Leveraging Color to Improve Your Data Visualization

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This is the second post in a series of guest blog entries by Tableau Public authors for Design Month. Ryan Sleeper is the Manager of Data Visualization & Analysis at Evolytics in Kansas City, Missouri. At TCC13, he won the third annual Iron Viz Championship.

The use of color can help a story in your data pop off the page. Color can add a level of professionalism to any project and can even elicit specific emotions in viewers. The use of color is one of the easiest ways to take your data visualization from good to great – so why do we see so many blue, orange, and green lines out there? Maybe it's that creative design is thought of as unnecessary in a corporate setting. Maybe visualization designers don't realize just how easy it is to set your dashboards apart by introducing some custom color. True, Tableau worked hard to provide standard color options that work very well together, but maybe you need to align your data visualization with your corporate identity or are just looking for a way to help your work stand out. To help you leverage color to improve your data visualization, this post shares an introduction to color theory, provides some examples for you to benchmark against, and points you to a tutorial for loading custom color palettes into your own version of Tableau so you can use them every day.

The Color Wheel: Where it all begins

The color wheel is based off of the primary colors of red, yellow, and blue, with secondary and tertiary colors between each of the three primary colors. This allows a designer to visualize the balance and harmony of colors when they are side by side. The colors on the outside ring of the color wheel below are at full saturation, meaning there is no black or white added. These are referred to as hues. Adding lightness (white) or darkness (black) will result in different tints and shades of each primary, secondary, and tertiary hues. These variations can be seen as you move to the center of the color wheel. Note that some color wheel illustrations you find may have the original hues represented on a middle ring, with darker shades as you move to the outside of the wheel and lighter tints as you move to the center of the wheel.

There are ten basic color schemes that can be derived from the color wheel, but for use with Tableau, I am going to recommend starting with complementary and monochromatic schemes.

A complementary scheme is created whenever two direct opposites on the color wheel are used. This is a great way to start a custom diverging color palette. For example, from the wheel above, you could use blue-violet to represent positive values, and yellow-orange, the color on the exact opposite side of the wheel, to represent negative values. You can also use variations from the inner rings as long as the opposites are on the same ring. A complementary scheme is also a good choice when you are comparing two distinct values of a dimension, such as East vs. West.

A monochromatic scheme is ideal for a custom sequential palette. To create this, simply pick any column of the color wheel, then use any or all of the variations in that same column. In Tableau, this could be used to color the intensity of a measure, such as sales, with darker variations of the color representing higher sales. This type of color scheme is ideal for a heatmap. I also like to use these schemes when comparing year over year values, with the hue representing the current year, and lighter tints representing past years (the older the year, the lighter the tint). Many monochromatic color schemes come standard with Tableau, but maybe you would like to try a different color or control the intensities of a specific color.

The Psychology of Color

If you are looking for help with choosing a color to use in a design, consider what each color means. Thinking about color in this way will not always be necessary, but if your design is themed, using the psychology of color can help your visualization elicit emotional responses in viewers. Here is a brief psychology of each color according to the book Color Harmony Compendium by Terry Marks and Tina Sutton:

RED is the most vibrant color in the spectrum. Not only does it express emotions such as excitement, power, and passion, it brings objects to the foreground. Red is a good choice if you are wanting to illustrate a clear story in your data.

YELLOW is the most visible color and is synonymous with happiness. Yellow also has the advantage of stimulating clear thinking. Using a yellow background with dark type has been proven to aid in retention. Consider using a combination like this when you want your audience to remember one main point from your visualization.

ORANGE, like red, is both a high energy and high visibility color. Even in small amounts, orange can help convey warning signals, which makes it a good choice for KPIs that are performing below expectations. Orange is also a favorite of children, teens, and athletes, so consider this color accordingly if you work with any of those audiences.

GREEN is said to be the most physically relaxing and calming color in the spectrum. It has emerged as a global symbol for safety, so it is no wonder that green is typically associated with positive values in corporate scorecards.

BLUE is the best-liked of all colors. This color is typically perceived as positive, making it an alternative choice for positive values. Blue has the added advantage of being colorblind friendly. Use darker shades of blue to instill a sense of loyalty, trustworthiness, and integrity.

PURPLE, especially darker shades of the hue, exudes luxury. Be careful with this one though – studies have shown that people get less work done around purple because it encourages daydreaming!

PINK, no surprise, is the most feminine color. Pink discourages aggressiveness and has a soothing effect. This color would probably be best-served in a themed visualization, but in certain situations, could also be a good choice for conveying that performance is positive, or at least in-line with expectations.

