MAKING DATA SEXY

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www.makingdatasexy.com
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I dedicate this book to my amazing kids,
Destinee, Victoria, Camilla, and Kian!
(I know, I know, I'm a breeder.)

As a single mom, there were so many things
I ached to be able to provide for you but couldn't.
What I hope you can take away from this book—
as the ones who had front row seats throughout
the entire process—are inspiration and validation.
If I, being a perennial perfectionist, can overcome my
crippling perfectionism enough to write a book like this,
you guys can do anything your wild hearts dream of!

Thank you for being patient with me as I invested so
much of my life into this project! You endured many
screenshots of excerpts from the book in our family
chat, letting me know how funny or clever they were,
whether you really believed that or not. That's love!

I would also be remiss to not give a shout out to my
amazing dog, Finnegan (**@FinnCushing** on the 'gram)!
No one—and I mean *no one*—loves people as enthusiastically
as you do! You're always ready to greet total strangers and
make them feel like the most important person on the
sidewalk at that time! You're the best Chief Ball Chaser
any entrepreneur can have!

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Design with Elegance

There are a few techniques I will be using again and again throughout the tutorials in the Create Charts chapter. As I've said before, I'm a minimalist with design, but function wins out over form. There are times I might need to litter a chart with a text box that's larger than I feel comfortable with. But if there's an urgent issue that needs to be addressed, communicating that issue in a way that grabs management's attention outweighs my design preferences. However, in the absence of an exigent circumstance like that, I'm always looking for ways to weed out unnecessary pixels in my chart.

To that end, I'll give you some tools in this chapter that will help you format your charts in a way that will throw the spotlight where you want: on your data! Chart noise vies for that spotlight. By the time you get to the end of this chapter you'll have the skills you'll need to tamp it down.

You may choose to skip this chapter and just earmark it for when tutorials reference a section. But there's potential benefit to biting the bullet and reviewing the techniques listed here because you might find yourself in a situation where a recipient of one of your visualizations challenges you on a design decision, and you will need to be armed with alternatives to appease his concerns.

For example, let's say you remove gridlines from your chart, and your boss tells you she needs them to understand the chart. If you know the alternatives to just throwing gridlines into a chart, you could suggest some alternatives, like bringing the data into the chart with data labels. If she is recalcitrant, you can at least make those gridlines as unobtrusive as possible by setting them to a light color—like gray—or reducing their transparency.

TWO MAIN OBJECTIVES

When I'm assessing the effectiveness of a visualization's design, I'm mostly looking for three things:

- *Does it align with the organization's brand?*
- *Is it free from clutter?*
- *Is it the best chart for what's being communicated?*

The last item will be addressed ad nauseam in the Create Charts chapter. By the time you get to the end, you will have learned how to create 60+ visualizations in Excel. But I'll address the first two objectives in this chapter.

ALIGNMENT WITH BRANDING

Many organizations have branding guides. And many more should have one but don't. Many times brand managers in these organizations hawk over compliance with their branding guide but give nary a thought to the charts and other visualizations they publish and distribute

to customers, clients, board members, and other stake-holders. This is an oversight—and one that I will address relentlessly throughout the book.

FREEDOM FROM CLUTTER

Microsoft doesn't do you any favors with their default visualizations when it comes to decluttering. They are *rife* with chartjunk, a term coined by Edward Tufte in his 1983 book *The Visual Display of Quantitative Information*. Chartjunk—such as unnecessary grid-lines (hate them!), axis labels that could be sent packing with data labels, 3-D effects, etc.—is distracting and can cause spikes in anxiety. It's like your viewers' eyes don't know where to land. They just dart back and forth, undirected, in search of relevance. I've seen some things. And some stuff….

Note: I'm not a fan of chart junk being one word, so I'll separate them in future references. It's not you, Edward; it's me! *laughs awkwardly*

This chapter will help you prepare your charts for presentation by handing you a tool belt you will use again and again in the Create Charts chapter to get the junk out of your trunk.

A TALE OF TWO ORGANIZATIONS

DOJ'S DISASTROUS CHARTS

One of the saddest examples I've seen of the impact of this kind of oversight can be found on the U.S. Department of Justice (DOJ) website. The DOJ's branded palette contains an amalgam of powerful colors, as shown in the screenshot of their homepage below, taken in January 2018 **(Fig 3.1)**.

But then they use charts like this one, which was included in their *Asset Forfeiture Program* slideshow. You can view it here: **bit.ly/mdsem-doj-chart-01 (Fig 3.2)**. There are a number of issues with this visualization:

✦ It uses Excel's default theme.

✦ It uses Excel's default colors *instead of the DOJ's*.

✦ The markers serve no real purpose.

✦ The data table redefines unnecessary.

✦ The gridlines are unnecessarily thick.

✦ The mixture of line formatting is busy.

✦ The mean line is too thick and the wrong color.

✦ It's not clear what the mean line is an average of? Total deposits? Total expenses? Net?

Fig 3.1: The DOJ's branding is a treasure trove for a skilled data artist.
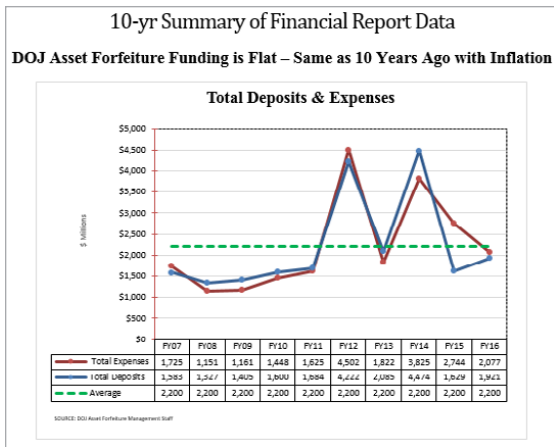
Fig 3.2: Not using their stunning color palette in their visualizations is a crime against data. Cuff 'em and stuff 'em!
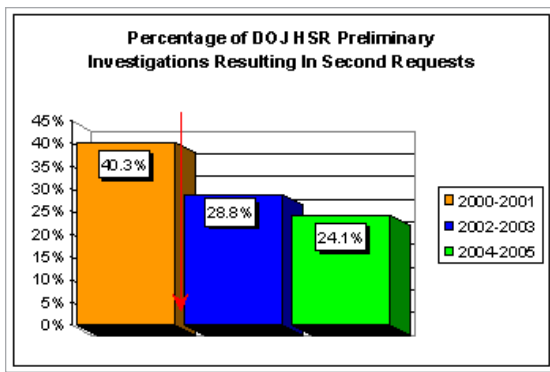
Fig 3.3: Just say no to 3-D charts—and neon! #chartmullet

They published an even more egregious example of a 3-D column chart they published on their Merger Review Process Initiative – Backgrounder page, which you can view here: **bit.ly/mdsem-doj-chart-02 (Fig 3.3)**.

There are a number of issues with this visualization:

✦ It uses Excel's default theme.

✦ It doesn't use the DOJ's branded colors.

✦ It uses neon green. (Completely unrelated: my first car was neon green. And I had matching sunglasses.)

✦ It employs Excel's pretty horrible 3-D effect, which can be tougher to interpret and look more amateur than 2-D charts.

✦ There's no need for the axis labels because the values were brought into the columns using data labels.

✦ There's no need for gridlines for the same reason as above—especially not unnecessarily thick (and dark) lines.

✦ The border around the legend looks clunky.

✦ The red arrow is poorly formatted and confusing. It appears, from the preceding paragraph, it's supposed to denote when the Merger Review Process initiative was announced, but someone shouldn't need to read a paragraph of text to figure out why an annotation is on the chart. If it's not abundantly clear, there should be an accompanying text box.

I have to say, although I was a bit aghast at the lack of alignment with their powerful branding and basic chart design principles, I was encouraged by just how important these data visualization skills are. If the DOJ is struggling with making their data sexy, it should encourage you to see just how marketable these skills will make you!

THE MAKEOVER

After accessing the DOJ's branded colors and primary font using Chrome Developer Tools, I transformed their 3-D chart in just under three minutes **(Fig 3.4)**.
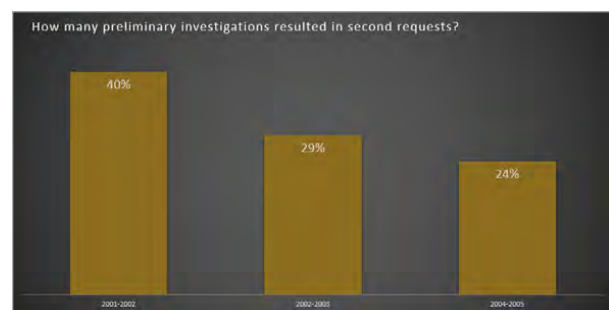
Fig 3.4: I transformed DOJ's 3-D chart using Excel's built-in styles and its colors and fonts.

💬 **LEARN MORE** See the Steps to Creating a Template section of the Set It and Forget It chapter to find a brand's main fonts and colors.

Truth be told, I cheated on the background by using Excel's built-in chart styles (**Chart Design ▸ Style 9**). Shh.

I rarely use background colors for charts, especially ones with gradients, but it was a good opportunity to point out that you can use Excel's chart styles for inspiration, if nothing else. However, many of them are littered with chart junk, so proceed with caution. In reality though, the chart I would more typically create would be void of background color **(Fig 3.5)**.
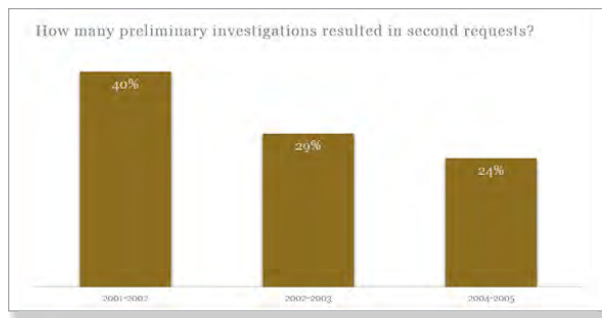
Fig 3.5: What the chart would look like with no background color.

I won't be using them in any of the visualizations in the Create Charts chapter. We'll build everything from scratch. Like how I used to make cookies until they came out with tubs of chocolate chip cookie dough.

Annnd I just lost my focus and am jonesing for cookies now….

For the second visualization (seriously, who uses data tables?), I built a few alternatives **(Fig 3.6)**.

The first one incorporates a mean line. Take note its subtlety compared to the one on the DOJ site. I also brought the data into the columns and bars to satisfy their lust for data tables.

💬 LEARN MORE See the Diverging Bar Chart and Diverging Stacked Bar Chart tutorials to learn how.

The second chart took 12 minutes because it was a little more customized. But a diverging bar chart can be a great way to visualize metrics that are oppositional in nature. Sometimes recipients will spend more time digesting your data because they're mesmerized by the creativity of the presentation. And then they'll start wondering if they're paying you enough to prevent a competitor from poaching you.

But I digress.
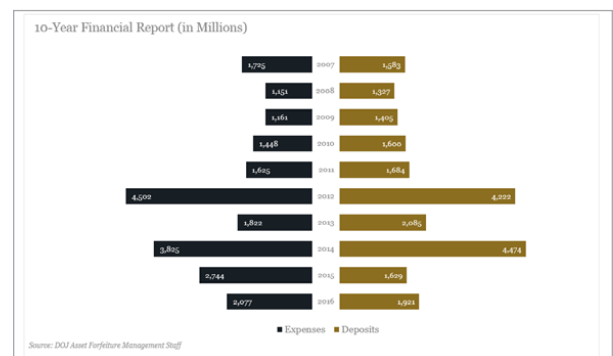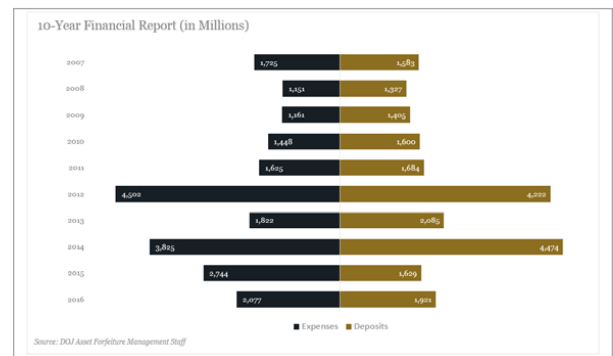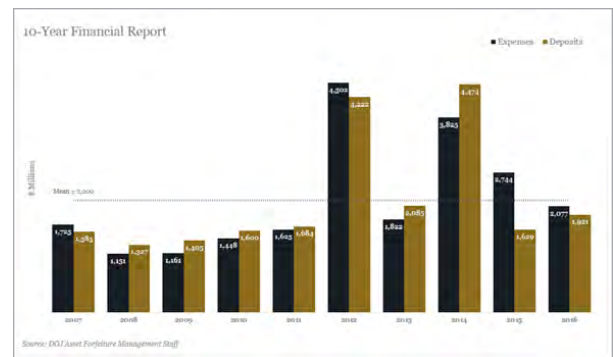
Fig 3.6: These are just a few streamlined alternatives to their line chart.

The last chart took me 40 minutes to figure out because it's super hacked. Excel doesn't give you the ability to position your data labels in between your diverging bar charts. And it really doesn't want to. I wanted to include a tutorial on how I accomplished this hack, but the labels need to be identical in length in order for it to work (e.g., Q1, Q2, etc or years), so the uses cases were too limited to justify the tutorial.

The moral of this story: Don't be a cautionary tale.

BE LIKE CHEVRON

Disclosure: I have no affiliation with Chevron, and they've never been a client. But I could hug the analyst responsible for branding their visualizations. Clearly a kindred spirit.

All the charts and visualizations I found on **chevron.com** reflected Chevron's branding. They were also elegant and relatively clutter free. When you're publishing your data publicly, you can't assume viewers have any kind of backstory. Consequently, annotations are key, and they use them effectively.

I'm not saying that they're perfect or that I endorse all their design choices. If we're being picky, there is a change I'd recommend for each of the charts:

✦ Sort the data before creating a donut chart from it **(Fig 3.7)**.
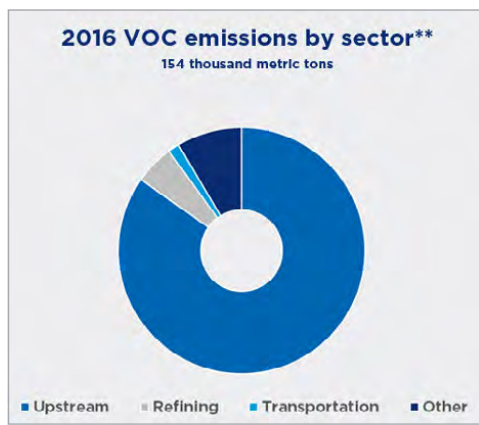
Fig 3.7: I'd sort the data first.

✦ Use a stacked bar chart over a stacked column chart because of the longer labels. I don't like making viewers tilt their heads to read labels **(Fig 3.8)**.
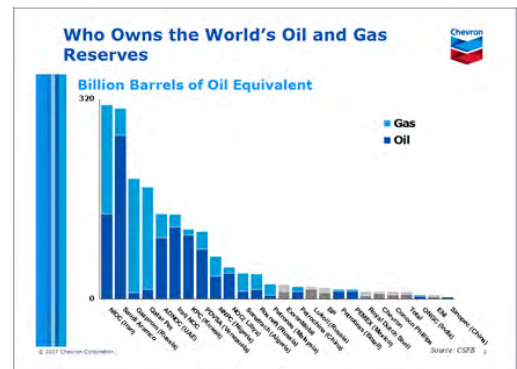
Fig 3.8: I'd use stacked bar charts.

✦ You don't always need a vertical axis or gridlines with a line chart **(Fig 3.9)**. If the chart is simple, you can use markers with data labels embedded in them to pull the data into the line, as you'll see with Add Sizzle variation of the Line Chart tutorial **(Fig 3.10)**.
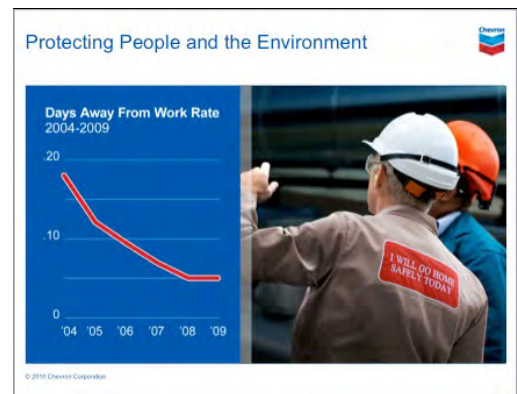
Fig 3.9: I'd use data labels over an axis.
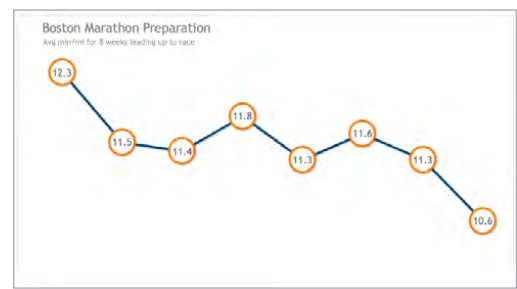
Fig 3.10: This chart would allow them to ditch the y axis and gridlines—and highlight actual values.

✦ Use a thinner target line **(Fig 3.11)**.

That said, they're still a far cry from the DOJ's visualizations.
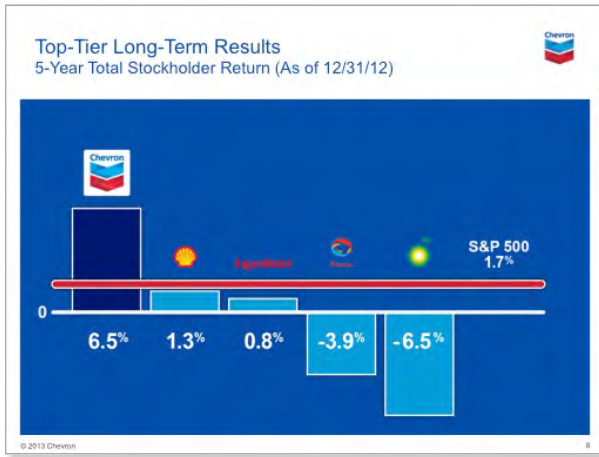
Fig 3.11: I'd user a thinner target line.

HOW TO ANALYZE AN ORGANIZATION'S BRANDING

When I'm analyzing a new client's branding I look a few places:

✦ *Their Homepage:* Most organizations put their best foot forward on their homepage of their website. I look at their accent colors and compare them to the logo. If your client is Google, finding their branded colors couldn't be easier. But you don't usually get quite that lucky.

✦ *Google Images:* I'll use Google Images specifically to search for images of charts and other visualizations. You can use a custom query to search only the **chevron.com** domain for images about charts or data **(Fig 3.12)**.
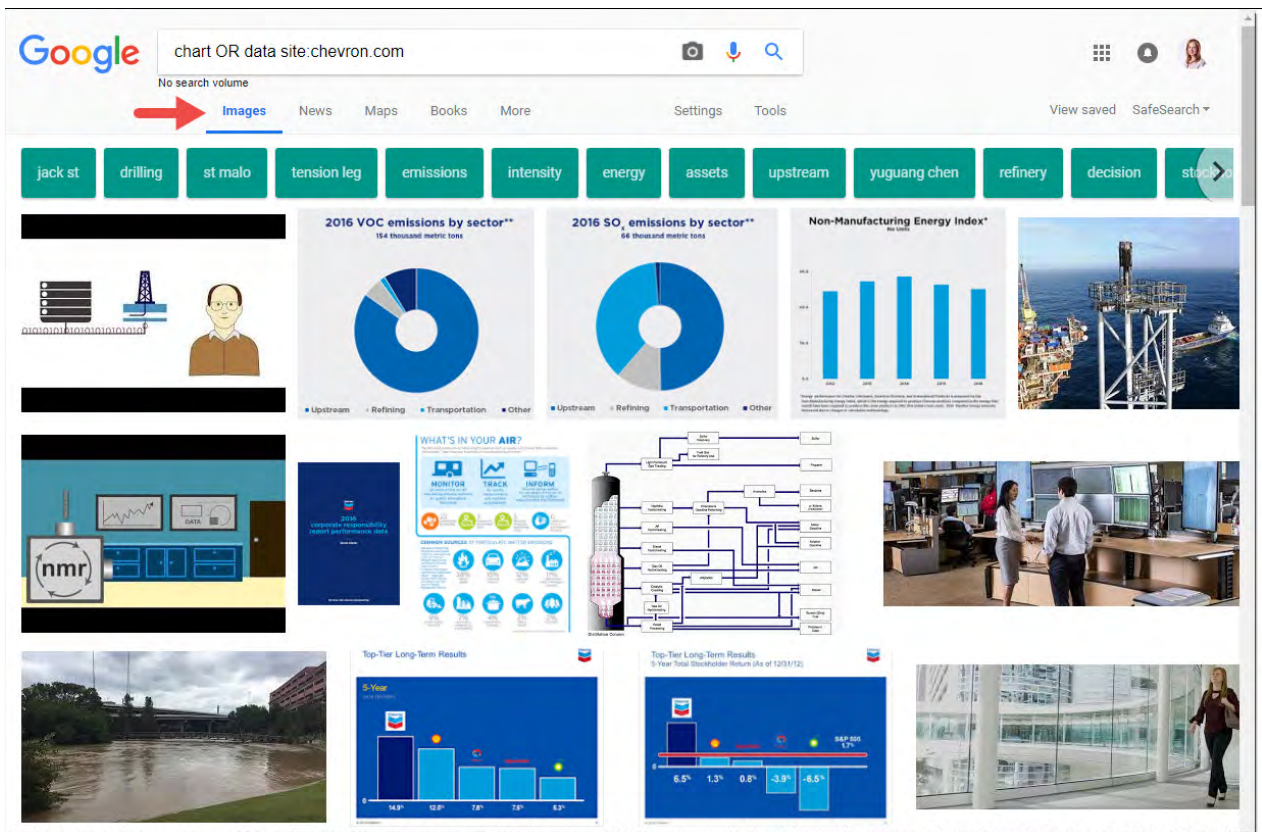
Fig 3.12: Searching Google Images is a great way to see if a site has published any of its charts.

