Table Calculations in Tableau 6: A Primer

DATE:
March 16, 2011

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Overview

Table calculations are a powerful and flexible way for Tableau users to extend their data. Table calculations are computations that are applied to all values in a table, and are often dependent on the table structure itself. For example, you can use table calculations to compute the running total of inventory across a specified date range or to compute each month's contribution to annual or quarterly sales.

There are two ways you can work with table calculations in Tableau. The first is a collection of commonly-used table calculations called Quick Table Calculations. These let you define a table calculation with one click and are a great place to start.

Starting with Tableau 6.0, you can also create your own table calculations using the new Table Calculation Functions. These functions give workbook authors the power to extend the Tableau calculation language and manipulate table calculations as custom functions. You can either create your own table calculation function from scratch, or you can use one of the Quick Table Calculations as a starting point.

This white paper describes some of the key concepts you should know when you're working with table calculations. It will also walk you through a number of examples of table calculations and creating your own table calculation function. To explore table calculations in greater depth, refer to the product documentation or visit the Tableau forums.

When to Use Table Calculations

How are table calculations different from regular calculations? Table calculations are dependent on the structure of the results and are often compared to other rows or values. For example, the difference between profit and operating expenses in a given year is a calculation. That same difference over a series of years would be a table calculation. Put another way, table calculations depend upon the data in the view, not the underlying data.
Table calculations provide an easy yet powerful way for users to drive additional insights from their data in scenarios, such as:

- Making relative comparisons: Comparing growth or differences across time periods or categories. Example: Year over year growth.
- Calculating running totals: Looking at the up-to-the moment total for specific period. Example: Number of products in an inventory list grows as you add products each day.
- Indexing to an average: The relative value of a change to an average often more important than the absolute value itself. Example: Difference in the number of orders this quarter versus an average quarter.

- Grouping dimensions based on table calculations: You often want to sort data based on the result of a calculation on that same data. Example: Total sales for regions that had an above average margin.
- Shifting data to be relative to an event: The absolute date of an event is often less interesting than its value relative to another date. This is also referred to as a common baseline. Example: Number of days since first purchase or amount of time that passed since first click.
- Displaying flexible weighted averages and samples: You may want to weight one measure by the value of another measure. Example: Number of orders weighted by order priority.
- Performing statistical calculations and ranking: Common statistical functions can be performed with Table Calculations. Examples: z-score or t-test and sales rank.

See the Tableau website for training and more examples.

Key Concepts with Table Calculations: Addressing vs. Partitioning

There are two important concepts in understanding table calculations: partitioning and addressing. This defines the "what" and the "how" a table calculation will be performed. Another way to think of it is to understand the context for the calculation and then ordering of the calculation:

- Partitioning: the scope or grouping of the calculation. This can be the full table, a pane, a cell, a dimension or it can be customized even further for more advanced calculations.
- Addressing: the anchor or the source of each partition. It defines the root of the calculation.

Consider, for example, looking at a running sum of sales by product across several years. In our example, the running sum is partitioned by product: every product's sale is summed over time, so the result of the calculation is a running sum of coffee sales, tea sales, etc. The addressing field is the date field. With every new date, the sales of that data are added to the sum. When you define the addressing for a table calculation, all the other fields are used for partitioning. Let's look at a few more examples to make this more practical.

The chart below shows quarterly sales by region and product category:

		Category / Region								
		Furniture				Office Supplies				Grand Total
Year of Order Date	Quarter of Order Date	Central	East	South	West	Central	East	South	West	
2008	Q1	$54,839	$41,843	$54,162	$98,604	$69,738	$20,531	$38,466	$85,317	$463,500
	Q2	$71,341	$56,705	$103,741	$103,660	$43,070	$38,547	$65,251	$108,219	$590,533
	Q3	$104,219	$78,408	$91,407	$56,204	$70,649	$29,540	$80,171	$68,221	$578,819
	Q4	$43,478	$107,494	$89,127	$85,453	$64,378	$44,255	$23,944	$52,238	$510,365
2009	Q1	$41,344	$77,462	$29,104	$66,449	$62,809	$58,498	$28,940	$47,086	$411,692
	Q2	$78,894	$64,045	$163,505	$69,963	$46,951	$21,775	$66,439	$50,694	$562,265
	Q3	$157,720	$39,988	$75,475	$82,548	$65,696	$53,205	$72,427	$43,299	$590,359
	Q4	$74,210	$77,246	$49,308	$44,382	$87,564	$65,831	$34,448	$87,042	$520,031
Grand Total		$626,045	$543,191	$655,829	$607,262	$510,855	$332,183	$410,085	$542,115	$4,227,565

Table (Across)

Table (Across) is a Calculate Along option. The chart below uses Table (Across) to set the addressing to compute along the entire table, moving horizontally through each partition.

When calculation addressing is set to Table(Across), the fields that span horizontally across the table are the addressing fields (Category and Region). All the other fields (Year, Quarter) are partitioning. The view below shows using the "% of Total" Table Calculation with the Table (Across) setting. The addressing fields are shown in orange while partitioning fields are shown in blue.

		Category / Region								
		Furniture				Office Supplies				Grand Total
Year of Order Date	Quarter of Order Date	Central	East	South	West	Central	East	South	West	
2008	Q1	11.83%	9.03%	11.69%	21.27%	15.05%	4.43%	8.30%	18.41%	100.00%
	Q2	12.08%	9.60%	17.57%	17.55%	7.29%	6.53%	11.05%	18.33%	100.00%
	Q3	18.01%	13.55%	15.79%	9.71%	12.21%	5.10%	13.85%	11.79%	100.00%
	Q4	8.52%	21.06%	17.46%	16.74%	12.61%	8.67%	4.69%	10.24%	100.00%
2009	Q1	10.04%	18.82%	7.07%	16.14%	15.26%	14.21%	7.03%	11.44%	100.00%
	Q2	14.03%	11.39%	29.08%	12.44%	8.35%	3.87%	11.82%	9.02%	100.00%
	Q3	26.72%	6.77%	12.78%	13.98%	11.13%	9.01%	12.27%	7.33%	100.00%
	Q4	14.27%	14.85%	9.48%	8.53%	16.84%	12.66%	6.62%	16.74%	100.00%
Grand Total		14.81%	12.85%	15.51%	14.36%	12.08%	7.86%	9.70%	12.82%	100.00%

That means that each partition will be the combination of Year and Quarter. You can see in the view below that the first partition is defined as Q1 2008. The second partition is Q2 2008.

		Category / Region								
		Furniture				Office Supplies				Grand Total
Year of Order Date	Quarter of Order Date	Central	East	South	West	Central	East	South	West	
2008	Q1	11.83%	9.03%	11.69%	21.27%	15.05%	4.43%	8.30%	18.41%	100.00%
	Q2	12.08%	9.60%	17.57%	17.55%	7.29%	6.53%	11.05%	18.33%	100.00%
	Q3	18.01%	13.55%	15.79%	9.71%	12.21%	5.10%	13.85%	11.79%	100.00%
	Q4	8.52%	21.06%	17.46%	16.74%	12.61%	8.67%	4.69%	10.24%	100.00%
2009	Q1	10.04%	18.82%	7.07%	16.14%	15.26%	14.21%	7.03%	11.44%	100.00%
	Q2	14.03%	11.39%	29.08%	12.44%	8.35%	3.87%	11.82%	9.02%	100.00%
	Q3	26.72%	6.77%	12.78%	13.98%	11.13%	9.01%	12.27%	7.33%	100.00%
	Q4	14.27%	14.85%	9.48%	8.53%	16.84%	12.66%	6.62%	16.74%	100.00%
Grand Total		14.81%	12.85%	15.51%	14.36%	12.08%	7.86%	9.70%	12.82%	100.00%

Table (Down)

This option sets the addressing to compute along the entire table moving vertically through each partition. For example, the same view from above is shown below with the addressing set to compute along Table Down. The fields that span vertically (Year, Quarter) are now the addressing fields and the rest of the fields are partitioning (Category and Region). The addressing fields are shown in orange while partitioning fields are shown in blue.

		Category / Region								
		Furniture				Office Supplies				Grand Total
Year of Order Date	Quarter of Order Date	Central	East	South	West	Central	East	South	West	
2008	Q1	8.76%	7.70%	8.26%	16.24%	13.65%	6.18%	9.38%	15.74%	10.96%
	Q2	11.40%	10.44%	15.82%	17.07%	8.43%	11.60%	15.91%	19.96%	13.97%
	Q3	16.65%	14.43%	13.94%	9.26%	13.83%	8.89%	19.55%	12.58%	13.69%
	Q4	6.94%	19.79%	13.59%	14.07%	12.60%	13.32%	5.84%	9.64%	12.07%
2009	Q1	6.60%	14.26%	4.44%	10.94%	12.29%	17.61%	7.06%	8.69%	9.74%
	Q2	12.60%	11.79%	24.93%	11.52%	9.19%	6.56%	16.20%	9.35%	13.30%
	Q3	25.19%	7.36%	11.51%	13.59%	12.86%	16.02%	17.66%	7.99%	13.96%
	Q4	11.85%	14.22%	7.52%	7.31%	17.14%	19.82%	8.40%	16.06%	12.30%
Grand Total		100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

That means that each partition is the combination of Category and Region. In this case, the first partition is Furniture in the Central Region.

