

Storytelling with Data

Module 4: Principles of persuasion and brief proposals

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Agenda

Next deliverable

Today's objectives

Readings: perspectives on persuasion

Comparison, metaphor, patterns

Visual components of persuasion

Next deliverable

What we've discussed so far

Knaflic's
Storytelling with data

Understand data context
Choice of appropriate visual display
Eliminate clutter
Focus audience attention
Think like a designer
Tell a story

Technical audience, employee
Example 250-word memo
Dodgers, game decisions should optimize expectations
background > goals > problem > data > method > impact

Adapt to your audience
Doumont's *Trees, Maps, Theorems*
Messages, not just information

Identifying events,
Citi Bike, user behaviors
example case studies
Measurements of events and behaviors

be concise, every word tell
Strunk & White's
The Elements of style
overstatements diminish credibility

Columbia University
The Writing Center

TL;DR

Spencer's
Scoping a data analytics project
decisions > goals and actions >
methods > data

step into their shoes!
CAO, CMO, CEO

beyond the minimum

background > goals > problem > method > impact
Example **Jakarta** proposal
Improving traffic safety through video analysis
Technical audience, not employee

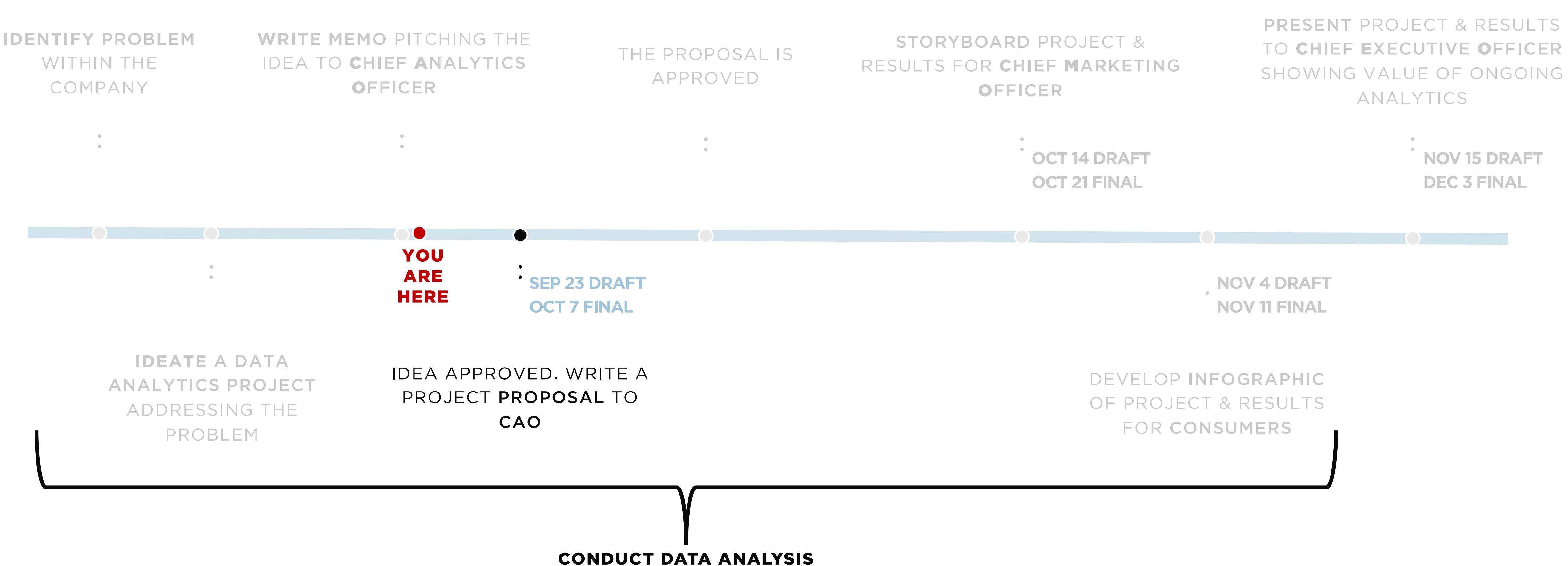
complexity last
Booth's
Revising style

subjects of verbs should be central characters
old before new

ING's **General audience**
The Next Rembrandt

Upcoming deliverable

750-word brief proposal – Write a brief proposal to **CAO** detailing your proposed analytics project. Consider background context, problem, data, solution, and impact. At this point you should have data to start an analysis.



Today's Objectives

Objectives

1

Explain the role of persuasion in getting buy-in for analytics projects.

