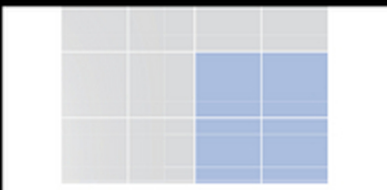

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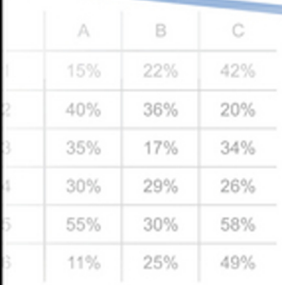

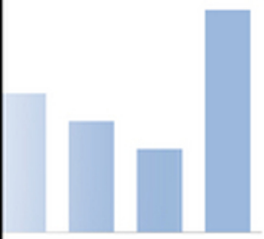

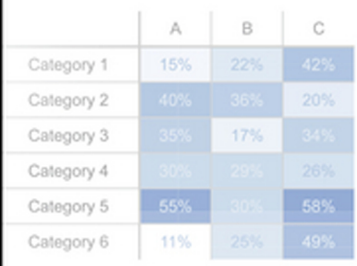

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To Randolph

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foreword

"Power Corrupts. PowerPoint Corrupts Absolutely."

—Edward Tufte, Yale Professor Emeritus[1]

We've all been victims of bad slideware. Hit-and-run presentations that leave us staggering from a maelstrom of fonts, colors, bullets, and highlights. Infographics that fail to be informative and are only graphic in the same sense that violence can be graphic. Charts and tables in the press that mislead and confuse.

It's too easy today to generate tables, charts, graphs. I can imagine some old-timer (maybe it's me?) harrumphing over my shoulder that in *his* day they'd do illustrations by hand, which meant you had to *think* before committing pen to paper.

Having all the information in the world at our fingertips doesn't make it easier to communicate: it makes it harder. The more information you're dealing with, the more difficult it is to filter down to the most important bits.

Enter Cole Nussbaumer Knaflic.

I met Cole in late 2007. I'd been recruited by Google the year before to create the "People Operations" team, responsible for finding, keeping, and delighting the folks at Google. Shortly after joining I decided

[1] Tufte, Edward R. 'PowerPoint Is Evil.' Wired Magazine, www.wired.com/wired/archive/11.09/ppt2.html, September 2003.

we needed a People Analytics team, with a mandate to make sure we innovated as much on the people side as we did on the product side. Cole became an early and critical member of that team, acting as a conduit between the Analytics team and other parts of Google.

Cole always had a knack for clarity.

She was given some of our messiest messages—such as what exactly makes one manager great and another crummy—and distilled them into crisp, pleasing imagery that told an irrefutable story. Her messages of "don't be a data fashion victim" (i.e., lose the fancy clipart, graphics and fonts—focus on the message) and "simple beats sexy" (i.e., the point is to clearly tell a story, not to make a pretty chart) were powerful guides.

We put Cole on the road, teaching her own data visualization course over 50 times in the ensuing six years, before she decided to strike out on her own on a self-proclaimed mission to "rid the world of bad PowerPoint slides." And if you think that's not a big issue, a Google search of "powerpoint kills" returns almost half a million hits!

In *Storytelling with Data*, Cole has created an of-the-moment complement to the work of data visualization pioneers like Edward Tufte. She's worked at and with some of the most data-driven organizations on the planet as well as some of the most mission-driven, data-free institutions. In both cases, she's helped sharpen their messages, and their thinking.

She's written a fun, accessible, and eminently practical guide to extracting the signal from the noise, and for making all of us better at getting our voices heard.

And that's kind of the whole point, isn't it?

Laszlo Bock

SVP of People Operations, Google, Inc.
and author of *Work Rules!*

May 2015

acknowledgments

My timeline of thanks

Thank you to…

2010–CURRENT **My family**, for your love and support. To my love, my husband, Randy, for being my #1 cheerleader through it all; I love you, darling. To my beautiful sons, Avery and Dorian, for reprioritizing my life and bringing much joy to my world.