		Category / Region								
		Furniture				Office Supplies				Grand Total
Year of Order Date	Quarter of Order Date	Central	East	South	West	Central	East	South	West	
2008	Q1	8.76%	7.70%	8.26%	16.24%	13.65%	6.18%	9.38%	15.74%	10.96%
	Q2	11.40%	10.44%	15.82%	17.07%	8.43%	11.60%	15.91%	19.96%	13.97%
	Q3	16.65%	14.43%	13.94%	9.26%	13.83%	8.89%	19.55%	12.58%	13.69%
	Q4	6.94%	19.79%	13.59%	14.07%	12.60%	13.32%	5.84%	9.64%	12.07%
2009	Q1	6.60%	14.26%	4.44%	10.94%	12.29%	17.61%	7.06%	8.69%	9.74%
	Q2	12.60%	11.79%	24.93%	11.52%	9.19%	6.56%	16.20%	9.35%	13.30%
	Q3	25.19%	7.36%	11.51%	13.59%	12.86%	16.02%	17.66%	7.99%	13.96%
	Q4	11.85%	14.22%	7.52%	7.31%	17.14%	19.82%	8.40%	16.06%	12.30%
Grand Total		100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Table (Across then Down)

This option sets the addressing to compute across the entire table horizontally and then down the table vertically. This means that both the fields that span across the table and down the table are addressing fields.

		Category / Region								
		Furniture				Office Supplies				Grand Total
Year of Order Date	Quarter of Order Date	Central	East	South	West	Central	East	South	West	
2008	Q1	1.30%	0.99%	1.28%	2.33%	1.65%	0.49%	0.91%	2.02%	10.96%
	Q2	1.69%	1.34%	2.45%	2.45%	1.02%	0.91%	1.54%	2.56%	13.97%
	Q3	2.47%	1.85%	2.16%	1.33%	1.67%	0.70%	1.90%	1.61%	13.69%
	Q4	1.03%	2.54%	2.11%	2.02%	1.52%	1.05%	0.57%	1.24%	12.07%
2009	Q1	0.98%	1.83%	0.69%	1.57%	1.49%	1.38%	0.68%	1.11%	9.74%
	Q2	1.87%	1.51%	3.87%	1.65%	1.11%	0.52%	1.57%	1.20%	13.30%
	Q3	3.73%	0.95%	1.79%	1.95%	1.55%	1.26%	1.71%	1.02%	13.96%
	Q4	1.76%	1.83%	1.17%	1.05%	2.07%	1.56%	0.81%	2.06%	12.30%
Grand Total		14.81%	12.85%	15.51%	14.36%	12.08%	7.86%	9.70%	12.82%	100.00%

That means that the entire table is the partition. The computation will compute across, move to the next row and continue to compute across, and so on.

		Category / Region								
		Furniture				Office Supplies				Grand Total
Year of Order Date	Quarter of Order Date	Central	East	South	West	Central	East	South	West	
2008	Q1	1.30%	0.99%	1.28%	2.33%	1.65%	0.49%	0.91%	2.02%	10.96%
	Q2	1.69%	1.34%	2.45%	2.45%	1.02%	0.91%	1.54%	2.56%	13.97%
	Q3	2.47%	1.85%	2.16%	1.33%	1.67%	0.70%	1.90%	1.61%	13.69%
	Q4	1.03%	2.54%	2.11%	2.02%	1.52%	1.05%	0.57%	1.24%	12.07%
2009	Q1	0.98%	1.83%	0.69%	1.57%	1.49%	1.38%	0.68%	1.11%	9.74%
	Q2	1.87%	1.51%	3.87%	1.65%	1.11%	0.52%	1.57%	1.20%	13.30%
	Q3	3.73%	0.95%	1.79%	1.95%	1.55%	1.26%	1.71%	1.02%	13.96%
	Q4	1.76%	1.83%	1.17%	1.05%	2.07%	1.56%	0.81%	2.06%	12.30%
Grand Total		14.81%	12.85%	15.51%	14.36%	12.08%	7.86%	9.70%	12.82%	100.00%

Pane (Across)

This option sets to compute across the pane horizontally. The fields that span across the pane horizontally are the addressing fields. However, the fields that separate the panes are now partitioning fields. In the example below Category becomes a partitioning field along with Year and Quarter. Region is the addressing field.

		Category / Region								
		Furniture				Office Supplies				Grand Total
Year of Order Date	Quarter of Order Date	Central	East	South	West	Central	East	South	West	
2008	Q1	21.98%	16.77%	21.71%	39.53%	32.58%	9.59%	17.97%	39.86%	100.00%
	Q2	21.27%	16.90%	30.93%	30.90%	16.88%	15.11%	25.58%	42.42%	100.00%
	Q3	31.56%	23.74%	27.68%	17.02%	28.42%	11.88%	32.25%	27.44%	100.00%
	Q4	13.36%	33.02%	27.38%	26.25%	34.83%	23.95%	12.96%	28.26%	100.00%
2009	Q1	19.29%	36.14%	13.58%	31.00%	31.83%	29.64%	14.67%	23.86%	100.00%
	Q2	20.96%	17.01%	43.44%	18.59%	25.26%	11.72%	35.75%	27.28%	100.00%
	Q3	44.34%	11.24%	21.22%	23.21%	28.00%	22.68%	30.87%	18.45%	100.00%
	Q4	30.27%	31.51%	20.11%	18.10%	31.85%	23.95%	12.53%	31.66%	100.00%
Grand Total		25.74%	22.33%	26.96%	24.97%	28.46%	18.50%	22.84%	30.20%	100.00%

That means that the combination of Year, Quarter, and Category is the partition.

		Category / Region								
		Furniture				Office Supplies				Grand Total
Year of Order Date	Quarter of Order Date	Central	East	South	West	Central	East	South	West	
2008	Q1	1 21.98%	16.77%	21.71%	39.53%	32.58%	9.59%	17.97%	39.86%	100.00%
	Q2	2 21.27%	16.90%	30.93%	30.90%	16.88%	15.11%	25.58%	42.42%	100.00%
	Q3	31.56%	23.74%	27.68%	17.02%	28.42%	11.88%	32.25%	27.44%	100.00%
	Q4	13.36%	33.02%	27.38%	26.25%	34.83%	23.95%	12.96%	28.26%	100.00%
2009	Q1	19.29%	36.14%	13.58%	31.00%	31.83%	29.64%	14.67%	23.86%	100.00%
	Q2	20.96%	17.01%	43.44%	18.59%	25.26%	11.72%	35.75%	27.28%	100.00%
	Q3	44.34%	11.24%	21.22%	23.21%	28.00%	22.68%	30.87%	18.45%	100.00%
	Q4	30.27%	31.51%	20.11%	18.10%	31.85%	23.95%	12.53%	31.66%	100.00%
Grand Total		25.74%	22.33%	26.96%	24.97%	28.46%	18.50%	22.84%	30.20%	100.00%

Pane (Down)

This option sets the addressing to compute down the table within the pane. The fields that separate the pane (Category and Year) are partitioning fields. In addition, the Region field becomes a partitioning field while the Quarter field is the addressing field.

		Category / Region								
		Furniture				Office Supplies				Grand Total
Year of Order Date	Quarter of Order Date	Central	East	South	West	Central	East	South	West	
2008	Q1	20.02%	14.71%	16.00%	28.67%	28.14%	15.45%	18.51%	27.17%	21.63%
	Q2	26.05%	19.93%	30.65%	30.14%	17.38%	29.01%	31.40%	34.47%	27.55%
	Q3	38.05%	27.56%	27.01%	16.34%	28.51%	22.23%	38.58%	21.73%	27.01%
	Q4	15.87%	37.79%	26.33%	24.85%	25.98%	33.31%	11.52%	16.64%	23.81%
2009	Q1	11.74%	29.94%	9.17%	25.23%	23.88%	29.35%	14.31%	20.64%	19.75%
	Q2	22.40%	24.75%	51.52%	26.57%	17.85%	10.93%	32.85%	22.22%	26.98%
	Q3	44.79%	15.45%	23.78%	31.35%	24.98%	26.69%	35.81%	18.98%	28.32%
	Q4	21.07%	29.85%	15.54%	16.85%	33.29%	33.03%	17.03%	38.16%	24.95%
Grand Total		100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

That means that the combination of Year, Category, and Region is the partition.