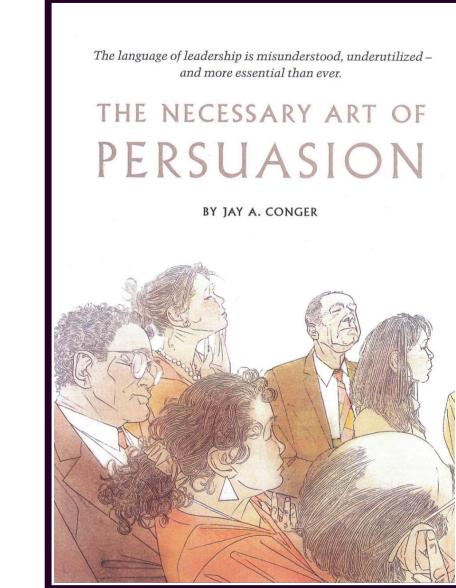
2

Explain the role of persuasion in implementing analytic insights.

3

Employ tools and techniques taught in class to persuade technical and non-technical audiences.

Readings: perspectives on persuasion



Necessary art of persuasion

Conger

Conger is an executive educator, coach, and program designer who teaches leadership to companies and individuals.

Persuading involves four steps

Establish credibility

First assess your credibility—your knowledge about the strategy, product, or change proposed—by **self reflection** and **asking others**. **Fill in gaps**: gain knowledge; cite outside sources; demonstrate the proposal by starting smaller.

Find common ground

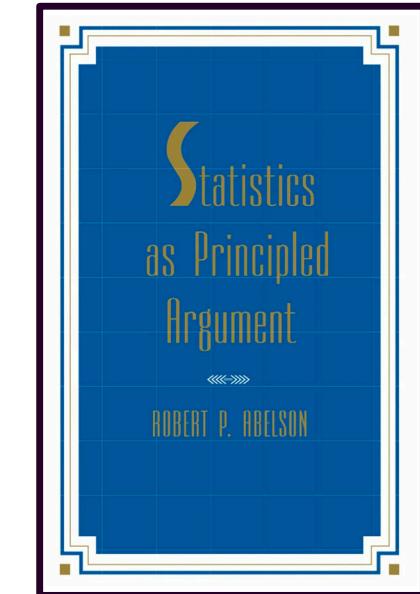
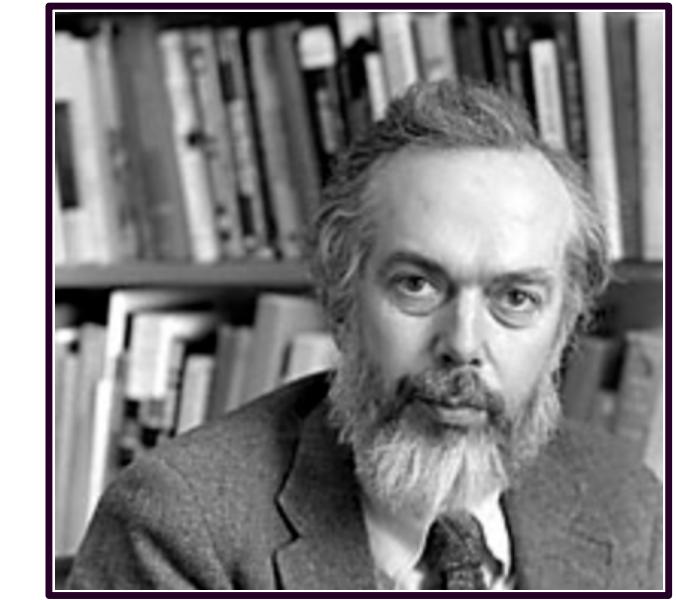
Study the issues with colleagues; **think through their arguments, evidence, and perspectives**. Address or include them, making your proposal something shared.

Combine evidence with story, metaphor

Numerical evidence should be **supplemented with** “examples, stories, metaphors, and analogies” to enliven your proposal. This is particularly helpful when presenting **comparable situations** to the one under discussion.

Connect emotionally

Understand how your audience feels on the issues, and recognize—even share—them. Empathize.



Statistics as principled argument

Abelson

Educated at MIT and Princeton, the late professor of psychology and political science taught at Yale 42 years, consulted for NBC, and was an analyst for three presidential campaigns.

What we might aim for

Comparison gives meaning

Elements of statistical persuasion

His “image of the ideal statistician, already conceived as a good (but honest!) lawyer and a good storyteller, also includes the virtues of a good detective.”

The idea of comparison is crucial. To make a point that is at all meaningful, statistical presentations must refer to differences between observation and expectation, or differences among observations.”

Several properties of data, and its analysis and presentation, govern its persuasive force.

