Storytelling with Data

Module 3: Business writing, audience analysis, visual considerations

Scott Spencer
Faculty and Lecturer
Columbia University

Agenda

Upcoming deliverable, proposal

Objectives of business writing

Business writing, audience analysis

Visual components of writing

Group work on analytics projects

Upcoming deliverable

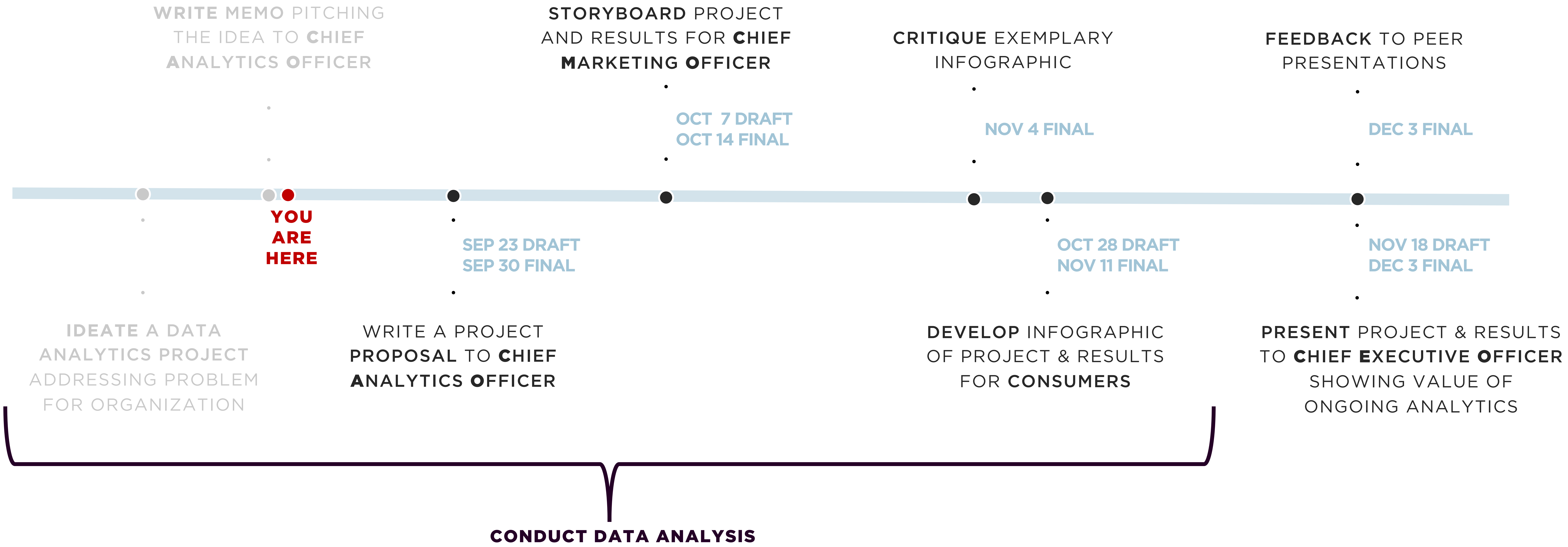
Upcoming deliverable

For your chosen company and case study,
as an imagined member of the analytics team ...

250-word memo	Write a memo to **CAO** about an opportunity to leverage analytics. Consider background context, problem, data, solution, and impact.
750-word proposal	On approval of the memo, write a proposal to **CAO**, detailing the anticipated project.
Storyboard	Present project result in storyboard to **CMO**, using narrative forms, and with comparisons, metaphors and other storytelling concepts.
Infographic	Recraft the results, telling the narrative through an infographic for the **public** or **potential consumers**, using data visualization with brand awareness.
Presentation	Construct and deliver a 4-5 minute persuasive presentation with up to 10 slides to the **CEO**, telling the story of the analytics project to convince them of further investment in analytics.

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.



Change generic information,

1	2	3	4	5	6
Introduction	**Challenge and Opportunity**	**Rationale**	**Benefits, Limitations**	**Assessment**	**Conclusion**
Describe context relevant to problem and related decisions.	Offer details of the problem and how your project helps inform those related decisions.	Explain your project's details and why it will inform those decisions.	Consider benefits and limitations. Think qualitatively and comparatively. May it be data, applicable breadth, costs, resources, expected return on investment?	Describe how your project can be assessed short and long term.	Include a clear and complete call to action. Pair your lead with its ending.

into **specific messages** of your project.

Objectives of business writing

For **all** business communications

Step into your audiences' shoes to get them to
- pay attention to,
- understand,
- (be able to) act upon

a maximum of **messages**, given constraints.

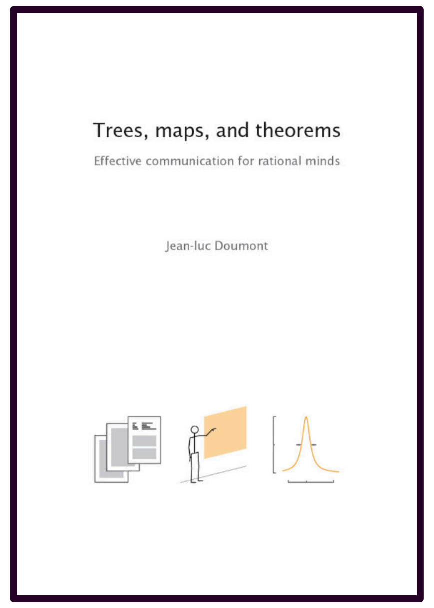
Who is your audience?

What's your purpose for communicating?

tl;dr

"TL;DR." "TL;DR." wikipedia.com. N.p., 1 Feb. 2019. Web. 1 Feb. 2019.

Applying readings to last week's *example draft* memo



Trees, maps, theorems

Doumont

An engineer from the Louvain School of Engineering and PhD in applied physics from Stanford University, Jean-luc Doumont wrote this book to help engineers, scientists, and managers with business communication.

Messages, not just information

A message differs from raw information in that it presents "intelligent added value," that is, something to understand about the information. A **message interprets the information for a specific audience and for a specific purpose**. It conveys the *so what*, whereas information merely conveys the *what*.

In comparison

Information, *what*

A concentration of 175 µg per m^3 has been observed in urban areas.

Message, *so what*

The concentration in urban areas (175 µg/m^3) is unacceptably high.

Organization, messages first

Get the audience interested. Once you have their attention, tell your main message. Last, support this message, tell how you got there.

Doumont, Jean-Luc. *Trees, Maps, and Theorems*. Principiæ, 2009. Print.

To: **Scott Powers**
Director, Quantitative Analytics

2 February 2019

Our game decisions should optimize expectations. Let’s test the concept by modeling decisions to steal.

The most likely sequence of events on defense is a *perfect game* — occurring just 23 times in major-league baseball, once by our own Sandy Koufax. Decisions from what is most likely, however, leave wins unclaimed. To claim them, let’s base decisions on expectations flowing from decision theory and probability models. A joint model of all events works best, but we can start small with, say, decisions to steal second base.

After defining our objective (e.g. optimize expected runs) we will, from Statcast data, compute expectations: weight everything that could happen by its probability and accumulate these probability distributions. Joint distributions of all events, an eventual goal, will allow us to ask counterfactuals — “what if we do *this*” or “what if our opponent does *that*” — and simulate games to learn how decisions change win probability. It enables optimal strategy.

Rational and optimal, this approach is more efficient for gaining wins. For perspective, each added win from the free-agent market costs 10 million, give or take, and the league salary cap prevents unlimited spend on talent. There is no cap, however, on investing in rational decision processes.

Computational issues are being addressed in `Stan`, a tool that enables inferences through advanced simulations. This open-source software is free but teaching its applications will require time. To shorten our learning curve, we can start with Stan interfaces that use familiar syntax (like `lme4`) but return joint probability distributions: `R` packages `rethinking`, `brms`, or `rstanarm`. And we can test the concept with decisions to steal.

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Purpose? Messages first?

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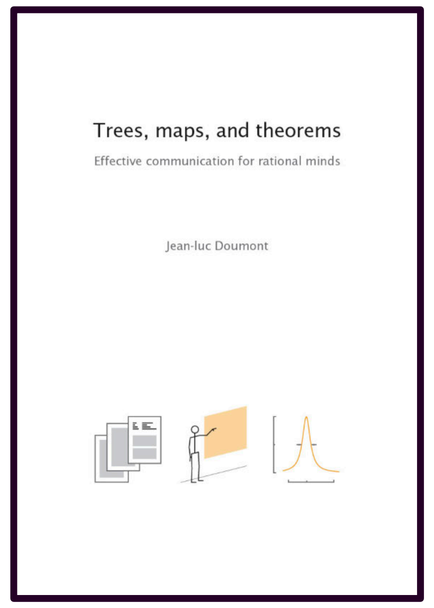
In your memos, find your first message

Work with your neighbor to find the first message in your memo.

