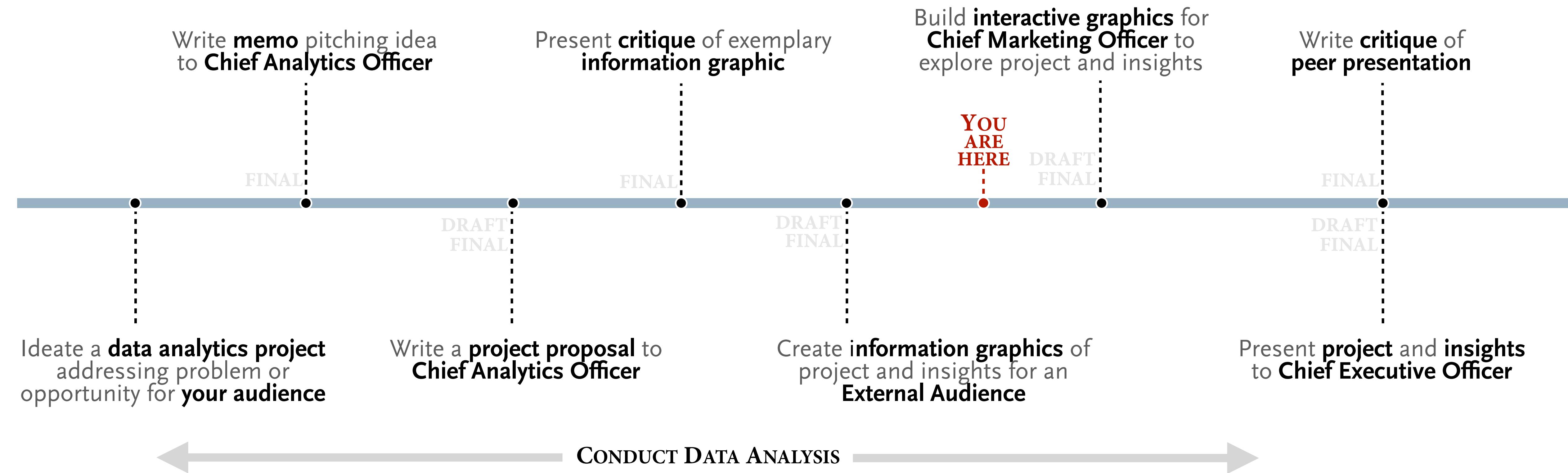


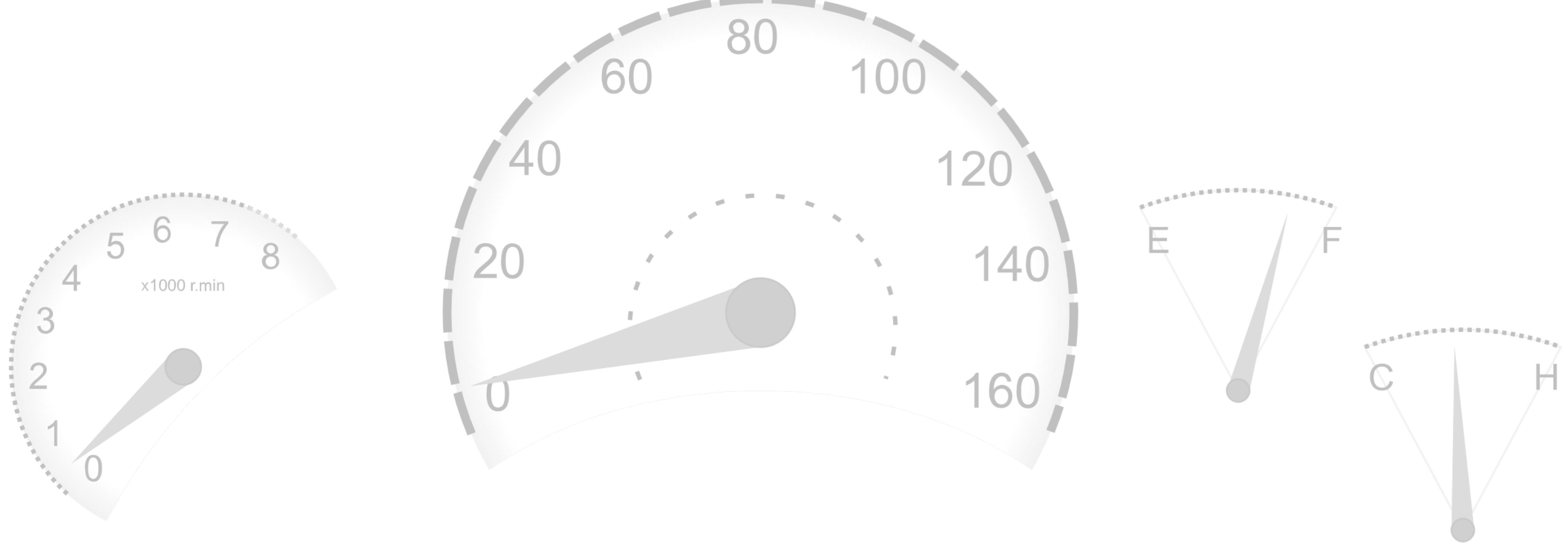
Storytelling with data

11 | Interactive communication with data-driven graphics

course overview, main course deliverables



