

# Storytelling with Data

## Module 6: The storytelling process

**Scott Spencer**

Faculty and Lecturer  
Columbia University

# Agenda

Upcoming deliverable – **final** storyboard

Today's objectives

Stories – why, what, how

Stories, in words and pictures

From data to visual

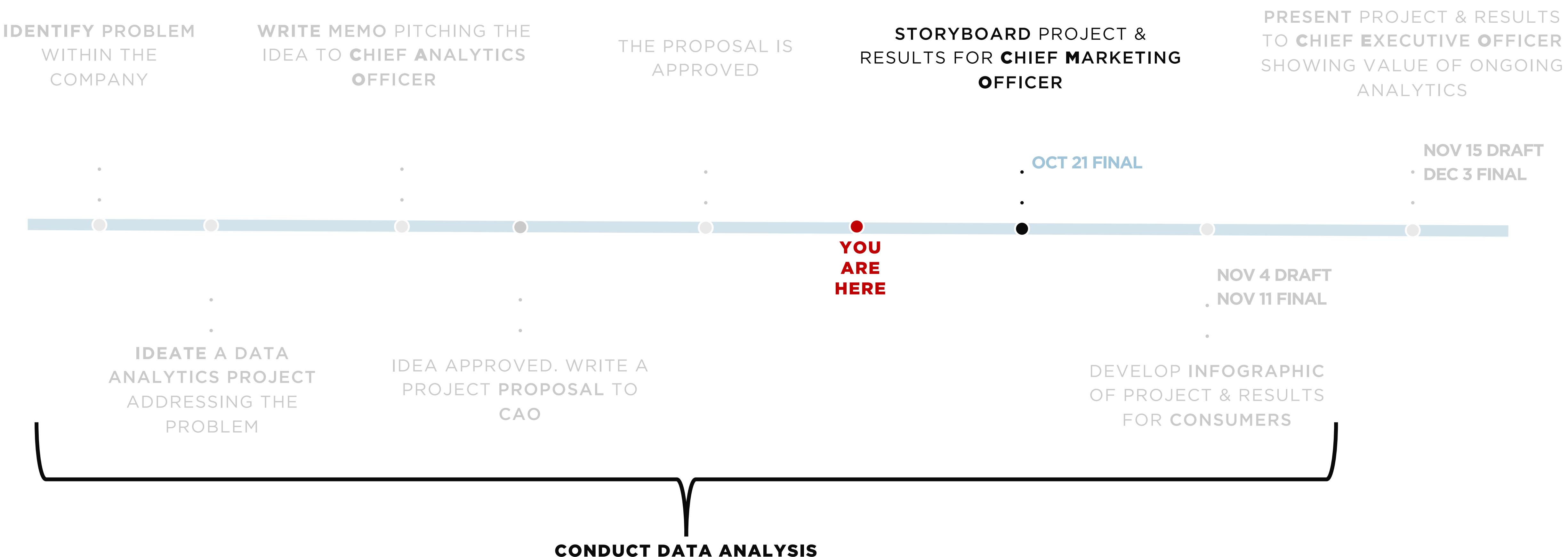
# Questions or suggestions?

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# Upcoming deliverable

# Upcoming deliverable

In **Storyboard** form – describe (1) your project, (2) preliminary results or insights so far, and (3) why those results are interesting for the marketing team. Use a distinct narrative arc (beginning, middle, and end), be clear and accessible for the **CMO**.



# Today's Objectives

# Objectives

1

Build a story around an analytics project.

2

Craft a narrative to captivate, convince, and inspire an audience.

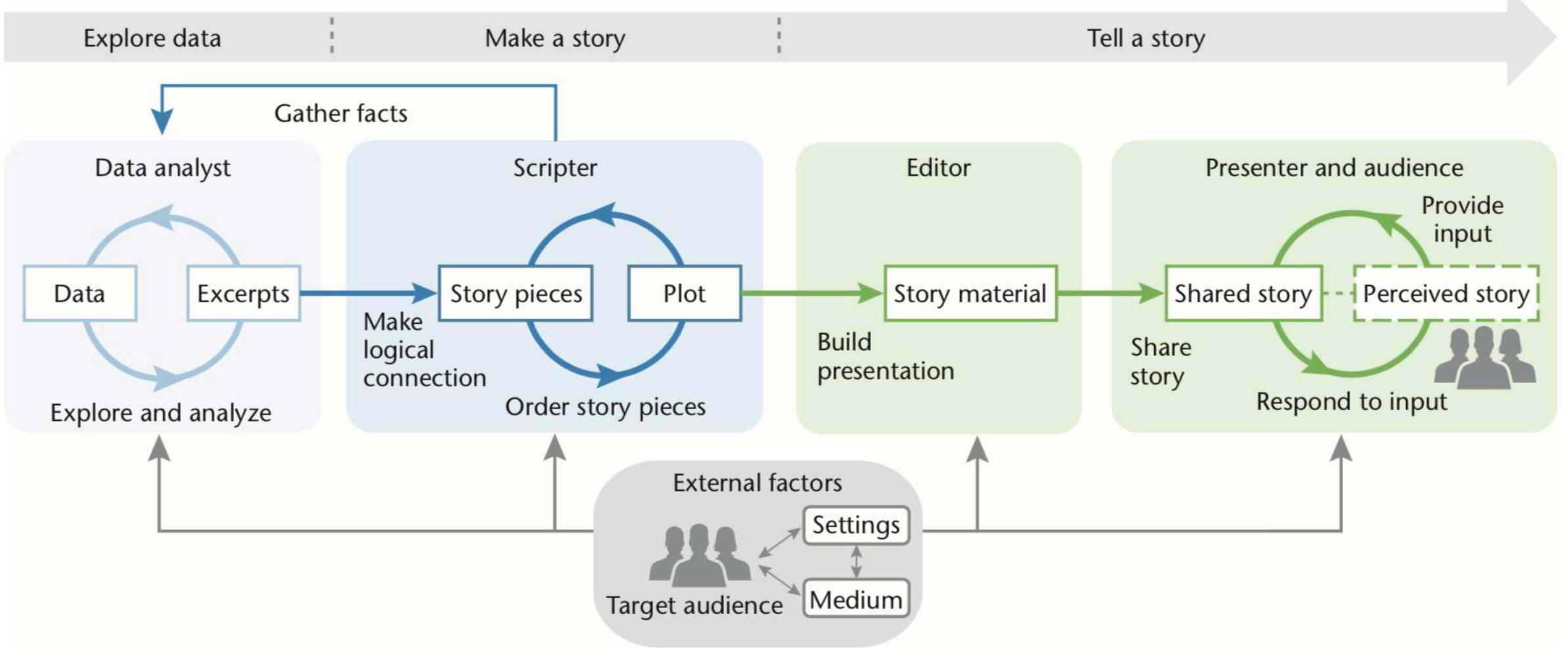
# **Stories – scope and process**



# Transforming data into visually shared stories

*Lee & co-author*

Authors Lee and Riche, who was also the main author of Data-Driven Storytelling, work at Microsoft, advancing research on data stories.



Scope of a visual data story

A visual data story is more than a visualization of data. They include a set of story pieces — that is, **specific facts backed up by data**.

They are **visualized** to support intended messages, include **annotations** (labels, pointers, text) and **narration** to highlight and emphasize the message and avoid ambiguity.

They are presented in a **meaningful order** or with a connection between them to support the author's high-level communication goal.

# **Stories – why, what, how**



# Management is much more than a science

*Martin & Golsby*

Professor Martin is director of the Martin Prosperity Institute at the School of Management, University of Toronto. Golsby-Smith is founder of 2nd Road, a strategy and innovation firm, now part of Accenture Strategy.

**Narratives frame hypotheses for what could be**

To make decisions about **what could be**, managers should devise narratives about possible futures, applying the tools of metaphor, logic, and emotion.

**Consider possibilities broader than data**

The **absence of data does not preclude possibility**. If we are talking about new outcomes and behaviors, then there is no prior evidence. Consider not only what the data suggests but also what within the bounds of possibility could happen.

**Metaphor helps compare unlinked ideas**

The core engine of creative synthesis is “associative fluency”—the mental ability to **connect two concepts that are not usually linked** and to forge them into a new idea.

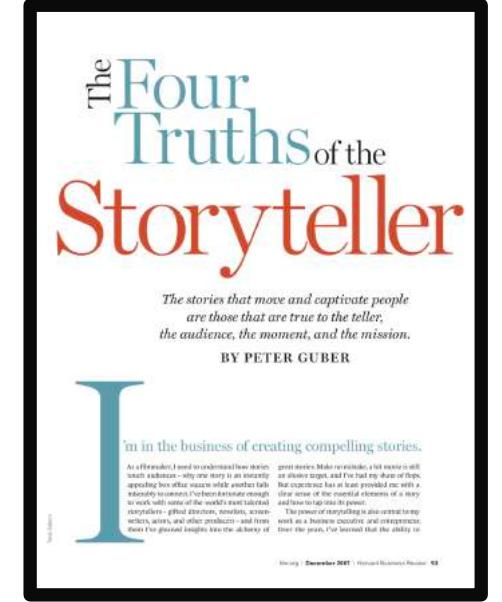
**Clarify conditions, create new data**

With new narratives—hypotheses—we must **hypothesize** what would have to be true for those narratives to happen and **validate** their hypotheses through prototyping.

# The four truths of the storyteller

*Guber*

Peter is author of *Tell to Win*, has been awarded business person of the year by Los Angeles Business Journal, is owner of several pro sports teams and an entertainment company. He was top executive at Sony and Columbia Pictures.



## Persuasive stories depend on four truths

Great storytelling does not conflict with truth. Stories that move people are true to the teller, audience, moment, and mission.

**Teller.** The teller must be congruent with the story, must share emotions felt, allowing the audience to identify with those emotions.

**Audience.** As a teller, we must take time to understand what our listeners know about, care about, and want to hear. And then, craft a story that resonates with what we learn. Test the story on others, skeptics. Include audience in the tale—/ becomes we.

**Moment.** Know the tale well enough to improvise, molding it to the moment's context.

**Mission.** The tale should capture the mission, and truth to the mission should win over any conflicts with truth to the audience.

# Telling tales

*Denning*

Stephen is the former director of Knowledge Management at the World Bank, an author, and focuses on leadership strategy.



## A story — narrative as sequence of events

### Narrative patterns for business

Although good business arguments are developed through the use of numbers, they are typically approved on the basis of a story—that is, a narrative that links a set of events in some kind of causal sequence.

Stories can advance business objectives, e.g.:

Sparking action

Communicating who you are

Transmitting values

Fostering collaboration

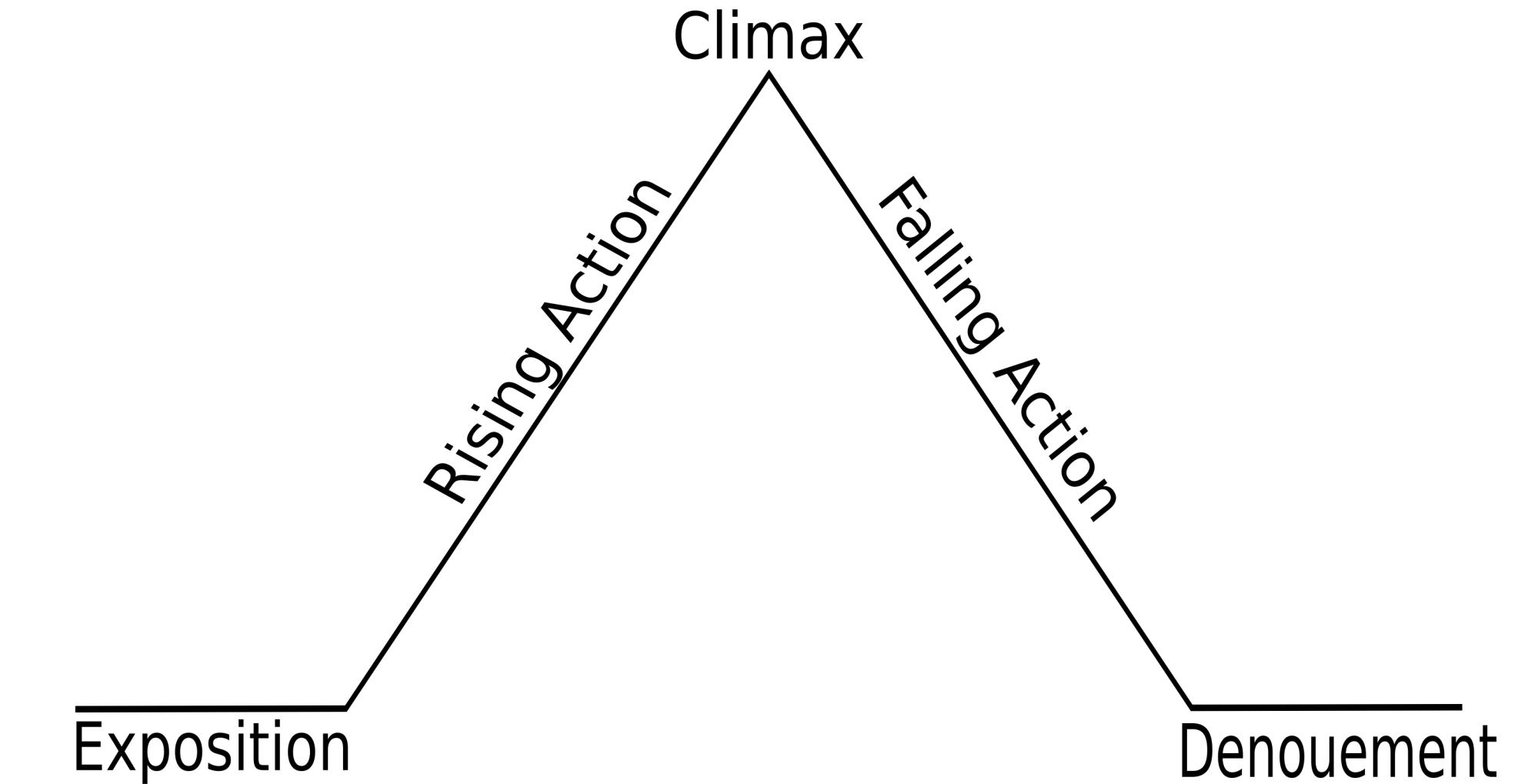
Taming the grapevine

Sharing knowledge

Leading people into the future

# **Stories – more about narrative and audience**

# One way to tell: analytics projects



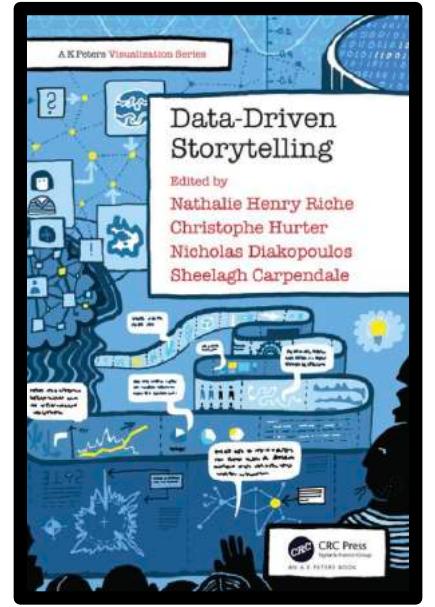
The primary elements of an applied analytics project are a well-articulated business problem, a data science solution, and a measurable outcome to produce value for the organization.