		Category / Region								
		Furniture				Office Supplies				Grand Total
Year of Order Date	Quarter of Order Date	Central	East	South	West	Central	East	South	West	
2008	Q1	20.02%	14.71%	16.00%	28.67%	28.14%	15.45%	18.51%	27.17%	21.63%
	Q2	26.05%	19.93%	30.65%	30.14%	17.38%	29.01%	31.40%	34.47%	27.55%
	Q3	38.05%	27.56%	27.01%	16.34%	28.51%	22.23%	38.58%	21.73%	27.01%
	Q4	15.87%	37.79%	26.33%	24.85%	25.98%	33.31%	11.52%	16.64%	23.81%
2009	Q1	11.74%	29.94%	9.17%	25.23%	23.88%	29.35%	14.31%	20.64%	19.75%
	Q2	22.40%	24.75%	51.52%	26.57%	17.85%	10.93%	32.85%	22.22%	26.98%
	Q3	44.79%	15.45%	23.78%	31.35%	24.98%	26.69%	35.81%	18.98%	28.32%
	Q4	21.07%	29.85%	15.54%	16.85%	33.29%	33.03%	17.03%	38.16%	24.95%
Grand Total		100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

1 2 3 4

Pane (Across then Down)

This option sets the addressing to compute across within the pane, then move to the next row and continue to compute across. The addresssing fields are both the fields that run across the table horizontally and down the table vertically (Region and Quarter). The partitioning fields are the fields that define the pane (Category and Year).

		Category / Region								
		Furniture				Office Supplies				Grand Total
Year of Order Date	Quarter of Order Date	Central	East	South	West	Central	East	South	West	
2008	Q1	4.42%	3.37%	4.37%	7.95%	7.73%	2.27%	4.26%	9.45%	21.63%
	Q2	5.75%	4.57%	8.36%	8.36%	4.77%	4.27%	7.23%	11.99%	27.55%
	Q3	8.40%	6.32%	7.37%	4.53%	7.83%	3.27%	8.88%	7.56%	27.01%
	Q4	3.50%	8.66%	7.18%	6.89%	7.13%	4.90%	2.65%	5.79%	23.81%
2009	Q1	3.47%	6.50%	2.44%	5.58%	7.04%	6.55%	3.24%	5.27%	19.75%
	Q2	6.62%	5.37%	13.72%	5.87%	5.26%	2.44%	7.44%	5.68%	26.98%
	Q3	13.24%	3.36%	6.33%	6.93%	7.36%	5.96%	8.11%	4.85%	28.32%
	Q4	6.23%	6.48%	4.14%	3.72%	9.81%	7.37%	3.86%	9.75%	24.95%
Grand Total		25.74%	22.33%	26.96%	24.97%	28.46%	18.50%	22.84%	30.20%	100.00%

That means that the combination of Category and Year make up the partition.

		Category / Region								
		Furniture				Office Supplies				Grand Total
Year of Order Date	Quarter of Order Date	Central	East	South	West	Central	East	South	West	
2008	Q1	4.42%	3.37%	4.37%	7.95%	7.73%	2.27%	4.26%	9.45%	21.63%
	Q2	5.75%	4.57%	8.36%	8.36%	4.77%	4.27%	7.23%	11.99%	27.55%
	Q3	8.40%	6.32%	7.37%	4.53%	7.83%	3.27%	8.88%	7.56%	27.01%
	Q4	3.50%	8.66%	7.18%	6.89%	7.13%	4.90%	2.65%	5.79%	23.81%
2009	Q1	3.47%	6.50%	2.44%	5.58%	7.04%	6.55%	3.24%	5.27%	19.75%
	Q2	6.62%	5.37%	13.72%	5.87%	5.26%	2.44%	7.44%	5.68%	26.98%
	Q3	13.24%	3.36%	6.33%	6.93%	7.36%	5.96%	8.11%	4.85%	28.32%
	Q4	6.23%	6.48%	4.14%	3.72%	9.81%	7.37%	3.86%	9.75%	24.95%
Grand Total		25.74%	22.33%	26.96%	24.97%	28.46%	18.50%	22.84%	30.20%	100.00%

Cell

This option sets the addressing to the indvidual cells in the table. All fields become partitioning fields. This option is generally most useful when computing a percent of total calculation.

		Category / Region								
		Furniture				Office Supplies				Grand Total
Year of Order Date	Quarter of Order Date	Central	East	South	West	Central	East	South	West	
2008	Q1	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
	Q2	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
	Q3	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
	Q4	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
2009	Q1	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
	Q2	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
	Q3	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
	Q4	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Grand Total		100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

That means that the partition is the combination of Category, Region, Year, and Quarter.

		Category / Region								
		Furniture				Office Supplies				Grand Total
Year of Order Date	Quarter of Order Date	Central	East	South	West	Central	East	South	West	
2008	Q1	100.0% 1	100.0% 2	100.0% 3	100.0% 4	100.0%	100.0%	100.0%	100.0%	100.0%
	Q2	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
	Q3	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
	Q4	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
2009	Q1	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
	Q2	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
	Q3	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
	Q4	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Grand Total		100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Using Table Calculations

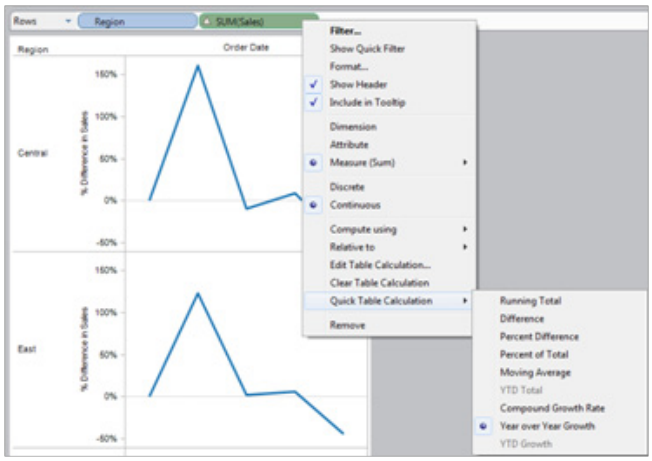
Table Calculations can be used in a number of different ways in Tableau 6. Table Calculations are available on the right-click menu of any measure as well as in the calculated field editor.

Quick Table Calculations

The fastest way to start using table calculations is to use the "Quick Table Calculation" menu. This provides some of the most commonly used Table Calculations.

By Default, the quick table calculations will be partitioned by "Table (across)" and the measure will be compared to the "previous" cell. The partition can be easily changed in the "compute using" context menu and the comparison can be changed in the "relative to" context menu.

When starting with table calculations it can be useful to experiment in a crosstab view to ensure that the values are being computed in the expected way.



Sorting Table Calculations

Tableau provides extensive sorting capabilities. When using Tableau Quick Table Calculations there are times when using the one-click sort feature will result in inconclusive results.

Computed sorts are created when you bring up the sort dialogue for a dimension and choose to sort by another field in the data source. These sorts will never display or include **Tableau Quick Table Calculations**. This is because Tableau Quick Table

Calculations occur as a post-database processing step, and Tableau does not go back to the underlying data to perform a second pass through the data simply to sort the Tableau Quick Table Calculations results.

One-click sort will work great for running totals, percent of totals, and differences from discrete elements (first, last, "named" element, etc).

Certain types of Tableau Quick Table Calculations will create inconclusive results when using the one-click sort. These include moving averages, difference from "previous" and percent difference from "previous". All of these types of calculations use relative positions for running the calculation, and if you re-sort the dimensions, the relative positions will change, thus creating inconclusive results.

Filtering

A measure used for a table calculation can be included as a filter just like any other measure. This enables users to create on-the-fly analyses based on the newly calculated values. The filter is applied on the client side and no additional query is sent to the database server. This can be useful when, to continue our running total example, you want to filter to products that exceeding a certain amount of sales over the period specified. The advantage of using Table Calculations in this case is that not only can you use the Table Calculation as a filter, but you can filter on Date as well to change the period included in the running sum.

