

# Storytelling with Data

## Module 4: Principles of persuasion and brief proposals

**Scott Spencer**  
Faculty and Lecturer  
Columbia University

# Agenda

Next deliverable

Today's objectives

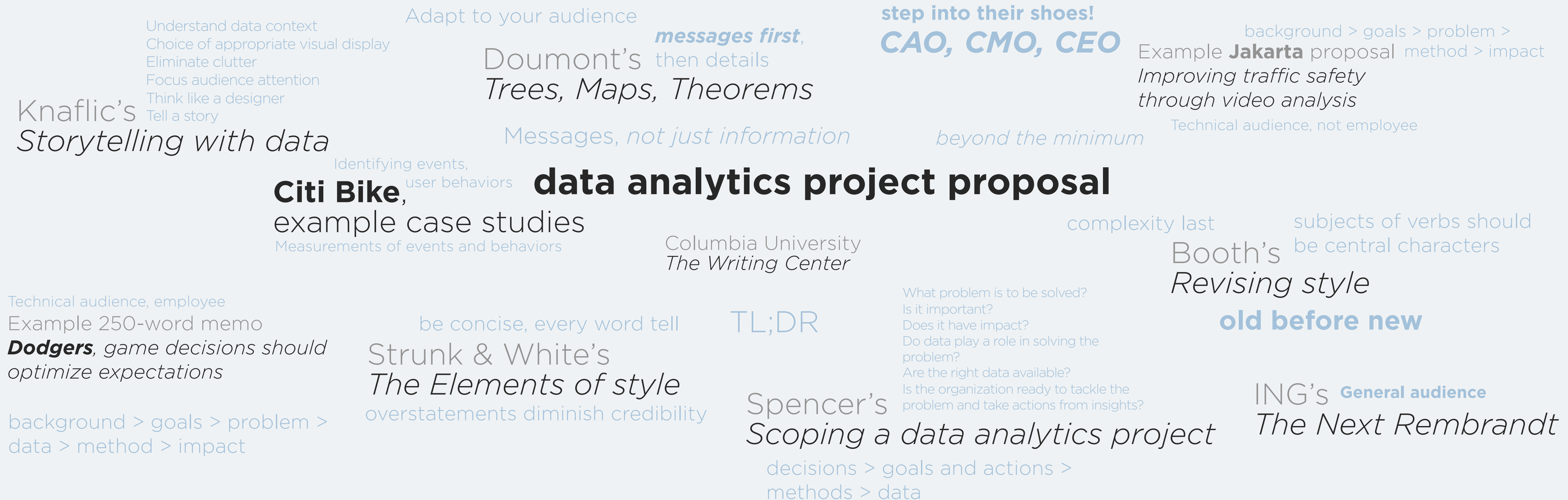
Readings: perspectives on persuasion

Comparison, metaphor, patterns

Visual components of persuasion

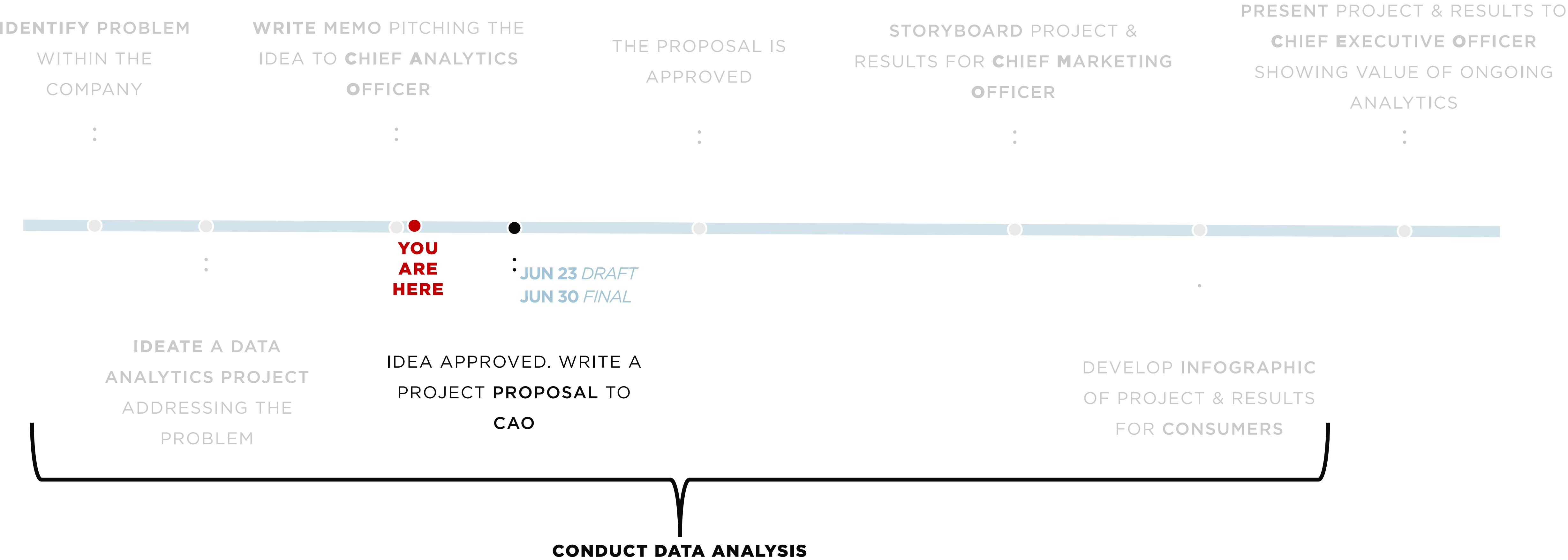
# Next deliverable

# What we've discussed so far



# 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

A faint, light blue background illustration of a person in a meditative pose, possibly a deity or a sage, with a crown or ornate headpiece. The figure is centered and occupies the right half of the slide.