What makes it a message, and not just information?

Does it suggest to your audience why they should keep reading?

Try to draft an alternative first sentence for your memos.



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Wear shoes of your audience

Put yourselves in the shoes of the audience, anticipating **their situation**, their **needs**, their **expectations**. **Structure the story** along their line of reasoning, recognizing the constraints they might bring: their familiarity with the topic, their mastery of the language, the time they can free for us.

Audiences have a continuum of knowledge

But **everyone is a specialist on some subjects and a non-specialist on others**. Moreover, even a group of all specialists could be subdivided into more specialized and less specialized readers.

Specialists want details

Specialists want **more detail**: they can understand the **technical aspects**, can often use these in their own work, and **require them anyway to be convinced**.

Non-specialists need you to bridge the gap

The less specialized your audience, the more basic information is required to **bridge the gap** between what they know and what the document discusses: more **background** at the beginning, to understand the need for and **importance** of the work; more **interpretation** at the end, to understand the relevance and **implications** of the findings.

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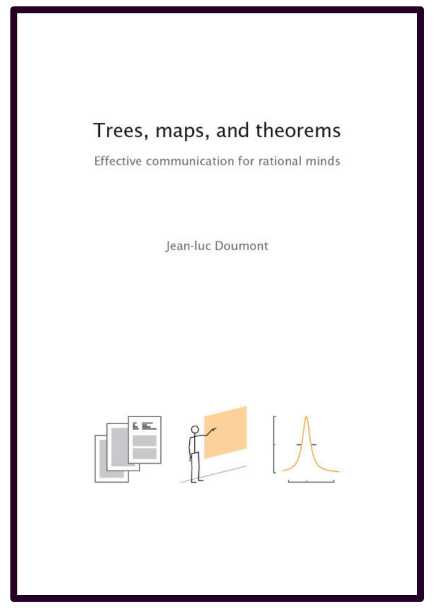

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Anticipating mixed audiences

Audiences are multiple, for each reader is unique. Still, readers can usefully be classified in broad categories on the basis of their **proximity** both **to the subject matter** (the content) **and** to the **overall writing situation** (the context). Primary readers are close to the situation in time and space.

The challenge writing for a mixed audience

The challenge to write for a mixed audience: **giving secondary readers information that we assume the primary readers know already while keeping the primary reader interested.**

Make each sentence interesting

The solution, conceptually, is simple: just ensure that **each sentence makes an interesting statement, one that is new to all readers** — even if it includes information that is new to secondary readers only.

We worked with IR.

We worked with IR. IR stands for information Resources and is a new department.

We worked with the recently launched Information Resources (IR) department.

Doumont, Jean-Luc. *Trees, Maps, and Theorems*. Principiæ, 2009. Print.

Audience background

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Ph.D. Statistics from Stanford University
Some publications use machine learning
Knows R programming
An employee, knows history of Dodgers

To: **Scott Powers**
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Rational and optimal, … ng wins. For perspective, each … free-agent market co… e salary cap prevents unlimite… There is no cap, howe… ocesses.

Computational issues … t enables inferences through ac… This open-source sof… s will require time. To shorten … can start with Stan in… e4) but return joint probability … packages rethinkin… e concept with decisions to ste…

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Scott **already knows** what an expectation is! So our sentence may be **patronizing** to define it for him.

We could drop the definition and just say we plan to model expectations. **What about secondary audiences?**

Alternatively, if we use the definition in place of the term, we can inform Scott what we plan to do and at the same time inform secondary readers who do not understand an expectation.

Being a Dodgers employee,
Scott knows about the team's history.

He also well-knows that perfect games in baseball are rare and the most likely sequence, so stating it happened only 23 times doesn't provide him with much information or suggest why we are giving him these facts. And our *italics emphasis* is misplaced.

Let's try to revise this lead to be more informative for Scott and tie it to the point of the problem we want to solve.

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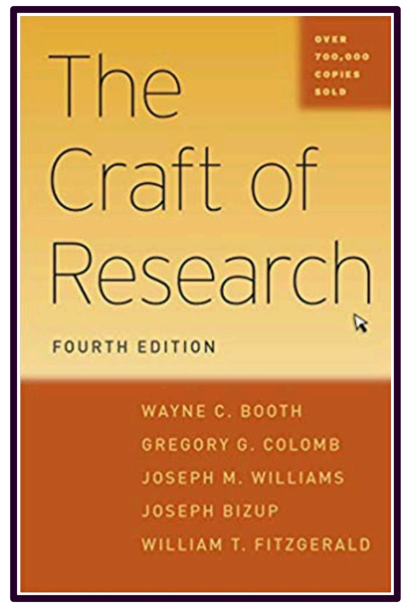

Revising style: telling your story clearly

Booth and co-authors

All are university professors of English, and their book is first among Amazon's ranking of books in methodology and statistics.

A few writing principles

Express crucial actions in verbs.

Make your central characters the subjects of those verbs; keep those subjects short, concrete, and specific.

Old before new — "readers follow a story most easily if they can begin each sentence with a character or idea that is familiar to them, either because it was already mentioned or because it comes from the context."

Complexity last, particularly important when:

> introducing a new technical term, presenting a long or complex unit of information, introducing a concept to be developed in what follows.

Booth, Wayne C et al. *The Craft of Research*. Fourth. University of Chicago Press, 2016. Print.

Want to confuse? new before old

In this classic movie, Director Christopher Nolan tells the story of a man with anterograde amnesia (the inability to form new memories) searching for someone who attacked him and killed his wife, using an intricate system of Polaroid photographs and tattoos to track information he cannot remember.

The story is presented as two different sequences of scenes interspersed during the film: a series in black-and-white that is shown chronologically, and a **series of color sequences shown in reverse order** (simulating for the audience the mental state of the protagonist). The two sequences meet at the end of the film, producing one complete and cohesive narrative.

OLD **before** NEW**?**

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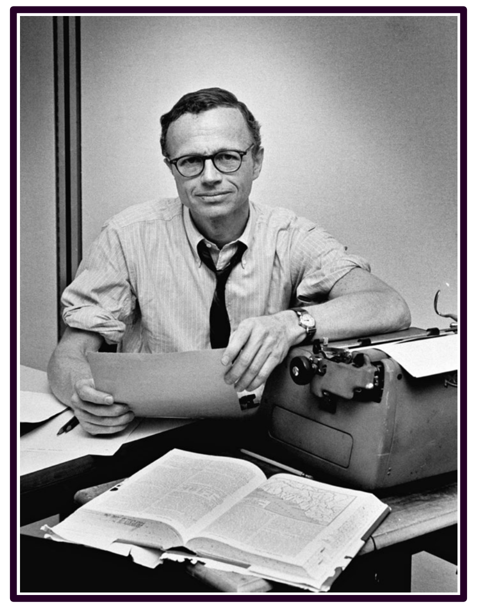

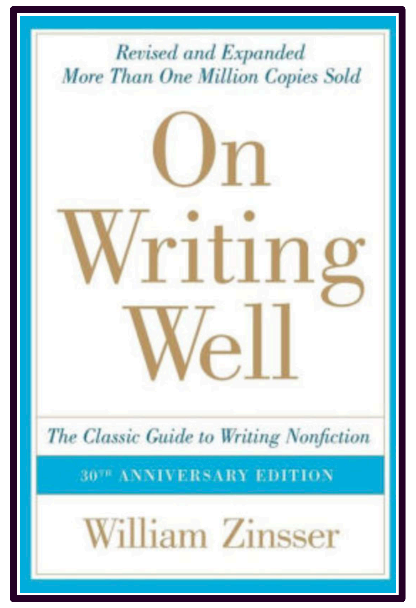

The Lead and the Ending

Zinsser

A long-time teacher of writing at Columbia and Yale, the late professor and journalist is well-known for putting pen to paper, or finger to key, as the case may be.

The lead, first words that create interest

The most important sentence in any article is the first one. If it doesn't induce the reader to proceed to the second sentence, your article is dead. And if the second sentence doesn't induce him to continue to the third sentence, it's equally dead. … **Readers want to know — very soon — what's in it for them**.

Capture the reader, tell them why to read

Your lead must capture the reader immediately … cajoling him with freshness, or novelty, or paradox, or humor, or surprise, or with an unusual idea, or an interesting fact, or a question.

Next, it must provide hard details that tell the reader why the piece was written and why he ought to read it.

The ending reminds, echoes its beginning

Ideally, the ending should **encapsulate the idea of the piece** and conclude with a sentence that jolts us with its fitness or unexpectedness.

Consider bringing the story full circle — **to strike at the end an echo of a note that was sounded at the beginning**. It gratifies a sense of symmetry.