The analytics project may thus be conceptualized as a story arc, with a beginning (**problem**), middle (**analytics**), and end (**overcoming of the problem**), along with characters (**analysts, colleagues, clients**) who play important roles.

# Narrative Design Patterns for Data-Driven Storytelling

*Riche, co-editors*

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



## Narrative in time

The narrative can be linear, e.g., representing the actual order of events (the story) chronologically; or nonlinear, e.g., circular, where the beginning and end mirror themselves.

## Narrative in an endless number of ways

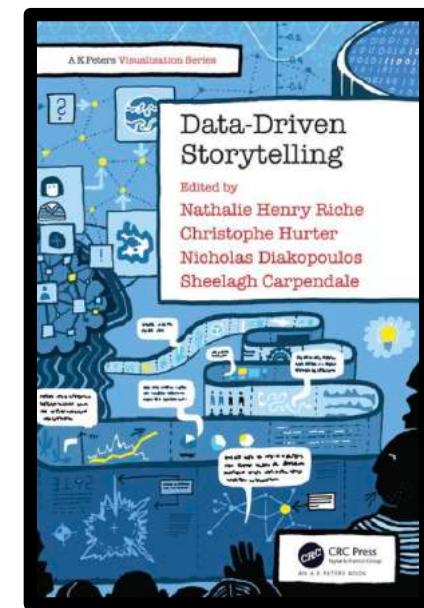
**Todo: clean up  
quote and narrow**

A single story can be narrated in an endless number of ways. Beyond the temporal ordering of events, it can be told at a varying pace to create emphasis: slowing down the narrative pace can give the audience time to think about what is being “told” and to increase the importance of this moment in the story; speeding up the narrative pace can produce an overwhelming effect of information onslaught and reduce the importance of moments in the story. Arguments can be made explicit or kept implicit. The narrative can emphasize comparison and contrasting points of view; it can convey abstract concepts through the use of analogies, making them more concrete; it can address and engage the audience directly with abrupt questions, while interrupting the flow of the story; or it can draw the audience in so that it becomes a part of the story, releasing it with a call-to-action.

# Narrative Design Patterns for Data-Driven Storytelling

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## Narrative “Patterns”

### Patterns for flow

A narrative pattern is a low-level narrative device that serves a specific intent. A pattern can be used individually or in combination with others to give form to a story.

**Todo:** Details.

### Patterns for framing

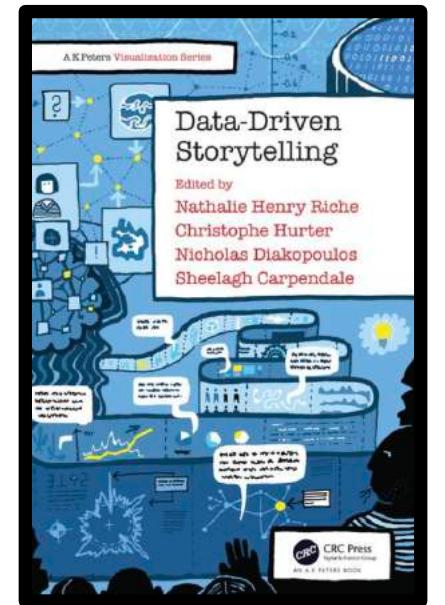
**Todo:** Details.

### Patterns for empathy, emotion

**Todo:** Details.

### Patterns for engagement

**Todo:** Details.

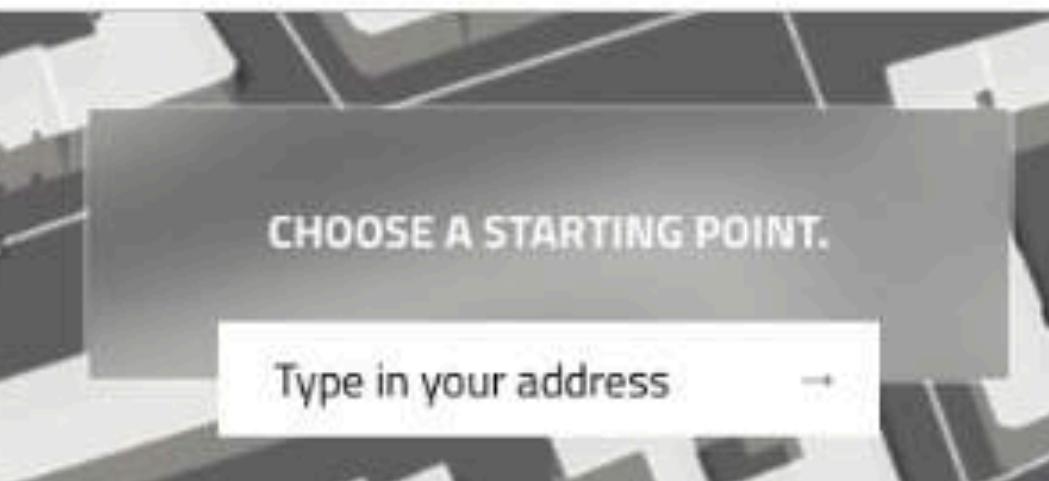


# Narrative Design Patterns for Data-Driven Storytelling

*Riche, co-editors*

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

Todo: Examples from reading or experiences.

**Incorporating the audience****HOW**

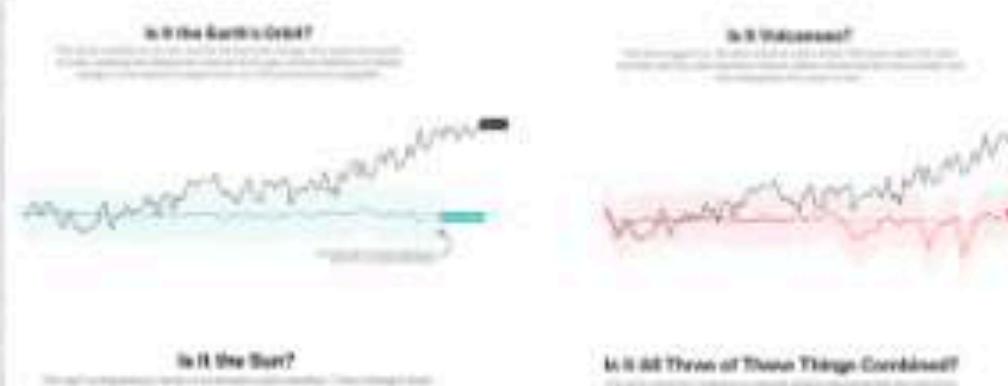
Audience becomes part of the narrative.

**WHY**

Increase empathy, facilitate personal comparisons. Helps make the data and information more personally relevant. To allow reader to use herself as measuring device.

**EXAMPLE**

Ubisoft: Collapse

**Repetition****HOW**

A phenomenon is re-presented multiple times with changes to the main variable/dimension (the data) or the time frame or the animation pattern (see the example) while other elements of the story don't change. Note: this could be like running multiple simulations with the data to see which is most effective (and in this case, the story would be more reader driven)

**WHY**

To show that the same phenomenon happens over and over again. It also strengthens the narrative through rhythm. Establishing a constant reference frame can help to emphasize change and differences.

**EXAMPLE**

Bloomberg: What's really warming the world?

**Juxtaposition****HOW**

Showing two or more complementary visualizations (pictures) juxtaposed.

**WHY**

Compare cases or samples, allows to highlight contrast, difference, absence of difference, change over time. Allows for individual exploration of (minor) differences.

**EXAMPLE**

David McCandless: Billion Dollar Gram

**Breaking the fourth wall****Humans behind the dots****Make a guess**

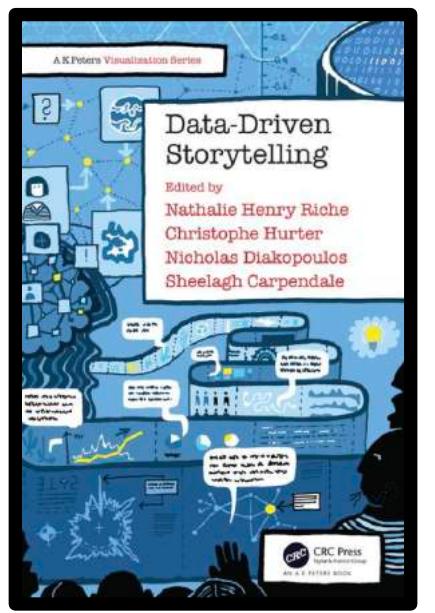
Draw your line on the chart below



# Communicating data to an audience

*Riche, co-editors*

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



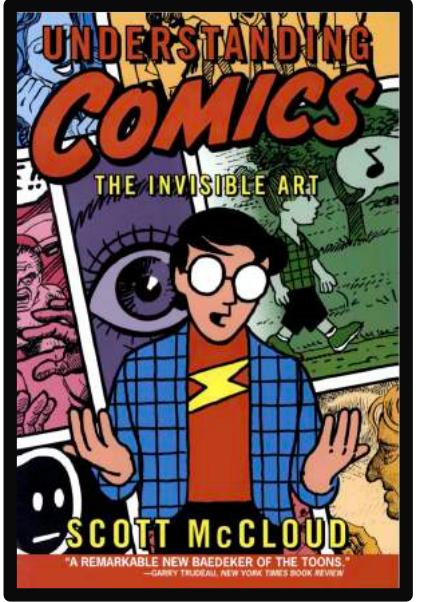
**Point**

Details.

Todo: Pull points from chapter.

# **Stories, in pictures and words**

You can tell a story to your audience on a **Storyboard**, which—like comics—has **visual** components, corresponding **written narrative**, and **sequencing**.



# Understanding Comics

*McCloud*

Scott provides the seminal reference, in the context of comics, on understanding the connection between words and visuals.

**Words and visuals  
have shared meaning**

In comics, visuals and words complement one another, each contributing to a shared meaning.

## Story in sentences

I CROSSED THE STREET TO THE CONVENIENCE STORE. THE RAIN SOAKED INTO MY BOOTS.

I FOUND THE LAST PINT OF CHOCOLATE CHOCOLATE CHIP IN THE FREEZER.

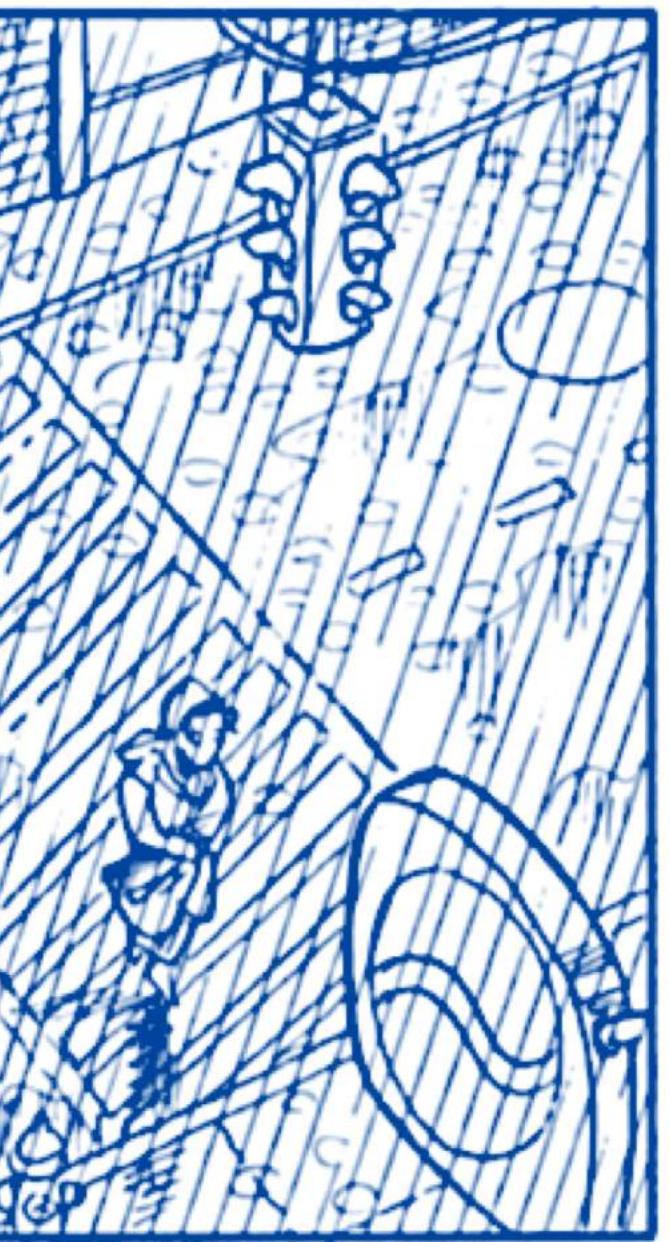
THE CLERK TRIED TO PICK ME UP. I SAID NO THANKS. HE GAVE ME THIS CREEPY LOOK...

I WENT BACK TO THE APARTMENT--

--AND FINISHED IT ALL IN AN HOUR.

