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Formatting Visualizations to Look Great and Work Well

So far you have learned how to visualize data; but have just learned that is not enough. The data needs to be presented in such a way that it makes a huge difference in the way it is received and understood. As you move beyond making great discoveries and doing great analysis, you need to look at formatting to present the story of the data. Formatting is more than just making a data visualization look good.

Tableau's formatting options give you quite a bit of flexibility. Fonts, titles, captions, colors, row and column banding, labels, shading, annotations, and much more can be customized to make your visualizations tell a story effectively.

This chapter will cover the following topics:

- Formatting considerations
- Understanding how formatting works in Tableau
- Adding value to visualizations

Formatting considerations

Tableau employs good practices for formatting and visualization from the time you start dropping fields on shelves. Tableau 10 additionally introduces a wide variety of new fonts, colors, and defaults that emphasize aesthetic appeal. You'll find that the discrete palettes use colors that are easy to distinguish, fonts, grid lines are faint where appropriate, and numbers and dates follow the default format settings defined in the metadata.

The default formatting is more than adequate for discovery and analysis. If your focus is analysis, you may not want to spend too much time fine-tuning the formatting until you have moved on in the cycle. However, when you start to consider how you will communicate the data to others, you will need to contemplate how adjustments to formatting can make a difference in how well the data story is told.



Sometimes, you will have certain formatting preferences in mind when you start your design. In these cases, you might set formatting options in a blank workbook and save it as a template.

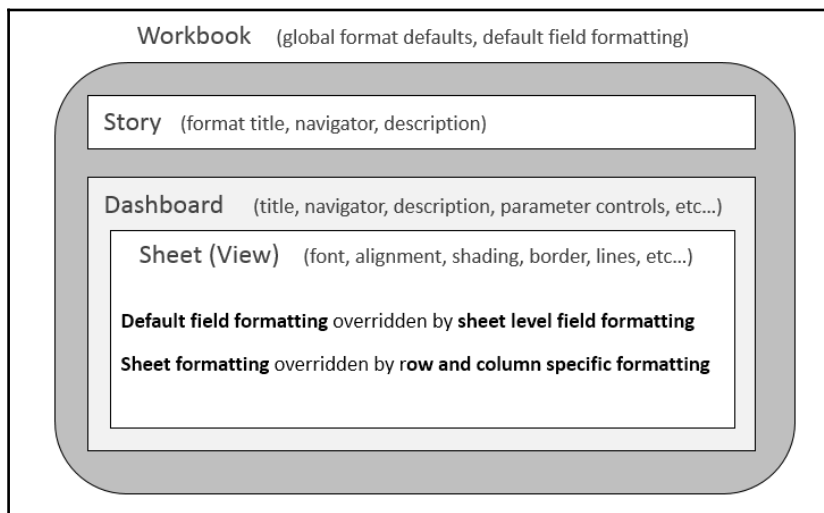
Here are some of the things you should consider:

- **Audience:** Who is the audience and what is the need?
- **Setting:** This is the environment in which the data story is communicated. Is it a formal business meeting where the format should reflect a high level of professionalism? Is it going to be shared on a blog to informally, or even playfully, tell a story?
- **Mode:** How will the visualizations be presented? You'll want to make sure rows, columns, fonts, and marks are large enough for a projector or compact enough for an iPad. If you are publishing to Tableau Server, Tableau Online, or Tableau Public, then did you select fonts that are safe for the web? Will you need to use the device designer to create different versions of a dashboard?
- **Mood:** Certain colors, fonts, and layouts elicit different emotional responses. Does the data tell a story that should invoke a certain response from your audience? The color red, for example, may connote danger, negative results, or indicate that an action is required. However, you'll need to be sensitive to your audience and the specific context. Colors have different meanings for different cultures and contexts. Red might not be a good choice to communicate negativity if it is also the color of the corporate logo.
- **Consistency:** Generally, use the same fonts, colors, shapes, line thickness, and row-banding throughout all visualizations. This is especially true when they will be seen together in a dashboard or even used in the same workbook. You can also consider how to remain consistent throughout the organization without being too rigid.

All of these considerations will inform your formatting decisions. Think of formatting as an iterative process. Look for feedback from your intended audience often and adjust as necessary to make sure your communication is as clear and effective as possible. The goal of formatting is to communicate the data more effectively.

Understanding how formatting works in Tableau

Tableau uses default formatting that includes default fonts, colors, shading, and alignment. Additionally, there are several levels of formatting you can customize, as shown in the following diagram:



Workbook level: The following type of formatting comes under this category:

- **Workbook defaults:** From the menu bar, navigate to **Format** | **Workbook**. The ability to set certain formatting as default for the workbook is new to Tableau 10.
- **Default field formatting:** Using the drop-down menu on a field in the data pane, navigate to **Default Properties** | **Date Format** or **Default Properties** | **Number Format**. This sets the default format in Tableau's metadata and will be applied to any view where custom formatting has not been applied.

- **Story level:** Navigate to a story tab and navigate to **Format | Story** (or **Story | Format**) to edit formatting for story-specific elements. These include options for customizing shading, title, navigator, and description.
- **Dashboard level:** Dashboard-specific elements can be formatted. When viewing a dashboard, navigate to **Format | Dashboard** (or **Dashboard | Format**) to specify formatting for dashboard titles, subtitles, shading, and text objects.

