

Storytelling with Data

Module 9: Frame the story – consumers and information graphics

Scott Spencer

Faculty and Lecturer
Columbia University

Agenda

Upcoming deliverable

Today's objectives

Considering uncertainty

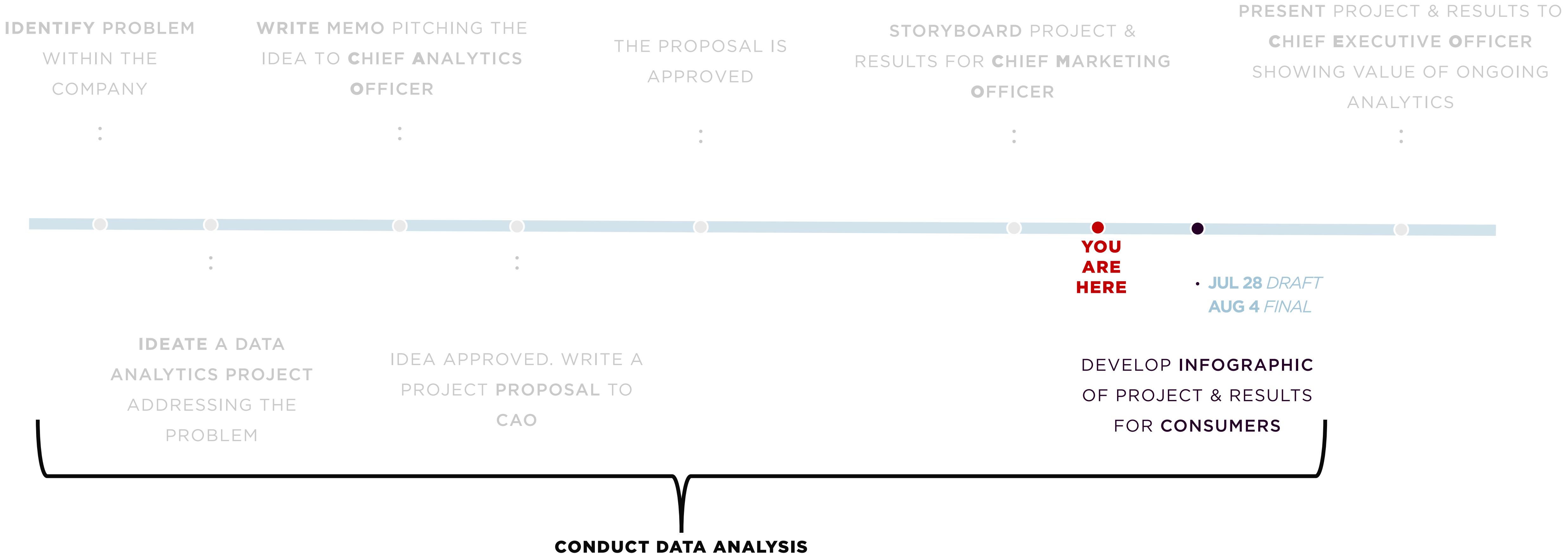
Information graphics

Questions or suggestions?

Upcoming deliverables

Upcoming deliverables

Information graphic – reframe your story, this time building off the messages you built for the marketing team in order to craft an infographic that displays the results of the analytic work in a way that is accessible, engaging, and exciting for a **general or consumer audience**.



Today's Objectives

Objectives

1

Communicating uncertainty
with data visualization

2

Organizing information

3

Use information graphics
to tell a story

Communicating uncertainty

Where's my data? Evaluating Visualizations with Missing Data

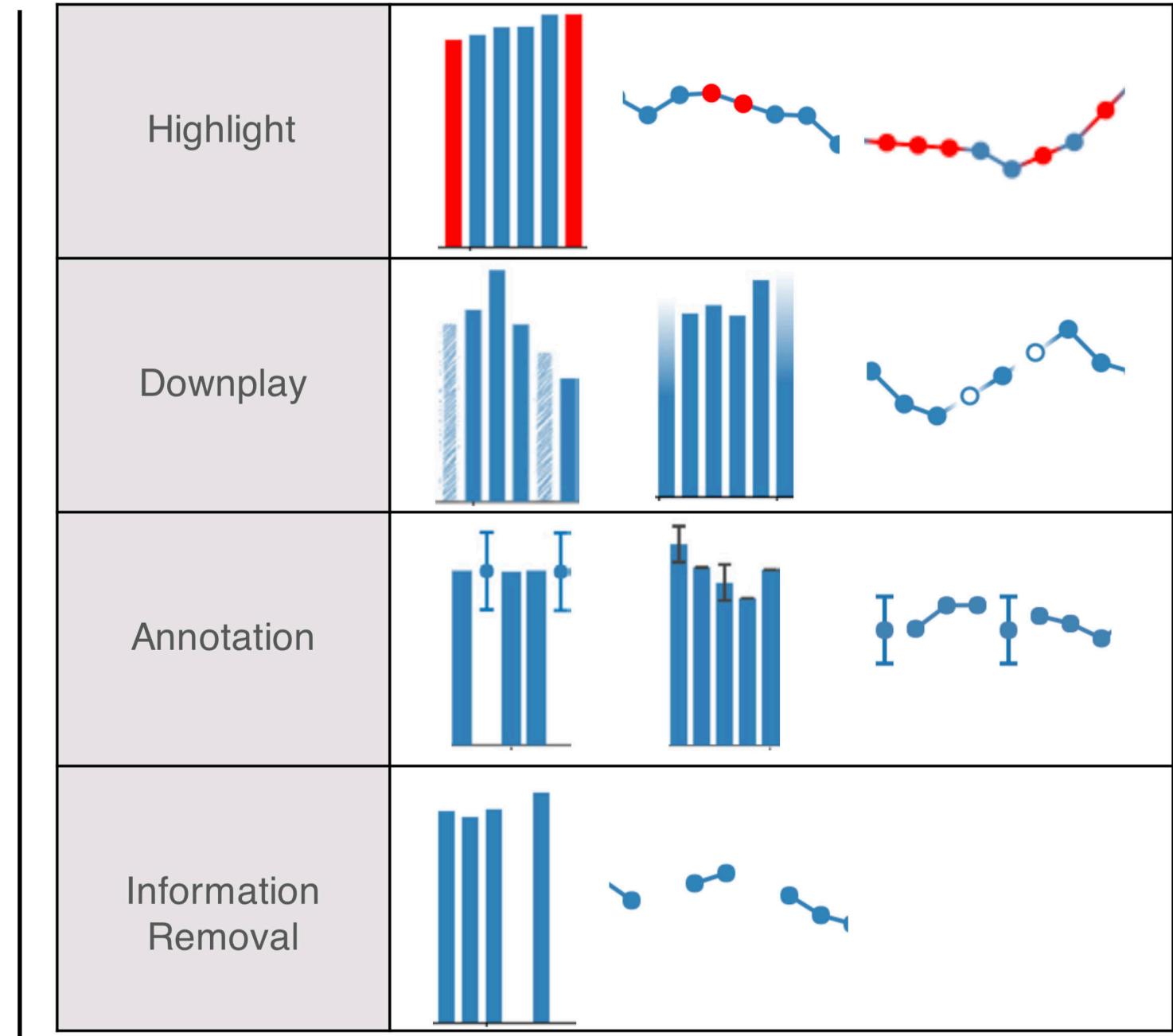
Song & Szafir

The authors were academics at the University of Colorado Boulder.



Visual choices for missing values on perception of data quality

Choice of missing-data visualization alters perceptions of data quality



Perceived data quality and confidence generally degrade as the amount of missing data increases.

Data visualized by **highlighting missing values** tends to be seen as **higher quality than downplay or information removal**.

Information removal can significantly **degrade** perceptions of data quality, and confidence. These methods even lead to incorrect responses if missing values break the visual continuity of a visualization.

Linear interpolation leads to **higher perceptions** of quality and confidence in analysis.

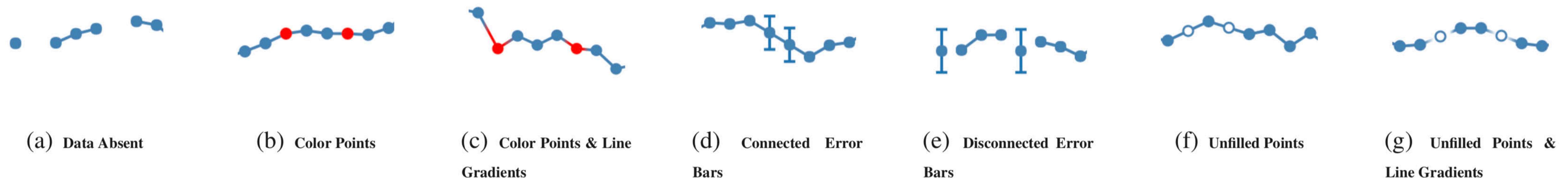


Fig. 4: We tested seven different methods for visualizing missing values in line graphs manipulating both point and line appearance: two highlighting missing values, two downplaying missing values, two annotating missing values, and one removing missing values. .

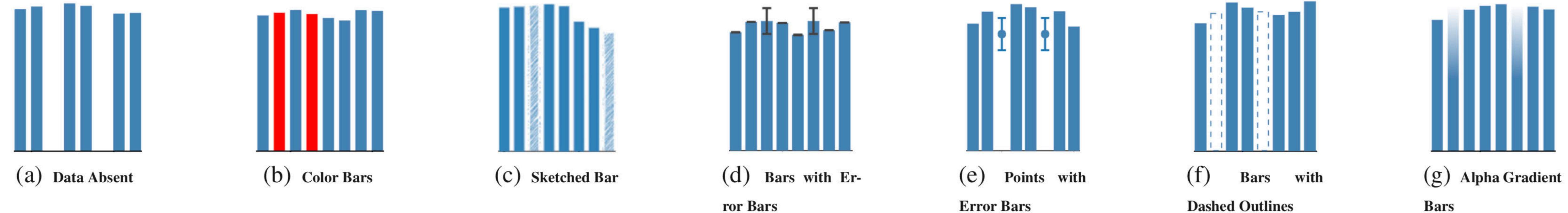


Fig. 6: We tested seven different methods for visualizing missing values in bar charts: one highlighting missing values, three downplaying missing values, two annotating missing values, and one removing missing values.

Imagining Replications

Hullman & co-authors

The authors are part of an academic group formally studying the perception of uncertainty, among other things.



Sketching perception of uncertainty before seeing results improves accuracy

Visualizing uncertainty as set of discrete outcomes improved recall

Crowd-sourced study that evaluated the impact of an interactive, graphical uncertainty prediction technique for communicating uncertainty in results. Users sketched their prediction of the uncertainty in experimental effects prior to viewing the true sampling distribution from an experiment.

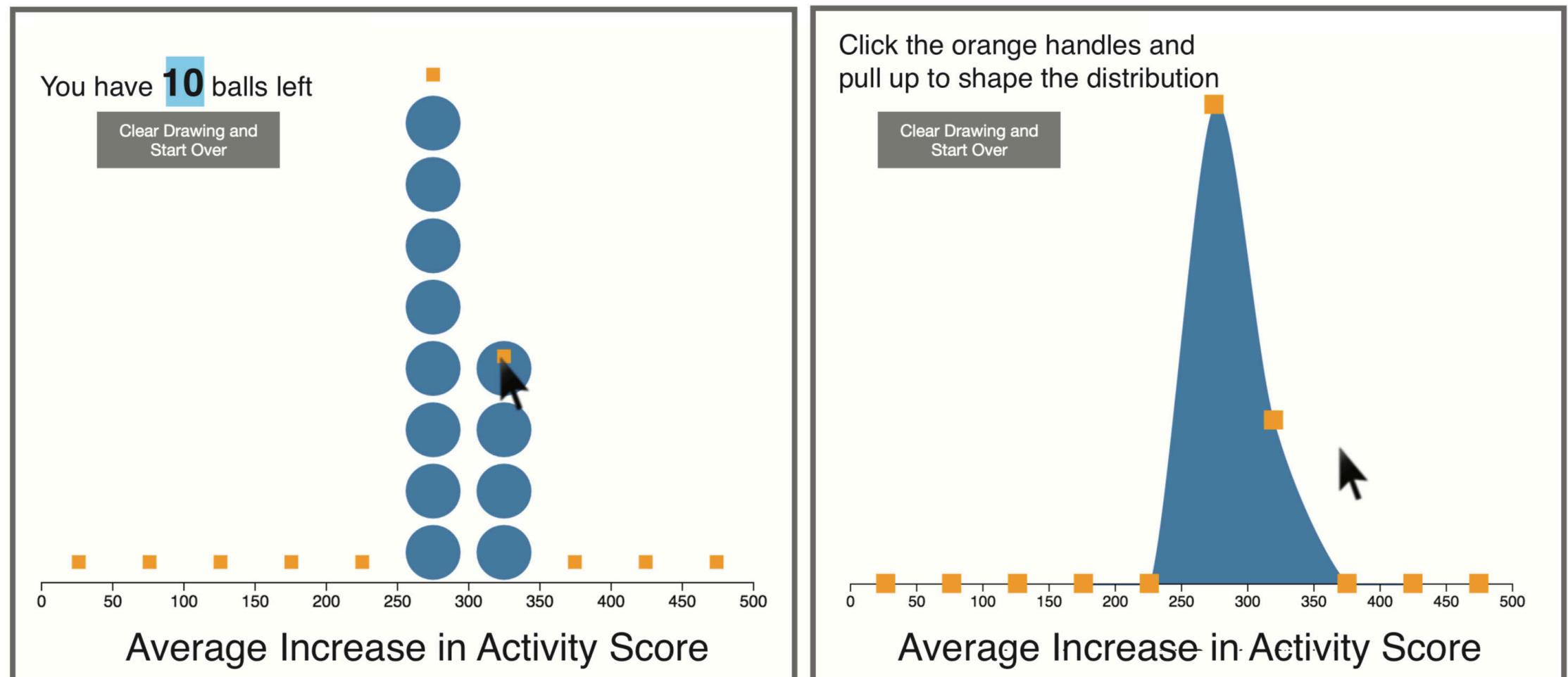


Fig. 1. Discrete and continuous elicitation interface used by participants in our study to predict replication uncertainty.

