

# Visual Design Building Blocks

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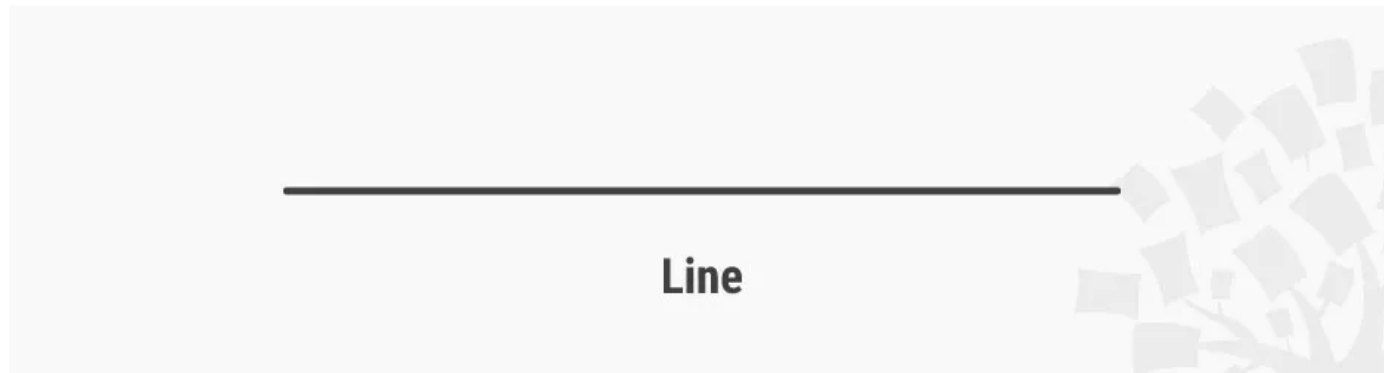


- Visual design is about creating and making the general aesthetics of a product consistent.
- *Fundamental elements of visual design is needed to create the aesthetic style , arranging them according to principles of design.*
- *These elements and principles together form the building blocks of visual design, and a firm understanding of them is crucial in creating a visual design of any product.*

# **Elements of Visual Design**

# Line

- Lines are strokes connecting two points, and the most basic element of visual design.
- Use line to create shapes, and when repeated it can form patterns that create textures.



- *A line connects two points and is the simplest element of design.*
- lines can possess a large variety of properties that allow us to convey a range of expressions. For example, lines can be thick or thin, straight or curved, have uniform width or taper off, be geometric (i.e., look like they are drawn by a ruler or compass) or organic (i.e., look like they are drawn by hand).



**Geometric, uniform  
width line**



**Organic, non-uniform  
width line**

- *Lines are simple, but can convey different emotions by using different properties.*



- A line can also be implied: that is, *suggested* by forming an invisible connection between other elements. In the logo of the Interaction Design Foundation, for instance, the words “Interaction Design Foundation” around the tree connect to create a semicircular implied line.



*The words “Interaction Design Foundation” form an implied semicircular line in our logo.*

# Shape

- Shapes are self-contained areas, usually formed by lines (although they may also be formed by using a different colour, value or texture).
- A shape has two dimensions: length and width.



**Shape**

- *We can form shapes using lines, or by using differences in colour, texture or value.*

# Negative/White Space

- Negative space (also known as white space) is the empty area around a (positive) shape.
- The relation between the shape and the space is called figure/ground, where the shape is the figure and the area around the shape is the ground.
- When designing positive shapes, it designs also negative spaces at the same time.
- Negative space is just as important as the positive shape itself — because it helps to define the boundaries of the positive space and brings balance to a composition.

**Ground  
(negative space)**

**Figure  
(positive shape)**



- Negative space, also called white space, is the empty area around a positive shape. You can choose to see this as a blue ball set against a light blue rectangle — or, is it a light blue rectangle with a hole in it?

- Some designs make use of negative space to create interesting visual effects. For example, the famous World Wide Fund for Nature (WWF) logo makes use of the confusion between positive shape and negative space to create the image of a panda.



*WWF's logo doesn't explicitly draw out the entire panda: it cleverly uses negative (white) space around the black shapes to suggest the rest of the panda.*

# Volume

- Volume applies to visuals that are three-dimensional and have length, width and depth. We rarely use volume in visual design, because most digital products end up being viewed on a 2D screen, although some apps and websites do use 3D models and graphics. (Technically, though, 3D images viewed on a 2D screen are still 2D images.)



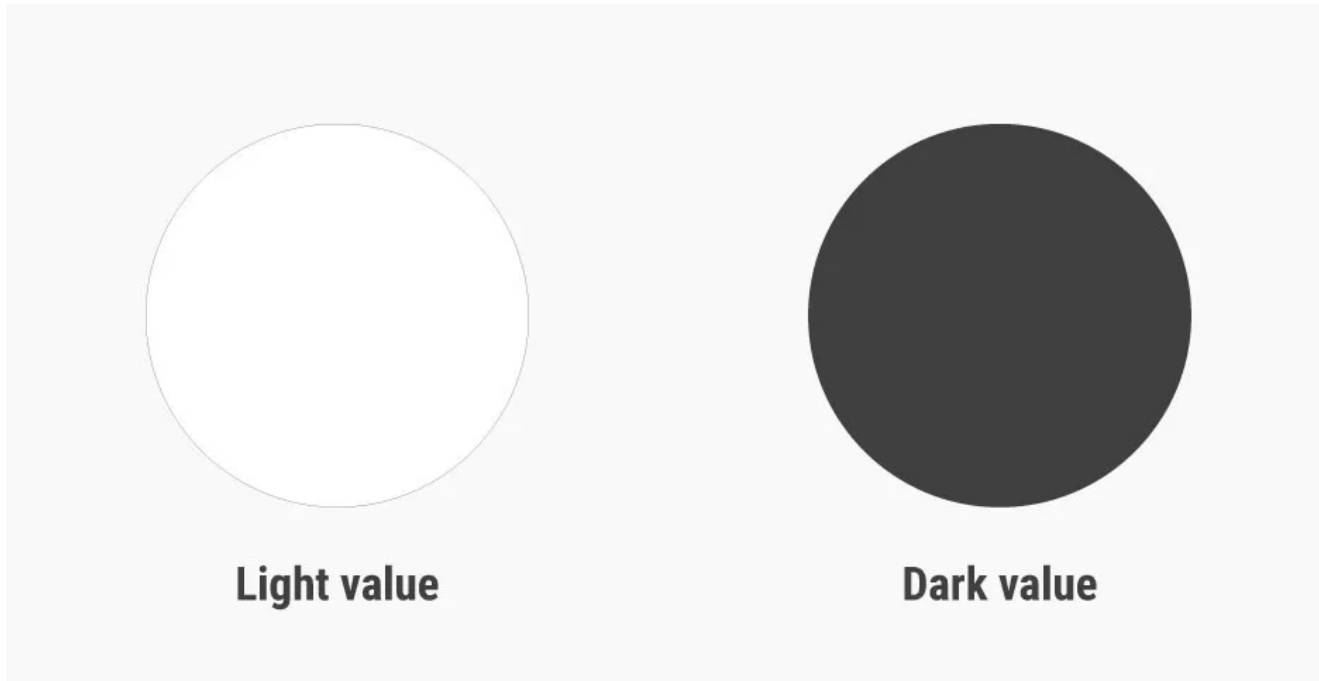


**Volume**

*Volume has 3 dimensions: length, width and depth. This image is a simulation of volume in 2D graphics.*

# Value

- Value, quite simply, describes light and dark.



*Light value vs. dark value: value describes lightness and darkness.*

- A design with a high contrast of values (i.e., one which makes use of light and dark values) creates a sense of *clarity*, while a design with similar values creates a sense of *subtlety*.
- We can also use value to simulate volume in 2D, for instance, by using lighter values where the light hits the object and darker values for shadows.

**Clarity**

**Subtlety**

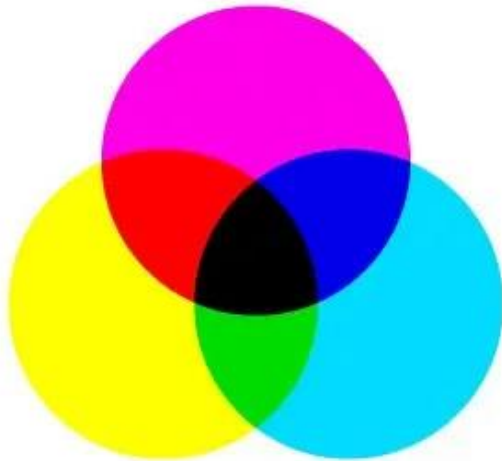
*Differences in values create clear designs,  
while designs using similar values tend to look  
subtle.*

# Colour

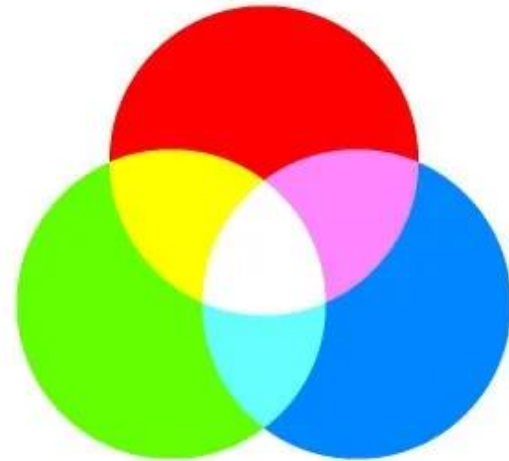
- Colour is an element of light. Colour theory is a branch of design focused on the mixing and usage of different colours in design and art.
- In colour theory, an important distinction exists between colours that mix subtractively and colours that mix additively.

