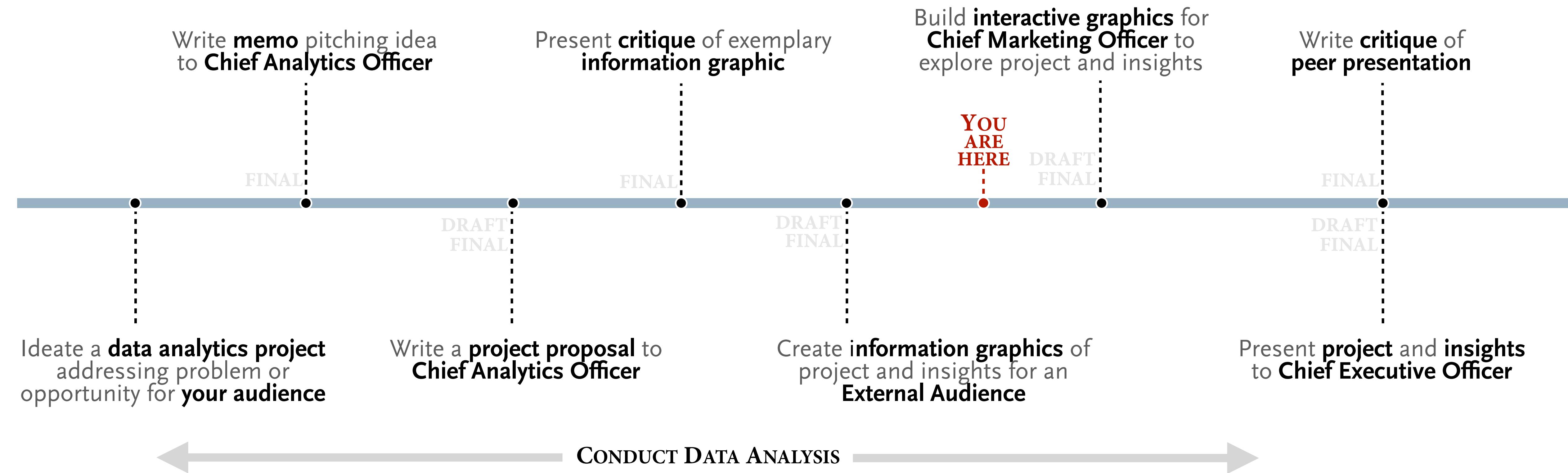


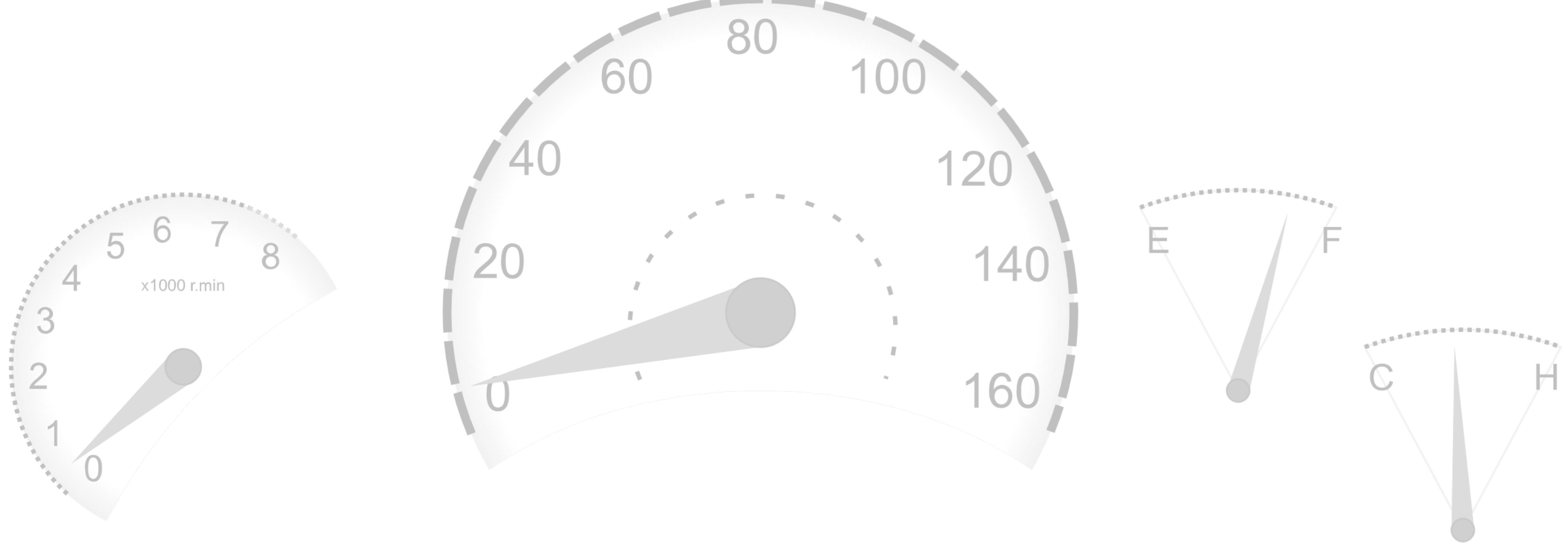
# Storytelling with data

**11 | Interactive communication with data-driven graphics**

# course overview, main course deliverables



**visual narrative flow**

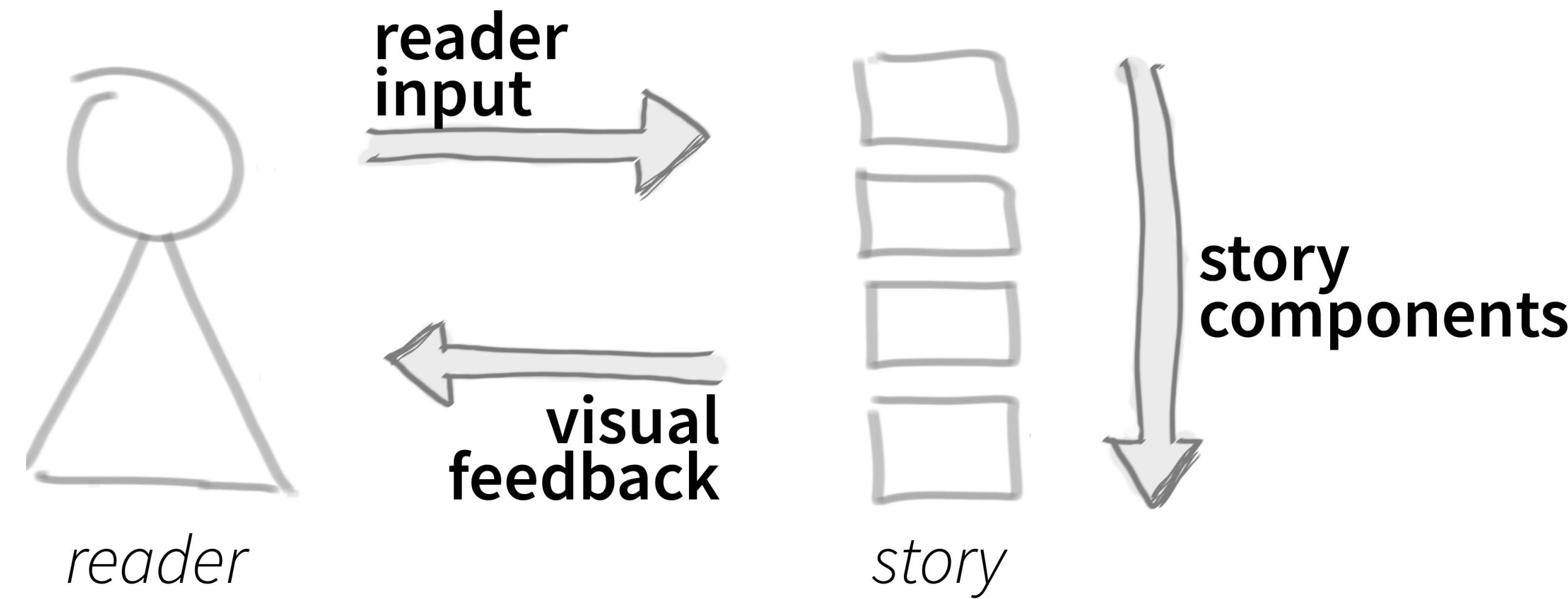


For a vehicle dashboard, who's its audience? What's its purpose? Needs words? — Audience and purpose drive design.

## **visual narrative flow, if a dashboard, the need for *guided* dashboards**

An issue of communication is related to storytelling ability. Dashboards are increasingly used for decision making and communication across contexts: top-down, within departments, and across the organization. **Dashboards that capture only the data and not the semantics of the data, or what was done in response to the data, can be *insufficient* for communication purposes.