Worksheet level: We'll consider the various options in the following section. The following types of formatting are available for a worksheet:

- **Sheet formatting:** This formatting includes font, alignment, shading, borders, and lines.
- **Field level formatting:** This formatting includes fonts, alignment, shading, and number and date formats. This formatting is specific to how a field is displayed in the current view. The options you set at a field level override defaults set at a worksheet level. Number and date formats will also override the default field formatting.
- **Additional formatting:** Additional formatting can be applied to titles, captions, tooltips, labels, annotations, reference lines, field labels, and more.
- **Rich text formatting:** Titles, captions, annotations, labels, and tool tips all contain text which can be formatted with varying fonts, colors, and alignment. This formatting is specific to the individual text element.

Worksheet-level formatting

Let's start by considering worksheet level formatting. Before we specifically look at how to adjust formatting, consider the following parts of a view as it relates to formatting:

Formatting: Parts of the View

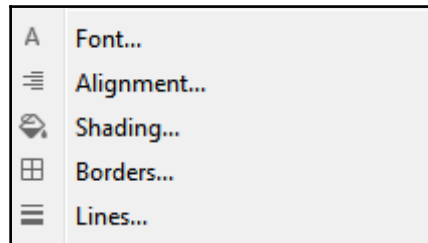
		Customer Segment				
1 Department	Category	Consumer	Corporate	Home Office	Small Business	a Grand Total
3 Furniture	Bookcases	5 92,626	262,085	79,404	73,381	507,496
	Chairs & Chairmats	305,381	407,724	212,830	238,651	1,164,586
	Office Furnishings	69,528	115,506	197,188	62,412	444,634
	Tables	228,934	363,979	287,507	181,502	1,061,922
	a Total	a 696,469	1,149,294	776,929	555,946	3,178,638
Office Supplies	Appliances	63,813	167,941	124,757	100,225	456,736
	Binders and Binder Accessor...	103,625	225,160	148,472	161,326	638,583
	Envelopes	37,643	44,462	22,577	43,233	147,915
	Labels	3,713	7,929	5,411	6,393	23,446
	Paper	53,004	89,312	61,123	50,181	253,620
	Pens & Art Supplies	24,027	36,004	21,765	21,469	103,265
	Rubber Bands	1,710	2,197	2,294	2,469	8,670
	Scissors, Rulers and Trimme..	14,628	9,625	12,947	3,232	40,432
	Storage & Organization	121,719	154,918	179,151	129,929	585,717
	Total	423,882	737,548	578,497	518,457	2,258,384
Technology	Computer Peripherals	80,805	224,142	110,840	75,064	490,851
	Copiers and Fax	148,504	205,639	174,718	132,354	661,215
	Office Machines	260,011	516,513	245,019	197,112	1,218,655
	Telephones and Communicat.	225,571	436,295	282,962	199,456	1,144,284
	Total	714,891	1,382,589	813,539	603,986	3,515,005
b Grand Total		1,835,242	3,269,431	2,168,965	1,678,389	8,952,027

This view consists of the following parts which can be formatted:

1. **Field labels for rows:** Field labels can be formatted from the menu (**Format | FieldLabels...**) or by right-clicking on them in the view and selecting **Format....** Additionally, you can hide field labels from the menu (**Analysis | Table Layout**) and then uncheck the option for showing field labels or by right-clicking on them in the view and selecting the option to hide. You can use the **Analysis | Table Layout** option on the top menu to show them again if desired.
2. **Field labels for columns:** These have the same options as for rows, but may be formatted or shown/hidden independently from the row field labels.
3. **Row headers:** These will follow the formatting of headers in general, unless you specify different formatting for headers of rows only. Notice that subtotals and grand total have headers. The subtotal and grand total headers marked **a** and **b** in the preceding figure, are total row headers.
4. **Column headers:** These will follow formatting of headers in general, unless you specify different formatting for headers of columns only. Note that subtotals and grand totals have headers. The grand total header marked a column header.

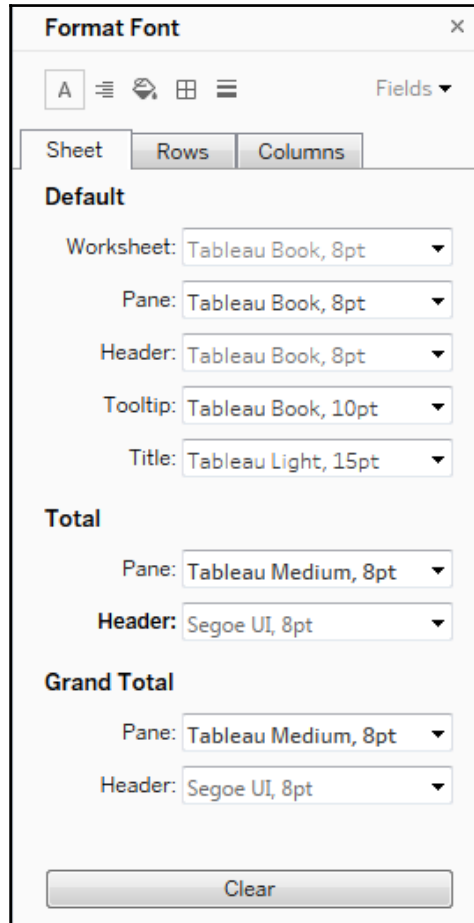
5. **Pane:** Many formatting options include the ability to format the pane differently from the headers.
6. **Grand totals (column) pane:** This is the pane for grand totals that can be formatted at a sheet or column level.
7. **Grand totals (row) pane:** This is the pane for grand totals that can be formatted at a sheet or row level.