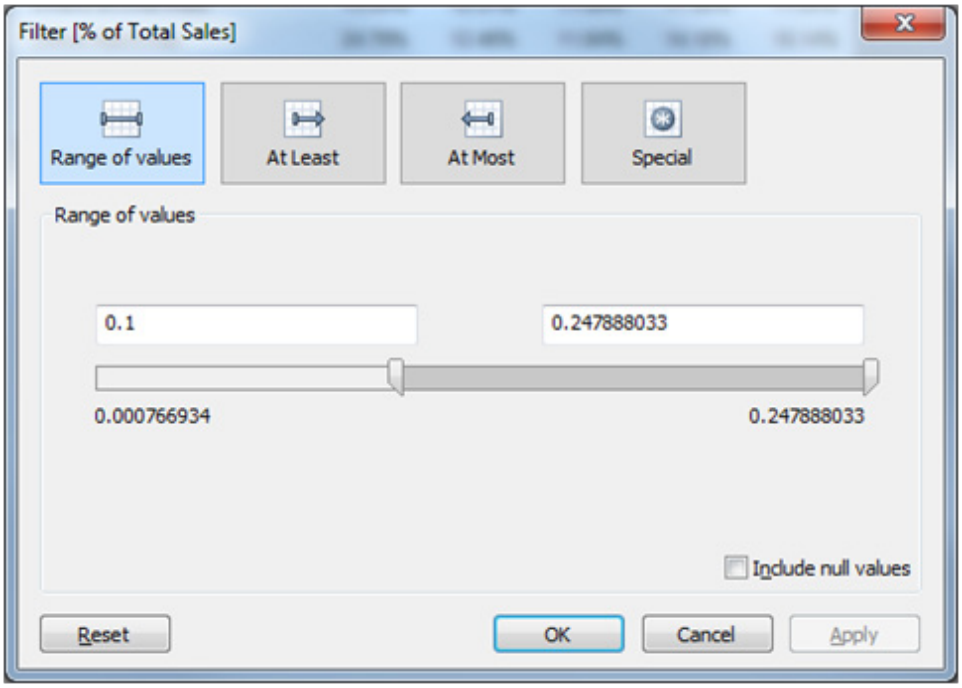


Table Calculation Functions

Tableau 6 introduces a new set of table calculation functions:

Helper Functions

Certain table calculation functions provide information about the relative position of an item within a partition. These can be used in a view or more commonly they are used as part of other calculations.

First( )

Returns the number of rows from the current row to the first row in the partition. For example, the view below shows quarterly sales. When FIRST() is computed within the Date partition, the offset of the first row from the second row is -1.

Year of Order Date	Quarter of Order Date	Region: Central	East	South	West	First()
2009	Q1	$160,877	$231,411	$133,934	$185,961	0
	Q2	$197,213	$204,914	$337,813	$213,507	-1
	Q3	$302,678	$165,201	$283,806	$206,512	-2
	Q4	$297,208	$226,983	$214,845	$230,291	-3
2010	Q1	$180,609	$180,123	$273,943	$251,145	-4
	Q2	$195,785	$224,882	$251,391	$195,976	-5
	Q3	$116,613	$50,363	$194,601	$102,731	-6

Example (when current row index is 3): FIRST() = -2

LAST( )

Returns the number of rows from the current row to the last row in the partition. For example, the table below shows quarterly sales. When LAST() is computed within the Date partition, the offset of the last row from the second row is 5.

Year of Order Date	Quarter of Order Date	Region: Central	East	South	West	LAST()
2009	Q1	$160,877	$231,411	$133,934	$185,961	6
	Q2	$197,213	$204,914	$337,813	$213,507	5
	Q3	$302,678	$165,201	$283,806	$206,512	4
	Q4	$297,208	$226,983	$214,845	$230,291	3
2010	Q1	$180,609	$180,123	$273,943	$251,145	2
	Q2	$195,785	$224,882	$251,391	$195,976	1
	Q3	$116,613	$50,363	$194,601	$102,731	0

Example (when the current row index is 3 of 7): LAST() = 4

INDEX( )

Returns the index of the current row in the partition. The first row index starts at 1. For example, the table below shows quarterly sales. When INDEX() is computed within teh Date partition, the index of each row is 1, 2, 3, 4...etc.

Year of Order Date	Quarter of Order Date	Region: Central	East	South	West
2009	Q1	$160,877	$231,411	$133,934	$185,961
	Q2	$197,213	$204,914	$337,813	$213,507
	Q3	$302,678	$165,201	$283,806	$206,512
	Q4	$297,208	$226,983	$214,845	$230,291
2010	Q1	$180,609	$180,123	$273,943	$251,145
	Q2	$195,785	$224,882	$251,391	$195,976
	Q3	$116,613	$50,363	$194,601	$102,731

	INDEX()
$160,877	1
$197,213	2
$302,678	3
$297,208	4
$180,609	5
$195,785	6
$116,613	7

Example (for the third row in the partition): INDEX() = 3

SIZE()

Returns the number of rows in the partition. For example, the view below shows quarterly sales. Within the Date partition, there are seven rows so the Size() of the Date partition is 7.

Year of Order Date	Quarter of Order Date	Region: Central	East	South	West
2009	Q1	$160,877	$231,411	$133,934	$185,961
	Q2	$197,213	$204,914	$337,813	$213,507
	Q3	$302,678	$165,201	$283,806	$206,512
	Q4	$297,208	$226,983	$214,845	$230,291
2010	Q1	$180,609	$180,123	$273,943	$251,145
	Q2	$195,785	$224,882	$251,391	$195,976
	Q3	$116,613	$50,363	$194,601	$102,731

$160,877
$197,213
$302,678
$297,208
$180,609
$195,785
$116,613

Size = 7

Example (partition has 5 rows): SIZE() = 5

Primary functions:

These functions are fundamental to Table Calculations and are used for most calculations. It's important to remember that these functions will return different values depending on how the calculation is addressed and partitioned. Primary functions include:

1. Total
2. Lookup
3. Window
4. Running
5. Previous value

LOOKUP(expression, [offset])

Returns the value of the given expression in a target row, specified as a relative offset from the current row. Use FIRST() + n and LAST() - n for a target relative to the first/last rows in the partition. If offset is omitted, the Compare To row may be set on the field menu. Returns NULL if the target row cannot be determined.

For example, the view below shows quarterly sales. When LOOKUP (SUM(Sales), 2) is computed within the Date partition, each row will show the sales value from 2 quarters in the future.

			Region		
Year of Order Date	Quarter of Order Date	Central	East	South	West
2009	Q1	$160,877	$231,411	$133,934	$185,961
	Q2	$197,213	$204,914	$337,813	$213,507
	Q3 +2	$302,678	$165,201	$283,806	$206,512
	Q4	$297,208	$226,983	$214,845	$230,291
2010	Q1	$180,609	$180,123	$273,943	$251,145
	Q2	$195,785	$224,882	$251,391	$195,976
	Q3	$116,613	$50,363	$194,601	$102,731

			Region		
Year of Order Date	Quarter of Order Date	Central	East	South	West
2009	Q1	$302,678	$165,201	$283,806	$206,512
	Q2	$297,208	$226,983	$214,845	$230,291
	Q3	$180,609	$180,123	$273,943	$251,145
	Q4	$195,785	$224,882	$251,391	$195,976
2010	Q1	$116,613	$50,363	$194,601	$102,731
	Q2				
	Q3				

Example: LOOKUP(SUM([Profit]), FIRST()+2) = SUM([Profit]) in the third row of the partition.

PREVIOUS_VALUE(expression)

Returns the value of this calculation in the previous row. Returns the given expression if the current row is the first row of the partition.

Example: SUM([Profit]) * PREVIOUS_VALUE(1) = running product of SUM(Profit)

RUNNING (Avg, Count, Max, Min, sum)

EX: RUNNING_AVG(expression)

Returns the running average of the given expression, from the first row in the partition to the current row.

For example, the view below shows quarterly sales. When RUNNING_AVG(SUM([Sales]) is computed within the Date partition, the result is a running average of the sales values for each quarter.

Year of Order Date	Quarter of Order Date	Region: Central	East	South	West
2009	Q1	$160,877	$231,411	$133,934	$185,961
	Q2	$197,213	$204,914	$337,813	$213,507
	Q3	$302,678	$165,201	$283,806	$206,512
	Q4	$297,208	$226,983	$214,845	$230,291
2010	Q1	$180,609	$180,123	$273,943	$251,145
	Q2	$195,785	$224,882	$251,391	$195,976
	Q3	$116,613	$50,363	$194,601	$102,731

$160,877
$197,213
$302,678
$297,208
$180,609
$195,785
$116,613

Average = $179,045

Year of Order Date	Quarter of Order Date	Region: Central	East	South	West
2009	Q1	160,877	231,411	133,934	185,961
	Q2	179,045	218,162	235,873	199,734
	Q3	220,256	200,509	251,851	201,993
	Q4	239,494	207,127	242,599	209,068
2010	Q1	227,717	201,726	248,868	217,483
	Q2	222,395	205,586	249,289	213,899
	Q3	207,283	183,411	241,476	198,018

Example: RUNNING_AVG(SUM([Profit])) = running average of SUM(Profit)

WINDOW (Avg, Sum, Min, Max, Count, STDEV, Stedp, Var, Varp, Total

WINDOW_AVG(expression, [start, end])

Returns the average of the expression within the window. The window is defined as offsets from the current row. Use FIRST()+n and LAST()-n for offsets from the first or last row in the partition. If the start and end are omitted, the entire partition is used.