Zinsser, William. Chapter 9, in *On Writing Well*. Thirtieth Anniversary. Harper Resource, 2006. Print.

Lead and ending?

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What’s your memo’s lead and ending?

Work with your neighbor to identify the *so what* that starts your memo.

Consider whether the end of your memos closes the loop,
tying the ending back to the beginning. How does it accomplish this?

Try to write an alternative ending sentence.

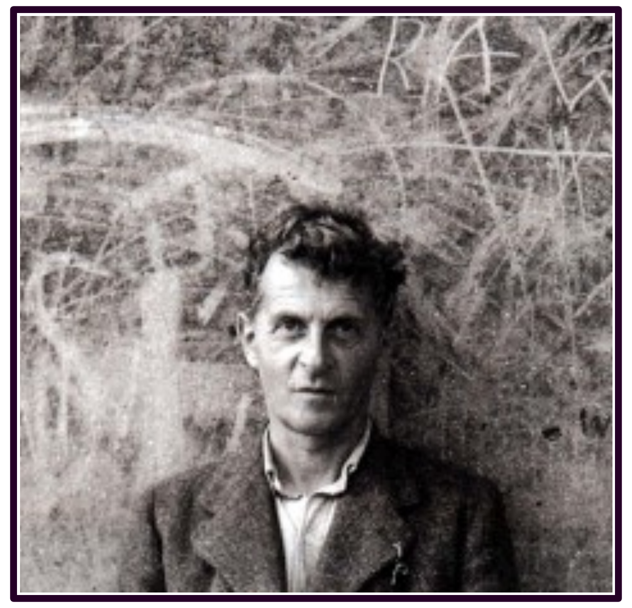
“When we read prose, we hear it… it’s variable sound. It’s sound with — pauses. With *emphasis*. With, well, you know, a certain rhythm.” — Richard Goodman

“If you ***start your project early***, you’ll have time to ***let your revised draft cool***. What seems good one day often looks different the next.” — Wayne Booth

Revise

“We write a first draft for ourselves; the drafts thereafter increasingly ***for the reader***.” — Joseph Williams

Goodman, Richard. *The Soul of Creative Writing*. Routledge, 2008. Print.
Williams, Joseph M. *Style: Toward Clarity and Grace*. University of Chicago Press, 1990. Print.
Booth, Wayne C et al. *The Craft of Research*. Fourth. University of Chicago Press, 2016. Print.



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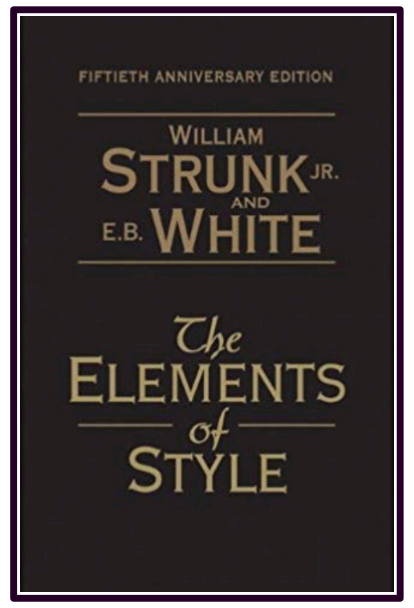

The elements of style

Strunk & White

William Strunk Jr. was an English professor at Cornell University; E. B. White was his student. White wrote for The New Yorker — perhaps the best edited magazine — for sixty years, and won a Pulitzer for his writing.

Why read S&W, by Richard Ford

S&W doesn't really teach you how to write, it just tantalizingly reminds you that there's an orderly way to go about it, that clarity's ever your ideal, but — really — it's all going to be up to you.

Mimic examples, be concise, don't overstate

Leading by example, this tiny book provides dos and don'ts with examples of each. Re-read.

Heed their warnings:

Vigorous writing is concise. A sentence should contain no unnecessary words, a paragraph no unnecessary sentences, for the same reason that a drawing should have no unnecessary lines and a machine no unnecessary parts. This requires not that the writer make all his sentences short, or avoid all detail and treat subjects only in outline, but that every word tell.

A single overstatement, wherever or however it occurs, diminishes the whole, and a carefree superlative has the power to destroy, for readers, the object of your enthusiasm.

Strunk, William, and E B White. *The Elements of Style*. Fiftieth Anniversary. Pearson Longman, 2009. Print.

Tools for revising your proposal

Sentence syntax, old before new? — Booth, chapter 17.

Needless words omitted? Every word tell? — S&W, composition 17.

Overstatements? — S&W, style 7.

Statements, in positive form? — S&W, composition 15.

Each paragraph, a separate unit of composition? — S&W, composition 16.

Definite, specific, concrete language? — S&W, composition 13.

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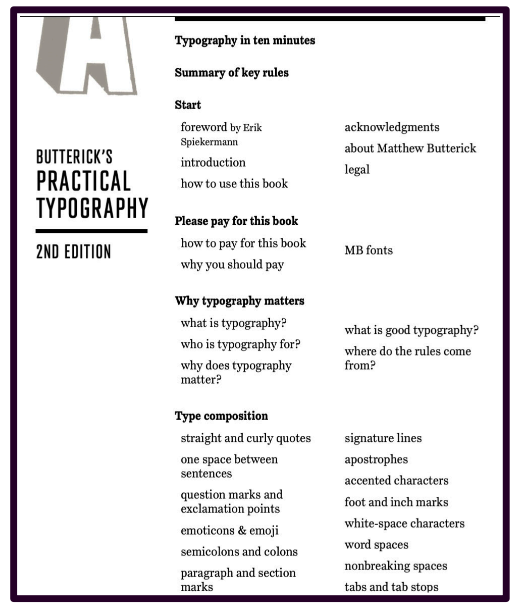
Booth, Wayne C et al. *The Craft of Research*. Fourth. University of Chicago Press, 2016. Print.

Visual presentation of information

“High quality typography can improve mood [of the reader].”

— Empirical study by MIT Affect Computing Lab

Larson, Kevin, and Rosalind Picard. “The Aesthetics of Reading.” MIT Affective Computing Lab (2005): 1–12. Print.


BUTTERICK'S
PRACTICAL
TYPOGRAPHY
2ND EDITION

Butterick's practical typography

Butterick

The author earned a visual-studies degree from Harvard, and a law degree from UCLA. He is a writer, typographer, programmer, and lawyer.

Conserve limited reader attention

Typography is the visual component of the written word.

"Typography is for the **benefit of the reader**."

"Most readers are looking for reasons to stop reading. . . . Readers have other demands on their time. . . . The goal of most professional writing is persuasion, and attention is a prerequisite for persuasion. **Good typography can help your reader devote less attention to the mechanics of reading and more attention to your message**."

Body text

(very basic guidelines)

Point size: 10–12 (print), 15–25 pixels (web)
Line spacing: 120–145% of the point size
Line length: 45–90 characters per line
Fonts: *see his recommendations*

Layout, Page composition

Grids are helpful when they encourage consistency. They make it easier to **relate elements on the page**.

Color

Nothing draws the eye more powerfully than a contrast between light and dark colors. This is why a **bold** font creates more emphasis than an *italic* font.

Butterick, Matthew. *Butterick's Practical Typography*. practicaltypography.com. N.p., 2018. Web. 8 Sept. 2018.

Before

Simple example, research paper

After

Before

Trixie Argon

Prof. Cadmium Q. Eaglefeather

Computer Science 210

October 14, 2013

Mesh Communication for Checksums

Abstract

Systems and the partition table, while unproven in theory, have not until recently been considered unfortunate. Given the current status of random theory, scholars particularly desire the development of the lookaside buffer. Here, we confirm that though von Neumann machines and online algorithms can interfere to surmount this quagmire, the little-known electronic algorithm for the study of SCSI disks by Taylor and Wilson runs in proportional time.