# Objectives

1

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

2

Explain the role of persuasion in implementing analytic insights.

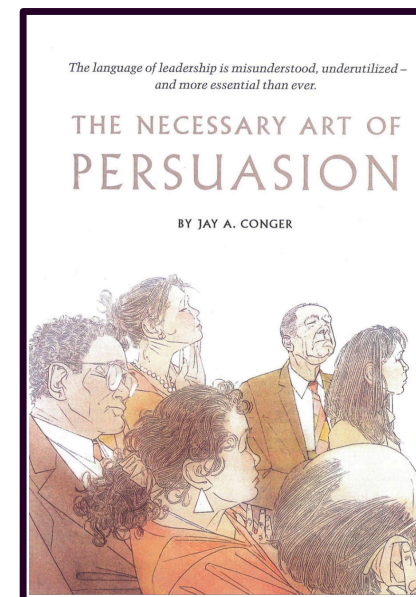
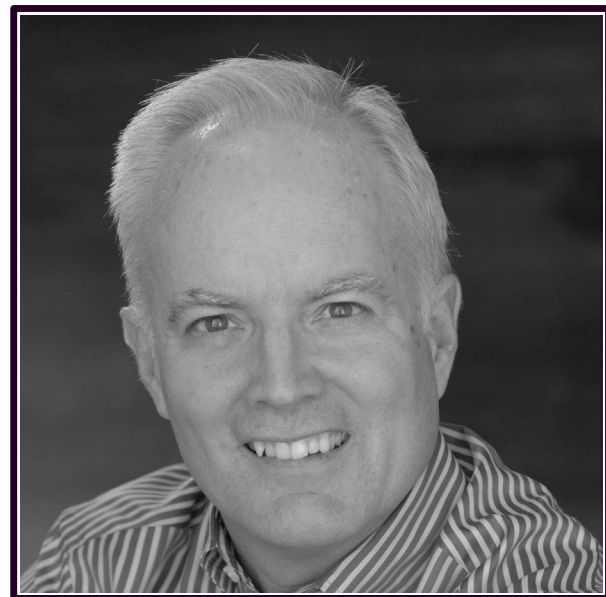
3

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

# Readings: perspectives on persuasion

A faint, light blue background illustration of a person in a meditative pose, possibly a deity or a sage, wearing a crown and having arms outstretched. The figure is centered in the background, behind the main text.