Example: WINDOW_AVG(SUM[Profit]), FIRST()+1, 0) = Average of SUM(Profit) from the second row to the current row

WINDOW_COUNT(expression, [start, end])

Returns the count of the expression within the window. The window is defined as offsets from the current row. Use FIRST()+n and LAST()-n for offsets from the first or last row in the partition. If the start and end are omitted, the entire partition is used.

Example: WINDOW_COUNT(SUM[Profit]), FIRST()+1, 0) = Count of SUM(Profit) from the second row to the current row

WINDOW_MAX(expression, [start, end])

Returns the maximum of the expression within the window. The window is defined as offsets from the current row. Use FIRST()+n and LAST()-n for offsets from the first or last row in the partition. If the start and end are omitted, the entire partition is used.

Example: WINDOW_MAX(SUM[Profit]), FIRST()+1, 0) = Maximum of SUM(Profit) from the second row to the current row

WINDOW_MIN(expression, [start, end])

Returns the minimum of the expression within the window. The window is defined as offsets from the current row. Use FIRST()+n and LAST()-n for offsets from the first or last row in the partition. If the start and end are omitted, the entire partition is used.

Example: WINDOW_MIN(SUM[Profit]), FIRST()+1, 0) = Minimum of SUM(Profit) from the second row to the current row

WINDOW_STDEV(expression, [start, end])

Returns the sample standard deviation of the expression within the window. The window is defined as offsets from the current row. Use FIRST()+n and LAST()-n for offsets from the

first or last row in the partition. If the start and end are omitted, the entire partition is used.

Example: WINDOW_STDEV(SUM[Profit]), FIRST()+1, 0) = Standard deviation of SUM(Profit) from the second row to the current row

WINDOW_STDEVP(expression, [start, end])

Returns the biased standard deviation of the expression within the window. The window is defined as offsets from the current row. Use FIRST()+n and LAST()-n for offsets from the first or last row in the partition. If the start and end are omitted, the entire partition is used.

Example: WINDOW_STDEVP(SUM[Profit]), FIRST()+1, 0) = Standard deviation of SUM(Profit) from the second row to the current row

WINDOW_SUM(expression, [start, end])

Returns the summation of the expression within the window. The window is defined as offsets from the current row. Use FIRST()+n and LAST()-n for offsets from the first or last row in the partition. If the start and end are omitted, the entire partition is used.

Example: WINDOW_SUM(SUM[Profit]), FIRST()+1, 0) = Summation of SUM(Profit) from the second row to the current row

WINDOW_VAR(expression, [start, end])

Returns the sample variance of the expression within the window. The window is defined as offsets from the current row. Use FIRST()+n and LAST()-n for offsets from the first or last row in the partition. If the start and end are omitted, the entire partition is used.

Example: WINDOW_VAR(SUM[Profit]), FIRST()+1, 0) = Variance of SUM(Profit) from the second row to the current row

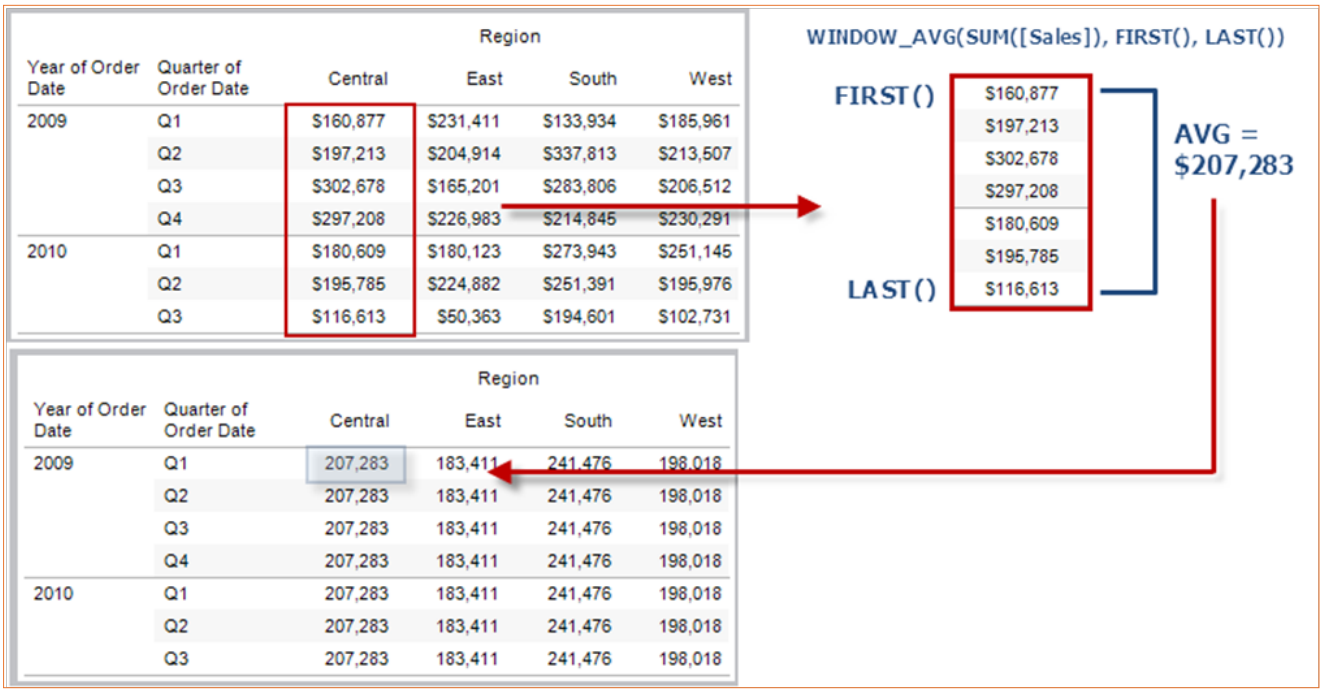
WINDOW_VARP(expression, [start, end])

Returns the biased variance of the expression within the window. The window is defined as offsets from the current row. Use FIRST()+n and LAST()-n for offsets from the first or last row in the partition. If the start and end are omitted, the entire partition is used.

Example: WINDOW_VARP(SUM[Profit]), FIRST()+1, 0) = Variance of SUM(Profit) from the second row to the current row

Returns the average of the expression within the window. The window is defined as offsets from the current row. Use FIRST()+n and LAST()-n for offsets from the first or last row in the partition. If the start and end are omitted, the entire partition is used.

For example, the view below shows quarterly sales. A window average within the Date partition returns the average sales across all dates.



Year of Order Date	Quarter of Order Date	Region: Central	East	South	West
2009	Q1	$160,877	$231,411	$133,934	$185,961
	Q2	$197,213	$204,914	$337,813	$213,507
	Q3	$302,678	$165,201	$283,806	$206,512
	Q4	$297,208	$226,983	$214,845	$230,291
2010	Q1	$180,609	$180,123	$273,943	$251,145
	Q2	$195,785	$224,882	$251,391	$195,976
	Q3	$116,613	$50,363	$194,601	$102,731

Year of Order Date	Quarter of Order Date	Region: Central	East	South	West
2009	Q1	207,283	183,411	241,476	198,018
	Q2	207,283	183,411	241,476	198,018
	Q3	207,283	183,411	241,476	198,018
	Q4	207,283	183,411	241,476	198,018
2010	Q1	207,283	183,411	241,476	198,018
	Q2	207,283	183,411	241,476	198,018
	Q3	207,283	183,411	241,476	198,018

Example: WINDOW_AVG(SUM[Profit]), FIRST()+1, 0) = Average of SUM(Profit) from the second row to the current row

Putting it all together: an example in practice

A Simple Example:

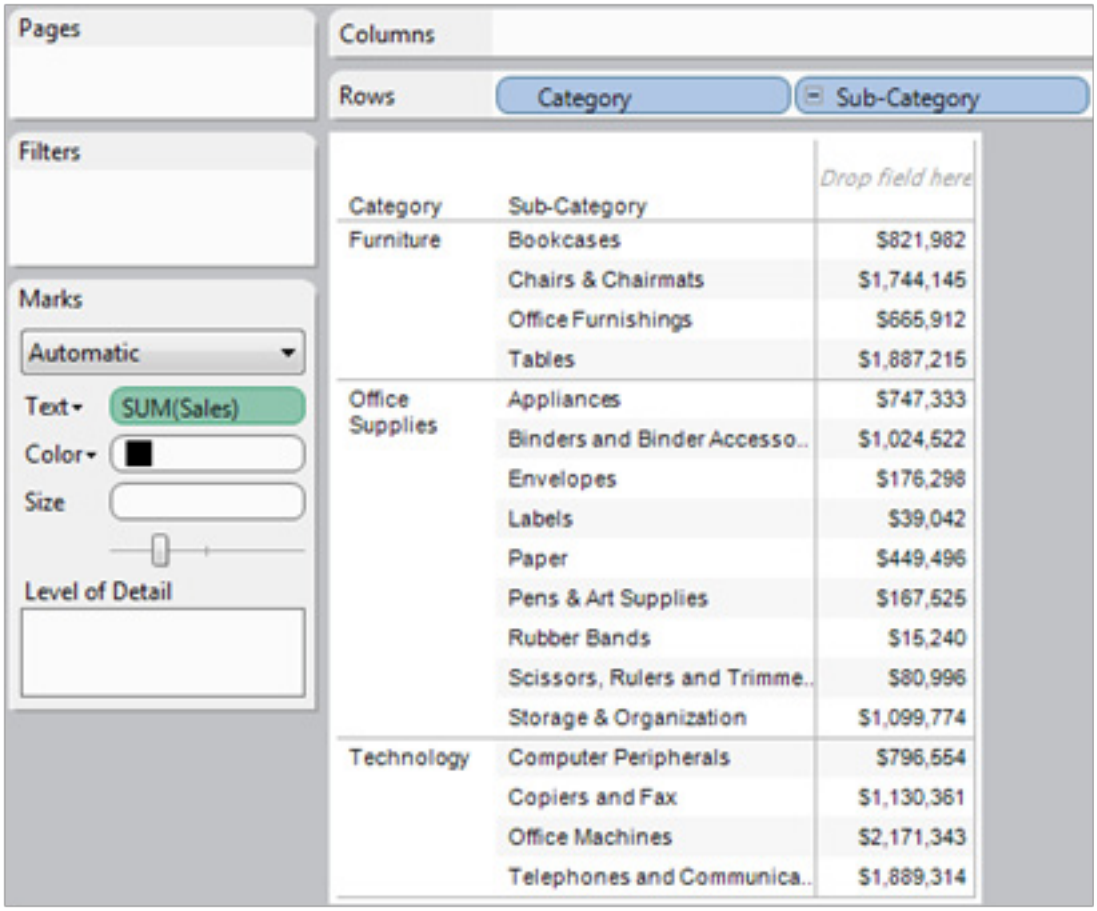
Let's calculate the percentage of total sales for each item in a product category. The view will use the Percent of Total table calculation and apply it to the pane. The calculation is dynamic which means that as I change the dimensions in the view the calculation will always compare the values within the current pane.

Step 1 - Open a new workbook and connect to the Superstore sample.

Step 2 - From the Dimensions pane, drag Product Category and Product Sub-Category to the Rows shelf.

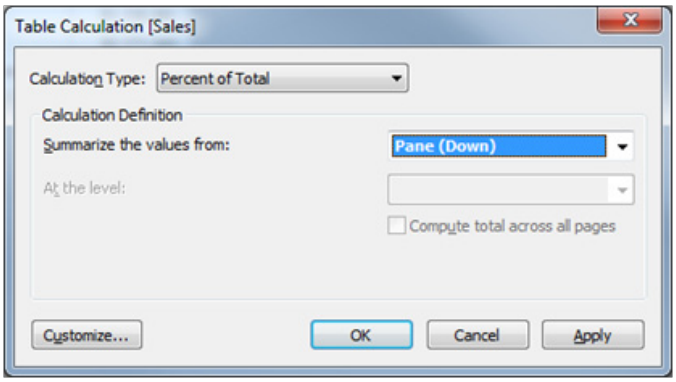
Step 3 - From the Measures pane, drag Sales to the Text shelf on the Marks card.

Step 4 - On the Text shelf, right-click Sales and select Add Table Calculation.

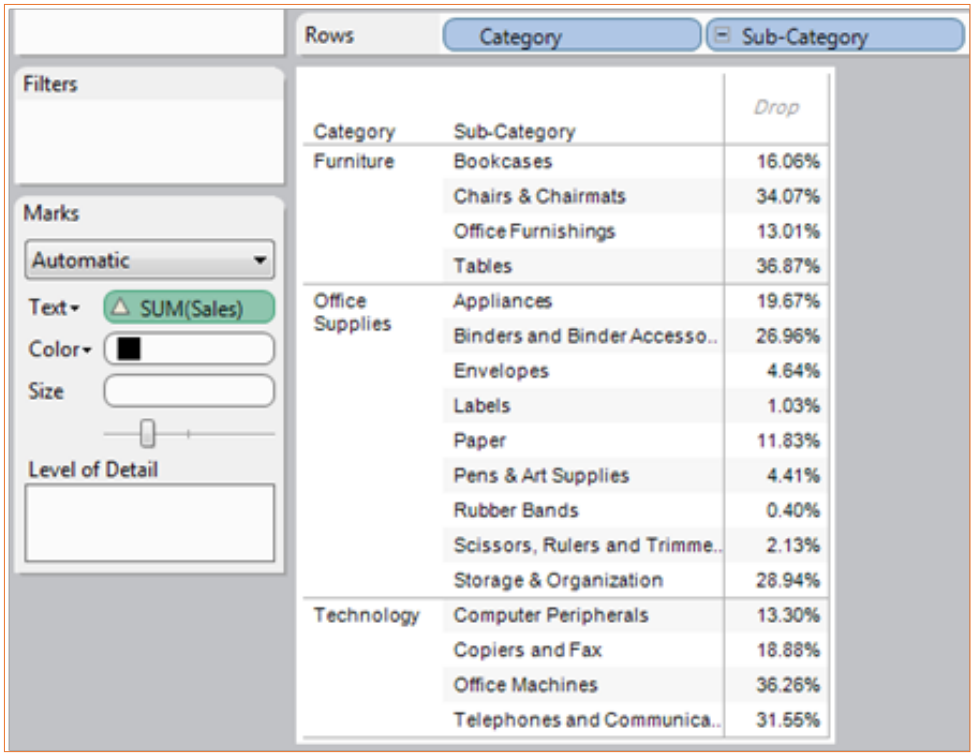


Step 5 - In the Table Calculation dialog box, in the Calculation Type list, select Percent of Total.

Step 6 - In the Compute the total within list, select Pane (Down).



The resulting view will look like this:



Category	Sub-Category	
Furniture	Bookcases	16.06%
	Chairs & Chairmats	34.07%
	Office Furnishings	13.01%
	Tables	36.87%
Office Supplies	Appliances	19.67%
	Binders and Binder Accesso..	26.96%
	Envelopes	4.64%
	Labels	1.03%
	Paper	11.83%
	Pens & Art Supplies	4.41%
	Rubber Bands	0.40%
	Scissors, Rulers and Trimme..	2.13%
	Storage & Organization	28.94%
Technology	Computer Peripherals	13.30%
	Copiers and Fax	18.88%
	Office Machines	36.26%
	Telephones and Communica..	31.55%

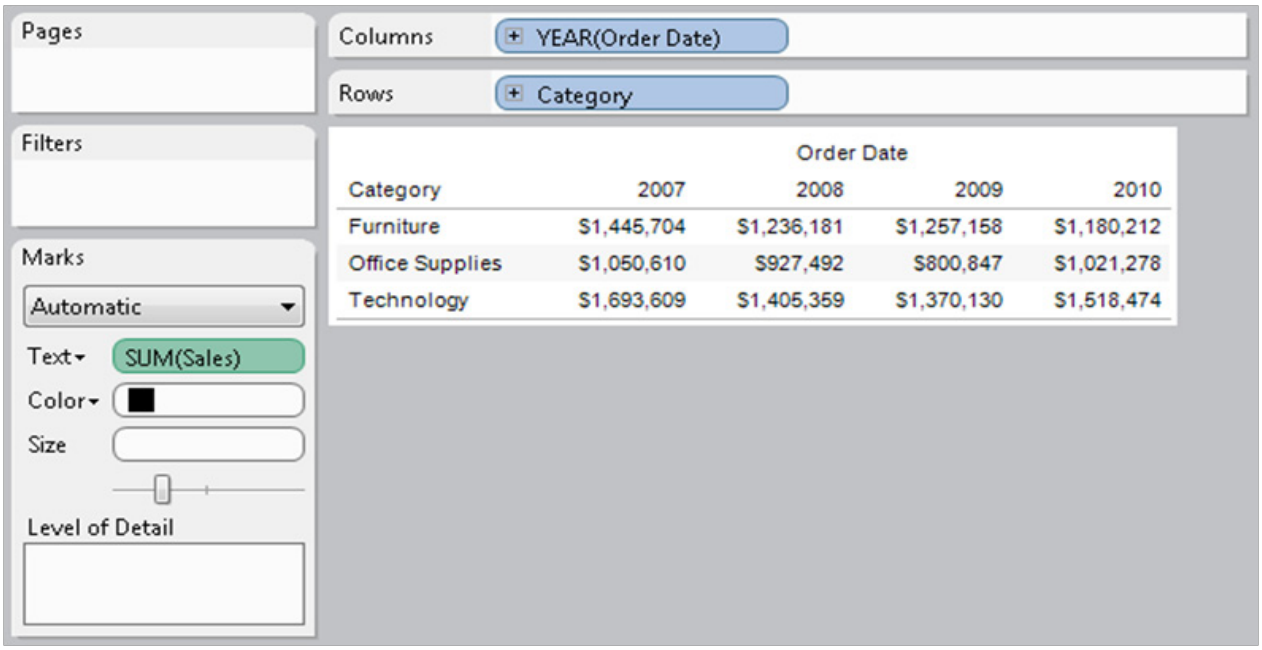
Advanced Example:

This example compares the difference in total sales to the difference in average sales from year to year. It does this by creating:

1. A table calculation that determines the difference in total sales from year to year
2. A table calculation that determines the difference in the moving average of sales from year to year
3. A calculated field that subtracts the difference in total sales from the difference in the moving average of sales from year to year

To create a calculated field based on a table calculation, you click Customize in the Add Table Calculation dialog box. In the Calculated Field dialog box, you can refine the table calculation further as necessary.