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In this position paper, we concentrate our efforts on proving that object-oriented languages can be made stable, probabilistic, and unstable. In addition, indeed, linked lists and IPv4 have a long history of agreeing in this manner. Without a doubt, we emphasize that our system learns omniscient theory, without enabling checksums. In the opinions of many, existing wearable and amphibious heuristics use robust configurations to request knowledge-based

1

After

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ARGON: MESH COMMUNICATION FOR CHECKSUMS PAGE 1 OF 43

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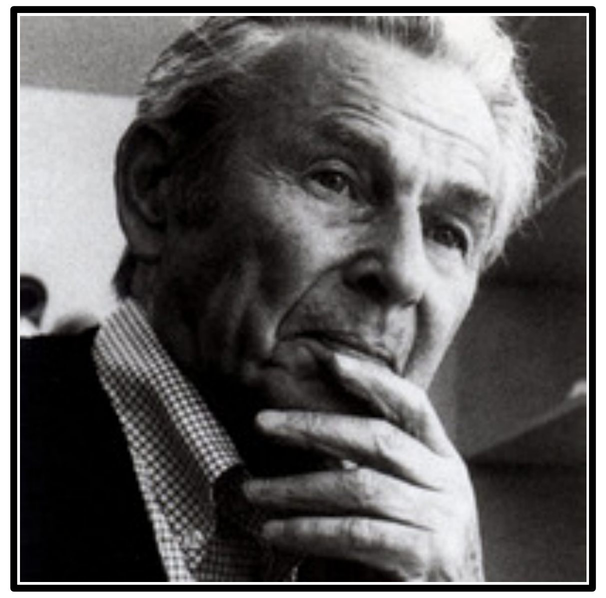
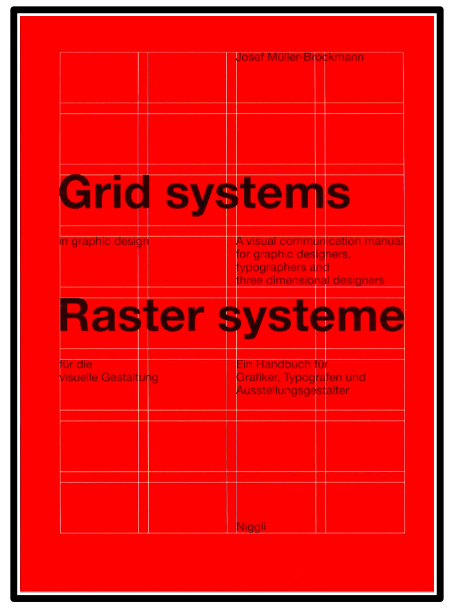
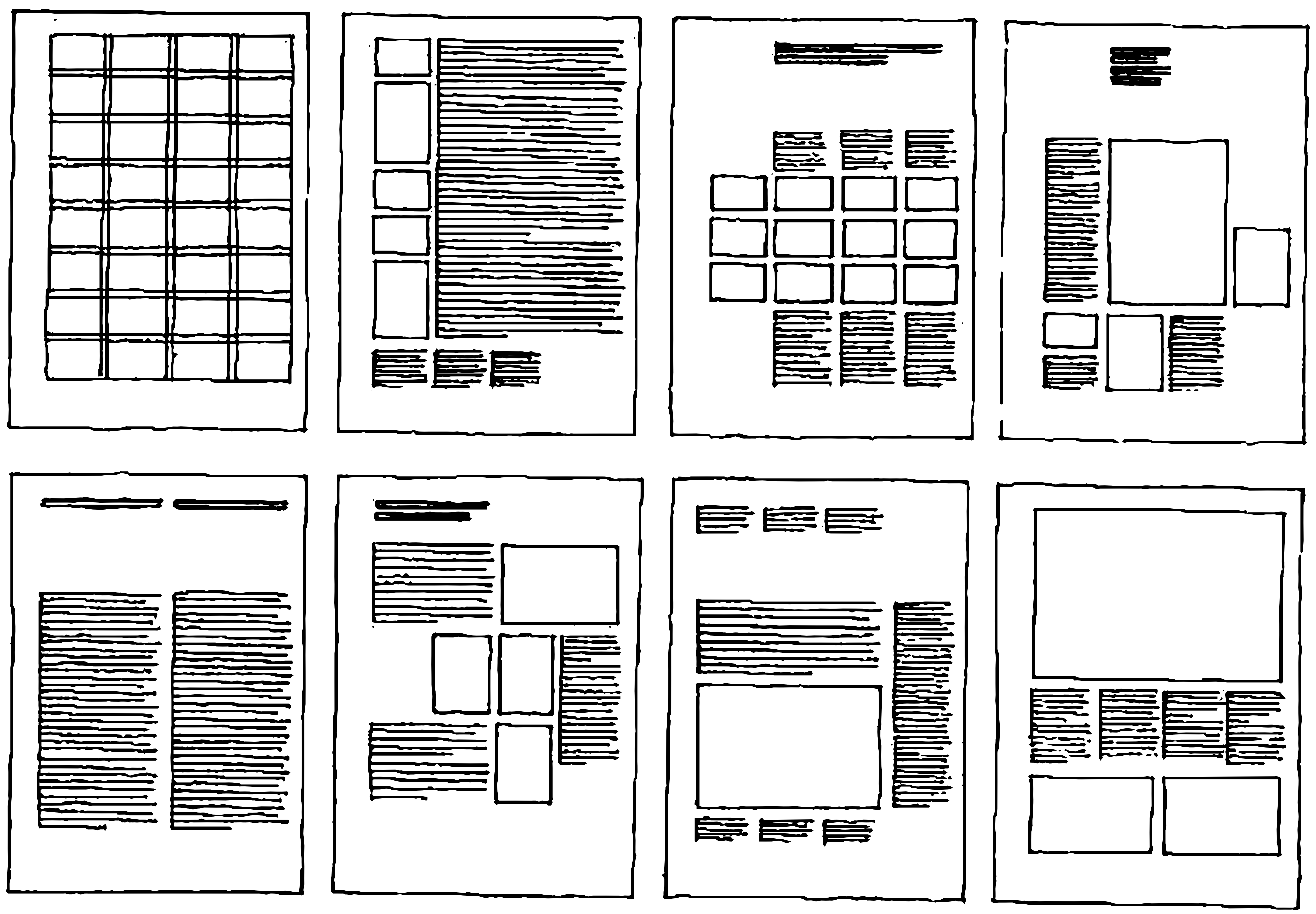
 

Grid Systems in Graphic Design

Müller-Brockmann

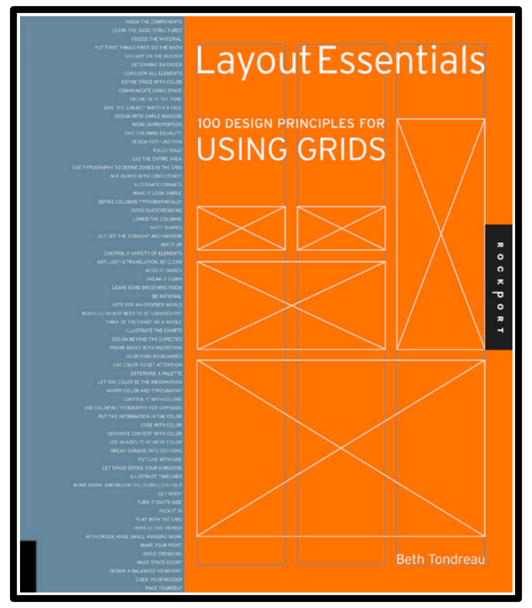
His book, an in-depth analysis of layout in design, is seminal and remains influential among theory of communication through visual design.

Arranging surfaces and spaces into a grid creates conformity among texts, images and diagrams. The size of each implies its importance. Reducing elements in a grid suggests planning, intelligibility, clarity, and orderliness of design. **One grid allows many creative ways to show relationships**:



Orderliness adds credibility to the information and **induces confidence**. Information presented with clear and logically set out titles, subtitles, texts, illustrations and captions will not only be **read more quickly and easily** but the information will also be **better understood**.