# Necessary art of persuasion

*Conger*

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

## 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

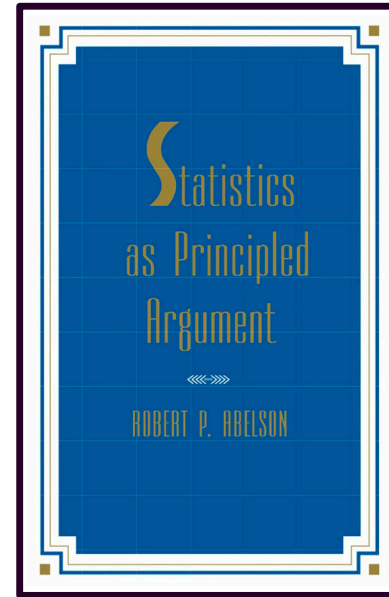
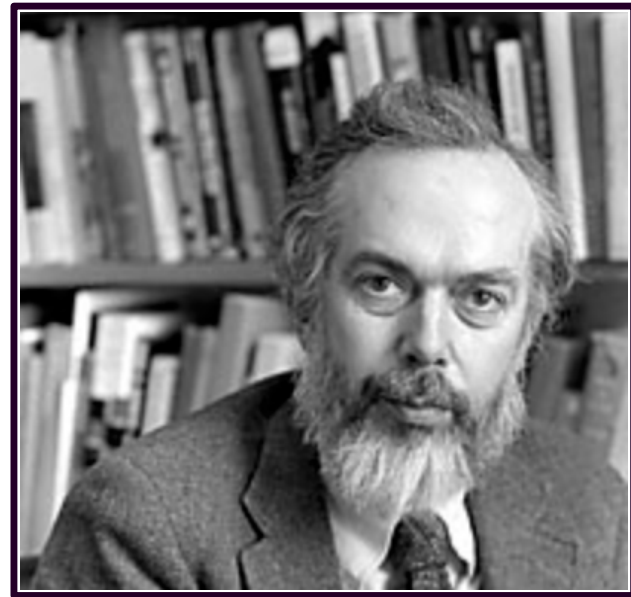
Study the issues with colleagues; ***think through their arguments, evidence, and perspectives***. Address or include them, making your proposal something shared.

## 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

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.”

Comparison gives meaning

“**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.”

Elements of statistical persuasion

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

**M**agnitude of effects

**A**rticulation of results

**G**enerality of effects

**I**nterestingness of argument

**C**redibility 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**

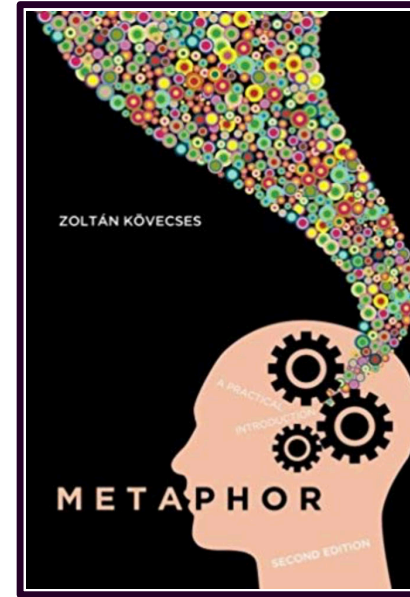
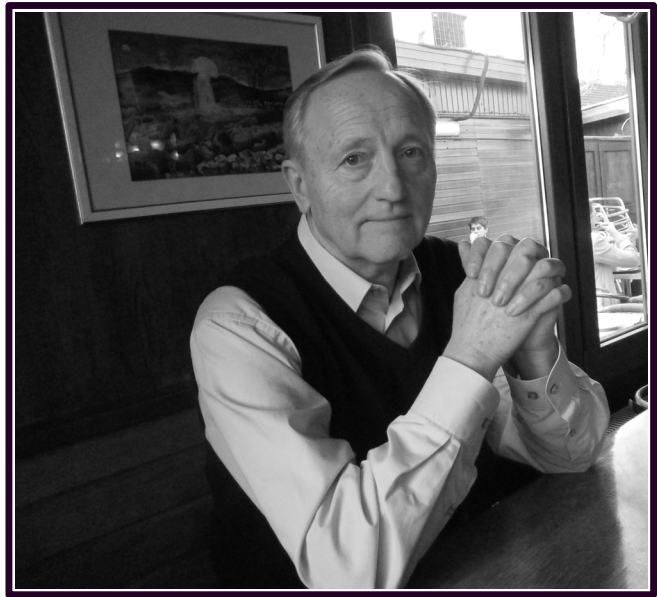
Structure; facts; data; information; logical arguments; reason