- In paint, colours mix *subtractively* because the pigments in paints absorb light.
- When different pigments are mixed together, the mixture absorbs a wider range of light, resulting in a darker colour.
- A subtractive mix of cyan, magenta and yellow will result in a black colour.
- A subtractive mix of colours in paint and print produces the CMYK (i.e., **C**yan, **M**agenta, **Y**ellow and **black**) colour system.

- In digital design, where the product shows up on a screen, colours mix *additively*, since the screen emits light and colours add to one another accordingly.
- When different colours are mixed together on a screen, the mixture emits a wider range of light, resulting in a lighter colour.
- An additive mix of red, blue and green colours on screens will produce white light. An additive mix of colours on digital screens produces the RGB (i.e., **R**ed, **G**reen, **B**lue) colour system.



**Subtractive mix  
(in print)**



**Additive mix  
(on screen)**



- *The subtractive mix of colours in paint and print produces the CMYK colour system. The additive mix of colours on digital screens produces the RGB colour system.*

- Use colours in visual design to convey emotions in and add variety and interest to our designs, separate distinct areas of a page, and differentiate our work from the competition.

# Texture

- Texture is the surface quality of an object.



**Texture**

*Texture can be created by a repeated pattern of lines, or by using tiled images of textures. Above, the diagonal lines add a 'grip' effect to an otherwise 'smooth' rectangle.*

- two types of textures: *tactile* textures, where you can feel the texture, and *implied* textures, where you can only see — i.e., not feel — the texture.
- Most visual designers will work with implied textures, since screens (at least as far as the state of the art had pushed them by the mid-2010s) are unable to produce tactile textures.

# Read Yourself Slide

- The app icon designs in iOS 6 and earlier mimic the glossy texture of glass to incite users to tap them.
- Later, Apple (in)famously introduced a linen fabric texture to much of its user interface.
- With the popularity of flat design (a minimalist style that features clean spaces and two-dimensional, flat illustrations), the use of textures in visual design would greatly decrease by the mid-2010s — although they can still be very useful.



- *iOS 1-6 app icons feature a glossy texture so that they look like actual buttons.*



*Around 2011, Apple introduced a widespread use of linen texture (which first appeared on iOS) in all of its operating systems.*

# Principles of Design

- The elements of visual design — line, shape, negative/white space, volume, value, colour and texture — *describe* the building blocks of a product's aesthetics.
- On the other hand, the principles of design tell us *how* these elements can and should go together for the best results.
- Many of the principles below are closely related and complement one another.

- Partner and chief research and development officer at the Applied Management Sciences Institute William Lidwell, in his landmark and widely referenced book *Universal Principles of Design*, explains:
- “The best designers sometimes disregard the principles of design. When they do so, however, there is usually some compensating merit attained at the cost of the violation. Unless you are certain of doing as well, it is best to abide by the principles.” – William Lidwell



# Unity

- Unity has to do with creating a sense of harmony between all elements in a page. A page with elements that are visually or conceptually arranged together will likely create a sense of unity.



**Unity**



**Lack of unity**

*A lack of unity in designs can create a sense of unease and chaos. Our eyes govern our judgements.*

# Gestalt

- Gestalt refers to our tendency to perceive the *sum* of all parts as opposed to the individual elements.
- The human eye and brain perceive a unified shape in a different way to the way they perceive the individual parts of such shapes.
- In particular, we tend to perceive the overall shape of an object first, before perceiving the details (lines, textures, etc.) of the object.



## Gestalt

*Gestalt is the reason that we can see a square, circle and triangle even though the lines are not complete. We see the whole formed by the dotted lines first, before perceiving the separate dotted lines in each of the images.*

- The WWF logo, shown earlier, is an example of making use of the principle of gestalt to create interesting designs. By placing the parts of a panda near one another and strategically, the design makes use of our tendency to view the whole of an image rather than its parts, thereby creating an illusion of a panda.

*Designs with clear sections are easier to process and scan than those without clear distinctions between sections — especially if the sections are conceptually distinct.*



**Clear distinctions  
between sections**



**Lack of distinctions  
between sections**

# Hierarchy

- Hierarchy shows the *difference in importance* of the elements in a design. Colour and size are the most common ways we can create hierarchy — for instance, by highlighting a primary button, or using larger fonts for headings.
- Items that appear at the top of a page or app also tend to be viewed as having a higher hierarchy than those appearing below.

# **Large header is clearly important**

Smaller subtitle is of secondary importance, and will only be read after  
the header

*Font size and style is one of the ways to  
establish hierarchy.*

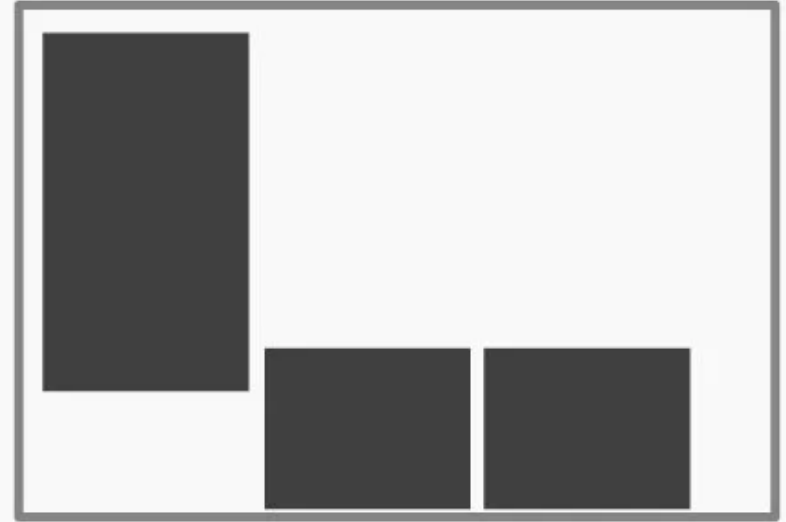


# Balance

- Balance is the principle governing how we distribute the elements of a design *evenly*. Balanced designs tend to appear calm, stable and natural, while imbalanced designs make us feel uneasy.



**Balance**



**Imbalance**

*Balanced designs appear stable, while imbalanced designs seem unsustainable and unnatural.*

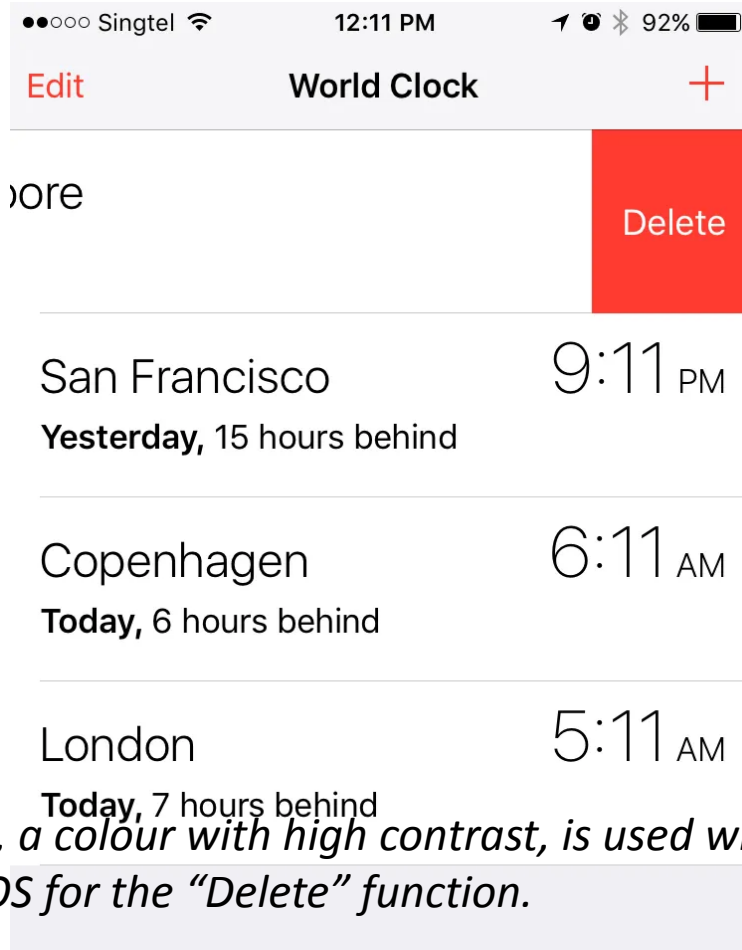
# Read Yourself Slide

- Balance can be achieved by having symmetry in the design (for instance, having a webpage with centralised text and images). However, you can also achieve balance *without* symmetry — perhaps unsurprisingly, this is known as asymmetrical balance. We achieve asymmetrical balance when we arrange differently sized elements in a way that results in unity. We can imagine a centre point of the design and distribute the elements in a way that creates balance.