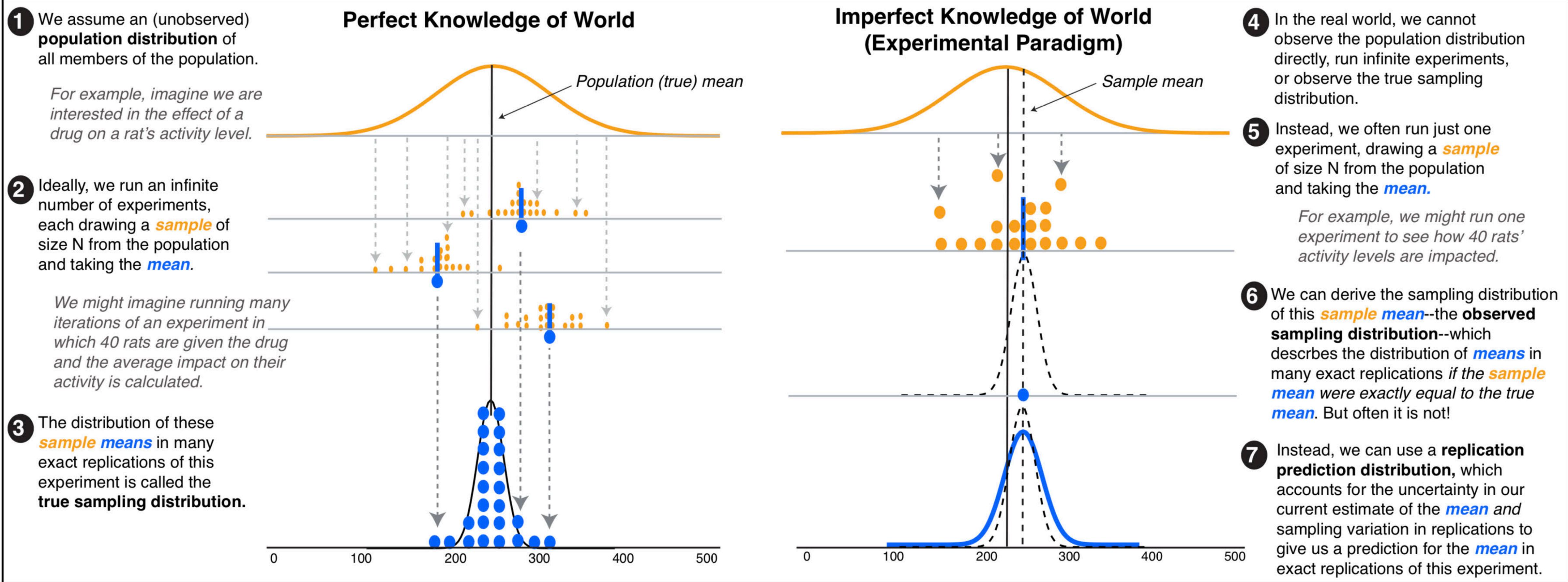


Fig. 2. A depiction of distributions relevant to replication uncertainty, including those based on perfect knowledge of the world (left) and those derived from samples obtained in experimentation (right).

Information graphics

Too broad, generic

infographic n. a visual image such as a chart or diagram used to represent information or data in an easily understandable form.



All

Images

News

Videos

Books

More

Settings

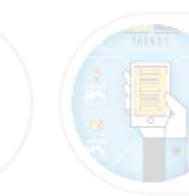
Tools



education



timeline



social media



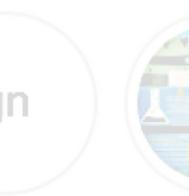
health



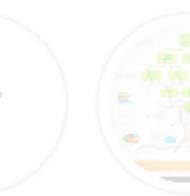
food



design



water



technology



business



process

Want bad examples? Just google.



What is an Infographic? Infograph...
vennagage.com



Reports & Charts Online ...
visme.co



What is an Infographic? Infograph...
vennagage.com



Free Online Infographic Mak...
canva.com



Reports & Charts Online ...
visme.co



Free Online Infographic Mak...
canva.com



Most collect trivia. They lack:
change, complexity, story, design.



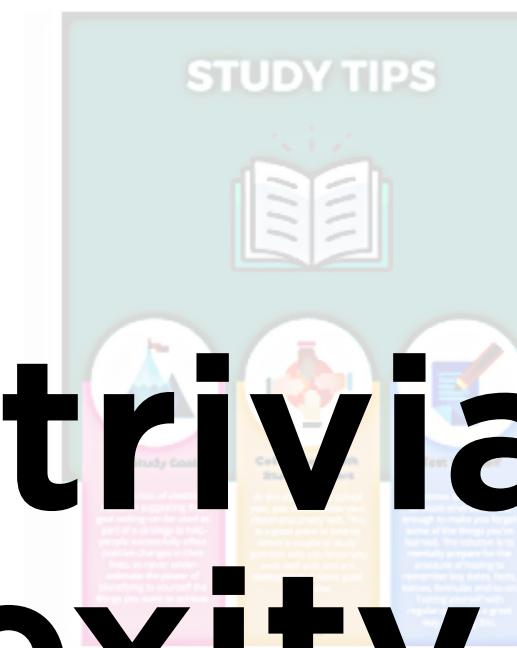
Creating Beautiful Infographic...
blog.hubspot.com



Infographic - Part 1: The 45 ...
advancecardiohealth.org



The 45 Most Popular Infographics of 2016
columnfivemedia.com



Creating Infographics: A ...
edgeforscholars.org



Creating Infographics: A ...
visme.co



A r...
pro:





2017 PITCHER HEATMAPS

by Jacob Olsufka

2017 PITCHER HEATMAPS

How to read this heatmap visual: each column is a start, each row is an inning

Runs per game

The bars across the top shows a pitcher's trend of total runs allowed over the season.
A dot represents a quality start (>= 6 innings, <= 3 ER).

Depth into game

Follow the depth of the bars across the bottom to see the trend of how far into a game a pitcher goes.

Runs per inning

See which innings pitchers gave up the most total runs with the bars to the right.

Individual innings

The heatmap shows each inning during a pitcher's season, and when they gave up their runs colored by intensity.

INDICATES LEAGUE
LEADER

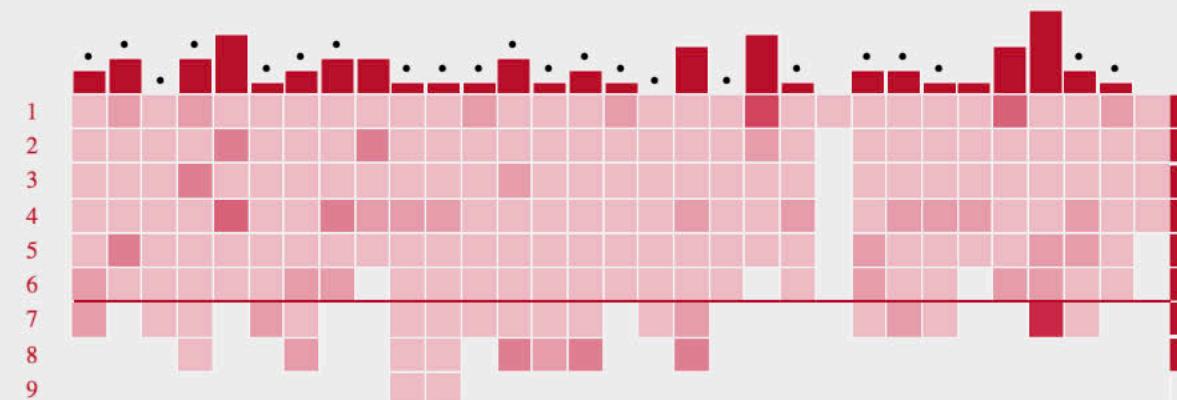
THE CY YOUNGS



MAX SCHERZER

16-6 2.51 ERA 0.90 WHIP 268 SO 22 QS

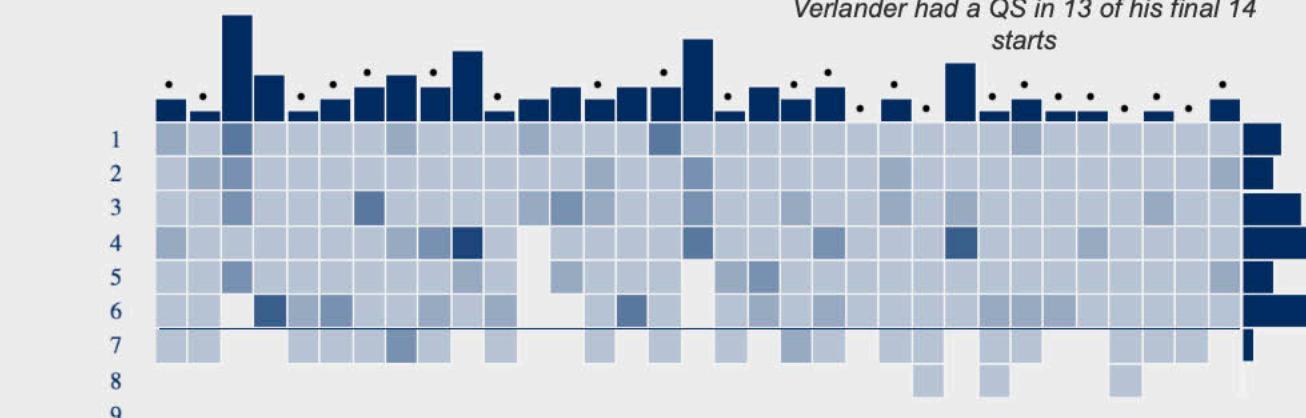
Scherzer led the league with a .178 batting avg against



JUSTIN VERLANDER

15-8 3.36 ERA 1.17 WHIP 219 SO 23 QS

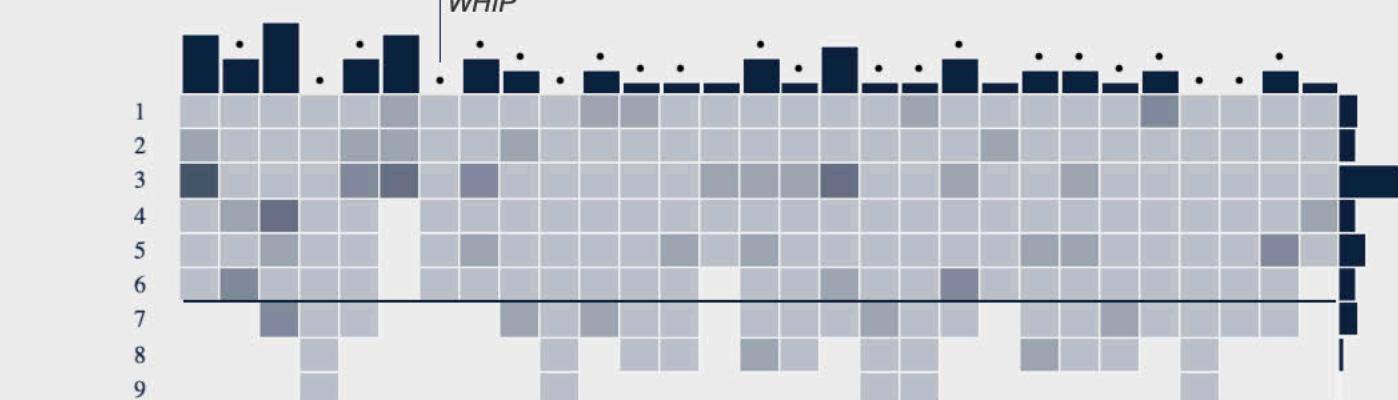
Verlander had a QS in 13 of his final 14 starts



COREY KLUBER

18-4 2.25 ERA 0.87 WHIP 265 SO 22 QS

From June on, Kluber had a 1.62 ERA and 0.76 WHIP



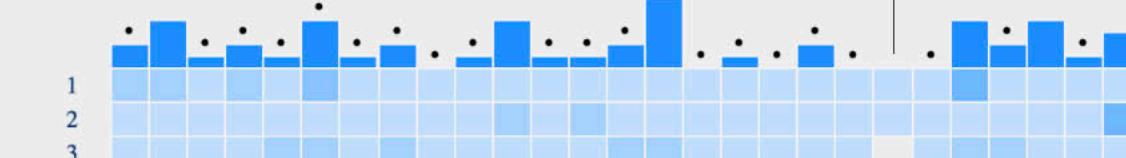
THE 'MAYBE COULD HAVE WON' THE CY YOUNGS



CLAYTON KERSHAW

18-4 2.31 ERA 0.95 WHIP 202 SO 20 QS

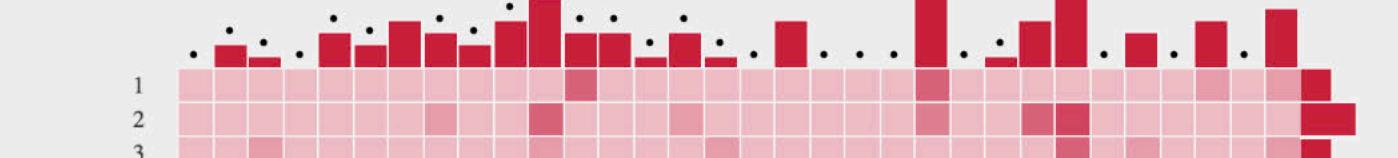
Kershaw left with a back injury



CHRIS SALE

17-8 2.90 ERA 0.97 WHIP 308 SO 23 QS

Sale had the most Ks in the AL since 1999



**Without a narrative,
it's just trivia, list of facts:**



Data-Driven Storytelling

Riche, co-editors

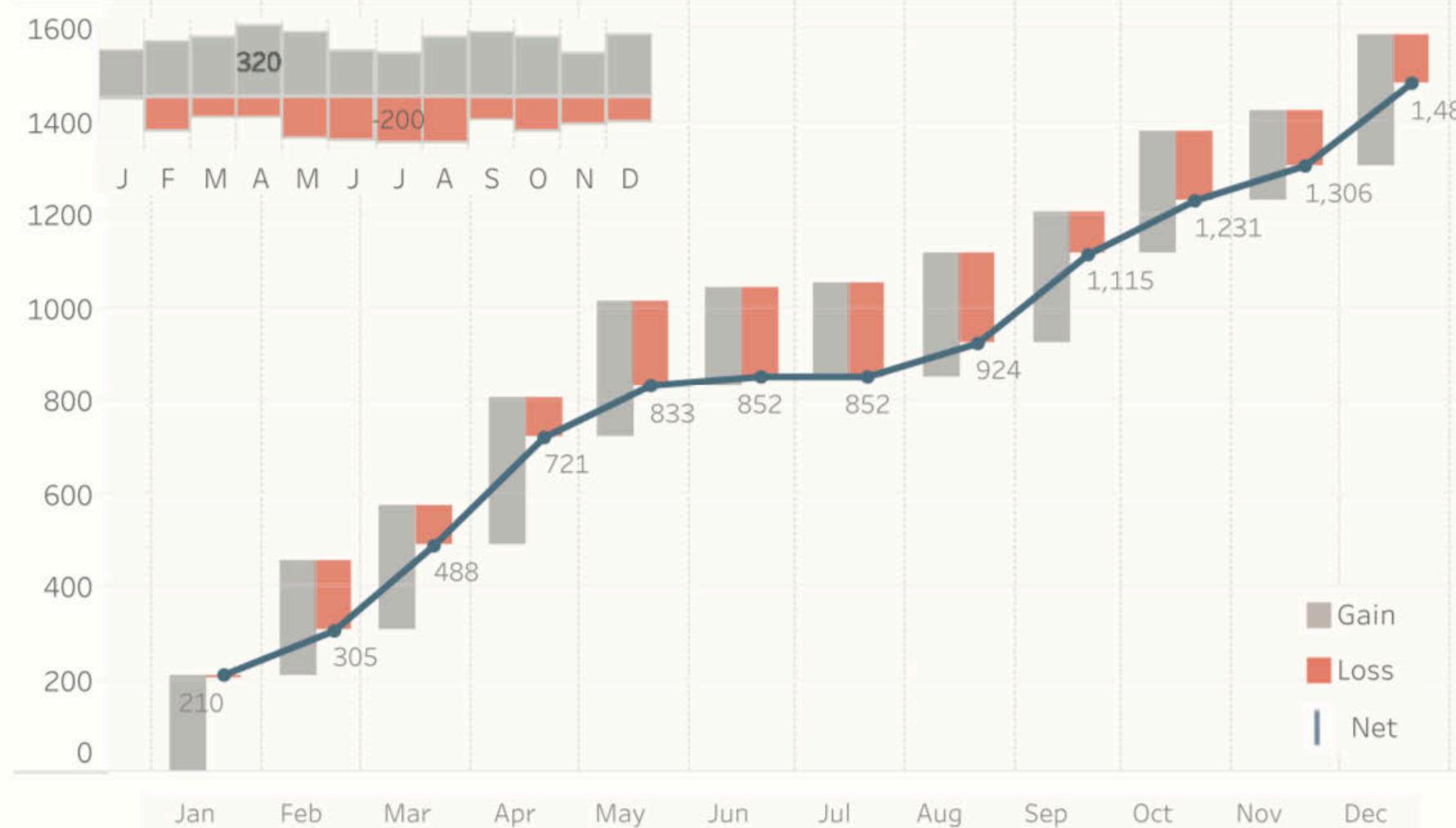
The editors are researchers and professors with focuses on human-computer interaction and information visualization.