+ *Press Kit:* Most larger organizations have some kind of press kit they make available to journalists, and it's usually accessible from their About page. I simply search Google and restrict my search to that domain, e.g., [press kit site: **chevron.com**]. If the site doesn't have a press kit per se, they usually have some kind of downloadable file. Organizations put a lot of effort into these kits, so you should find the best representation of their branding.

+ *Investor Presentations:* Same as the press kit.

+ *Downloadable PDFs:* Search Google, restricting your query to the organization's domain, but add [filetype:pdf] (without the square brackets) to your query. In this case, you don't need any keywords. You could search instead, for example, [filetype:pdf site:chevron.com]. Again, organizations usually brand PDFs they make available for download.

Okay, story time is over. Let's jump into some key techniques you'll come across in the Create Charts chapter.

HOW TO SUMMON FORMATTING OPTIONS

Since we'll be focusing on formatting options throughout this chapter, this is as good a time as any to share a formatting tip I use frequently. By frequently, I actually mean in every visualization I create, without exception.

It's Command-1. It's the key to the formatting kingdom. Whatever you select in a chart element, pressing Command-1 will open the formatting options.

Microsoft has been moving away from pop-up dialogs in preference of a formatting pane that will open along the right edge of your workbook. You'll still come across some dialogs as you wend through the tutorials in the book, but over time it will probably become like finding a Rhode Island license plate out in the wild.

ALTERNATIVES TO KEYBOARD SHORTCUT

You have three alternatives to using the Command-1 keyboard shortcut:

+ *Right-click:* Right-click and choose **Format [element you right-clicked on]**. This is a reliable alternative, but sometimes I move the mouse when I right-click, causing me to misfire. Plus, I don't like wasting time looking for the format option in the contextual menu. But if you're a right-clicking superstar, go for it!

+ *Double-click:* Double-clicking on a chart element will oftentimes summon the corresponding formatting pane. However, at the time of writing, this technique doesn't work for data in cells or with objects, such as shapes or icons.

+ *Ribbon:* When you select a chart element, you'll oftentimes see an additional menu appear in the menu (e.g., the **Chart Design** or **Format** tabs).

ONE AND YOU'RE DONE

The first time you select a chart element to format it, you will need to open the formatting options using the keyboard shortcut or an alternative. Once the formatting pane (titled *Format [Element You Selected]*) is open, however, it will update whenever you select a new element in your chart.

Sometimes I forget about that workflow saver and press Command-1 when I need to format a new element. It will update the format pane so no harm no foul. Over time you'll get more comfortable with just selecting a new element and looking eastward.

NOT JUST FOR CHARTS

Command-1 doesn't just work in charts; it works with whatever you have selected. For example, if you select a cell or range of cells, you'll trigger the Format Cells dialog (no formatting pane for you, cells); if you're in a pivot table, you'll trigger pivot table formatting options; if you've selected a shape, you'll trigger the Format Shape

pane. You get the idea. You can also get to formatting options through the contextual menu (by right-clicking). I just have a strong preference for Command-1 because of its efficiency, so that's what I'll use throughout the tutorials in this book.

Warning: With shapes, an Excel engineer went rogue and required that you give the Shift key playtime to trigger the **Format Shape** pane (so Command-Shift-1). Someone needs to get that fly out of the ointment. If Command-1 doesn't work, I just right-click and move on with my life.

TIP FOR HARD-TO-REACH CHART ELEMENTS

There are times when you may have a difficult time selecting chart elements. This might be because you've added a data series with a percentage (decimal) vis-à-vis a data series with whole numbers (e.g., website revenue vs. conversion rate or home sales vs. interest rates). When your data series is hugging the bottom of the ocean floor, it can difficult to select.

If this happens to you, click anywhere inside your chart. It can even be in the **Chart Area**. Open the **Format**

tab and navigate to the **Chart Elements** drop-down menu in the far-left edge of the menu. The visible item will be the chart element you clicked. Click the down-facing arrow to see all your chart elements and click to select one **(Fig 3.13)**.

I wish I had known about this tip earlier in my career as an analyst. It would have saved me some time and frustration zooming in on my data series until I could finally grab the elusive little sucker.

KEY FORMATTING TECHNIQUES

OVERALL AESTHETICS

Stick to Branded Colors

I can't underscore this point enough. Every time I see a website with a gorgeous color scheme publish visualizations with Excel's [hideous] default colors, a piece of me dies inside. It's exhausting.

I can hear your protests now: "Annie, my site only has three branded colors, but my visualization has seven categories…It takes a lot of time to manually change
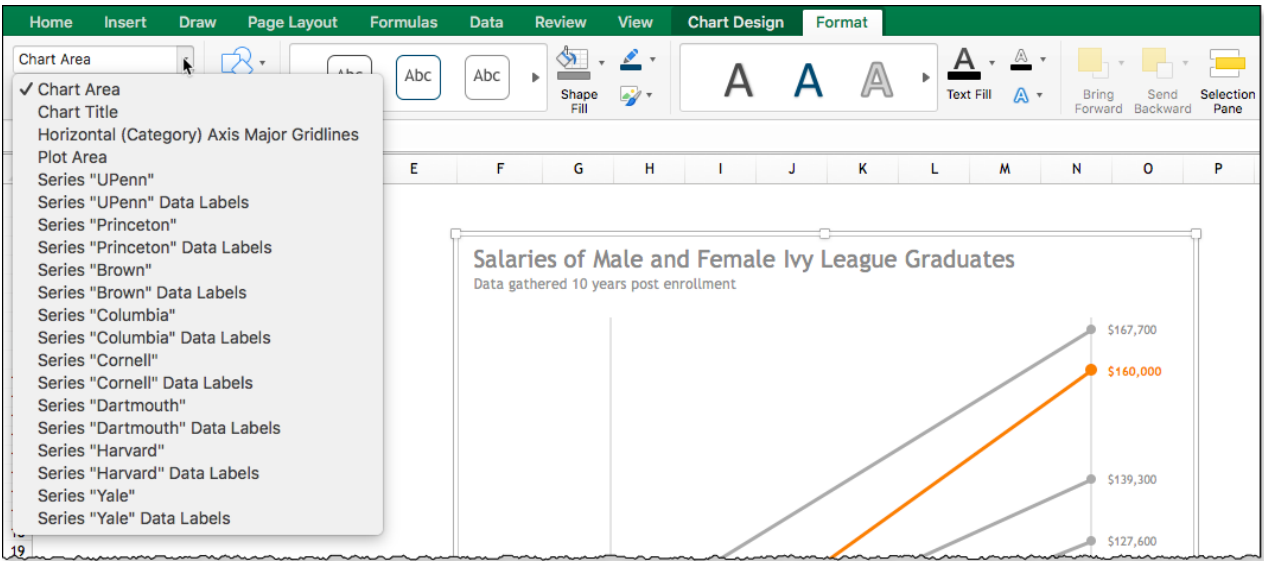
Fig 3.13: Take advantage of the Chart Elements menu to select hard-to-grab elements.

the colors in each of my charts…I don't know the hexadecimal values for my branded colors…I don't even know what an hexadecimal value is…."

Well, for one, if your site's palette doesn't include gray, you can throw that in. You'll need gray if you're building elegant visualizations, in my opinion. If you still need more, I highly recommend using tints of your branded colors over foreign colors. Tints are the colors that result from adding white.

Aside: Shades are the colors that result from adding black, but I work more with tints than shades in building visualizations. As always, you do you!

Note: In this book, if I refer to blue, orange, or gray, I'm referring specifically to my branded colors. I never use colors outside the branded palette I used for the book.

Create Tints and Shades

Excel gives you the ability to create tints and shades with a slider in its **Colors** dialog that you can get to in a myriad of ways in Excel. Drag that slider to the left, and you create a tint; drag it to the right and you create a shade **(Fig 3.14)**.

I rarely use this option because I'm a stickler when it comes to precision and consistency, and I don't like that you can't titrate white or black into your color with greater specificity. I wish you could enter percentages. But since you can't, I'll outline a few options you can choose from.

First of all, to get to the **Colors** dialog, select **More Colors** from whatever pane or dialog you're in **(Fig 3.15)**. Excel gives you five tabs of color options to choose from **(Fig 3.16)**.
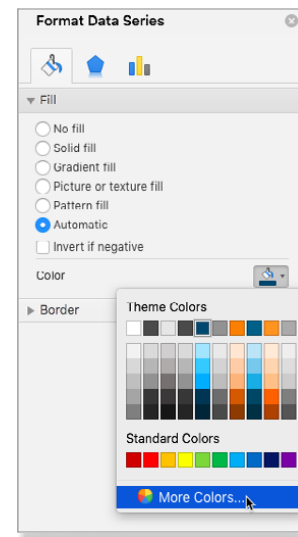
Fig 3.15: Select More Colors from any color picker button.

Fig 3.14: Drag slider to create tints and shades.
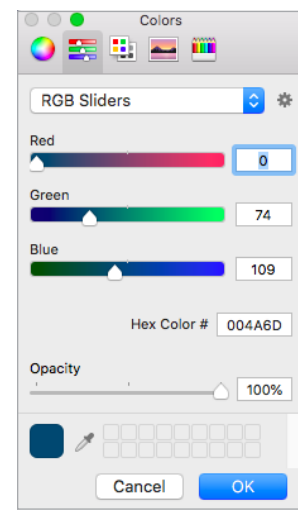
Fig 3.16: You have five tabs of color options to choose from.

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Three Approaches

THE RESPONSIBLE (ADULT) OPTION

One great tool that gives you the tint values of your branded colors is the Hex Color Tool at **hexcolortool.com**. To get started, either enter the hexadecimal code associated with your color in the first field under **Enter a color** or enter the RGB values into the next field over **(Fig 3.17)**.

Fig 3.17: Find tint values for your theme colors using hexcolortool.com.
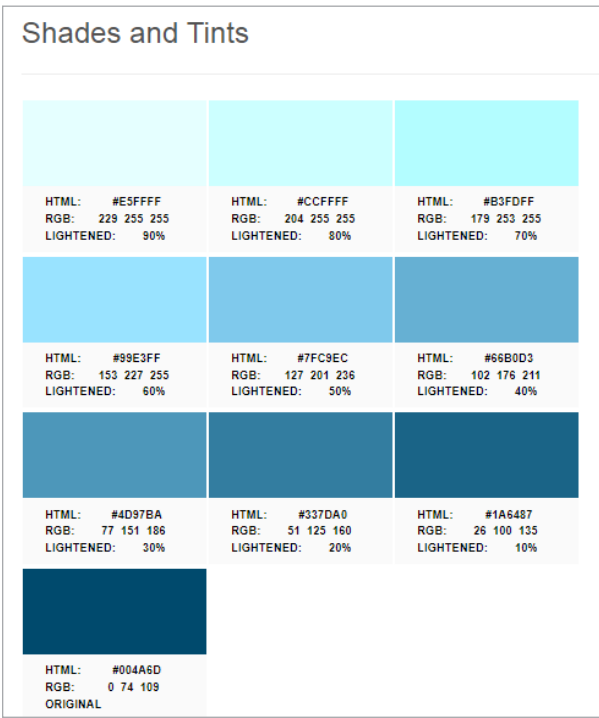
Fig 3.18: This is my favorite way to find tint colors.

If you only have the RGB values for your color, replace the RG and B values in the RGBA field. At the time of writing it's unlabeled, but the persistent tooltip inside the field reads 'rgba(x, y, z, 1)'. Replace x with your R value, y with your G value, and z with your B value. Leave the last parameter set to 1.

Tip: Only use the text boxes to the right of the sliders if you have HSL values. I kept trying to enter my RGB values and banged my head against that wall for a while before I figured that out.

Set what percent you want to lighten your branded color by using the drop-down menu and click the Lighten button. You'll see your tints to the right **(Fig 3.18)**. You can see examples from the dark blue color used in this book.

I really like how the tool gives you both the hexadecimal and RGB values for each of the colors. Rinse and repeat for each of your branded colors. Store these somewhere because you'll need them for quick reference.

Excel for Mac allows you to use hexadecimal values, which is the only advantage I've found to the Mac version over the PC version…Well, that and Mac users can choose colors using crayons with colors like *Bubblegum*, which is a big hit among Excel users under the age of 10, I'm sure. So you can use RGB or hexadecimal values.

If you feel more comfortable using RGB values, dropping a hexadecimal value into Google (don't forget the #) will usually return the RGB values for that color. What a time to be alive!

MANUALLY ADJUST RGB VALUES

When finding incrementally lighter (or darker) colors to complement your branded palette, you can increment (or decrement) each of your RGB values by the same amount. For example, the orange I use for the visualizations in this book has the RGB value of 238, 132, 52. If I wanted to make it lighter, I could add 10 to each of those values, giving me an RGB value of 248, 142, 62.
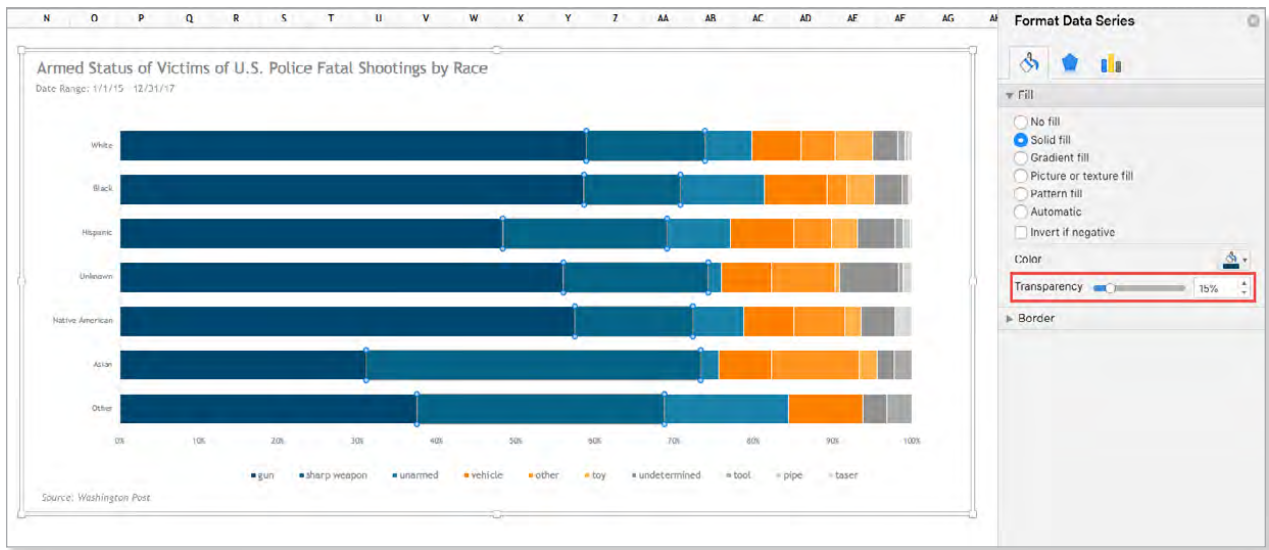
Fig 3.19: Adding transparency is a pauper's tint generator.

And if I wanted to make it darker, I could subtract 10 from each of those values, giving me an RGB value of 228, 122, 42.

THE KINDA NINJA (LAZY) OPTION

I probably shouldn't open myself up to scrutiny over this hack. Discretion is the better part of valor and all that. But sometimes it's not worth creating a full palette of colors to choose from, especially if you just need to create a tint or shade for an ad hoc chart (i.e., one you'll only use once and won't be templatized). In those cases, I create a poor man's palette on the fly by applying transparency to my branded colors using the same amount each time **(Fig 3.19)**. I have an affinity for adding transparency in 8–15% intervals. Ymmv.

Whatever amount you choose, you should keep it the same for each color. Any time you have the option to add a fill color—whether to a chart element, shape, symbol, etc.—you have the option to add transparency. If your object is against a white background (which they are by default), you're adding white to your color.

I know, mind blown, right?

Warning: If anyone ever decides to throw your chart against a formatted background, your shenanigans will come to light. If that's a risk you can live with, go for it! With the skills you'll learn in this book, you should have no problem finding another job!

Design for Colorblind Users

According to the National Eye Institute, the most common type of hereditary color blindness is red-green. Also, men are more likely to be colorblind than women because the genes responsible for the most common, inherited color blindness are on the X chromosome. And since we chicks have twice as many X chromosomes (HOLLAH!), we're infinitely more qualified to decide if your tie clashes with your socks. (Okay, I might be taking liberties.) Learn more about what researchers actually said about color blindness here: **bit.ly/mdsem-color-blindness**.

Where the pinch comes in is many cultures use greens and reds to express positive and negative metrics, respectively. You will need to decide, as an organization, how your chart designs will comply with usability best practices.
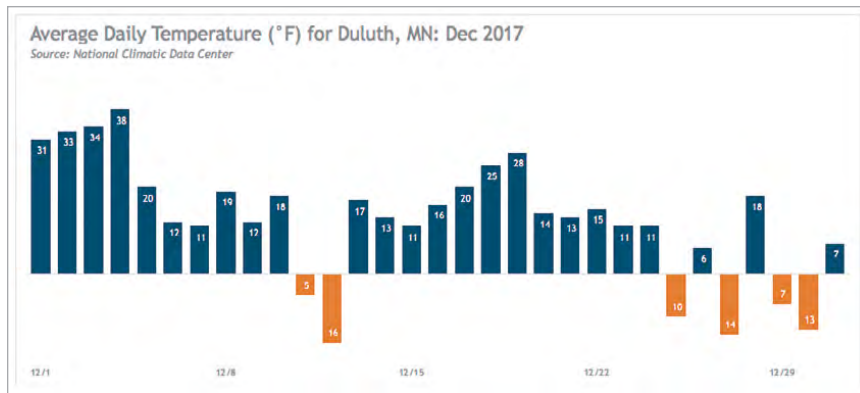
Fig 3.20: It's clear that the orange bars indicate negative metrics by their position and the data labels.
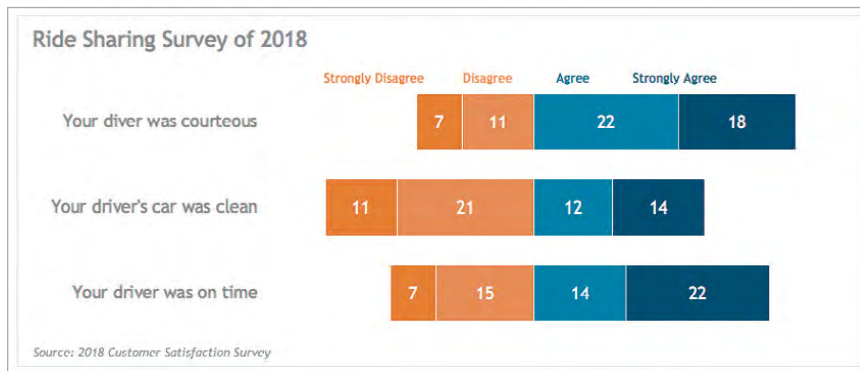
Fig 3.21: I didn't need to use red and green to indicate positive and negative survey responses.