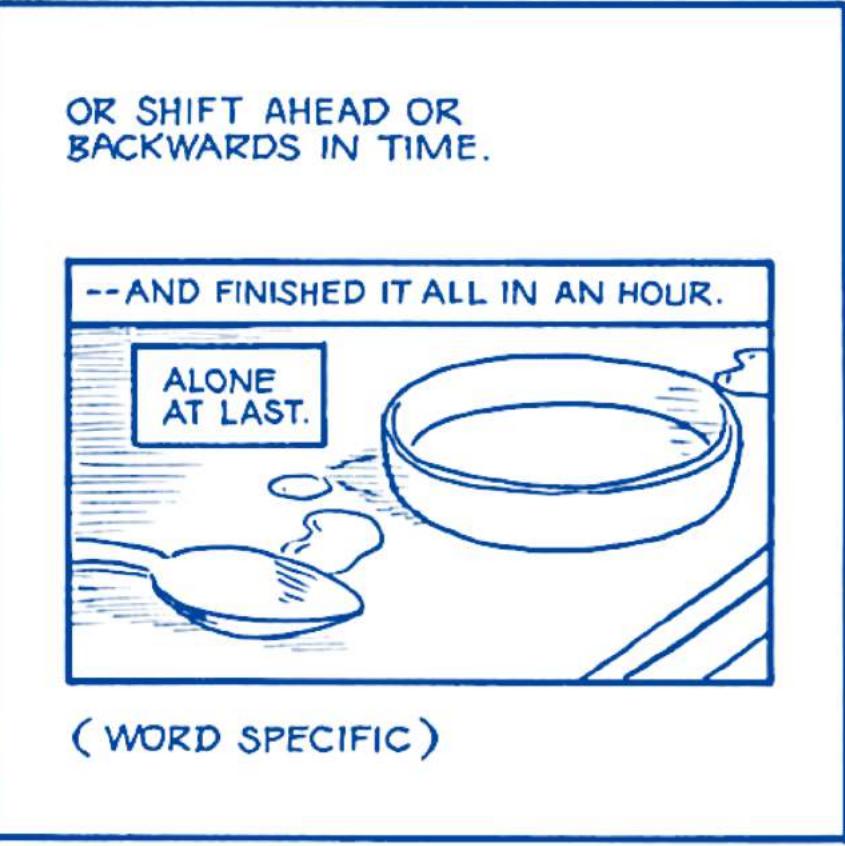
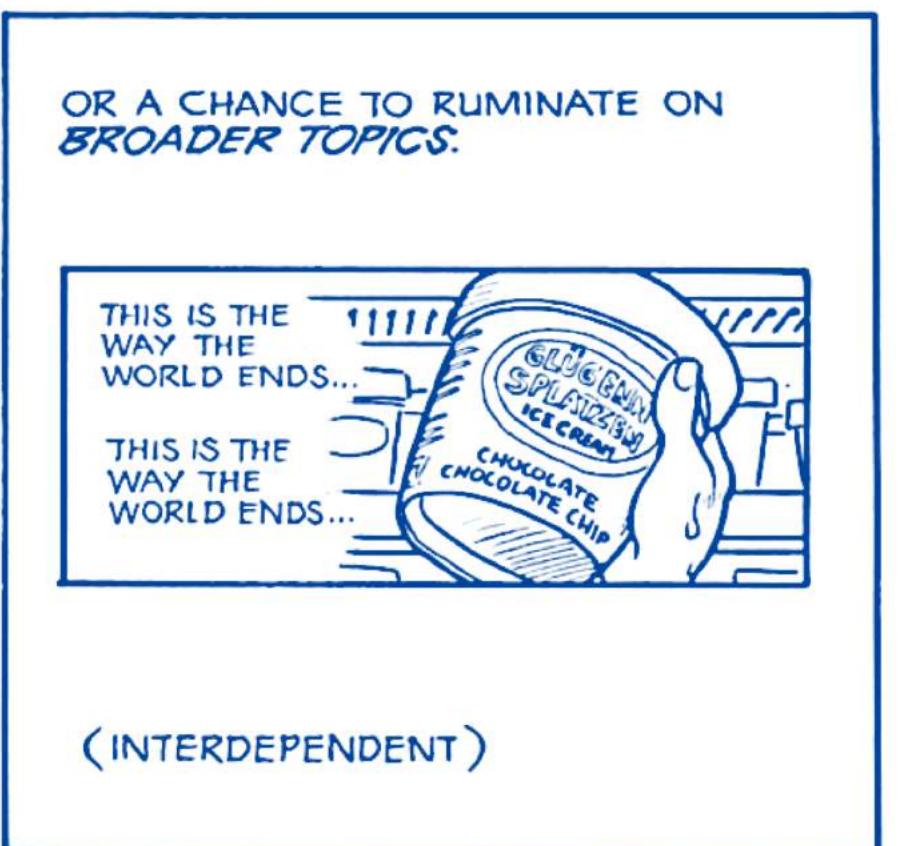
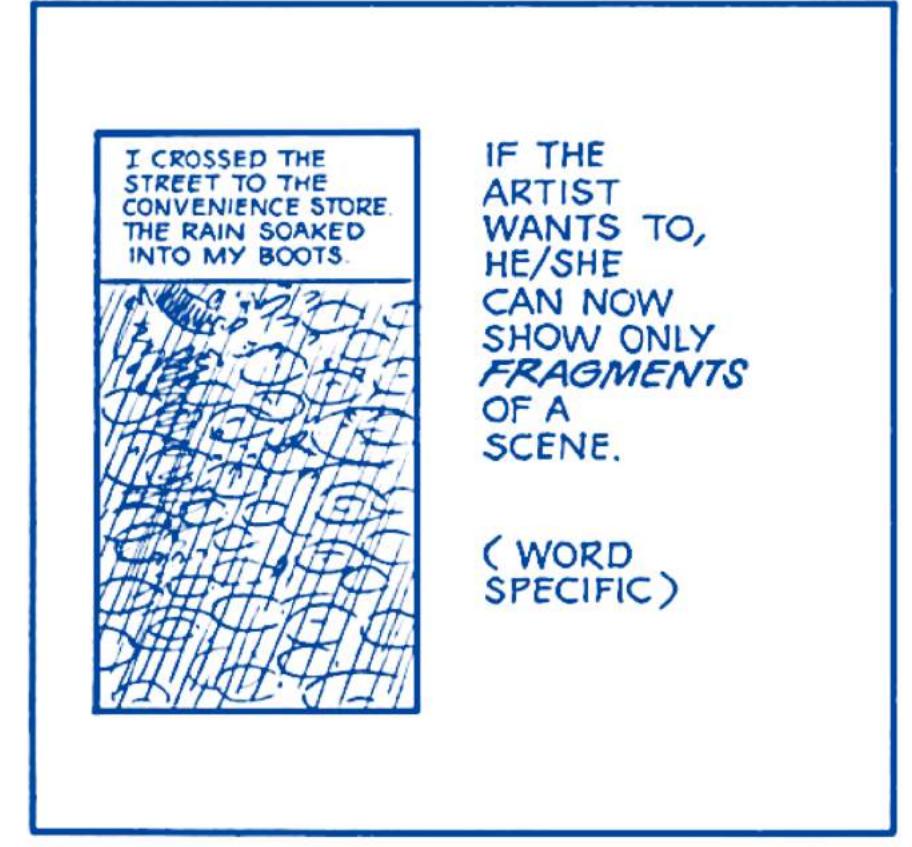
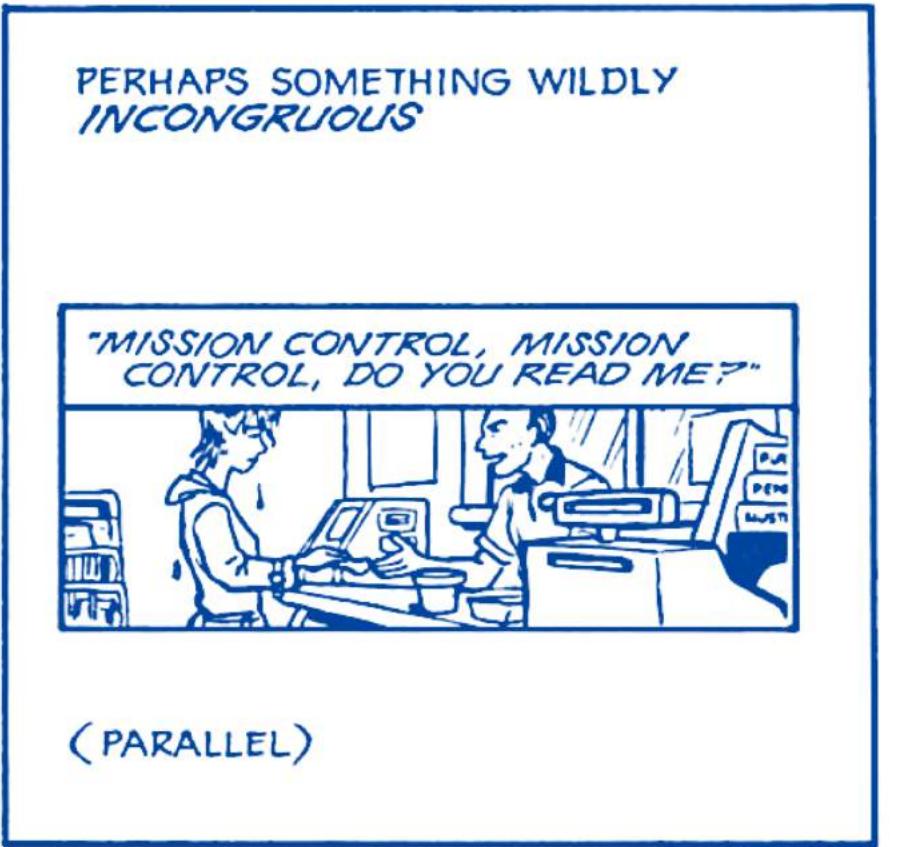
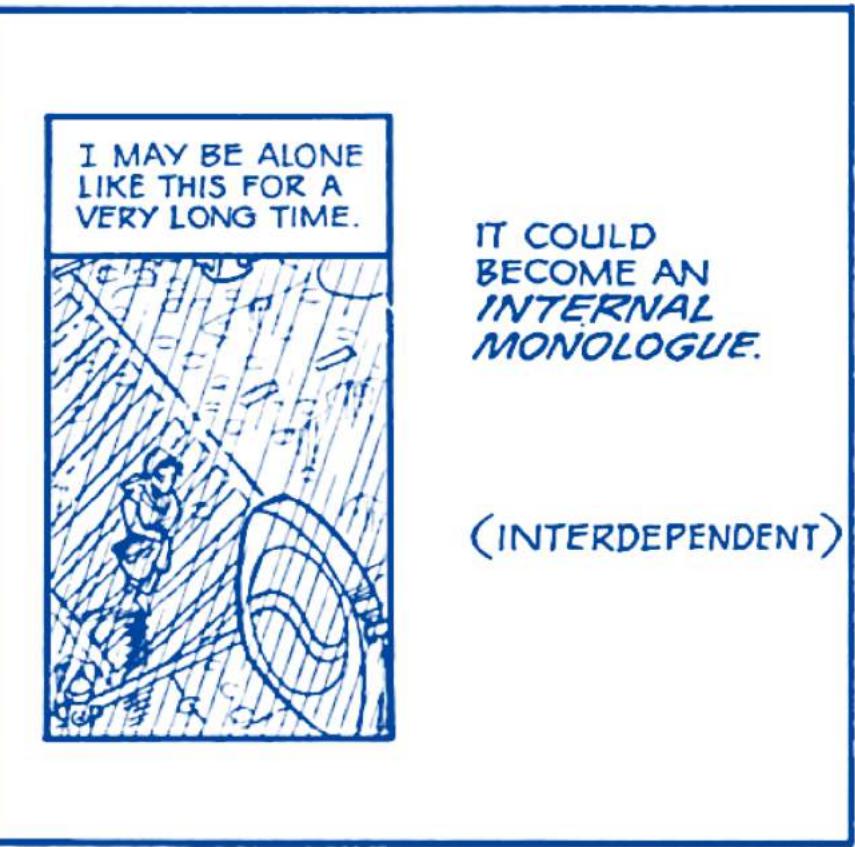
ALONE AT LAST.

## Story in pictures





## Use words and images for different purposes



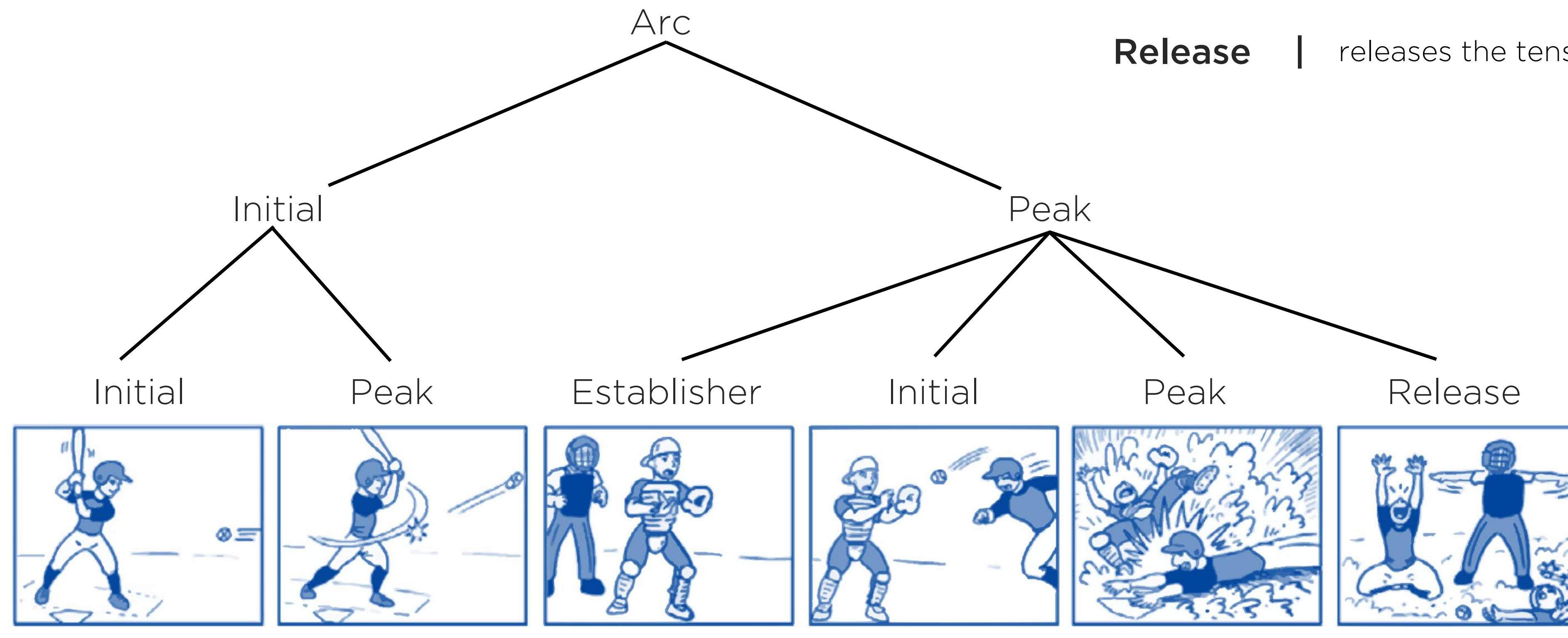
# Like written narrative, sequential pictures can have grammar

**Establisher** | sets up an interaction without acting upon it

**Initial** | initiates the tension of the narrative arc

**Peak** | marks the height of narrative tension and point of maximal event structure

**Release** | releases the tension of the interaction



INTERDEPENDENT COMBINATIONS AREN'T ALWAYS AN EQUAL BALANCE THOUGH AND MAY FALL ANYWHERE ON A SCALE BETWEEN TYPES ONE AND TWO.

GENERALLY SPEAKING, THE MORE IS SAID WITH WORDS, THE MORE THE PICTURES CAN BE FREED TO GO EXPLORING AND VICE VERSA.

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# Front Office Directory

[« Back to directory](#)



## Lon Rosen

*Executive Vice President & Chief Marketing Officer*

One of the foremost executives in the sports and entertainment industry, Lon Rosen directs the Dodger organization's marketing, sales and broadcasting initiatives as their executive vice president and chief marketing officer.