“ We differentiated ... “**list of fact**” infographics from the infographics medium as a whole, and chose to **exclude them** because this specific submedium **lacks authorial narrative**. ”

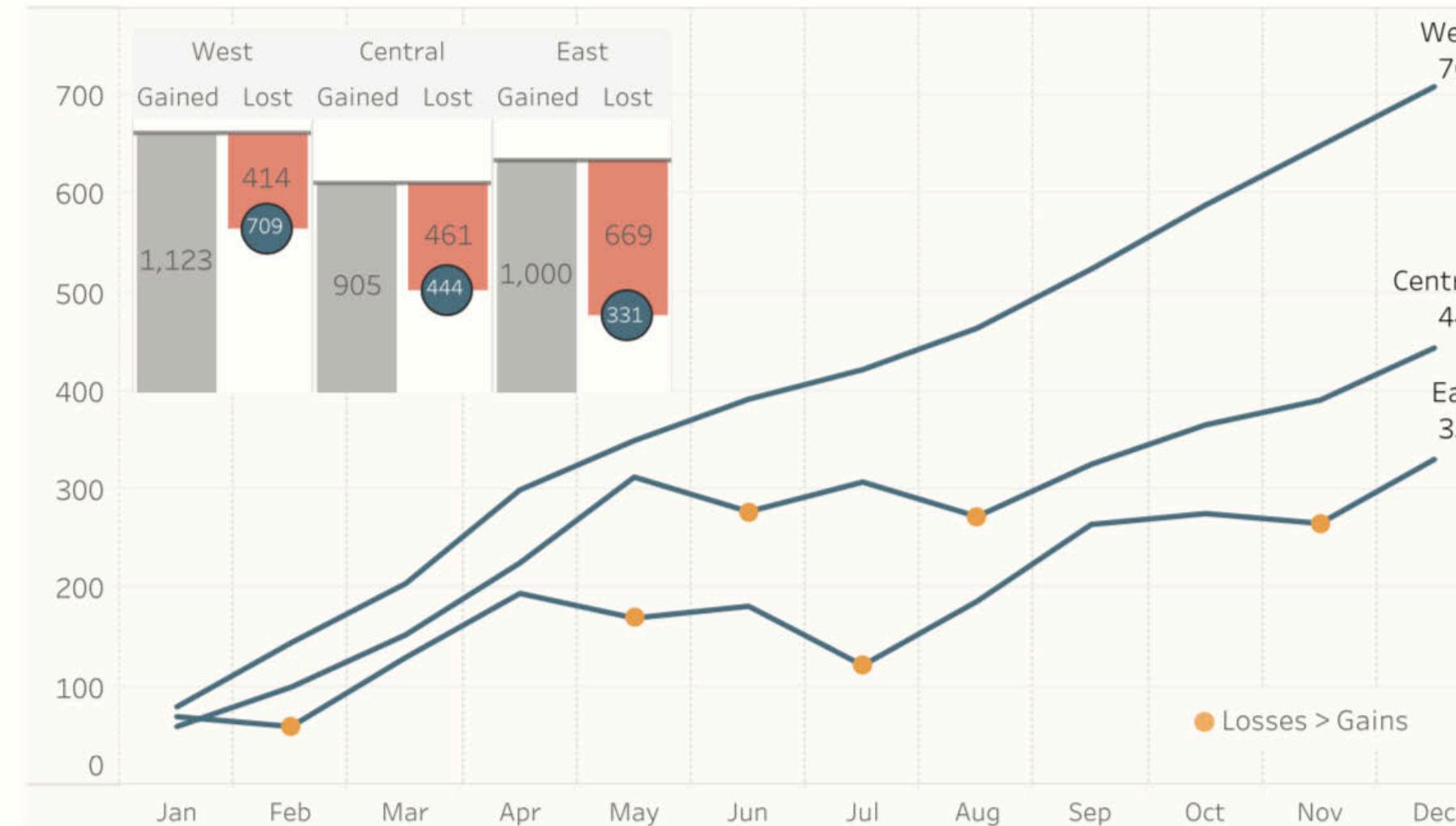
Dashboards, while sometimes a part of an infographic, may lack narrative or story on their own.

Subscriber Churn Analysis

Subscriber activity - All



Net subscriber activity by division



Details

| | | 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 Total | | | | | |
| 3,028 | | | | | |
| -1,544 | | | | | |
| 1,484 | | | | | |

Malofiej—Infographics World Summit

“The Pulitzer Prizes
of Infographics”

Interviews of Malofiej speakers on infographics



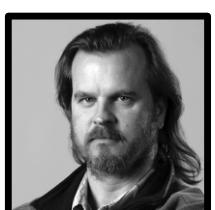
Gregor Aisch

Infographics is an abbreviated form of “information graphics”. It seems to mean a lot of different things to different people. I rarely use the term.



Federica Fragapane

A visual translation of data and information: a language to communicate topics, contents and **stories** to people.



Laris Karklis

Infographics is . . . using visuals **to tell a story**.



Nadieh Bremer

Infographics ... combine graphical elements, such as a drawn portion of an animal, human, map, etc. with small mini **data visualizations** (a small bar chart for example) and **annotations** **to tell a story**.

We want information graphics to ...

Tell a complete story where the purpose is to inform, entertain or persuade the audience. It should:

simple, focused messages

new, surprising information

credible data sources

visually coherent, integrated

use comparisons for context, meaning

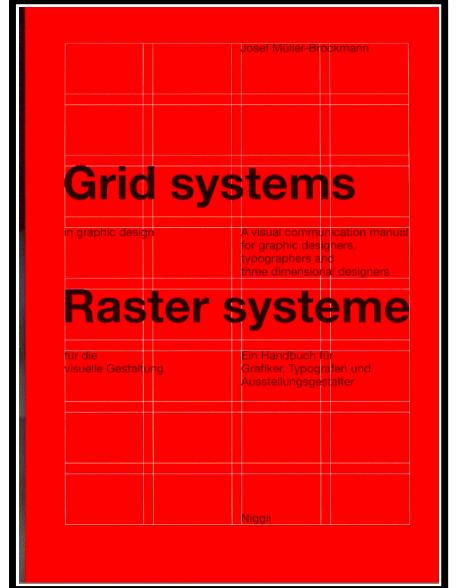
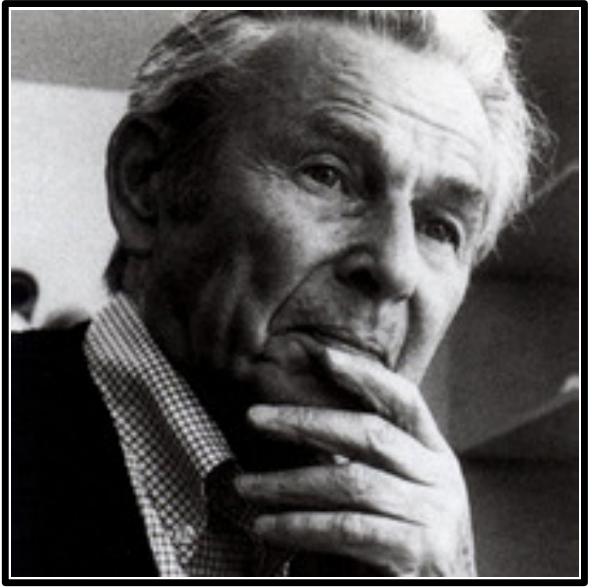
principles of information design, organized

Organizing information graphics

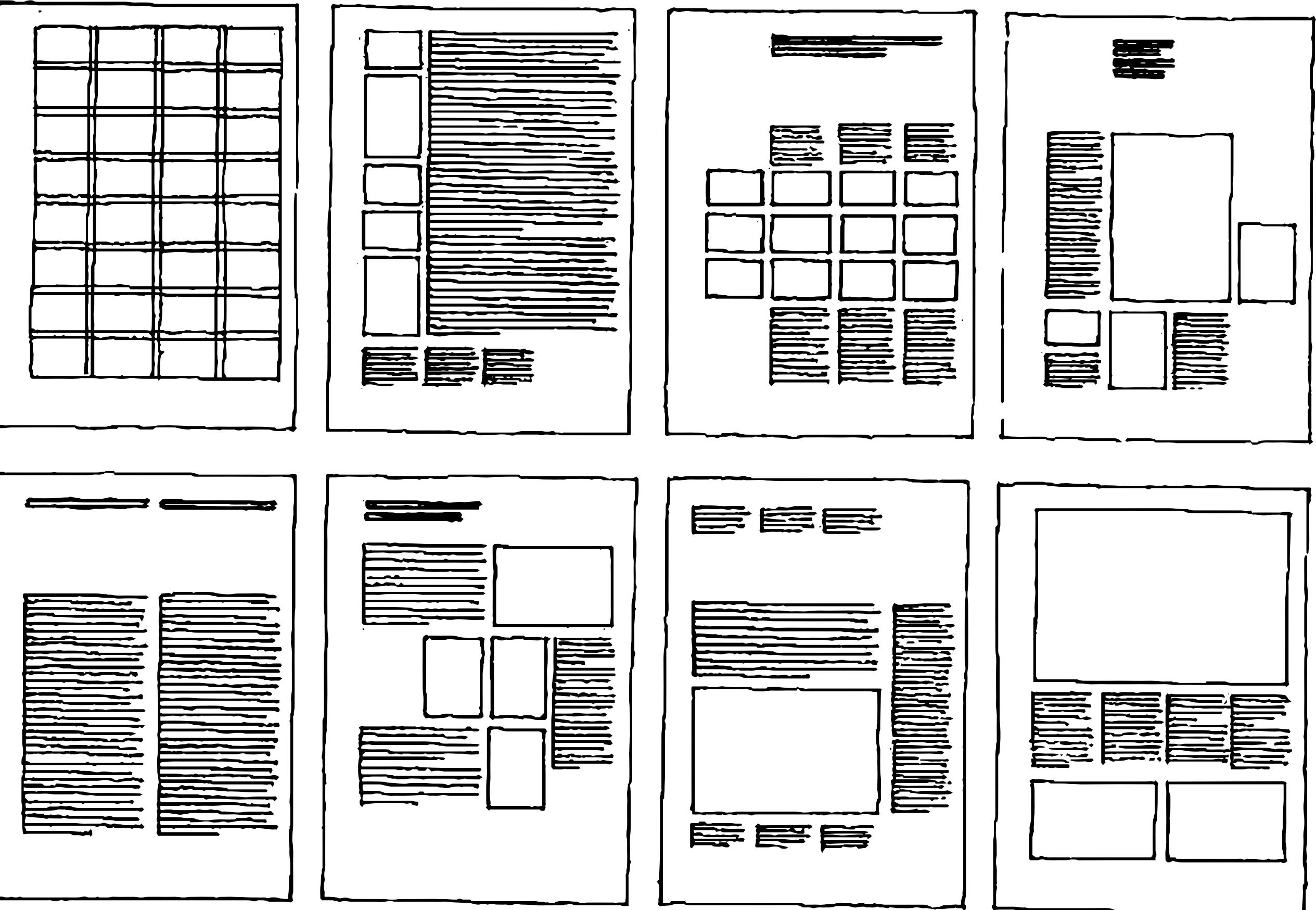
Grid Systems in Graphic Design

Müller-Brockmann

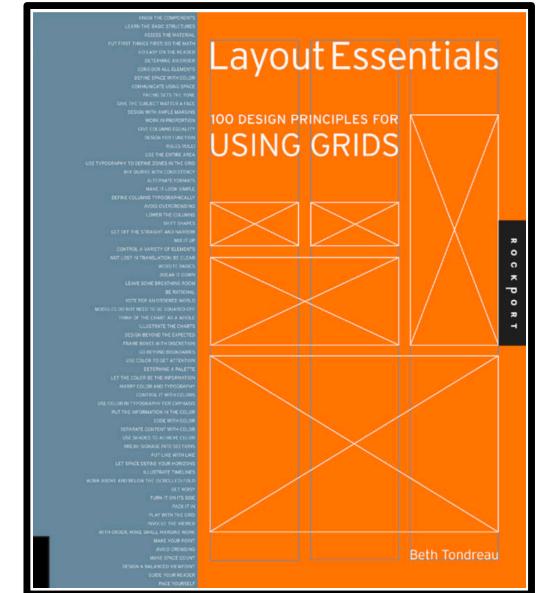
His book, an in-depth analysis of layout in design, is seminal and remains influential among theory of communication through visual design.



Arranging surfaces and spaces into a grid creates conformity among texts, images and diagrams. The size of each implies its importance. Reducing elements in a grid suggests planning, intelligibility, clarity, and orderliness of design. **One grid allows many creative ways to show relationships:**



Orderliness adds credibility to the information and **induces confidence**. Information presented with clear and logically set out titles, subtitles, texts, illustrations and captions will not only be **read more quickly and easily** but the information will also be **better understood**.



Layout Essentials

Tondreau

Before founding a design firm, Tondreau was Design Director at Viking / Penguin publishing company.

Her book on layout essentials helps readers consider information organization.

The main components of a grid are margins, markers, columns, flowlines, spatial zones, and modules.