I'm not a fan of using red and green in charts (unless they're your branded colors) and don't use them in any of the visualizations in this book. I restrict all my colors to the three branded colors in my palette. Instead, I rely on positioning, data labels, annotations, and chart titles to express negative metrics. For example, in the Baseline Delta Chart tutorial, you'll see that you can use positioning of your negative columns and data labels to clearly communicate negative values. I even customized the number formatting of the data labels to remove the negative signs **(Fig 3.20)**.

> 💬 **LEARN MORE** See the Customize Number Formatting section of this chapter to learn how to customize your number formats.

Similarly, I use position and tints to indicate different levels of positive and negative survey responses **(Fig 3.21)**.

To see how people with different types of color blindness would see your visualization, you can use a tool like the Coblis Colorblindness Simulator (available at **bit.ly/mdsem-cb-test**). Just take a screenshot of your chart and upload it. You might be surprised by what you see!

Point Out Actionable Insights

Storytelling with data is all the rage. When you're using data to tell a story, your chart title serves as a headline of sorts. The rule I follow, in general, is if I'm doing ad hoc analysis, I gravitate more toward headline-esque titles, e.g., "Social Traffic is En Fuego" or "Sales in the Southeastern Region Have Stalled." Then I'll use a subtitle to indicate what I'm charting.

However, if I'm building out a dashboard—especially one that updates automatically using an API connection—I tend to flip that approach on its axis (data analogies for days!) and use the title to indicate what's being charted and a subtitle or text box to tell the story. This is just my approach. Over time, you will need to figure out what works for you.

The important takeaway is that you always point out what you want your viewers to take away from the visualization. You might think it's glaringly obvious, but you've been all up in the data. Your viewers haven't. Therefore, be cognizant of that and err on the side of
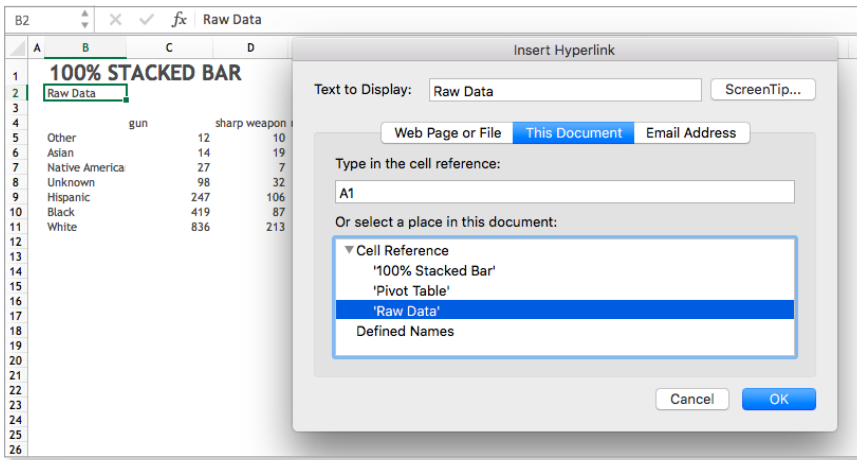
Fig 3.22: Link to other cells/worksheets to make your document easy to navigate.

Customize Number Formatting

There are times in this book you will need to use custom number formatting. You can access number formatting options by selecting a value in a cell(s) or chart element (e.g., data label or axis) and pressing Command-1. Excel's custom number formatting options are robust, and we'll barely scratch the surface in this book.

over-communication, even if these insights are extracted and published in a separate worksheet. I recommend linking to the visualization you reference if you tease out findings in a separate worksheet. To link to another worksheet in your workbook, take the following steps: press **Ctrl-K** ▸ select **This Document** in the **Insert Hyperlink dialog** ▸ select your target worksheet from the preview window and/or type in your cell reference (or navigate to the cell you want to link to and select it) ▸ click **OK** to close the dialog **(Fig 3.22)**.

The main thing to keep in mind is that Excel separates each of the codes with semicolons **(Fig 3.23)**. The first set of code determines the formatting for positive numbers (red outline), the second set determines the formatting for negative numbers (gray outline), and the third set determines the formatting for 0 (black outline).

The simplest way to customize number formatting is to tweak the code Excel generates, as we'll see in examples later in this section.

Use Cases
Working with Accounting Number Format

I use Excel's accounting number format quite a bit because revenue is oftentimes the bottom-line metric organizations care most about. But there are a few customizations you'll see in this book:

✦ *Remove decimals:* In my line of work, I'm usually working with revenue data that's aggregated. So, when dealing with large revenue amounts, the decimals are unnecessary and hence become noise. I remove them using the **Decrease Decimal** button under **Home** (last one on the right).

✦ *Replace hyphen with 0:* Excel's default accounting number format uses hyphens for the value 0. So, instead of a 0 in the bottom-left corner of a chart,

Fig 3.23: From L to R: positive, negative, and 0 formatting.

you'll see a hyphen, which I really don't like. It reminds me of the "Which one of these is not like the others" game on *Sesame Street*. I *always* pull up the formatting options and change the hyphen to a 0. The easiest way to switch them out is to apply the number format you want from the number formatting buttons under the **Home** tab, then press Command-1 to open the **Format Cells** dialog. Under the **Number** tab, set **Category** to **Custom** and carefully select **"–"**? in the 0 formatting code (i.e., after the second semicolon) and replace it with a 0 **(Fig 3.24)**. Be careful not to remove the space before the first quotation mark, or your 0 won't align with your positive and negative values.
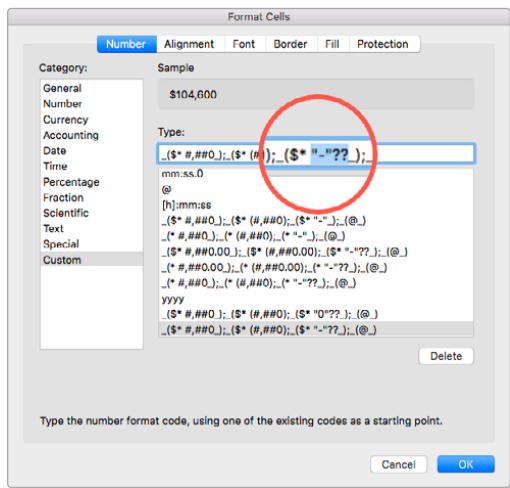
Fig 3.24: Evict those unsightly hyphens without notice, if you're charting accounting data.

✦ *Remove negative formatting:* You'll see an example of where I do this in the Baseline Delta Chart tutorial.

✦ *Assign special formatting:* Although we don't use this strategy in the book because it falls more under data entry, you could format numbers like social security numbers (in the U.S.) or product IDs. For social security numbers, you would set it to ###–##–####. This way, if a user needs to enter a column of social security numbers, he won't need to include the hyphens.

Adding a Thousands Separator

I use thousands separators (essentially, commas for numbers) for any numbers > 999. But I also tuck in most blouses, blow dry cold necklaces, and fluff my pillows before I can use them. So there's that.

Some [wrong] people eschew thousands separators until they hit five digits. But whatever you decide for yourself, when you need them, you can access the **Comma Style** button under the **Home** tab. This style adds sophisticated custom number formatting code that helps your numbers align. If I'm not working with currency (which uses the same highly customized formatting, only with currency symbols), I'll frequently apply this formatting just to trigger these finessed formatting options, then go in and customize it to take it the rest of the way.

Warning: Applying the thousands separator also switches out 0s for hyphens, so if you prefer a 0 over a hyphen, you'll need to customize the format, as demonstrated in the previous section.

Working with a TEXT function

We will also use custom number formatting code inside TEXT functions to trick out our visualizations with chart elements, such as chart titles and annotations that update dynamically—as you'll see in the Bar Chart tutorial—or reference a cell containing text and a calculated value—as you'll see in the Scatter Plot tutorial, where we pull the correlation coefficient into our chart.

Simplify Large Numbers

Having very large numbers in a chart axis can make the axis cumbersome, so I'll oftentimes express values in thousands or millions. To do this, first apply the thousands separator to format your data, then take the steps below, depending on your values.

Alternatively, you can use the **Display units** feature in the **Format Axis** pane to indicate that you've simplified larger numbers in your axis **(Fig 3.25)**.

Thousands

If you want to simplify thousands, you would carefully remove the highlighted sections from the **Type** field (##0): **(Fig 3.26)**.

I also customed the code for 0 by replacing **"–"**?? with 0. If you're working with currency, you would first apply accounting number formatting to your data, then take the same steps. The accompanying screenshot shows what it would look like when you're finished **(Fig 3.27)**.

And if you want a decimal place, don't remove the decimals before customizing your number formatting.

You can see an example of simplifying thousands values in the Line Chart tutorial **(Fig 3.28)**.

Fig 3.25: You can also use the Display units feature to simplify larger numbers.

Fig 3.26: Simplify large numbers using the format code.

Fig 3.27: Customize number formatting to simplify currency values.

Fig 3.28: Axis labels are shown in thousands with an axis title indicating the truncation.

Millions

If you want to express numbers in millions, simply add another comma. This will make your first comma sliiide to the left **(Fig 3.29)**.

If you simplify large numbers in your axis, be sure to communicate that somewhere in the chart. A few options you have are in the chart title (if the title isn't too long), a subtitle, a text box, or an axis label.
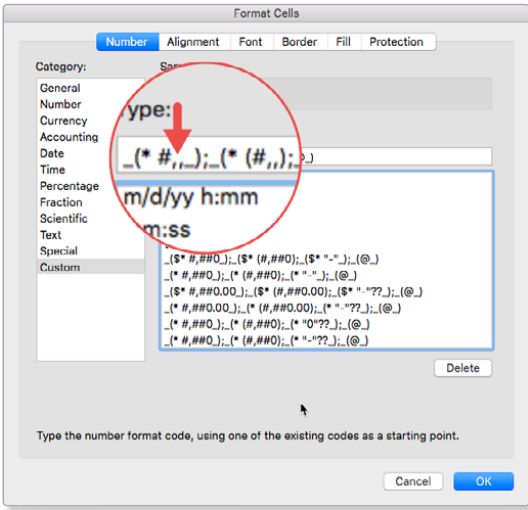
Fig 3.29: Throw in an extra comma to simplify by millions.

You can see an example of simplifying millions values in the Lollipop Graph tutorial **(Fig 3.30)**.

Reformat Negative Numbers

There are times you'll use negative values to position your data to the left of the vertical axis, as you'll see in the Diverging Bar Chart tutorial. To do this, you'll just make sure the code for negative numbers (after the first semicolon) matches the code for positive numbers. This usually means removing parentheses or the negative sign.

Fix Alignment

I don't know about you, but when I was a kid we would randomly pretend that certain areas of the playground—usually under the jungle gym—were filled with lava. Unless you wanted to be screamed at by a mob of kids doped up on sugar-laden school lunches, it was in your best interest to avoid these pop-up lava pits.

Where am I going with this?

The first time I added numbers to data labels to markers in a chart, I was perplexed by the alignment and would wonder to myself, *Why does it look like the left*
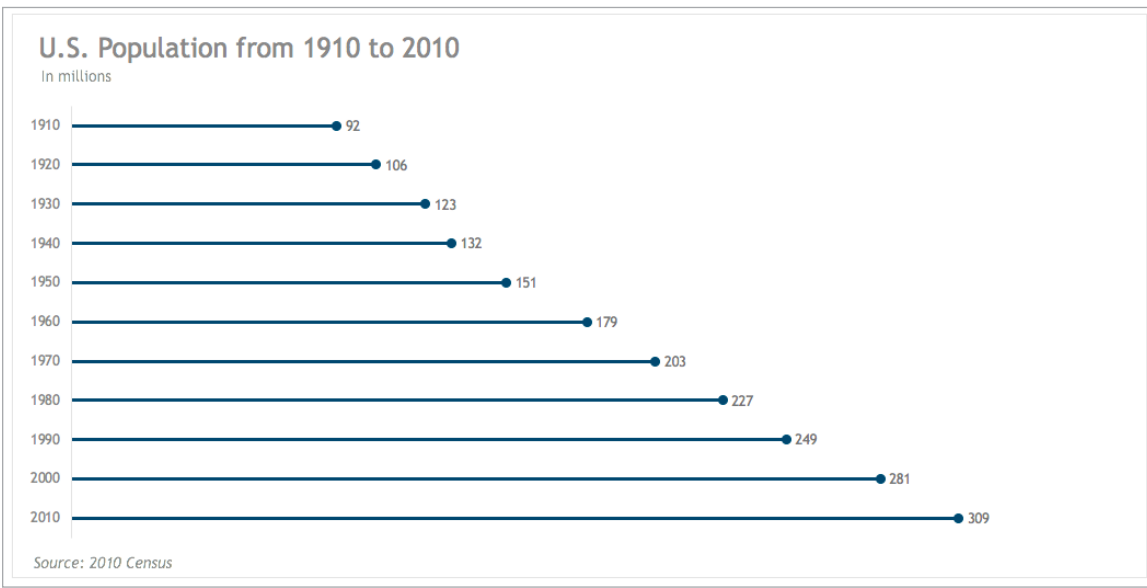
Fig 3.30: Values in data labels are simplified to millions.
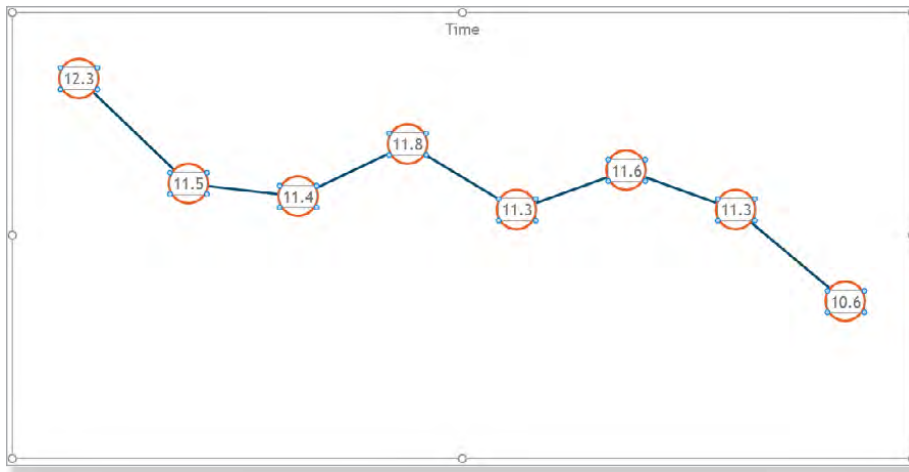
Fig 3.31: Your number formatting may push the numbers in the data labels a hair to the right of center.

LEARN MORE See the Customize Number Formatting section of this chapter to learn how to customize your number formats.

side of the marker is a lava pit from years gone by? It was because positive numbers were coded to include a space to the left of the number **(Fig 3.31)**.

The "_ (" at the very front of the number code is the drama queen. The underscore tells Excel to leave a space the width of whatever character comes after it—in our case, a parenthesis. This allows positive numbers to line up with negative numbers that are formatted with parentheses.

To resolve this issue, select your data labels by clicking one of them, then press Command-1 to open the **Format Data Labels** pane. Next, open the **Label Options** tab. Under **Number**, deselect **Linked to source**, which will reveal the number formatting code in the **Format Code** field.

You can delete the offending underscore-parenthesis team, and add your custom code into the Type field by clicking the **Add** button. For charts with both positive and negative values in your data labels, you'll need to remove this dynamic duo for both positive and negative values. I included the 0 number formatting in the accompanying screenshot to cover all my bases **(Fig 3.32)**.

(But I didn't have any 0 values in the example file.)

Alternatively, you could simplify your code to what you know you'll need, which is what I did to clean up the data labels referenced above **(Fig 3.33)**. I used:

`0.0;-0.0;0`
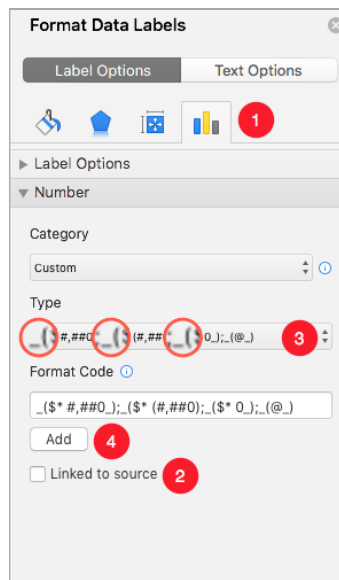
Fig 3.32: Removing the "_(" in the number code may fix the funky alignment.
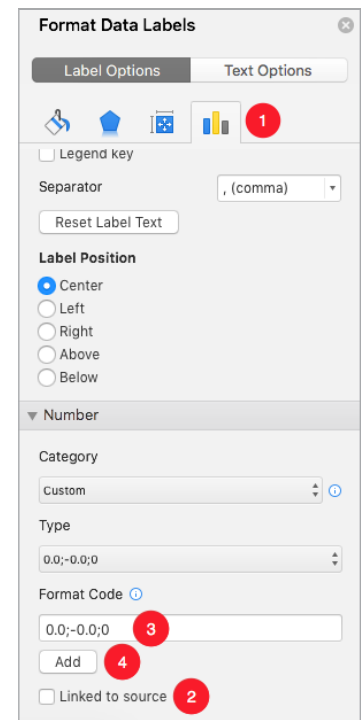
Fig 3.33: You can also simplify your number formatting to realign text.

Colorize Icons

If you use an icon from Excel (as you'll see in the Pictograph tutorial), you can change its color several ways:

✦ Open the **Format Graphic** pane and choose one of your theme colors from the **Fill/Outline Color** button **(Fig 3.34)**. (They're in the top row.)
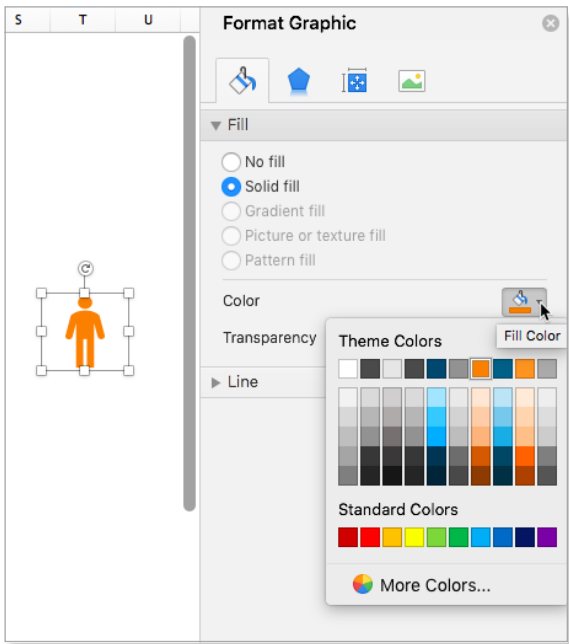
Fig 3.34: First option to recolor an icon.
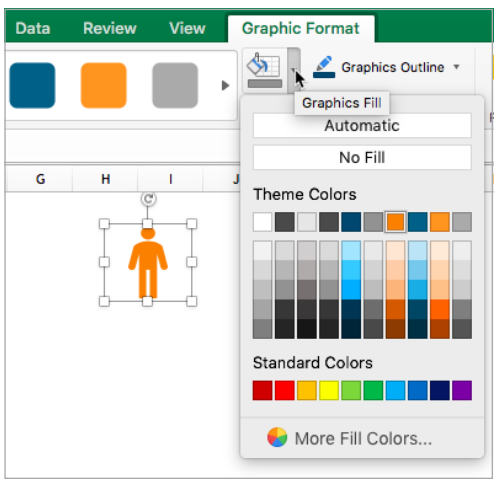
Fig 3.35: Second option to recolor an icon.

✦ Navigate to **Graphic Format ▶ Graphics Fill (Fig 3.35)**.

✦ Select one of the presets Excel creates from your theme under the **Graphic Format** menu **(Fig 3.36)**.