visual narrative flow

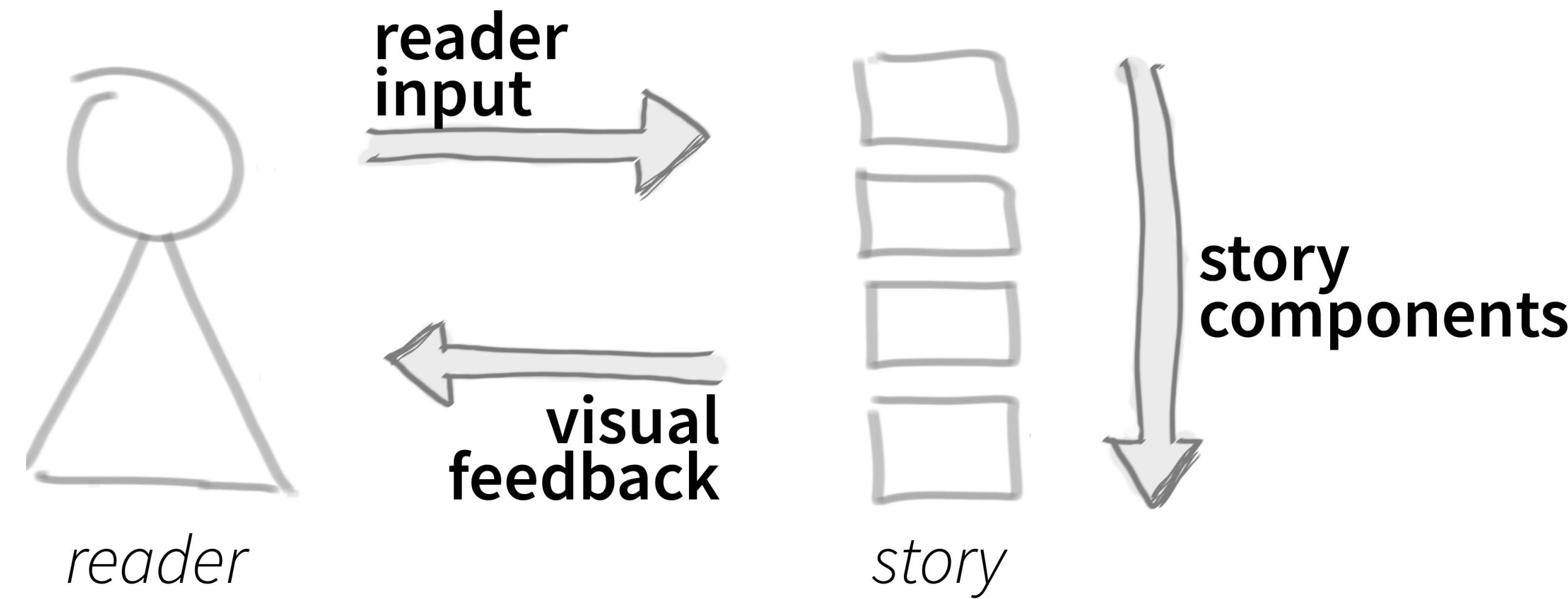


For a vehicle dashboard, who's its audience? What's its purpose? Needs words? — Audience and purpose drive design.