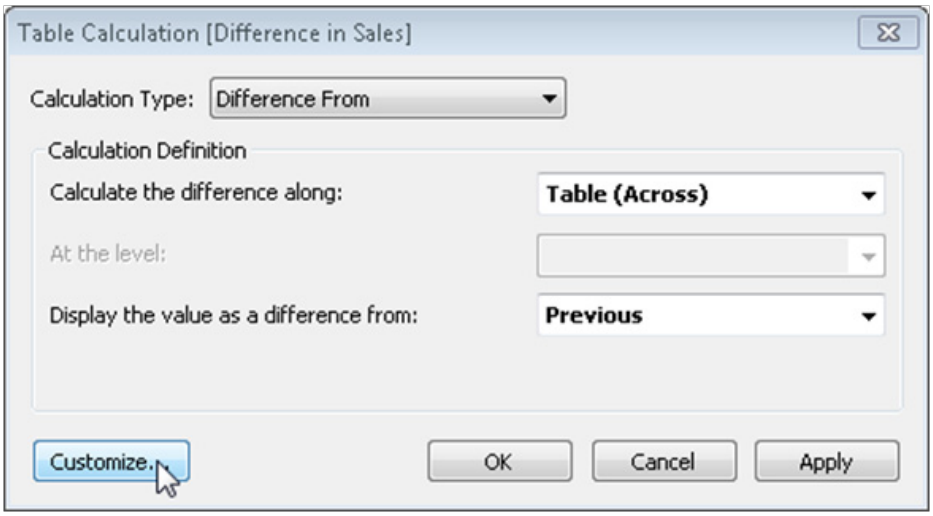
Step 1 – Start with an initial view of the data. In this example, we'll use the sales of Products over Time



Step 2 – Define the first table calculation to determine the difference in total sales from year to year. On the Text shelf, right click on Sales and select Add Table Calculation. The default settings are:

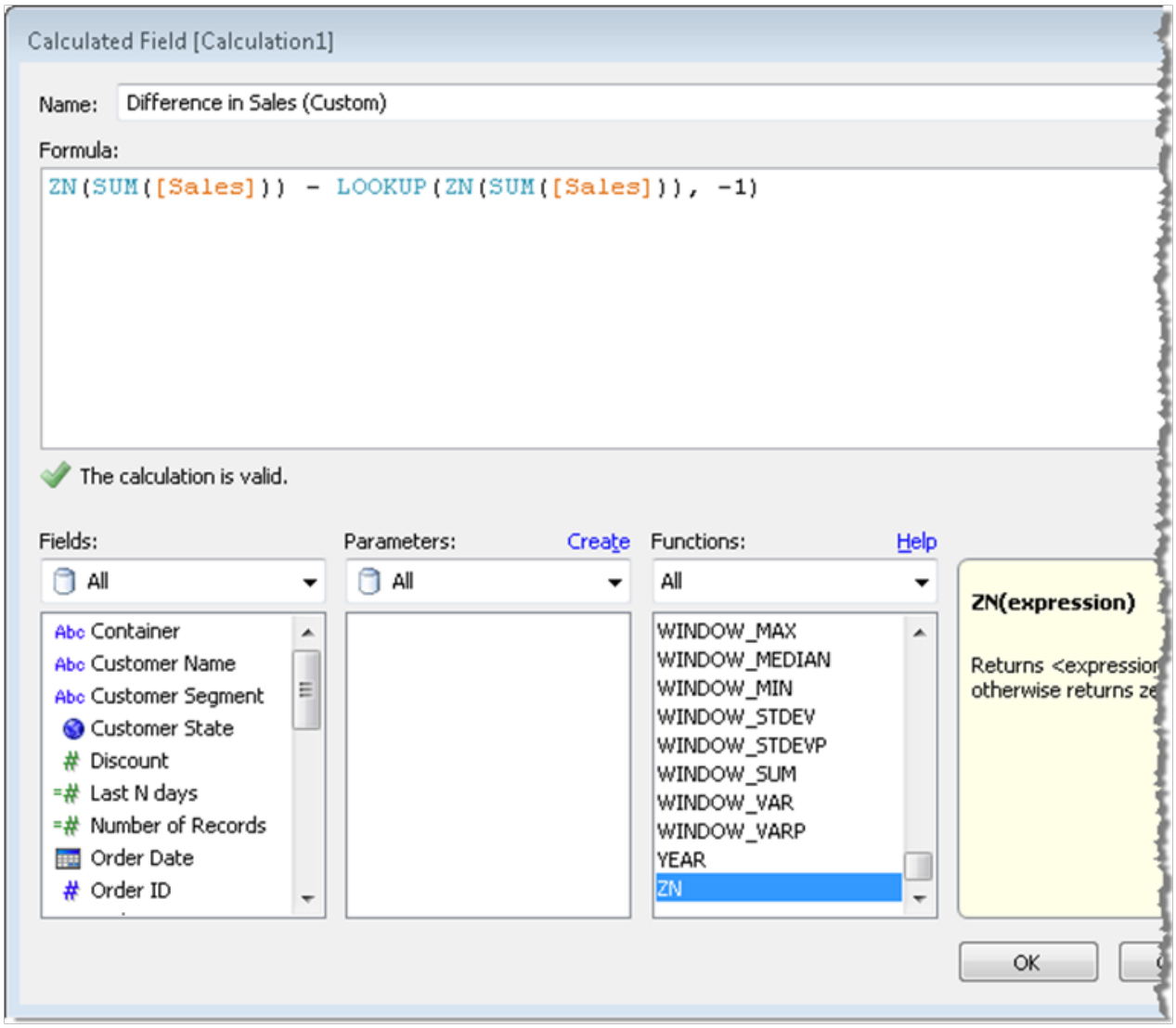
- Calculation Type: Difference From
- Calculate the difference along: Table (Across)
- Display the value as a difference from: Previous

For this example, you do not have to change these default values.