** In BI, people often take screenshots of dashboards and put them into slide presentations in order to annotate them with contextual information, suggesting a ***need* for more powerful storytelling features.**

# visual narrative flow, characteristics that affect experience

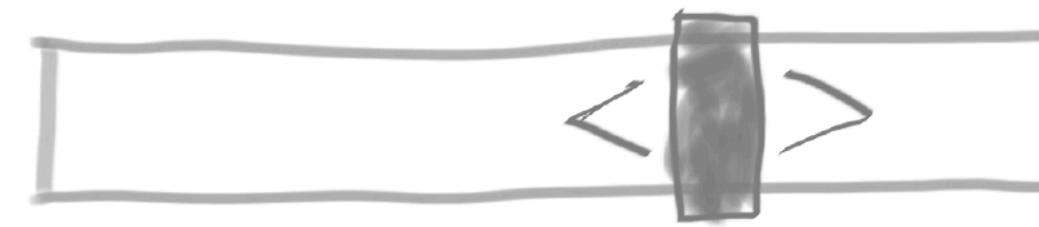


**visual narrative flow** | the congruence between *flow-factors*, i.e., 1) the way a reader navigates the story, 2) the visual components of the story, and 3) the type of visual feedback the reader receives; along with the nature of the data and facts that the author wants to communicate.

design space for *flow factors*, navigation input · level of control · navigation progress · story layout · role of visualization · story progression · navigation feedback



