Aisch, Gregor, Wilson Andrews, and Josh Keller. "The Cost of Mobile Ads on 50 News Websites." New York Times, October 1, 2015, Online edition, sec. Business. https://www.nytimes.com/interactive/2015/10/01/ business/cost-of-mobile-ads.html.

Audience?

Purpose?

Data encodings, decodings?

Comparison or change?

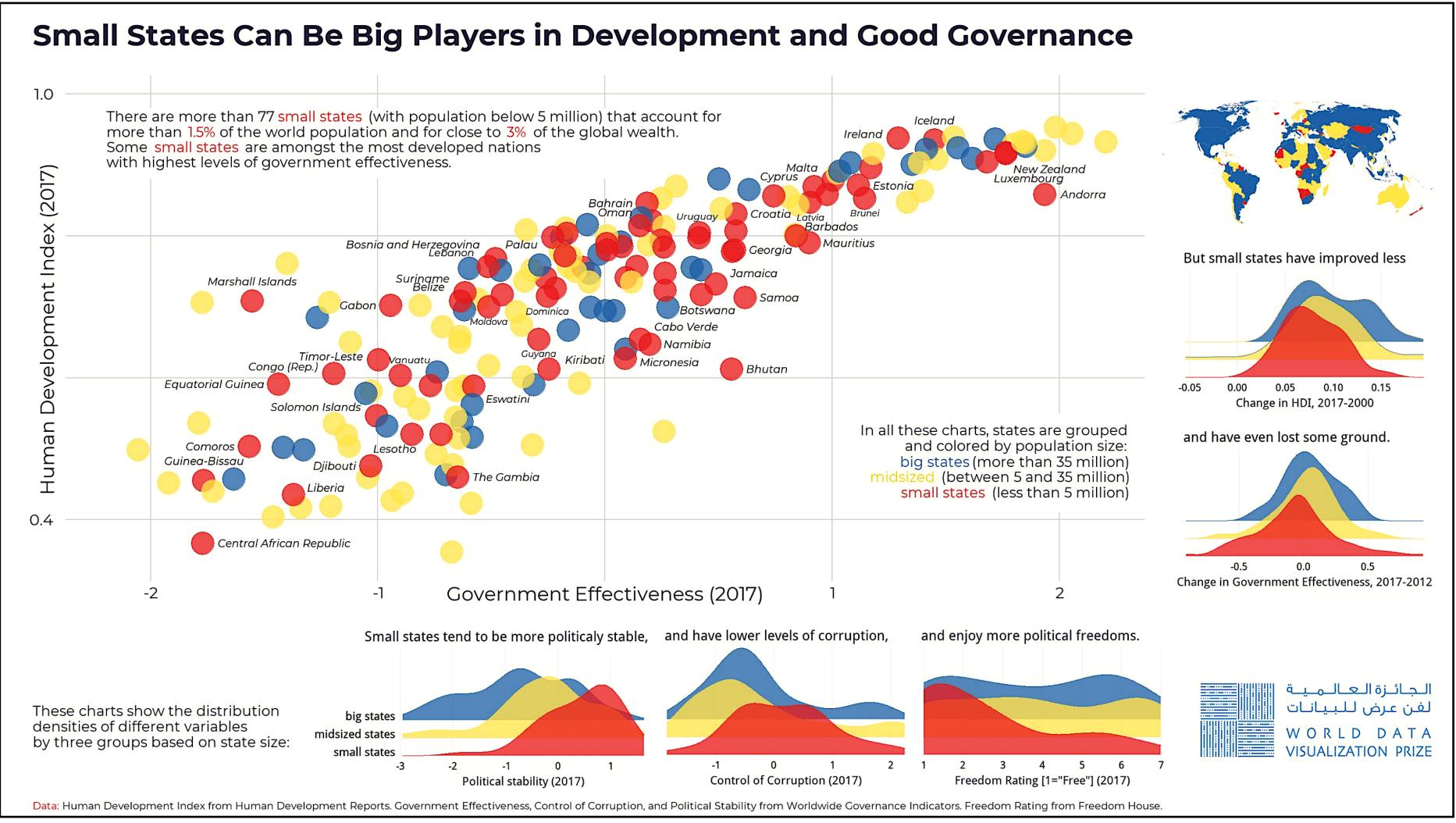
Narrative?

Color, coherency?

Hierarchy, layering, layout?

Credibility, transparency?

Dimiter, Toshkov. "World Data Visualization Prize: Small States Can Be Big Players in Development and Good Governance." Personal. Dimiter Toshkov, 2019. http:// www.dimiter.eu/Visualizations_files/WDVP.html.





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Purpose?

Data encodings, decodings?

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Narrative?

Color, coherency?

Hierarchy, layering, layout?

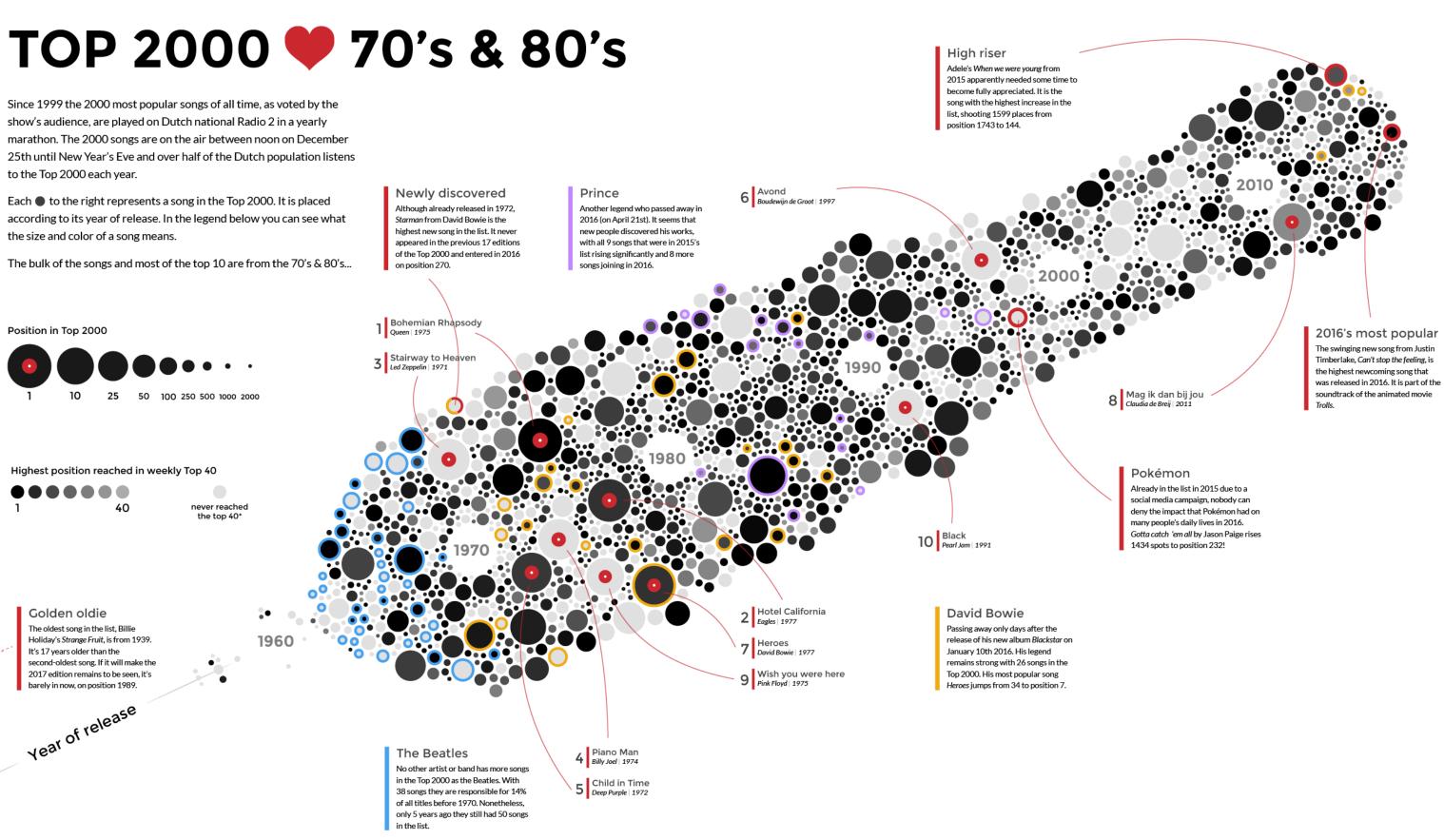
Credibility, transparency?