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

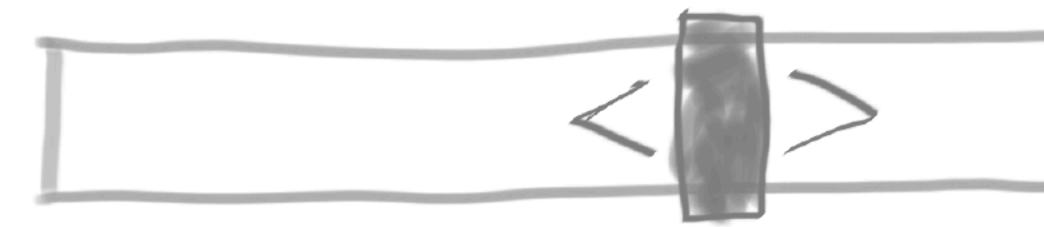


visual narrative flow | the congruence between *flow-factors*, i.e., 1) the way a reader navigates the story, 2) the visual components of the story, and 3) the type of visual feedback the reader receives; along with the nature of the data and facts that the author wants to communicate.

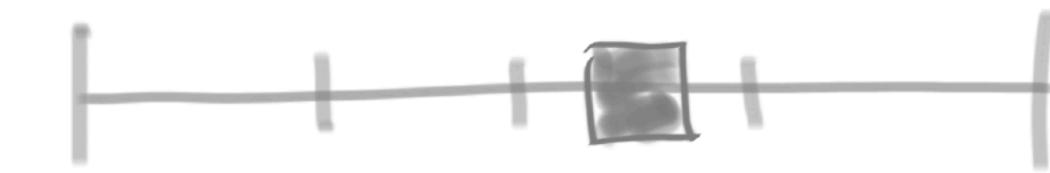
design space for *flow factors*, navigation input · level of control · navigation progress · story layout · role of visualization · story progression · navigation feedback