If you're using a theme—which you'll learn how to create in the Set It and Forget It chapter—you can (and should) change it to one of your theme colors **(Fig 3.37)**.
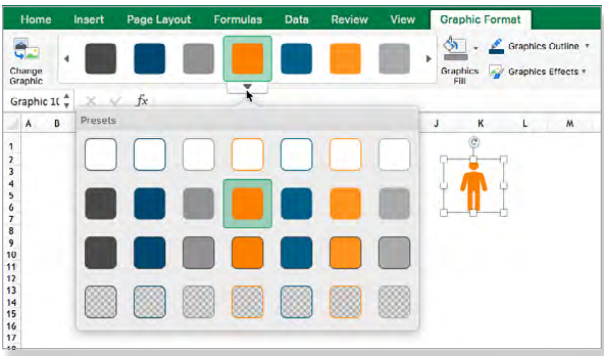
Fig 3.36: Third option to recolor an icon.
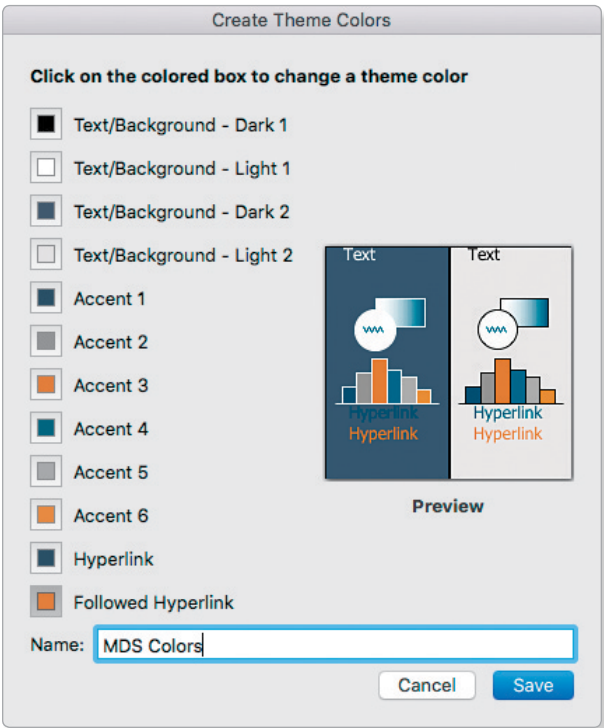
Fig 3.37: Recolor icons using your branded colors.
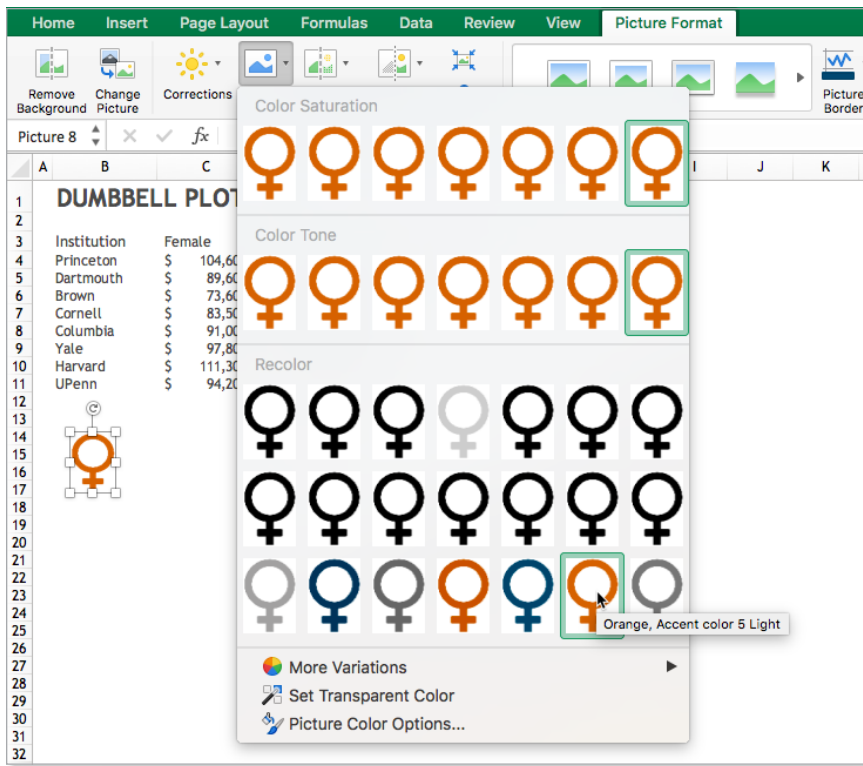
Fig 3.38: Recolor images to align them with your branding.

Fig 3.39: Additional settings are available in the Format Picture pane.

Warning: Command-1 won't open the **Format Graphic** pane. Hopefully the Microsoft team will fix this eventually. You'll need to right-click on the icon or graphic and choose **Format Graphic** from the contextual menu or select **Format Pane** from the **Graphic Format** tab.

> 💬 **LEARN MORE** See the Stick to Branded Colors section of this chapter to learn about the importance of restricting your design choices to your branded colors.

If you're using an image from elsewhere (as you'll see in the Dumbbell Plot tutorial), you can change its color to align with your branding. First, select the image, then and navigate to **Picture Format ▸ Color ▸ Recolor** to choose a recoloring option. Alternatively, you can either adjust the saturation or tone. I usually choose the recolor option **(Fig 3.38)**.

If you're not using a monochromatic image (your lust for color may be your undoing!), you may need to tinker with more advanced settings, which you can get to by selecting **Picture Color Options** from the bottom of the **Color** drop-down menu, which will open the **Format Picture** pane **(Fig 3.39)**.

Paint Formats

Sometimes you go to great lengths to format your data, just to do it all over again for another dataset. A great tool I use all the time is Excel's Format Painter. You can access it by navigating to **Home ▸ Format**. (It's the paintbrush icon in the first section of tools. Excel for Mac doesn't have labels for these sections like you get in the PC version. *sigh*)

If you select one cell, Excel will use that cell's formatting to paint another cell or range of cells. If you select

several columns of data with a variety of formats (number, fill, border, conditional formatting, etc.) and paint over a range of cells with the same number of columns (or rows), Excel will apply the formatting from the first dataset's columns to the second dataset.

You can also use the Format Painter to copy column and row widths. To do this, select the column or row heading, click the **Format Painter** and apply to another column(s) or row(s).

Warning: If you use the Format Painter to set column width or row height, Excel will apply any other formatting that was applied to the column/row you sampled. For this reason, I'll usually only sample blank columns/rows. If you need to sample a column that is formatted, you'll want to use the Paste Special option.

> 💬 **LEARN MORE** See the Copy Column Widths section of this chapter to learn how to replicate column widths.

Finally, double-clicking the **Format Painter** will allow you to use it more than once. When you're finished, click the **Format Painter** again or press the Esc key to send it back into retirement.

Where this can be especially handy is with visualizations that require advanced formatting, such as the heatmap, which you'll see in the Heatmap tutorial. Because a heatmap is a table and not a chart, you can't save it as a chart template. However, you can save it in your workbook of visualizations you can't save as templates, then apply its formatting to a new dataset with similar data, saving you a significant amount of time. And the **Format Painter** works across workbooks, meaning you can load it up with formats from one workbook, switch to another workbook, and apply your formatting.

CHART AESTHETICS

Add Data Labels

In my quest to minimize clutter, I'm always looking for the opportunity to get rid of as many elements in my charts as possible. One of the top elements on my radar is the value axis. The best way to eliminate the need for the value axis is to bring your values into the chart via data labels.

How to Add

To add data labels, select a data series or data point and navigate to **Chart Design ▶ Add Chart Element ▶ Data Labels ▶ More Data Label Options**, which will open the **Format Data Labels** pane. Under the **Label Options** tab, you'll be able to set what you want to appear in your data labels under **Label Contains** and your data labels' position under (wait for it….) **Label Position**.

If you don't want your data labels to appear outside the bars—like they locked their keys in the car and are locked out until AAA shows up—set them to **Inside End**. You might need to change the text color to white to make them pop. That's my go-to setting for most charts.

If I'm adding them to markers, I'll typically make the marker bigger and set **Label Position** to **Center**. You can see examples of these in the Line Chart and Dumbbell Plot tutorials.

Making Room

If you're working with columns or bars and they're not wide enough to accommodate your labels, you can fatten them up. You'll learn how in the Adjust Chart Series Spacing section in this chapter.

You also have the option to customize the number formatting of your data labels in the **Number** section under the **Label Options** tab of the **Format Data Labels** pane. To customize, enter your code in the **Format Code** field and click the **Add** button below.

LEARN MORE See the Customize Number Formatting section of this chapter to learn how to finesse your number formatting.

After you set the formatting for one series, you don't need to continue doing this. When you apply it to another data series, you can set **Category** to **Custom**. Then you will see your custom code in the **Type** drop-down menu. Simply select it to apply it. You can see an example of using custom number formatting in the Dumbbell Plot tutorial **(Fig 3.40)**.

Reassign Values

Sometimes you might need to point a data label to a different cell in your data.

This is easier to do on a PC because in the **Label Options** tab, under **Label Options**, you have the option to select **Value** from **Cells**. Then you just click the **Select Range** button and click-and-drag over the data you want to use. Excel for Mac doesn't offer that feature.

Hopefully the Excel for Mac team will bring that feature to the Mac version one day. But until then, what you need to do is select each data label individually and point it to the new cell with a formula. In the accompanying screenshot, I selected the data label (make sure it's surrounded by white boxes, not blue circles), entered an = in the **Formula Bar**, selected cell C41, then pressed Return to finalize the deal **(Fig 3.41)**. The data label updated to 74,113.
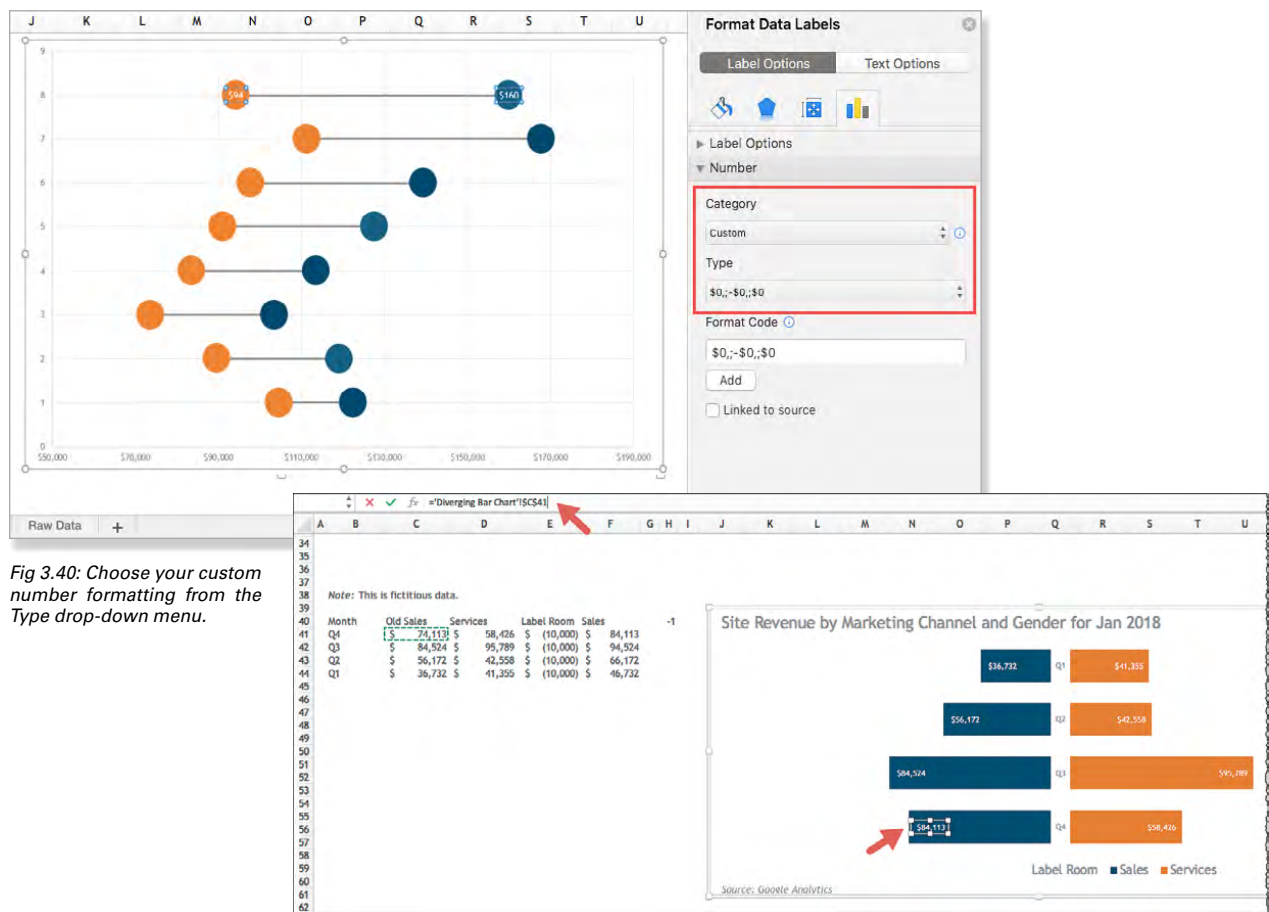
Fig 3.40: Choose your custom number formatting from the Type drop-down menu.

Fig 3.41: It's a manual process, but you can switch out the values in your data labels.
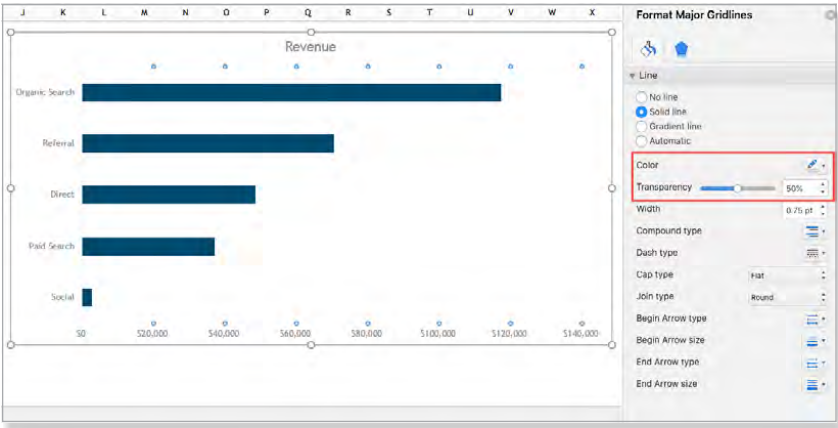
Fig 3.42: You can (and should) either delete or significantly lighten gridlines in your charts.

Ditch Gridlines

You don't need gridlines in your worksheets, especially if you format your raw datasets as tables. To rid your worksheets of them, select any cell in your worksheet, then navigate to **View** and deselect **Gridlines**.

> 💬 **LEARN MORE** See the Formatted Tables section of the Massage Your Data chapter to learn how to customize Excel's tables to meet your needs and branding.

In charts, you can select them by selecting one of them, then either press the Delete key on your keyboard or lighten them by pressing Command-1 and either increasing **Transparency** or setting **Outline color** to a lighter color in the **Format Major Gridlines** pane **(Fig 3.42)**.

Modify Chart Title

Excel will pull the metric you're charting into your chart title, but a sole metric is rarely adequate. You want your chart title to be descriptive. You may also want to add a subtitle or annotation with more info about the data source, methodology, etc.

You can also create a title that dynamically updates with new info, such as the current month. To do this, you need to create a formula in a cell that concatenates

(i.e., glues together) the different pieces that will become your title. These formulas can get complicated fast, but you can use helper cells to build your title piece by piece and then stitch them together in a cell with your final formula. Learn more about using helper columns in my post on the Search Engine Land website: **bit.ly/mdsem-helper-columns**.

When combining text and a value that updates in a cell, you'll usually need to wrap the value reference in a TEXT function. The TEXT function lets you change the way a number appears by applying formatting to it with number format codes **(Fig 3.43)**.
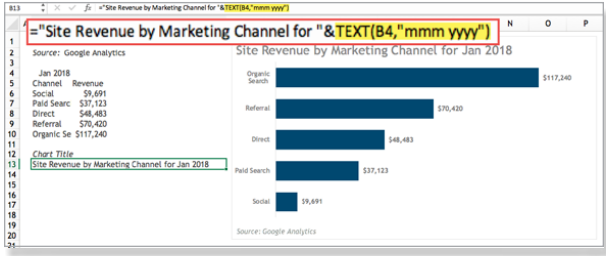
Fig 3.43: Create dynamic title with the TEXT function.
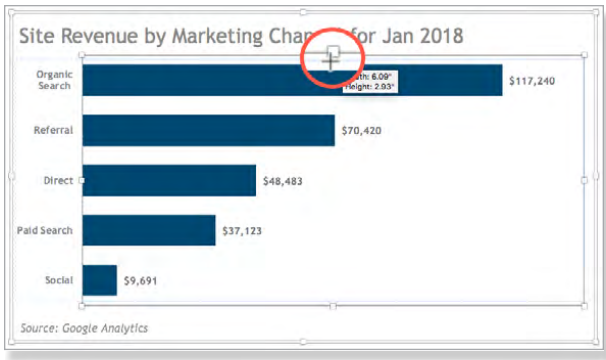
Fig 3.44: White space is your friend.

When you're finished formulating your chart title in your helper cell, select your chart title chart element, then enter an equal sign in the **Formula Bar** and select the helper cell to link them.

Give Chart Title Space

I personally don't like how Excel's default format is to have the chart title hug the top boundary of the **Plot Area** in a chart. I like to add a little of white space. If you want to add white space, click inside the **Plot Area** and drag the sizing handle along the top of the **Plot Area** down a bit **(Fig 3.44)**.

Add Annotations

You can add additional information, such as source for your data, methodology, observations, and even additional data by inserting a text box.

How to Add

To add a text box to your chart, click anywhere inside the **Chart Area** and navigate to **Insert ▶ Text Box**. Drag toward the bottom-right corner of your worksheet until it's about the size you need. You may need to make room for your text box it by selecting the **Chart Area** and/or **Plot Area** and dragging the sizing handles to taste.

Formatting Text Boxes

The default formatting of text boxes is pretty clunky. There are a few steps I recommend taking before taking them out in public. To open the formatting options for a text box, select it, then navigate to the **Shape Format** tab or press Command-1 to open the **Format Shape** pane.

Tip: If the **Format Shape** pane doesn't open when you press Command-1 (Excel can be temperamental), select **Format Pane** under the **Shape Format** tab to open it.

Fix Funky Margins

To adjust the settings, with the outside edge of your text box still selected, select **Format Pane** from the **Shape Format** tab. This will open the **Format Shape** pane. Open the **Size & Properties** tab, and in the **Text Box** section, select **Resize shape to fit text**. This will ensure your text doesn't break the boundaries of your text box (and should be the default setting, in my opinion). Next, set **Top margin** and **Bottom margin** to .1 to match the **Left margin** and **Right margin (Fig 3.45)**. These options, when used in concert, ensure that your text will be centered in the text box.
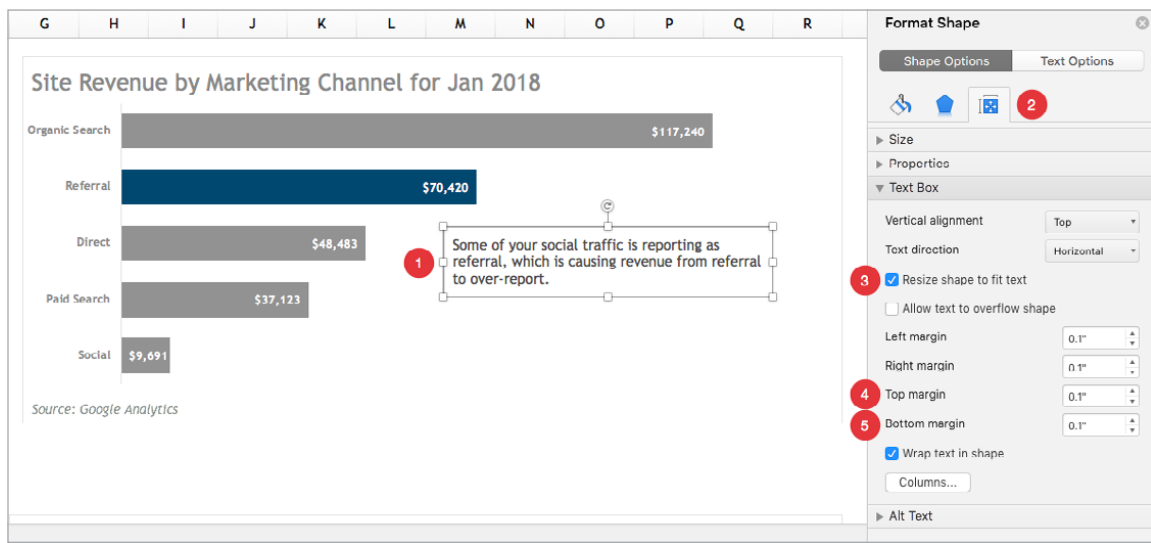
Fig 3.45: These settings ensure text centers in your text box.