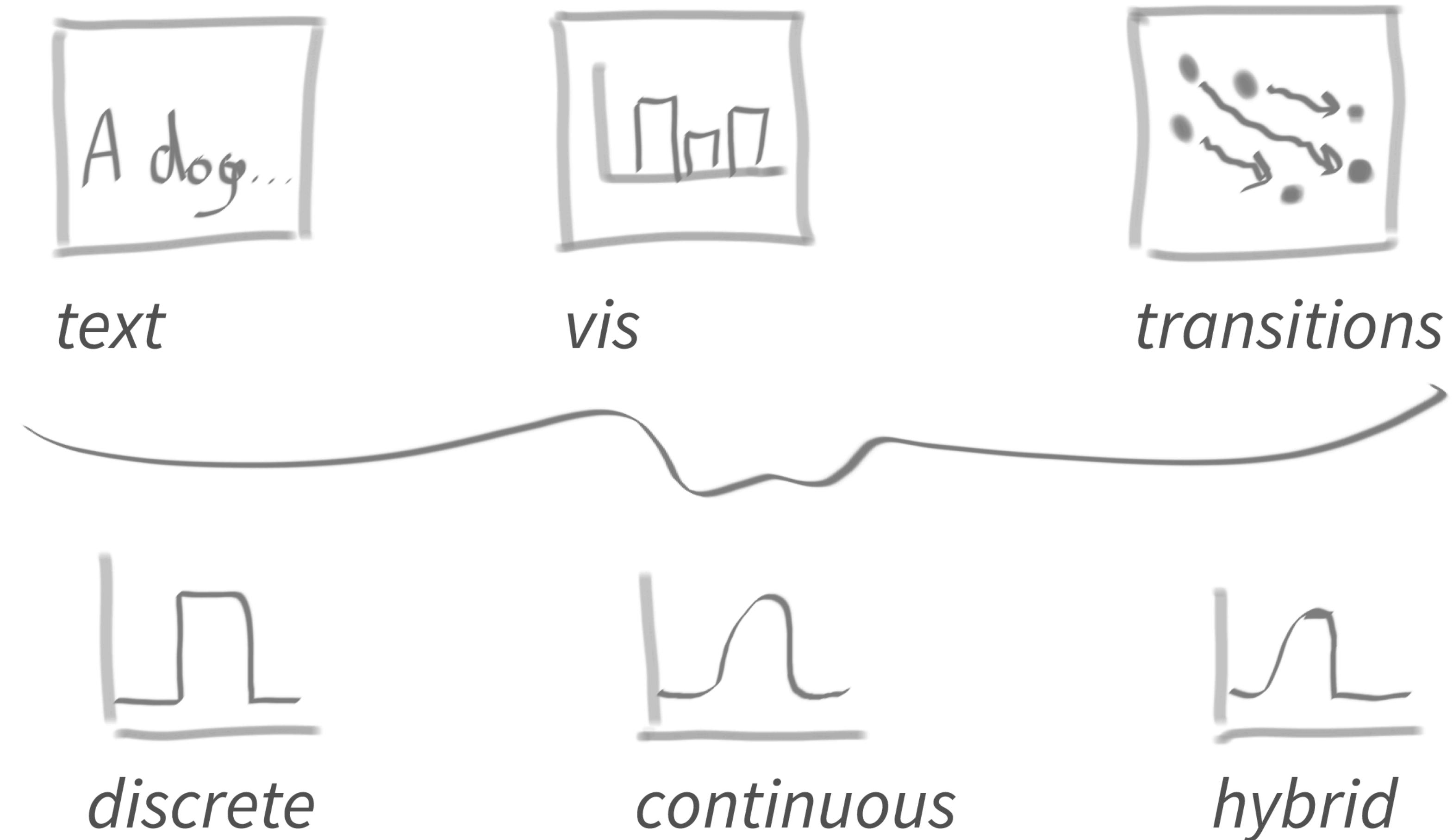
*button*



*scroll*



*slider*

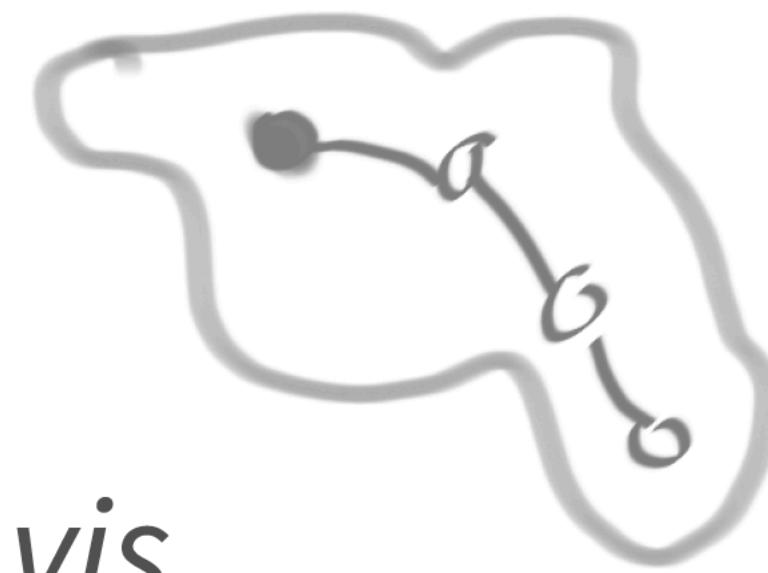




*text*



*dots*



*vis*



*document*



*slideshow*



*hybrid*



*equal*



*figure*



*annotated*



*linear*



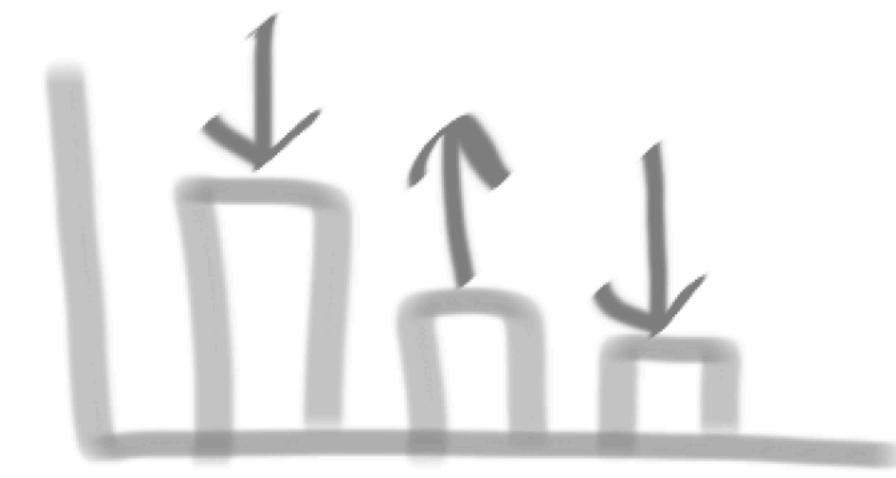
*linear skip*



*tree/graph*



*text*



*vis*



*widget*

# design space for *flow factors*, taxonomies like theirs can be helpful in seeing many example variations of these techniques