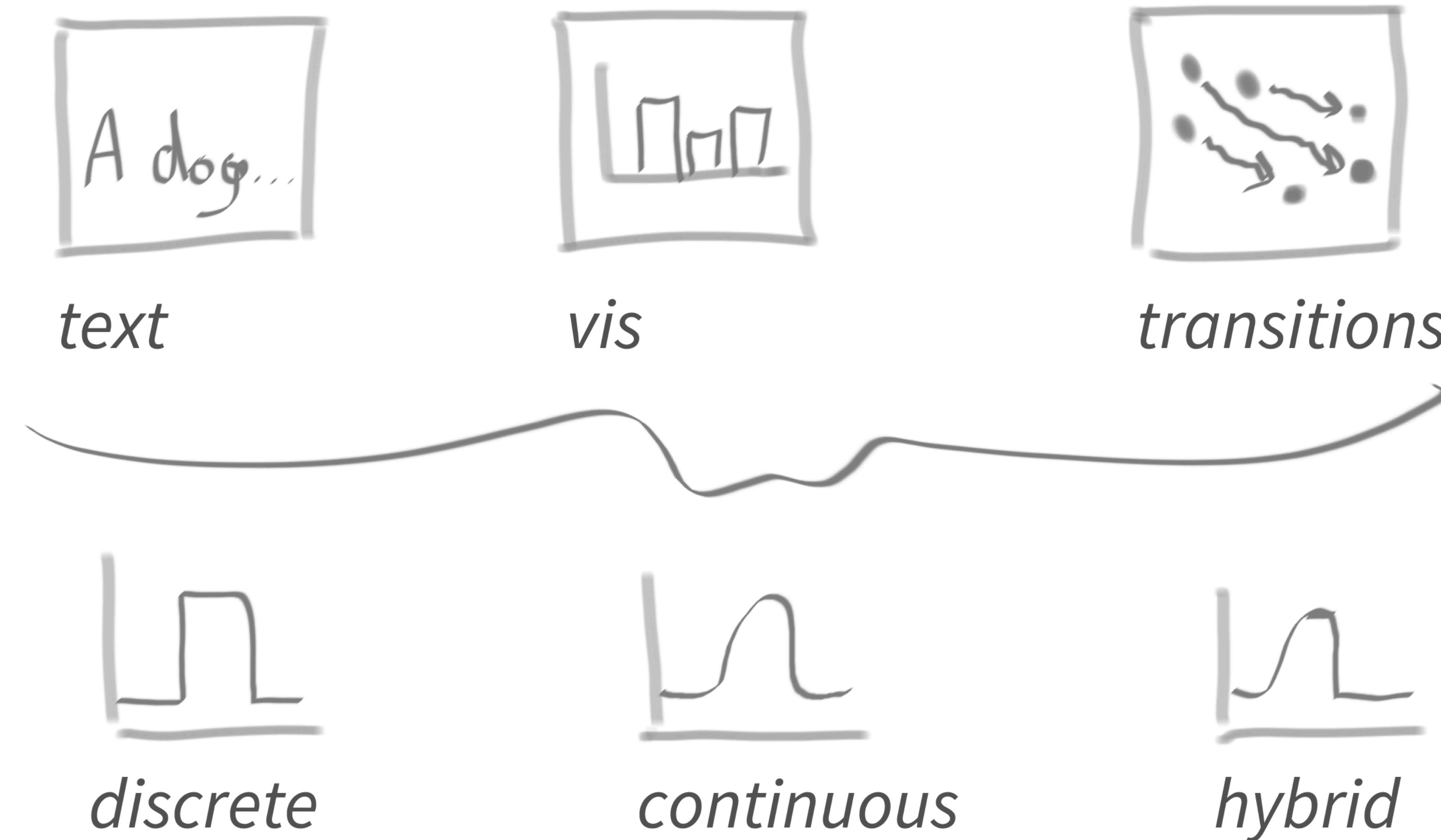
button



scroll



slider

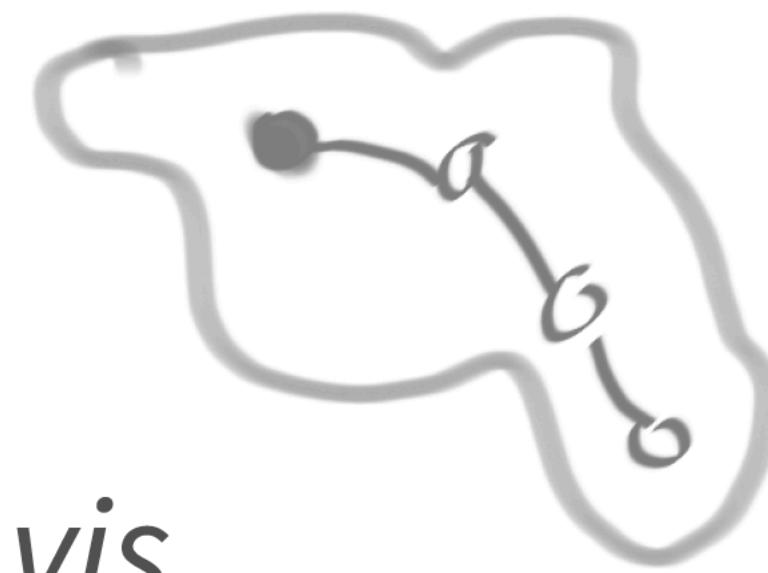




text



dots



vis



document



slideshow



hybrid



equal



figure



annotated



linear



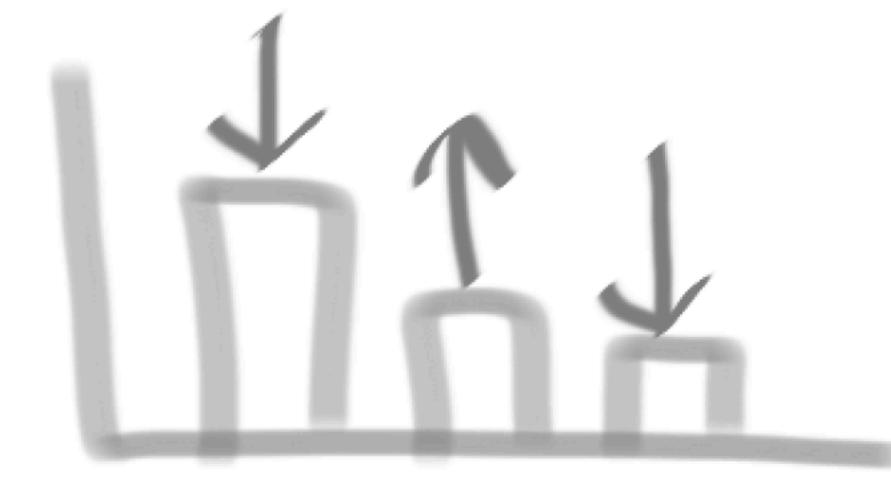
linear skip



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.