Format Border

The default text box border is unremarkable. Experiment with different settings in the **Format Shape** pane **(Fig 3.46)**. I formatted the text boxes in the book using the following settings under **Fill & Line**:

✦ **Line: Solid line**

✦ **Color:** blue

✦ **Width:** 2.25 pt

✦ **Dash type: Round Dot**

I also added a drop shadow to give my text box a little depth. To do this, open the **Effects** tab. Under **Shadow**, set **Presets** to your choice **(Fig 3.47)**. I used **Outer ▶ Offset: Bottom Right** (the first option). Or you can customize your shadow options using the **Color**, **Transparency**, **Size**, **Blur**, **Angle**, and **Distance** settings.

Set Default Text Box Formatting

If you want to reuse your text box, you can set it to be your default text box by right-clicking on it and choosing **Set as Default Text Box** from the contextual menu
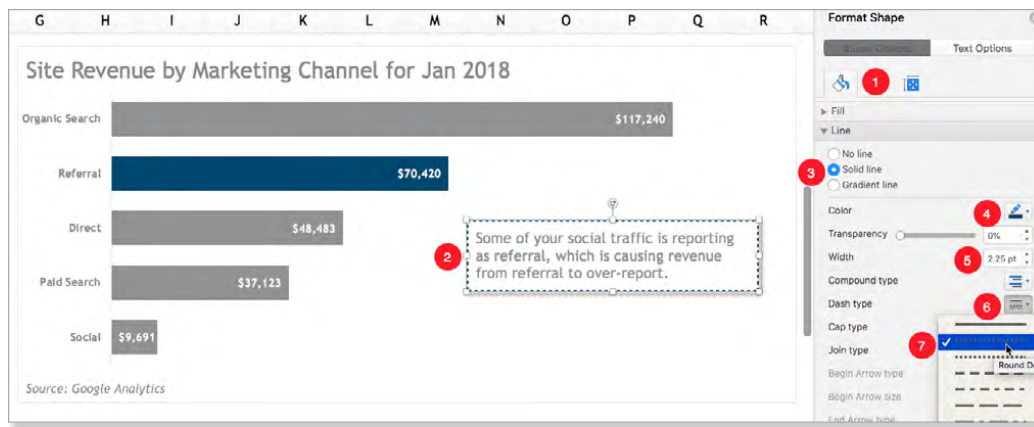
Fig 3.46: Soup up your text box with some boujee borders.
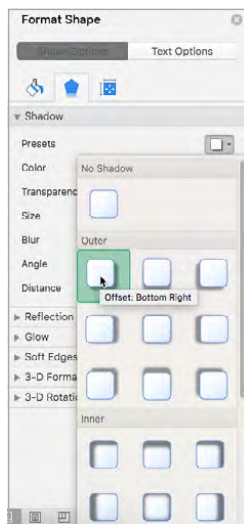
Fig 3.47: Add a subtle drop shadow to your text box to create a sense of depth.
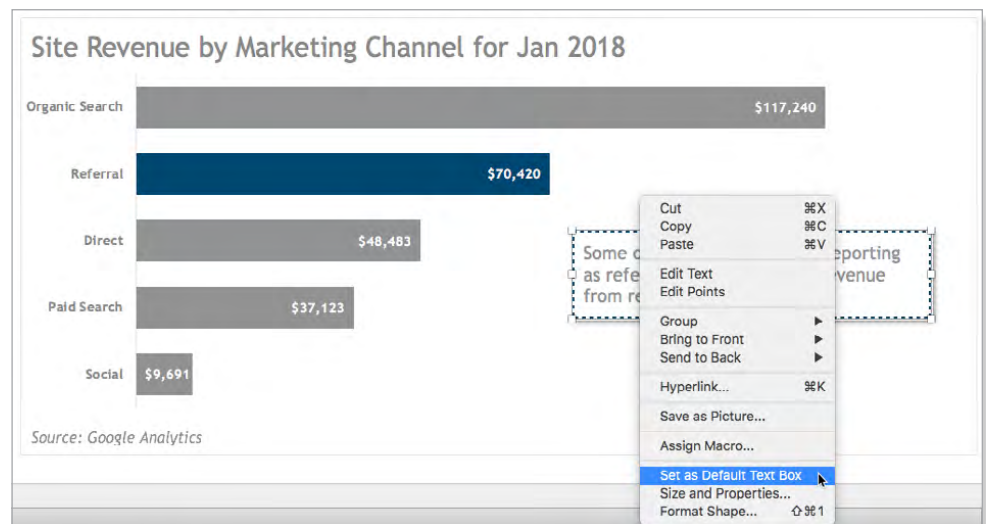
Fig 3.48: You can set your formatted text box as the default text box.

(Fig 3.48). The super bummer is that this will only set the text box as the default for that file. But we'll fix that with the mother of all Excel hacks.

> 💬 **LEARN MORE** See the Templatize Everything section of the Set It and Forget It chapter to learn how to save time and effort with templates.

Pull in Values

Another cool thing you can do with text boxes is dynamically pull in text or a value that resides in a cell. To do this, select the text box, then enter an equal sign in the **Formula Bar**, select the cell with the text or value you want to pull in, then press Enter to activate the formula **(Fig 3.49)**.
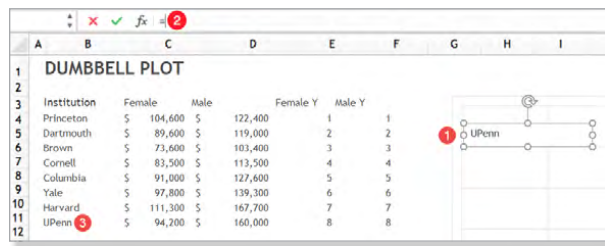
Fig 3.49: Use a formula to pull text or a value from a cell into a text box.

If you want to combine values and text, you'll need to stitch everything together in a cell in your worksheet. First, enclose text in quotation marks. Then enter an ampersand (&). Finally, wrap the cell that contains the value you want to include inside a TEXT function. You will need to include the number formatting code in the function.

For example, in the Scatter Plot tutorial, I dropped the following formula into cell E5:

```
="r  =  "&TEXT(E4,"0.00")
```

A few notes about this technique:

✦ If you specify only one section of format code—as I do in the above example—the code is used for all numbers. Negative numbers, in this case, will use the negative sign (as you'll see in the Scatter Plot tutorial).

✦ If you specify two sections of format code, the first section of code is used for positive numbers and zeros, and the second section of code is used for negative numbers.

✦ When you skip code sections in your number format, you must include a semicolon for each of the missing sections of code.

✦ If you forget which function you need to pull both text and a calculated value into a text box, just think TEXT function, text box…You won't be judging my silly mnemonic devices when you realize the Google searches I just saved you the first three or so times you try to do this!

✦ Any text needs to be wrapped in quotation marks. Remember to add in spaces so the value generated from your TEXT function doesn't get too awkward with your text. This makes perfect sense until you go to concatenate. Imagine my gloatiest "toldja" face when it happens

✦ You use an ampersand (&) to join text with calculated values.

✦ In cell E4, I've used the CORR function to calculate the correlation coefficient for my dataset:

```
=CORREL(B4:B253,C4:C253)
```

✦ Even if I restrict my value to two decimal places in E4, unless I use the TEXT function, Excel will pull in the full value **(Fig 3.50)**.
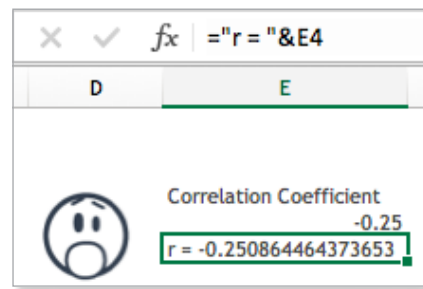
Fig 3.50: Whoa. At ease, Excel.
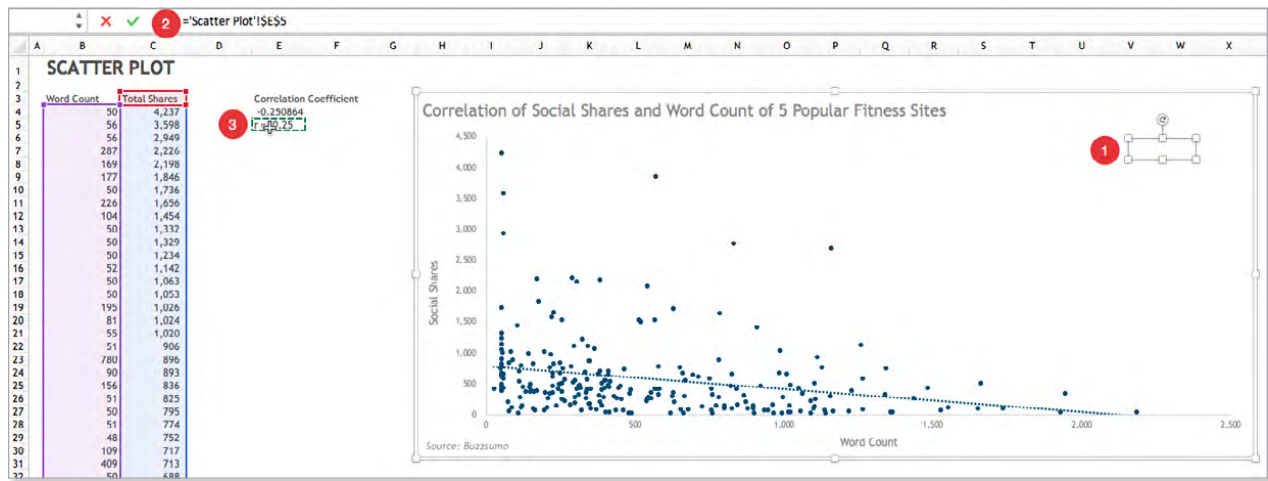
Fig 3.51: Use a function to dynamically pull content into a text box.

* Remember to wrap your number formatting in quotation marks. I forget to do this more than I remember. #dontjudge

* Remember to add any symbols you need inside your number formatting, e.g., currency, thousands separator, percentage sign, etc.

* To embed your text box in your chart so that it moves and resizes with it, you need to select your chart before drawing it. If you just draw it on top of your chart without selecting it or create it outside your chart and drag it in, your text box will not be embedded. It will sit in a layer on top of your chart. This isn't ideal. If you created your text box outside your chart, you'll need to cut it, select your chart, and paste it in. Excel will drop it in the upper-left corner of the Chart Area. Just drag it where you want it.

* To pull your final value into your chart, first draw your text box inside your chart. Next, select it by clicking its border, then enter an = sign into the Formula Bar and select the cell that contains your TEXT function. When you press Enter, it will appear in your text box **(Fig 3.51)**. Then you can format it to taste.

> **💬 LEARN MORE** See the Customize Number Formatting section of this chapter to learn how to finesse your number formatting.

Add Border to Touching Data Series

With some charts, such as any of the stacked charts or the pie chart, your series may touch. Sometimes Excel is cool and automatically adds a border between series. You'll see that in the Pie Chart, Donut Chart, Histogram, and Pareto Chart tutorials. But other times, Excel is asleep and lets the series touch. And sometimes when they touch, the honesty's too much. Lulz. #productofthe70s

I like the extra contrast the border adds, especially with charts with many series, where you may be working with tints of your branded colors, as you'll see in the 100% Stacked Area Chart tutorial **(Fig 3.52)**.

To add a border to a data series, select the series and press Command-1 to open the **Format Data Series** pane **(Fig 3.53)**. In the **Fill & Line** tab, set your border parameters. I typically use the settings below:

* **Border: Solid line**

* **Outline color:** white

* **Width:** .75 pt
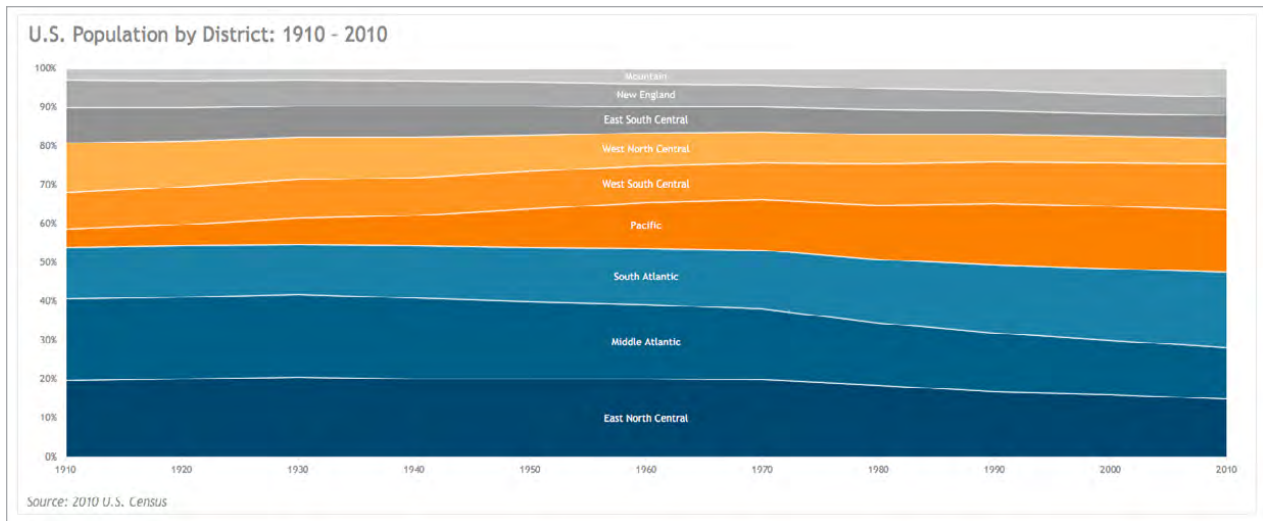
Fig 3.52: Series borders add a touch of class to your charts.
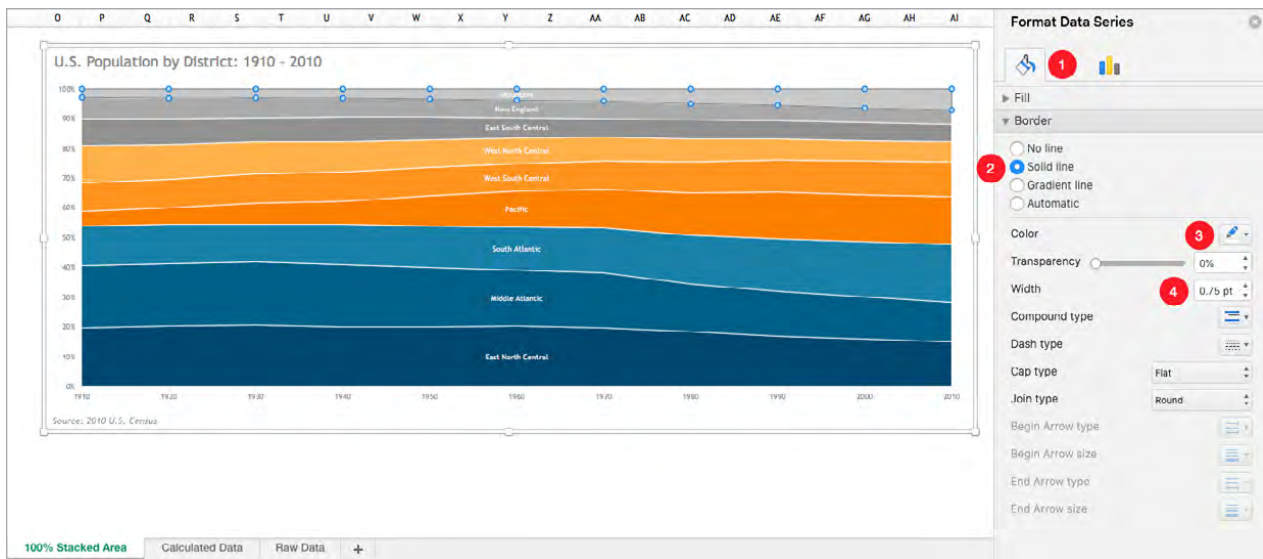
Fig 3.53: Use half the border line width you need because borders are additive.

Tip: When you apply the border to your first series, it will look pretty lame. But when you apply the same border to your next data series, you'll notice that the width of the border will be doubled because the borders are adjacent, not overlapping. Then your border width should work—although feel free to tweak and test!

Align Strategically

Just because Microsoft centers most everything by default, this isn't necessarily the optimal choice. For example, if you pull together a number of charts together in a dashboard, it can be more visually distracting to have chart titles floating all over the place, which is how they look when they're centered in each of your chart widgets.

Anything can be moved, so don't be afraid to move things around. To move the title, drag it to where you want it. Hold down the Shift key to constrain movement to a horizontal or vertical plane.

Align Options

We will use the **Align** menu quite a bit in tutorials **(Fig 3.54)**. You can access it from the **Format** tab of whatever you're working with. Some of the tab titles you'll see are Format, Shape Format, Graphic Format, and Picture Format. You can also usually access it through the contextual menu, which you summon by right-clicking on the object you want to edit.
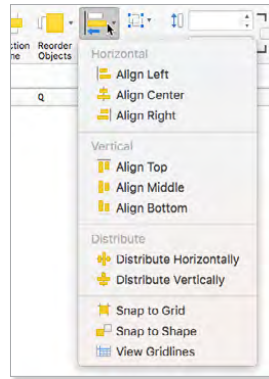
Fig 3.54: The Align menu is helpful in adding finesse to your visualizations.

To select objects to align them, you can hold down the Shift or Command key.

Demystifying Align Options

The **Align** menu groups your options, but I find the categories a bit confusing so I'll break them down:

✦ *Horizontal:* If you have objects that are distributed vertically, the options in this section are what you need—even though it's categorized as **Horizontal**. (See the pinch?) You can align them by their left edges, centers, or right edges. If you're lining up text boxes, left-aligning is the most reliable. If you want to use one of the other options, you need to ensure you don't have excess space between your text and the right edge of the text box because it will be factored in and will throw off the alignment.

✦ *Vertical:* Same as above, but they help you align objects that are positioned horizontally.
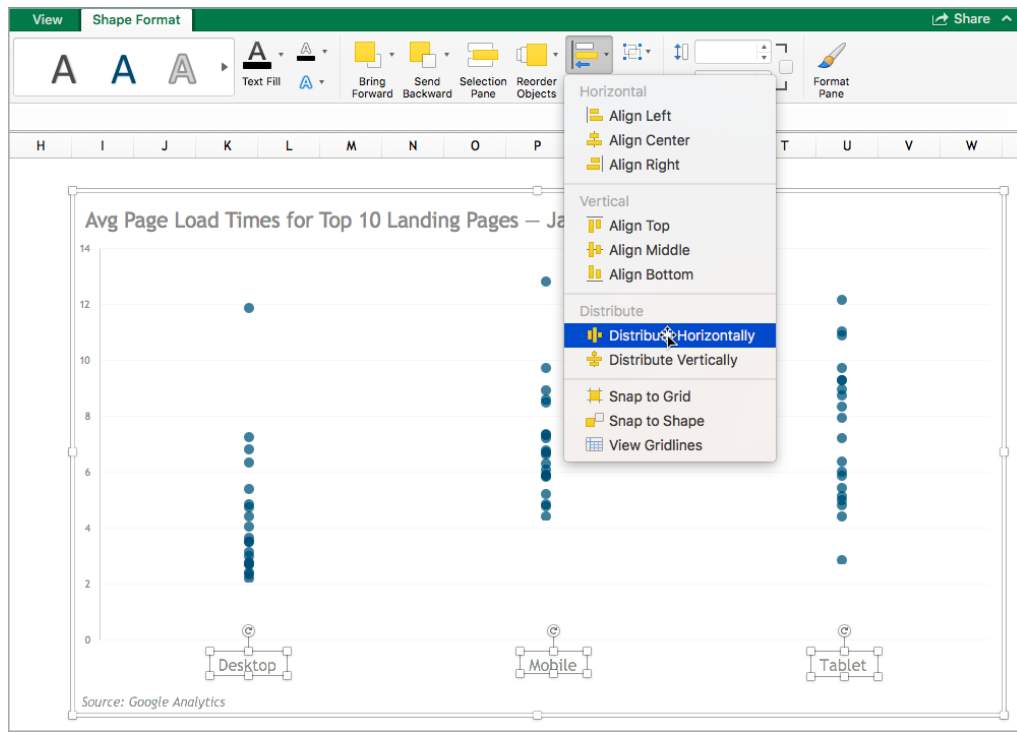
Fig 3.55: Use the Distribute Horizontally option to ensure your faux axis is runway ready.