COLUMNS

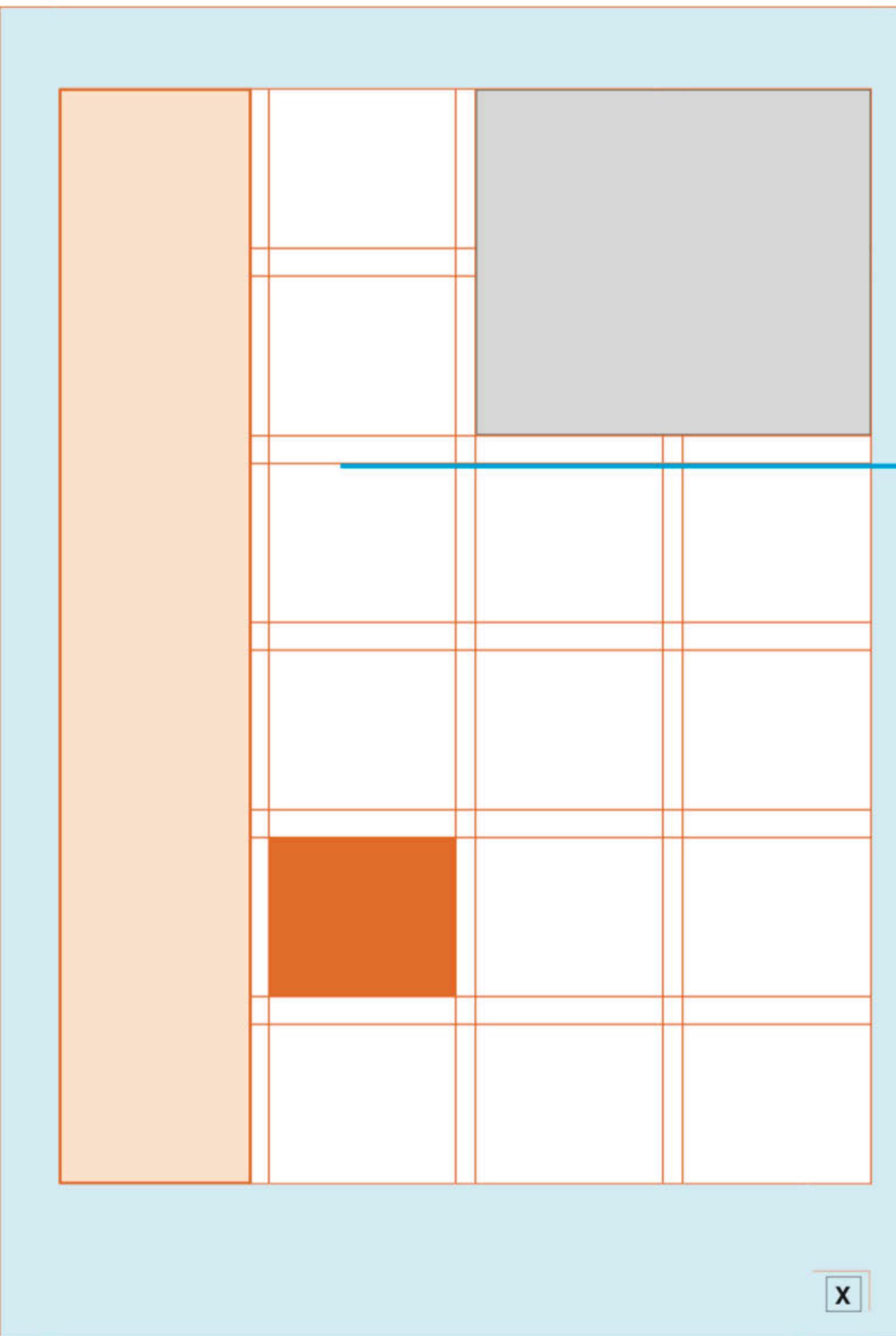
are vertical containers that hold type or images. The width and number of columns on a page or screen can vary, depending on the content.

MODULES

are individual divisions separated by consistent space, providing a repeating, ordered grid. Combining modules can create columns and rows of varying sizes.

MARGINS

are buffer zones. They represent the amount of space between the trim size, including gutter, and the page content. Margins can also house secondary information, such as notes and captions.



SPATIAL ZONES

are groups of modules or columns that can form specific areas for type, ads, images, or other information.

FLOWLINES

are alignments that break space into horizontal bands. Not actual lines, flowlines are a method for using space and elements to guide a reader across a page.

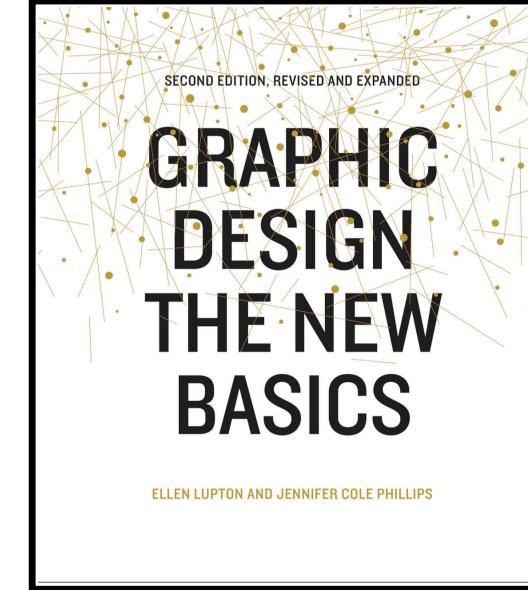
MARKERS

help a reader navigate a document. Indicating placement for material that appears in the same location, markers include page numbers, running heads and feet (headers and footers), and icons.

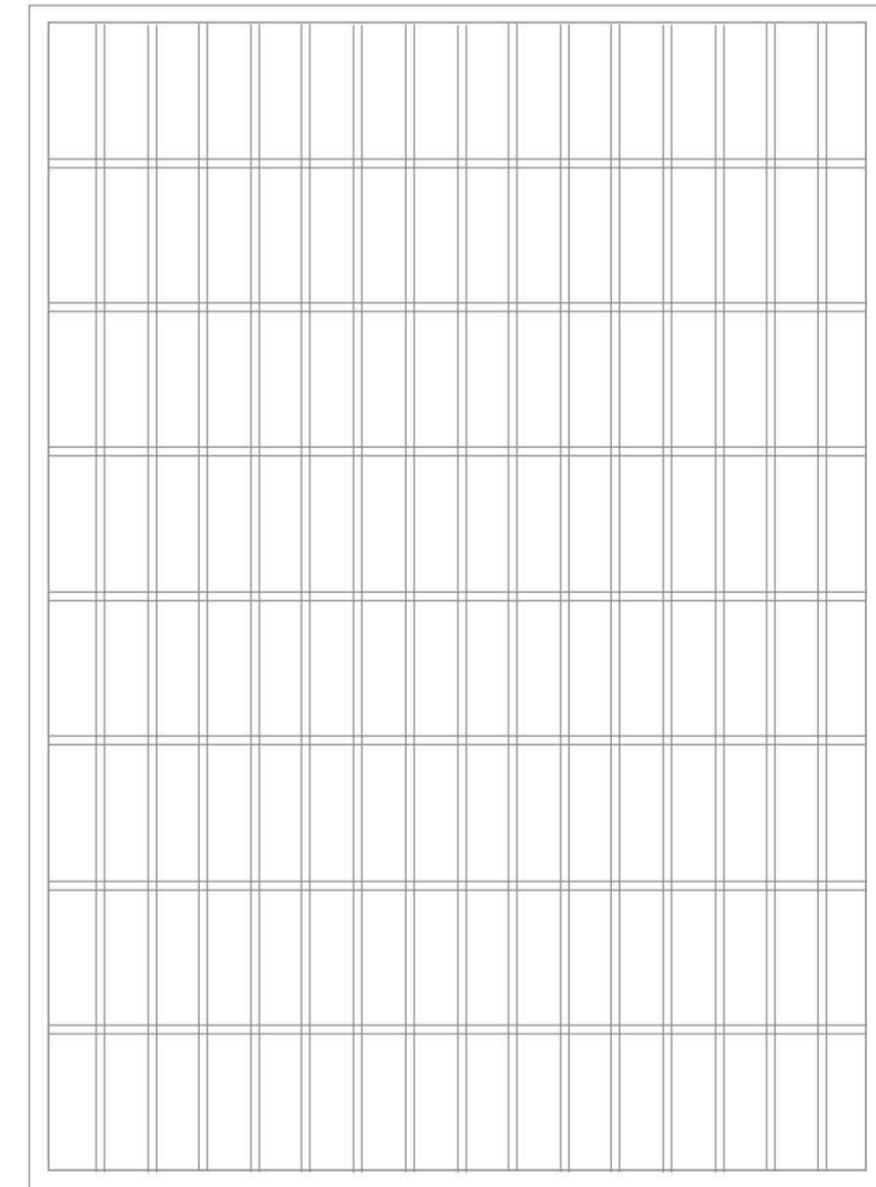
Graphic Design The New Basics

Lupton & Phillips

Lupton is Curator of Contemporary Design, Cooper-Hewitt, National Design Museum, Smithsonian Institution, New York and Director, Graphic Design MFA Program, Maryland Institute College of Art, Baltimore. she is the recipient of numerous awards in design.



Grids provide form to creativity



By marking space into numerous equal units, the grid makes the entire surface available for use; the edges become as important as the center. Grids help designers create active, asymmetrical compositions in place of static, centered ones. By breaking down space into units, grids encourage designers to leave some areas open rather than filling up the whole page.

A well-made grid **encourages the designer to vary the scale and placement of elements** without relying wholly on arbitrary or whimsical judgments. The grid offers a rationale and a starting point for each composition, converting a blank area into a structured field.



Information graphics, examples for discussion

Figurative Map of the successive losses in men of the French Army in the Russian Campaign 1812 ~1813.

Drawn up by M. Minard, Inspector General of Bridges and Roads in retirement.

Paris, November 20, 1869.

The numbers of men present are represented by the widths of the colored zones at a rate of one millimeter for every ten thousand men; they are further written across the zones. The red designates the men who enter into Russia, the black those who leave it. — The information which has served to draw up the map has been extracted from the works of M.M. Thiers, of Séguir, of Fezensac, of Chambray and the unpublished diary of Jacob, pharmacist of the Army since October 28th. In order to better judge with the eye the diminution of the army, I have assumed that the troops of Prince Jérôme and of Marshal Davout who had been detached at Minsk and Moghilev and have rejoined around Orsha and Vitebsk, had always marched with the army.

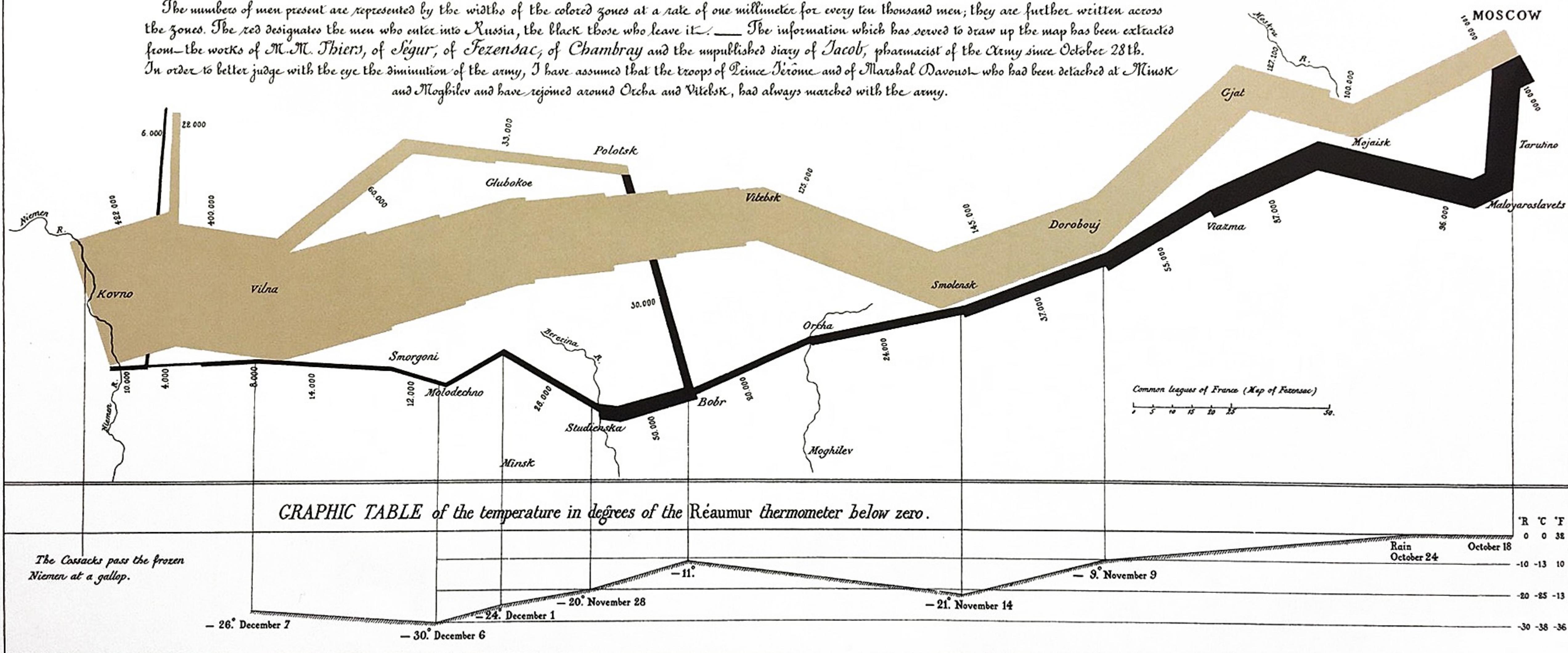
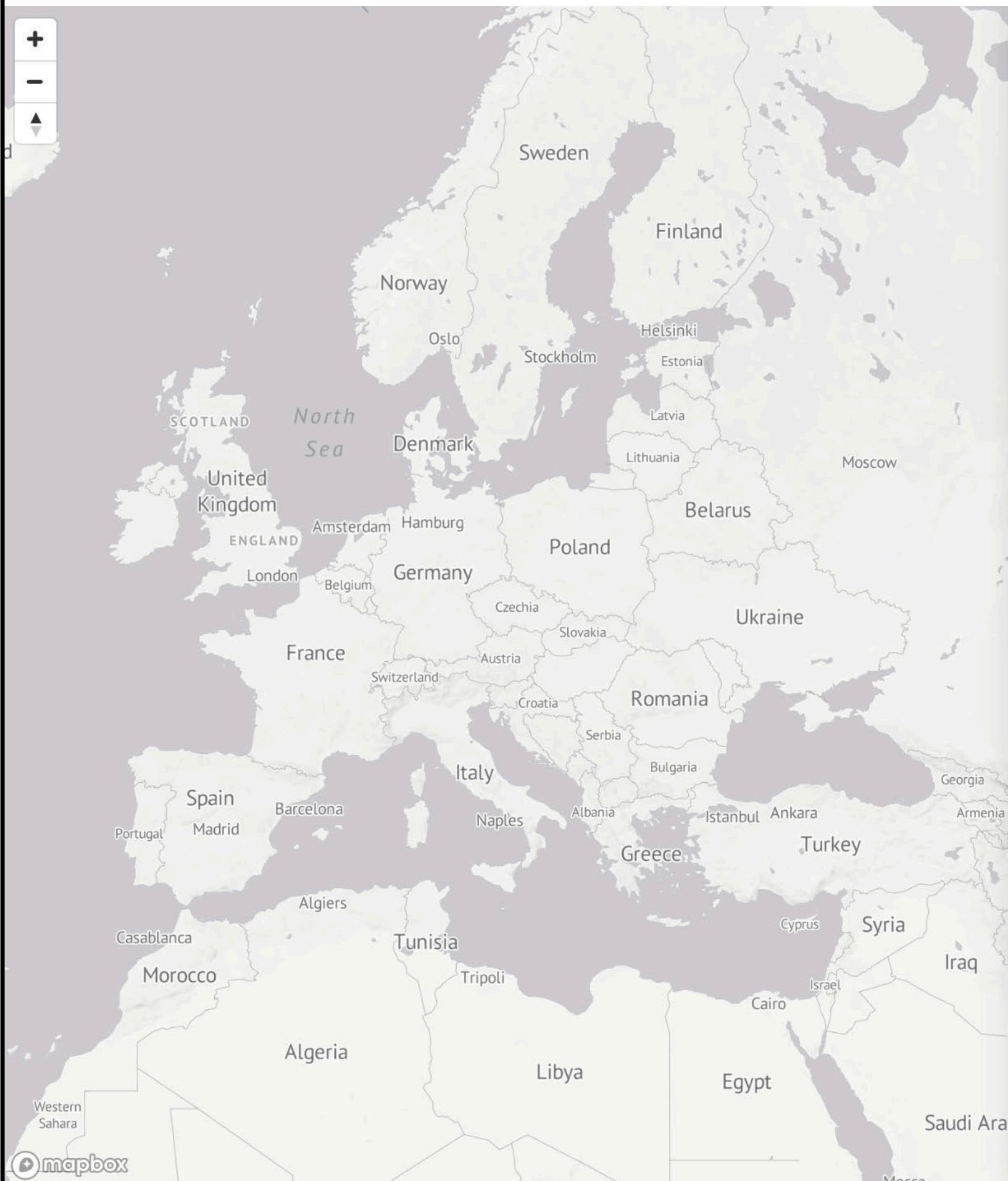