# 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.



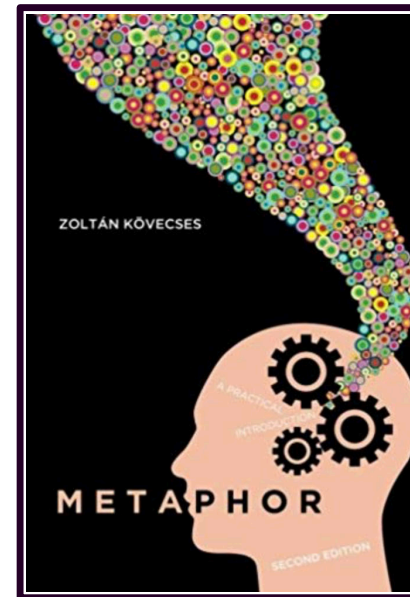
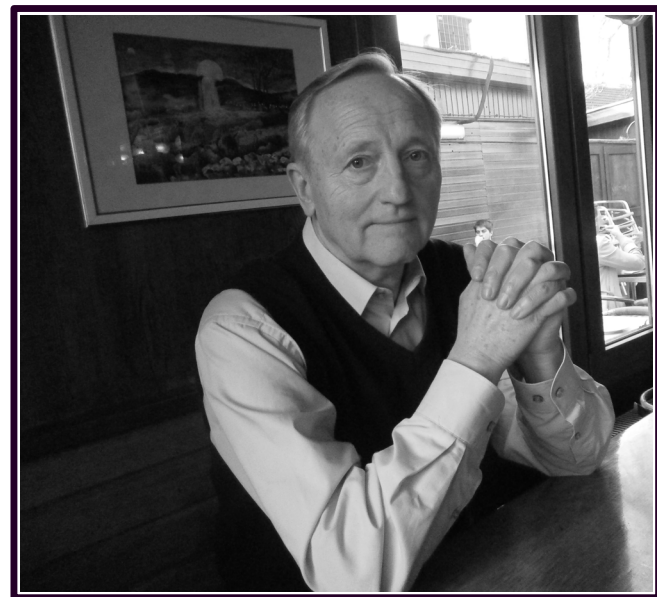