Worksheet level formatting is accomplished using the format window, which will appear on the left side, in place of the data pane. To view the format window, select **Format** from the menu and then **Font...**, **Alignment...**, **Shading...**, **Border...**, or **Lines...**:



You can also right-click on nearly any element in the view and select **Format**. This will open the format window specific to the context of the element you selected. Just be certain to verify that the title of the format window matches what you expect. When you make a change, you should see the view update immediately to reflect your formatting. If you don't, you are likely working in the wrong tab of the formatting window or you may have formatted something at a lower level (for example, **Rows**) which overrides changes made at a higher level (for example, **Sheet**).

You should now see the format window on the left. It will look similar to this:



Note the following key aspects of the formatting window:

- The title of the window will give you the context for your formatting selections.
- The icons on the top match the selection options of the **Format** menu. This allows you to easily navigate through those options without returning to the menu each time.
- The three tabs, **Sheet**, **Rows**, and **Columns** allow you to specify options at a sheet level and then override those options and defaults at a row and column level. For example, you could make row grand totals have different pane and header fonts than column grand totals (though this specific choice would likely be jarring and is not recommended!)

- The field's dropdown in the upper-right corner allows you to fine-tune formatting at a field level.
- Any changes that you make will be previewed and result in a bold label to indicate that the formatting option has been changed from the default (notice how the font for the header under `Total` has been customized in the preceding figure, resulting in the label text of the header being shown in bold).

Clearing formatting, there are three options for clearing the format are as follows:

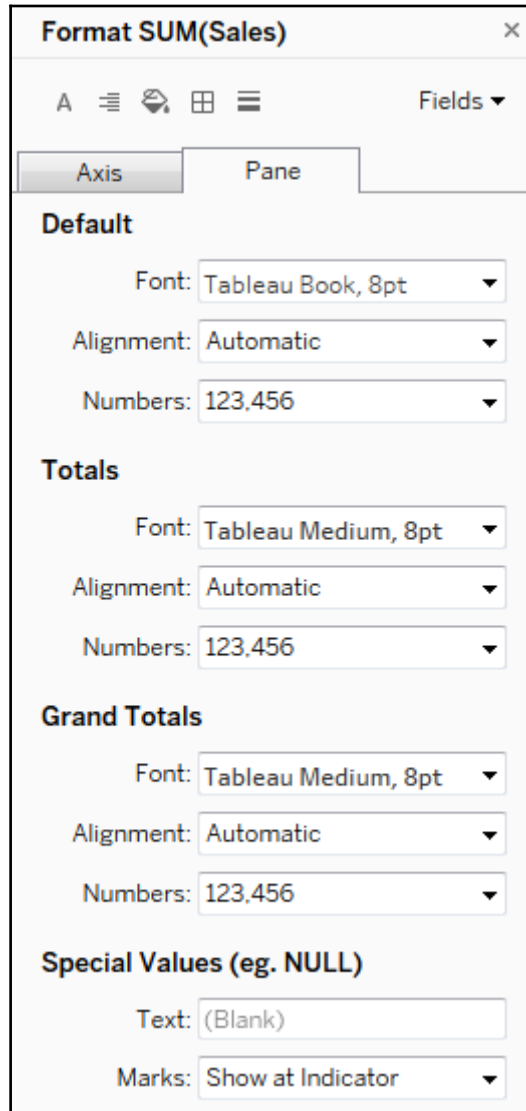
- **Clear single option:** In the format window, right click the label or control of any single option you have changed and select **Clear** from the pop-up menu.
- **Clear all current options:** At the bottom of the format window, click the **Clear** button to clear all visible changes. This applies only to what you are currently seeing in the format window. For example, if you are looking at **Shading** and the **Rows** tab, and then click **Clear**, only the shading options you have changed on the **Rows** tab will be cleared.
- **Clear sheet:** From the menu, navigate to **Worksheet | Clear | Formatting**. You can also use the drop-down from the **Clear** item on the toolbar. This clears all custom formatting on the current worksheet.

The other format options (alignment, shading, and so on) all work very similarly to the font option. There are only a few subtleties to mention:

- * **Alignment:** This includes options for horizontal and vertical alignment, text direction, and text wrapping.
- * **Shading:** This includes an option for **Row** and **Columns** banding. The banding allows for alternating patterns of shading that help to differentiate or group rows and columns. Light row banding is enabled by default for text tables, but can be useful in other visualization types such as horizontal bar charts as well. Row banding can be set to different levels which correspond to the number of discrete (blue) fields present on the **Rows** or **Columns** shelf.
- **Borders:** This refers to the borders drawn around cells, panes, and headers. It includes an option for **Row** and **Columns** dividers. You can see in the view, the dividers between the departments. By default, the level of the borders is set based on the next to last field on **Rows** or **Columns**.
- **Lines:** This refers to lines that are drawn on visualizations using an axis. This includes grid lines, reference lines, zero lines, and axis rulers. You can access a more complete set of options for reference lines and drop lines from the **Format** option on the menu.