Table 20.1 Napoleon's March Data

| lonc | latc | city | lont | temp | date | lonp | latp | survivors | direction | group |
|------|------|----------------|------|------|--------|------|------|-----------|-----------|-------|
| 24.0 | 55.0 | Kowno | 37.6 | 0 | Oct 18 | 24.0 | 54.9 | 340,000 | A | I |
| 25.3 | 54.7 | Wilna | 36.0 | 0 | Oct 24 | 24.5 | 55.0 | 340,000 | A | I |
| 26.4 | 54.4 | Smorgoni | 33.2 | -9 | Nov 9 | 25.5 | 54.5 | 340,000 | A | I |
| 26.8 | 54.3 | Molodexno | 32.0 | -21 | Nov 14 | 26.0 | 54.7 | 320,000 | A | I |
| 27.7 | 55.2 | Gloubokoe | 29.2 | -11 | | 27.0 | 54.8 | 300,000 | A | I |
| 27.6 | 53.9 | Minsk | 28.5 | -20 | Nov 28 | 28.0 | 54.9 | 280,000 | A | I |
| 28.5 | 54.3 | Studienska | 27.2 | -24 | Dec 1 | 28.5 | 55.0 | 240,000 | A | I |
| 28.7 | 55.5 | Polotzk | 26.7 | -30 | Dec 6 | 29.0 | 55.1 | 210,000 | A | I |
| 29.2 | 54.4 | Bobr | 25.3 | -26 | Dec 7 | 30.0 | 55.2 | 180,000 | A | I |
| 30.2 | 55.3 | Witebsk | | | | 30.3 | 55.3 | 175,000 | A | I |
| 30.4 | 54.5 | Orscha | | | | 32.0 | 54.8 | 145,000 | A | I |
| 30.4 | 53.9 | Mohilow | | | | 33.2 | 54.9 | 140,000 | A | I |
| 32.0 | 54.8 | Smolensk | | | | 34.4 | 55.5 | 127,100 | A | I |
| 33.2 | 54.9 | Dorogobouge | | | | 35.5 | 55.4 | 100,000 | A | I |
| 34.3 | 55.2 | Wixma | | | | 36.0 | 55.5 | 100,000 | A | I |
| 34.4 | 55.5 | Chjat | | | | 37.6 | 55.8 | 100,000 | A | I |
| 36.0 | 55.5 | Mojaisk | | | | 37.7 | 55.7 | 100,000 | R | I |
| 37.6 | 55.8 | Moscou | | | | 37.5 | 55.7 | 98,000 | R | I |
| 36.6 | 55.3 | Tarantino | | | | 37.0 | 55.0 | 97,000 | R | I |
| 36.5 | 55.0 | Malo-jarosewli | | | | 36.8 | 55.0 | 96,000 | R | I |
| | | | | | | 35.4 | 55.3 | 87,000 | R | I |
| | | | | | | 34.3 | 55.2 | 55,000 | R | I |
| | | | | | | 33.3 | 54.8 | 37,000 | R | I |
| | | | | | | 32.0 | 54.6 | 24,000 | R | I |
| | | | | | | 30.4 | 54.4 | 20,000 | R | I |
| | | | | | | 29.2 | 54.3 | 20,000 | R | I |
| | | | | | | 28.5 | 54.2 | 20,000 | R | I |
| | | | | | | 28.3 | 54.3 | 20,000 | R | I |
| | | | | | | 27.5 | 54.5 | 20,000 | R | I |
| | | | | | | 26.8 | 54.3 | 12,000 | R | I |
| | | | | | | 26.4 | 54.4 | 14,000 | R | I |
| | | | | | | 25.0 | 54.4 | 8,000 | R | I |
| | | | | | | 24.4 | 54.4 | 4,000 | R | I |
| | | | | | | 24.2 | 54.4 | 4,000 | R | I |
| | | | | | | 24.1 | 54.4 | 4,000 | R | I |
| | | | | | | 24.0 | 55.1 | 60,000 | A | II |
| | | | | | | 24.5 | 55.2 | 60,000 | A | II |
| | | | | | | 25.5 | 54.7 | 60,000 | A | II |
| | | | | | | 26.6 | 55.7 | 40,000 | A | II |
| | | | | | | 27.4 | 55.6 | 33,000 | A | II |
| | | | | | | 28.7 | 55.5 | 33,000 | A | II |
| | | | | | | 28.7 | 55.5 | 33,000 | R | II |
| | | | | | | 29.2 | 54.2 | 30,000 | R | II |
| | | | | | | 28.5 | 54.1 | 30,000 | R | II |
| | | | | | | 28.3 | 54.2 | 28,000 | R | II |
| | | | | | | 24.0 | 55.2 | 22,000 | A | III |
| | | | | | | 24.5 | 55.3 | 22,000 | A | III |
| | | | | | | 24.6 | 55.8 | 6,000 | A | III |
| | | | | | | 24.6 | 55.8 | 6,000 | R | III |
| | | | | | | 24.2 | 54.4 | 6,000 | R | III |
| | | | | | | 24.1 | 54.4 | 6,000 | R | III |

Winner, Information is Beautiful Award

TASS



TASS



1812

WHEN NAPOLEON VENTURED EAST

HOW THE 1812 PATRIOTIC WAR TURNED NAPOLEON'S GRAND ARMY INTO A HANDFUL OF SURVIVORS

PYC ENG



Nobels no degrees

This visualization explores Nobel Prizes and graduate qualifications from 1901 to 1912, by analysing the age of recipients at the time prizes were awarded, average age evolution through time and among categories, graduation grades, main university affiliations and the principal hometowns of the graduates.



How to read it?

Each dot represents a Nobel laureate, each recipient is positioned according to the year the prize was awarded (x axis) and age of the person at the time of the award (y axis).

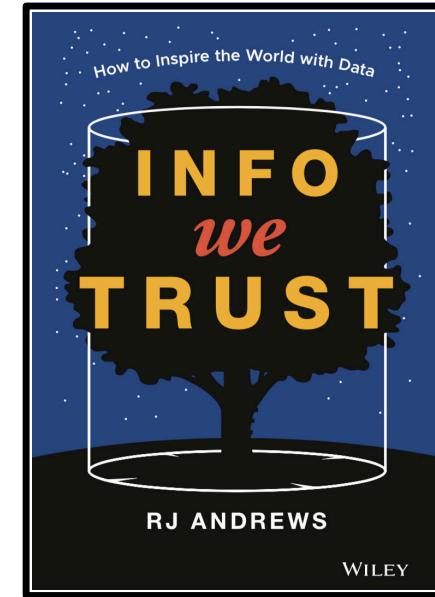


Winner, Information is Beautiful Award

Lupi, Fragapane

The co-authors work together at Lupi's design firm, whom we've previously met when considering this visualization.

The visualization has been designed and produced by Accurat (www.accurat.it), and was originally published in Italian on La Lettura the sunday cultural supplement of Corriere della Sera.

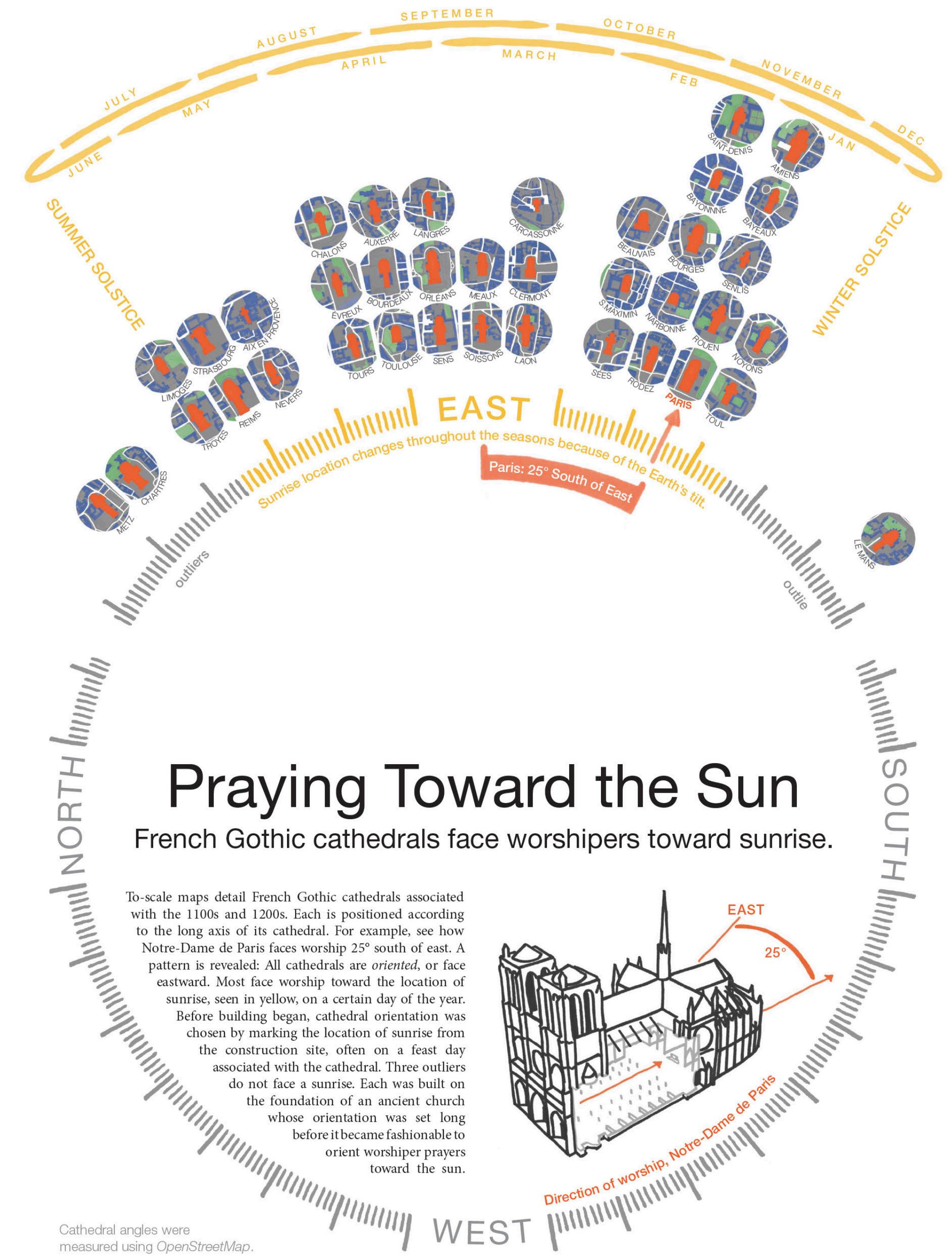


Info We Trust

How to inspire the world with data

Andrews

He is a data storyteller. His book is an adventure exploring how to inspire the world with data. RJ is the creator of www.infowetrust.com, where he makes available some of his data stories.