# Metaphor: a practical introduction

*Kövecses*

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

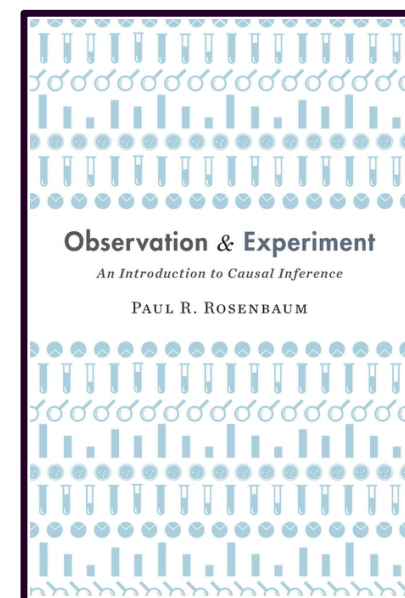
## Target domains

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





# Observation & Experiment

*Rosenbaum*

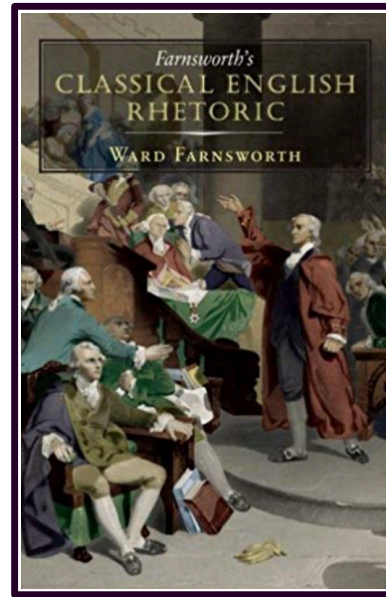
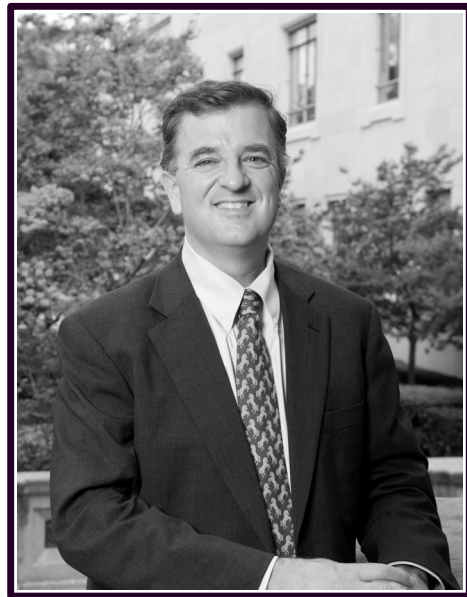
He is Professor of Statistics at the Wharton School and a Senior Fellow of the Leonard Davis Institute of Health Economics, University of Pennsylvania. His book epitomizes the idea that “the most important ideas in statistics can be clearly explained in plain English, with little or no math.”

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

“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.



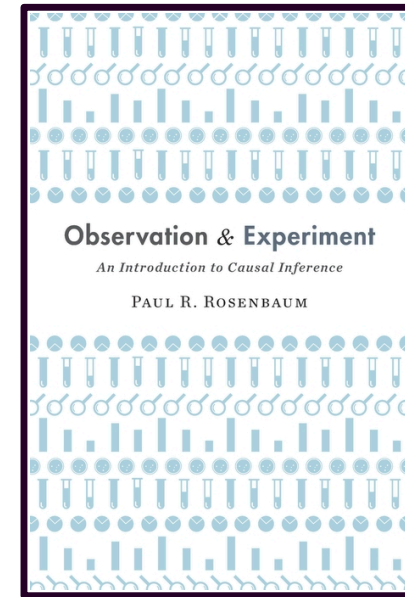
# Classical English Rhetoric

*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.”<sup>+</sup> These patterns can be the most effective and efficient ways to show comparisons and contrasts.



# Observation & Experiment

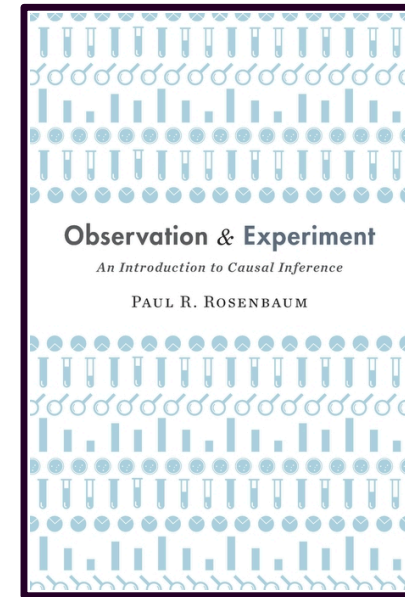
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**Example:** Reversal of structure, repetition at the end

“**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**.