✦ *Distribute:* These options allow you distribute objects equidistantly—either horizontally or vertically. You'll see an example of how we use the **Distribute Horizontally** option to mimic horizontal axis labels in the Dot Plot tutorial **(Fig 3.55)**.

Snap to Options
Snap to Grid

If you want to snap to the grid when you're moving objects (charts, text boxes, shapes, etc.) you can enable this option from the **Align** menu by selecting **Snap to Grid**. Then items will automatically try to snap to the grid as you drag them.

Alternatively, if you hold the Command key down while you drag, Excel will snap your object to the grid. I actually prefer this method.

This shortcut also works when you're dragging sizing handles, e.g., to line your chart's edges up with Excel's grid and other charts. You don't have to turn on gridlines for this to work. I don't even think about it. I just Command-drag like a fool. But if you want to turn on gridlines, you can do that by navigating to **View** ▸ **Show** ▸ **Gridlines**.

Warning: It's one or the other. Command-dragging won't work if you've enabled **Snap to Grid**.

My typical workflow is to snap the upper-left corner of the chart to the grid, then Command-drag the bottom-right corner of the chart to snap the right and bottom borders to the grid **(Fig 3.56)**.

Tip: If you want to make charts the same size, you can drag over a range next to the chart to see how many cells wide and/or long it is. If there's data in those cells, you can look at **Count** in the **Status Bar**.

If there's no data in the cells, it's a little trickier but still doable. Just click-and-drag over the range, but before you let go of the mouse, take a gander at the **Name Box**. It will tell you the number of columns and rows in the active selection. It will take the form of rows x columns **(Fig 3.57)**.

Snap to Shape

There are times you can't just select the items you want to align and use an option from the **Align** menu. In those instances I'll drag out a shape—usually a very thin line—and use Excel's Snap to Shape feature to align my chart elements. This is a helpful trick when aligning your chart title with other text boxes, like a subtitle and/or text box (as you'll see in most of the charts in this book). Aligning data labels can be also problematic, as you'll see in the Add a Target Line variation of the Line Chart tutorial.

Fig 3.56: Use the count value from the Status Bar to calculate the length of a data range.
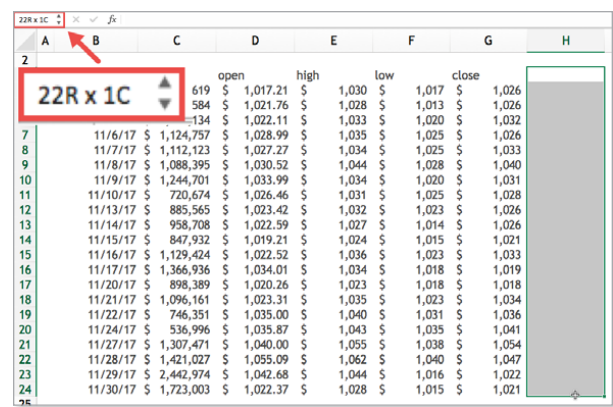
Fig 3.57: Use the Name Box to count empty cells.

First, Shift-drag out a line (**Insert ▸ Shapes ▸ Lines ▸ Line**). Holding down the Shift key constrains the angle of the line you're drawing to 45° angles, giving you perfectly horizontal, perpendicular, or diagonal lines. Then select the object you want to line up with your line and turn on **Snap to Shape** by navigating to the **Format** tab for that object (**Format Shape**, **Picture Format**, etc.), then selecting **Snap to Shape** from the **Align** menu **(Fig 3.58)**. You'll see a checkmark next to it when you enable it. (You'll need to reopen the Align menu to see it.)
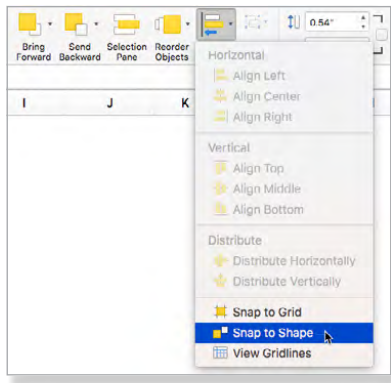
Fig 3.58: Turn on Snap to Shape if you need to align objects to a common element.

Now drag your object toward the line until it snaps into position. Rinse and repeat for each object. Once everything is lined up, delete the line.

Warning: If you turn on **Snap to Shape** before you drag out your line you might have a difficult time positioning it where you want. Also, make sure **Snap to Grid** is turned off.

Group to Preserve Your Work
Once you get everything aligned, I highly recommend grouping your objects before you deselect them. You can group by Shift- or Command-selecting the items, then navigating to the format tab that appears in the menu and selecting **Group Objects ▸ Group**. Alternatively, you can right-click on the selected objects and choose **Group ▸ Group** from the contextual menu.

At the time of writing, with the [half-baked] charts that are new to 2016, you can't add text boxes inside a chart (meaning they won't move with your chart), so you need to group them with your chart. Grouping objects with your chart is kind of like adoption for data. Aww!

Resize Fonts
I usually like to bump up the font size on chart titles to make them stand out more. I also sometimes increase the font size in legends. To adjust the font size, select the item and navigate to **Home ▸ Font Size** and choose the size from the drop-down menu. Or use the **Increase Font Size** or **Decrease Font Size** buttons to the right for incremental changes.

Adjust Chart Series Spacing
Bar and column charts sometimes look a little better if the bars are wider. To adjust them, select a bar to select the entire data series and press Command-1 to open the **Format Data Series** pane. Next, open the **Series Options** tab and reduce **Gap Width** using the slider or entering the percentage **(Fig 3.59)**. I'll usually fatten up my bars to make room for data labels. With the extra space, you may also want to bump up the font size of your labels and/or make the font bold.
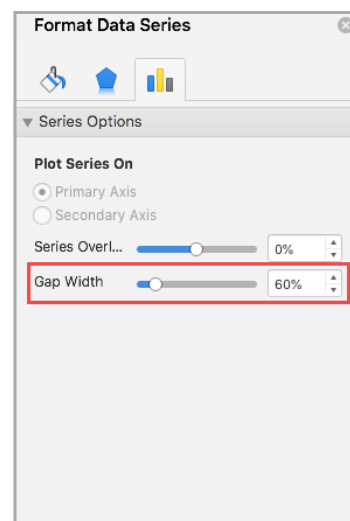
Fig 3.59: Fatten up your bars by reducing Gap Width.
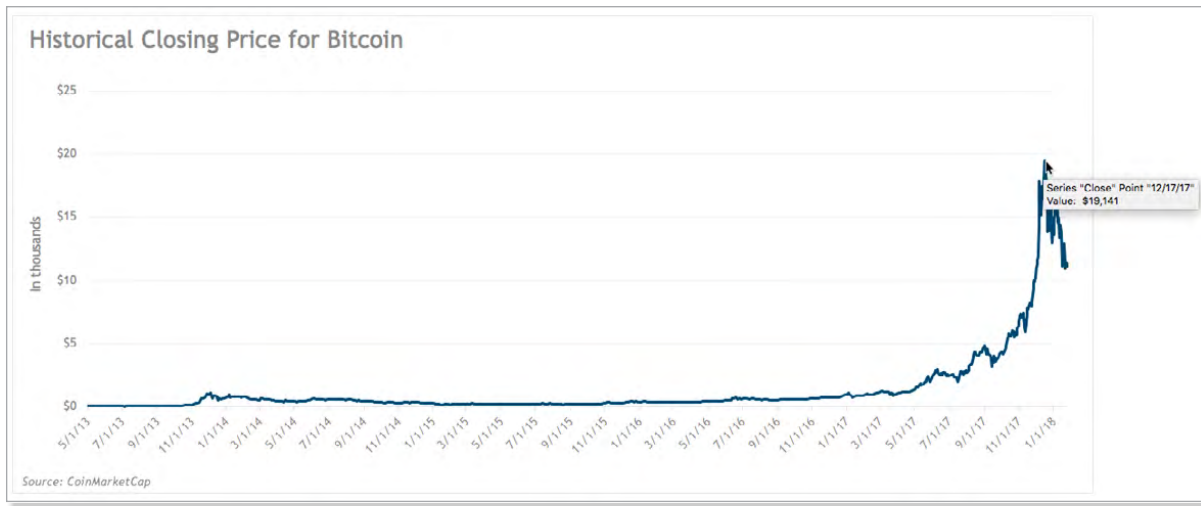
Fig 3.60: A viewer can always get the exact date by hovering over a data point.

Thin Out Axes

There are two issues I commonly see with axis labels:

- *Labels are turned sideways:* This is one of my greatest pet peeves with chart design. Sometimes this happens because the chart designer used a [vertically oriented] column chart when she should have used a [horizontally oriented] bar chart. This is addressed in the Bar Chart and Column Chart tutorials. But, as a general rule, if your x axis isn't charting a time element, use bar charts when you're working with datasets that have longer labels.

- *Axes are unnecessarily dense:* Sometimes your axis labels are unnecessarily detailed, exceeding that optimal noise/signal ratio we're aiming for. Excel allows you to set the interval for your axis to give you some breathing room. To access these options, select your axis and press Command-1 to open the **Format Axis** pane.

We push Excel a little too far in the Cycle Plot tutorial—causing it to crumble into a ball on the floor and scream uncontrollably like a toddler who missed naptime—but most times this technique is fairly reliable. That said, there are some nuances, depending on the type of data that's referenced in your axis, so we'll address the strategies for each data type separately.

Date Axes

I often see charts with dates in the horizontal axis, but the chart designer will do silly things like have the full date representing each day of the month, for example, and then turn the labels on their side because there's no room in the axis. I call it silly because indulge me for a second: You're reporting on the performance of something from last month, and you're telling me the month started with 6/1/2018, followed by 6/2/2018, followed by 6/3/2018…See where I'm going with this?

You can put the year (and even month) elsewhere in your worksheet: the chart title, the worksheet title, an annotation…anywhere but your axis labels, where real estate is precious.

With year taken care of, we can still shave our axis labels down more. You could easily skip every other day, and no one will panic and ask, "Wait, what about even days? What kind of dystopian society did I wake up in today?" I've seen charts skip as much as six days at a time, and I've still been able to interpret the chart with no issue. If a viewer wants to see the exact date experienced that spike (or precipitous drop), he can hover over a data point and see the date **(Fig 3.60)**.

💬 **LEARN MORE** See the Customize Number Formatting section of this chapter to learn how to finesse your number formatting.

To this end, Excel gives you some extra options with a date axis. The one I use most is the **Major Units** setting in the **Format Axis** pane **(Fig 3.61)**. Regardless of what format my dates take (e.g., month, days of week, date), I usually bump **Major Units** up from 1 to 2. If you set your number formatting to mmm for months only, ddd for days of the week, mm/dd for month and day (with leading 0s), or m/d, skipping one unit will result in a lighter axis without sacrificing clarity. You'll put this technique to good use in the Line Chart tutorial.

Value Axes

For all other axis-thinning options, you'll just adjust the **Major Units** under **Axis Options (Fig 3.62)**. I often find doubling the default value gives me the light and airy axis my minimalist soul craves. In the accompanying screenshot, the original value was 5000. I bumped it up to 10000. (Thousands separators need not apply in these settings.)

Warning: If you plan to create a chart template from your chart (something you will learn all about in the next chapter), you should first create the template (right-click ▶ **Save as Template**) *before* customizing your axis. If you customize your value axis (usually the y axis) before you create the template, you will hardcode the major units for all future charts.

💬 **LEARN MORE** See the Create a Store of Chart Templates section of the Set It and Forget It chapter to learn how to work with templates.

Text Axes

You may be wondering, *Why would I want to thin out a text axis?* In most cases a text axis is the default for categorical data: region, marketing channel, country, employee, gender, etc. You obviously wouldn't want to remove every other region or employee in your department. However, sometimes you will have dates show up as text. For example, if the dataset you're handed has hardcoded months as abbreviations (Jan, Feb, Mar), Excel will treat them as text. Same with days of the week. (I've seen it all and have suffered so you don't have to! #messiahcomplex)

You can see an example of a date column that is treated as text in the Lollipop Graph tutorial, as well as the Add a Target Line variation of the Line Chart tutorial. In this case, you can thin out them out in the **Labels** section of the **Axis Options** tab of the **Format Axis** pane. Set **Interval between labels** to your desired amount **(Fig 3.63)**. (I usually set mine to 2, but if you're working with months you could just as easily show only the first month of each quarter without loss of understanding.)
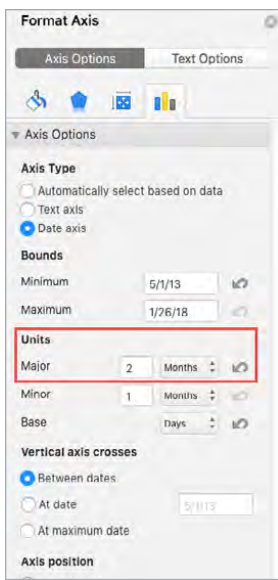

Fig 3.61: Thin out a date axis by bumping up the Major Units setting.
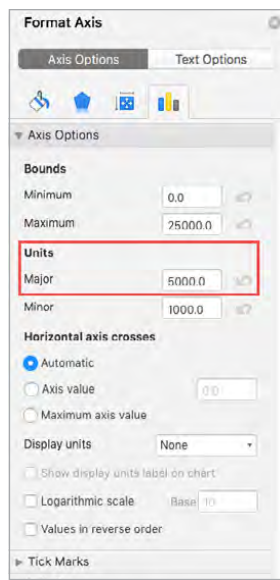
Fig 3.62: Hardcode Major Units setting to thin out a value axis.
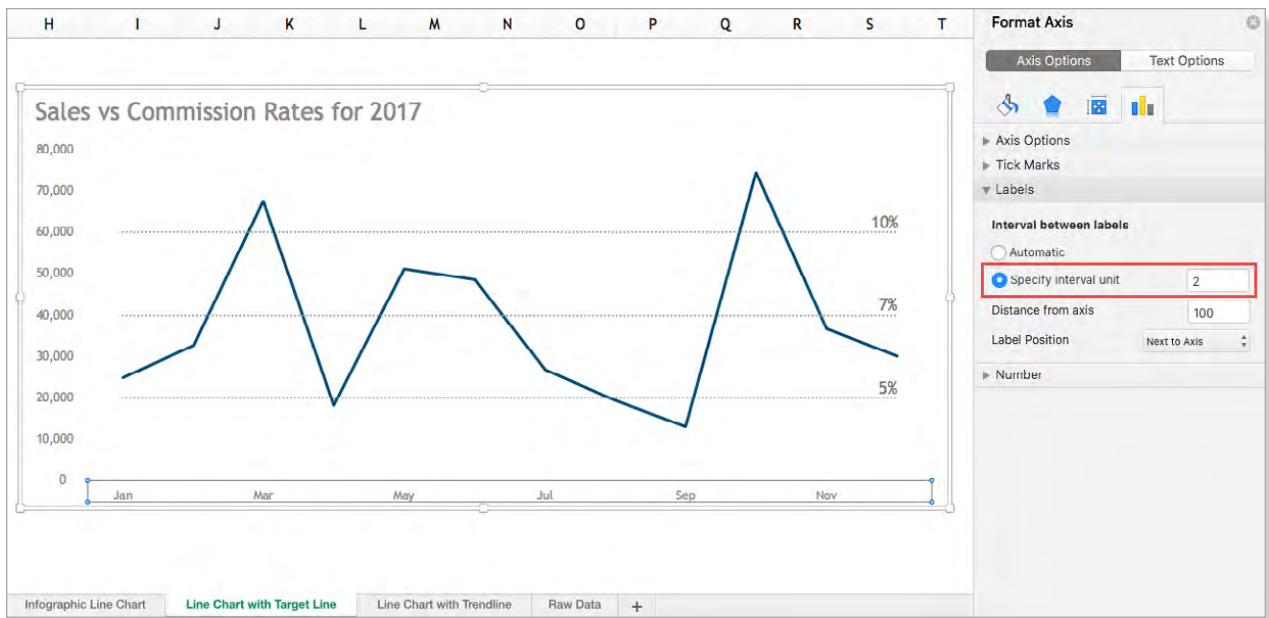
Fig 3.63: Thin out text axes by setting the interval unit.

Remove Unnecessary Axes

If you use data labels in your charts, you may no longer need your axis. To remove it, select it and press Delete on your keyboard **(Fig 3.64)**.

Add an Axis Title

Sometimes it's important to add an axis title to your chart. One reason might be that you have two axes, as you do with a combination chart.

Fig 3.64: Don't be afraid to delete your value axis if you're using data labels.

Warning: If you're creating a scatter plot you'll need to manually add axis titles. I'm surprised Excel doesn't add them by default because there's no way to know which value is plotted on which axis without them.

To add one, select the chart and navigate to **Chart Design ▸ Add Chart Element ▸ Axis Titles**. From the flyout menu you can choose **Primary Horizontal** or **Primary Vertical**. If you want more options, choose **More Axis Title Options**, which will open the **Format Axis Title** pane.

When you add a title, Excel places it a little too close to the axis for my taste, at least for vertical axes. If you're uncomfortable with its lack of boundaries too, you can drag it away while holding down the Shift key to keep it vertically centered or drag the sizing handle on the left side of the **Plot Area** to move it over. To enter your text, either double-click inside the title box and start typing or select the title box and type your title in the **Formula Bar**.

Add Markers

Some chart types consist primarily of markers, as you'll see in the Dot Plot, Dumbbell Plot, and Scatter Plot tutorials. In other charts markers are merely an augmentation, as you'll see in the Slope Chart, Sparklines, Line Chart, and Stock Chart tutorials.

If your chart has a marker option, you'll be able to add them by selecting your data series and pressing Command-1 to open the **Format Data Series** pane. The **Marker** options are housed under the **Fill & Line** tab.

Excel gives you a few formatting options for your markers:

* *Type:* You have a number of shapes to choose from. This book will only use the circle option. I personally find charts that mix types busy and amateur. Also, one marker type might look bigger or smaller than another marker type of the same size. Just because you can do something doesn't mean you should.

* *Size:* Don't be afraid to play with this setting. Using larger markers can give your chart a trendy feel. Because most Excel users don't play with size, you'll automatically show yourself to be a cut above.

* *Fill:* You can play with both the color and transparency of your fill color. I will sometimes add transparency to my marker fill to make my border pop.

* *Border:* Make sure your border serves a purpose. I mostly use them if I want a white fill (as you'll see in the Add Sizzle variation of the Line Chart tutorial) or I'm increasing the transparency of my markers (as you'll see in the Bubble Chart tutorial) or data series (as you'll see in the Use Area Chart variation of the Combination Chart tutorial).

Hack Excel's Charting Engine

As you'll see in the Slope Chart tutorial (which spotlights one of the more galvanizing datasets in the book), there are times you'll need to modify a data series (i.e., a column of data in a dataset). And, as you'll see in the Dumbbell Plot, Add Categories variation of the Scatter Plot tutorial, and Add a Mean Line
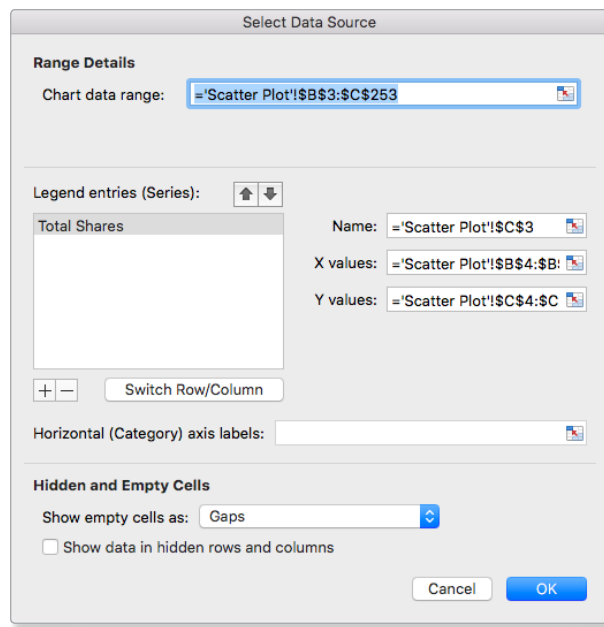
Fig 3.65: We will deconstruct the Select Data Source dialog.

variation of the Bar Chart tutorial, there are other times you'll need to create a data series from scratch. You'll need to summon the **Select Data Source** dialog **(Fig 3.65)**. I'll dedicate this section to demystifying what I believe to be Excel's most confusingly labeled dialog.

Scariest Dialog in Excel?