Magnitude of effects

Articulation of results

Generality of effects

Interestingness of argument

Credibility of argument

On persuasion

We persuade in three general ways

Rhetoric is the ability to see the available means of persuasion. — Aristotle

ethos

Source credibility; trustworthiness; practical wisdom; goodwill; likeability; reputation

pathos

Positive and negative emotions; storytelling; authenticity; paralinguistic cues; body language

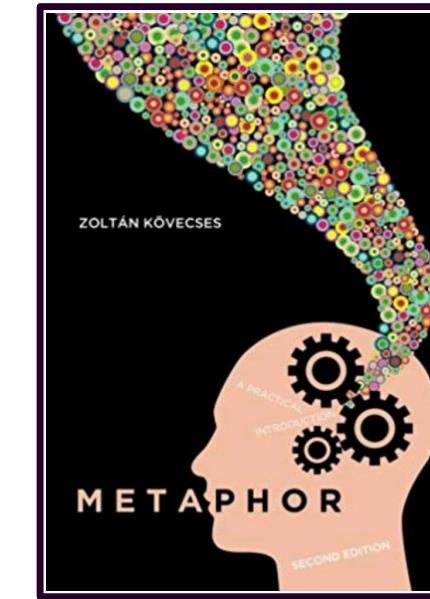
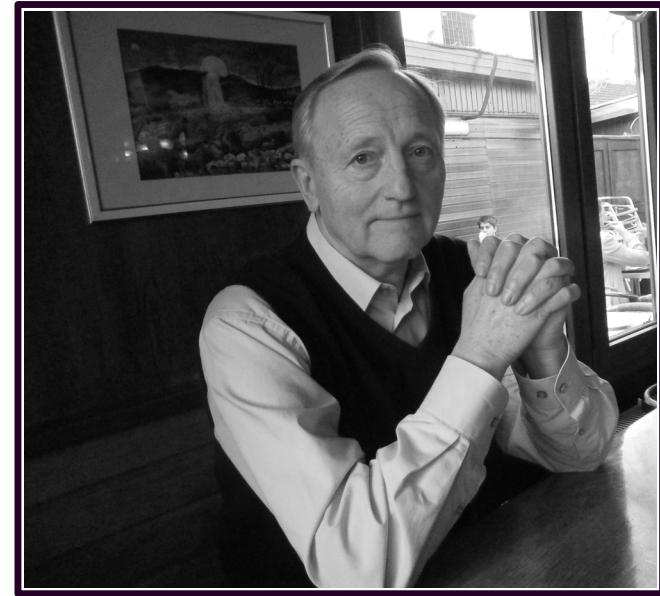
logos

Structure; facts; data; information; logical arguments; reason

Writing persuasively with comparison, metaphor and word patterns

Basics first

*Write for your audience, putting messages first, describing old before new, and omit needless words **before** layering in comparison, metaphor and word pattern.*

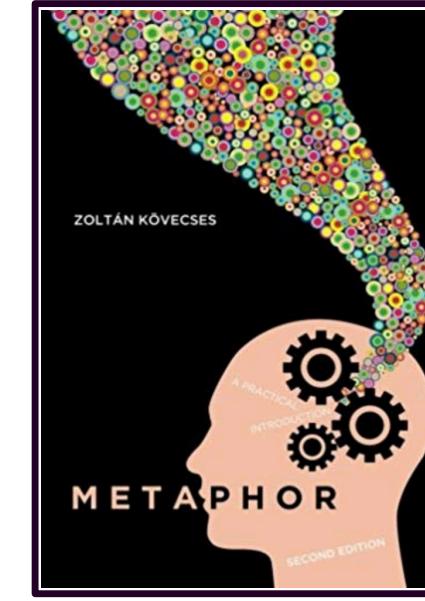
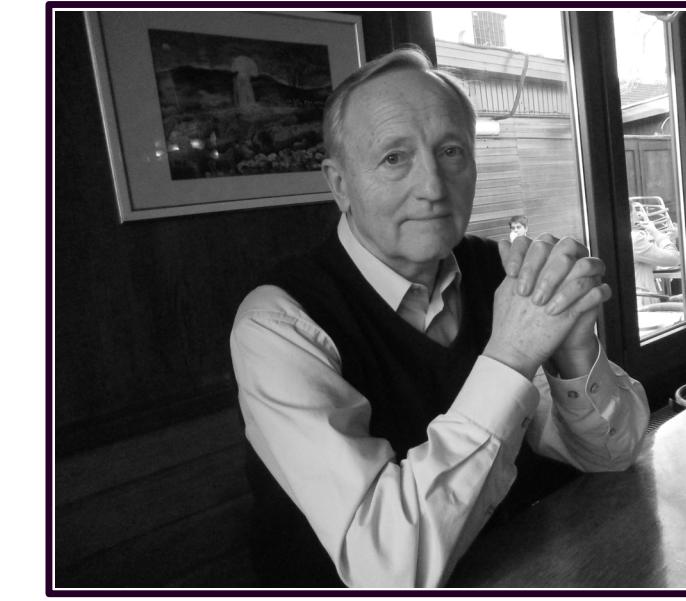


Metaphor: a practical introduction

Kővecses

He is professor of linguistics at Eötvös Loránd University, Budapest. He researches language and conceptualization of emotions, cross-cultural variation in metaphor, and the issue of the relationship between language, mind, and culture.