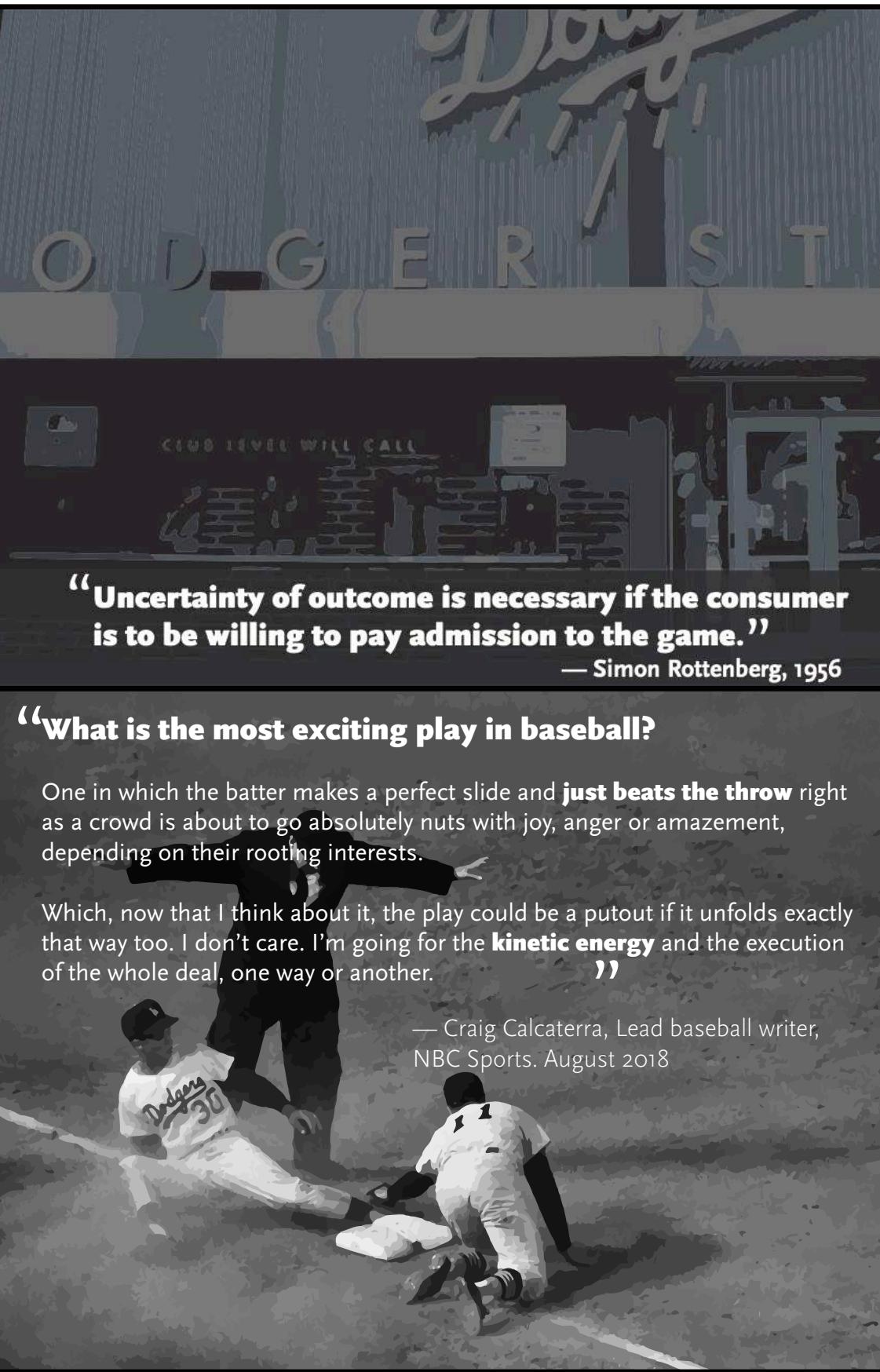
With more than 25 years of experience in the field, Rosen was instrumental in assisting his former employer, Magic Johnson, and Guggenheim Partners in acquiring the Dodgers on May 1, 2012, in what was the largest team sports transaction in history. Rosen previously served in the same role for two years starting in 2004 before rejoining Magic Johnson Enterprises.

Rosen focused his efforts for Magic Johnson on business development, television productions, sports consulting and new media ventures, in addition to his representations of broadcasters, coaches, hosts and other entertainment personalities.

Upon graduation from college, Rosen headed to the Fabulous Forum, where he began his sports career with the NBA's Los Angeles Lakers and the NHL's Los Angeles Kings. He worked his way from an internship to the position of director of promotions for the Lakers, Kings and the Los Angeles Forum's Special Events, where he served seven years (1980-87). From there, he started his own sports marketing company, First Team Marketing, and moved into sports marketing and sports representation.

Rosen, a University of Southern California graduate, resides in Los Angeles with his wife, Laurie. They have two sons.

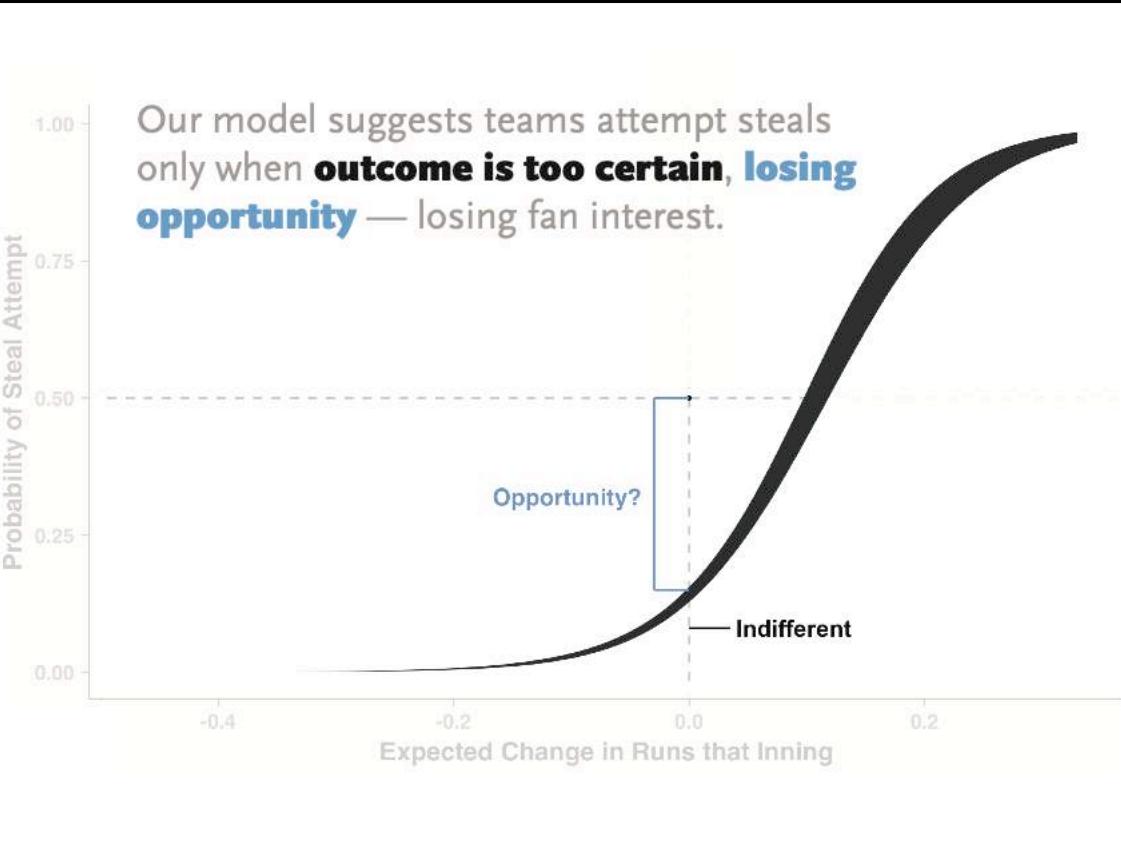
## Visual narrative

**“What is the most exciting play in baseball?**

One in which the batter makes a perfect slide and **just beats the throw** right as a crowd is about to go absolutely nuts with joy, anger or amazement, depending on their rooting interests.

Which, now that I think about it, the play could be a putout if it unfolds exactly that way too. I don't care. I'm going for the **kinetic energy** and the execution of the whole deal, one way or another.

— Craig Calcaterra, Lead baseball writer, NBC Sports. August 2018



## Written narrative

1

Our average game attendance hovers around mid-80 percent capacity — we have seats to fill, despite having multiple winning seasons.

To draw more fans, consider the words of famed economist Simon Rotenberg, who said “uncertainty of outcome” is necessary for consumers to pay admission to ball games. While winning is important, it’s the not-knowing that creates excitement.

2

We have started modeling the uncertainty of outcome for different events in the game.

Let's focus, then, on an event that lead baseball writer for NBC sports, Calcaterra, said is potentially the most exciting play in baseball. He says that the most exciting play may be one where the baserunner just beats the catcher's throw when stealing a base.

3

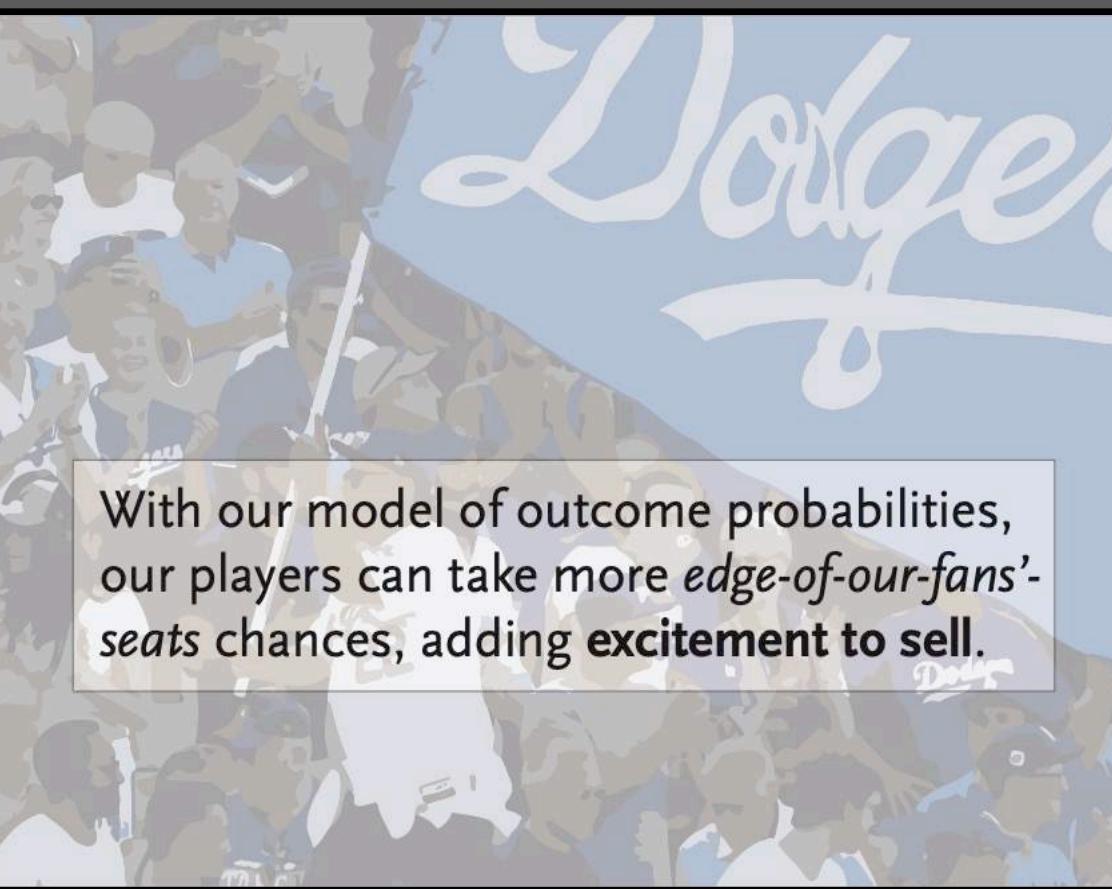
Using our model, we asked whether we are maximizing base-stealing excitement. We considered running speed of the player on first base, catcher throw time to second base, the latent talents of the specific pitcher, catcher, and baserunner, and estimated the probability of successfully stealing second.

From a game outcome perspective — whether teams win — managers should be indifferent if a baserunner steals when the expected change in runs is zero. The model suggests baserunners are too conservative.

## Visual narrative

4

**Dodgers were average taking risks with base stealing last season.**



## Written narrative

5

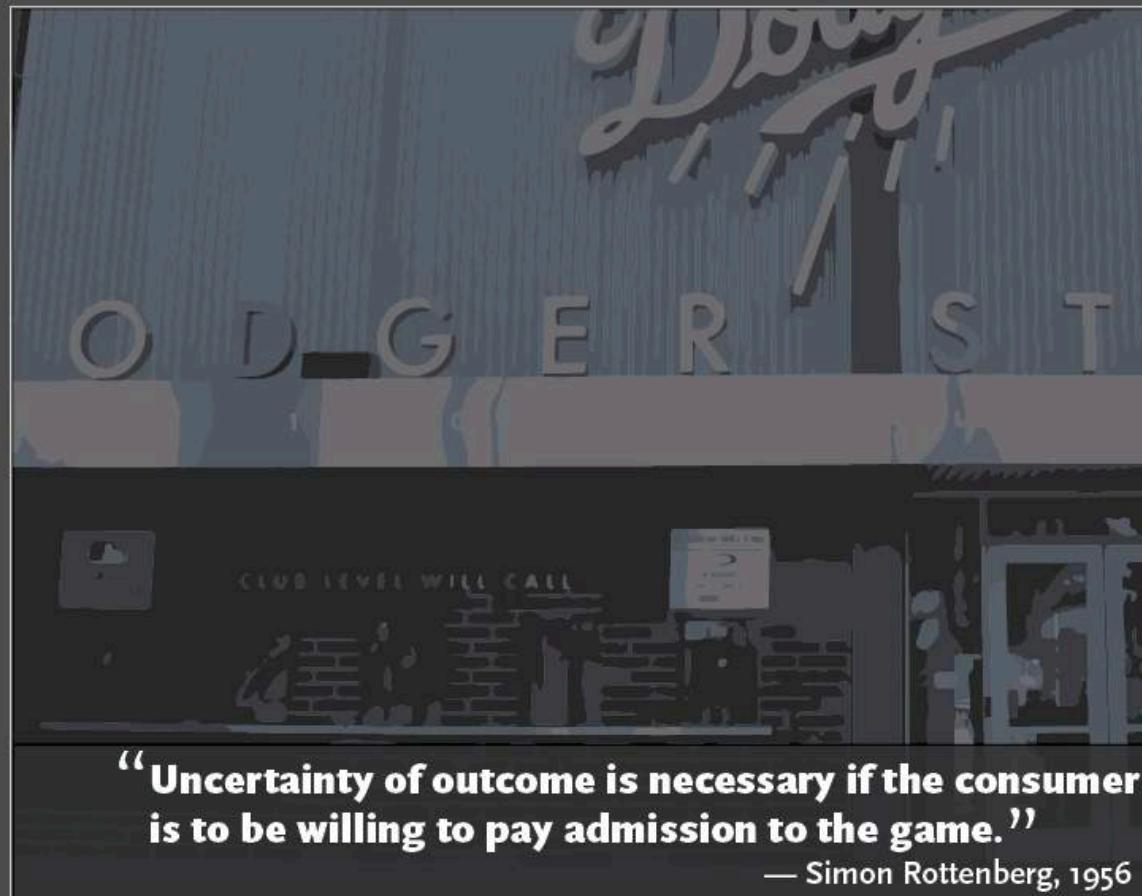
Among teams, we were only average in attempting Calcaterra's most exciting play in baseball. Following the model, our baserunners will know to steal more often, when the outcome is less certain, but the probability still favors our team.