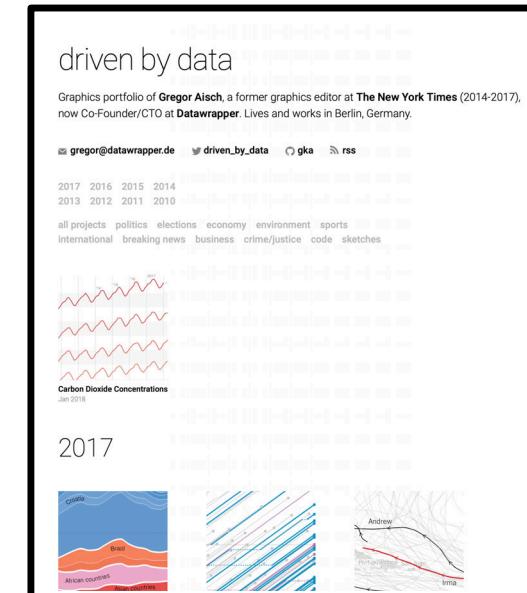


The Cost of Mobile Ads on 50 News Websites

By GREGOR AISCH, WILSON ANDREWS and JOSH KELLER OCT. 1, 2015

Ad blockers, which Apple first allowed on the iPhone in September, promise to conserve data and make websites load faster. But how much of your mobile data comes from advertising? We measured the mix of **advertising** and editorial on the mobile home pages of the top 50 news websites – including ours – and found that **more than half of all data came from ads** and other content filtered by ad blockers. Not all of the news websites were equal. [RELATED ARTICLE](#)

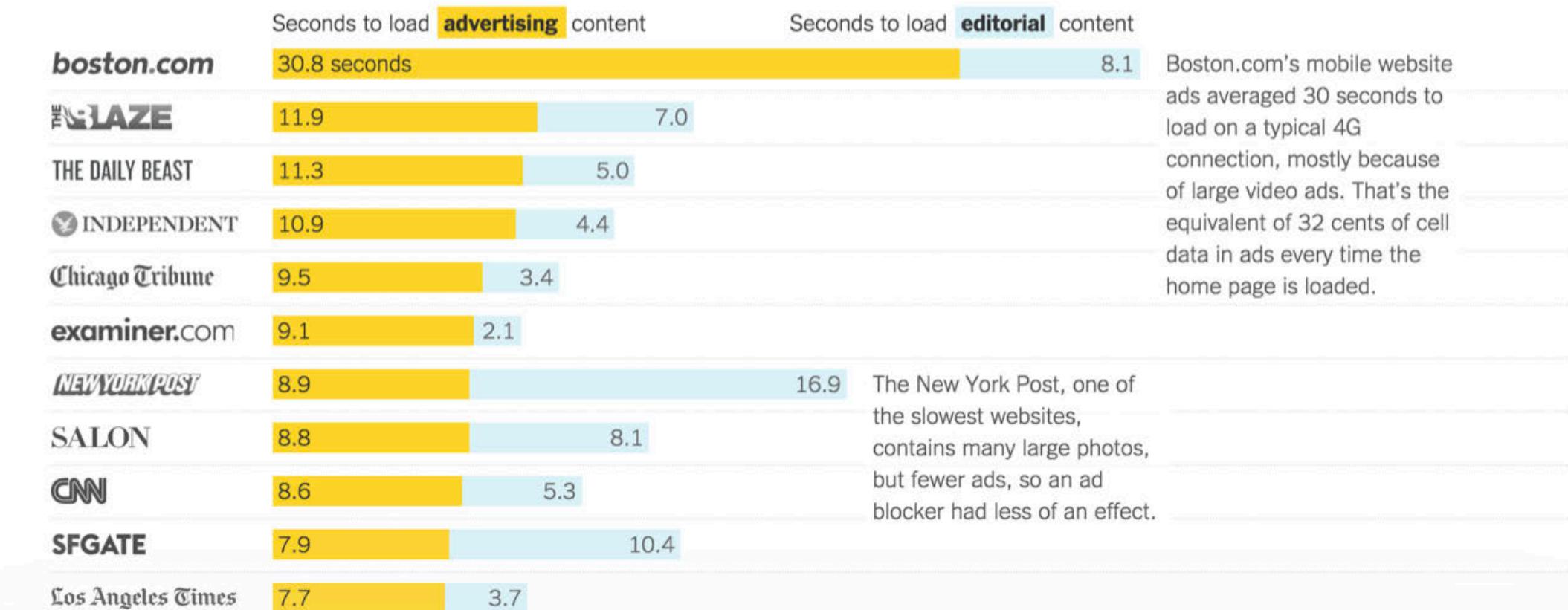
| Estimated load time on a 4G LTE network | Data usage to load mobile home page | Cost per page on a typical data plan |
|--|--|---|
|--|--|---|



Graphics portfolio, NYT Infographic

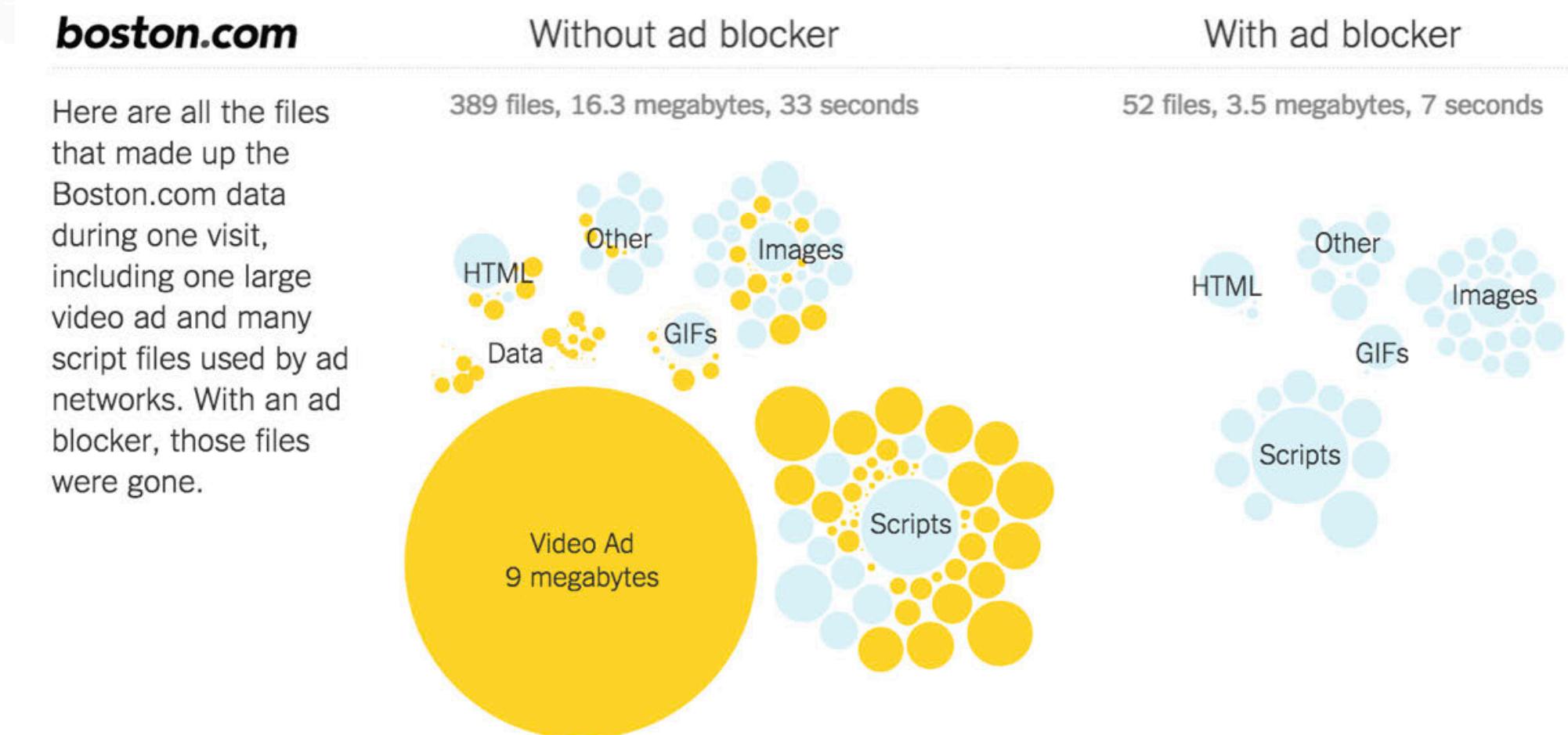
Aisch

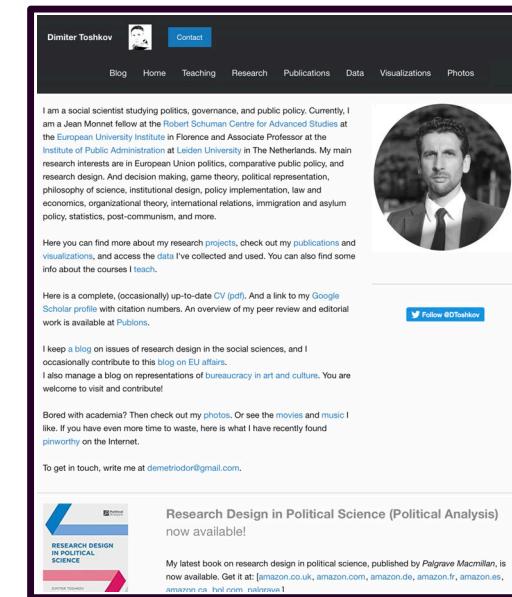
Gregor was graphics editor at the NY Times, and recipient of infographics awards at Malofiej.



Boston.com's mobile website ads averaged 30 seconds to load on a typical 4G connection, mostly because of large video ads. That's the equivalent of 32 cents of cell data in ads every time the home page is loaded.

The New York Post, one of the slowest websites, contains many large photos, but fewer ads, so an ad blocker had less of an effect.



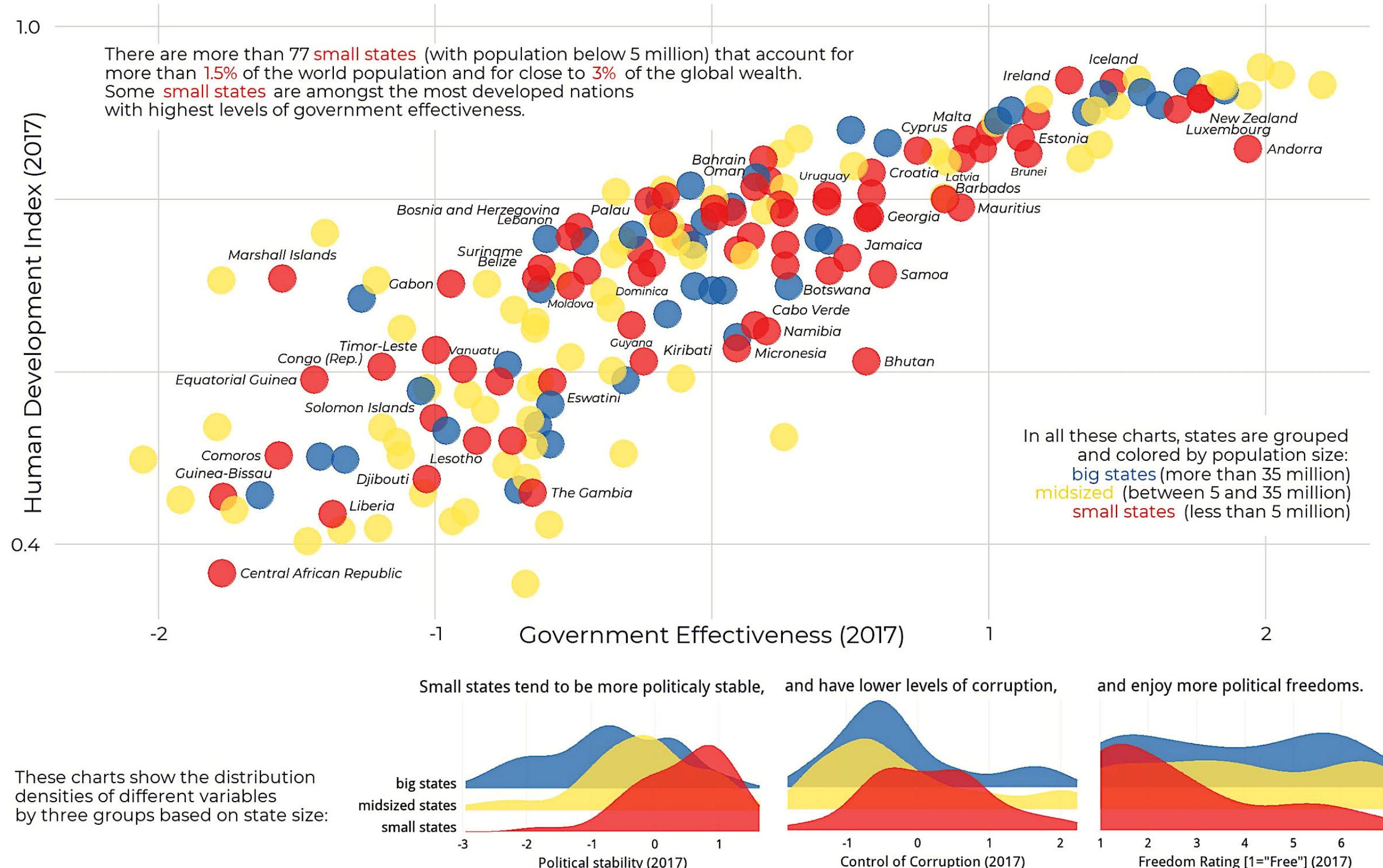


Winner, Information is Beautiful Award

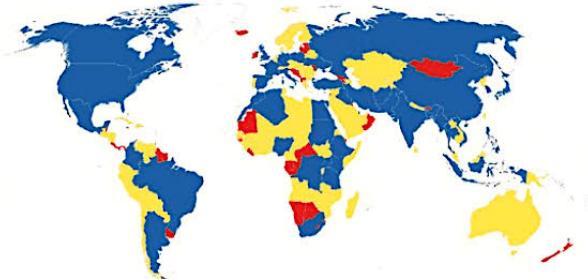
Toshkov

Associate Professor at the Institute of Public Administration, won an award for this infographic, which was made using R.

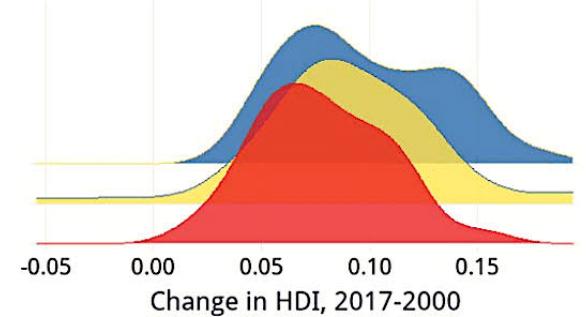
Small States Can Be Big Players in Development and Good Governance



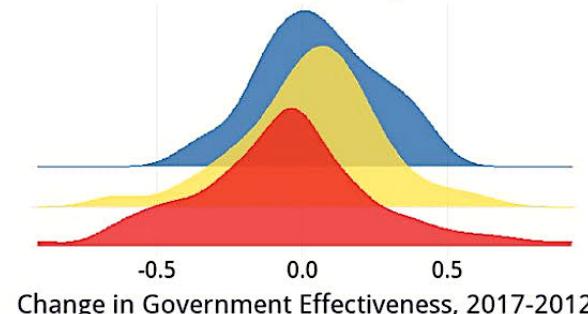
Data: Human Development Index from Human Development Reports. Government Effectiveness, Control of Corruption, and Political Stability from Worldwide Governance Indicators. Freedom Rating from Freedom House.



But small states have improved less



and have even lost some ground.



الجائزـةـ العـالـمـيـةـ
لـفـنـ عـرـضـ لـلـبـلـيـانـاتـ
WORLD DATA
VISUALIZATION PRIZE

CBO

Even the Congressional Budget Office relies on infographics to convey large tomes of information in summary form.