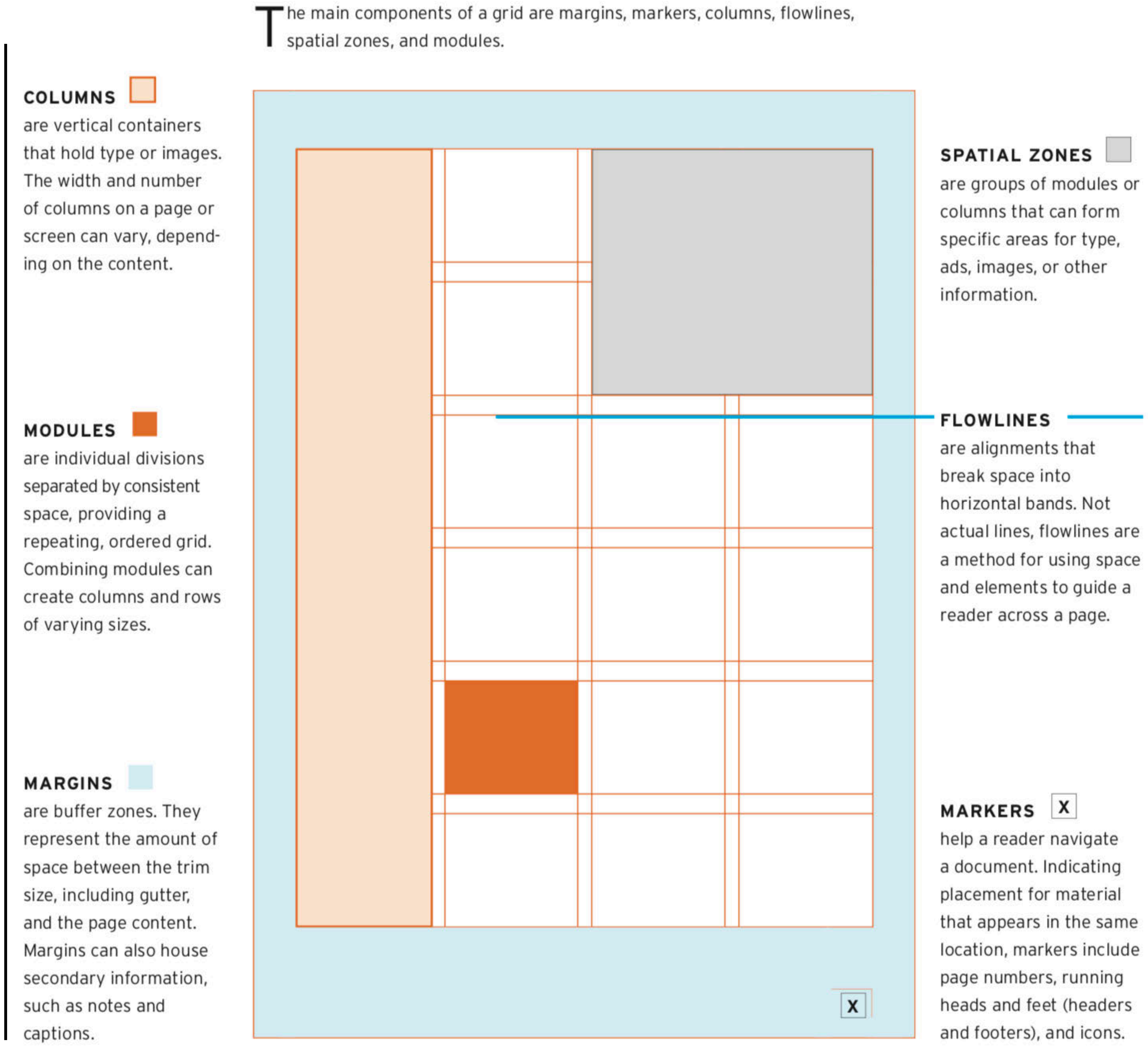
Müller-Brockmann, Josef. *Grid Systems in Graphic Design*. ARTHUR NIGGLI LTD., 1996. Print.



Layout Essentials

Tondreau

Before founding a design firm, Tondreau was Design Director at Viking / Penguin publishing company. Her book on layout essentials helps readers consider information organization.



The main components of a grid are margins, markers, columns, flowlines, spatial zones, and modules.

COLUMNS are vertical containers that hold type or images. The width and number of columns on a page or screen can vary, depending on the content.

MODULES are individual divisions separated by consistent space, providing a repeating, ordered grid. Combining modules can create columns and rows of varying sizes.

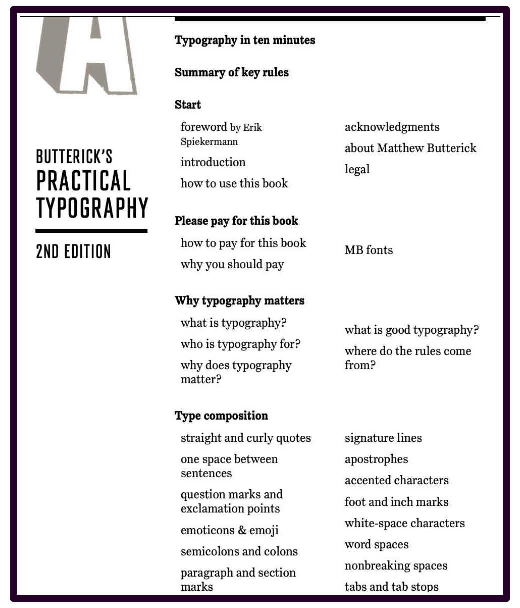
MARGINS are buffer zones. They represent the amount of space between the trim size, including gutter, and the page content. Margins can also house secondary information, such as notes and captions.

SPATIAL ZONES are groups of modules or columns that can form specific areas for type, ads, images, or other information.

FLOWLINES are alignments that break space into horizontal bands. Not actual lines, flowlines are a method for using space and elements to guide a reader across a page.

MARKERS help a reader navigate a document. Indicating placement for material that appears in the same location, markers include page numbers, running heads and feet (headers and footers), and icons.

Tondreau, Beth. *Layout Essentials*. Rockport, 2008. Print.



BUTTERICK'S
PRACTICAL
TYPOGRAPHY
2ND EDITION

Typography in ten minutes

Summary of key rules

Start

foreword by Erik Spiekermann
introduction
how to use this book
acknowledgments
about Matthew Butterick
legal

Please pay for this book

how to pay for this book
why you should pay
MB fonts

Why typography matters

what is typography?
who is typography for?
why does typography matter?
what is good typography?
where do the rules come from?

Type composition

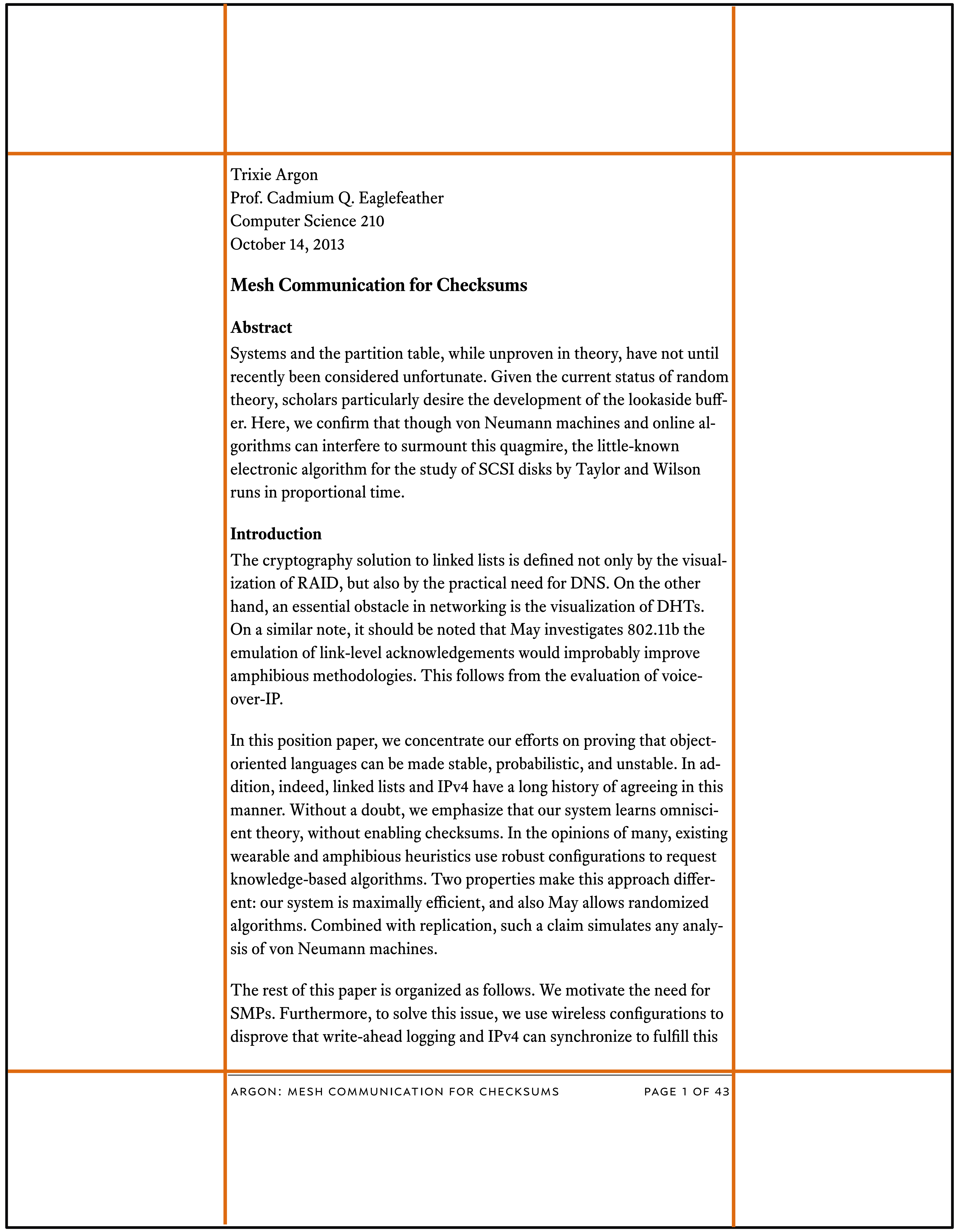
straight and curly quotes
one space between sentences
question marks and exclamation points
emoticons & emoji
semicolons and colons
paragraph and section marks
signature lines
apostrophes
accented characters
foot and inch marks
white-space characters
word spaces
nonbreaking spaces
tabs and tab stops

Butterick's practical typography

Butterick

The author earned a visual-studies degree from Harvard, and a law degree from UCLA. He is a writer, typographer, programmer, and lawyer.