Since 1999 the 2000 most popular songs of all time, as voted by the show's audience, are played on Dutch national Radio 2 in a yearly marathon. The 2000 songs are on the air between noon on December 25th until New Year's Eve and over half of the Dutch population listens to the Top 2000 each year.

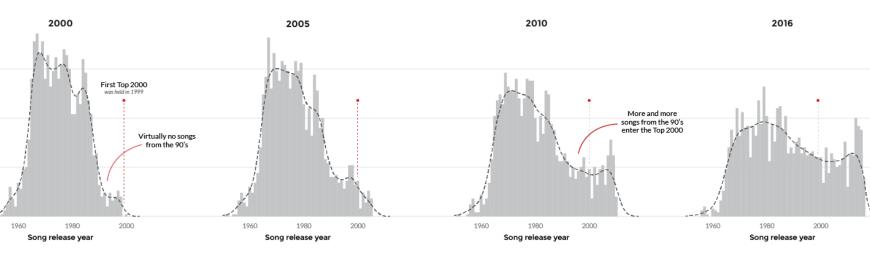
Each
to the right represents a song in the Top 2000. It is placed according to its year of release. In the legend below you can see what the size and color of a song means.

The bulk of the songs and most of the top 10 are from the 70's & 80's...

1 10 25	50 100 2	50 500 1000 20	•
Highest position reached Highest position r	in weekly 1	Top 40 never reached the top 40*	•
Golden oldie The oldest song in the list, Billi Holiday's <i>Strange Fruit</i> , is from It's 17 years older than the second-oldest song. If it will m 2017 edition remains to be see barely in now, on position 198	1939. ake the en, it's 9.	•	• • • • • • • • • • • • • • • • • • • •
Year of release			
year of rei		-	across release y
The charts on the right represent songs from 3 past editions of the (held in 2000, 2005, 2010) and th	all 2000 Top 2000	-	-
The charts on the right represent songs from 3 past editions of the (held in 2000, 2005, 2010) and the recent 2016 edition. The songs are stacked according to of release. The higher a rectangle songs that are in the Top 2000 list release year.	all 2000 Top 2000 e most to their year , the more	For 4 edition	2000
The charts on the right represent songs from 3 past editions of the (held in 2000, 2005, 2010) and th recent 2016 edition. The songs are stacked according of release. The higher a rectangle songs that are in the Top 2000 list	all 2000 Top 2000 e most to their year , the more t from that a smoothed akes the	For 4 edition No. of songs 75 50 25	2000



ad across release years of the 2000 songs



Visit tinyurl.com/2016top2000 for the interactive visual and see the name & title of each song

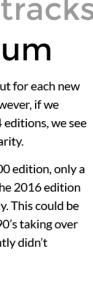
But they're losing tracks to the new Millenium

It makes sense that the Top 2000 will be more spread out for each new edition, since there are more songs to choose from. However, if we compare the distributions of the Top 2000 songs over 4 editions, we see that, especially, the 90's has been gaining a lot of popularity.

Even though all songs from the 90's were out in the 2000 edition, only a few songs from that decade were chosen. Whereas in the 2016 edition the number of songs from the 90's has risen significantly. This could be due to a new generation who has grown up during the 90's taking over from those who voted in the early 2000's (who apperantly didn't appreciate the new music).

Data | Top 2000 list from Radio 2 | Top 40 info from Mediamarkt's Top 40







Bremer, Nadieh. "The Top 2000 Loves the 70s & 80s." Personal. Visual Cinnamon, December 2016. https:// www.visualcinnamon.com/portfolio/top2000.

Audience?

Purpose?

Data encodings, decodings?

Comparison or change?