# Contrast

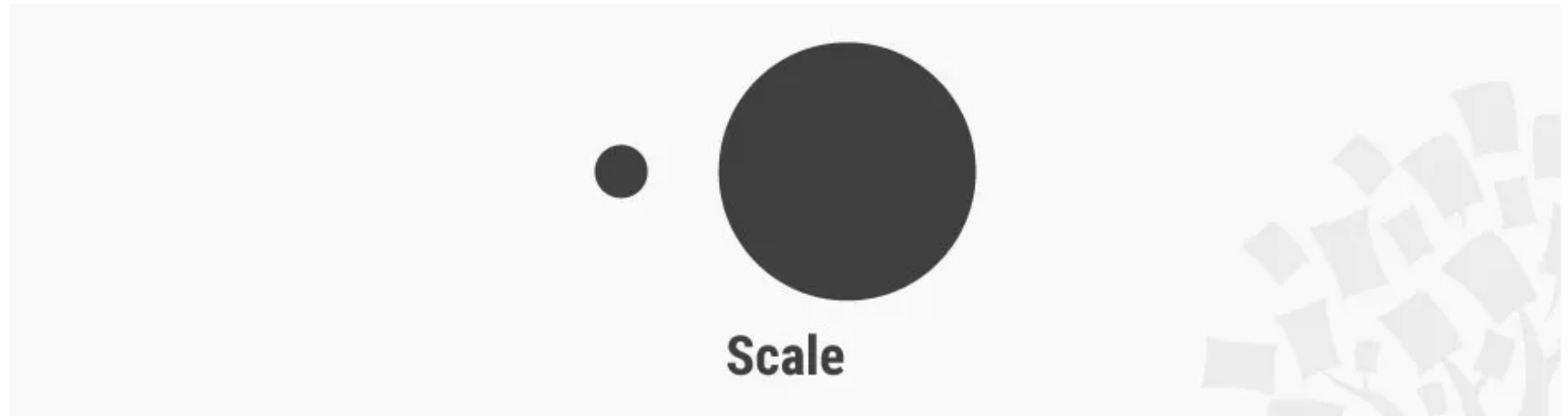
- use contrast to make an element *stand out* by manipulating differences in colour, value, size and other factors.
- For instance, as designers (be it in logo design, UI design, etc.), we often use the colour red to make certain elements stand out.
- In iOS, red often appears in the “Delete” action to signify that an (often) irreversible action is about to occur.

- On the other hand, green is often something we use (at least in Western design) in positive actions such as “Go” and “Accept” — thus highlighting that we cannot ignore the cultural meaning of colours when designing for contrast.
- If you’re designing for a client in a far-off land, learn about and adjust your work to conform to the cultural considerations. For instance, ask yourself, “Is their red lucky or angry?” or “Is their black businesslike or funerary?”



# Scale

- Scale describes the *relative sizes* of the elements in a design. By using scale to make an element larger than others appearing with it, you can *emphasise* that element.
- Not only can you make an element stand out this way—you can also use scale to create a sense of *depth* (since nearer objects appear larger to the human eye).
- Exaggerated scales of images also add a certain level of interest and drama to them.



Scale can be used to create a hierarchy for and add emphasis to certain elements on a design.



# Dominance

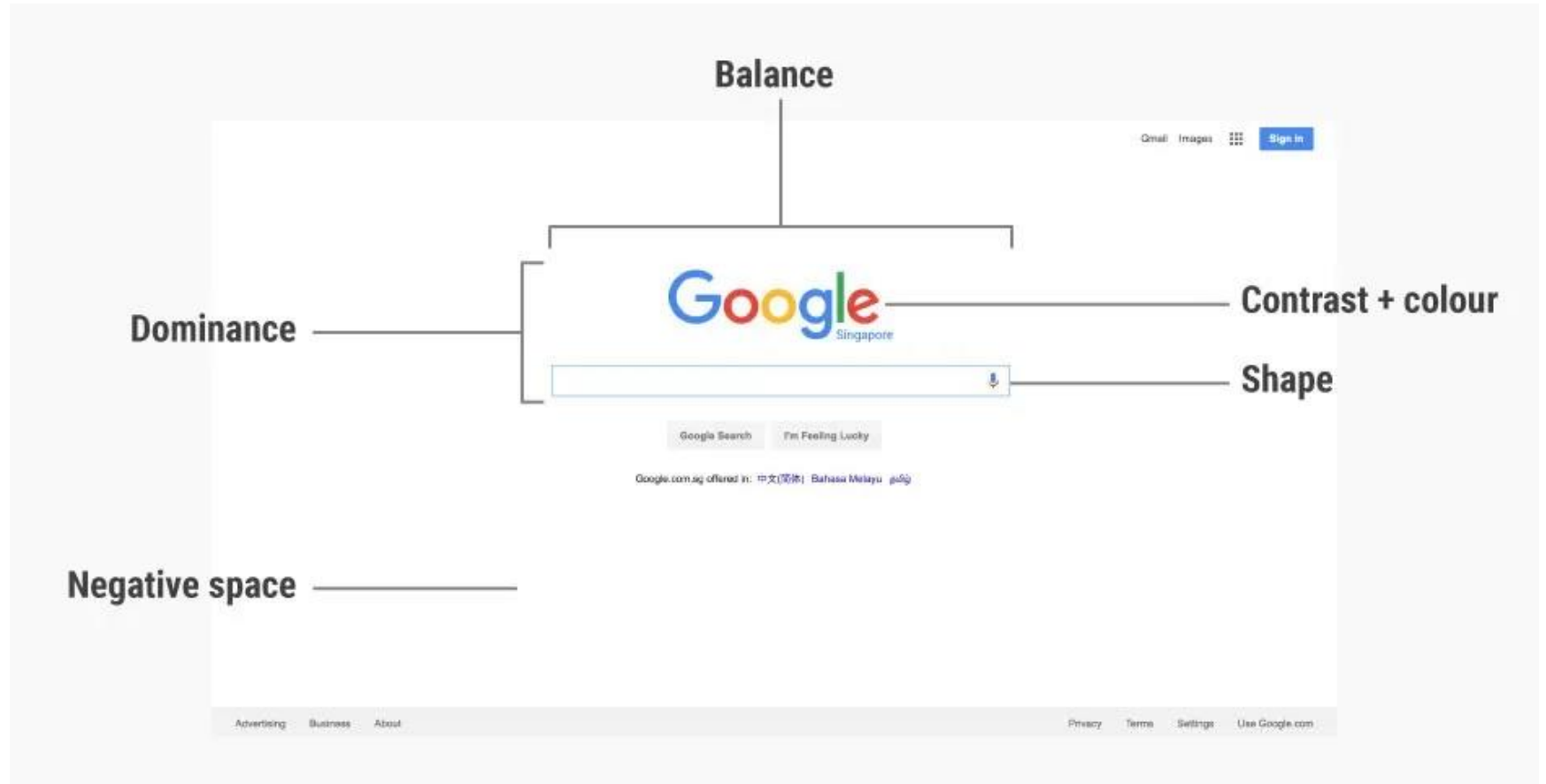
- Dominance creates *focus* on a *single* element. We can use colour, shape, contrast, scale, and/or positioning to achieve this. For instance, most websites have a main “hero” image, which uses dominance to appeal to users, drawing them to it naturally.