We still have room to take more risks, to give consumers more uncertainty in what happens, to entice more fans into seats.

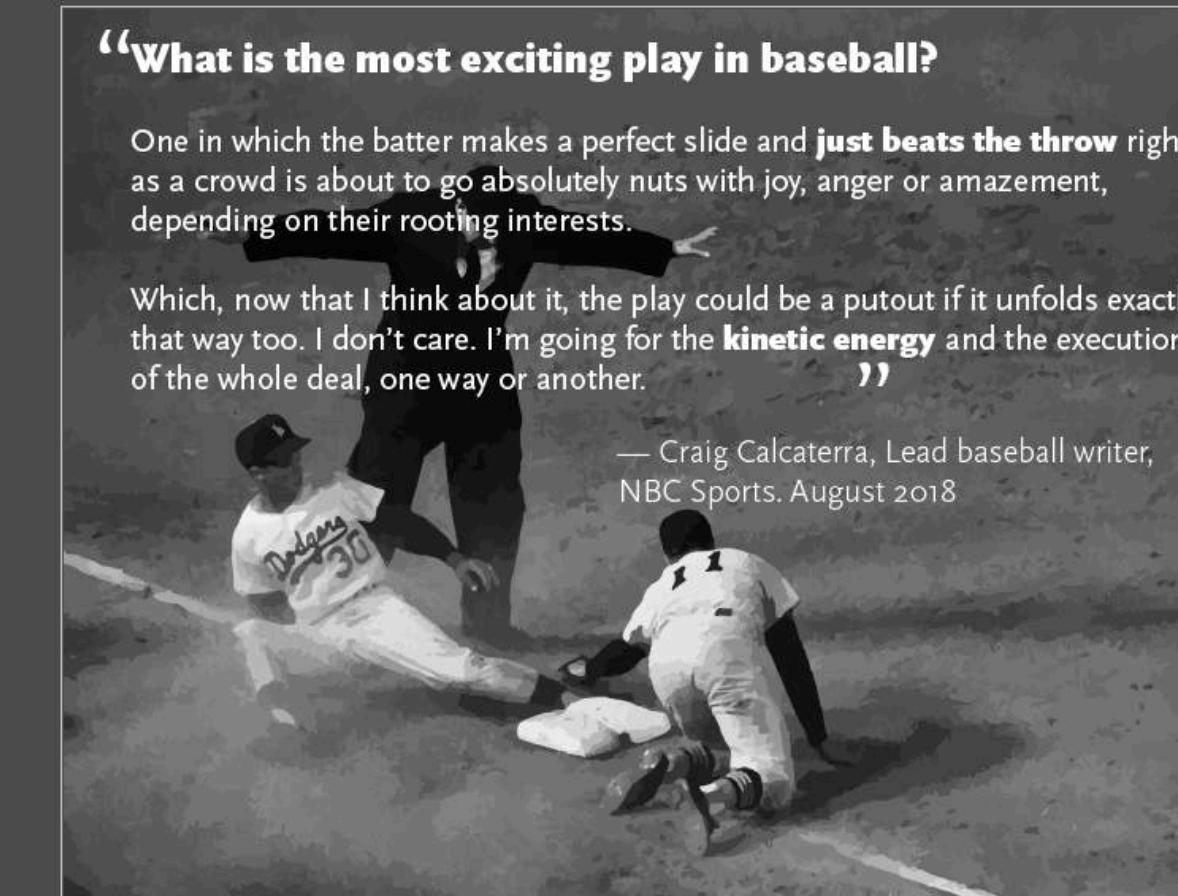
6

Having the uncertainty of each play outcome gives our managers a new tool to tell players to take more risks. The outcome can seem closer to a coin-flip, but in the long run, we can keep our decisions on the winning side. Our model-informed game will be more exciting, making it easier to market, sell tickets, generate buzz.

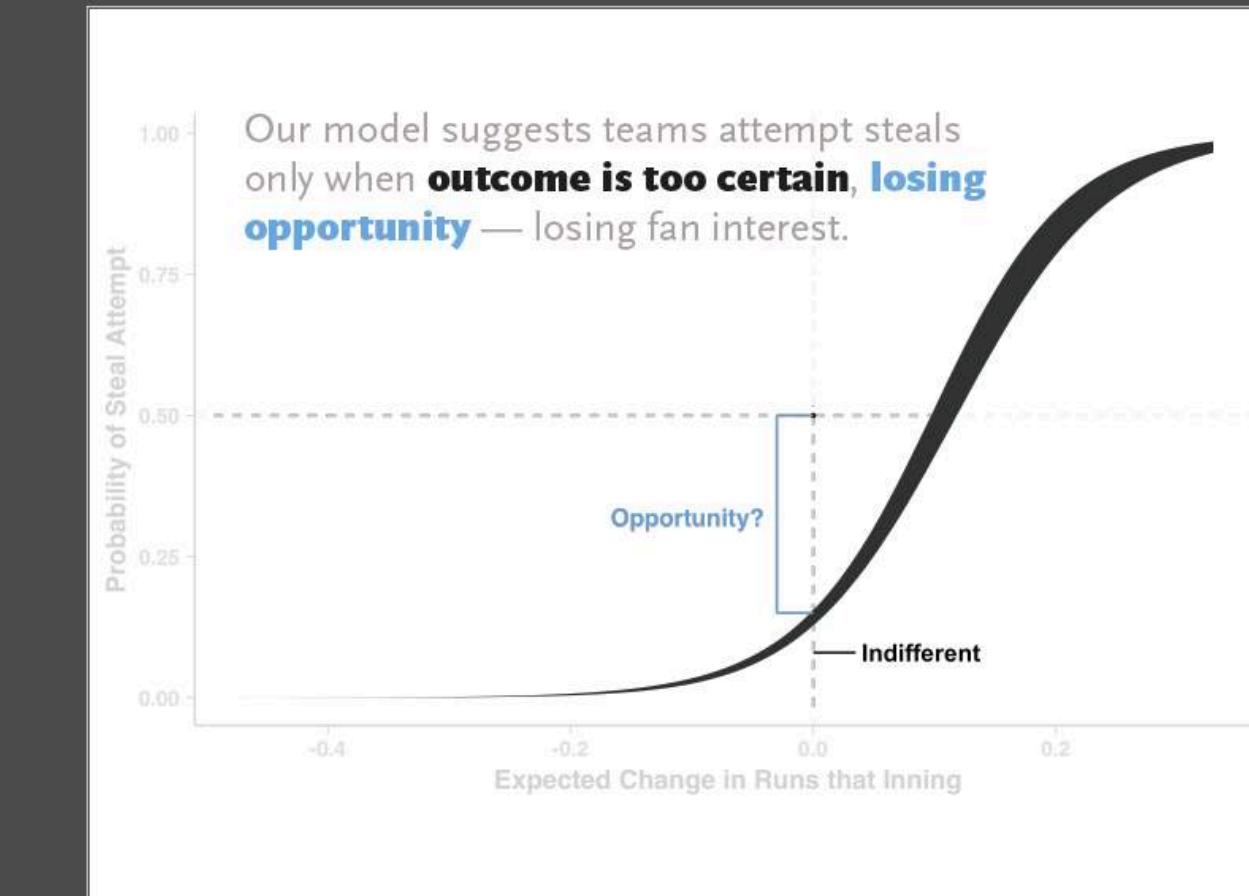
# Storyboarding something relevant with a preliminary insight



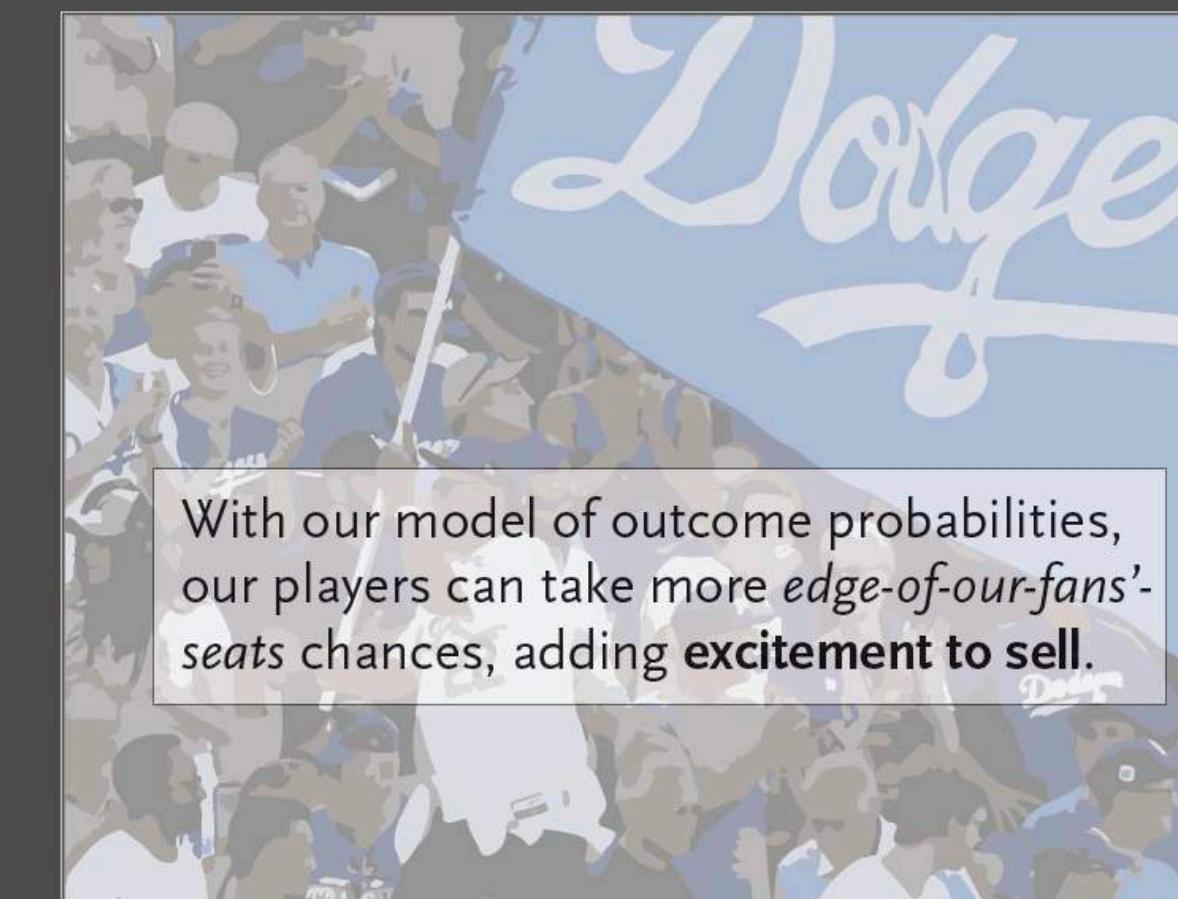
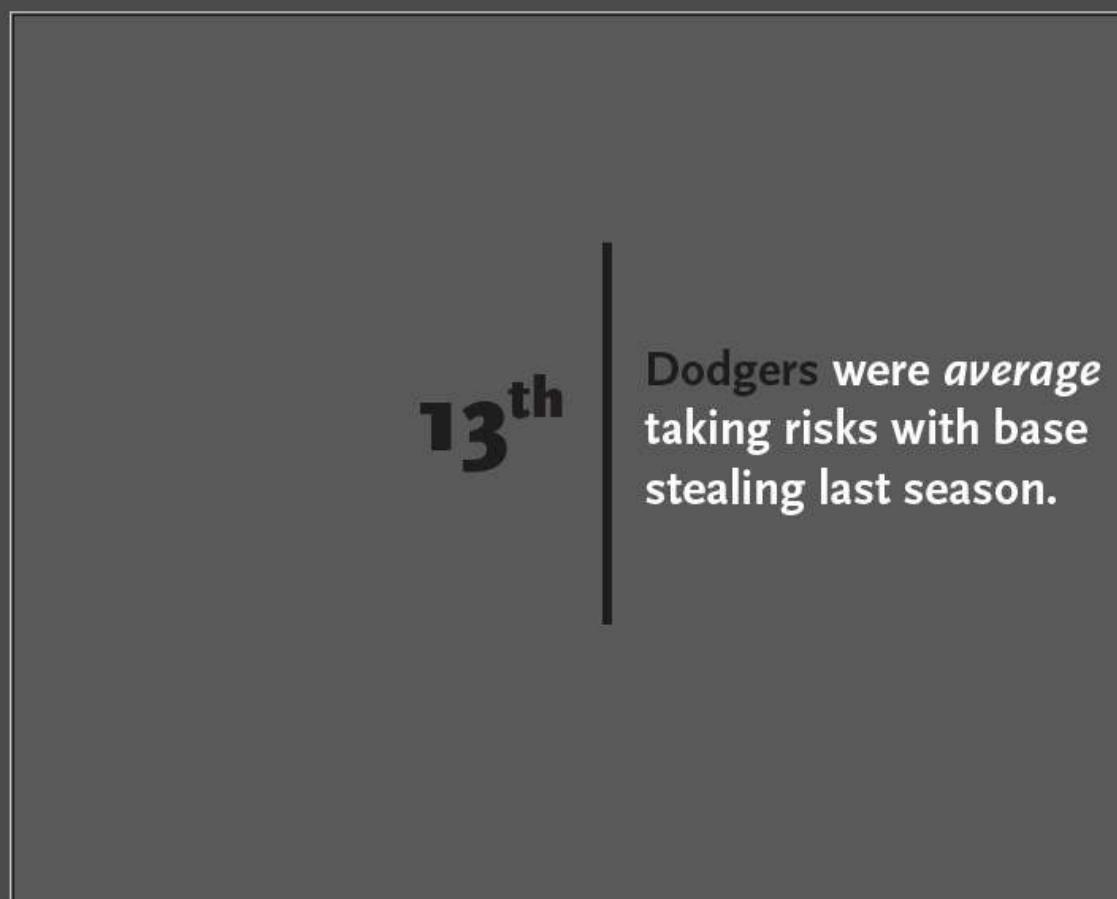
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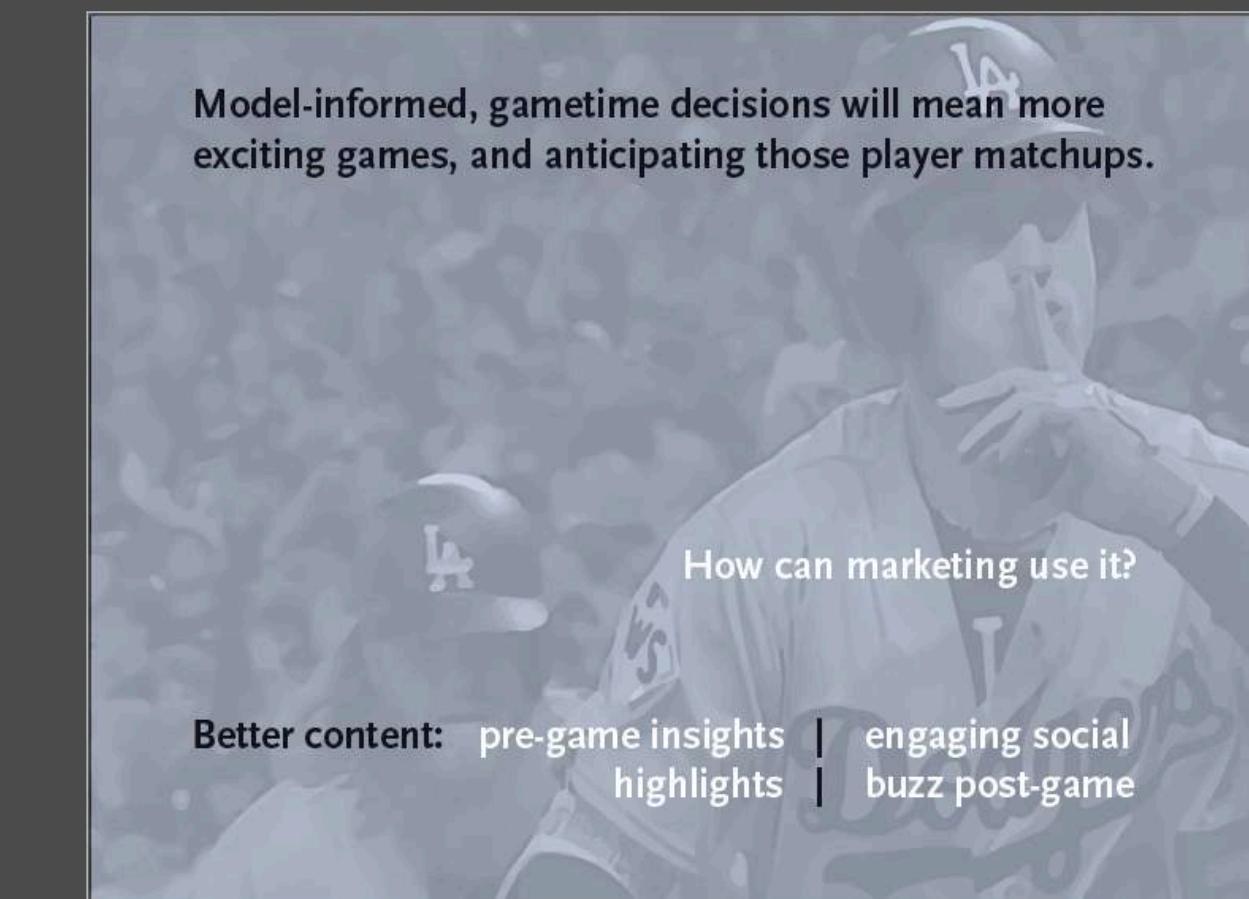
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5