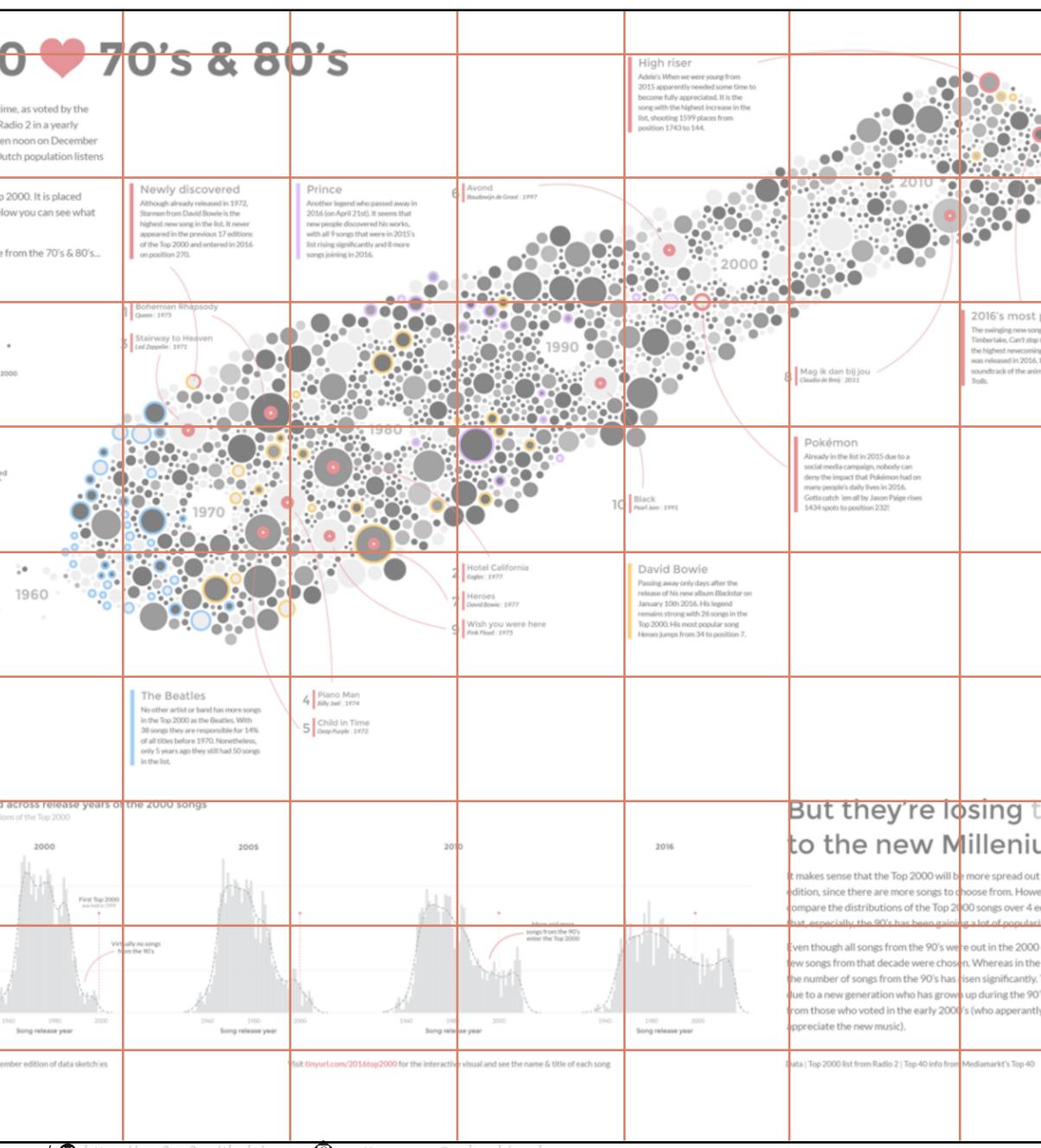
Narrative?

Color, coherency?

Hierarchy, layering, layout?

Credibility, transparency?

	TOP 20	0
	Since 1999 the 2000 most popular so show's audience, are played on Dutch marathon. The 2000 songs are on the 25th until New Year's Eve and over h to the Top 2000 each year.	national F air betwee
	Each to the right represents a son according to its year of release. In the the size and color of a song means.	
	The bulk of the songs and most of the	top 10 are
	Position in Top 2000) () ()
	Highest position reached in weekly T 1 40	pp 40 never reache the top 40*
2	Golden oldie The oldest song in the list, Billie Holiday's Stange Fruit, is from 1939. It's 17 years older than the second-oldest song. If it will make the 2017 edition remains to be seen, it's barely in now, on position 1989.	÷.
	Year of release	
		Spread For 4 edit
	The charts on the right represent all 2000 songs from 3 past editions of the Top 2000 (held in 2000, 2005, 2010) and the most recent 2016 edition.	No. of songs 75
	The songs are stacked according to their year of release. The higher a rectangle, the more songs that are in the Top 2000 list from that release year. The black dotted line represents a smoothed ourve over all 2000 songs. This makes the comparison between the 4 charts easier.	25
	Created by Nadieh Bremer VisualCinnamon.co	n for the Dec



•
popular ng from Justin o the feeling, is
ng song that . It is part of the mated movie
tracks
um
t for each new ever, if we
editions, we see ity
0 edition, only a e 2016 edition
. This could be J's taking over
ly didn't

Bremer, Nadieh. "The Top 2000 Loves the 70s & 80s." Personal. Visual Cinnamon, December 2016. https:// www.visualcinnamon.com/portfolio/top2000.

Audience?

Purpose?

Data encodings, decodings?

Comparison or change?

Narrative?

Color, coherency?

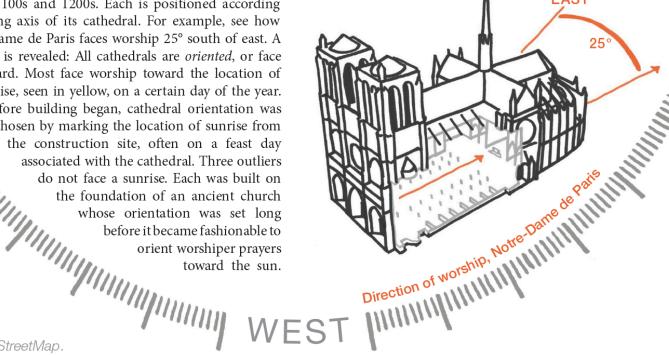
Hierarchy, layering, layout?

Credibility, transparency?



SEPTEMBER

To-scale maps detail French Gothic cathedrals associated with the 1100s and 1200s. Each is positioned according to the long axis of its cathedral. For example, see how Notre-Dame de Paris faces worship 25° south of east. A pattern is revealed: All cathedrals are oriented, or face eastward. Most face worship toward the location of sunrise, seen in yellow, on a certain day of the year. Before building began, cathedral orientation was chosen by marking the location of sunrise from the construction site, often on a feast day associated with the cathedral. Three outliers do not face a sunrise. Each was built on the foundation of an ancient church whose orientation was set long

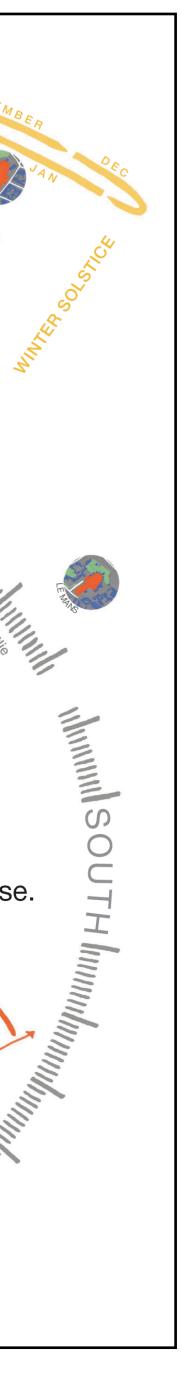


Cathedral angles were measured using *OpenStreetMap*.

NORTH Immun

1 humanahumanah





Andrews, R J. Info We Trust: How to Inspire the World with *Data*. Wiley, 2019.

Audience?

Purpose?

Data encodings, decodings?

Comparison or change?

Narrative?

Color, coherency?

Hierarchy, layering, layout?

Credibility, transparency?