# Observation & Experiment

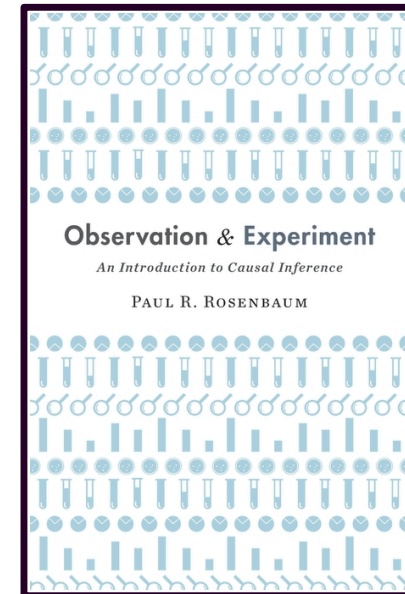
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**Example:** Repetition at the start, parallel structure

“**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

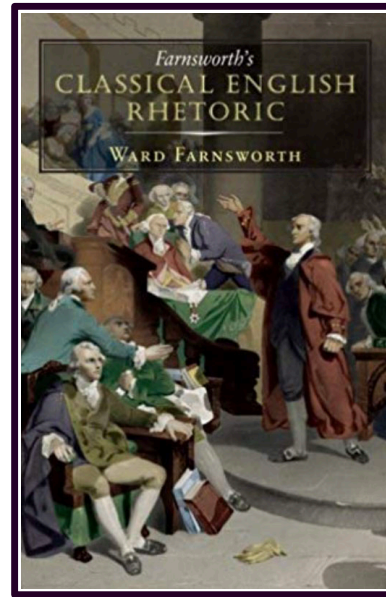
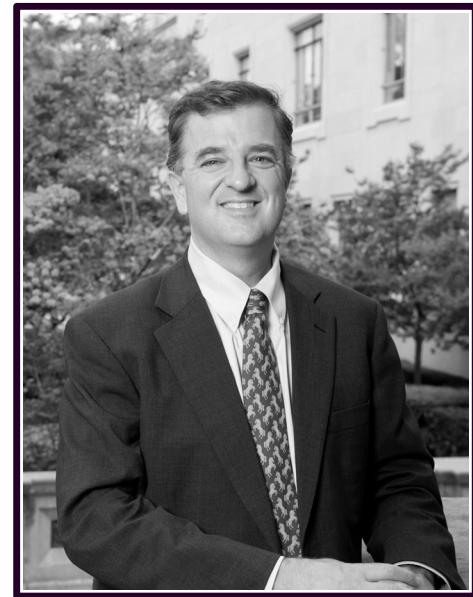
*Gelman*

Professor of Statistics and Social 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.

## 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*)

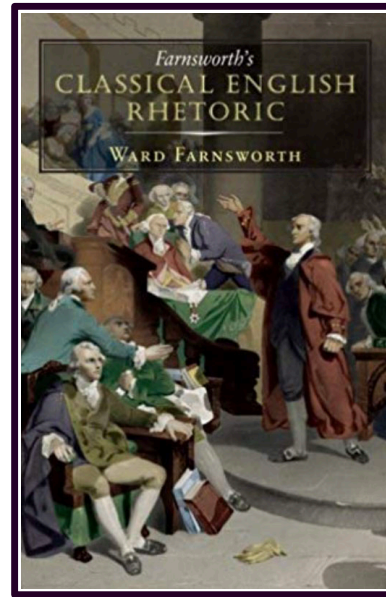
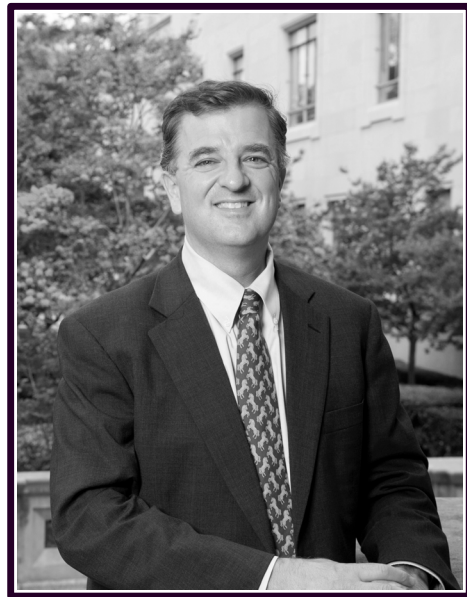
### Dramatic devices

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.





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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.”<sup>+</sup>

# **(More) visual components of persuasion**



# 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

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.