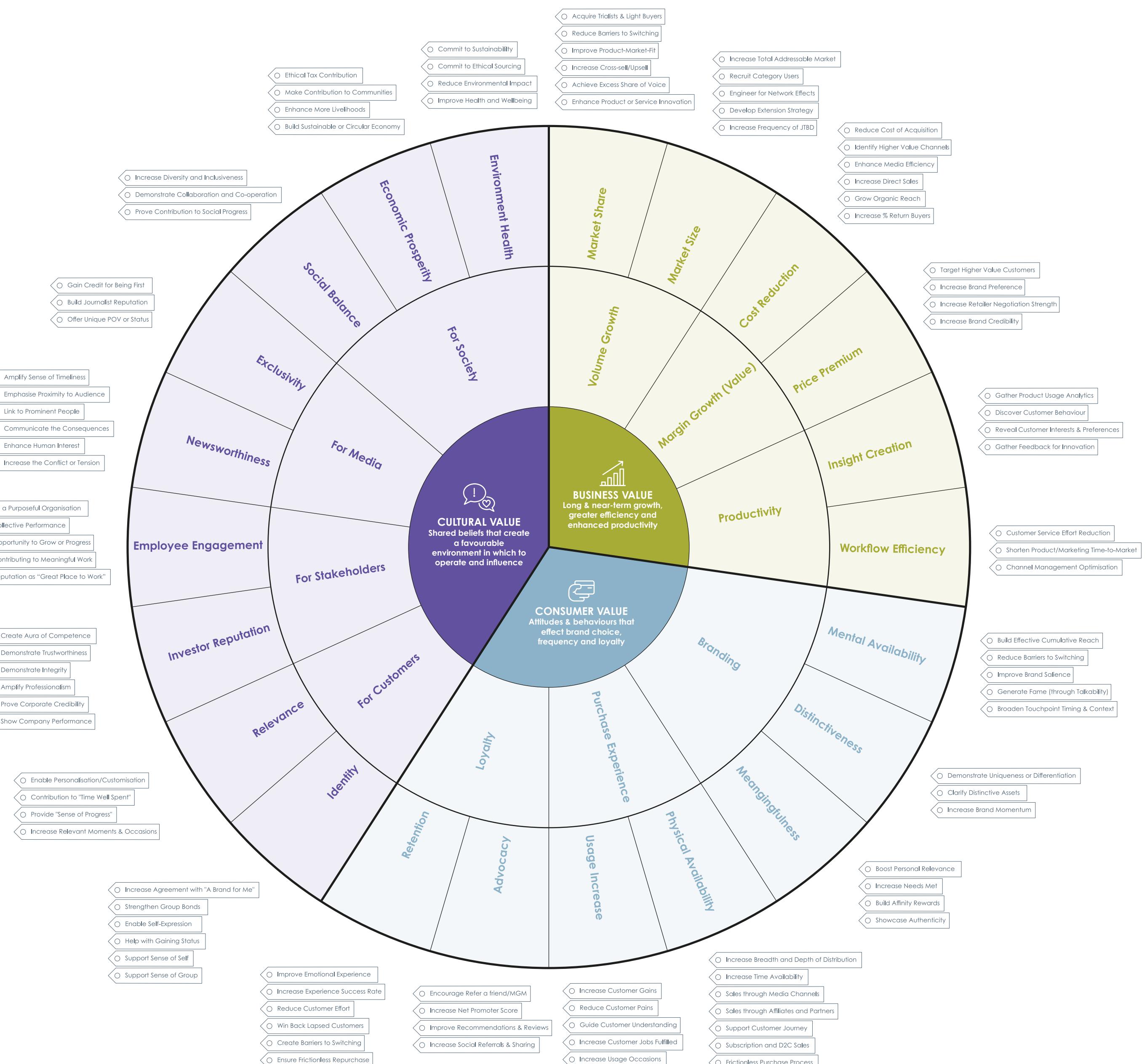
They felt that **all the data needed to tell the story should be displayed clearly in the report without the need to explore the data further....**