Summary of long term budget report

Congressional Budget Office

The 2012 Long-Term Budget Outlook

June 2012

CBO's long-term projections reflect two broad scenarios:

EB

CBO's Extended Baseline Scenario

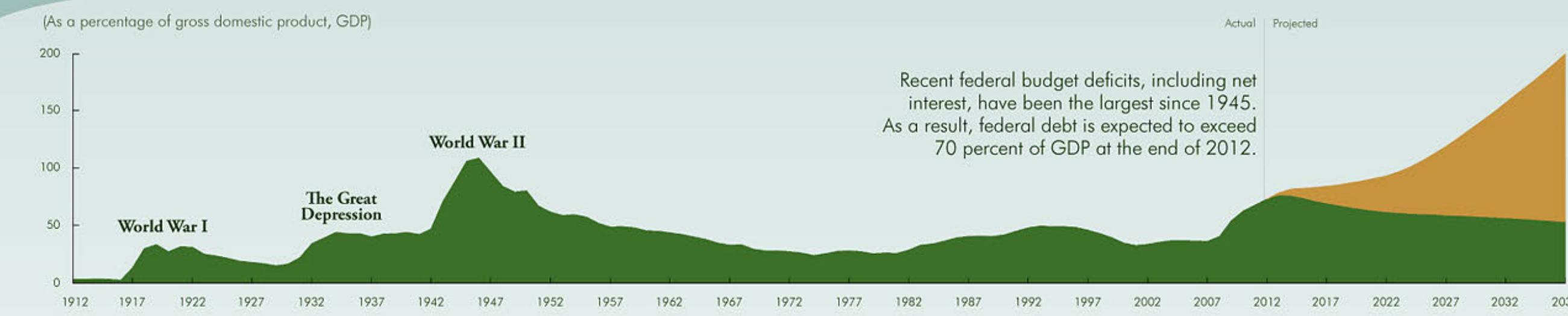
Reflects the assumption that current laws generally remain unchanged, implying that lawmakers will allow tax increases and spending cuts scheduled under current law to occur and that they will forgo measures routinely taken in the past to avoid such changes. Noninterest spending continues to rise, however,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

EAF

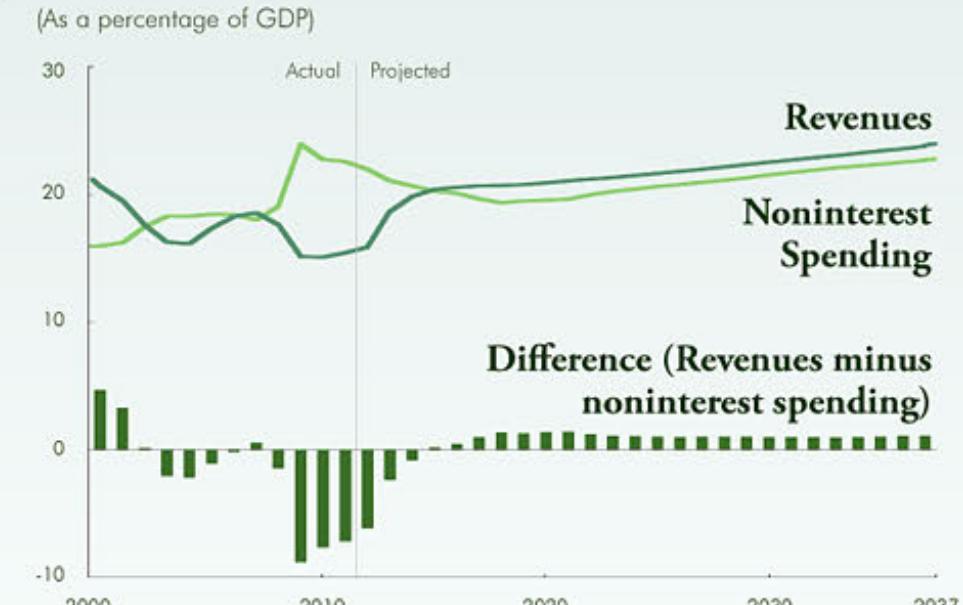
CBO's Extended Alternative Fiscal Scenario

Maintains what might be deemed current policies, as opposed to current laws, implying that lawmakers will extend most tax cuts and other forms of tax relief currently in place but set to expire and that they will prevent automatic spending reductions and certain spending restraints from occurring. Therefore, revenues remain near their historical average, and the gap between noninterest spending and revenues widens over the long term.

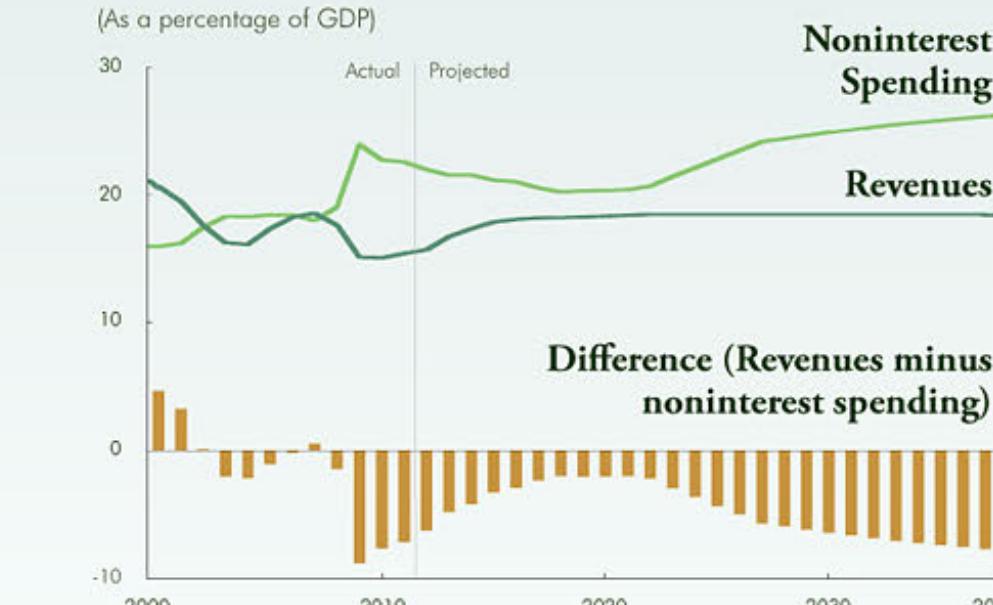
Federal Debt Held by the Public, Historically and Projected Under Two Policy Scenarios



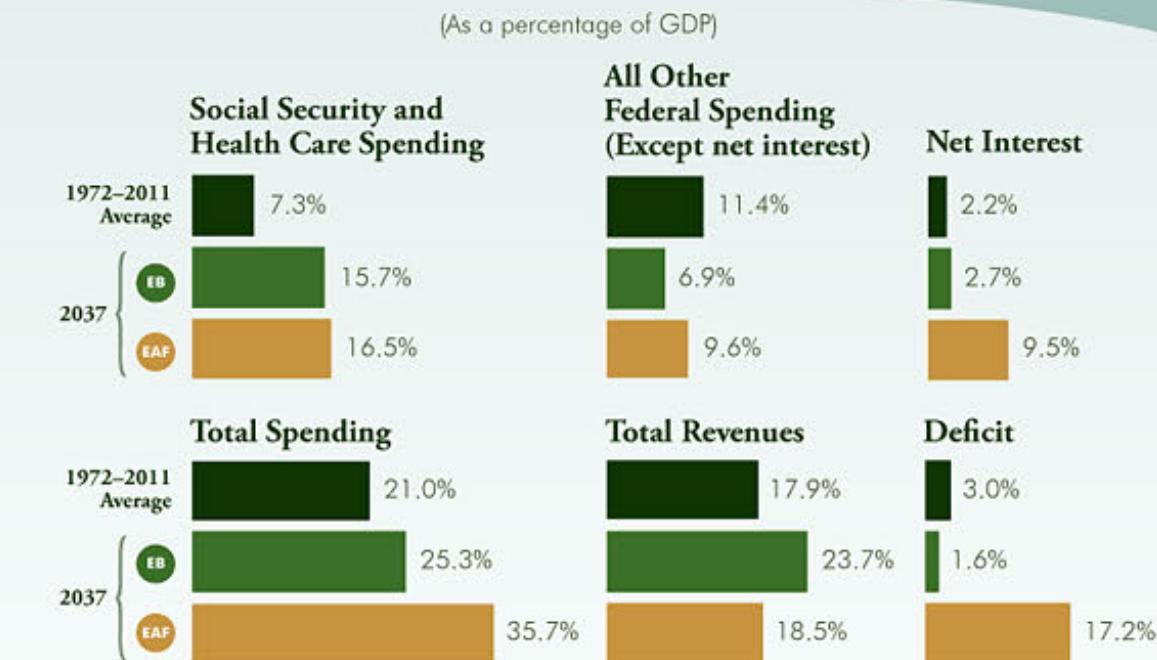
Extended Baseline Scenario EB



Extended Alternative Fiscal Scenario EAF



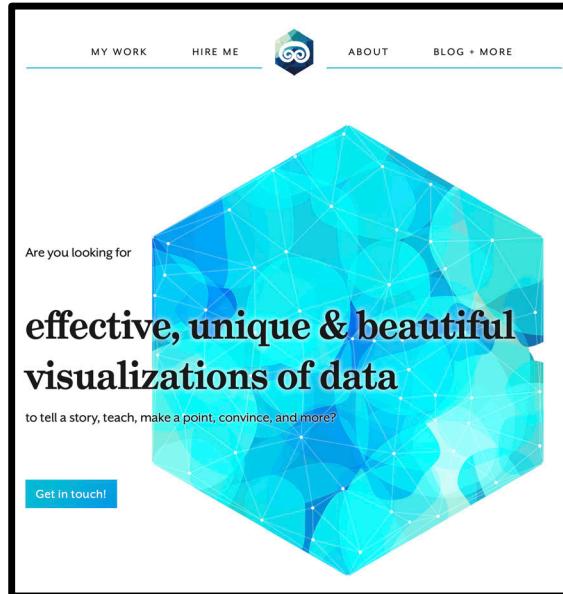
Components of the Federal Budget



Prepared by Maureen Costantino and Jonathan Schwabish
Contact: Long-Term Modeling Group



Sources: Congressional Budget Office; Office of Management and Budget
For details, see *The 2012 Long-Term Budget Outlook*, June 2012; <http://go.usa.gov/dKY>



Winner, Information is Beautiful Award

Bremmer

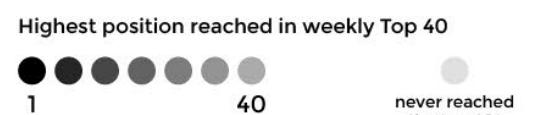
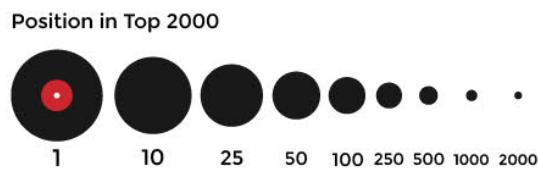
Previously an astronomer and analyst at a consulting company, Nadieh is a powerhouse freelance data visualization designer, and winner of numerous awards.

TOP 2000 ❤️ 70's & 80's

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...



Golden oldie
The oldest song in the list, Billie Holiday's *Strange 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 189.

Year of release

The Beatles
No other artist or band has more songs in the Top 2000 as the Beatles. With 38 songs they are responsible for 14% of all titles before 1970. Nonetheless, only 5 years ago they still had 50 songs in the list.

Piano Man
Billy Joel | 1974

Child in Time
Deep Purple | 1972

Newly discovered
Although already released in 1972, *Starman* from David Bowie is the highest new song in the list. It never appeared in the previous 17 editions of the Top 2000 and entered in 2016 on position 270.

Prince
Another legend who passed away in 2016 (on April 21st). It seems that new people discovered his works, with all 9 songs that were in 2015's list rising significantly and 8 more songs joining in 2016.

Avond
Boudewijn de Groot | 1997

Mag ik dan bij jou
Claudia de Breij | 2011

Pokémon
The swinging new song from Justin Timberlake, *Can't stop the feeling*, is the highest newcomer song that was released in 2016. It is part of the soundtrack of the animated movie *Trolls*.

High riser
Adèle's *When we were young* from 2015 apparently needed some time to become fully appreciated. It is the song with the highest increase in the list, shooting 1599 places from position 1743 to 144.

2010

2000

1990

1980

1970

1960

2016's most popular

2016

2015

2014

2013

2012

2011

2010

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1862

CitiBike example, infographic

CITI BIKE HOURLY BALANCE

IMBALANCE HOTSPOTS - A.M. PEAK HOUR - AVG. WEEKDAY - OCTOBER 2013

● OUTLIER STATIONS (BALANCED STATIONS WITHIN AN IMBALANCE HOTSPOT)