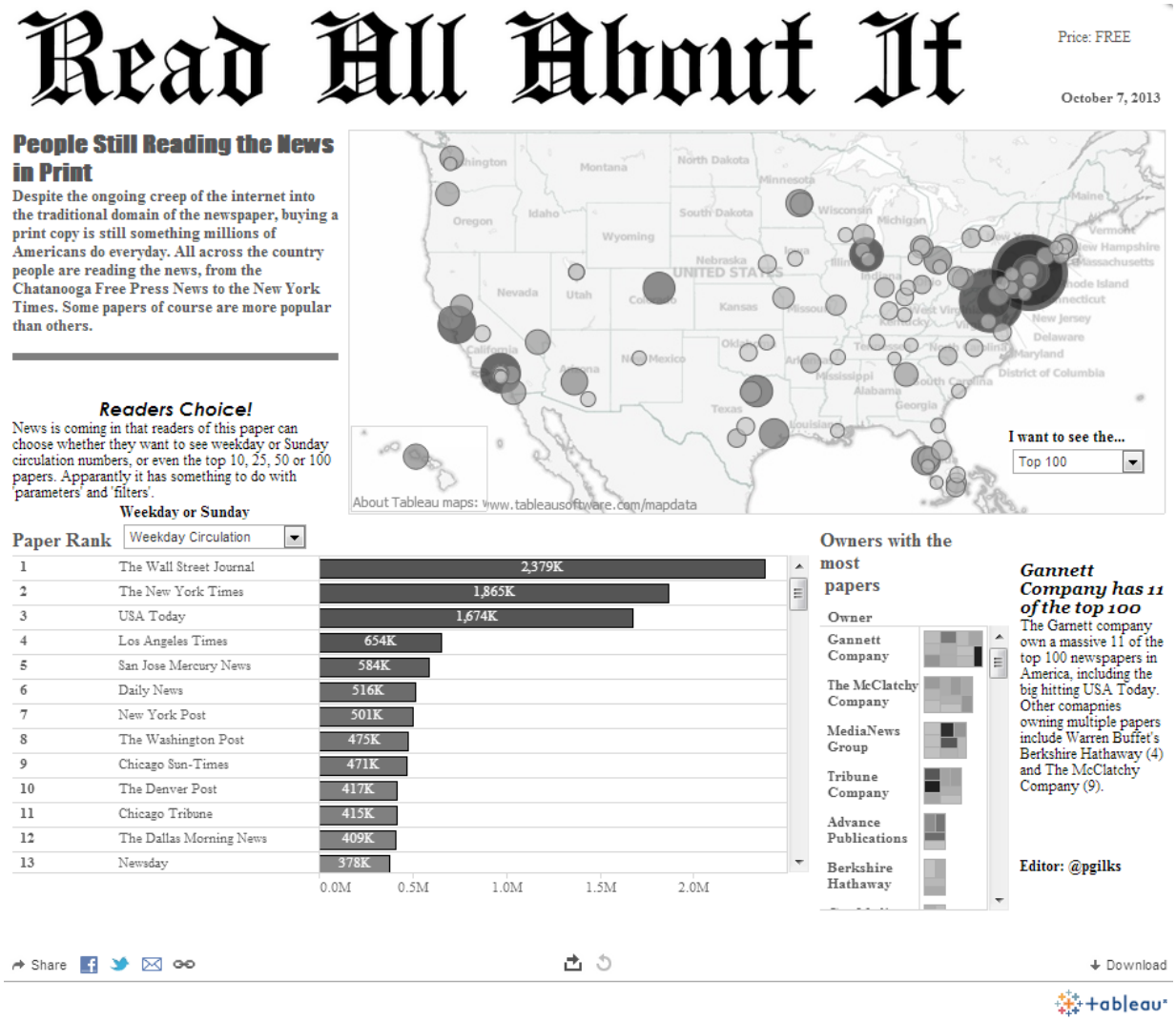
BROWN has been shown to put consumers at ease and is considered timeless. It is also closely associated with the earth, making it ideal for visualizations related to the environment.

GRAY has many similar qualities to brown, but is thought of as less warm when used alone. On the positive side, gray can represent conservative authority. Using it as a complementary color can help instill a feeling of maturity and the associated reliability.