**Dominance**

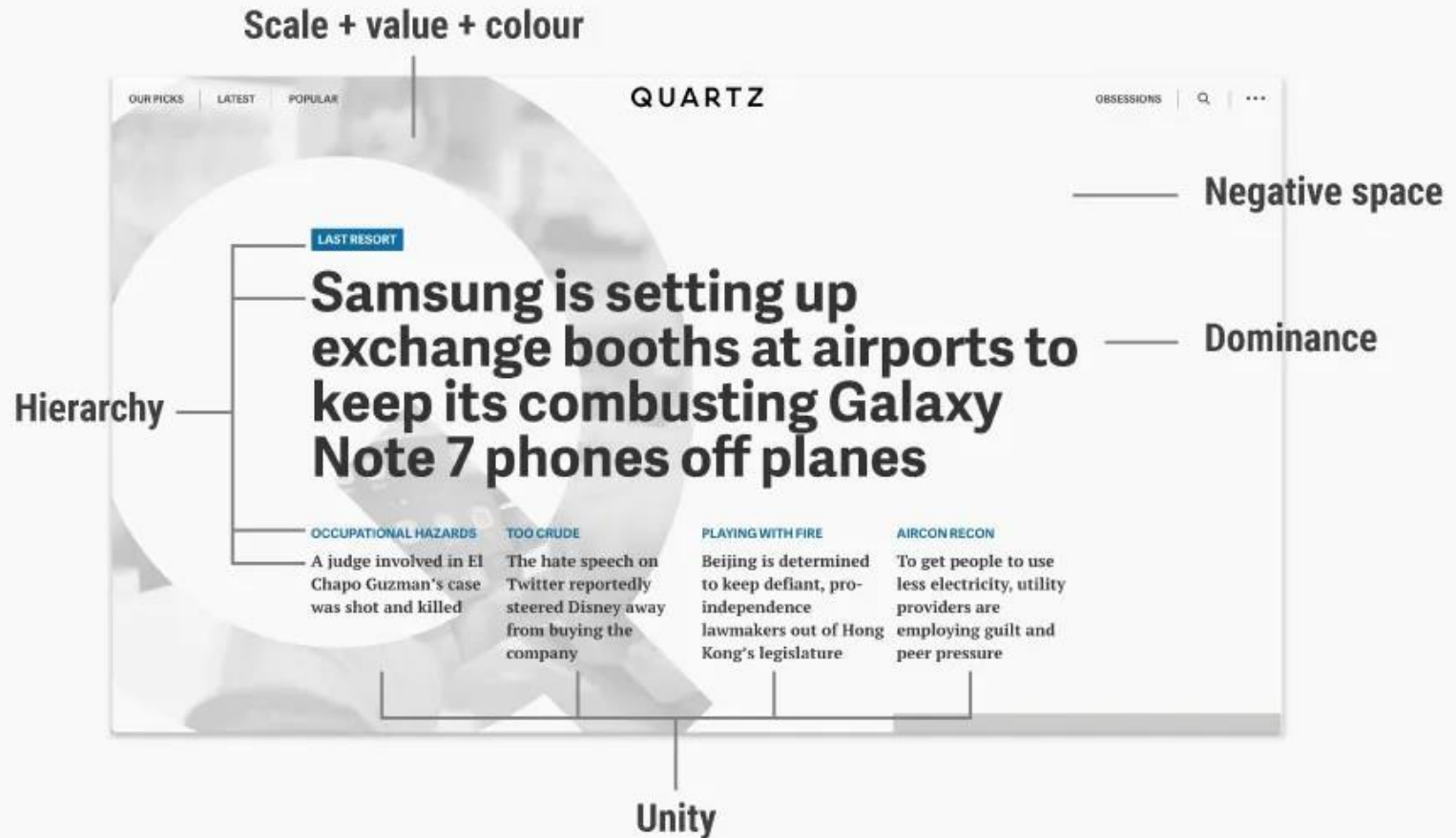
*Dominance can be established by using positioning, shape and colour, among many other factors.*

# Revisiting



- **Dominance:** The large Google logo and search box gives it dominance, making it the core (and to most, sole) focus of the entire page.
- **Contrast (and colour):** Google's logo uses bright (mostly primary) colours, and these mix well, forming a visually pleasing logo. The logo also has sufficient contrast against a white background, making it stand out on the page.
- **Shape:** The search box uses a rectangular shape to delineate the search field, making it very usable.
- **Negative space:** Google's homepage is predominantly made out of negative space, which makes the search box (the main function of the page) the centre of attention. The negative space also works well for the page, as it acts like a blank sheet of paper before users type in their search terms.
- **Balance:** The page is almost vertically symmetrical, resulting in a sense of balance that is very pleasing and calm to look at.

# Quartz's homepage



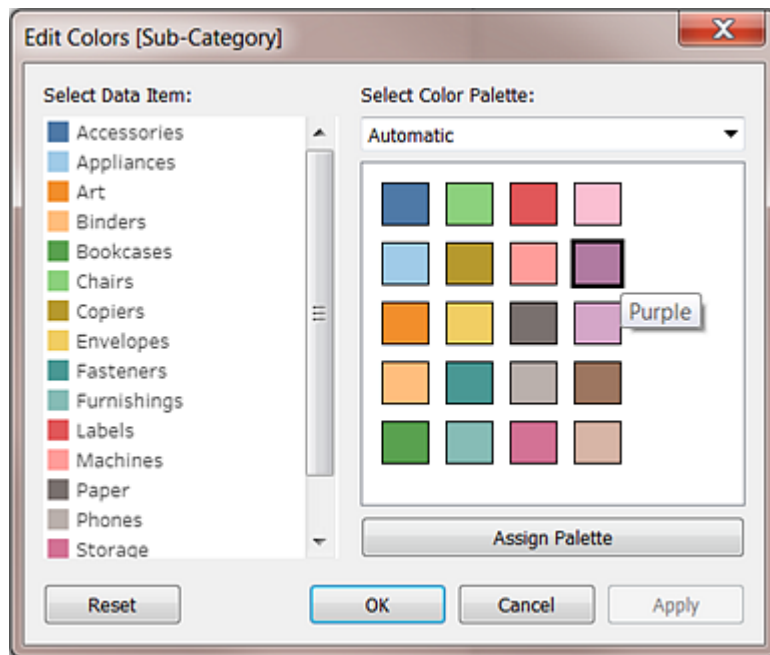
- *It's easy to admire the effect as a whole without looking past it at the nuts and bolts—the elements that are set together so well and according to age-old principles so as to create that 'wow' effect.*
- **Dominance:** The main news story immediately catches your eyes because its large, bold font makes it dominant on the homepage.
- **Hierarchy:** The homepage uses a clear hierarchy to establish the relative importance of various elements. The main story, with the largest text and bolded weight, has the highest hierarchy. The next four stories, positioned below the main story, have smaller fonts to show their subordinate hierarchy under the main story.
- **Scale, value and colour:** Quartz's homepage features a large (full page height) "Q", which is a mask of the hero image for the main story. The large "Q" quickly establishes the identity of the website (since "Q" stands for "Quartz") with the use of scale. However, the relative light value and greyscale colour of the "Q" makes it fade into the background, thus bringing the overall focus to the headline of the main story instead.
- **Negative space:** Most of the homepage is negative space, which allows the content to shine through. When the mouse is brought over the main story headline, the "Q" mask disappears, filling the negative space with the featured image. This is an example of how a unique play of negative space can stimulate interest in a website's design.
- **Unity:** Quartz uses a grid system in its website to create a sense of unity. For instance, the four stories have equal width and are uniformly spaced, creating a sense of orderliness and structure.

# Color Palettes and Effects

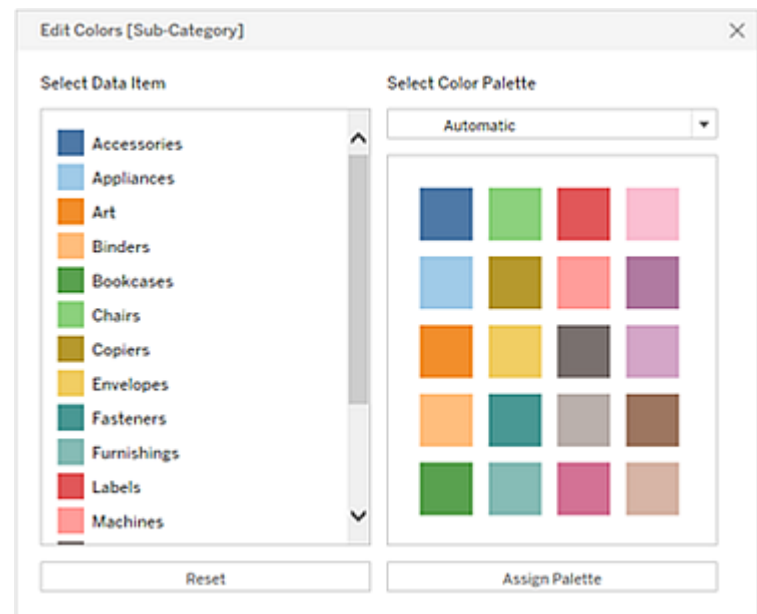
- All marks have a default color, even when there are no fields on **Color** on the **Marks** card. For most marks, blue is the default color; for text, black is the default color in tableau.

- Categorical Palettes
  - When you drop a field with discrete values (typically a dimension) on **Color** on the **Marks** card, Tableau uses a categorical palette and assigns a color to each value of the field.
  - Categorical palettes contain distinct colors that are appropriate for fields with values that have no inherent order, such as departments or shipping methods.