Metaphor adds to persuasiveness by **reforming abstract concepts into something more familiar to our senses**, signaling particular aspects of importance, memorializing the concept, or providing coherence throughout a writing.



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Mapping

Source Domain > Target Domain

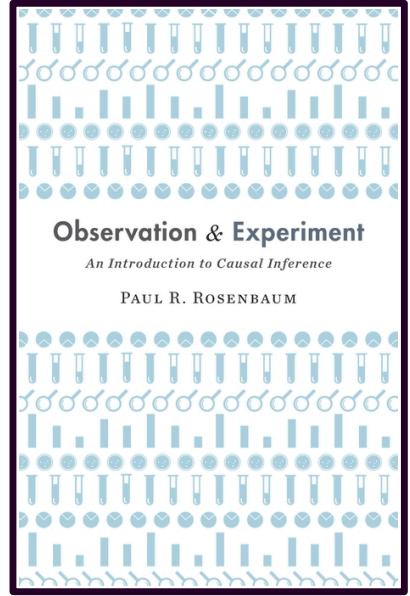
Target domains

The abstract concepts we need help explaining

Common source domains

- Human body
- Animals
- Plants
- Buildings and constructions
- Machines and tools
- Games and Sport
- Money
- Cooking and food
- Heat and cold
- Light and darkness
- Movement and direction

Example: uses poetry about travel (source domain) to explain the distinction between covariate and outcome (target domain):



Observation & Experiment

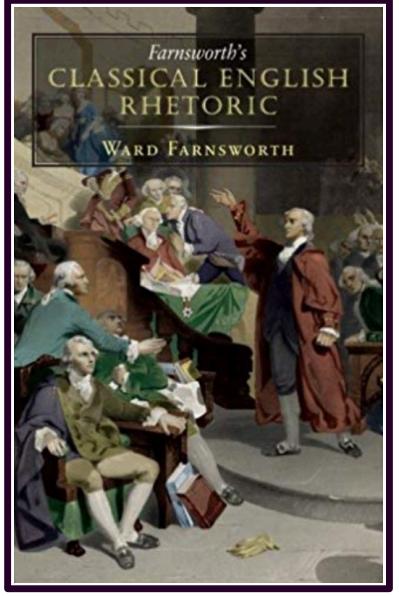
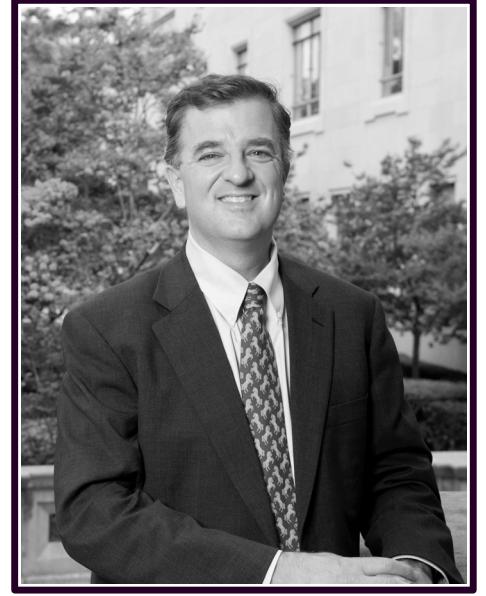
Rosenbaum

He is Professor of Statistics at the Wharton School and a Senior Fellow of the Leonard Davis Institute of Health Economics, University of Pennsylvania. His book epitomizes the idea that “the most important ideas in statistics can be clearly explained in plain English, with little or no math.”

If we accurately measure an outcome, we see one of its two potential values: the value that occurs under the treatment the patient actually received. **We can never see the outcome a patient would have exhibited under the treatment the patient did not receive.** . . . Perhaps the distinction between covariate and outcome is most vivid, most palpable, in Robert Frost’s poem “The Road Not Taken” (1916):

Two roads diverged in a yellow wood
And sorry I **could not travel both**
And be one traveler, long I stood
And looked down one as far as I could
To where it bent in the undergrowth

Frost creates the mood attending a decision, one whose full consequences we cannot see or anticipate: “Knowing how way leads on to way,” we will not see the road not taken. As it was for Frost in a **yellow wood**, so it is for a patient at risk of death in the ProCESS Trial, and so it will be in every causal question.