2010–CURRENT **My clients**, for taking part in my effort to rid the world of ineffective graphs and inviting me to share my work with their teams and organizations through workshops and other projects.

2007–2012 **The Google Years**. Laszlo Bock, Prasad Setty, Brian Ong, Neal Patel, Tina Malm, Jennifer Kurkoski, David Hoffman, Danny Cohen, and Natalie Johnson, for giving me the opportunity and autonomy to research, build, and teach content on effective data visualization, for subjecting your work to my often critical eye, and for general support and inspiration.

2002–2007 **The Banking Years**. Mark Hillis and Alan Newstead, for recognizing and encouraging excellence in visual design as I first started to discover and hone my data viz skills (in sometimes painful ways, like the fraud management spider graph!).

1987–CURRENT **My brother**, for reminding me of the importance of balance in life.

1980–CURRENT **My dad**, for your design eye and attention to detail.
1980–2011 **My mother**, the single biggest influence on my life; I miss you, Mom.

Thank you also to everyone who helped make this book possible. I value every bit of input and help along the way. In addition to the people listed above, thanks to Bill Falloon, Meg Freeborn, Vincent Nordhaus, Robin Factor, Mark Bergeron, Mike Henton, Chris Wallace, Nick Wehrkamp, Mike Freeland, Melissa Connors, Heather Dunphy, Sharon Polese, Andrea Price, Laura Gachko, David Pugh, Marika Rohn, Robert Kosara, Andy Kriebel, John Kania, Eleanor Bell, Alberto Cairo, Nancy Duarte, Michael Eskin, Kathrin Stengel, and Zaira Basanez.

about the author

Cole Nussbaumer Knaflic tells stories with data. She specializes in the effective display of quantitative information and writes the popular blog storytellingwithdata.com. Her well-regarded workshops and presentations are highly sought after by data-minded individuals, companies, and philanthropic organizations all over the world.

Her unique talent was honed over the past decade through analytical roles in banking, private equity, and most recently as a manager on the Google People Analytics team. At Google, she used a data-driven approach to inform innovative people programs and management practices, ensuring that Google attracted, developed, and retained great talent and that the organization was best aligned to meet business needs. Cole traveled to Google offices throughout the United States and Europe to teach the course she developed on data visualization. She has also acted as an adjunct faculty member at the Maryland Institute College of Art (MICA), where she taught Introduction to Information Visualization.

Cole has a BS in Applied Math and an MBA, both from the University of Washington. When she isn't ridding the world of ineffective graphs one pie at a time, she is baking them, traveling, and embarking on adventures with her husband and two young sons in San Francisco.

introduction

Bad graphs are everywhere

I encounter a lot of less-than-stellar visuals in my work (and in my life—once you get a discerning eye for this stuff, it's hard to turn it off). Nobody sets out to make a bad graph. But it happens. Again and again. At every company throughout all industries and by all types of people. It happens in the media. It happens in places where you would expect people to know better. Why is that?