# title	navigation input	level of control	navigation progress	story layout	role of visualization	story progression	navigation feedback
	scroll button slider	text vis anim	text dots vis other	doc slide cols	equal figure annot.	linear skip other	text vis widget order
1 A Visual Introduction to Machine Learning	● ●	C C C	○ ○ ○	● 2	● ●	● ●	● sync
2 Scientific Proof that Americans are Completely Unaware of Climate Change	● ●	C C D	● ● ○	● 2	● ●	● ●	● sync
3 Fewer Helmets, More Deaths	● ●	C C D	● ● ○	○ ○ 2	● ●	● ●	● vis
4 A 3-D View of a Chart That Predicts The Economic Future of the World	● ●	D D D	● ○ ○	● 1	● ●	● ●	● sync
5 A Visual Analysis of Battle at the Barricades	● ●	C C D	● ○ ○	● 1	● ●	● ●	● sync
6 Budget Forecasts, Compared With Reality	● ●	D D D	● ○ ○	● 1	● ●	● ●	● sync
7 Human Development Trends, 2005	● ●	D D D	● ○ ○	● 1	● ●	● ●	● hyb
8 Diary of a Food Tracker	● ●	H H H	● ○ ○	○ ○ 1	● ●	● ●	● vis
9 How Americans Die	● ●	D D D	● ○ ○	● 1	● ●	● ●	● vis
10 Visualizing MBTA Data: An Interactive Exploration	● ●	C C C	● ○ ○	● 1	● ●	● ●	● vis
11 The World According to China	● ●	C C D	● ○ ○	● 1	● ●	● ●	● swap
12 How the U.S. and OPEC Drive Oil Prices	● ●	C H D	● ○ ○	○ ○ 1	● ●	● ●	● sync
13 Scaling Mt. Everest: A Scroll Up the Icy Path	● ●	C C C	● ○ ○	● 3	● ●	● ●	● sync
14 Snow Fall: The Descent Begins	● ●	C C D	● ○ ○	● 2	● ●	● ●	● sync
15 The Story of Jess & Russ	● ●	C C C	● ○ ○	● 1	● ●	● ●	● sync
16 2014 Was the Hottest Year on Record	● ●	C C D	● ○ ○	● 1	● ●	● ●	● sync
17 The World's Ball	● ●	C C D	● ○ ○	● 1	● ●	● ●	● swap
18 The Russia Left Behind	● ●	C C C	● ○ ○	● 2	● ●	● ●	● sync
19 The Water We Eat	● ●	C H C	● ○ ○	○ ○ 1-2	● ●	● ●	● sync
20 Ski Jumping	● ●	C H C	● ○ ○	○ ○ 1	● ●	● ●	● swap
21 The Dawn Wall: El Capitan's Most Unwelcome Guest	● ●	C C -	● ○ ○	● 2	● ●	● ●	● sync
22 Russia's Endgame in Ukraine	● ●	C C -	● ○ ○	● 1	● ●	● ●	● swap
23 At Top Colleges, an Admissions Gap for Migrants	● ●	D D D	● ○ ○	● 1	● ●	● ●	● text
24 Greenland Is Melting Away	● ●	C C C	● ○ ○	● 2	● ●	● ●	● sync
25 How Different Groups Spend Their Day	● ●	D D D	● ○ ○	● 1	● ●	● ●	● sync
26 Deconstructing the Past: A New Look at History	● ●	D D D	● ○ ○	block image	● 1	● ●	● sync
27 Dollar-a-Day Schools	● ●	D D D	● ○ ○	● 1	● ●	● ●	● sync
28 ChopTainer	● ●	H C -	● ○ ○	○ ○ 1	● ●	● ●	● sync
29 Neurotic Neurons: An Interactive Explanation	● ●	D D D	● ○ ○	● 1	● ●	● ●	● hyb
30 The Year Ahead 2016: 50 Companies to Watch	● ●	C C -	● ○ ○	● 2	● ●	● ●	● sync
31 The Museum of the World	● ●	- C C	● ○ ○	● 1	● ●	● ●	● sync
32 Bloomberg Carbon Clock	● ●	D D D	● ○ ○	● 1	● ●	● ●	● vis
33 Interactive: Global Emission	● ●	- D D	● ○ ○	● 1	● ●	● ●	● vis
34 A Map of Olympic Medals	● ●	- D D	● ○ ○	● 1	● ●	● ●	● sync
35 Shaun White's Double McTwist	● ●	D D D	● ○ ○	● 1	● ●	● ●	● vis
36 Bubble to Bust to Recovery	● ●	D D D	● ○ ○	● 1	● ●	● ●	● vis
37 A Nation Divided	● ●	D C D	● ○ ○	○ ○ 1	● ●	● ●	● sync
38 342,000 Swings Later, Derek Jeter Calls It a Career	● ●	C D C	● ○ ○	○ ○ 1	● ●	● ●	● sync
39 52 Places to Go in 2015	● ●	C C -	● ○ ○	● 2	● ●	● ●	● sync
40 A Walk Through the Gallery	● ●	D D C	● ○ ○	● 2	● ●	● ●	● text