## Tableau Desktop version



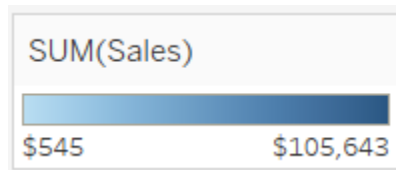
## Web version





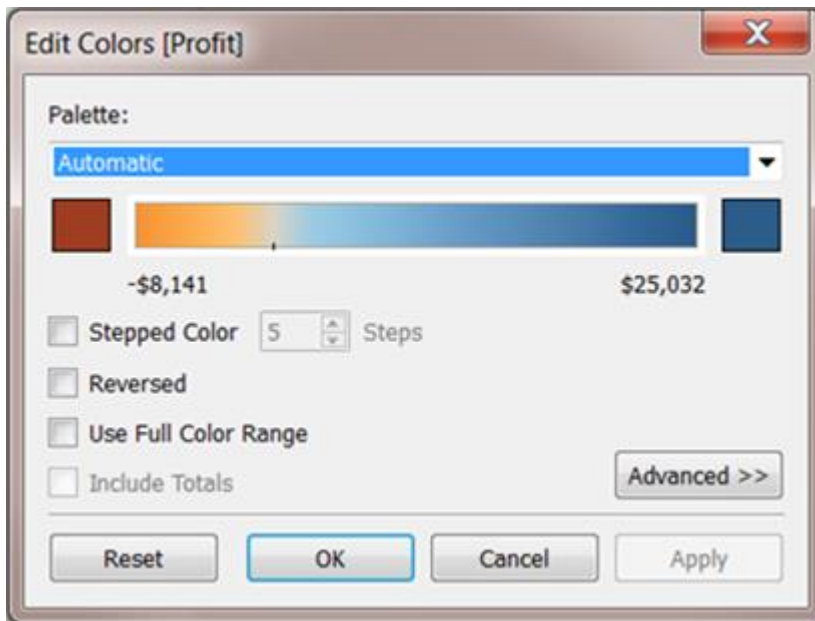
# Quantitative Palettes

When you drop a field with continuous values on the **Marks** card (typically a measure), Tableau displays a quantitative legend with a continuous range of colors.

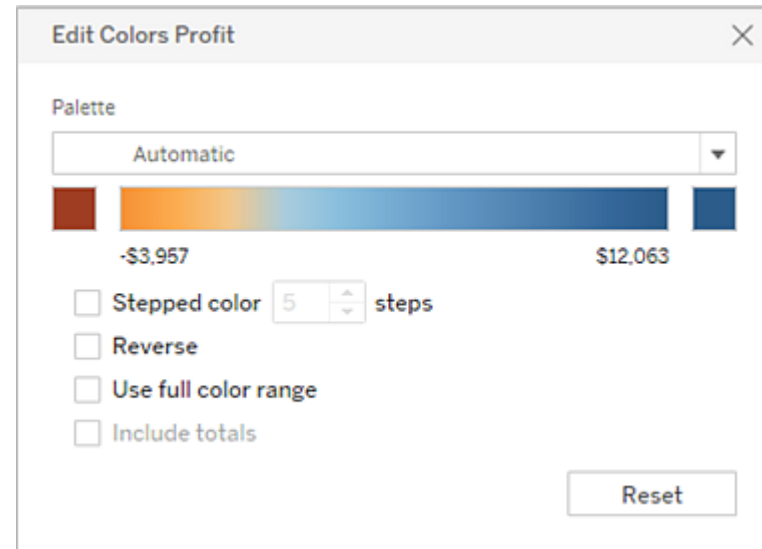


- To edit colors, click in the upper right of the color legend.
- In Tableau Desktop, select **Edit Colors** from the context menu.
- In Tableau Server or Tableau Online, the Edit Colors dialog opens automatically.

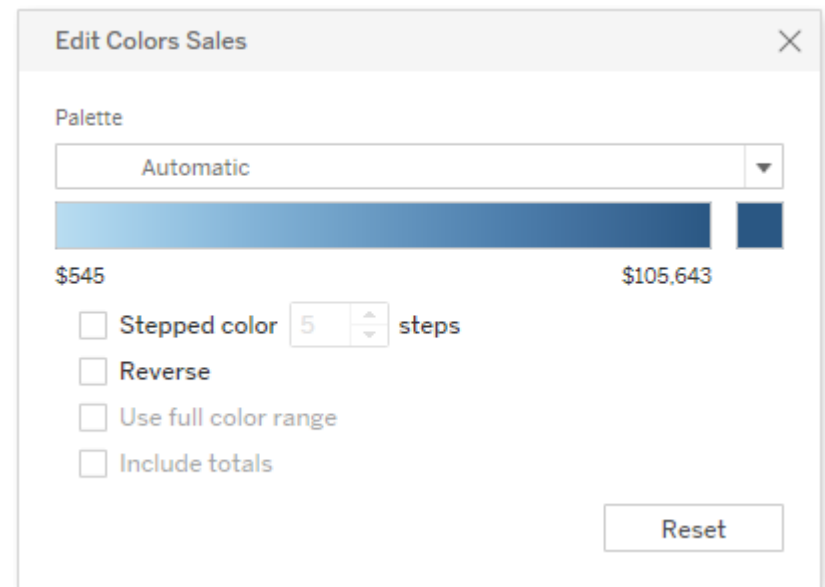
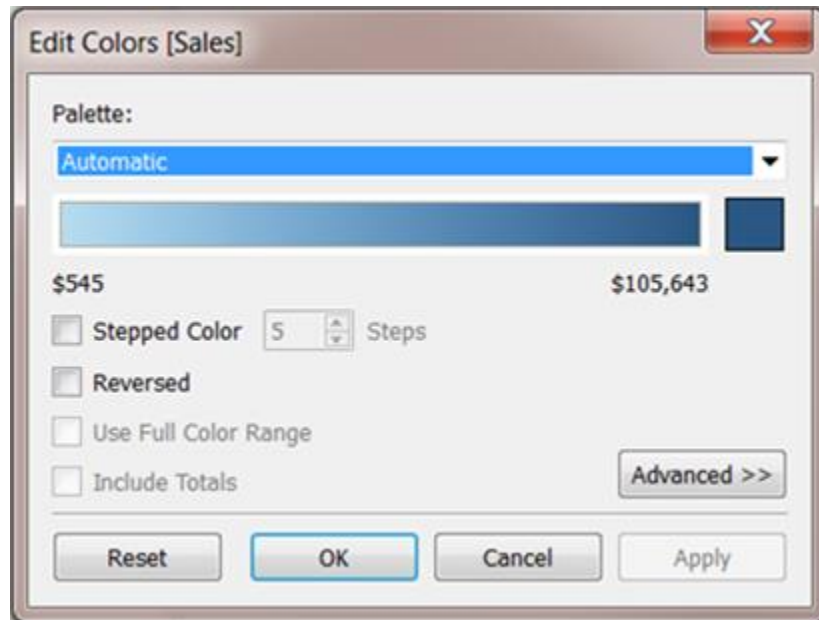
## Tableau Desktop version



## Web version



- When all values are either positive or negative, the default range of values will use a single color range and the Edit Colors dialog box for the field has a square color box only at the right end of the range. This is known as a sequential palette.

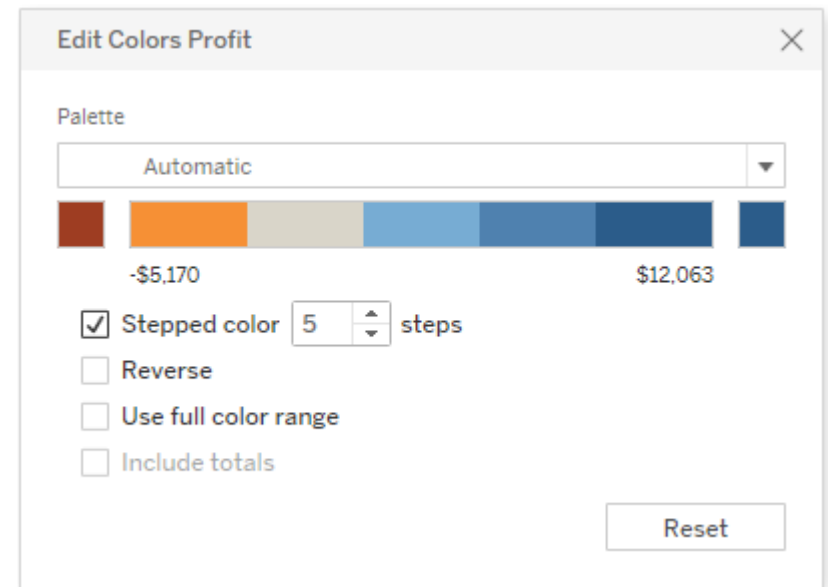
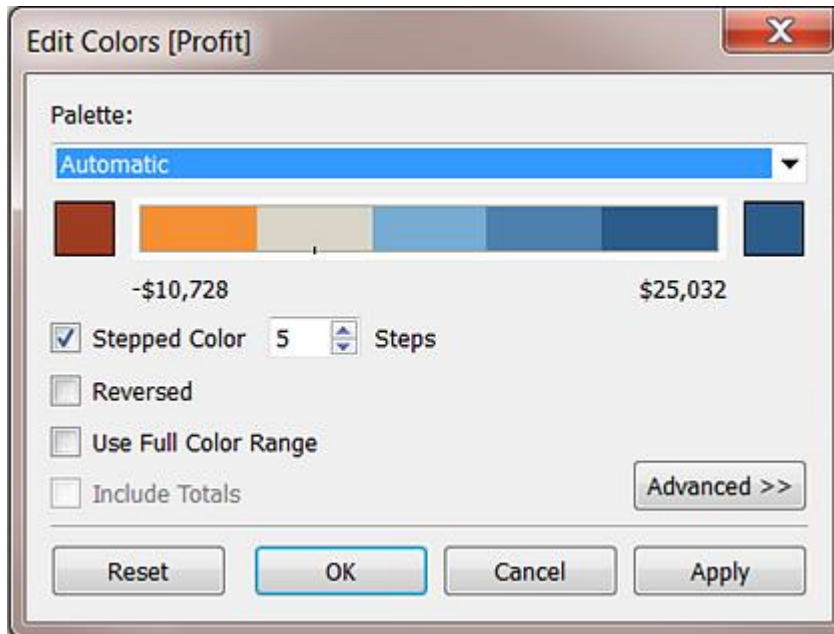