Classical English Rhetoric

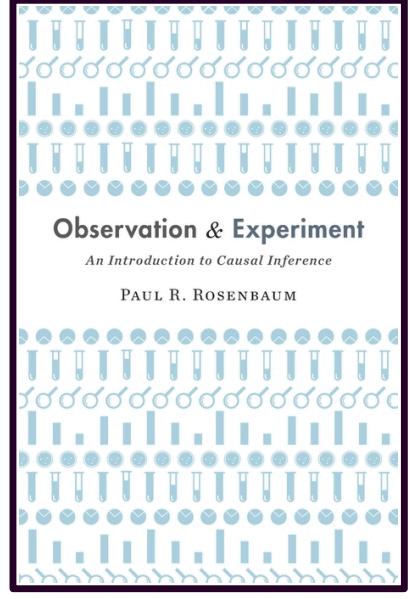
Farnsworth

He is dean and professor of the University of Texas School of Law. Before teaching, he graduated from University of Chicago Law School, clerked for Supreme Court Justice Kennedy, and served as advisor to an international tribunal in the Hague.

**Use patterns
to compare,
grab attention,
add emphasis**

We can use patterns to “make the words they arrange more emphatic or memorable or otherwise effective.”[†] These patterns can be the most effective and efficient ways to show comparisons and contrasts.

Example: Reversal of structure, repetition at the end



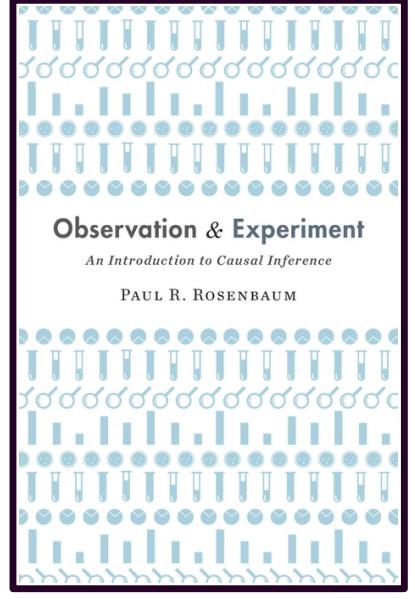
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A covariate is a quantity determined prior to treatment assignment. In the Pro-CESS Trial, the age of the patient at the time of admission to the emergency room **was a covariate**. The gender of the patient **was a covariate**. Whether the patient was admitted from a nursing home **was a covariate**.

Example: Repetition at the start, parallel structure



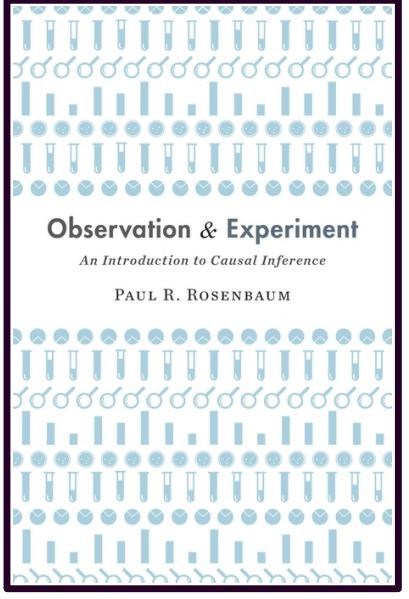
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“One might hope that panel (a) of Figure 7.3 is analogous to a simple randomized experiment in which one child in each of 33 matched pairs was picked at random for exposure. **One might hope** that panel (b) of Figure 7.3 is analogous to a different simple randomized experiment in which levels of exposure were assigned to pairs at random. **One might hope** that panels (a) and (b) are jointly analogous to a randomized experiment in which both randomizations were done, within and among pairs. All three of **these hopes** may fail to be realized: there might be bias in treatment assignment within pairs or bias in assignment of levels of exposure to pairs.

Example: Asking questions and answering them



Observation & Experiment

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“ Where did Fisher’s null distribution come from?
From the coin in Fisher’s hand.