41 Illuminating North Korea	● ●	C C -	● ○ ○	● 1	● ●	● ●	● sync
42 Walking New York	● ●	C D -	● ○ ○	● 2	● ●	● ●	● vis
43 Why Infectious Bacteria Are Winning	● ●	C D D	● ○ ○	● 1	● ●	● ●	● text
44 Hell and High Water	● ●	H D D	● ○ ○	○ ○ 1-2	● ●	● ●	● text
45 Eigenvectors and Eigenvalues	● ●	C C -	● ○ ○	● 1	● ●	● ●	● sync
46 Film Dialogue from 2,000 Screenplays, Broken Down by Word	● ●	C C D	● ○ ○	● 1	● ●	● ●	● sync
47 What's Really Warming the World?	● ●	H D D	● ○ ○	○ ○ 1	● ●	● ●	● sync
48 If the Moon Were Only One Pixel	● ●	C C -	● ○ ○	● 1	● ●	● ●	● sync
49 State of the Gadget Union	● ●	C C -	● ○ ○	● 1	● ●	● ●	● text
50 Why Pinellas County is the Worst Place in Florida	● ●	D D D	● ○ ○	● 1	● ●	● ●	● vis
51 The Dark Side of Guardian Comments	● ●	C C D	● ○ ○	○ ○ 1	● ●	● ●	● text
52 Trolls of the West	● ●	H H C	● ○ ○	○ ○ 1	● ●	● ●	● sync
53 Make Your Money Matter	● ●	H H C	● ○ ○	○ ○ 1	● ●	● ●	● sync
54 Bond: License to Drive	● ●	D C C	● ○ ○	○ ○ 1	● ●	● ●	● sync
55 Every Last Drop - Water Saving Website	● ●	H C C	● ○ ○	○ ○ 1	● ●	● ●	● sync
56 Green Honey	● ●	C D D	● ○ ○	● 2	● ●	● ●	● sync
57 The Clubs that Connect The World Cup	● ●	C C D	● ○ ○	● 2	● ●	● ●	● vis
58 Gestalt Principles for Data Visualization	● ●	C C D	● ○ ○	● 2	● ●	● ●	● text
59 Money Wins Elections	● ●	C C C	● ○ ○	○ ○ 1	● ●	● ●	● sync
60 The Air We Breathe	● ●	H C D	● ○ ○	● 1	● ●	● ●	● text
61 Most Unlikely Comebacks: Using Historical Data to Predict the Future	● ●	C C C	● ○ ○	● 2	● ●	● ●	● sync
62 Started From The Bottom	● ●	C C D	● ○ ○	● 2	● ●	● ●	● text
63 A Game of Shark and Minnow	● ●	C H D	● ○ ○	● 1-2	● ●	● ●	● text
64 Fleeing Syria for Europe: Safaa's fatal journey	● ●	C C C	● ○ ○	● 2	● ●	● ●	● sync
65 New Energy Outlook 2016	● ●	C C D	● ○ ○	● 2	● ●	● ●	● text
66 Introducing Serio Verify	● ●	H C C	● ○ ○	○ ○ 1	● ●	● ●	● sync
67 Im Zentrum Des Geschehens	● ●	H C D	● ○ ○	● 2	● ●	● ●	● sync
68 Das TunnelSystem der Rekorde	● ●	C C -	● ○ ○	● 2	● ●	● ●	● vis
69 These Memories Won't Last	● ●	C C -	● ○ ○	● 1	● ●	● ●	● sync
70 Fuglefjelllet	● ●	C D D	● ○ ○	● 3	● ●	● ●	● sync
71 Gun Deaths In America	● ●	D D D	● ○ ○	● 1	● ●	● ●	● vis
72 A Trail of Terror in Nice, Block by Block	● ●	D D D	● ○ ○	● 1	● ●	● ●	● vis
73 The Sieve of Eratosthenes	● ●	C D D	● ○ ○	○ ○ 2	● ●	● ●	● text
74 The Wild Path: An Icelandic Adventure	● ●	C D C	● ○ ○	● 2	● ●	● ●	● sync
75 How Fed Rates Move Markets	● ●	C C C	● ○ ○	● 1	● ●	● ●	● sync
76 What ECB Stimulus Has Done	● ●	H C C	● ○ ○	● 1	● ●	● ●	● vis
77 Sizing Up The Olympics	● ●	C C C	● ○ ○	● 1	● ●	● ●	● vis
78 The Internet of Things	● ●	D D D	● ○ ○	● 1	● ●	● ●	● sync
79 Setting the Pace: The Fed Acts, Markets Move	● ●	D H H	● ○ ○	● 1	● ●	● ●	● vis
80 What I Saw in Syria	● ●	D D -	slider	● 1	● ●	● ●	● sync

scroll press/swipe continuous discrete moving text transition duration sticky text



## Teaching Bar Charts through Data Visualization

### showing the raw data

Data enables us to better understand the world around us.

Take this list of a few characters from the TV show, The Simpsons. It includes their names, genders, and their ages.

Let's start with just the 5 main Simpson family characters.