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

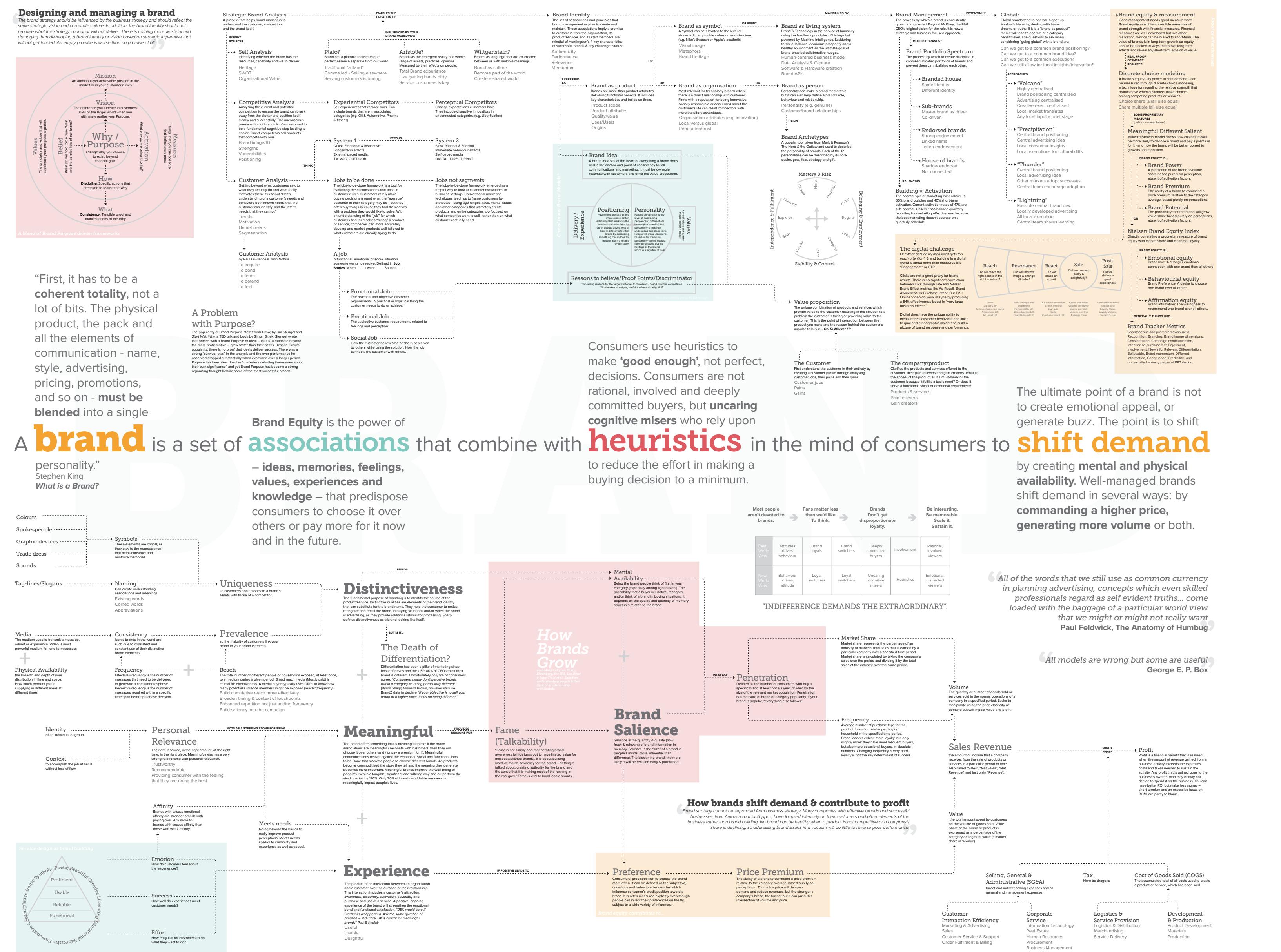
Agree? Disagree? Explain.