Field-level formatting

In the upper-right corner of the **Format SUM(Sales)** window is a little drop-down labeled **Fields**. Selecting this drop-down gives you a list of fields in the current view and selecting a field updates the format window with options appropriate for the field. Here, for example, is the window as it appears for the **SUM(Sales)** field:



The title of the format window will alert you to the field you are formatting. The options for fields include font, alignment, shading, and number and date formats. The latter two options will over-ride any default metadata formats. Selecting an icon for **Font**, **Alignment**, and so on will switch back to the sheet level formatting. However, you can switch between the tabs: **Axis/Header** and **Pane**.

Custom number formatting:



When you alter the format of a number you can select from several standard formats as well as a custom format. The custom format allows you to enter a format string which Tableau will use to format the number. The format string allows for up to three entries, separated by semi-colons, to represent positive, negative, and zero formats. Here are some examples assuming the positive number **34,331.336000** and the negative number **-8,156.777700**:

Format string	Resulting Values
#; -#	34331 and -8157
#,###.##; (#,###.##)	34,331.34 and (8,156.78)
#,###.000000; -#,###.000000	34,331.336000 and -8,156.777700
"up" "#,###; "down" "#,###; "same"	up 34,331 and down 8,157

Notice how Tableau rounds the display of the number based on the format string. Always be aware that numbers you see as text, labels, or headers may have been rounded due to the format.

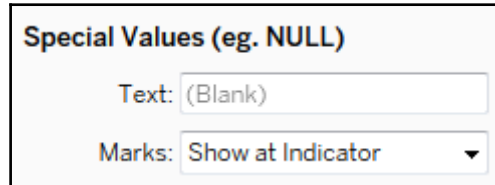


Also, observe how you can mix format characters such as the pound sign, commas, and decimal points with strings. The preceding example would give a label of "same" where a value of 0 would normally have been shown.

Instead of using "up" or "down" as shown in the preceding example, you could use a Unicode character, such as ▲ or ▼.

Selecting a predefined format that is close to what you want and then switching to custom, will allow you to start with a custom format string that is close.

An additional aspect of formatting a field is specially formatting NULL values. When formatting a field, select the **Pane** tab and locate the **Special Values** section, as shown in the following screenshot:



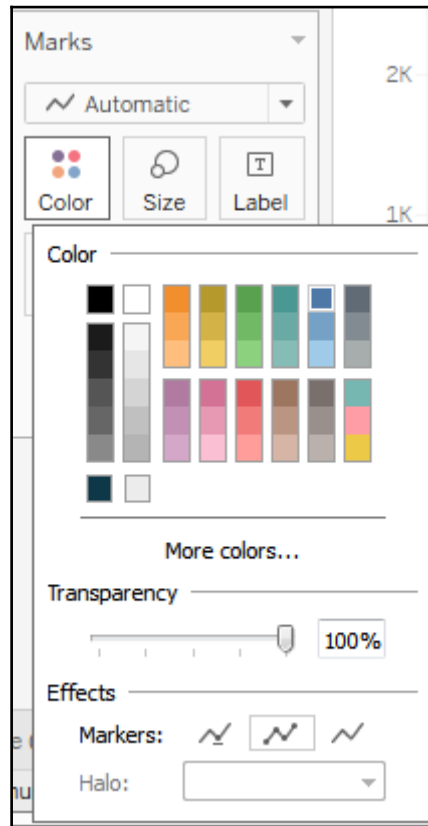
Enter any text you would like to display in the pane (in the **Text** field) when the value of the field is null. You can also choose where marks should be displayed. The **Marks** drop-down gives multiple options that define where and how the marks for null values should be drawn when an axis is being used. You have the following options:

- **Show at Indicator:** This results in a small indicator with the number of nulls in the lower right of the view. You can click the indicator for options to filter the nulls or show them at the default value. You can right-click the indicator to hide it.
- **Show at Default Value:** This option displays a mark at the default location (usually 0).
- **Hide (Connect Lines):** This option makes sure that it does not place a mark for null values, but it does connect lines between all non-null values.
- **Hide (Break Lines):** This causes the line to break where there are gaps created by not showing the null values.

You can see these options in the following screenshot, with the location of two null values indicated by a gray band:

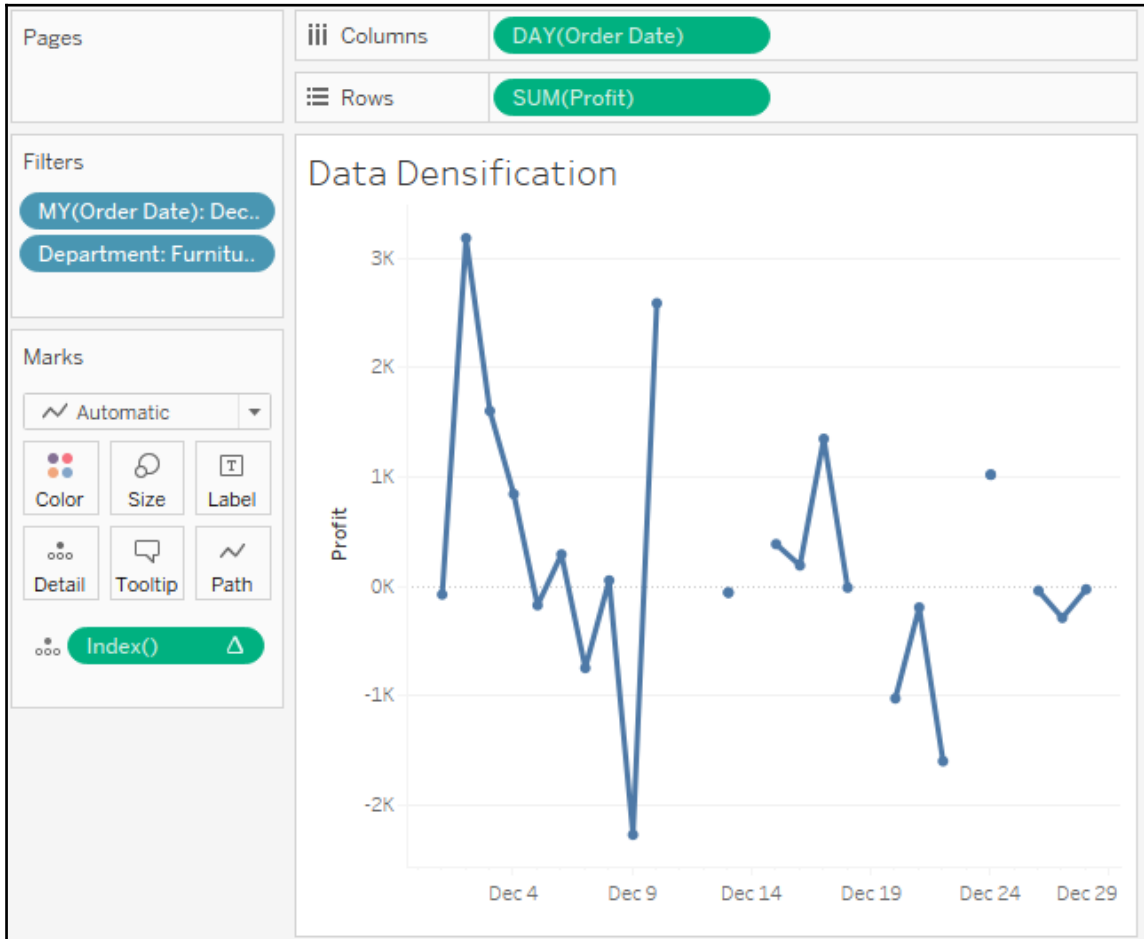


You'll notice that the preceding line charts have little circle markers at the location of each mark drawn in the view. When the mark type is a line, clicking on the **Color** shelf opens a menu that gives options for the markers. All mark types have standard options, such as color and transparency. Some mark types support additional options, such as border and/or halo, as shown here:

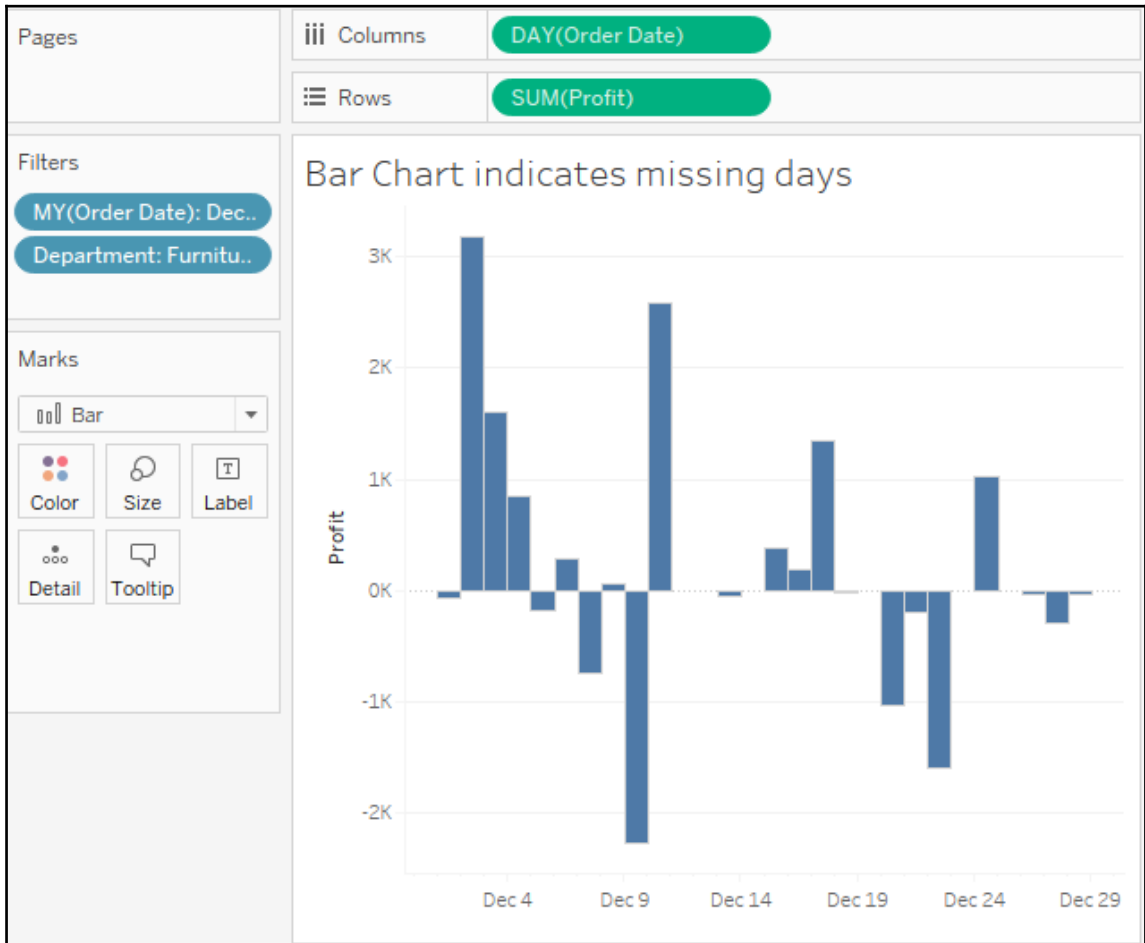


The **Hide (Break Lines)** or the **Show at Indicator** options work well in the preceding view because those two options do not obscure the null values. However, the formatting only helps with actual null values. These are the records that exist in the data, but have null, indicating no value. However, there are no records for some dates in December. In that case, the value isn't null, there isn't even a record of the data. Tableau still connects the lines across those missing days, potentially making it difficult to tell that there are gaps. In that case, consider enabling data densification (you can accomplish this by ensuring the **Show Missing Dates** option is selected from the drop-down of the **DAY(Order Date)** field on **Columns** and then adding certain table calculations such as **Index()** to the **Detail** of the view).

This causes Tableau to generate records of data for the missing dates and treat the values as null:



You can also use a bar chart as a visualization type that indicates the missing days more clearly:



Additional formatting options

Additional formatting options can also be accessed from the formatting window. These options include:

- A myriad of options for **Reference Lines**
- Line and text options for **Drop Lines**
- Shading and border options for **Titles and Captions**
- Text, box, and line options for **Annotations**
- Font, shading, alignment, and separator options for **Field Labels**
- Title and body options for **Legends, Quick Filters, and Parameters**
- **Cell Size** and **Workbook Theme** options

You'll find most of these fairly straightforward. A few options might not be as obvious:

- **Drop Lines:** They appear as lines drawn from the mark to the axis and can be enabled by right-clicking on any blank area in the pane of the view with an axis and selecting **Drop Lines** | **Show Drop Lines**. Additional options can be accessed using the same right-click menu and selecting **Edit Drop Lines**. Drop lines are only displayed in the Tableau desktop and Reader but are not available when a view is published to the Tableau server, online, or public.
- **Titles and Captions** can be shown or hidden for any view by selecting Worksheet from the menu and then selecting the desired options. In addition to standard formatting, which can be applied to titles and captions, the text of a title or caption can be edited and specifically formatted by double clicking, right-clicking and selecting Edit, or by using the drop down menu for the title or caption(or the drop-down menu of the view on a dashboard). The text of titles and captions can dynamically include the values of parameters, values of any field in the view, and certain other data and worksheet-specific values.
- **Annotations** can be created by right-clicking on a mark or space in the view and selecting **Annotate** and then selecting one of the following three types of annotations:
 - **Mark** annotations are associated with a specific mark in the view. If that mark does not show (due to a filter or axis range), then neither will the annotation. Mark annotations can include a display of the values of any fields that define the mark or its location.

- **Point** annotations are anchored to a specific point in the view. If the point is not visible in the view, the annotation will disappear. Point annotations can include a display of any field values that define the location of the point (for example, the coordinates of the axis).
- **Area** annotations are contained within a rectangular area. The text of all annotations can dynamically include the values of parameters and certain other data and worksheet specific values.

You can copy formatting from one worksheet to another (within the same workbook or across workbooks) by selecting **Copy Formatting** from the **Format** menu while viewing the source worksheet (or select the **Copy Formatting** option from the right-click menu on the source worksheet tab). Then select **Paste Formatting** on the **Format** menu while viewing the target worksheet (or select the option from the right-click menu on the target worksheet tab).



This option will apply any custom formatting present on the source sheet to the target. However, specific formatting applied during the editing of the text of titles, captions, labels and tooltips is not copied to the target sheet.