Benchmarking With Tableau Public

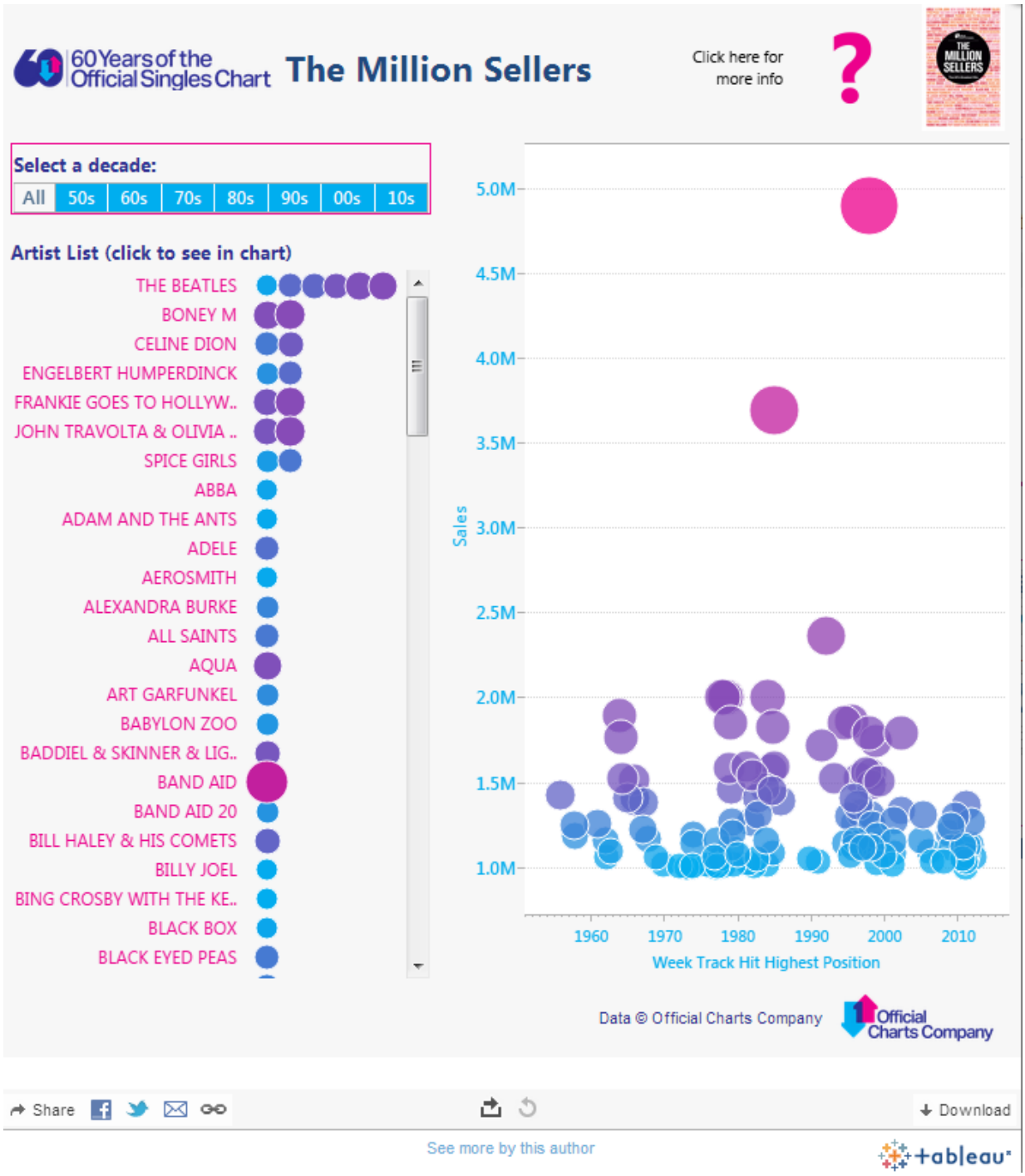
I cannot tell you how many ideas and design nuances I have picked up from the Tableau Public Gallery. Not only are the visualizations featured there a great place to get design inspiration, you can also download any of the workbooks to figure out how they were built. If you haven't already, I also recommend visiting Tableau's Viz of the Day page and subscribing in the top right corner. This RSS feed will drop a top quality data visualization in your inbox every afternoon. Here are just a few great uses of color I found in public visualizations and why I like them.

Read All About It by Peter Gilks



It's ironic that I choose a black and white design as one of my favorite examples as a great use of color, but Peter's newspaper theme is obviously an ideal scenario for this choice. The black and white is referred to as an achromatic scheme, meaning that it is without color. Peter also adds some nice touches including transparency in the map bubbles, borders on the bars, and varying intensity by paper circulation.

The UK's Best Singles by Craig Bloodworth and Andy Cotgreave



I'm a sucker for visualizations that are done in brand and Craig and Andy have used a custom color palette here to pull off the beautiful effect. The Official Charts Company's logo is a textbook analogous scheme, which uses three consecutive hues in the color wheel.

Hello Etsy by Jewel Loree

Jewel promised pink… and we got pink. Was there any other choice for a Hello Kitty-themed visualization? Like Craig and Andy above, Jewel also used a custom color palette to create this attention-grabbing design. As a bonus, she used a complementary scheme to create a custom sequential color palette to color the intensity of values throughout the dashboard.

Using Custom Color Palettes in Tableau

Now that you have some guidance on which colors to use in your designs, I will close by sharing a way to help you put the use of color into practice. In addition to the custom colors that can be entered as RGB or HSL values by clicking any color in a color legend, Tableau also makes it possible to load custom color palettes that can be saved for permanent use in your own version of Tableau. Tableau allows you to integrate three different types of custom color palettes: categorical, sequential, and diverging. If you have specific colors that you would like to have available to you while you design, start by looking up the hex values for those colors. Once you have the values, all you need to do is add a short snippet of code that includes the hex values in the preferences.tps file in your Tableau Repository. There is a great article in Tableau's Knowledge Base showing you exactly what this looks like.

Use these methods for choosing and using color and your visualizations will be standing out in no time! The great team over at Viz of the Day would love to see your innovative use of color, so nominate a design to share your example with the rest of us.