## *Read Yourself Slide*

- The **Palette** drop-down list provides a range of color palettes from which you can choose. There are two types of quantitative palettes available for continuous fields:
  - All palettes with *Diverging* in the name are diverging quantitative palettes—for example, *Orange-Blue Diverging*.
  - You can choose a diverging palette for any continuous field—it isn't necessary for the range of values to contain both positive and negative numbers.
  - To change the colors for a diverging palette, click one of the square color boxes at either end of the palette spectrum. Depending on whether you are authoring in Tableau Desktop or on the web, do one of the following:
    - In Tableau Desktop, in the color configuration dialog box (which is part of your computer's operating system), select a color from the color picker or enter custom values.
    - In Tableau Server or Tableau Online, enter a custom Hex value in the **Custom Color** field. If the value isn't valid, no changes are made.
  - All other palettes are sequential quantitative palettes. To change the colors for a sequential palette, click the square color box at the right end of the palette spectrum to either open the color configuration dialog box (Tableau Desktop), or enter a custom Hex value in the **Custom Color** field (Tableau Server or Tableau Online).

# Options for quantitative palettes

- Stepped Color
  - Select **Stepped Color** to group values into uniform bins, where each bin is associated with a color. Use the spin control to specify how many steps (bins) to create.
  - For example, for a range of values from 0 to 100 you could specify five steps to sort values into five bins (0-20, 20-40, etc.).



If a diverging color palette is selected, the point where the palette transitions between colors is shown on the color ramp with a small black tick mark. When the number of steps is odd, the mark is placed in the middle of the transitional step. When the number of steps is even, the mark is placed at the boundary between the steps where the color changes.

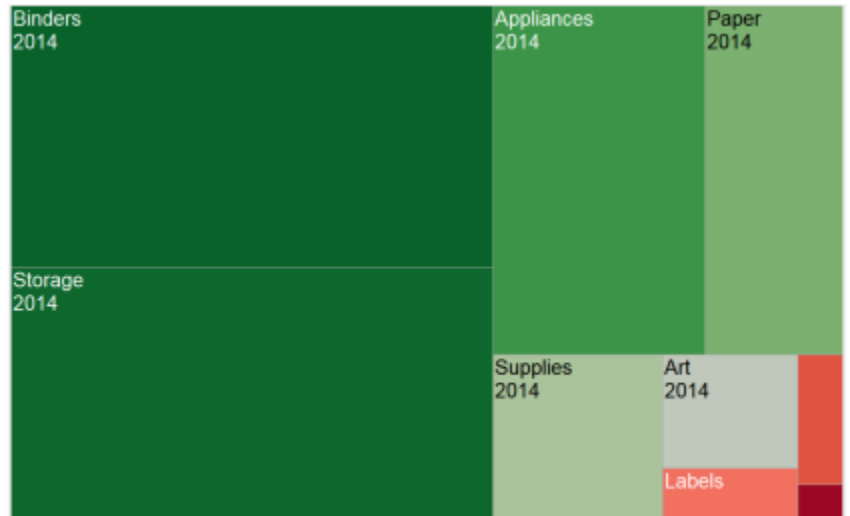
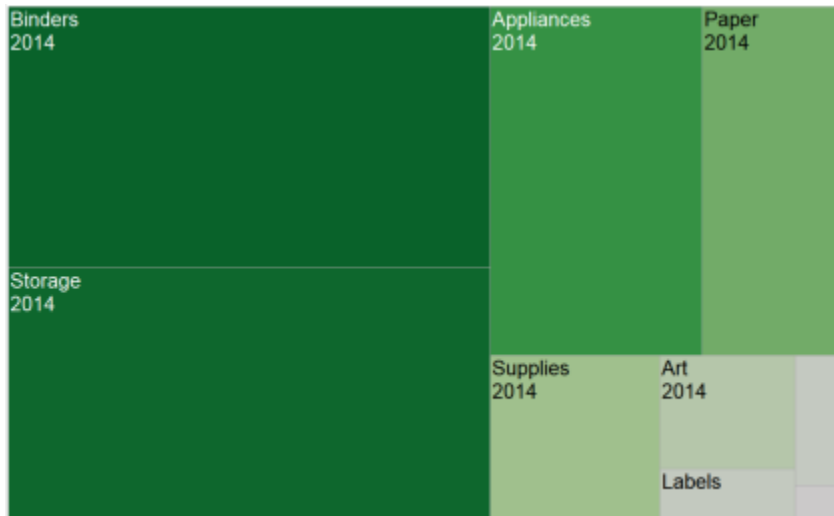
- Reversed

- Select **Reversed** to invert the order of colors in the range. For example, if you want lower values to have a darker intensity in a sequential palette, reverse the palette. For a diverging palette, reversing the color palette means swapping the two colors in the palette, in addition to inverting the shades within each color range.



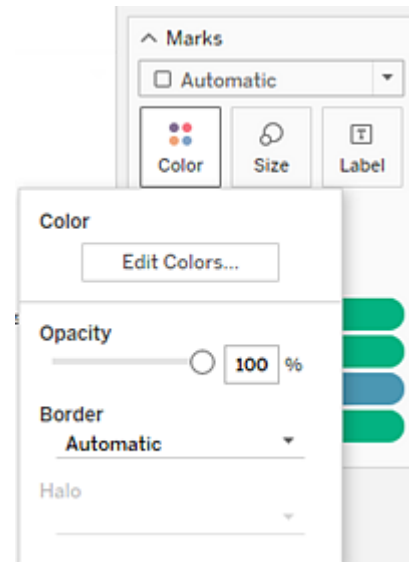
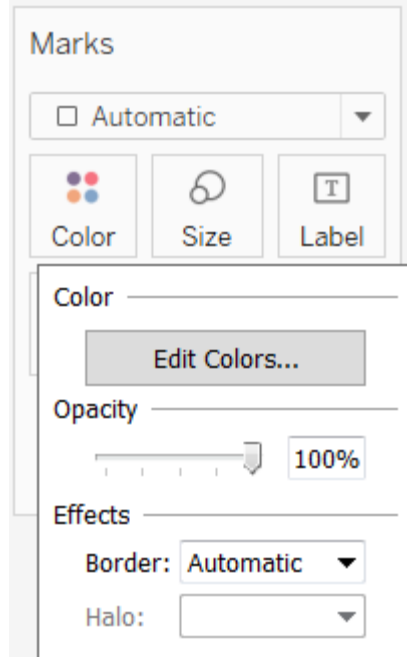
- Use Full Color Range
- With a diverging (two-color) palette, you can select to **Use Full Color Range**.
  - So if the range is from -10 to 100, the color representing negative numbers will be adjusted to change in shade much more quickly than the color representing positive numbers.
  - If you don't select **Use Full Color Range**, Tableau assigns the color intensity as if the range of values was from -100 to 100, so that the change in shade is the same on both sides of zero.
  - This means there will be much less change on the negative side, where actual values only range from -10 to 0, than on the positive side, where values range from 0 to 100.

- The image on the left below shows a red-green diverging color palette for values from -858 to 72,986.
- Without using the full color range, -858 (associated with the small box at the lower right of the chart) shows as gray, because -858 is only about 1% as far to the negative side as 72,986 is to the positive side.
- When the full color range is used, as in the image on the right, -858 shows as a dark red, equal in intensity to the maximum positive value.