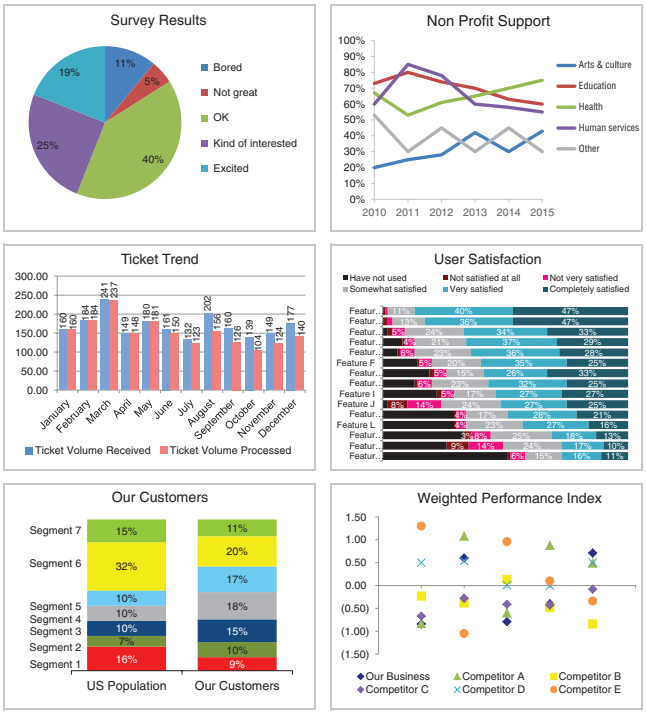

FIGURE 0.1 A sampling of ineffective graphs

We aren't naturally good at storytelling with data

In school, we learn a lot about language and math. On the language side, we learn how to put words together into sentences and into stories. With math, we learn to make sense of numbers. But it's rare that these two sides are paired: no one teaches us how to tell stories with numbers. Adding to the challenge, very few people feel naturally adept in this space.

This leaves us poorly prepared for an important task that is increasingly in demand. Technology has enabled us to amass greater and greater amounts of data and there is an accompanying growing desire to make sense out of all of this data. Being able to visualize data and tell stories with it is key to turning it into *information* that can be used to drive better decision making.

In the absence of natural skills or training in this space, we often end up relying on our tools to understand best practices. Advances in technology, in addition to increasing the amount of and access to data, have also made tools to work with data pervasive. Pretty much anyone can put some data into a graphing application (for example, Excel) and create a graph. This is important to consider, so I will repeat myself: *anyone* can put some data into a graphing application and create a graph. This is remarkable, considering that the process of creating a graph was historically reserved for scientists or those in other highly technical roles. And scary, because without a clear path to follow, our best intentions and efforts (combined with oft-questionable tool defaults) can lead us in some really bad directions: 3D, meaningless color, pie charts.

Skilled in Microsoft Office? So is everyone else!

Being adept with word processing applications, spreadsheets, and presentation software—things that used to set one apart on a resume and in the workplace—has become a minimum expectation for most employers. A recruiter told me that, today, having "proficiency in Microsoft Office" on a resume isn't enough: a basic level of knowledge here is assumed and it's what you can do above and beyond that will set you apart from others. Being able to effectively tell stories with data is one area that will give you that edge and position you for success in nearly any role.

While technology has increased access to and proficiency in tools to work with data, there remain gaps in capabilities. You can put some data in Excel and create a graph. For many, the process of data visualization ends there. This can render the most interesting story completely underwhelming, or worse—difficult or impossible to understand. Tool defaults and general practices tend to leave our data and the stories we want to tell with that data sorely lacking.

There is a story in your data. But your tools don't know what that story is. That's where it takes you—the analyst or communicator of the information—to bring that story visually and contextually to life. That process is the focus of this book. The following are a few example before-and-afters to give you a visual sense of what you'll learn; we'll cover each of these in detail at various points in the book.

The lessons we will cover will enable you to shift from simply showing data to **storytelling with data.**