Orizzonti Mappe

Sushi styl

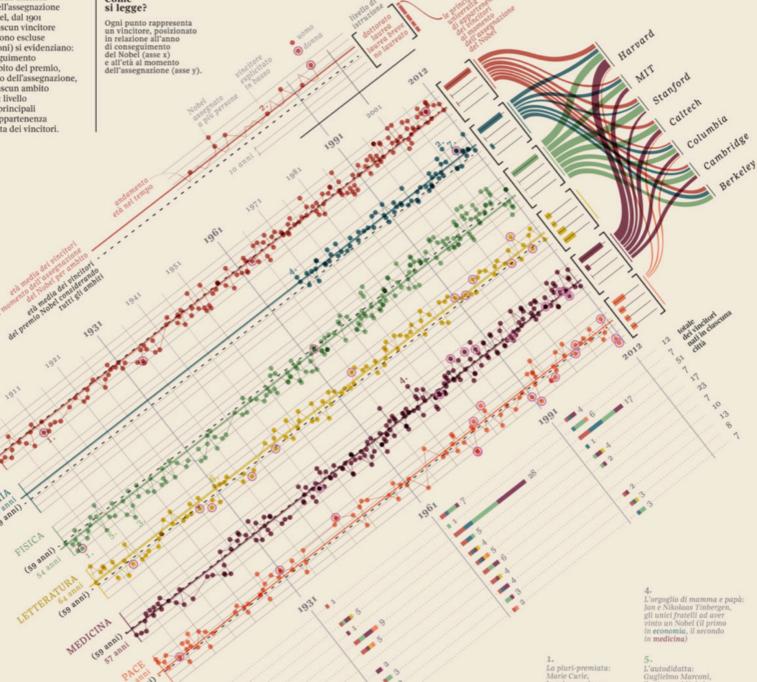
lagakure, le regole di un samura Si devono coltivare tre qualità interiori ezza (chi), solidarietà (gin), corag (yù). La saggezza consiste nel sape sare. La solidarietà nell'agire

pensare alle conseguenze». Sono le rege ell'«Hagakure, il codice dei samura noto Tsunetomo (Bur). Consig ssime buddiste: «Le grandi

Visual data

I riconoscimenti vengono consegnati il 10 dicembre, anniversario della morte dell'ideatore del premio Ecco l'origine, l'età e gli studi dei vincitori, dal 1901 a oggi Quanti (non) laureati al Nobel

l'evoluzione dell'assegnazi dei premi Nobel, dal 1901 al 2012. Per ciascun vincito dallo studio sono escluse organizzazioni) si evide lel Nobel, ambito del premie età al momento dell'assegn genere. Per ciascun ambito ono restituiti: livello i istruzione, principali iniversità di appartenena e città di nascita de



di MARA GERGOLET

he cosa dice la geografia del Nobel? dei sessi e di generazioni, quale pri-mato (arroganza?) accademica trova la sua giustificazione, se si mettono nel frullato- non portano a casa un Nobel, quasi a dar fermata una teoria in economia: la categore le età, le città d'origine, gli atenei di ap-partenenza, il titolo di studio degli 864 No-bel premiati dal 1901 a oggi? Guardi le cit-bre battuta di Orson Welles: «Cinque secotà, in questo gioco che chiunque può fare con il grafico qui sopra, e leggi il declino degli imperi. Quello della Vienna asburgi-New York nel dopoguerra ha staccato tutti ca (4 Nobel fino agli anni 30, poi una serie di geni quasi tutti emigrati in America). E e che però, con buona pace di Groucho Marx («A New York praticamente tutti vo-

Scott Fitzgerald, Picasso e Gertrude Stein, del premio alla letteratura

ricordi che negli anni 20 e 30, quando si frequentavano alle feste Hemingway e Philip Roth, le manca il quadratino giallo

The mondo emerge, quale battaglia | Man Ray e Buñuel, Parigi è stata un'irripe- Si è geni precoci nella física (il Nobel economia, física (due portati a casa da Ma- inglese Cambridge, Berkeley). A ben guar

ze. Sei premi in 112 edizioni tra chimica,

Gli autori

La visualizzazione e l'analisi dei dati sono a cura di Accurat (www.accurat.it), società di information design e consulenza progettuale diretta da Giorgia Lupi, Simone Quadri, Gabriele Rossi. tenarie, ma quella verdissima delle palazzine funzionali e degli skateboard della West coast. E allora, la geografia del genio ricalca quella del predomino politico e culturale? Non c'è dubbio. Però, benedetti gli «irregolari» della letteratura o del Nobe per la pace! C'è pur sempre lo scarto della fantasia, o dell'ossessione e della tenacia.





Lupi, Giorgia. "Visual Data - La Lettura," 2016. http:// giorgialupi.com/lalettura.

Audience?

Purpose?

Data encodings, decodings?

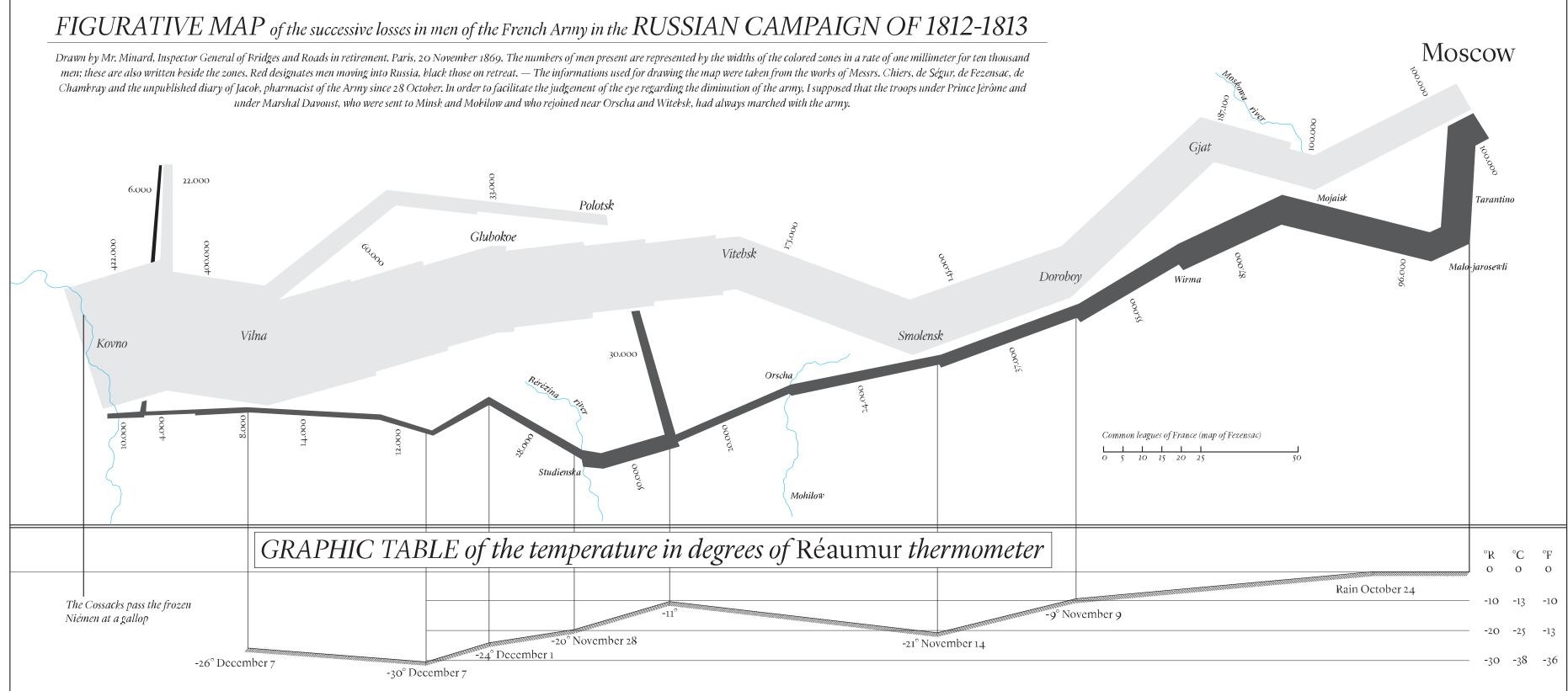
Comparison or change?