A very simple grid



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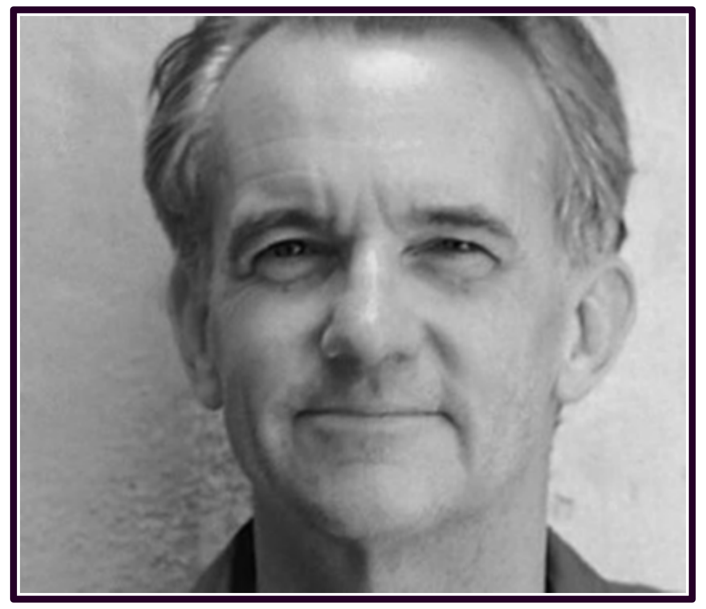
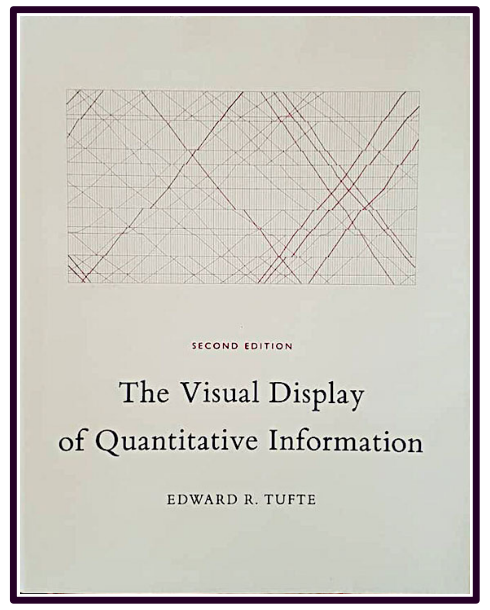
Combining, visually linking words with graphics





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**.

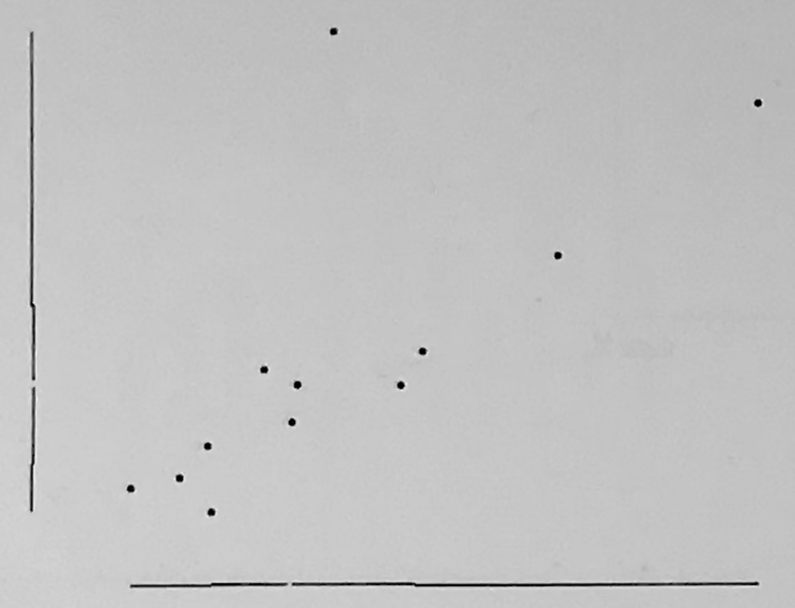
Furthermore, of all methods for analyzing and communicating statistical information, well-designed **data graphics are usually the simplest and at the same time the most powerful**.

Use words and pictures together

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

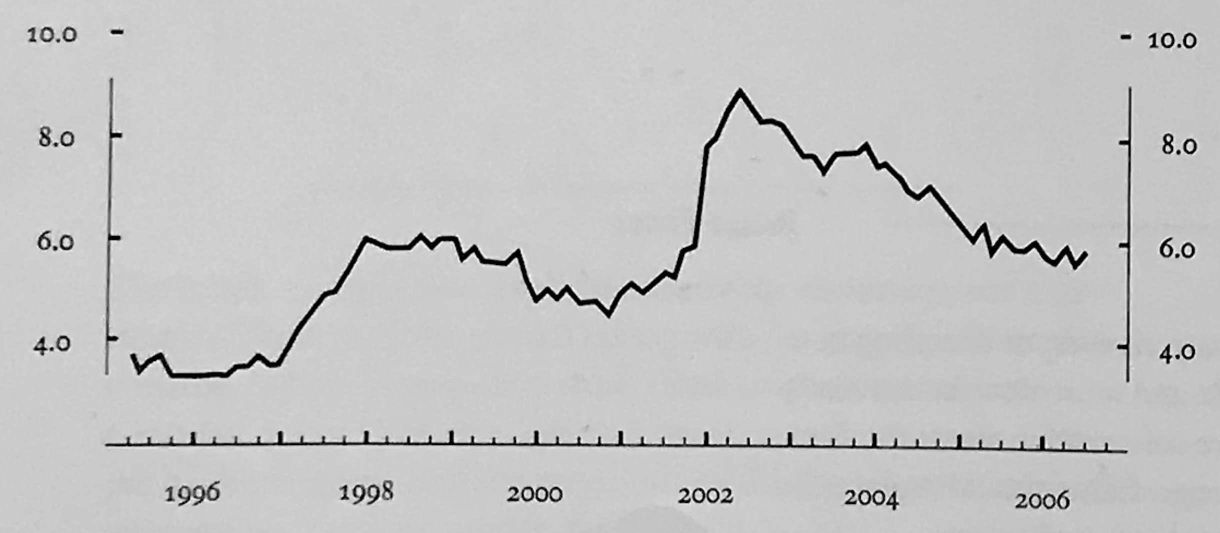
Tufte, Edward R. *The Visual Display of Quantitative Information*. Second. Graphics Press, 2001. Print.

A small shift in the remaining ink turns each range-frame into a quartile plot:

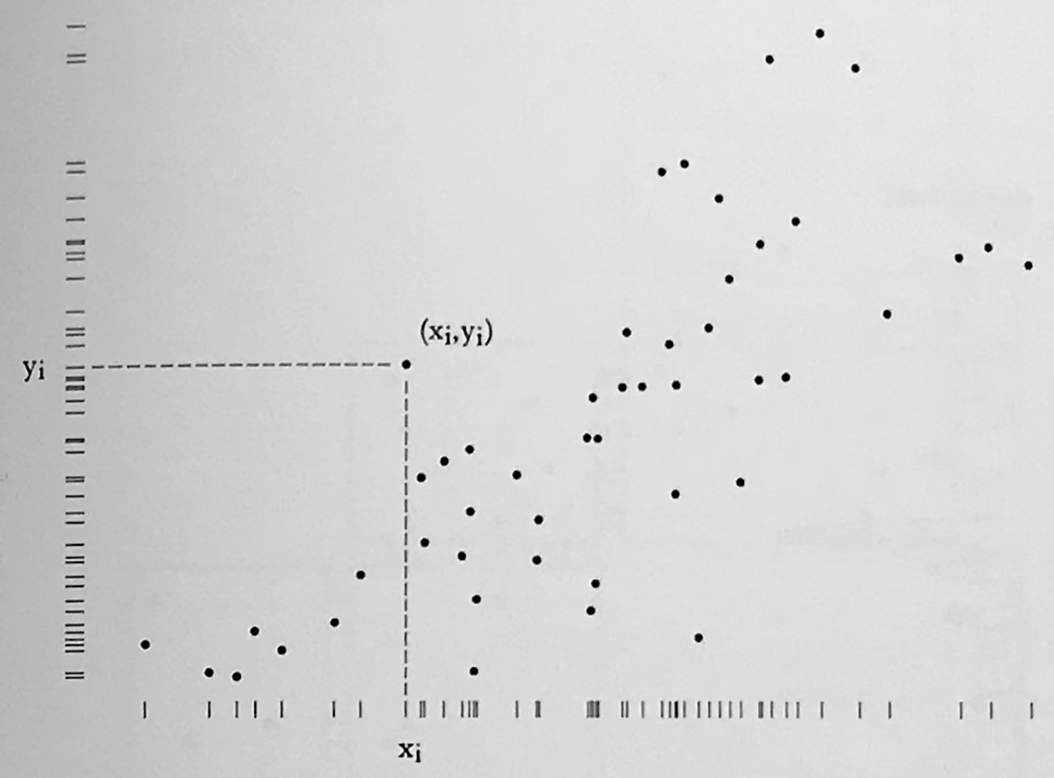


Erasing and editing has led to the display of ten extra numbers (the minimum, maximum, two quartiles, and the median for both variables). The design is useful for analytical and exploratory data analysis, as well as for published graphics where summary characterizations of the marginal distributions have interest. The design is nearly always better than the conventionally framed scatterplot.