- Include totals
- Select **Include Totals** to include totals, sub-totals and grand totals in the color encoding. This option only applies when total values are included in the view.

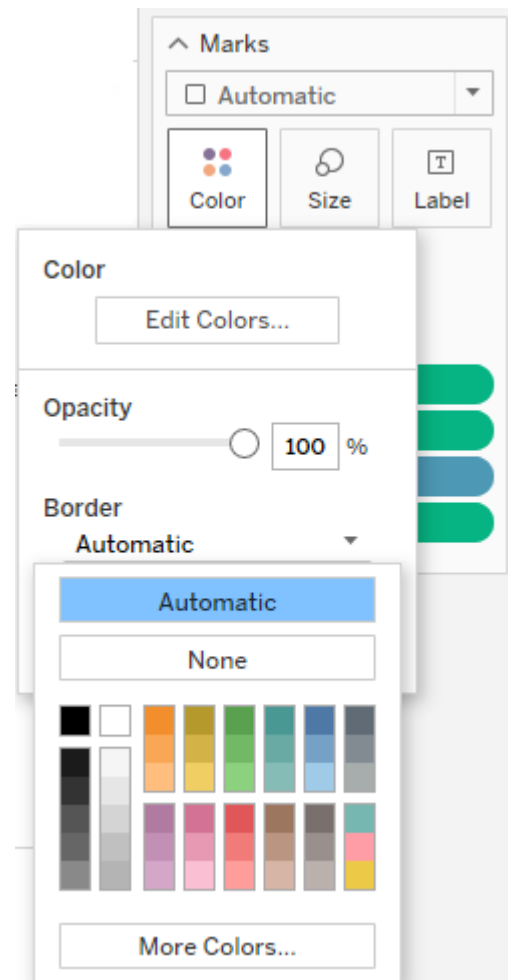
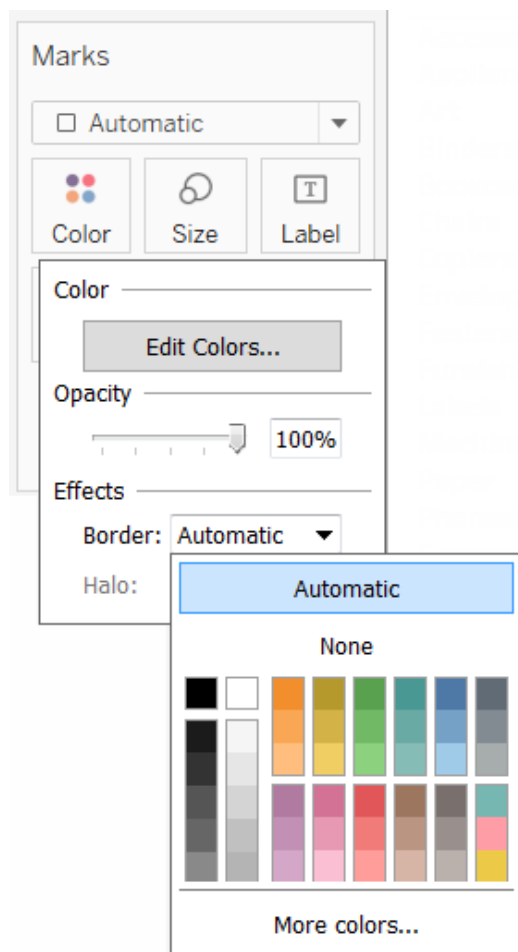
- Configure Color Effects
  - Click the **Color** drop down on the **Marks** card to configure additional **Color** settings not related to the actual colors shown.



# Opacity

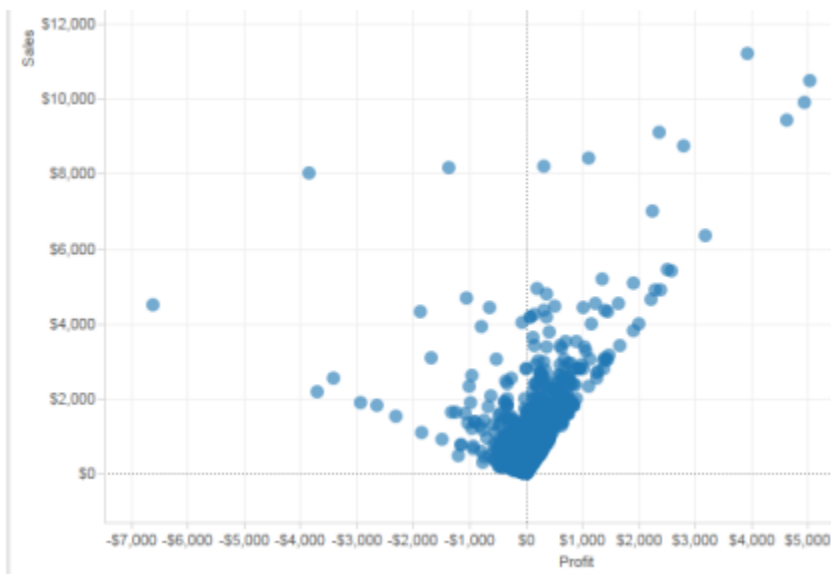
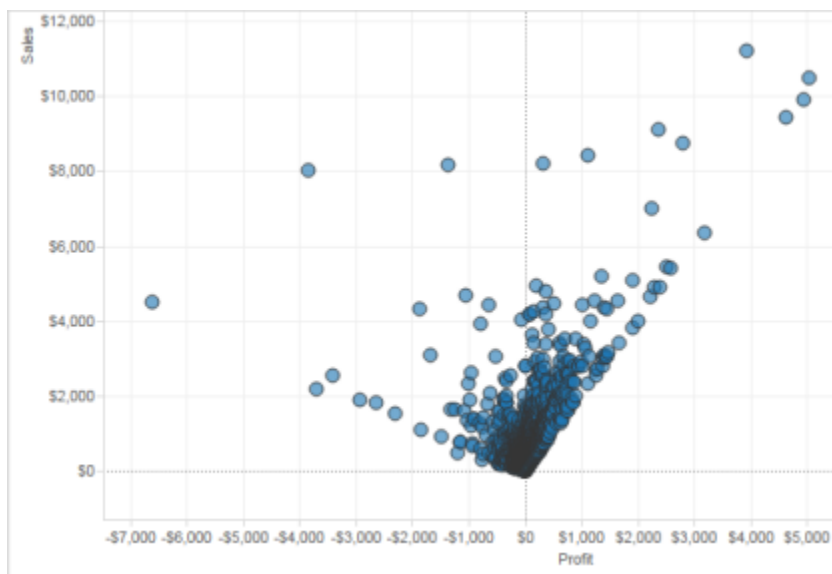
- Modify the opacity of marks by moving the slider.
- Adjusting opacity is especially useful in dense scatter plots or when you are looking at data overlaying a map or background image. As you slide the slider toward the left, marks become more transparent.
-

- Mark borders
- By default, Tableau displays all marks without a border. You can turn on mark borders for all mark types except text, line, and shape. On the **Color** drop-down control, select a mark border color.