This dialog was one of the more intimidating menus in Excel to me for years. I only went into it and modified it if a tutorial walked me through the steps. And even then, I was convinced when I clicked **OK** to close it, my chart would vomit all over itself like a college kid after playing beer pong for the first time.

But the **Select Data Source** dialog—which you get to by right-clicking anywhere inside a chart and selecting **Select Data** from the contextual menu—is to charts what creepers are to auto mechanics. (Not this kind of creeper: **bit.ly/mdsem-creep**.) It's how you access the underbelly of your chart to restructure it.

Anatomy of the Select Data Source Dialog

Let's break down the **Select Data Source** dialog a bit. I think one of the problems with this dialog is Microsoft engineers got a little… enthusiastic…with the labels. But they actually make sense once you learn to interpret them. I kind of picture the engineers calling for a brainstorm meeting to determine how to label the features in this dialog and then shoehorning all the terms on the whiteboard into the dialog.
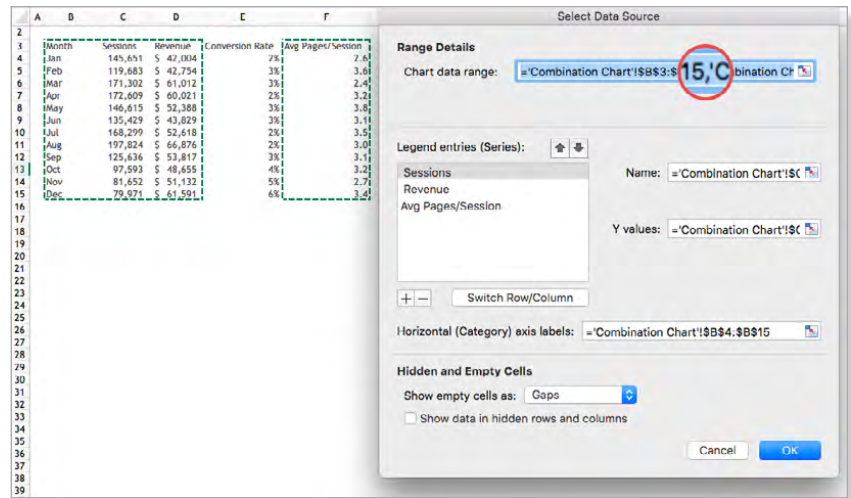
Fig 3.66: Non-contiguous ranges are separated by a comma.

Chart Data Range

Ah. The most intuitive label in the dialog, in my opinion. No complaints on this one. As the label suggests, this field references the range of cells in your dataset that are included in the chart. If you click inside this field, your range will suddenly find itself surrounded by an army of marching ants.

These columns are oftentimes contiguous (touching) but don't have to be. You can click-and-drag over a column of data, hold down the Command key and click-and-drag over another column. Technically, this can be a row of data, if your data is structured using rows instead of columns, but all the datasets used in this book are structured using columns, which is more the norm. If your columns aren't contiguous, you'll see them separated with a comma in the **Chart data range** field **(Fig 3.66)**.

You'll notice an icon next to this field with a red arrow and blue square. You'll see these all through the **Select Data Source** dialog. If you click it, the **Select Data Source** dialog will be reduced to just that field, which is intended to make it easier for you to click-and-drag over the data range you want represented in the chart **(Fig 3.67)**.
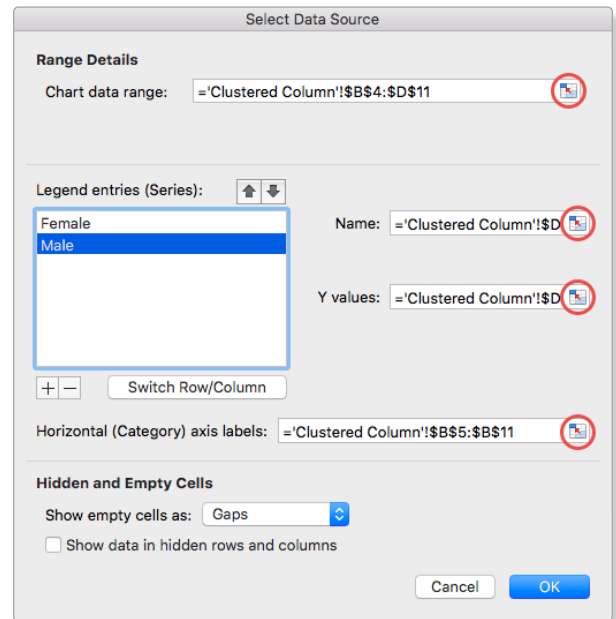
Fig 3.67: Excel allows you to remove all distraction when selecting a new data range.

You don't need to click this button to select a range. You can, instead, click inside the field, delete what's in there, if anything, and click-and-drag over the range of columns in your dataset you want included in the chart.

Legend entries (Series)
THINK METRICS PLAYGROUND

This area of the **Select Data Source** dialog was the most confusing to me. This is just where your data series reside. And because data series (e.g., individual lines in a line chart or columns of the same color in a clustered column chart, etc.) are differentiated in the legend, Microsoft engineers decided to lead with that. I think they did users a disservice with this label because the legend is really more secondary. You don't open Excel, crack your knuckles, and tell yourself, Today's the day I put the legend in legendary!

I suggest that you just think of this section as simply where your metrics go: revenue, runs batted in, miles, interest rate, website visits, revenue, etc. If you can measure it with a number, it most likely goes in this section. Therefore, whenever you go into the **Select Data Source** dialog (which you will do a lot throughout the course of this book), maybe switch out that label in your mind with something like *Metrics*. It might help.

ADDING AND EDITING DATA SERIES

You can add a new data series by clicking the + button and edit a data series by selecting it in the **Legend entries (Series)** field and using the **Name** and **Y values** fields **(Fig 3.68)**. Whatever you put in the **Name** field will replace **Seriesx** (Series2 in the screenshot).

In most cases, you won't need to fill out the **Horizontal (Category) axis labels** field **(Fig 3.69)**. By default, Excel uses the first column of your dataset to fill this area of the **Select Data Source** dialog. You mostly just need to manually add data series when modifying a chart or creating a hack chart, as you'll do quite a bit in this book! Sciiience ruuules!

Note: The **Select Data Source** dialog will include an X values field when you're working with charts that include x values, as you'll see in the Dot Plot, Scatter Plot, and Bubble Chart tutorials.

To set **Name**, you can either type your series name in (not recommended) or click inside the field, then select the column header of the column you're adding. To set **Y values**, delete the ={1} that auto-populates

Fig 3.68: Click the + button to manually add a data series.
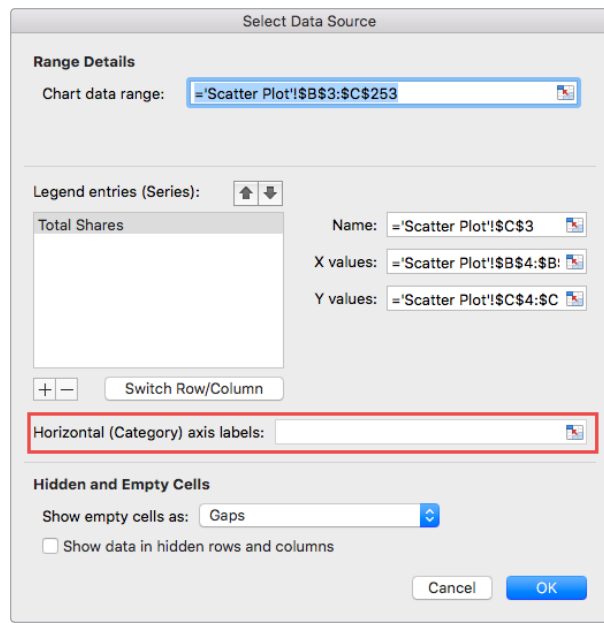
Fig 3.69: The Select Data Source dialog sometimes includes an X values field.
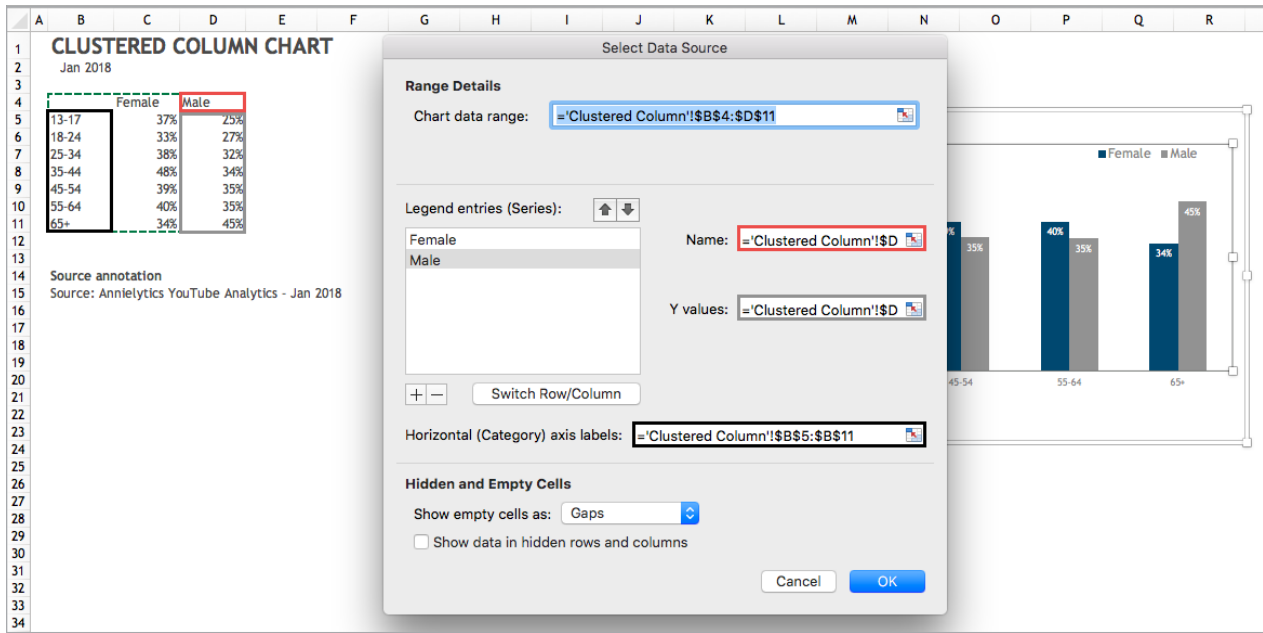
Fig 3.70: Add new data series manually in the Select Data Source dialog.

this field, and click-and-drag over just the values of your new column of data. To speed this up, select the first cell, then hold down the Command and Shift keys while pressing the down arrow key on your keyboard to select all contiguous cells in your column. If you have blanks in your data (tsk tsk), it might be faster to scroll to the bottom of the column and Shift-click the last cell. (If it's a really large dataset, I'll scroll way down, to where I know there are blank cells, then Command-click to pop up to the closest non-blank cell.) Then click **OK** to close the **Select Data Source** dialog **(Fig 3.70)**.

WHEN YOUR DATA SERIES HAS X AND Y VALUES

If you're working with a chart type that uses x and y values (as you'll see in the Dot Plot, Scatter Plot, and

Bubble Chart tutorials), the **Select Data Source** dialog will split the series values into x values and y values. When you click inside the **X values** field, the marching
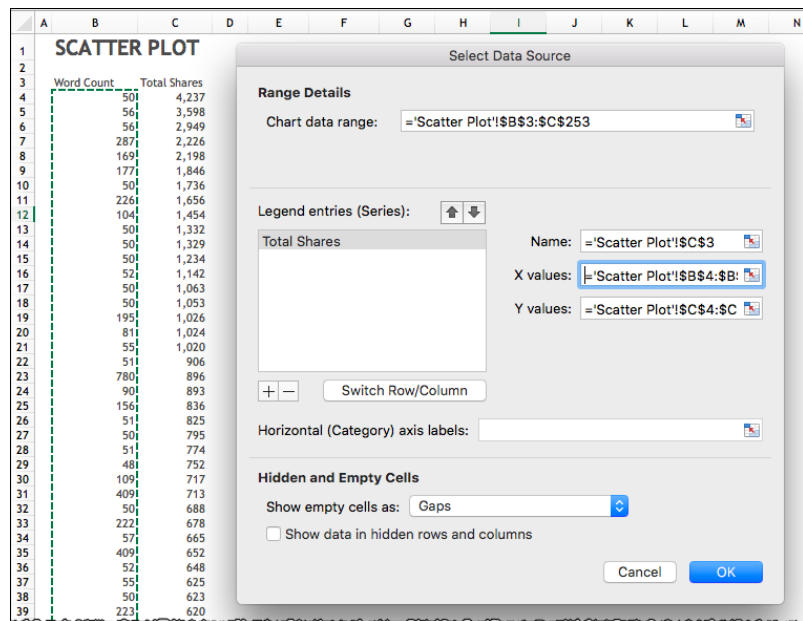
Fig 3.71: If you have x and y values, your Select Data Source dialog will add an extra field.

ants will surround the values you're plotting along the x (horizontal) axis **(Fig 3.71)**. This may cause some flashbacks to middle school algebra. If so, I apologize. Nobody deserves that.

With a scatter plot, for example, individual data points are determined by both their x value and y value. You travel across the horizontal axis to find the x value and then move parallel to the vertical axis to find the y value. But we'll also use this ability to set x and y values to create charts Microsoft engineers didn't anticipate us greedy little Excel users to try to create in Excel, as you'll see in the Dot Plot tutorial. Muahaha!

Horizontal (Category) Axis Labels
### THINK CATEGORIES PLAYGROUND

Again, in my opinion, this is an unnecessarily complicated label. This area of the dialog is very simply where your categories go: department, region, team, school, smart phone brand. You get the idea. And the word *horizontal* shouldn't even be in there because axis labels aren't always in the horizontal axis **(Fig 3.72)**.

By default, Excel uses the first column of your dataset to fill this area of the **Select Data Source** dialog. If you click inside the **Horizontal (Category) axis labels** field, you'll see marching ants around the categories you're charting. Excel doesn't care about the column header, only the categories. So, if you must manually select your categories, don't include the header in the selection **(Fig 3.73)**.

CATEGORIES GONE WILD

With some of the non-standard charts we'll build, you'll see the flexibility of the **Horizontal (Category) axis labels** field **(Fig 3.74)**. For example, you'll see in the Show % Change variation of the Clustered Column tutorial that we will pass two columns into our categories **(Fig 3.75)**.

Loosely related: You will adore pivot tables [almost] as much as I do when you see how easy it is to calculate year-over-year % difference. Go ahead and create this chart for your boss and see what happens. I'm telling you… Nothing says job security quite like a YoY % delta chart!

And in the Diverging Stacked Bar Chart tutorial we'll use multiple category variables: survey questions and survey responses **(Fig 3.76)**. This is a hacked chart type but oh so sexy—and a great way to visualize survey data **(Fig 3.77)**!
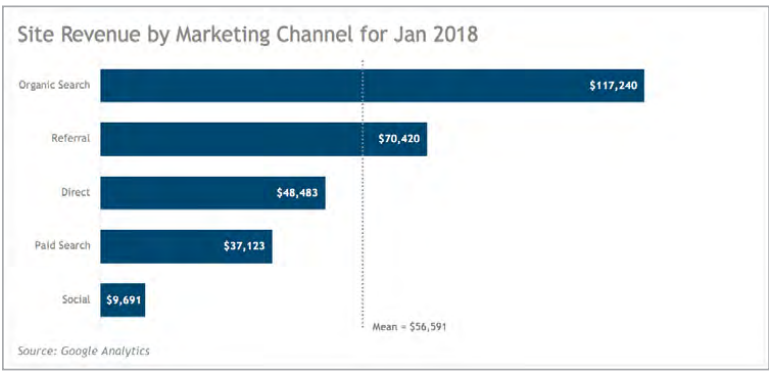

Fig 3.72: Exhibit A: Category labels aren't always along the horizontal axis.
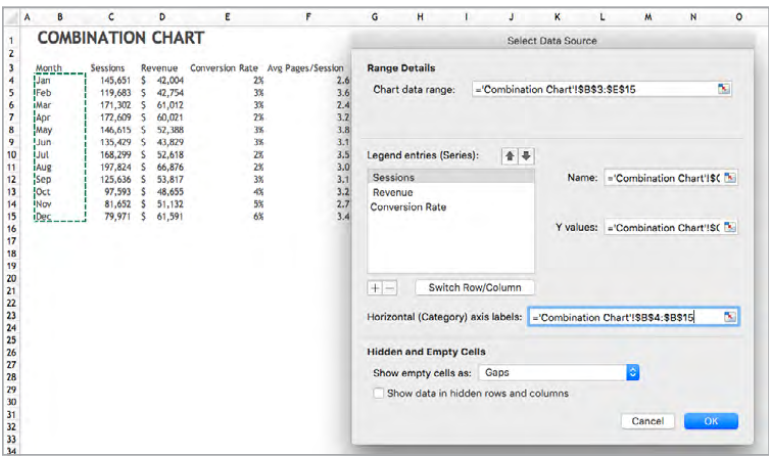
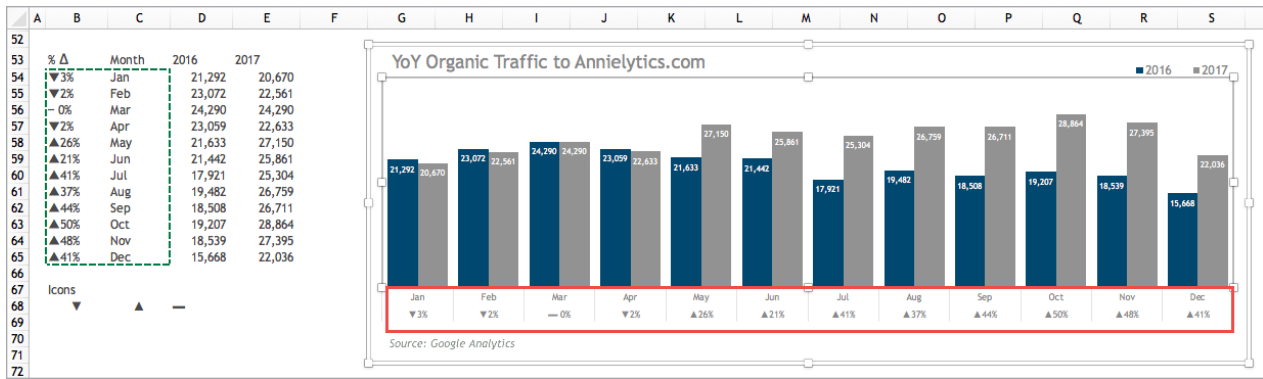Fig 3.73: Excel only needs the categories; the header need not apply.

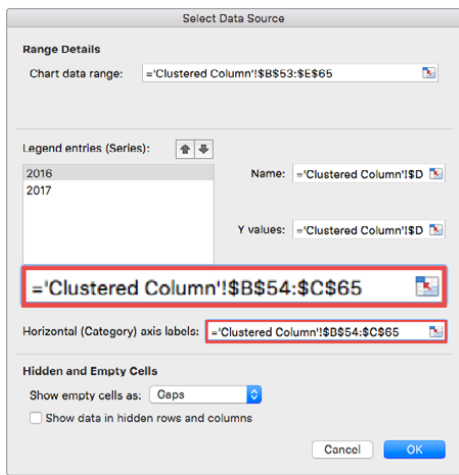Fig 3.74: Nothing says job security quite like a YoY % delta chart!