Narrative?

Color, coherency?

Hierarchy, layering, layout?

Credibility, transparency?



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scott.spencer@columbia.edu

Commons, Wikimedia. "Redrawing of Minard's Napoleon Map," 2018. https://commons.wikimedia.org/wiki/ File:Redrawing of Minard%27s Napoleon map.svg.

Audience?

Purpose?

Data encodings, decodings?

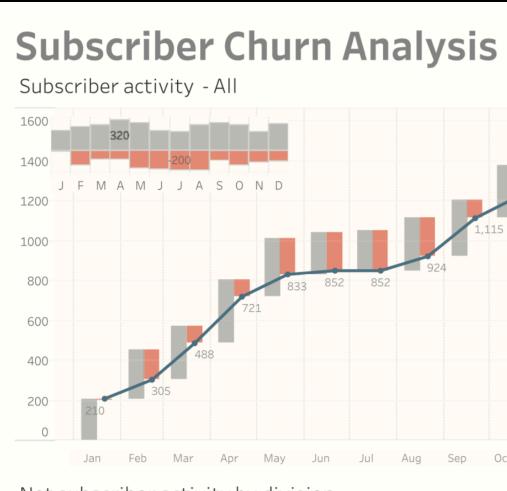
Comparison or change?

Narrative?

Color, coherency?

Hierarchy, layering, layout?

Credibility, transparency?







Net subscriber activity by division

		Gained	Lost	Net	Running total
West	January	80	0	80	80
	February	80	-15	65	145
	March	90	-30	60	205
	April	120	-25	95	300
	May	100	-50	50	350
	June	119	-77	42	392
	July	75	-45	30	422
	August	119	-77	42	464
	September	90	-30	60	524
	October	80	-15	65	589
	November	80	-20	60	649
	December	90	-30	60	709
	Total	1,123	-414	709	
Central	January	60	0	60	60
	February	85	-45	40	100
	March	80	-27	53	153
	April	90	-17	73	226
	May	120	-33	87	313
	June	45	-80	-35	278
	July	75	-45	30	308
	August	45	-80	-35	273
	September	80	-27	53	326
	October	85	-45	40	366
	November	60	-35	25	391
	December	80	-27	53	444
	Total	905	-461	444	
East	January	70	0	70	70
	February	80	-90	-10	60
	March	100	-30	70	130
	April	110	-45	65	195
	May	70	-95	-25	170
	June	45	-33	12	182
	July	50	-110	-60	122
	August	99	-34	65	187
	September	112	-34	78	265
	October	99	-88	11	276
	November	55	-65	-10	266
	December	110	-45	65	331
	Total	1,000	-669	331	
Grand Tot	al	3,028	-1,544	1,484	

Details



Wexler, Steve, Jeffrey Shaffer, and Andy Cotgreave. The Big Book of Dashboards: Visualizing Your Data Using Real-World Business Scenarios. Hoboken, New Jersey: Wiley, 2017.

Audience?

Purpose?

Data encodings, decodings?

Comparison or change?

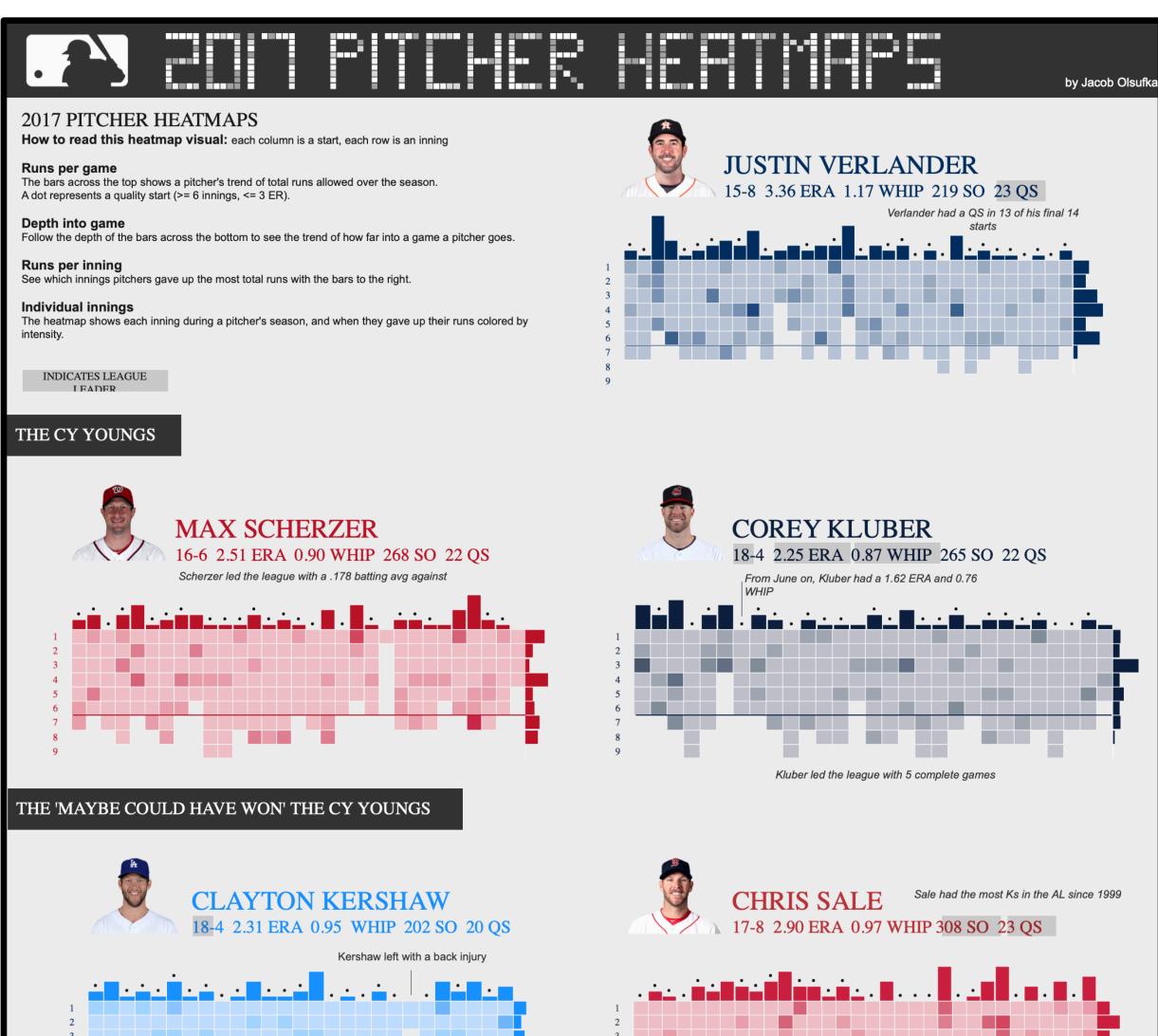
Narrative?