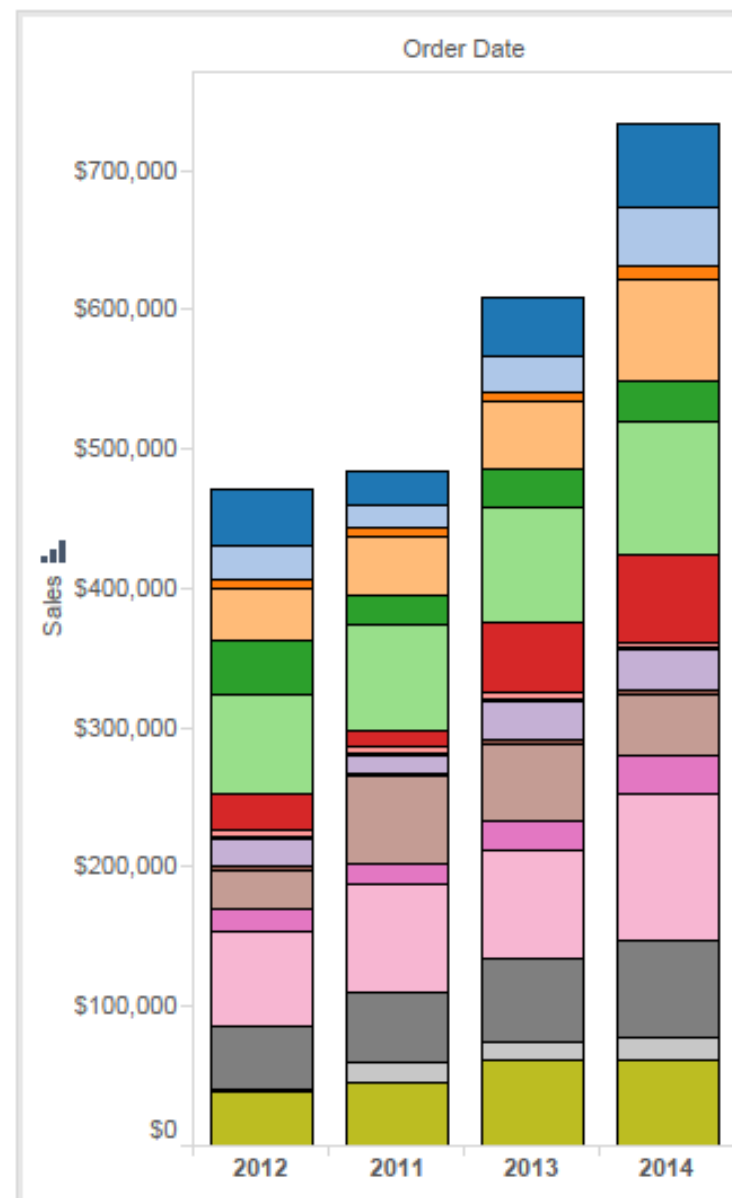
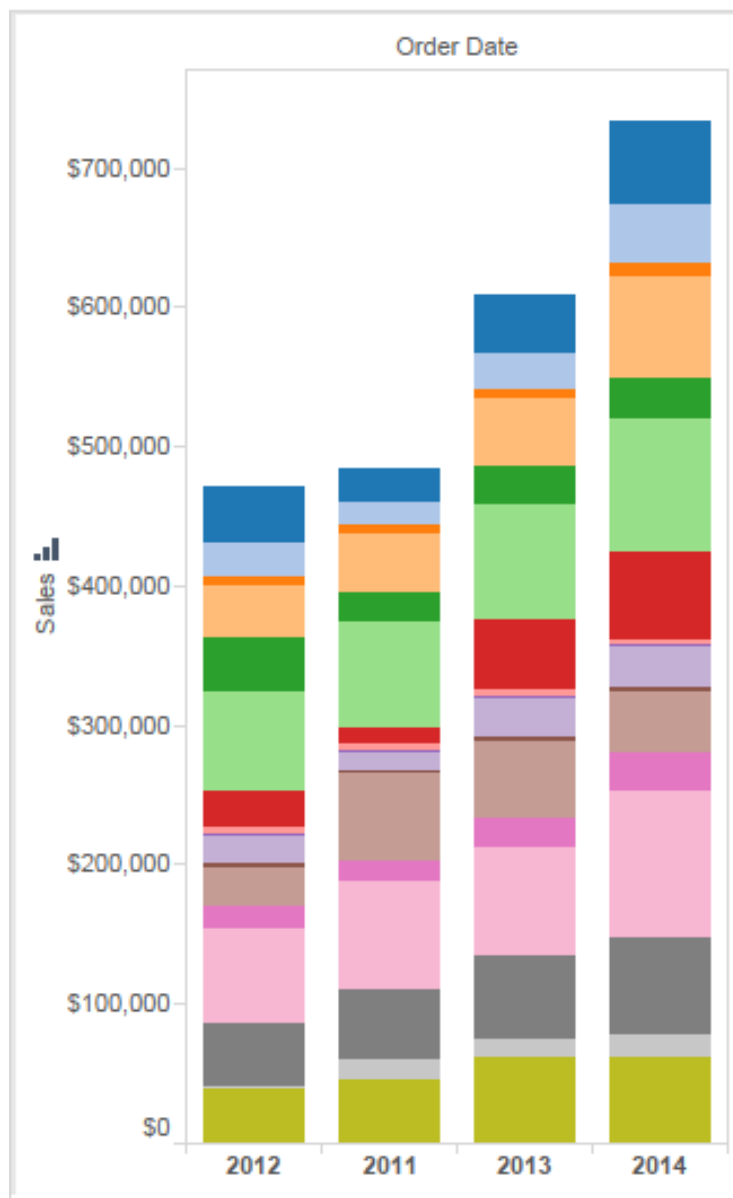


- Borders can be useful for visually separating closely spaced marks. For example, the views below show a scatterplot with mark borders turned on (left) and turned off (right). When borders are turned on, marks are easier to distinguish in areas where they are tightly clustered.

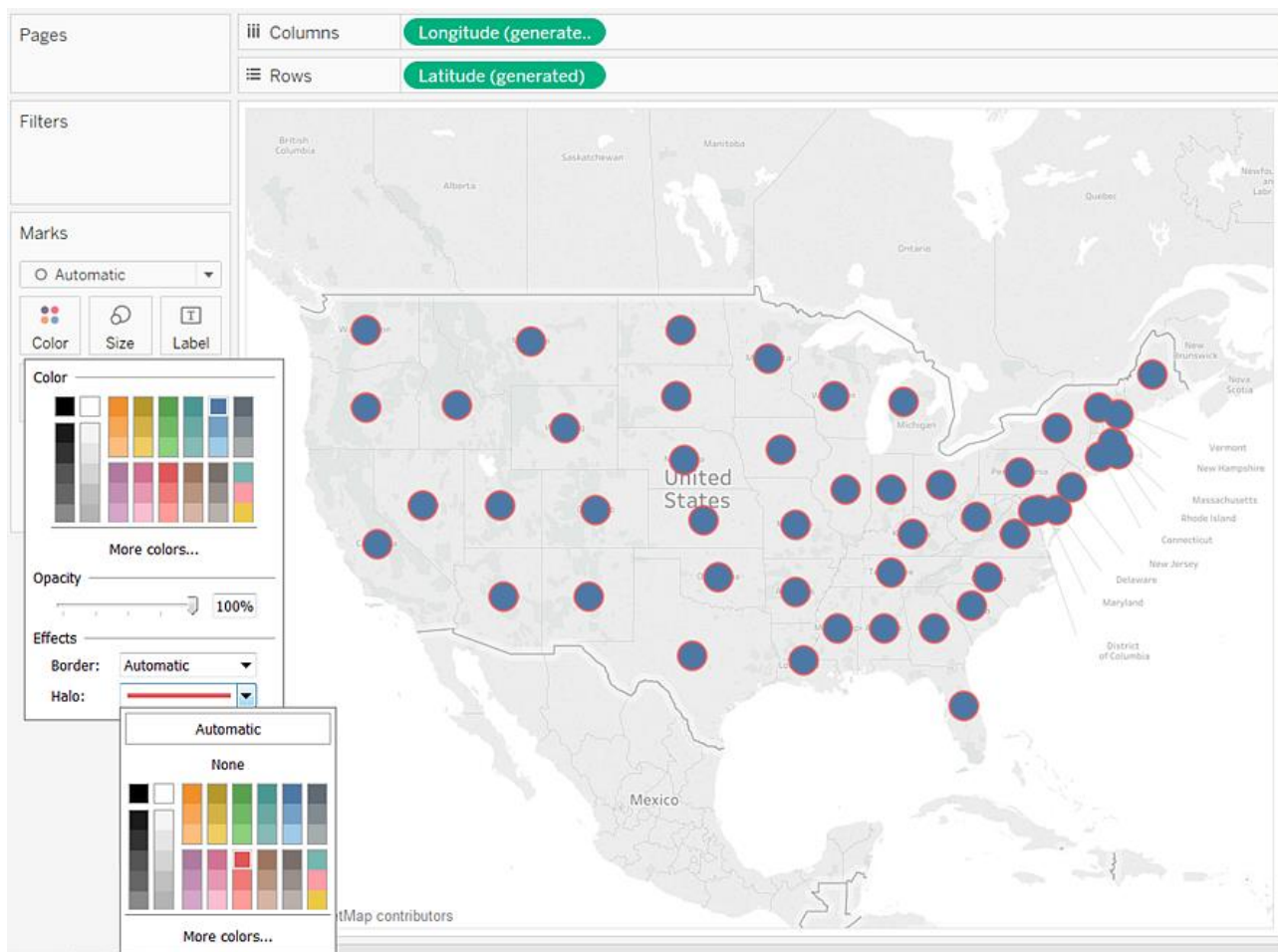


- When you are viewing a large number of color-encoded small marks, it is usually better to leave mark borders off. Otherwise borders can dominate the view, making it difficult to see the color encoding.

- For example, the views below show bars that are segmented by a large number of color-encoded dimension members. With mark borders turned on (right), some of the narrower marks are difficult to identify by color. With borders turned off (left), the marks are easy to distinguish.



- Mark halos
- To make marks more visible against a background image or map, surround each mark with a solid contrasting color called a halo. Mark halos are available when you have a background image or a background map. On the **Color** drop-down control, select a mark halo color.



- Markers
- In Tableau Desktop, when you are using the Line mark type, you can add a marker effect to show or hide points along the line. You can show selected points, all points, or no points. On the **Color** drop-down control, select a marker in the **Effects** section.