Annotation layer of visual display

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

Visual data comparisons: patterns for persuasion

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

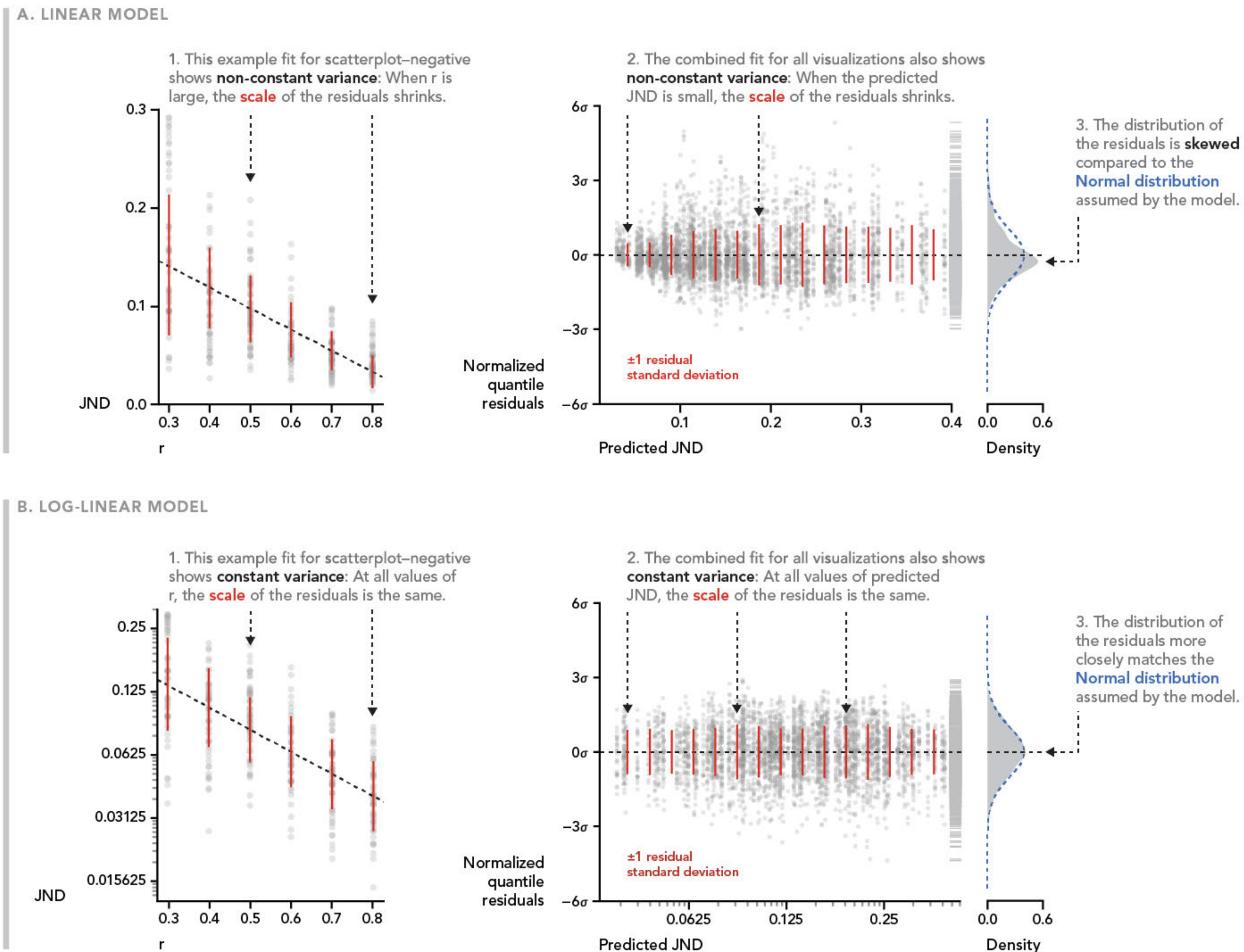


Fig. 3 Comparison of fits of the linear model (Section 3) and the log-linear model (Section 4). Example fits of each model to scatterplot-negative are shown in A.1 and B.1. Plots of normalized residuals for all visualization  $\times$  direction pairs are shown in A.2 and B.2. Density plots of normalized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