	Gender	Adult
Lisa	F	N
Bart	M	N
Homer	M	Y
Marge	F	Y
Maggie	F	N

## *design space for flow factors, general preferred approach of “business intelligence experts”, one study*

**Interactivity.** ...When creators were asked if they want the visualizations in the reports to be completely interactive and encourage readers to interact with them (e.g. using drill down/up, filter, link & brush), four of our **experts prefer to have interactive visualizations that permit linking and brushing (i.e. data selection).**

But **they would limit the more advanced interactions** such as drill down/up or filtering.

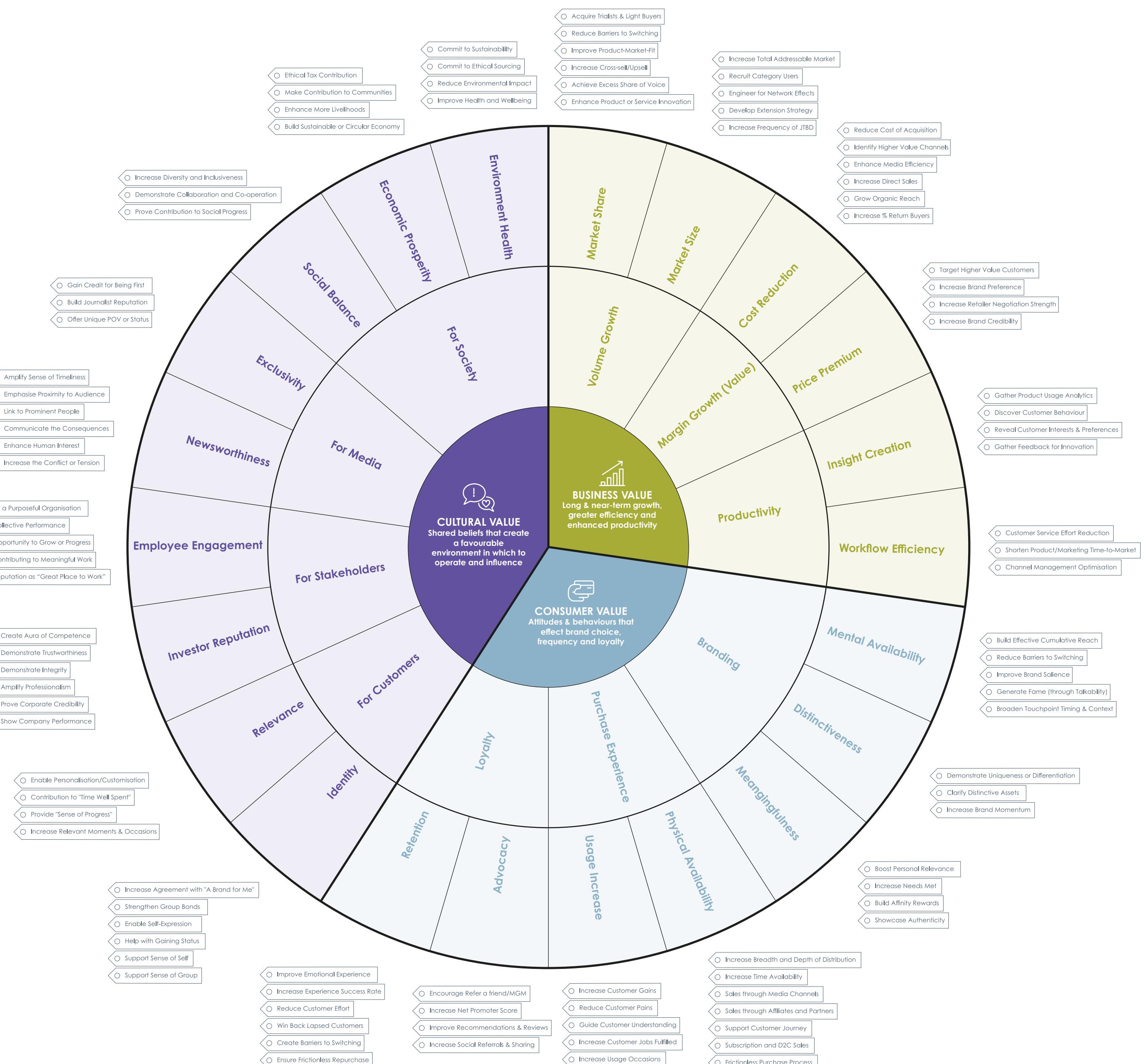
They felt that **all the data needed to tell the story should be displayed clearly in the report without the need to explore the data further....**

Thus authors feel business stories should be mostly author-driven and constraint, known to work best when the goal is storytelling or efficient communication.