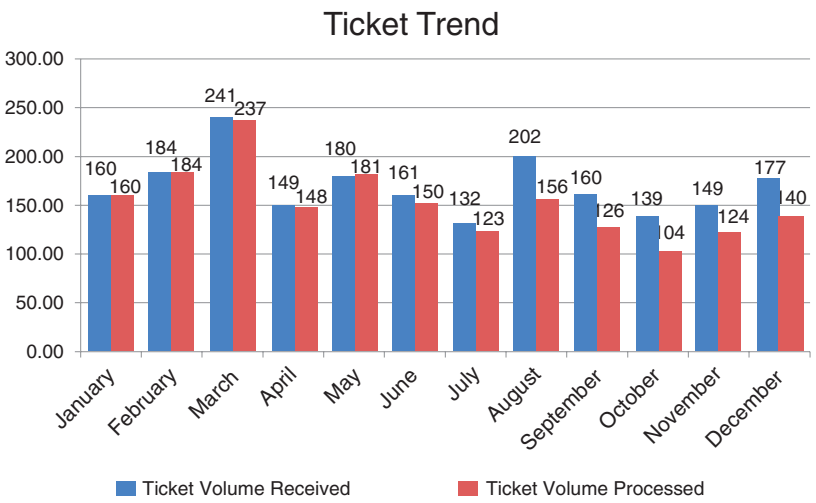

FIGURE 0.2 Example 1 (before): showing data

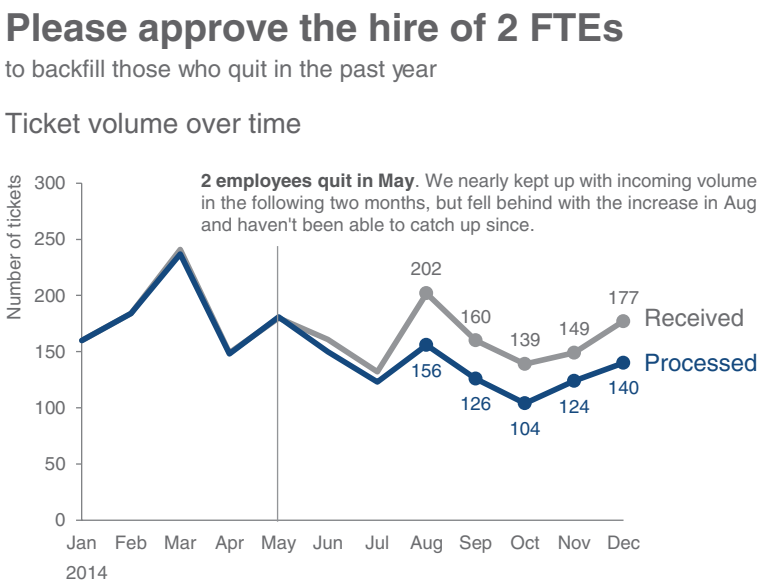

FIGURE 0.3 Example 1 (after): storytelling with data

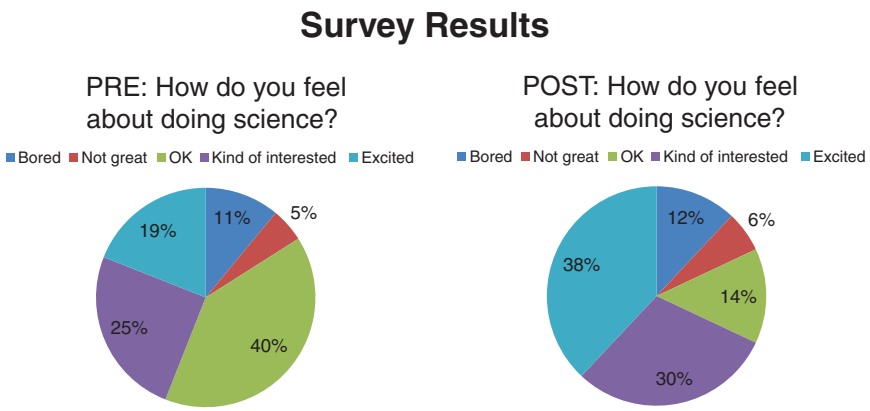

FIGURE 0.4 Example 2 (before): showing data

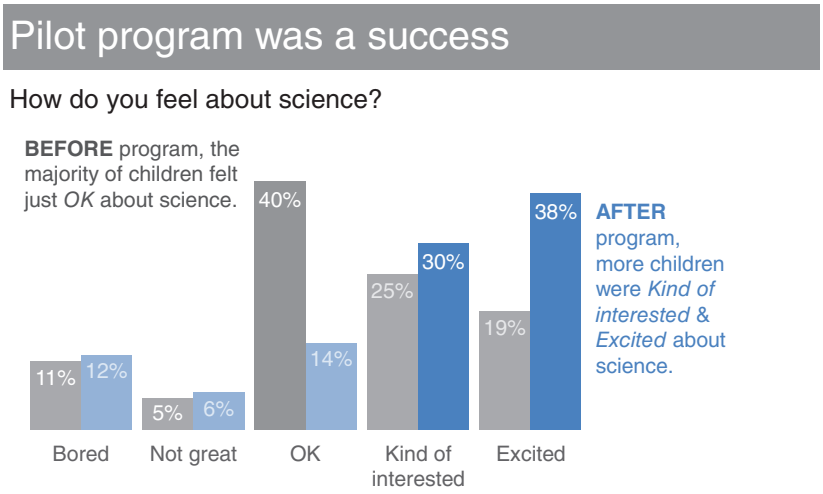

FIGURE 0.5 Example 2 (after): storytelling with data

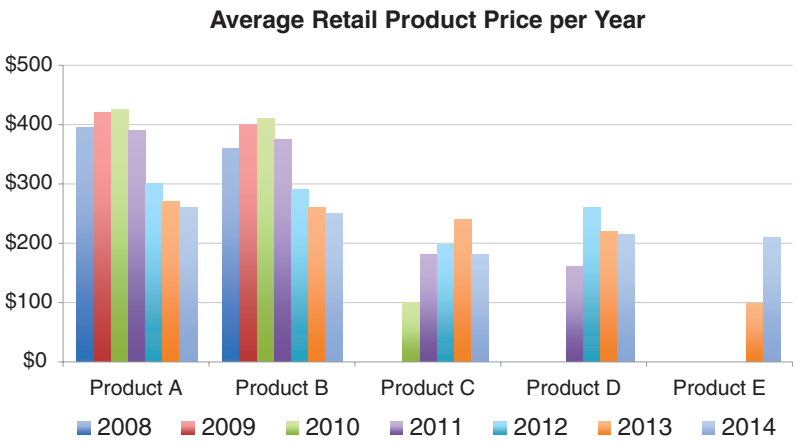

FIGURE 0.6 Example 3 (before): showing data

To be competitive, we recommend introducing our product *below the $223 average* price point in the **$150–$200 range**

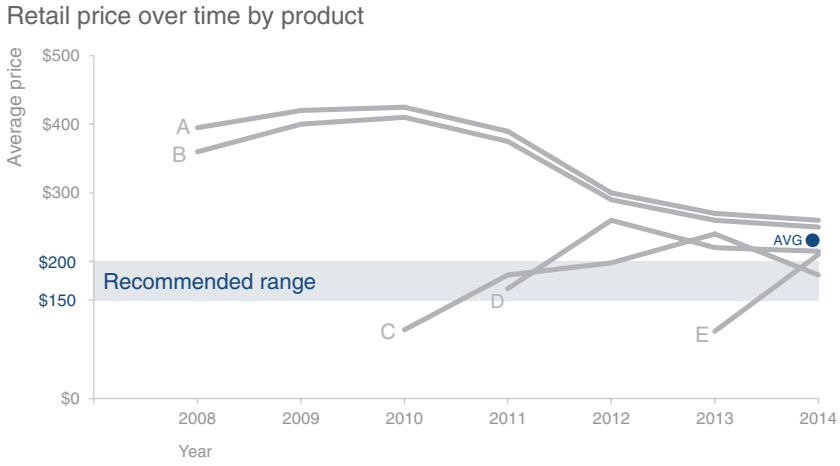

FIGURE 0.7 Example 3 (after): storytelling with data

Who this book is written for

This book is written for anyone who needs to communicate some*thing* to some*one* using data. This includes (but is certainly not limited to): analysts sharing the results of their work, students visualizing thesis data, managers needing to communicate in a data-driven way, philanthropists proving their impact, and leaders informing their board. I believe that anyone can improve their ability to communicate effectively with data. This is an intimidating space for many, but it does not need to be.