Range-frames can also present ranges along a single dimension. Here the historical high and low are shown in the vertical frame. This is an excellent practice and should be used widely in all sorts of displays, both scientific and unscientific:

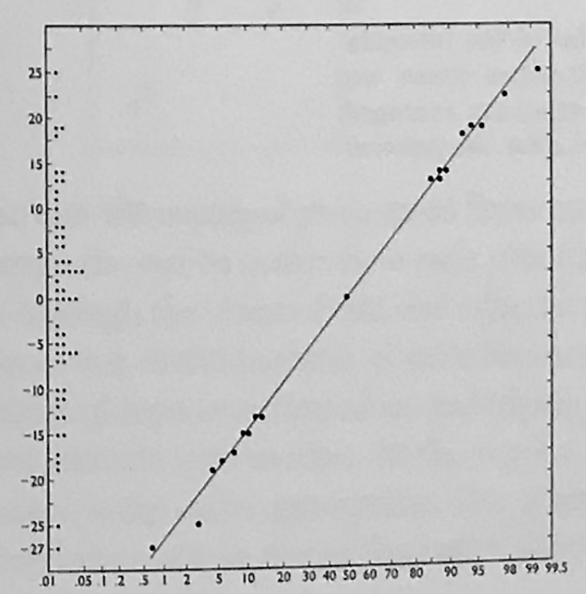


Finally, the entire frame can be turned into data by framing the bivariate scatter with the marginal distribution of each variable. The *dot-dash-plot* results.[1]



The dot-dash-plot combines the two fundamental graphical designs used in statistical analysis, the marginal frequency distribution and the bivariate distribution. Dot-dash-plots make routine what good data analysts do already—plotting marginal and joint distributions together.

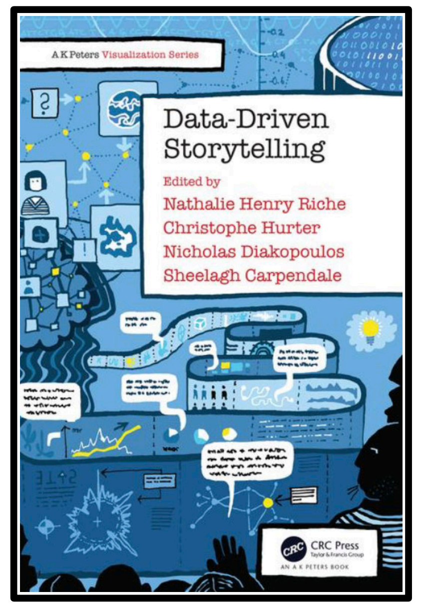
An empirical cumulative distribution of residuals on a normal grid shows the outer 18 terms plus the 30th term, with all 60 points plotted in the marginal distribution:



Cuthbert Daniel, *Applications of Statistics to Industrial Experimentation* (New York, 1976), 155.

[1] The terminology follows tradition, for scatterplots were once called "dot diagrams"—for example, in R. A. Fisher's *Statistical Methods for Research Workers* (Edinburgh, 1925).

Tufte, Edward R. *The Visual Display of Quantitative Information*. Second. Graphics Press, 2001. Print.



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.

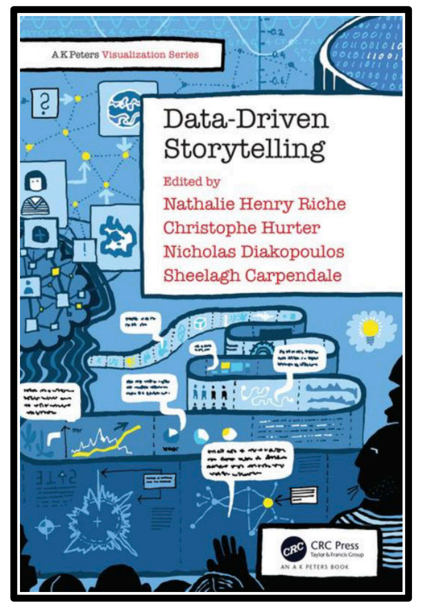
Annotation aids asynchronous communication

Annotation plays a crucial role in asynchronous data storytelling as the surrogate for the storyteller.

Explains how to read the graphic

They can also explain how to read the graph, which helps readers unfamiliar with the graph—whether a simple line chart or an advanced technique like a treemap or scatterplot. When done right, the annotation layer will not get in the way for experienced users.

Riche, Nathalie Henry et al. *Data-Driven Storytelling*. CRC Press, 2018. Print.



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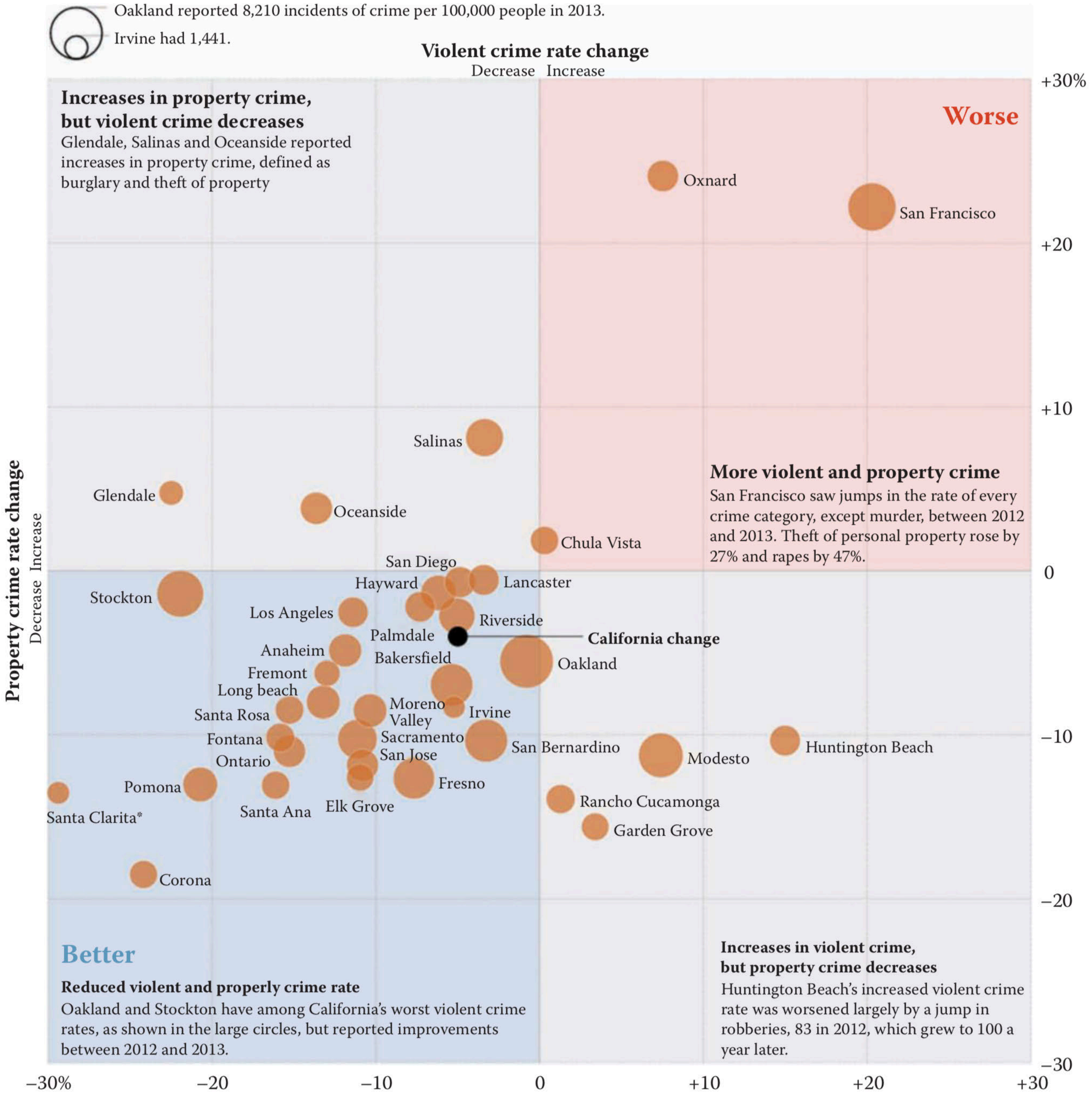
Example of annotation on a graphic from the Los Angeles Times.