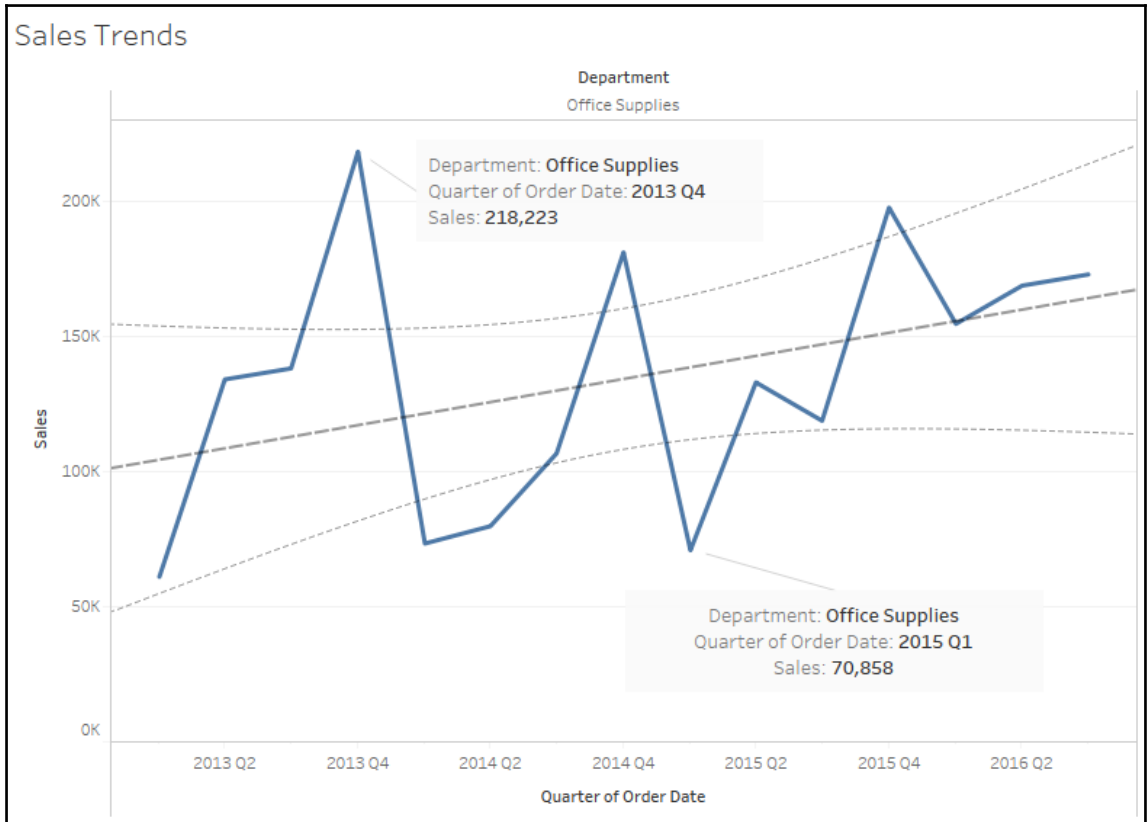
Adding value to visualizations

Now that we've considered how formatting works in Tableau, let's take a look at some ways in which formatting can add value to a visualization.

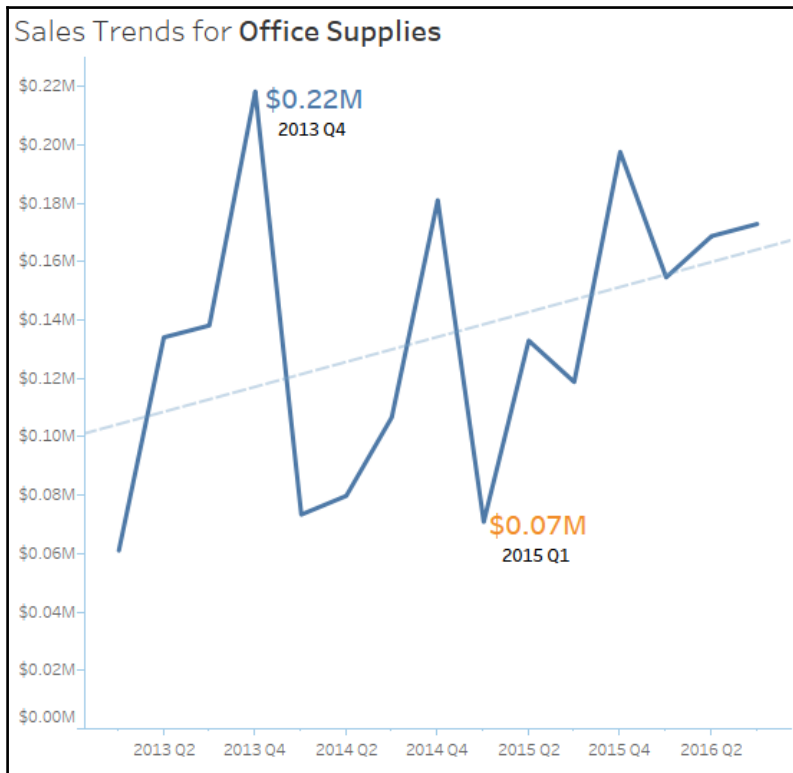
Always ask yourself what the formatting adds to the understanding of the data. Is it making the visualization clearer and easier to understand? Or is it just adding clutter and noise?

In general, try a minimalistic approach. Remove everything from the visualization that isn't necessary. Emphasize important values, text, and marks while de-emphasizing those which are only providing support or context.

Consider the following visualization using all the default formatting:



The default format works very well. But compare that with this visualization:



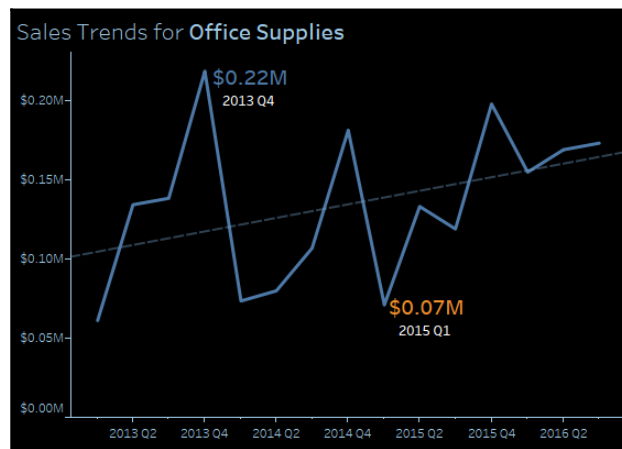
Both the preceding charts are showing sales by quarter, filtered to the office supplies department. With the exception that the top view has the department field on **Columns** in an attempt to make it clear that only office supplies sales are being shown, the field arrangement for the two views is exactly the same. The first view uses default formatting.