Color, coherency?

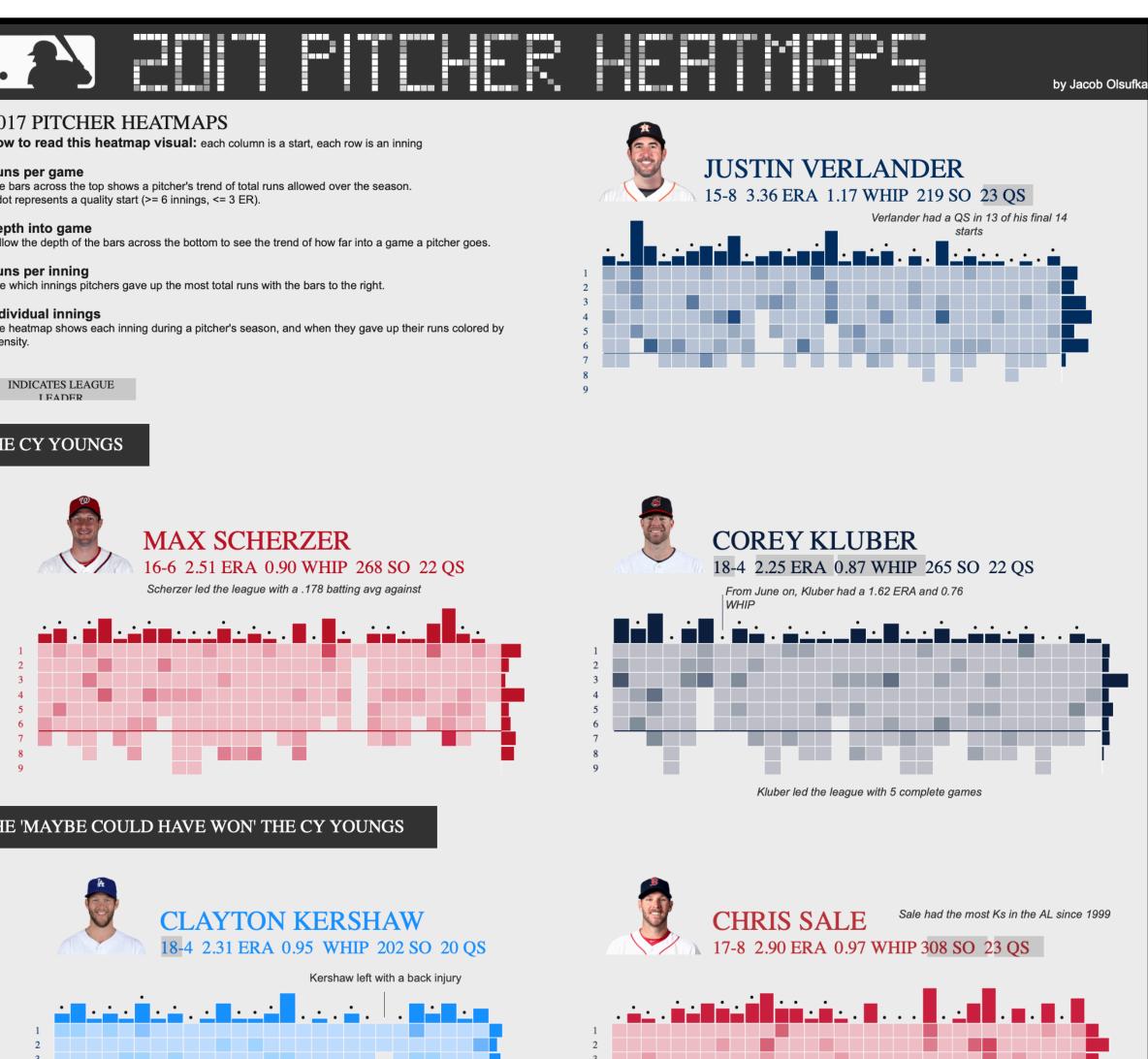
Hierarchy, layering, layout?