DESTINATIONS

ORIGINS

Central Park S & 6 Ave AM Balance = 205

Broadway & W 55 St AM Balance = -57

Broadway & W 53 St AM Balance = 55

E 52 St & 2 Ave AM Balance = -114

E 47 St & 1 Ave AM Balance = -220

E 45 St & 2 Ave AM Balance = -191

W 26 St & 8 Ave AM Balance = -129

E 20 St & Park Ave AM Balance = 33

E 16 St & 5 Ave AM Balance = 196

Duane St & Greenwich St AM Balance = 205

Hudson St & Reade St AM Balance = 112

Warren St & Church St AM Balance = 209

Barclay St & Church St AM Balance = -162

Spruce St & Nassau St AM Balance = 30

Fulton St & William St AM Balance = 147

John St & William St AM Balance = 198

Cliff St & Fulton St AM Balance = 227

Pike St & E Broadway AM Balance = -435

Norfolk St & Broome St AM Balance = -95

Stanton St & Margin St AM Balance = 79

Vill St & Stanton St AM Balance = -225

SPATIAL INFORMATION DESIGN LAB - GSAPP - COLUMBIA UNIVERSITY

0 0.25 0.5 MILES

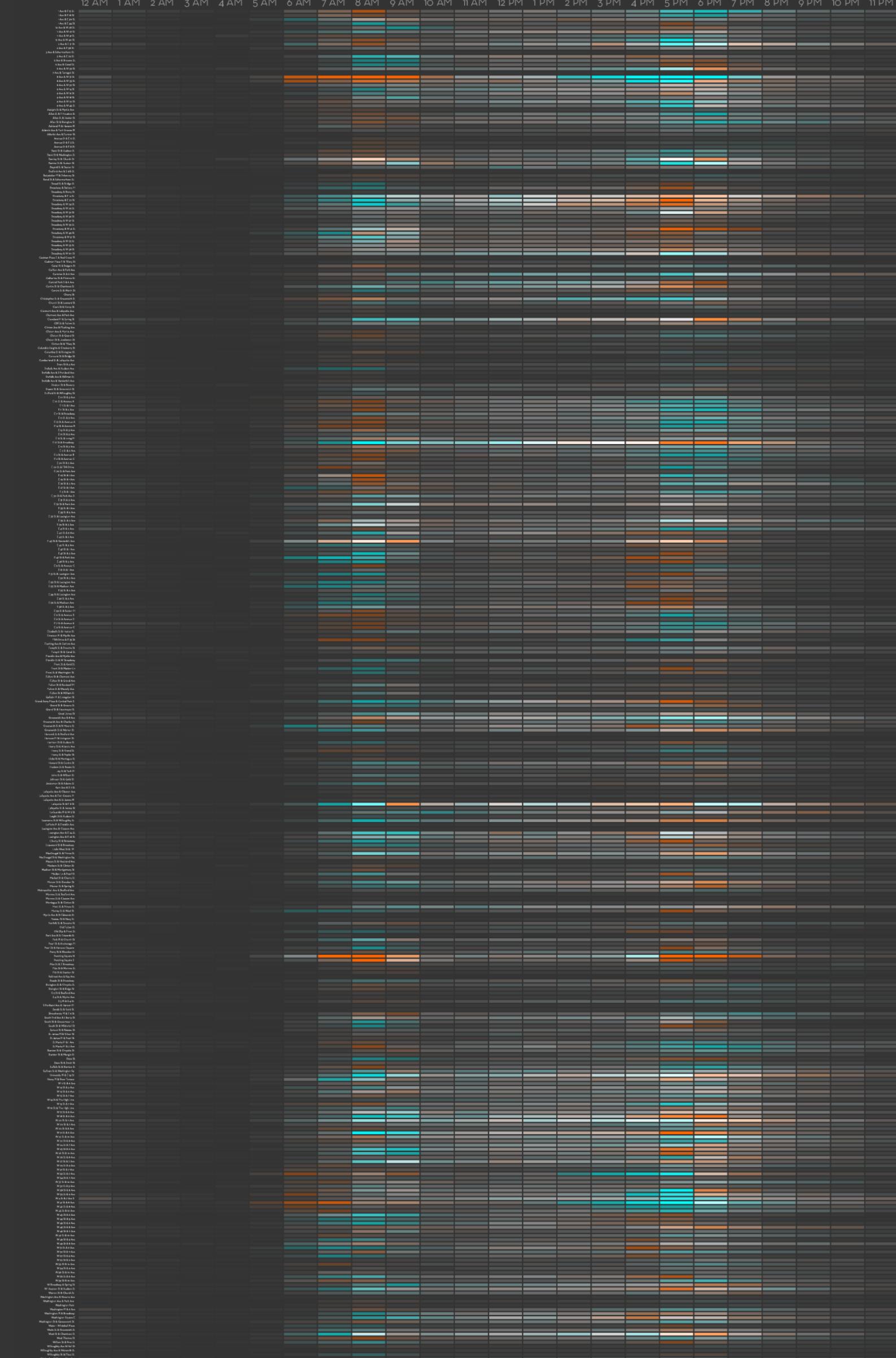
CITI BIKE HOURLY ACTIVITY AND BALANCE

ACTIVITY AND IMBALANCE MATRIX - AVG. WEEKDAY - OCTOBER 2013

DESTINATIONS

ORIGINS

ACTIVITY GRADIENT



SPATIAL INFORMATION DESIGN LAB - GSAPP - COLUMBIA UNIVERSITY



CitiBike example, Ride against the flow

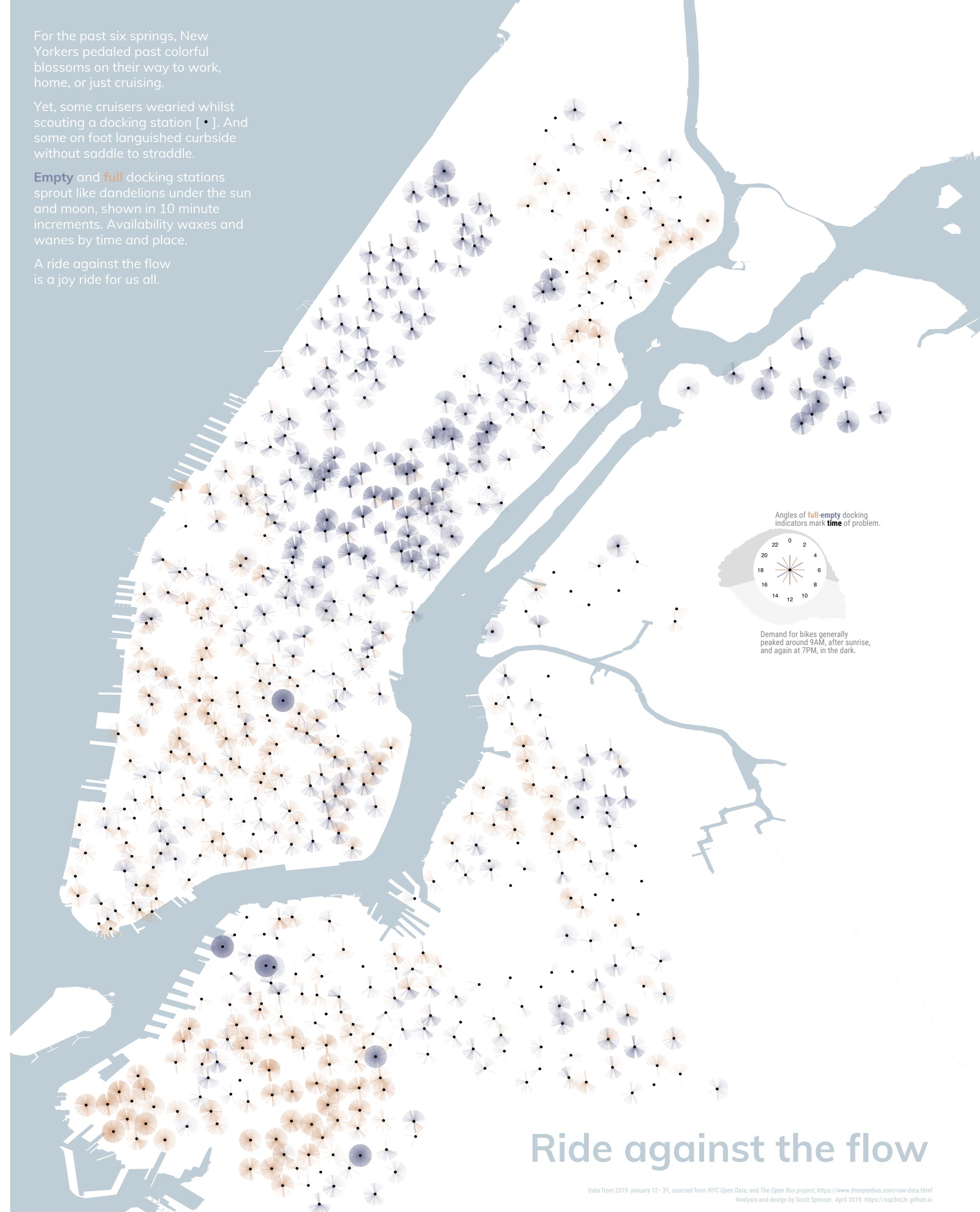
Spencer

For the past six springs, New Yorkers pedaled past colorful blossoms on their way to work, home, or just cruising.

Yet, some cruisers wore whilst scouting a docking station [•]. And some on foot languished curbside without saddle to straddle.

Empty and full docking stations sprout like dandelions under the sun and moon, shown in 10 minute increments. Availability waxes and wanes by time and place.

A ride against the flow is a joy ride for us all.



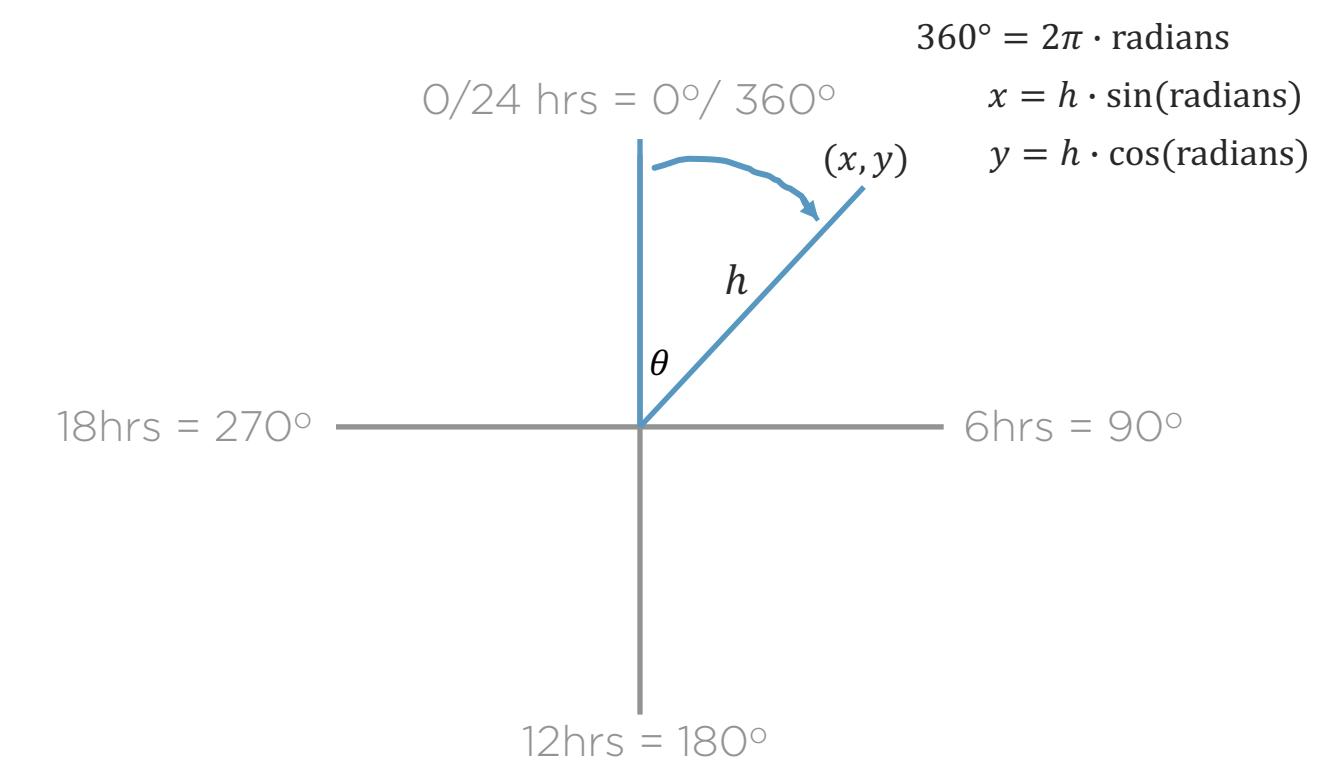
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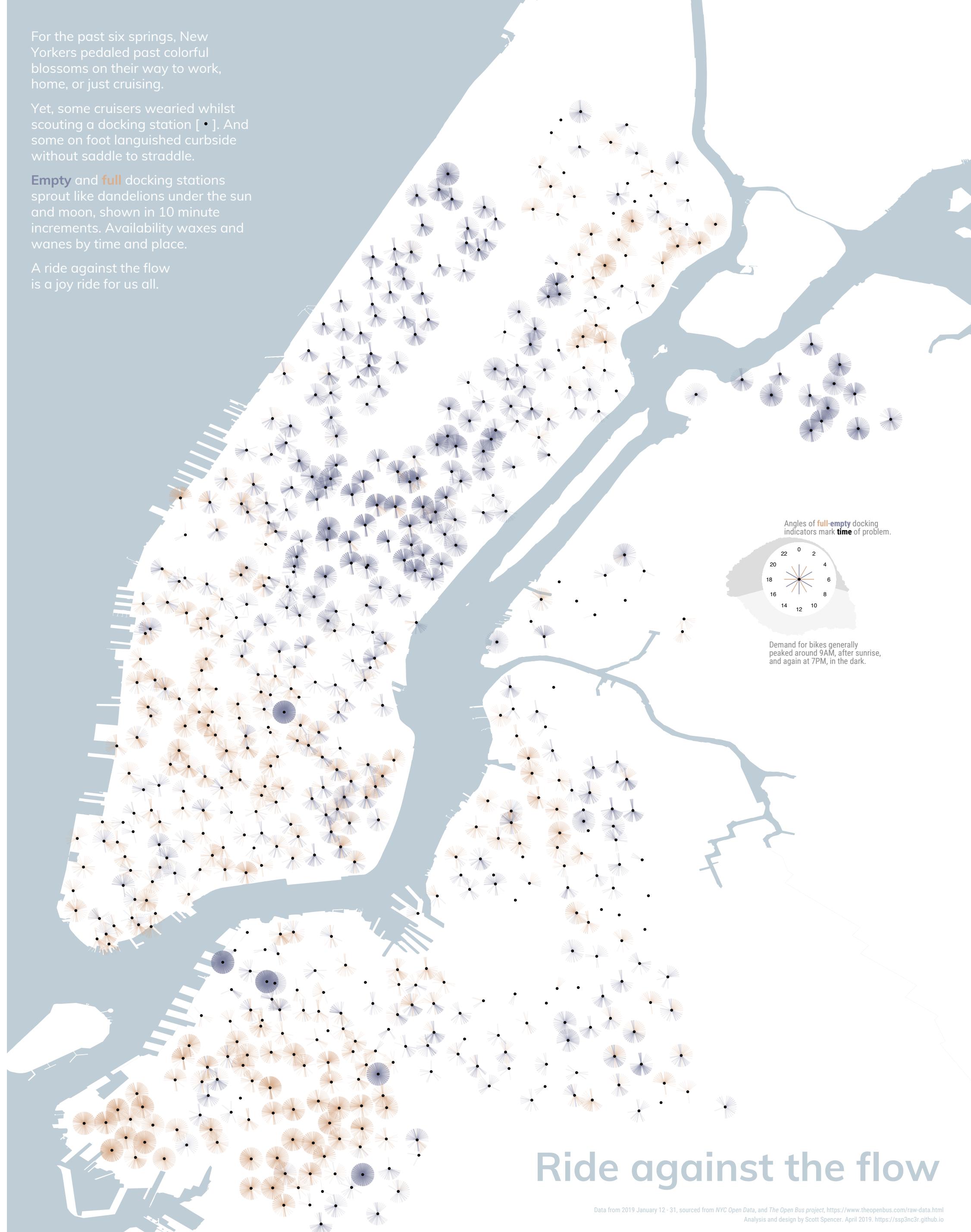
Empty and full docking stations sprout like dandelions under the sun and moon, shown in 10 minute increments. Availability waxes and wanes by time and place.

A ride against the flow is a joy ride for us all.

Maths to create data encodings at each dock station



Opacity is the lack of transparency. Opacity was lowered so that a single unavailable bike or full station would not be very noticeable but several markings at that time (on different days) would increase opacity, making the marking brighter and thus increase its visual importance.



Let's look ahead

For Next Week, Module 10:

Agenda next week

The minimum

Next deliverable, *draft* information graphic

More on information graphics

Kay, Matthew et al. *When (Ish) Is My Bus? User-Centered Visualizations of Uncertainty in Everyday, Mobile Predictive Systems*. New York, New York, USA: ACM Press, 2016. 5092–5103. Web.

Consider how test subjects responded to varying visual representations of uncertainty, and any implications for your projects.

Fischhoff, Baruch. *Communicating Uncertainty: Fulfilling the Duty to Inform*. Issues in Science and Technology 28.4 (2012): 63-70. Print.

Consider the author's view on issues with communicating uncertainty, and his suggestions for addressing these issues.

Wainer, Howard. *The Most Dangerous Equation*, in Chapter 1, *Picturing the Uncertain World*. Princeton University Press, 2009. Print.

Consider the issues he raises of when variation is misunderstood, and the exemplary implications.

Feedback

Looking back?

Of the material covered so far, what material, if any, would you like further review?

Group work

Next week we will work as groups on your information graphic. How would you like feedback from your colleagues structured to best help you? What questions should they help give you perspective?

**See you
next week!**