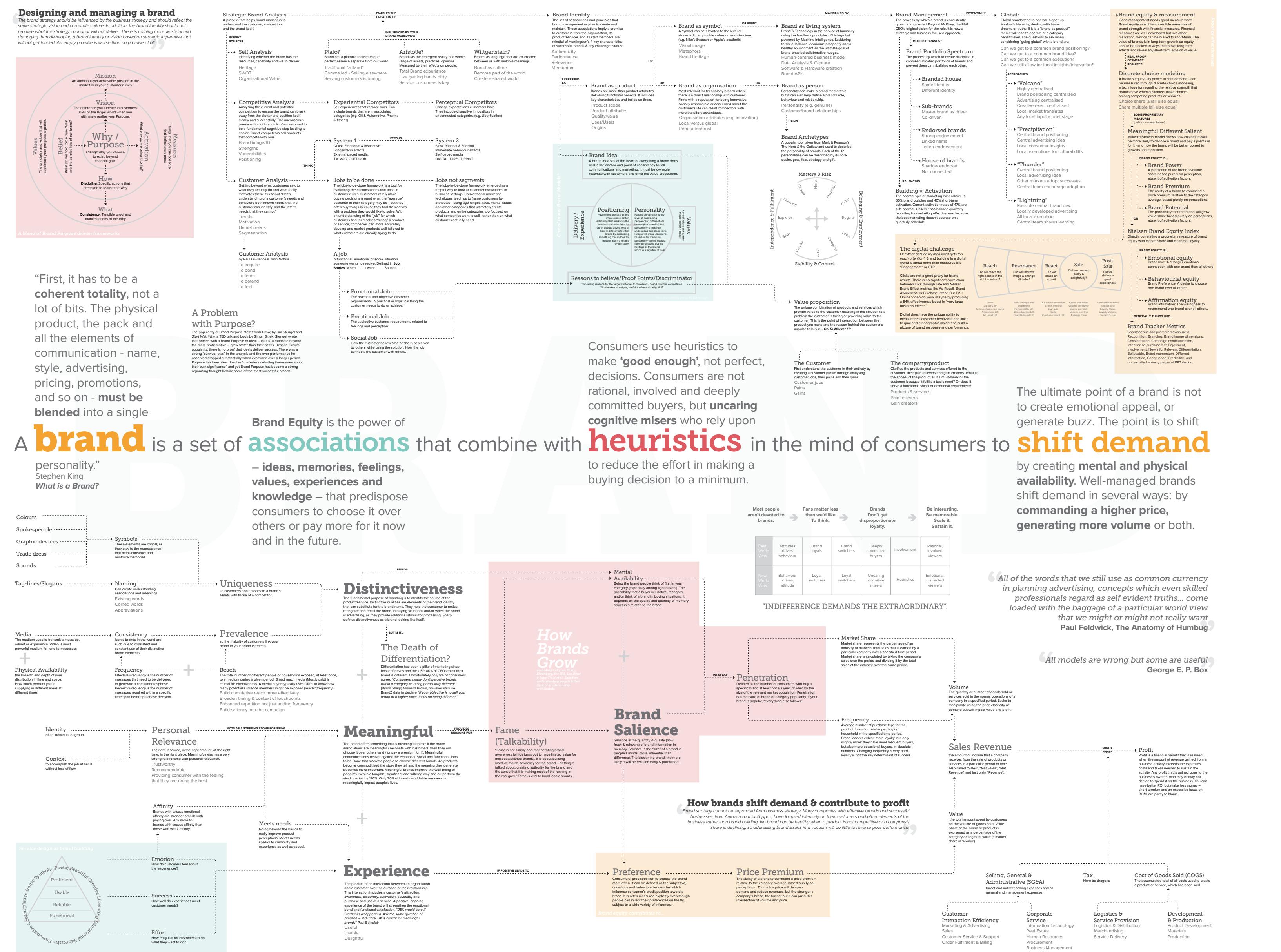
**Agree? Disagree? Explain.**

**minimal example — interactive, visual  
communication for Lyft's marketing executive**

# minimal example, for what things are a marketing executive responsible?



# *minimal example, for what things are a marketing executive responsible?*



21 Scott Spencer /  <https://ssp3nc3r.github.io>

[cott.spencer@columbia.edu](mailto:cott.spencer@columbia.edu)

minimal example, *how do marketing executives work with — and reason about — data?*



**Data drives marketing,  
can reveal biases**

This marketing director knows that marketing is data-driven. Further, “Data can often show the basis for our biases and intuition.”

**Limitations in  
data need to be  
understood,  
addressed**

He also understands issues with use of data:  
Sources of unique data can be limited.

Data is often corrupted, unhygienic, or mis-transformed when converting to information.

Data is often guestimated, panel-skewed, inaccurate, and not proven, but at the same time “treated as gospel.”

Measured data is only part of the story; things that go unmeasured are important and can change what the total information mean from a business standpoint.

**Use of data is  
about truth and trust,  
requires openness  
about source and  
methodology**

“The debate about the use of data in marketing and communications is really a debate about truth and trust, the two biggest issues in the world today.”

minimal example, what's the background of the head marketing executive for bikes at Lyft (CitiBike)?



Azmat Ali · 3rd 

Head of Rider Product Marketing at Lyft  
San Diego, California, United States · 500+ connections · Contact info

**About**

Results driven executive with over 25 years experience in leading start up, high growth and mature organizations through rapid growth and change worldwide. Consistently successful in identifying and developing growth opportunities, achieving operational results, building highly effective organizations and collaborating across organizational boundaries. Expertise includes management and diffusion of innovation, customer insights that drive action, consumer, SMB and enterprise customer segments, retail channel and international markets

Specialties: Strategic Marketing, Developing and delivering growth strategies, Management of Innovation, Consumer Marketing. Growth mindset. Innovation Funnel Management. New Category Creation. Excellent people and business management. Digital Marketing. PPC SEO and full funnel optimization. Data Analytics

#### Experience

 **Head of Rider Product Marketing**  
Lyft · Full-time  
May 2020 – Present · 11 mos  
San Francisco Bay Area

 **HP**  
3 yrs 11 mos  
Head of Innovation and Incubation  
Nov 2019 – May 2020 · 7 mos

 **Global Head, Consumer Product and Segment Marketing**  
Jul 2016 – Nov 2019 · 3 yrs 5 mos  
Palo Alto

 **VP Brand and Marketing**  
Evernote  
Feb 2016 – Jul 2016 · 6 mos  
San Francisco Bay Area

 **Chief Marketing Officer**  
Avegant  
Mar 2015 – Mar 2016 · 1 yr 1 mo  
San Francisco Bay Area

 **Vice President Marketing**  
Lytro Inc.  
Jan 2014 – Mar 2015 · 1 yr 3 mos  
Mountain View, California

Show 5 more experiences ▾

#### Education

 **Imperial College London**  
MBA, Marketing and Innovation  
1990 – 1991

 **Kingston University**  
Bachelor of Engineering - BE, Electronic Systems Engineering , Honours  
1986 – 1990

# Explore conditions of January, CitiBike ridership for segmentation and targeting.

Do rider **attributes** correlate with lower usage? Are we missing key target audiences?