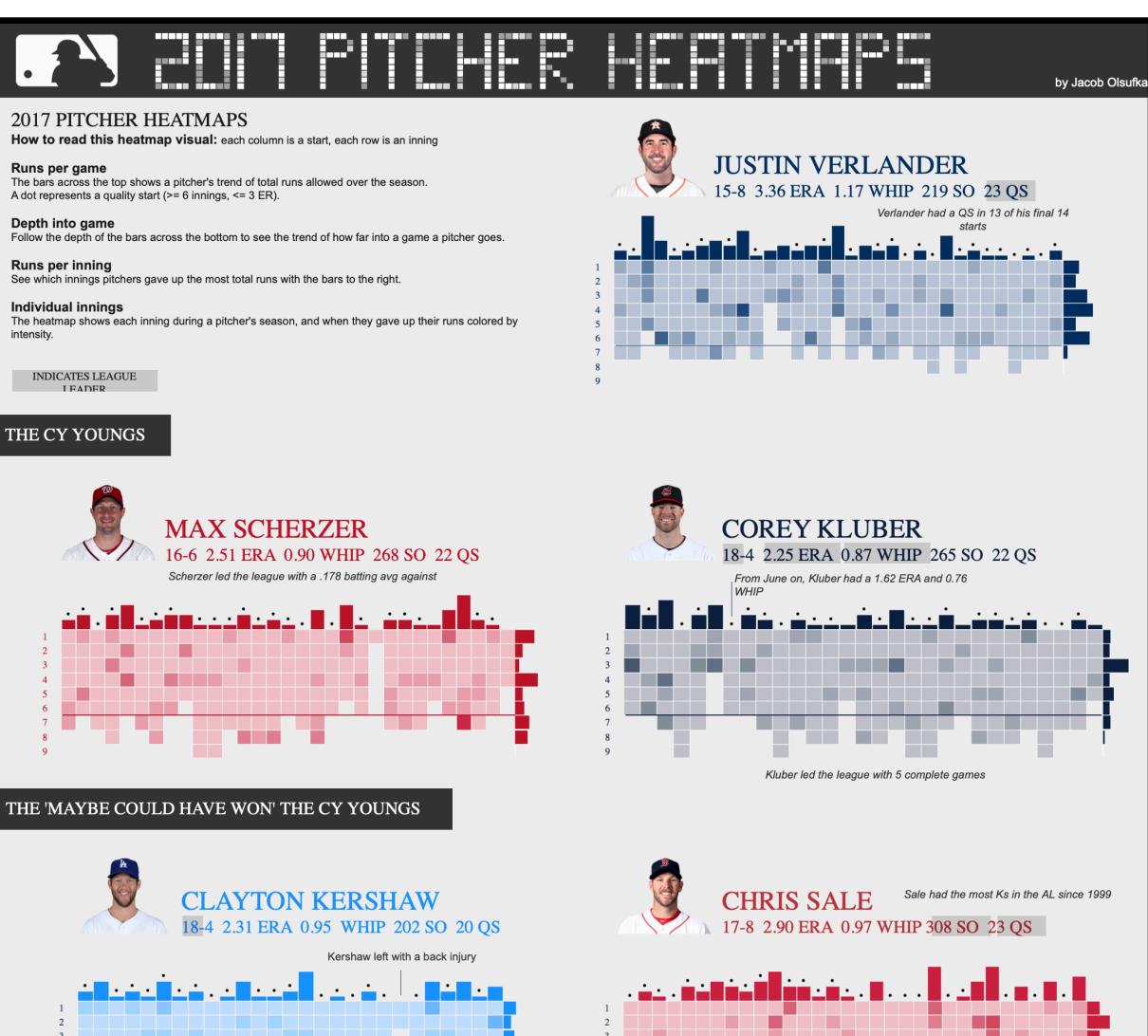
Credibility, transparency?

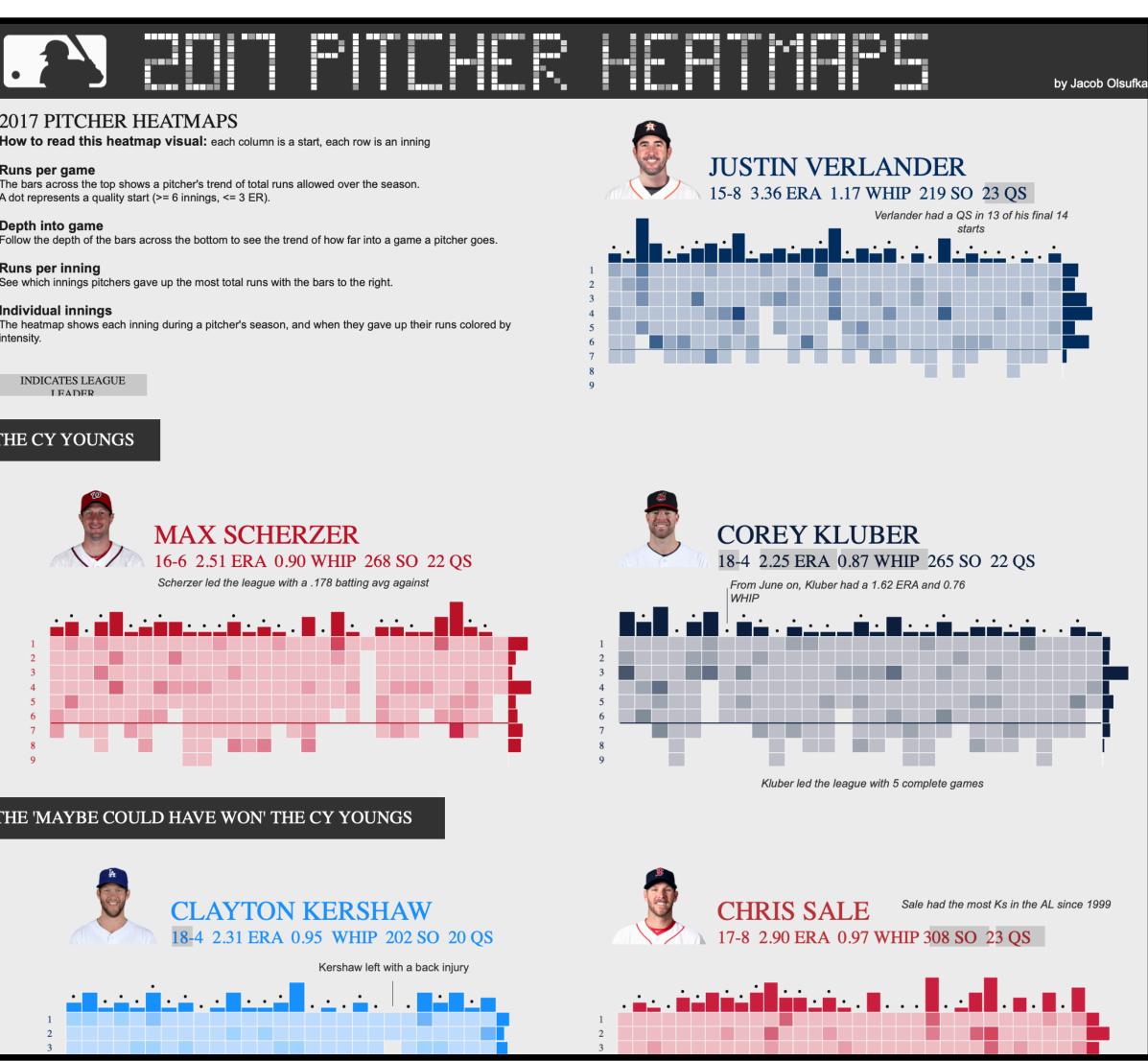
Olsufka, Jacob, 2017 MLB Pitcher Heatmaps. *Tableau Public*. <u>https://public.tableau.com/views/</u> 2017MLBPitcherHeatmaps/ MLB?:language=en&:display_count=y&:origin=viz_share <u>link</u>