# One approach to structuring this example

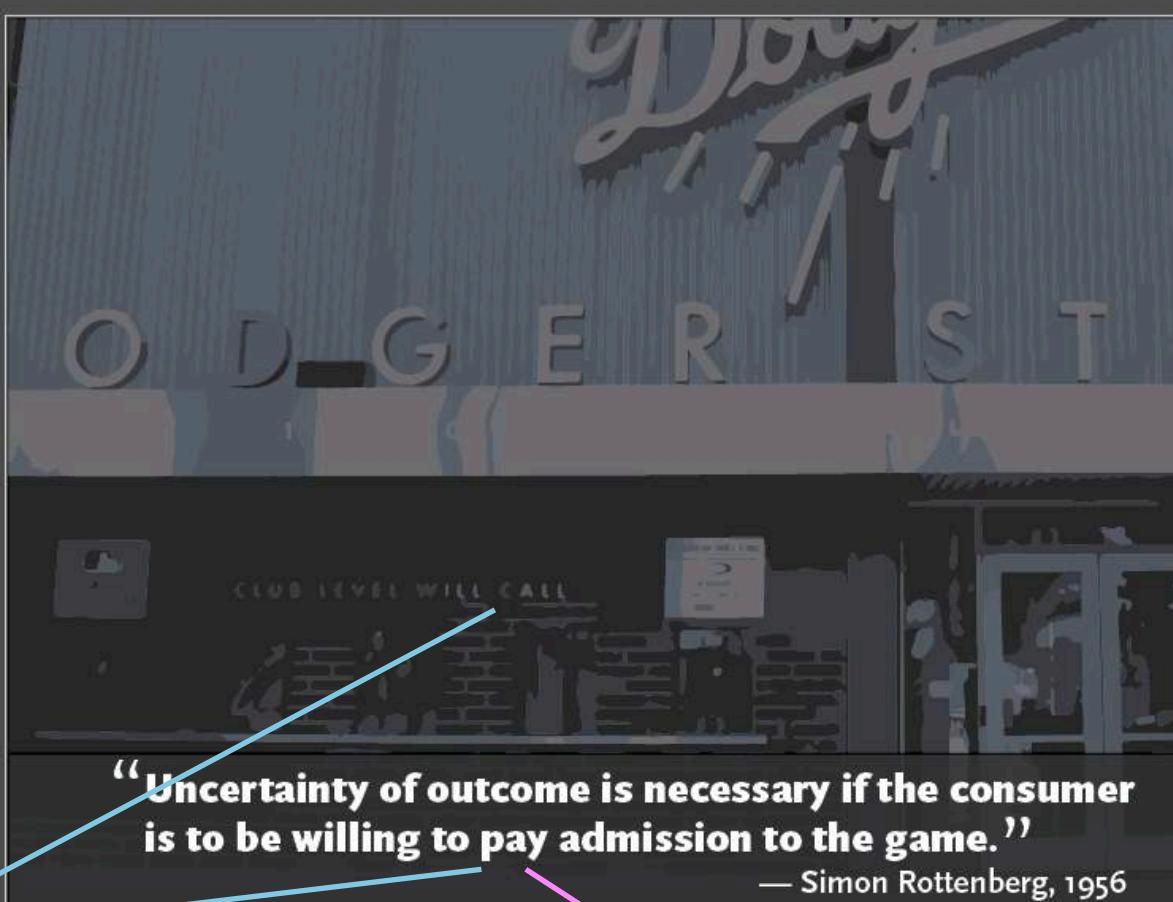
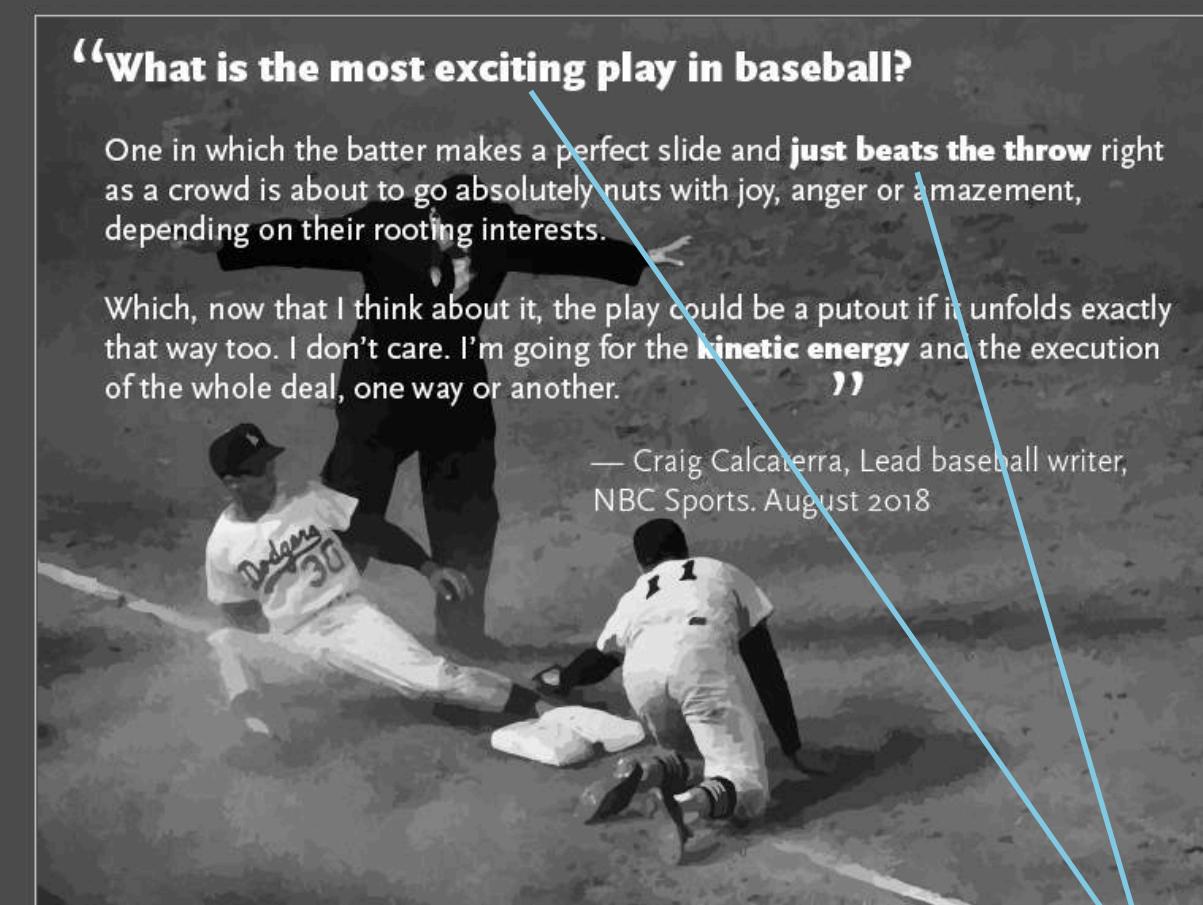
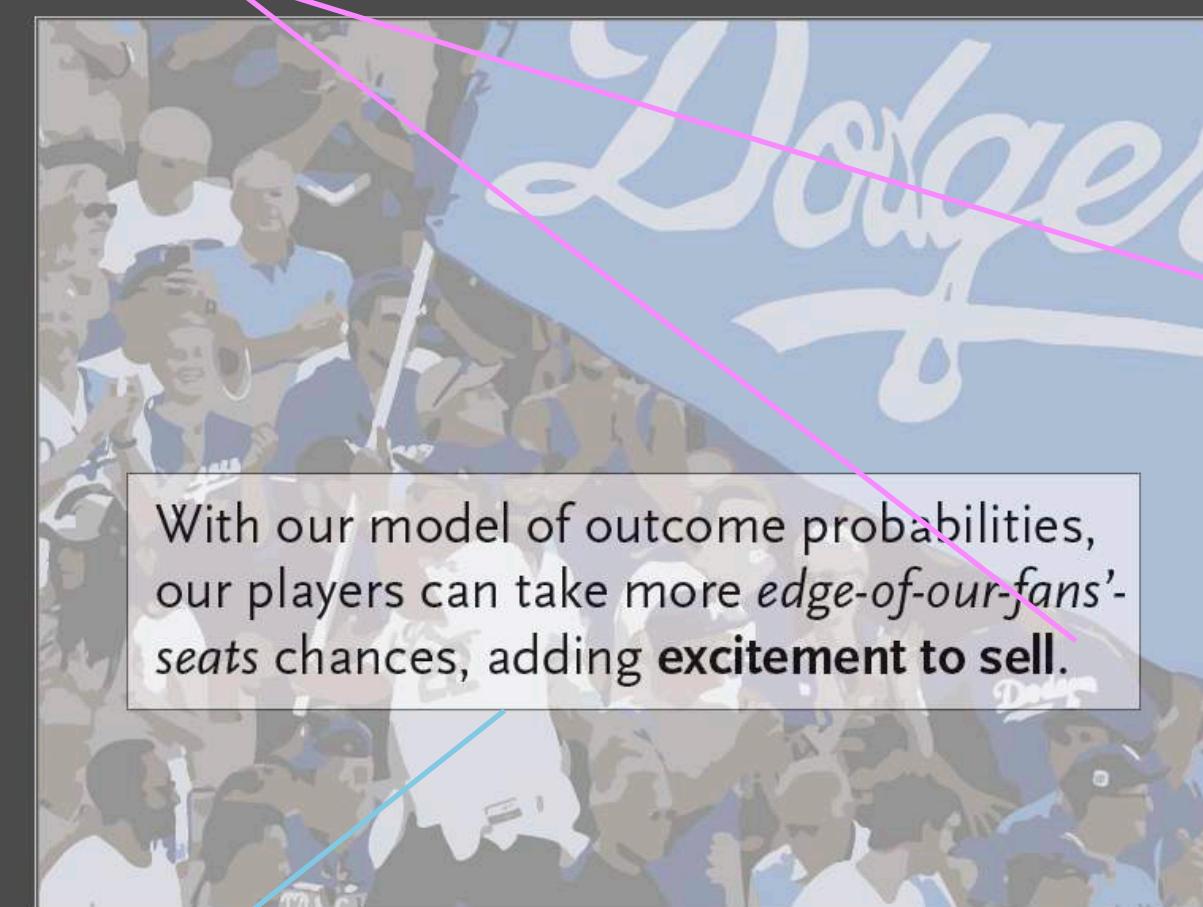


Illustration congruent with words



1 Exposition or establish  
Relevance to marketing (CMO)



4 Falling action or release (solution)



Color relates words to data display



5 Rising action or initial (problem)

6 Denouement or call to action

# Storyboarding tips

1

**Focus on the outcome of your persuasion.** What are you trying to persuade your audience to think or do differently?

2

**Include storytelling tools in your storyboard.** In the beginning, middle or end of your narrative, include one of the tactics described in class to help you connect emotionally with your audience.

3

**Combine images, graphs, and headlines to tell your story.** Make it easy for the reader to follow your story by using less copy and more instantly “telegraph” images, graphs and headlines.

4

**Include your voiceover.** The slide images, data, and copy may not be clear enough to tell your story; tell us your voice over on the slide in a separate section.

5

**Use real data and, as needed, strong supporting images.** Do the analysis required to tell your story, show the key data. If your story depends on the images, then you should absolutely find them to make a bigger impact.

**“It’s hard to have a story if nothing moves or nothing changes.”**

- Jonathan Corum: the science graphics editor at The New York Times and founder of 13pt LLC, an information design studio.

# Applied to class examples

Todo: Section needs a lot of work or delete.

## THE ARTWORK

Discover the story behind  
The Next Rembrandt

 [START SCROLLING](#)

01  GATHERING THE DATA

02  DETERMINING THE SUBJECT

03  GENERATING THE FEATURES

04  BRINGING IT TO LIFE





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## 01 GATHERING THE DATA

### BUILDING AN EXTENSIVE POOL OF DATA

It's been almost four centuries since the world lost the talent of one its most influential classical painters, Rembrandt van Rijn. To bring him back, we distilled the artistic DNA from his work and used it to create The Next Rembrandt.

We examined the entire collection of Rembrandt's work, studying the contents of his paintings pixel by pixel. To get this data, we analyzed a broad range of materials like high resolution 3D scans and digital files, which were upscaled by deep learning algorithms to maximize resolution and quality. This extensive database was then used as the foundation for creating The Next Rembrandt.