Statistical Modeling, Causal Inference, and Social Science

Gelman

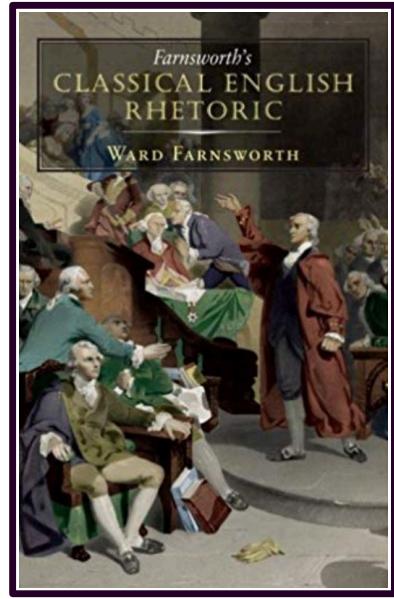
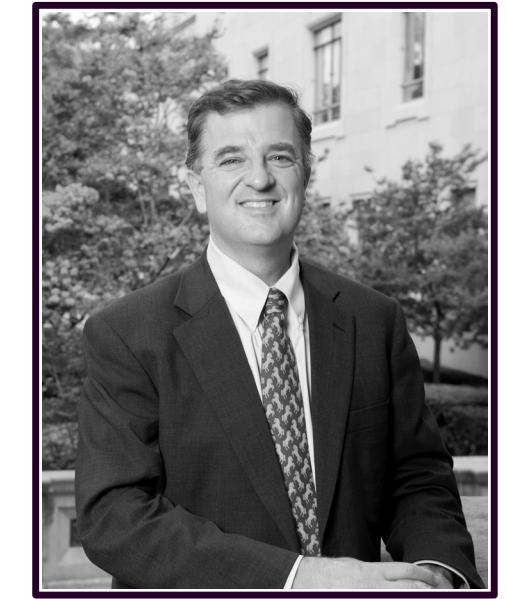
Professor of Statistics and Political Science at Columbia University, he is known widely for his work in Bayesian statistics, and has authored several textbooks, including Teaching Statistics, and Bayesian Data Analysis.

The screenshot shows a blog post by Andrew Gelman. The title of the post is "The most important aspect of a statistical analysis is not what you do with the data, it's what data you use" (survey adjustment edition). The post discusses survey weighting and the importance of using the right variables for accuracy. It includes a sidebar with recent comments from other users.

Example: Inversion of words

“

The most important aspect of a statistical analysis is not what **you** do with the **data**, it's what **data you** use.



Classical English Rhetoric

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Repetition of words & phrases

simple repetition (*epizeuxis, epimone*)
repetition at the start (*anaphora*)
repetition at the end (*epistrophe*)
repetition at the start and end (*symploce*)
repeating the ending at the beginning (*anadiplosis*)
repetition of the root (*polyptoton*)

Structural matters

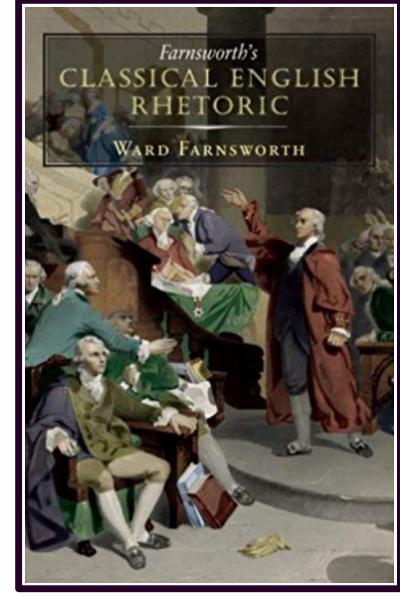
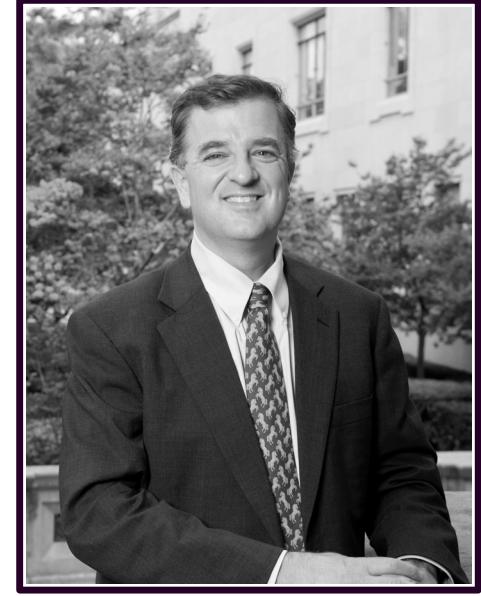
parallel structure (*isocolon*)
reversal of structure (*chiasmus*)
inversion of words (*anastrophe*)
leaving out words (*ellipsis*)

Dramatic devices

saying things by not saying them (*præteritio*)
correcting oneself (*metanoia*)
rhetorical uses of the negative (*litotes*)
rhetorical questions (*erotema*)
asking questions and answering them (*hypophora*)
anticipating objections and meeting them (*prolepsis*)

How unexpected patterns work

Unexpected word placement calls attention to them, creates emphasis by coming earlier than expected or violating the reader's expectations. Note that, to violate expectations necessarily means reserving a technique like inversion for just the point to be made, lest the reader come to expect it — **more is less, less is more**. Secondly, it can create an attractive rhythm. Thirdly, when the words that bring full meaning come later, it can add suspense, and finish more climactic.