When you are asked to "show data," what sort of feelings does that evoke?

Perhaps you feel uncomfortable because you are unsure where to start. Or maybe it feels like an overwhelming task because you assume that what you are creating needs to be complicated and show enough detail to answer every possible question. Or perhaps you already have a solid foundation here, but are looking for that something that will help take your graphs and the stories you want to tell with them to the next level. In all of these cases, this book is written with you in mind.

"When I'm asked to *show the data*, I feel..."

An informal Twitter poll I conducted revealed the following mix of emotions when people are asked to "show the data."

Frustrated because I don't think I'll be able to tell the whole story.

Pressure to make it clear to whomever needs the data.

Inadequate. Boss: Can you drill down into that? Give me the split by x, y, and z.

Being able to tell stories with data is a skill that's becoming ever more important in our world of increasing data and desire for data-driven decision making. An effective data visualization can mean the difference between success and failure when it comes to communicating the findings of your study, raising money for your nonprofit, presenting to your board, or simply getting your point across to your audience.

My experience has taught me that most people face a similar challenge: they may recognize the need to be able to communicate effectively with data but feel like they lack expertise in this space. People skilled in data visualization are hard to come by. Part of the challenge is that data visualization is a single step in the analytical process. Those hired into analytical roles typically have quantitative backgrounds that suit them well for the other steps (finding the data, pulling it together, analyzing it, building models), but not necessarily any formal training in design to help them when it comes to the communication of the analysis—which, by the way, is typically the only part of the analytical process that your audience ever sees. And increasingly, in our ever more data-driven world, those without technical backgrounds are being asked to put on analytical hats and communicate using data.

The feelings of discomfort you may experience in this space aren't surprising, given that being able to communicate effectively with data isn't something that has been traditionally taught. Those who excel have typically learned what works and what doesn't through trial and error. This can be a long and tedious process. Through this book, I hope to help expedite it for you.

How I learned to tell stories with data

I have always been drawn to the space where mathematics and business intersect. My educational background is mathematics and business, which enables me to communicate effectively with both sides—given that they don't always speak the same language—and help them better understand one another. I love being able to take

the science of data and use it to inform better business decisions. Over time, I've found that one key to success is being able to communicate effectively visually with data.

I initially recognized the importance of being skilled in this area during my first job out of college. I was working as an analyst in credit risk management (before the subprime crisis and hence before anyone really knew what credit risk management was). My job was to build and assess statistical models to forecast delinquency and loss. This meant taking complicated stuff and ultimately turning it into a simple communication of whether we had adequate money in the reserves for expected losses, in what scenarios we'd be at risk, and so forth. I quickly learned that spending time on the aesthetic piece—something my colleagues didn't typically do—meant my work garnered more attention from my boss and my boss's boss. For me, that was the beginning of seeing value in spending time on the visual communication of data.

After progressing through various roles in credit risk, fraud, and operations management, followed by some time in the private equity world, I decided I wanted to continue my career outside of banking and finance. I paused to reflect on the skills I possessed that I wanted to be utilizing on a daily basis: at the core, it was using data to influence business decisions.

I landed at Google, on the People Analytics team. Google is a data-driven company—so much so that they even use data and analytics in a space not frequently seen: human resources. People Analytics is an analytics team embedded in Google's HR organization (referred to at Google as "People Operations"). The mantra of this team is to help ensure that people decisions at Google—decisions about employees or future employees—are data driven. This was an amazing place to continue to hone my storytelling with data skills, using data and analytics to better understand and inform decision making in spaces like targeted hiring, engaging and motivating employees, building effective teams, and retaining talent. Google People Analytics is cutting edge, helping to forge a path that many other