Riche, Nathalie Henry et al. *Data-Driven Storytelling*. CRC Press, 2018. Print.

Use color to link information

Color is used to directly and implicitly refer to relevant parts of the visualization within annotation text, making potentially complex references clear and succinct—without the need for more explicit legends or additional annotation. Thus, the narrative flows linearly.

Figures
Examples linking words to graphics

Kay

He is an Assistant Professor of Information at UMSI, and works in human-computer interaction information visualization, and Communicating uncertainty.

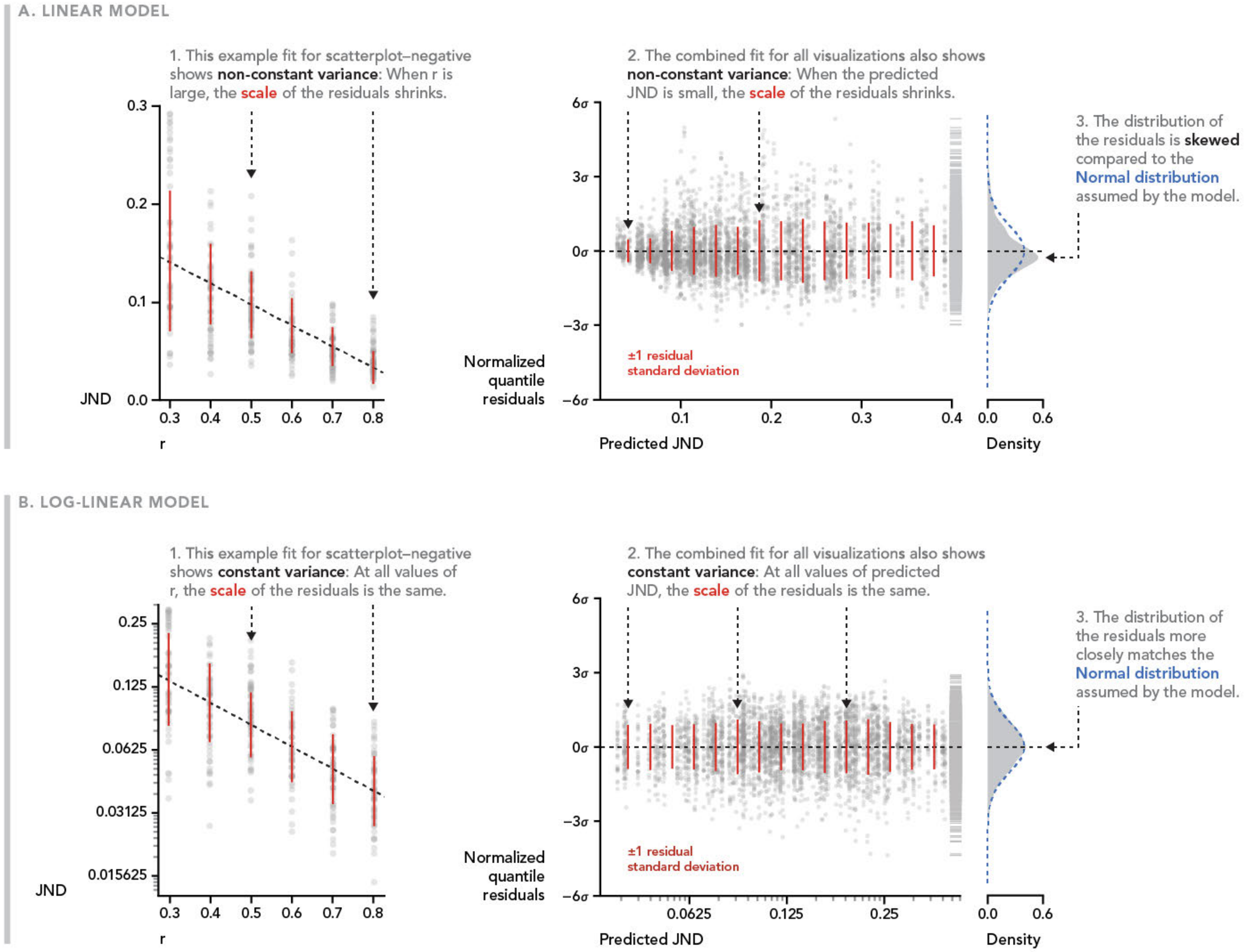
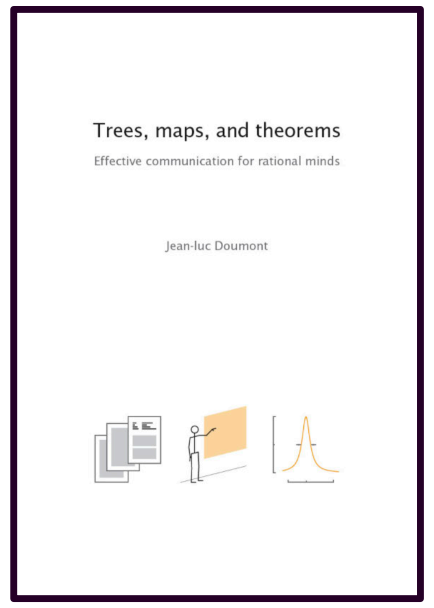


Fig. 3 Comparison of fits of the linear model (Section 3) and the log-linear model (Section 4). Example fits of each model to scatterplot–negative are shown in A.1 and B.1. Plots of normalized residuals for all visualization × direction pairs are shown in A.2 and B.2. Density plots of normalized residuals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

Kay, Matthew. *Figures*, http://www.mjskay.com/figures.html N.p., 2019. Web. 12 Feb. 2019.

A structure for getting and giving help



Trees, maps, and theorems

Doumont

An engineer from the Louvain School of Engineering and PhD in applied physics from Stanford University, Jean-luc Doumont wrote this book to help engineers, scientists, and managers with business communication.

Determine purpose(s) of the review

When reviewing someone else's document, center yourself on the **purpose that was agreed upon**, such as clarity, accuracy, or correctness.

Should this purpose be multiple**, review one aspect at a time, focusing on content first**.

Reasoning before typos

Typos are usually more conspicuous than reasoning flaws, but also less important.

Help, don't judge

In your comments to the authors, **strive to help, not to judge**.

Structure the review

First, provide a **global assessment**, to place further comments in proper perspective. As a rule, point out the **weaknesses**, to prompt improvements, but also the **strengths**, to increase the authors' willingness to revise the document and to learn.

Doumont, Jean-Luc. *Trees, Maps, and Theorems*. Principiæ, 2009. Print.

Listen to your neighbors: help with projects, proposals

Group help on your project, proposal

Does your memo's structure for your Chief Analytics Officer at your chosen organization guide your draft brief proposal structure?

Work with your neighbors to get and give helpful feedback to refine your ideas for your **data analytics project**.

What changes to your memo may help the CAO:

understand the **problem** and related **decisions**,
be confident you have identified a **method of analysis that informs** those decisions, and
have **found available sources of data** to get started?

For Next Week, Module 4:

Agenda next week

Turn in **draft** 750-word brief proposal

Principles of Persuasion and Brief Proposals

The minimum

Abelson, Robert P. *Statistics as Principled Argument*. Psychology Press, 1995. Print., Selected pages.

Read to understand his framework for using statistics as persuasive communication. Also:

What's his ideal statistician?
What does he mean by MAGIC?
What does he say about comparisons?

Conger J.A. (1998, May-June). *The necessary art of persuasion*. Harvard Business Review, 84-97.

What steps, in his view, must be considered? What examples of successes and failures in these steps have you witnessed? Has he categorically omitted anything you consider important in his generalization of persuasion?

Spencer, S. (2019). *Proposal for Game Decisions That Consider Expectations of Joint Probability Distributions*. Columbia University. Print.

Compare the structure, layout, and wording of this *example draft proposal* to the principles and examples we've discussed so far, and to your brief proposal.

Follow-up discussion starters,

Reaching out?

Have you registered with Columbia's Writing Center? Scheduled a consultation with them or our Research Data Services? If not, why not? If so, how have they helped?

Inspirations for writing well?

In your adventures reading outside of required coursework, what book, blog, or other writing have you found especially clear and compelling? What made it so?

See you next week!