Classical English Rhetoric

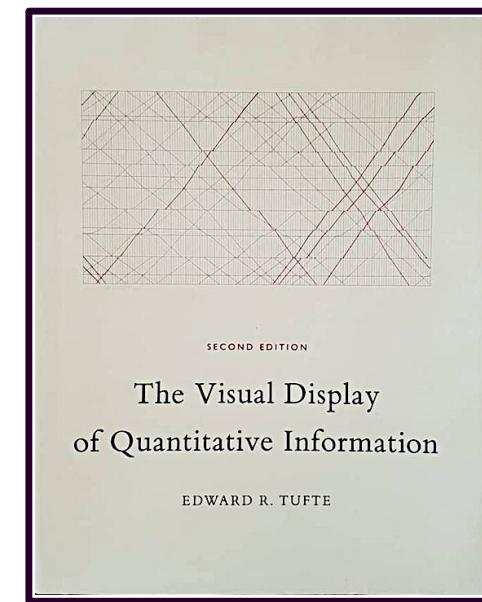
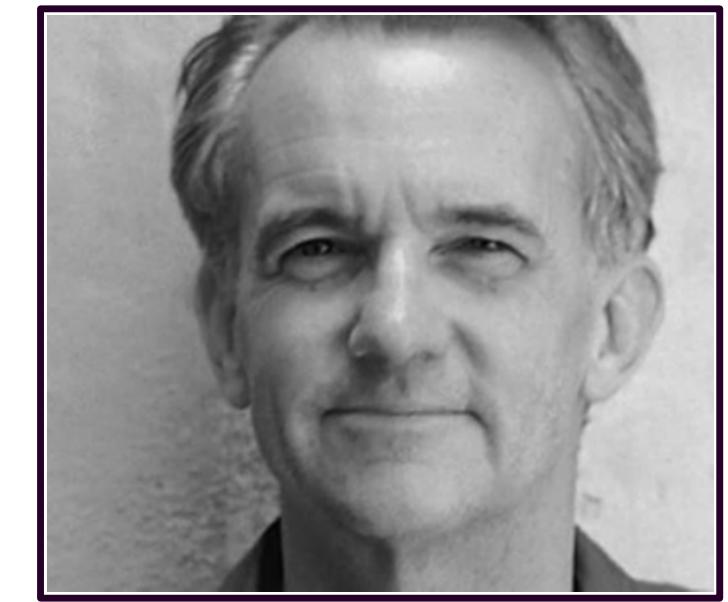
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**Immersion
precedes
implementation**

“Seeing just a few examples invites direct imitation of them, which tends to be clumsy. Immersion in many examples allows them to do their work by way of a subtler process of influence, with a gentler and happier effect on the resulting style.”[†]

(More) visual components of persuasion



The Visual Display of Quantitative Information

Tufte

Hailed "The Leonardo da Vinci of data" by the New York Times. He is professor emeritus of Political Science, Statistics, and Computer Science at Yale University.

Graphics help us reason with data

At their best, **graphics are instruments for reasoning about quantitative information**.

Often the **most effective way to describe, explore, and summarize a set of numbers**—even a very large set—is to **look at pictures of those numbers**.

Furthermore, of all methods for analyzing and communicating statistical information, well-designed **data graphics are usually the simplest and at the same time the most powerful**.

Use words and pictures together

The principle of data/text integration is: **data graphics are paragraphs about data** and should be treated as such.

Data-Driven Storytelling

Riche, co-editors

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



Link between narrative and visual

Annotation layer of visual display

Visual data comparisons: patterns for persuasion

The link between the narrative and the visualization **helps the reader discern what item in the visualization the author is referencing in the text.**

Create links with annotation, color, luminosity, or lines.

Annotations add explanations and descriptions to introduce the graph's context, which is important for almost any audience.

For comparison, the narrator presents multiple data sets, and draws conclusions. Visually, it can be made through side-by-side presentation of graphics, or changes of a single graphic over time.

Comparison can

show equality of both data sets, highlight differences and similarities, or give reasons for their difference.