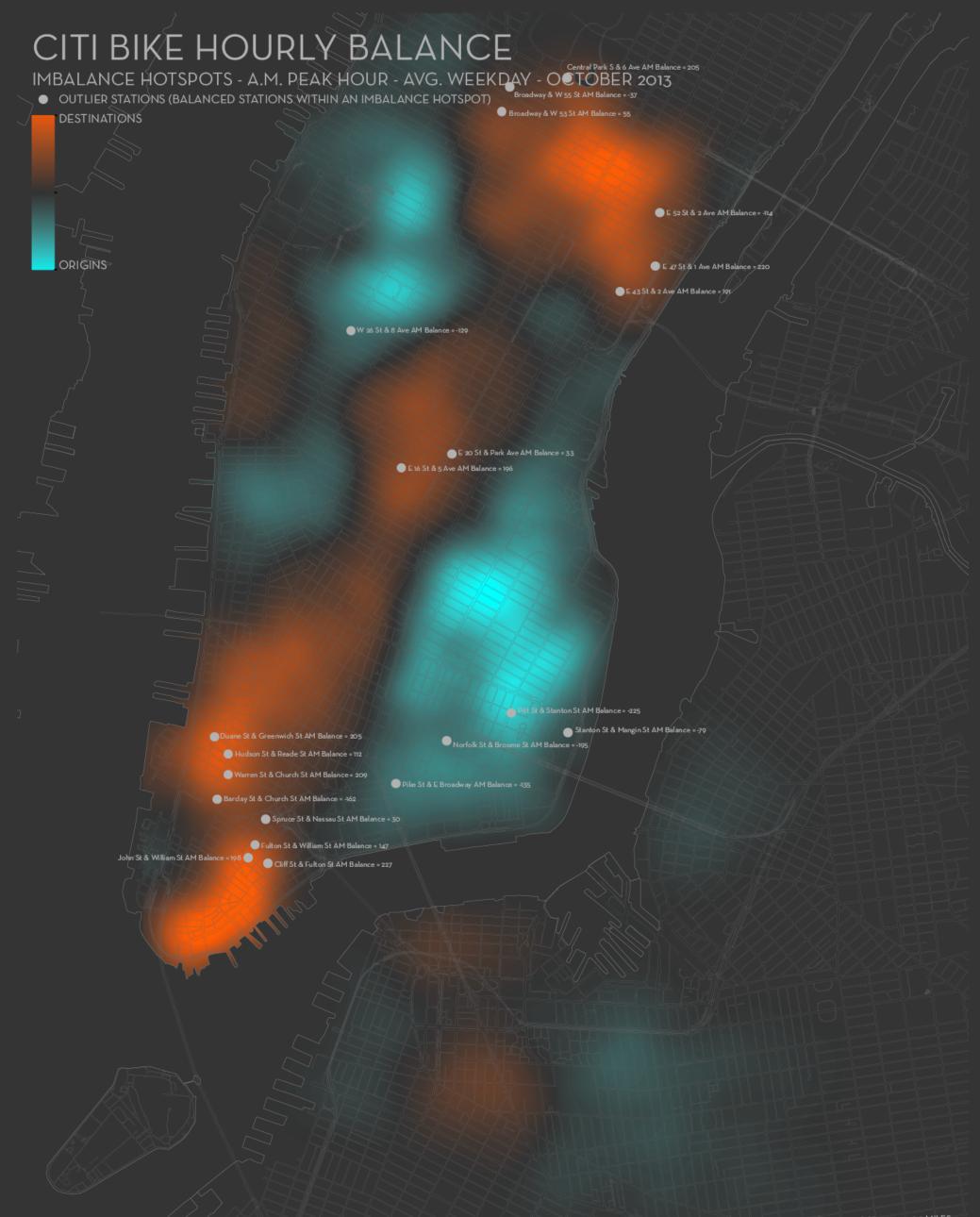




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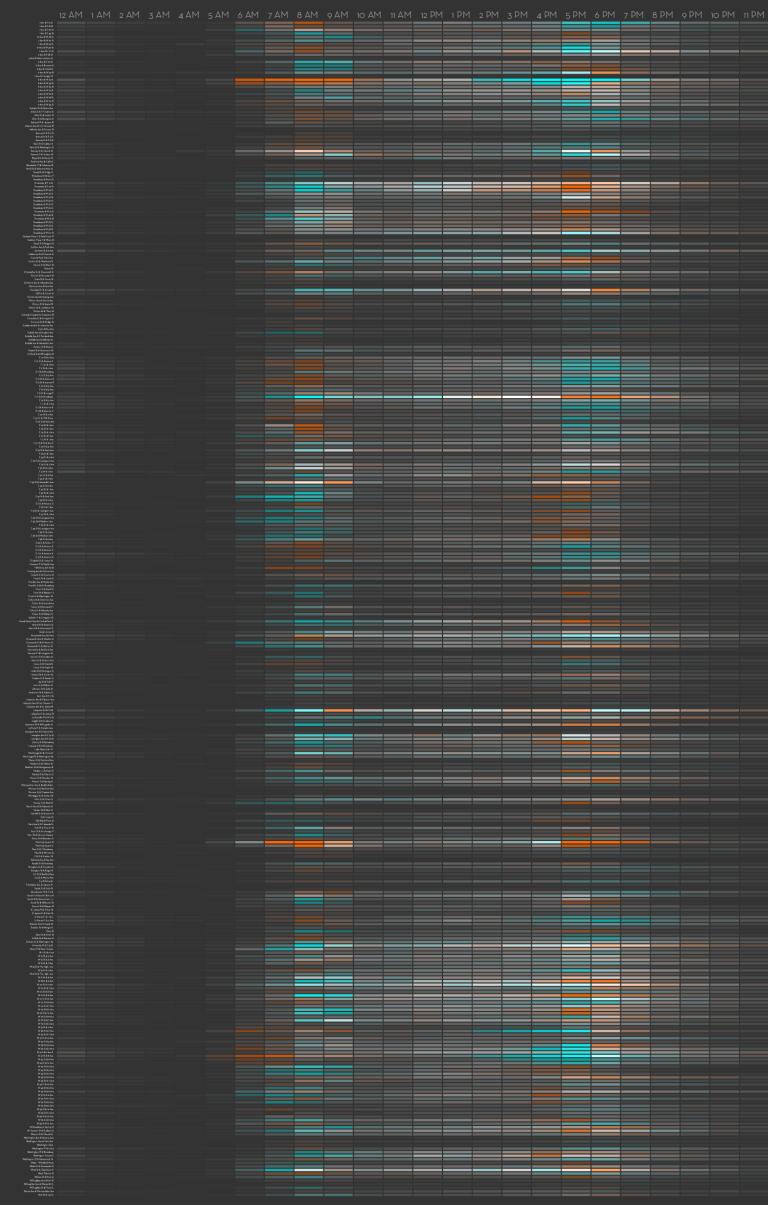
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CITI BIKE HOURLY ACTIVITY AND BALANCE DESTINATIONS ORIGINS

ACTIVITY AND IMBALANCE MATRIX - AVG. WEEKDAY - OCTOBER 2013



SPATIAL INFORMATION DESIGN LAB - GSAPP - COLUMBIA UNIVERSITY