Consider some of the customizations in the second view:

- The **Title** has been adjusted to include the department name.
- The **Sales** field has been formatted to be shown using a custom currency with two decimal places and units of millions. This is true for the axis and the annotations. Often a high-level of precision can clutter visualization. The initial view of the data gives the trend and enough detail to understand the order of magnitude. Tooltips or additional views can be used to reveal detail and precision.

- The axis labels have been removed by right-clicking on the axis, selecting **Edit Axis**, and then clearing the text. The title of the view clearly indicates that one is looking at **Sales**. The values alone reveal the second axis to be by quarter. If there are multiple dates in the data, you might need to specify which one is in use. Depending on your goals, you might consider hiding the axes completely.
- The gridlines on **Rows** have been removed. Gridlines can add a value to a view, especially in views where being able to determine values is of high importance. However, they can also clutter and distract. You'll need to decide, based on the view itself and the story you are trying to tell, whether gridlines are helpful or not.
- The trend line has been formatted to match the color of the line. Additionally, the confidence bands have been removed. You'll have to decide whether they add context or clutter based on your needs and audience.
- The **lines, shading, and boxes** have been removed from the annotations to reduce clutter.
- The **size and color** of the annotations have been altered to make them stand out. If the goal had been to simply highlight the minimum and maximum values on the line, labels might have been a better choice as they can be set to display at only **Min/Max**. In this case, however, the lower number is actually the second lowest point in the view.
- Axis rulers and ticks have been emphasized and colored to match the marks and reference line (axis rulers are available under the lines option on the format window).

Formatting can also be used to dramatically alter the appearance of visualization. Consider the following chart:



This visualization is nearly identical to the previous view with the difference of shading applied to the worksheet and the title. Additionally, fonts were lightened or darkened as needed to show up well on a black background. Some find this format more pleasing, especially on mobile devices. If the view is to be embedded in a website with a dark theme, this formatting may be very desirable. However, you may find some text more difficult to read on a dark background. You'll want to consider your audience, the setting, and mode of delivery as you consider whether such a format is the best for your situation.



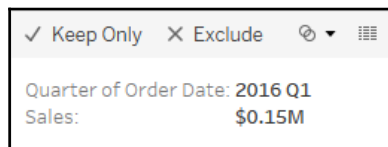
Sequential color palettes (a single color gradient based on a continuous field) should be reversed when using a black background. This is because the default of lighter (lower) to darker (higher) works well on a white background where darker colors stand out and lighter colors fade into white.



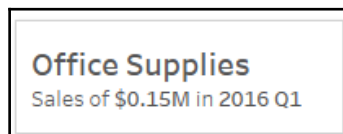
On a black background, lighter colors stand out more and darker colors fade into black. You'll find the reverse option when you edit a color palette using the drop-down menu on the legend, double clicking the legend, or right-clicking the legend and selecting **Edit Colors...** and checking **Reversed**.

Tooltips

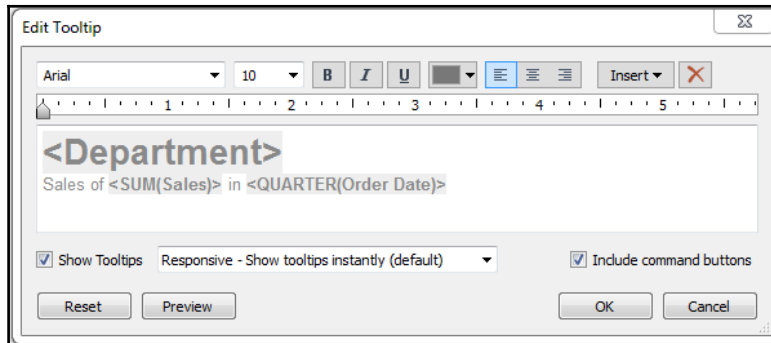
Tooltips add a subtle professionalism to the visualizations but are an easily overlooked aspect of visualizations as they are not always visible. Consider the following default tooltip that displays when the end user hovers over one of the marks in the preceding view:



Compare it to this tooltip:



The tooltip was edited using the menu option **Worksheet | Tooltip**, which brought up an editor allowing for the rich editing of text in the tooltip:



This editor is similar to those used for editing the text of labels, titles, captions, and annotations. Observe the **Insert** dropdown in the upper-right corner which allows you to insert fields, parameters, and other dynamic values. In the text, these are enclosed as a tag. You'll notice that the first tooltip included command buttons (keeping and excluding filters, creating sets, groups, and viewing the data). You'll need to decide if the command buttons add easy functionality or are distracting or confusing for your intended audience. The functionality is always available to the end user via a right-click.



You can stop a tooltip from showing at all by unchecking the option in the editor.

Summary

With an understanding of how formatting works in Tableau, you'll have the ability to refine the visualizations you created in discovery and analysis into incredibly effective communication of your data story. Always consider the audience, setting, mode, mood, and consistency as you work through the iterative process of formatting. Look for formatting that adds value to your visualization and avoid useless clutter. Next, we'll look at how it all comes together in dashboards.