How can we **segment** our audience to find opportunities for increasing ridership?

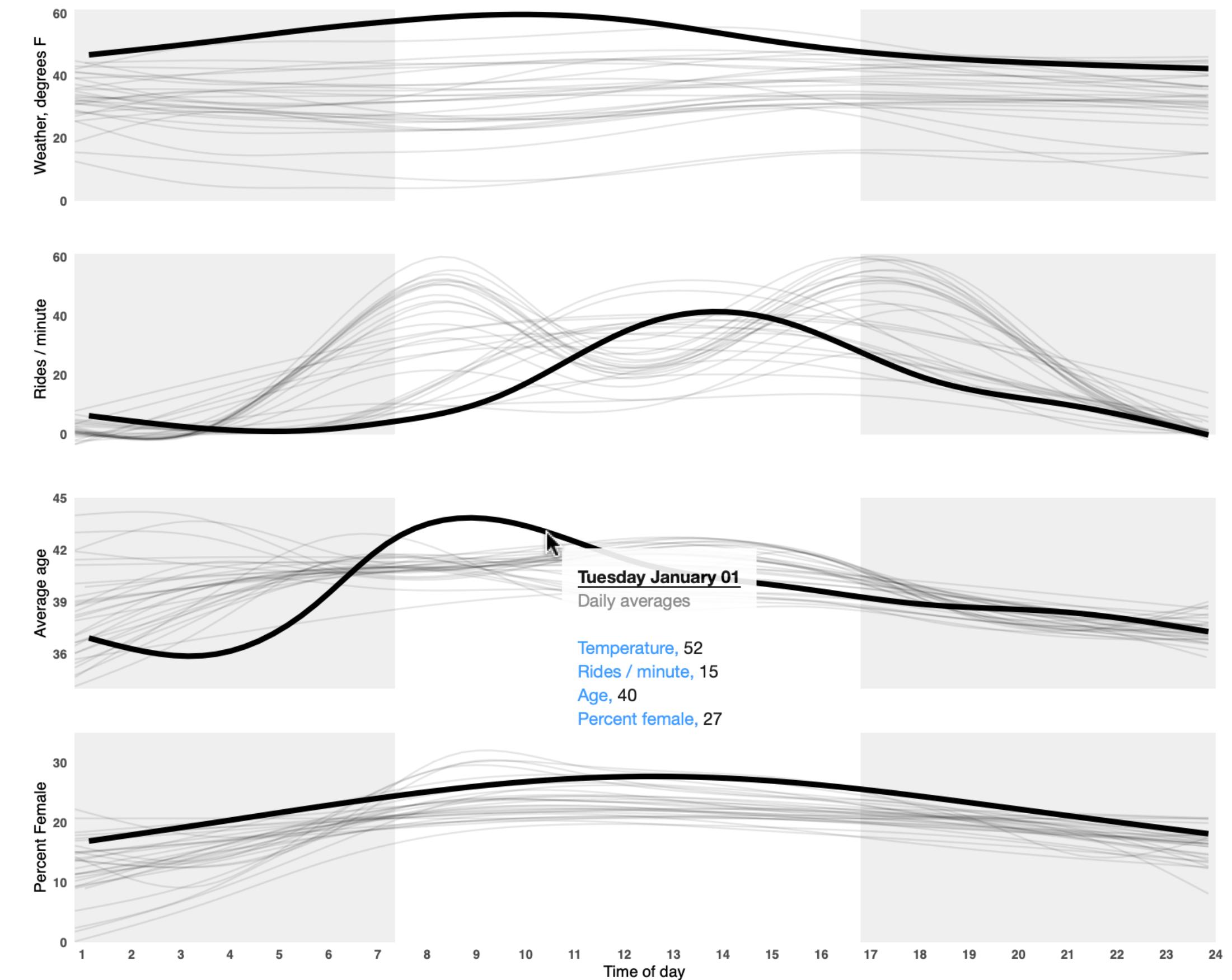
Are there better **temperatures** for us to trigger marketing messages to encourage rides?

Are there better **times of day** for us to trigger marketing messages to encourage rides?

**How to explore :** Hovering over any line will link the four variables — *weather, rides per minute, average age, and percent female* — and identify the *date and weekday selected*.

**Quick takes :** The morning and evening weekday peak commutes stand out from weekends, of course. But more

interestingly, on New Year's Day, our warmest of the month, you'll find a significant swing in average age  as night became morning; were our younger commuters out late, sleeping in? Below are *smoothed functions* of the data.



The lines show cubic splines, smoothing variation of each variable over the day. Sources: NYC Open Data, The Open Bus project, and Weather Underground. 2019 January 1-31. Design and code by Scott Spencer. 2021 March 31.

**group work**

**resources**

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