“ ”

"Data is used by many people today to help them be more efficient and knowledgeable about their daily work, and about the decisions they need to make. But in this project it's also used to make life itself more beautiful. It really touches the human soul."

- Ron Augustus, Microsoft



X



02  
DETERMINING THE SUBJECT

## BREAKING DOWN THE DEMOGRAPHICS IN REMBRANDT'S WORK

To create new artwork using data from Rembrandt's paintings, we had to maximize the data pool from which to pull information. Because he painted more portraits than any other subject, we narrowed down our exploration to these paintings.



Then we found the period in which the majority of these paintings were created: between 1632 and 1642. Next, we defined the demographic segmentation of the people in these works and saw which elements occurred in the largest sample of paintings. We funneled down that selection starting with gender and then went on to analyze everything from age and head direction, to the amount of facial hair present.



After studying the demographics, the data lead us to a conclusive subject: a portrait of a Caucasian male with facial hair, between the ages of thirty and forty, wearing black clothes with a white collar and a hat, facing to the right.



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03  
GENERATING THE FEATURES

## CONSTRUCTING A FACE OUT OF THE NEW FEATURES

Once we generated the individual features, we had to assemble them into a fully formed face and bust according to Rembrandt's use of proportions. An algorithm measured the distances between the facial features in Rembrandt's paintings and calculated them based on percentages. Next, the features were transformed, rotated, and scaled, then accurately placed within the frame of the face. Finally, we rendered the light based on gathered data in order to cast authentic shadows on each feature.

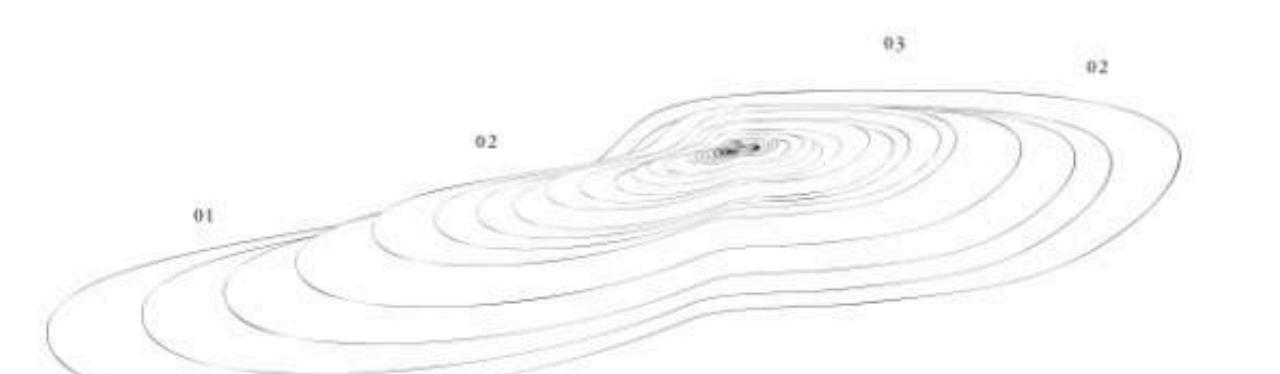
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04  
BRINGING IT TO LIFE

CREATING ACCURATE  
DEPTH AND TEXTURE



We now had a digital file true to Rembrandt's style in content, shapes, and lighting. But paintings aren't just 2D — they have a remarkable three-dimensionality that comes from brushstrokes and layers of paint. To recreate this texture, we had to study 3D scans of Rembrandt's paintings and analyze the intricate layers on top of the canvas.

“ “

“We looked at a number of Rembrandt paintings, and we scanned their surface texture, their elemental composition, and what kinds of pigments were used. That's the kind of information you need if you want to generate a painting by Rembrandt virtually.”

- Joris Dik, Technical University Delft

THE NEXT REMBRANDT



# THE NEXT REMBRANDT



PRESENTING PARTNER

ING is one the most innovative financial institutions in the world. Every day they reimagine new and relevant possibilities for their clients to stay a step ahead in life and business. The Next Rembrandt was a way for ING to bring this innovative spirit to their sponsorship of Dutch art and cultural icons.



SUPPORTING PARTNER

Microsoft saw an opportunity to show the power of data for businesses and individuals through The Next Rembrandt. Their Azure platform was instrumental to the project by supporting data handling and data analysis, as well as providing maximum calculating power.

WITH SPECIAL THANKS TO OUR ADVISORS



# Questions for discussion.

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Do you see a beginning, middle, and end? Where?

Where, in the visual-text combinations, do you see comparisons or contrasts or change?

What other structure or ideas that we've learned in class so far do you see?

Why might it be more or less useful to only have images, or only have words?

Why might it be helpful to hear additional context in, say, a voice-over?

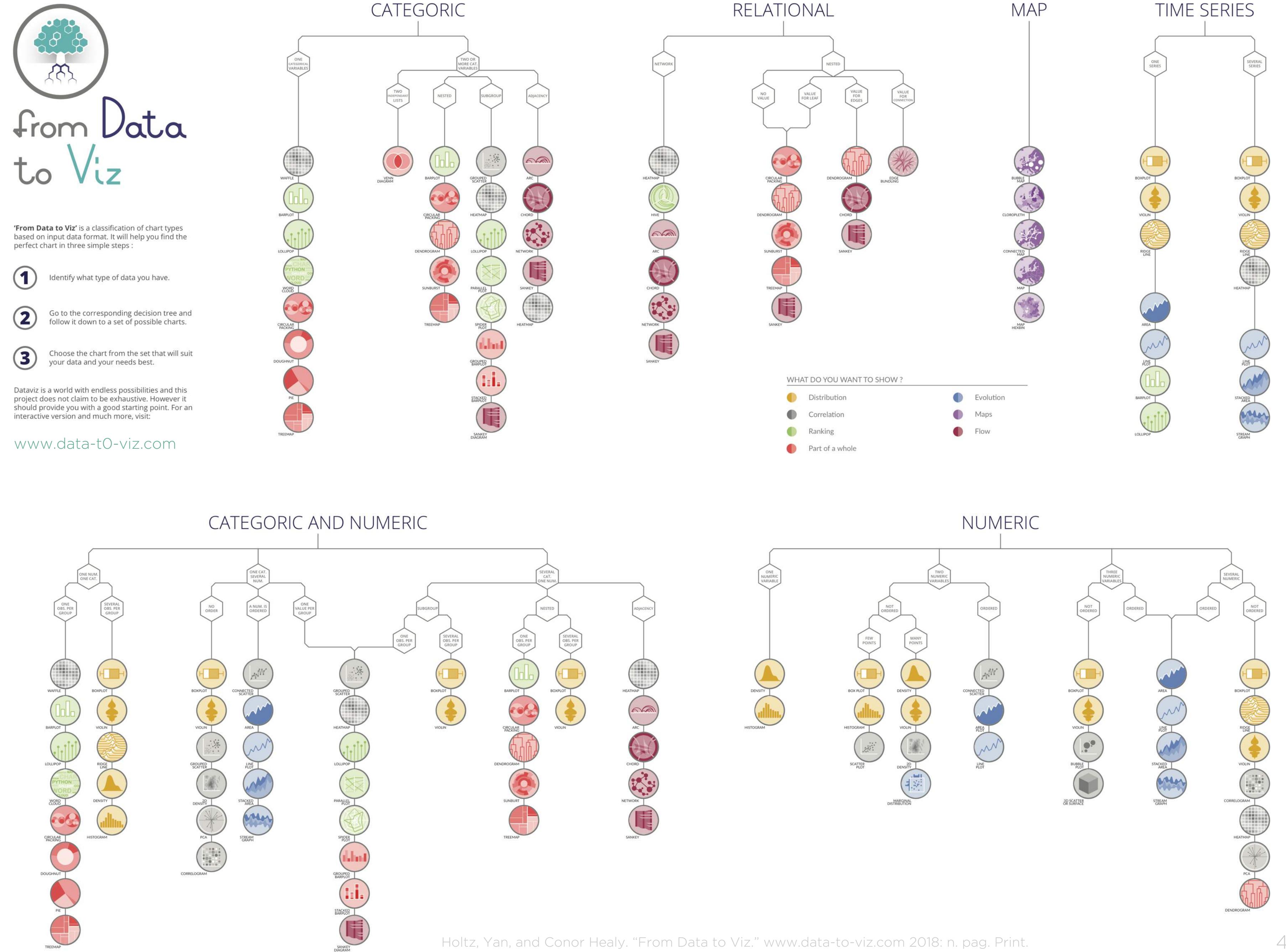
# Preview of graphics

Todo: Add explanation in this section. Main point is to give them a resource to start thinking about graphics before we fully dive in.



# from Data to Viz, Winner, Information is Beautiful Award

## Holtz & Healy



# Graphics as data pictures of comparison and change

Todo: The rest of  
presentation is bonus  
material if have time.  
Otherwise it goes in lecture  
with graphics.

## Example of comparison in Malofiej award-winning data story.

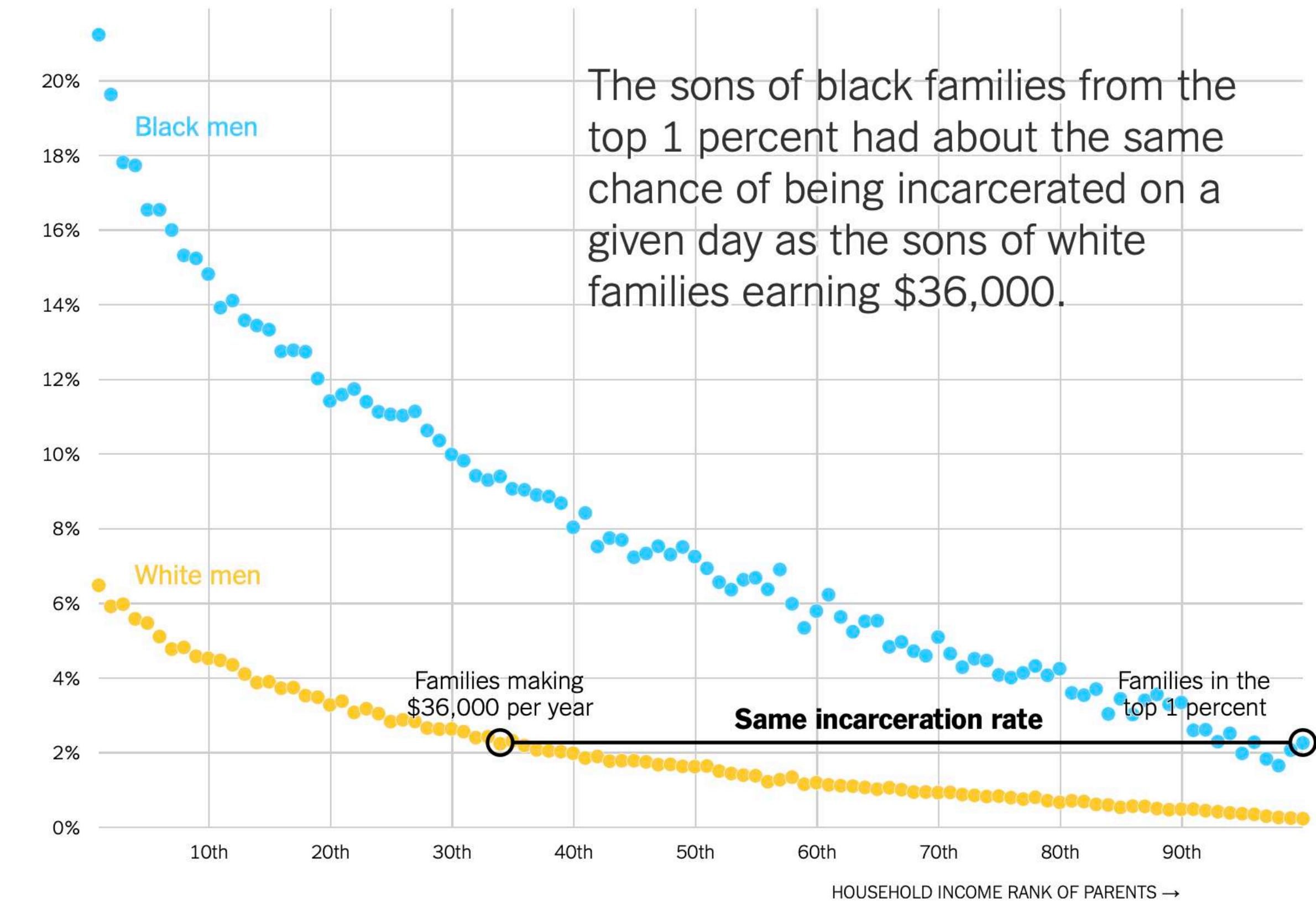


# Extensive Data Shows Punishing Reach of Racism for Black Boys

*Badger, co-authors*

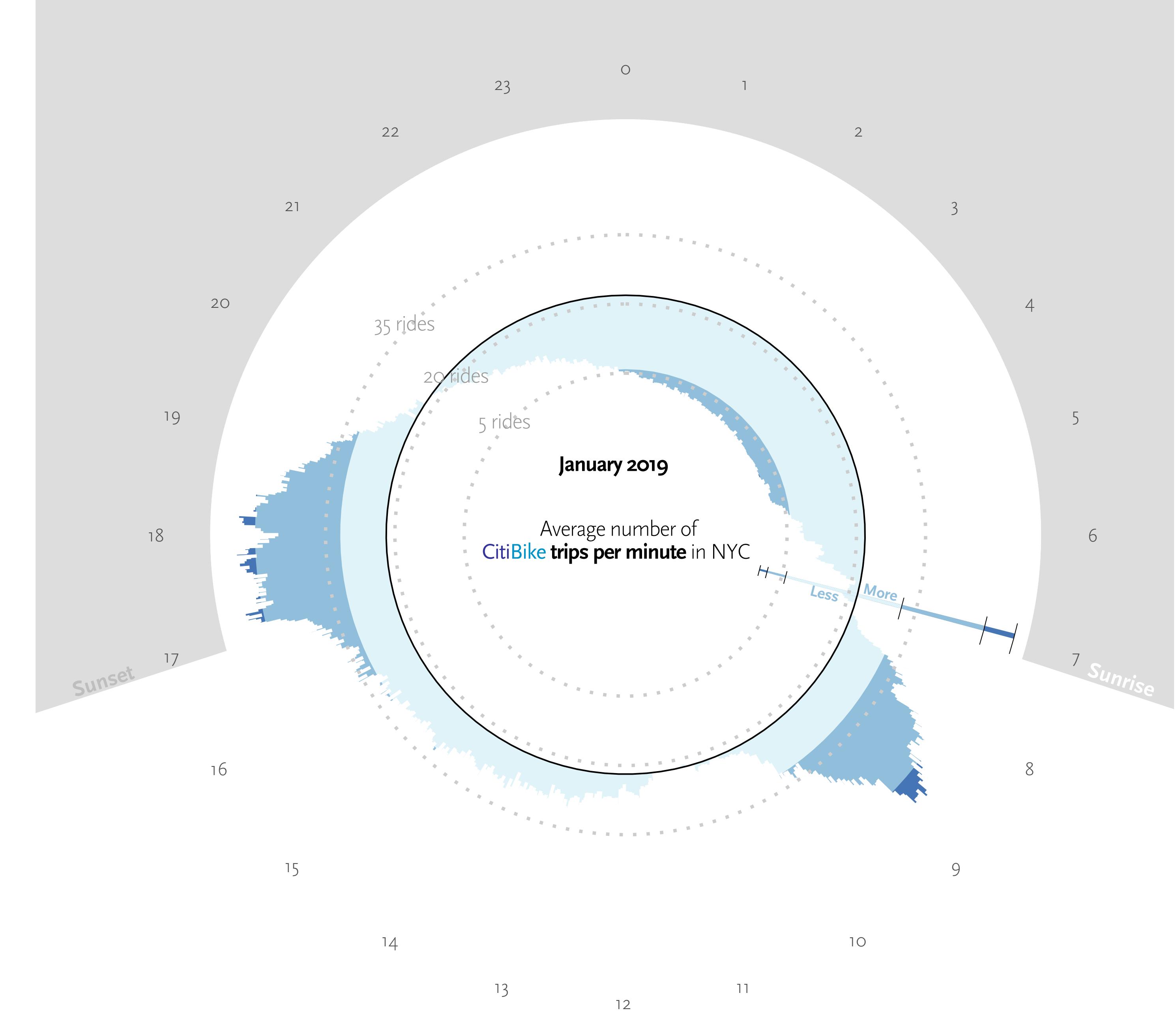
Emily writes about cities and urban policy for The Upshot from the Washington bureau. She's particularly interested in housing, transportation and inequality — and how they're all connected. She joined the Times in 2016 from The Washington Post.