Example from Kay, linking narrative to visual graphic

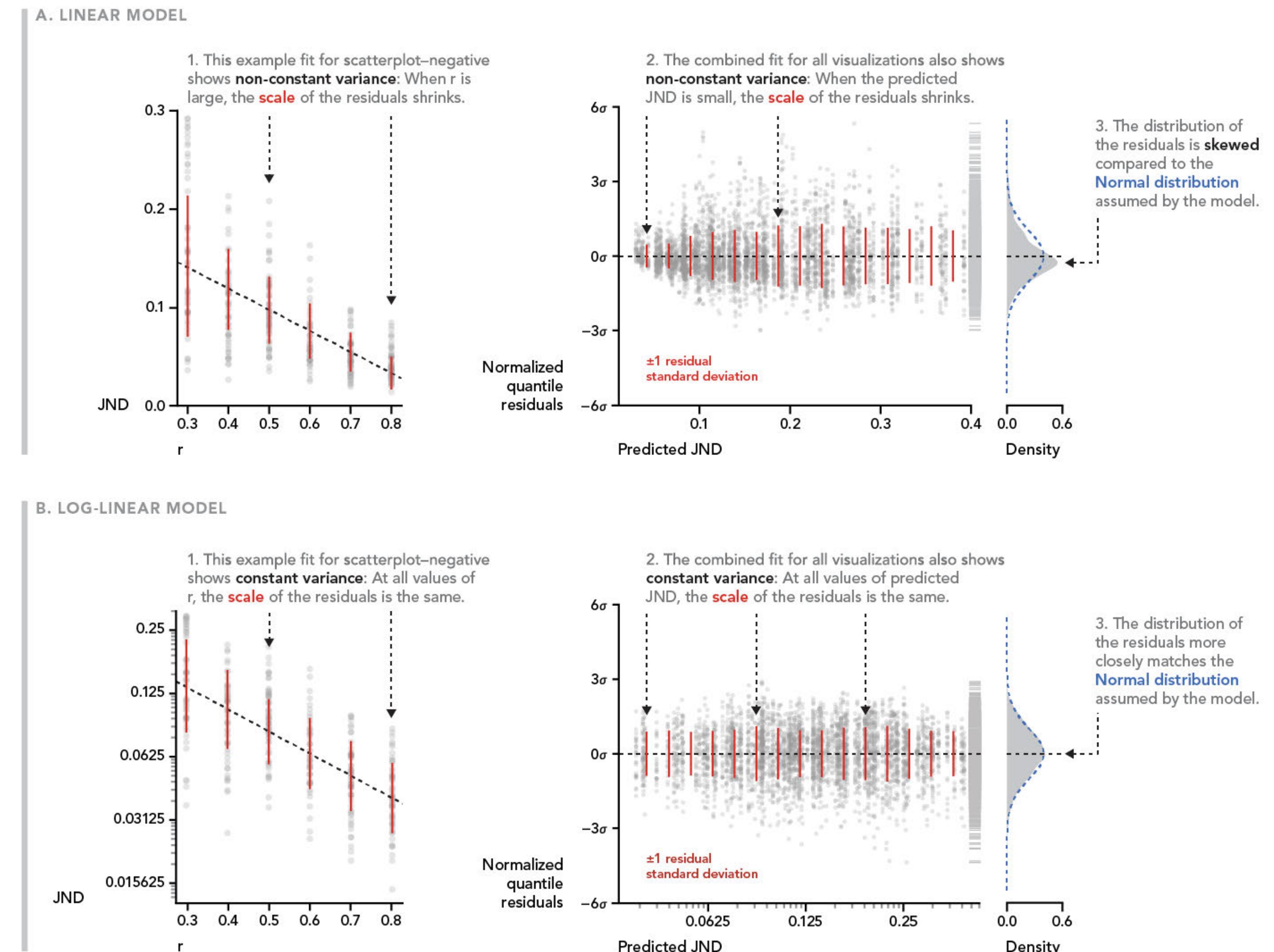


Fig. 3 Comparison of fits of the linear model (Section 3) and the log-linear model (Section 4). Example fits of each model to scatterplot-negative are shown in A.1 and B.1. Plots of normalized residuals for all visualization \times direction pairs are shown in A.2 and B.2. Density plots of normalized residuals with comparison to the standard normal distribution are shown in A.3 and B.3.

Wrapping up

For Next Week, Module 5:

Agenda next week

Next deliverable, draft 750-word (or less) proposal
Audience analysis

The minimum

Gilovich, et al. *Heuristics and Biases*. Cambridge University Press, 2009. Selected readings.

Read to understand common limitations and approaches to reasoning and making decisions amid uncertainty.

Dragicevic, Pierre. “Fair Statistical Communication in HCI.” *Modern Statistical Methods for HCI*. Springer International Publishing, 2016. 1-40.

Read to consider what may be important in communicating statistical analysis. Also, consider the graphical displays integrated into the writing.

Matthew Kay’s figures from published articles
<http://www.mjskay.com/figures.html>

Review how he integrates visual display into narrative.

Healy, Kieran. *Data Visualization*. Princeton University Press, 2019. Web. <https://socviz.co>

This is a great resource if you need help implementing visual displays in R.

Checking in,

**Turtles
and hares?**

Of what we covered so far, what material or concept would you like further review? Or are you ready as a rabbit to get on with it?

**Keyboard
worn out?**

Outside class assignments, how often do you practice writing? I recommend keeping a data science journal, writing something, anything on your mind about data science each week.

**Currently
reading?**

I've been reading Harari's *Sapiens*—well written! We learn to write by reading and, while reading, studying its structure. Not including class assigned readings, what are you reading?

**See you
next week!**