**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?



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

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
mistransformed when converting to
information.

Data is often guesstimated, 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?

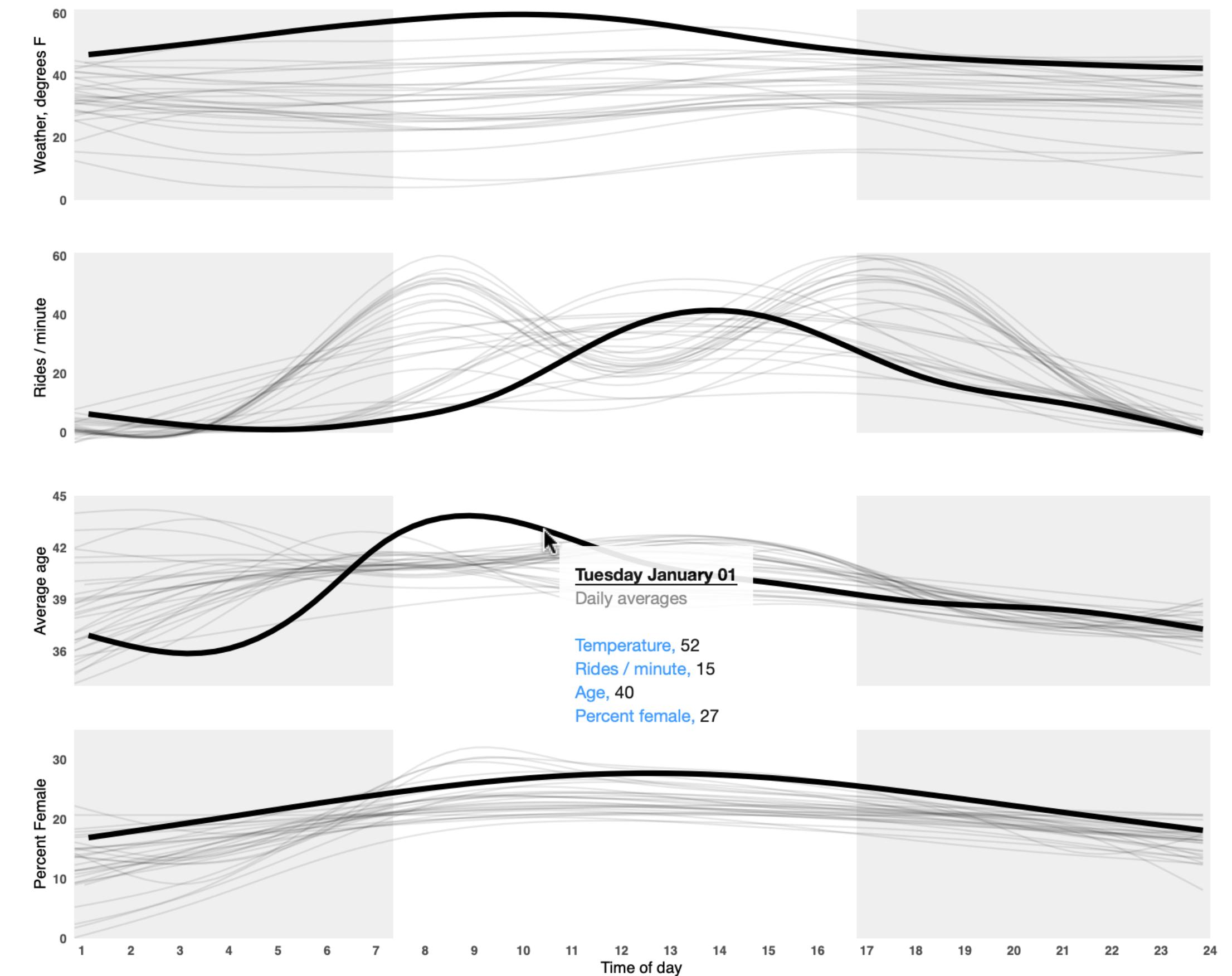
Are there better **temperatures** for us to trigger marketing messages to encourage rides?

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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