Share of the men incarcerated on April 1, 2010



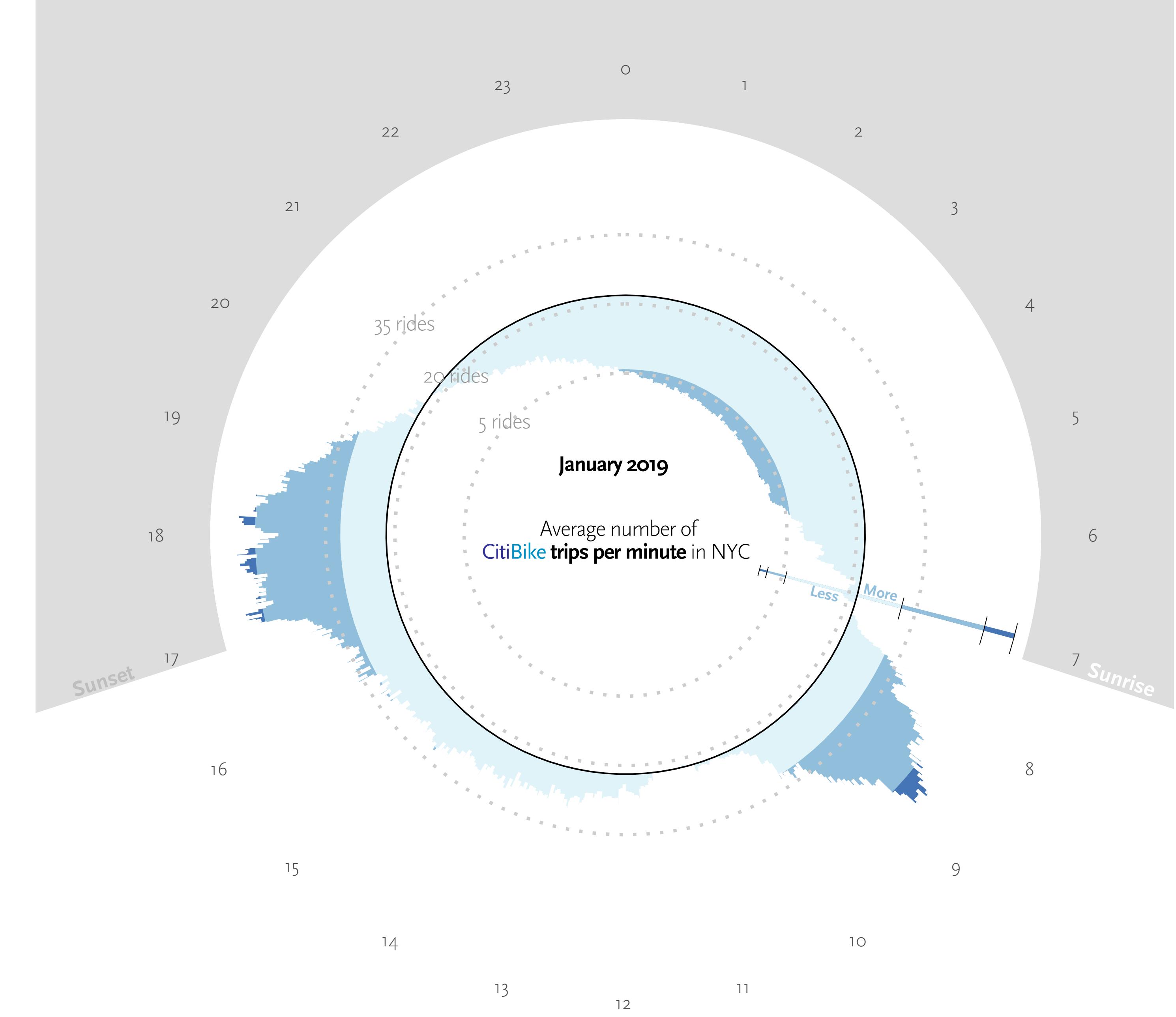
Includes men who were ages 27 to 32 in 2010.

# Revisiting CitiBike, showing temporal changes in activity

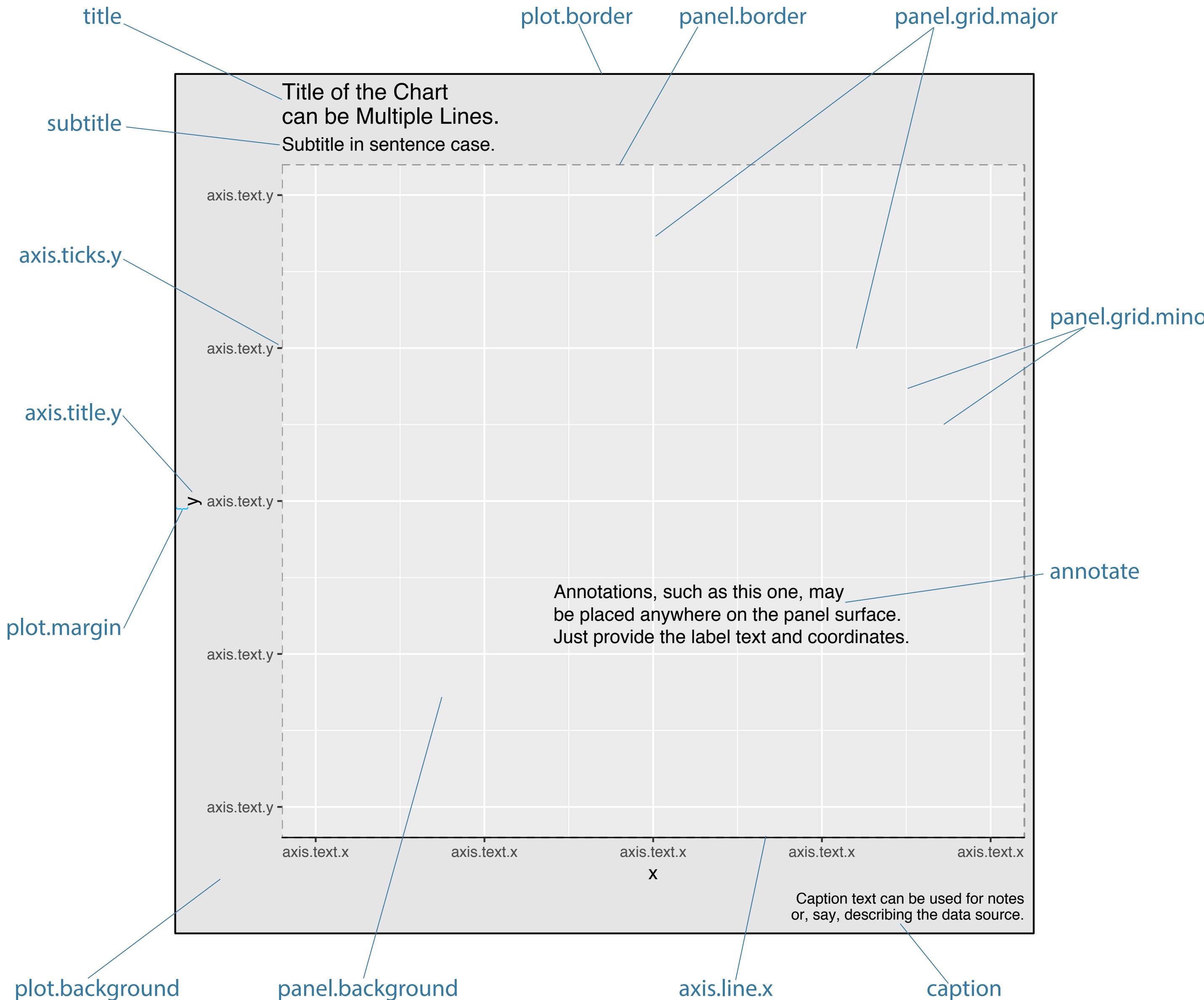


# **Creating graphics, a short, partial intro**

**Think about  
graphics as layers:  
here, a white  
layer partly masks  
the band of blues**



# First, think visually in describing the graphic. Then create the layers.



```
# load grammar of graphics  
library(ggplot2)
```

```
p <-
```

```
# functions for data ink
```

```
ggplot(data = <data>,  
       mapping = aes(<aesthetic> = <variable>,  
                     <aesthetic> = <variable>,  
                     <...> = <...>)) +  
  geom_<type>(<...>) +  
  scale_<mapping>_<type>(<...>) +  
  coord_<type>(<...>) +  
  facet_<type>(<...>) +  
  <...> +
```

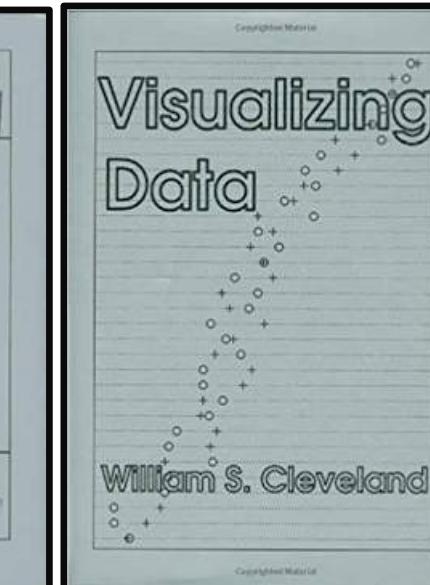
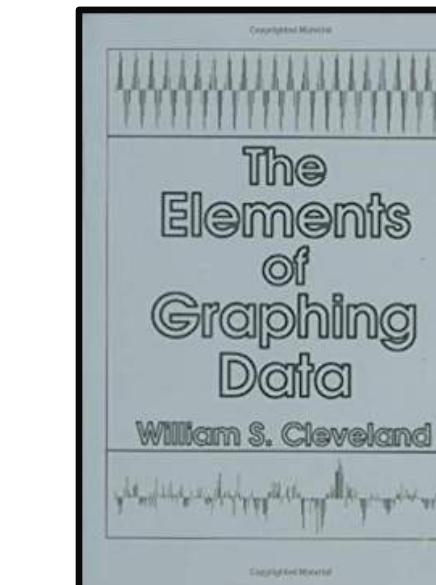
```
# functions for non-data ink
```

```
labs(<...>) +  
theme(<...> = <...>) +  
annotate(<...>) +  
<...>
```

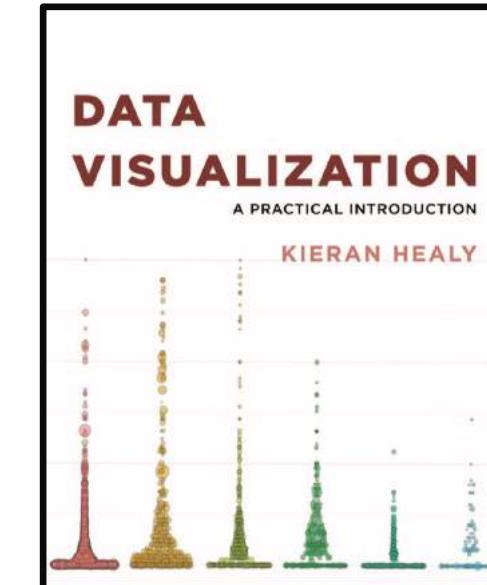
```
element_blank()  
element_line(<...> = <...>)  
element_rect(<...> = <...>)  
element_text(<...> = <...>)
```

## Learning & References

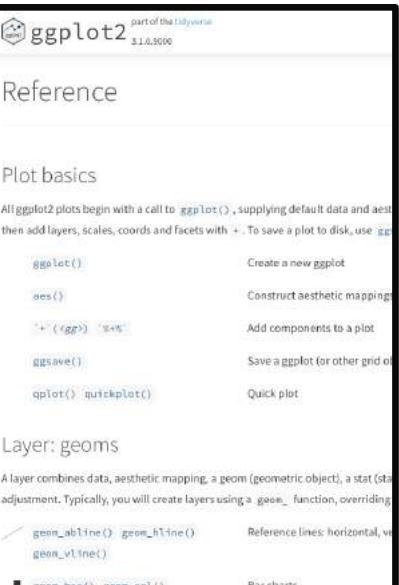
---- visual relationships in data ----



Implementation in R



ggplot reference



# **Between now and next class**

# For Next Week, Module 7:

## Agenda next week

### The minimum

Next deliverable, **final** storyboard

Storytelling continued

Theory and best practices for the visual components of an analytics story

**Corum, Jonathan.** See. *Think. Design. Produce.*  
28 Mar 2016. Web. <http://style.org/stdp3/>

Consider the perspective of a leading visual story designer on the process of visual data storytelling.

**Tufte, E. R. (2001).** Ch. 6 and 9. *The Visual Display of Quantitative Information.* Graphics Press.

Understand what “data-ink” includes, how it can be maximized, and whether there are limits to the idea. Further consider the interaction that graphics and words have in a narrative, and how placement matters.

**Healy, Kieran.** Ch. 1, *Look at Data. Data Visualization.* 2018. Web. <https://socviz.co/>

Consider how we perceive types of data encodings and how that influences our communications.

# Show and ask

## Show and ask

Find a non-moving data visualization that is also a story—one you really like—but that you don’t know how you could make it. Share the visual on Campus Wire and explain what part you don’t know how you could make.

## Learning with practice

Aside from your assigned projects, briefly describe one of your attempts in the past week to use any of the techniques we have discussed in the course.

See you  
next week!