Fig 3.75: Can you say bogo deal on axis categories?
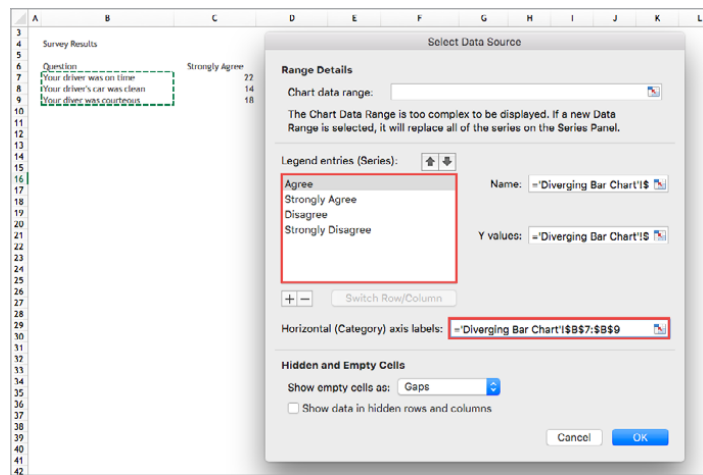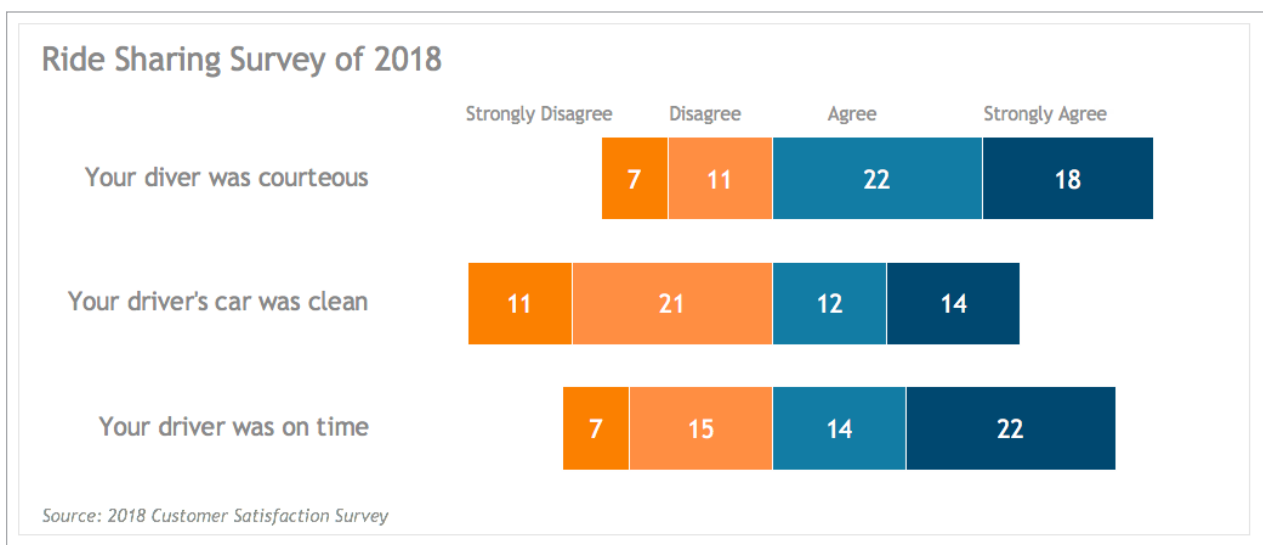

Fig 3.76: Two! TWO categories! Ah ah ahhh!

Fig 3.77: The diverging stacked bar chart is a great way to visualize survey data.

Switch Row/Column

As you might imagine, this button allows you to switch your rows and columns **(Fig 3.78)**.

We'll need to use it in our 100% Stacked Bar Chart tutorial (if you're following along with the sample dataset) because sometimes Excel will ignore the way your data is structured and do what it thinks is best. It'll make sense when you read through the tutorial.
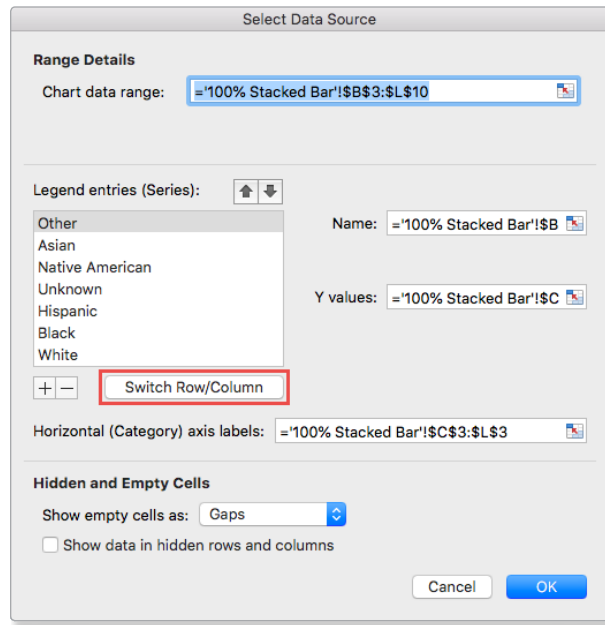

Fig 3.78: Sometimes you need to switch rows and columns.

We'll also use it create some sophisticated, non-standard charts, as you'll see in the Slope Chart tutorial.

Add Data Series to Chart

You will occasionally need to add new data series to charts. You have three ways to add them:

- *Drag sizing handles:* When you click anywhere in your **Plot Area**, you'll see purple, red, and blue highlighting in your dataset. These indicate the categories, series name, and series values, respectively. Click-and-drag the handle in the bottom-right corner of the blue outlined area to add contiguous (touching) data to the chart.

- *Copy-and-paste:* Click-and-drag over your new column (including the column header) to select it, then copy it, select your chart's **Plot Area**, and paste it into your chart.

- *Select data:* Right-click anywhere in the **Plot Area,** choose **Select Data** from the contextual menu, and add your new data series by clicking the **+** button in the **Legend entries (Series)** section. See the previous Anatomy of the Select Data Source Dialog section to learn how to use this dialog. I break it down in the simplest terms.

COPY-AND-PASTE TIPS

You will employ a variety of paste options throughout the tutorials in this book. For starters, it's important to know that the keyboard shortcut to copy is Command-C and paste is Command-V. But you have several advanced paste features you will use in creating visualizations.

For consistency's sake, we'll access all the paste options by right-clicking in a cell and choosing **Paste Special** to open the **Paste Special** dialog.

Paste as Values

We will use pivot tables to get our data in the structure we need for many tutorials. But if you create a chart from a pivot table and there's a pivot chart version of your chart option, Excel will use a pivot chart. The problem with this is pivot charts are difficult to finesse, in my opinion. I've never preferred them because of their design limitations. The way we'll get around this is to copy only what we need from the pivot tables we create and paste as values into the worksheet we'll be building the chart in. In real life I never put raw data in the same worksheet as my visualizations. I only do it in this book so that it will be easy for neophytes to reference the data that's being charted.

You can copy/paste as values through the **Paste Special** dialog. Choose **Values and number formats**
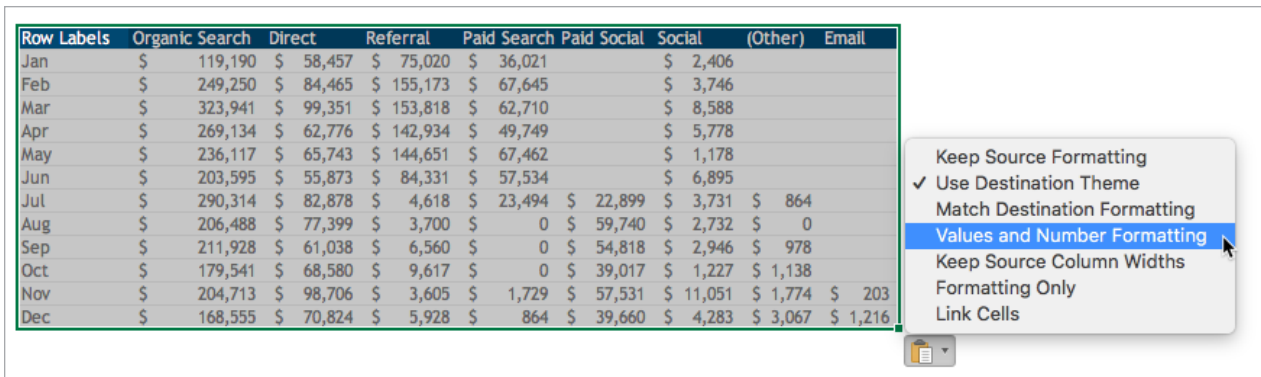
Row Labels	Organic Search	Direct	Referral	Paid Search	Paid Social	Social	(Other)	Email
Jan	$ 119,190	$ 58,457	$ 75,020	$ 36,021		$ 2,406		
Feb	$ 249,250	$ 84,465	$ 155,173	$ 67,645		$ 3,746		
Mar	$ 323,941	$ 99,351	$ 153,818	$ 62,710		$ 8,588		
Apr	$ 269,134	$ 62,776	$ 142,934	$ 49,749		$ 5,778		
May	$ 236,117	$ 65,743	$ 144,651	$ 67,462		$ 1,178		
Jun	$ 203,595	$ 55,873	$ 84,331	$ 57,534		$ 6,895		
Jul	$ 290,314	$ 82,878	$ 4,618	$ 23,494	$ 22,899	$ 3,731	$ 864	
Aug	$ 206,488	$ 77,399	$ 3,700	$ 0	$ 59,740	$ 2,732	$ 0	
Sep	$ 211,928	$ 61,038	$ 6,560	$ 0	$ 54,818	$ 2,946	$ 978	
Oct	$ 179,541	$ 68,580	$ 9,617	$ 0	$ 39,017	$ 1,227	$ 1,138	
Nov	$ 204,713	$ 98,706	$ 3,605	$ 1,729	$ 57,531	$ 11,051	$ 1,774	$ 203
Dec	$ 168,555	$ 70,824	$ 5,928	$ 864	$ 39,660	$ 4,283	$ 3,067	$ 1,216

Paste Options menu:
- Keep Source Formatting
- ✓ Use Destination Theme
- Match Destination Formatting
- **Values and Number Formatting**
- Keep Source Column Widths
- Formatting Only
- Link Cells

Fig 3.79: The Paste Options button is my favorite way to paste as values.

to maintain your number formatting, if you customize it before pasting **(Fig 3.79)**. If you haven't customized it, you can just choose **Values**. With experience, decisions like this will become second nature.

Alternatively, you can paste your range, then choose **Values** or **Values and Number Formatting** from the **Paste Options** button that appears in the bottom-right corner of your pasted range.

Note: I won't necessarily always differentiate between the two options in the tutorials. You decide which is better for you.

Calculate on the Fly

Excel allows you to do quick math by copying a value from a cell, selecting a range you want to apply the calculation to, and choosing a calculation option under **Operation** in the **Paste Special** dialog **(Fig 3.80)**. You can add, subtract, multiply, and divide. You'll see how we use this option to make values negative to move bars to the left of our y axis in the Diverging Bar Chart tutorial.

Copy Column Widths

Sometimes, when you're cleaning up your workspace, you might find that you have columns that have variable widths because of data that once resided there. And when you're creating dashboards, you'll sometimes want to standardize your column widths across

Paste Special dialog:

Paste
- ● All
- ○ Formulas
- ○ Values
- ○ Formats
- ○ Comments
- ○ Validation
- ○ All using Source theme
- ○ All except borders
- ○ Column widths
- ○ Formula and number formats
- ○ Values and number formats
- ○ All, merge conditional formats

Operation
- ○ None
- ○ Add
- ○ Subtract
- ● Multiply
- ○ Divide

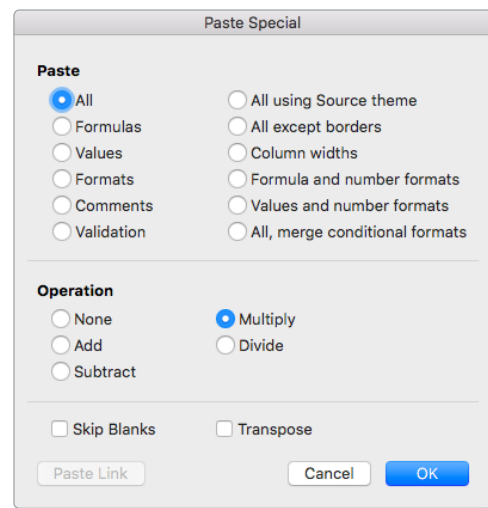- ☐ Skip Blanks
- ☐ Transpose

Paste Link | Cancel | OK

Fig 3.80: Do math on the fly in the Paste Special dialog. #mathlete

some of your visualizations. Excel has your back with its option to copy-and-paste column widths. You can access this option in the **Paste Special** dialog, under the **Paste** section.

Transpose

As you saw in the Hack Excel's Charting Engine section, if your data charts with the wrong configuration, you can use the **Switch Row/Column** button. But you can switch your rows and columns before you create your chart with the **Transpose** option. Access this option at the southern tip of the **Paste Special** dialog.

Paste Visible Cells Only

If you copy-and-paste a range with hidden rows or columns, they become unhidden. We don't have the option to paste only the visible cells in the **Paste Special** dialog, but we *do* in the **Go To** dialog, which we get to by pressing F5 or Control-G **(Fig 3.81)**. If you forget the keyboard shortcut (as I usually do), you can access the Go To dialog from the Edit menu by navigating to **Edit ▸ Find ▸ Go To**. In the **Go To** dialog, select the **Special** button to open the **Go To Special** dialog. Select **Visible cells only**, then navigate to where you want to paste your range, and paste as usual.

Warning: Be careful to not paste your visible cells into a range that includes hidden rows or columns or your data will be jumping out of the frying pan into the fire. (Translation: They will be hidden. I may or may not be writing from personal experience. #smh)
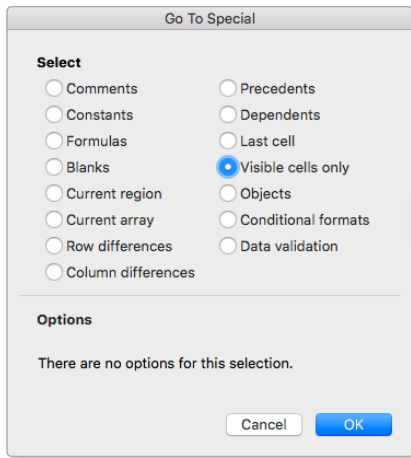

Fig 3.81: Select only visible cells from the Go To Special dialog to prevent pasting hidden cells.

Move Without Pasting

When you select a range, you can drag it without copying and pasting, but it's a little tricky. And I can't grab a screenshot because of conflicting keyboard shortcuts, so I'll walk you through it sans screenshot.

First, select a data range you want to move, then hover over any edge of the selection. Your cursor will become a hand. Now Shift-drag the selection where you want it. You'll see guides letting you know where you're about to drop the range.

Paste Chart Formats

Let's say you format a chart exactly the way you want it (the chart on the left). Then you want to create another chart just like it, so you create the second chart…the kinda derpy chart on the right **(Fig 3.82)**.

You can simply copy its format and paste it onto the new chart. To start, select your initial chart, then copy it and select your new chart. Then navigate to **Home ▸ Paste ▸ Paste Special**. This will open a tiny version of the **Paste Special** dialog **(Fig 3.83)**. Choose **Formats** and click **OK** to close the dialog **(Fig 3.84)**.
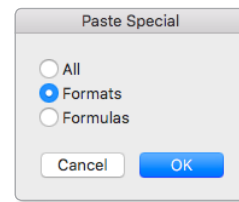

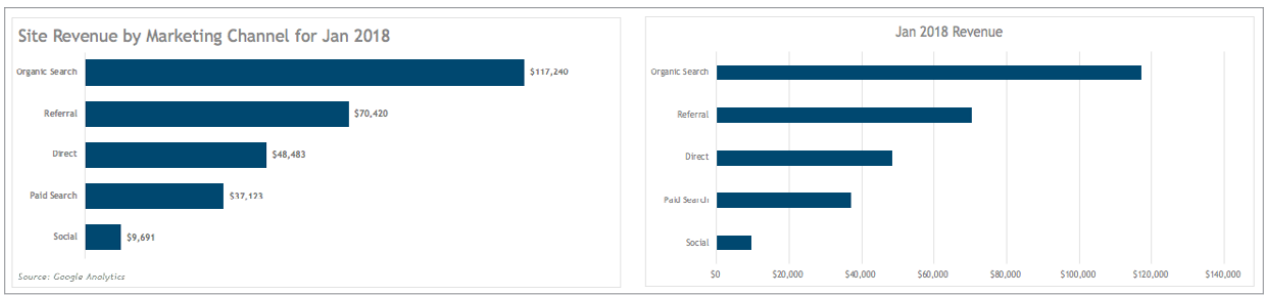*Fig 3.83: Aww, a baby Paste Special dialog!*

Fig 3.82: We'll copy the format from the chart on the left onto the chart on the right.
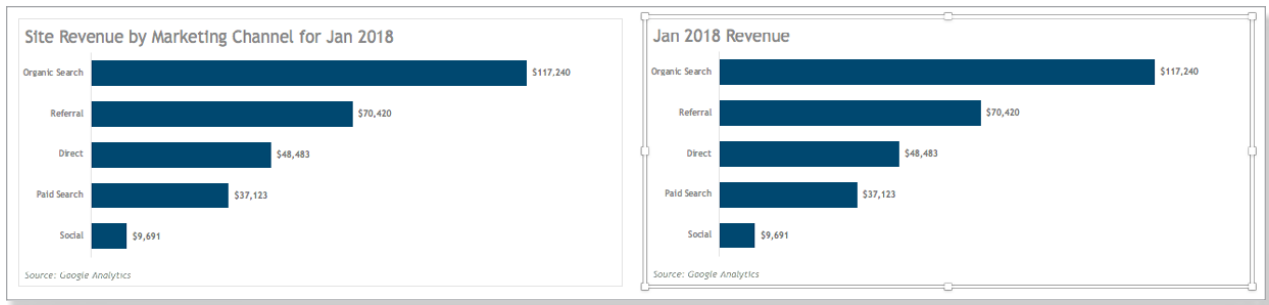
Fig 3.84: Copying chart formatting isn't a perfect solution, but it's a great option for ad hoc analysis.

You may still need to do some cleanup, but it's a great way to get you close to your finished product. The only thing that didn't copy over was my **Chart Area** border, but that's easily fixed.

As you'll see in the Set It and Forget It chapter, if you plan to use a chart type more than once, you should create a chart template from it. Learn more in the Create a Store of Chart Templates section.

BRING SEXY BACK

If at any point you regret your minimalist ways and want to add elements back in, you can do that by selecting your chart and navigating to **Chart Design ▶ Add Chart Element (Fig 3.85)**.
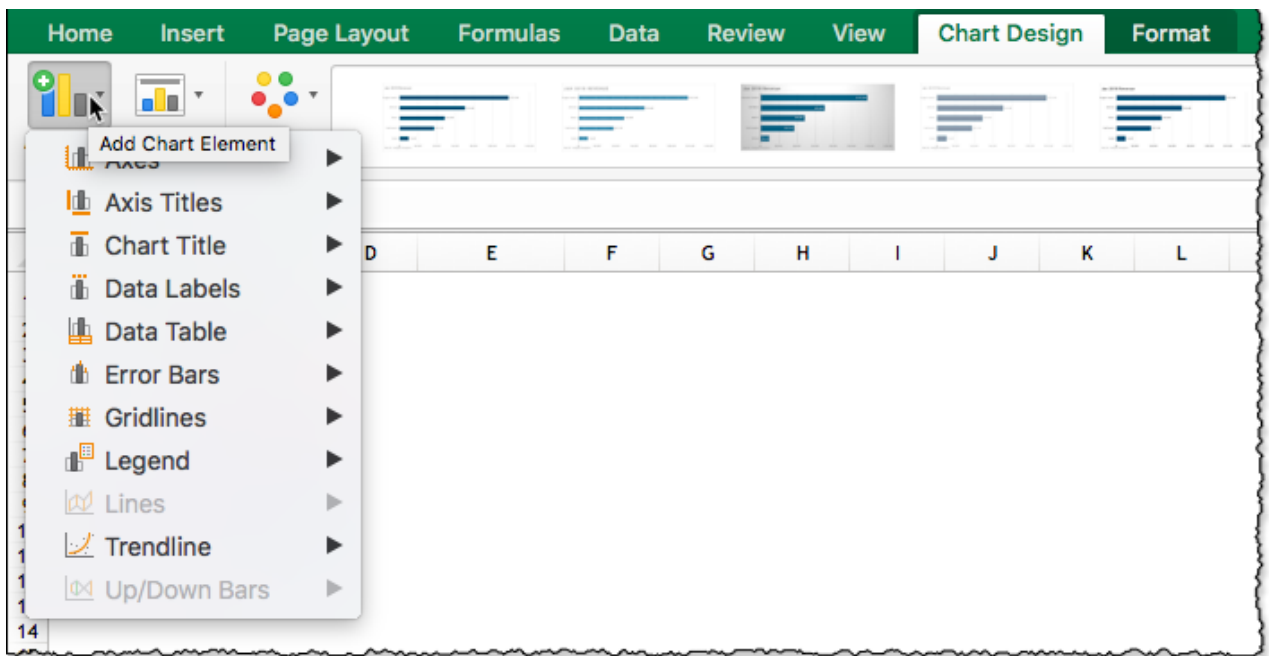

Fig 3.85: Easily add chart elements back into your chart via the Add Chart Element drop-down menu.