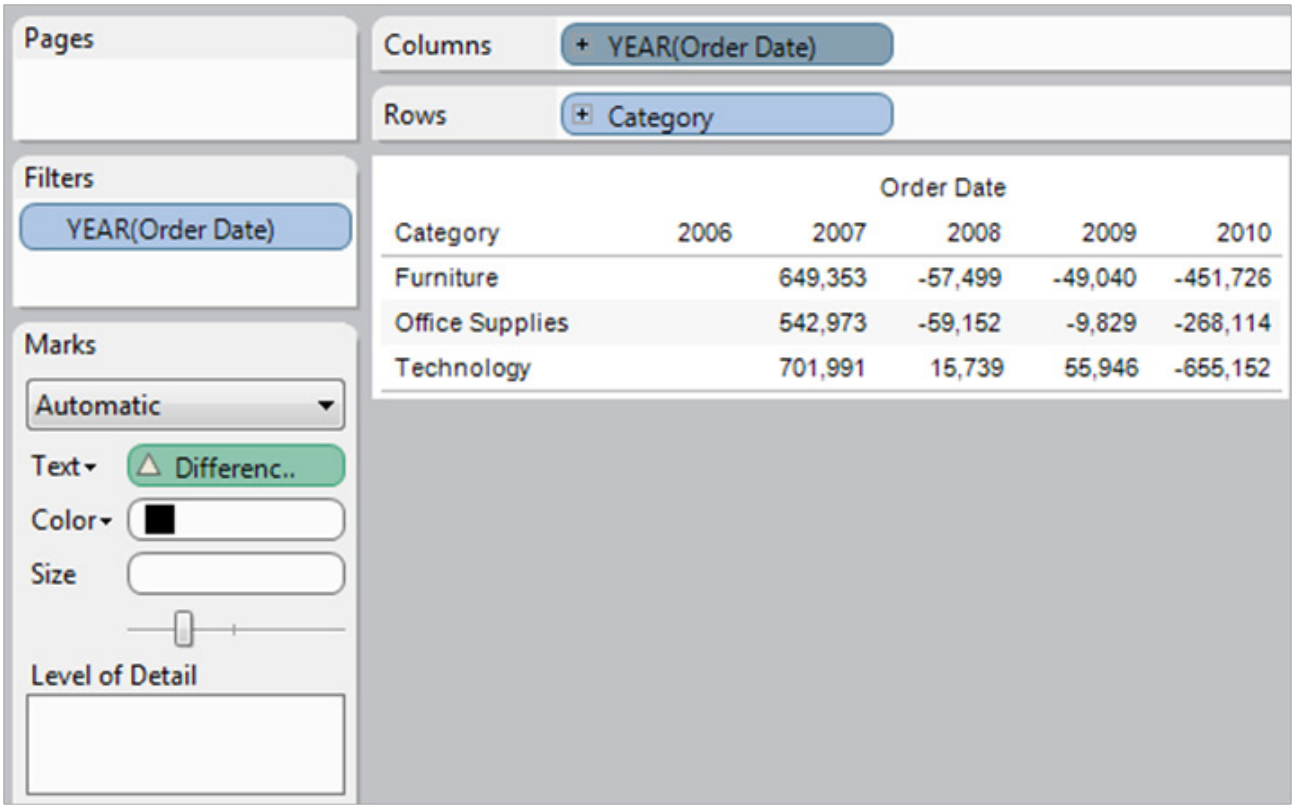


- In the Table Calculation dialog box, click Customize.
- In the Calculated Field dialog box, in the Name text box, type Difference in Sales (Custom).

The suggested calculation is correct for our purposes.

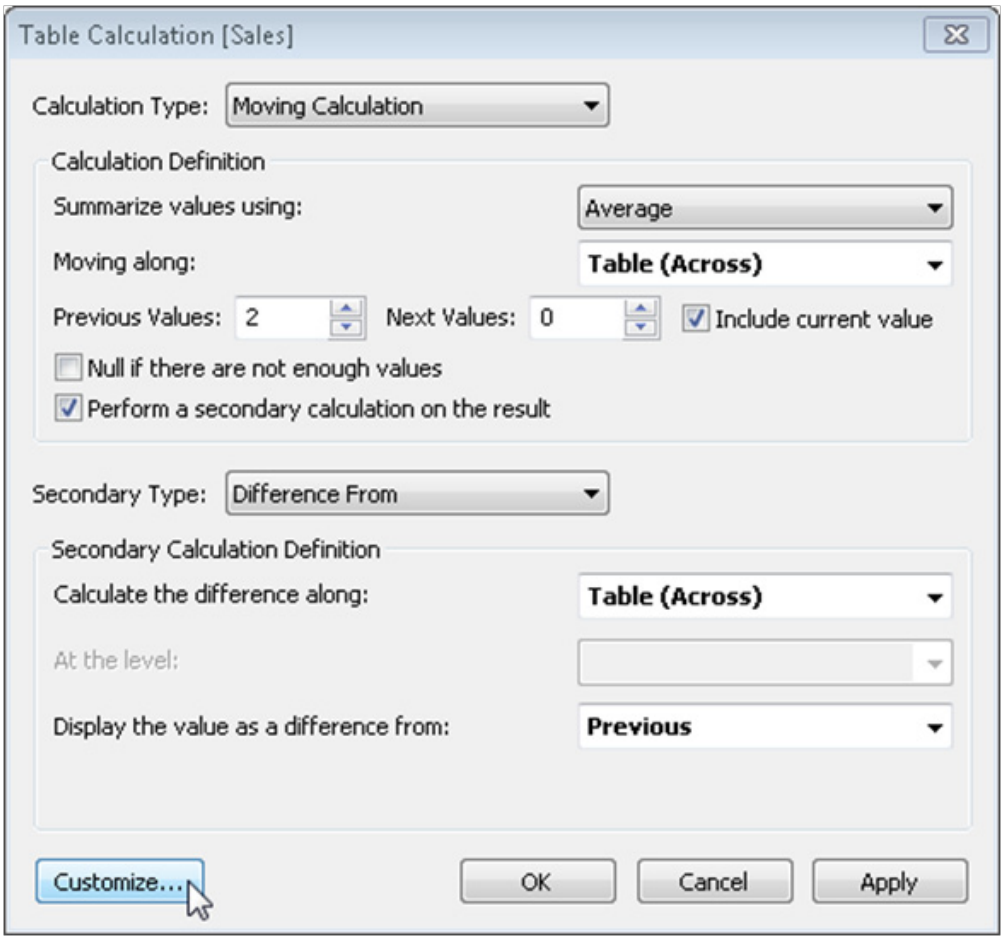


Click **OK**. We now have our Year over Year difference in sales calculation defined.

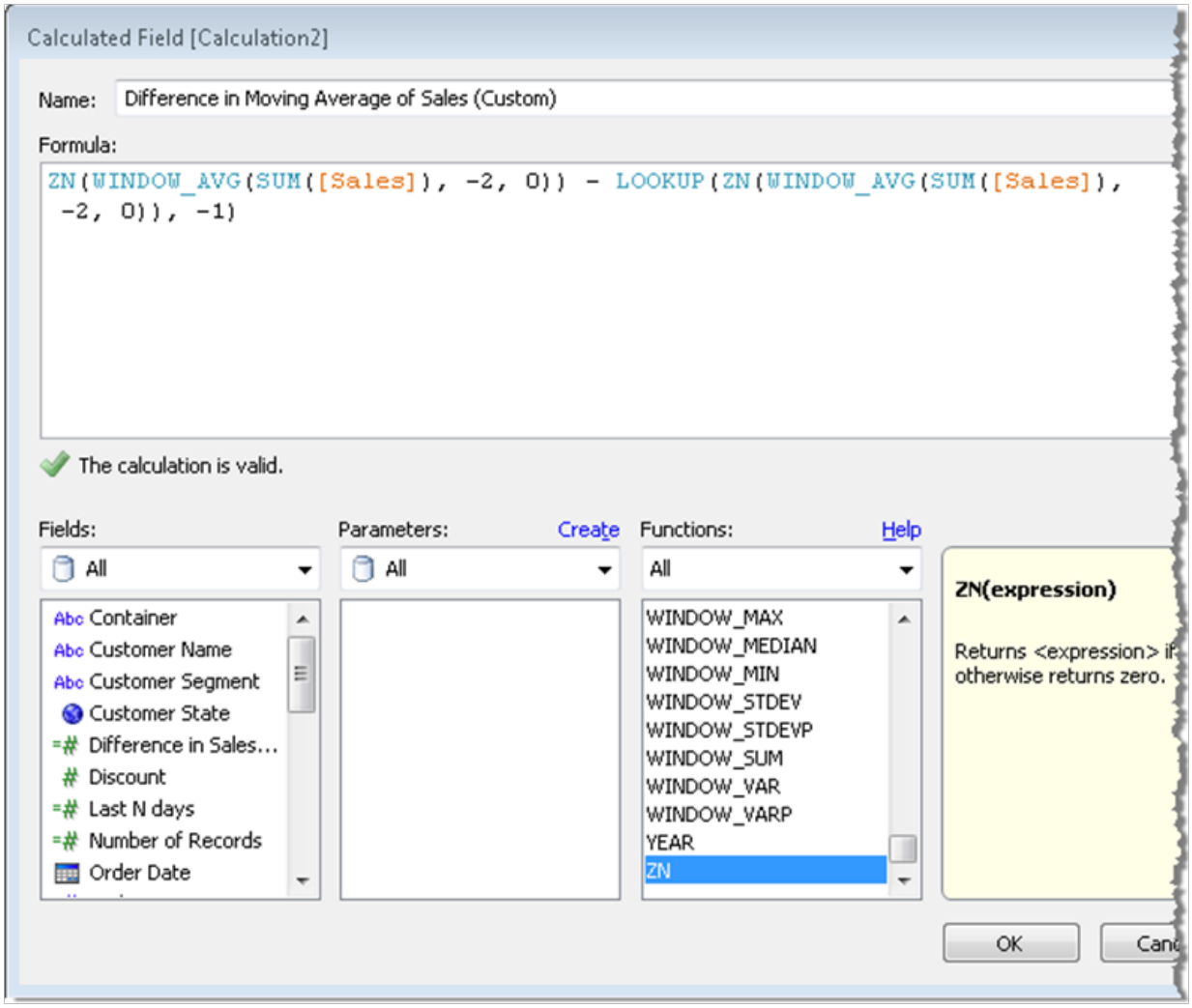


Step 3 – We'll now create a table calculation that determines the difference in the moving average of sales from year to year.

- Add sales to the view by double-clicking Sales in the Measures pane
- On the Measure Values shelf, right-click Sales and select Add Table Calculation.
- In the Table Calculation dialog box, in the Calculation Type list, select Moving Calculation.
- In the Summarize values using list, select Average.
- Select the check box for Perform a secondary calculation on the result.



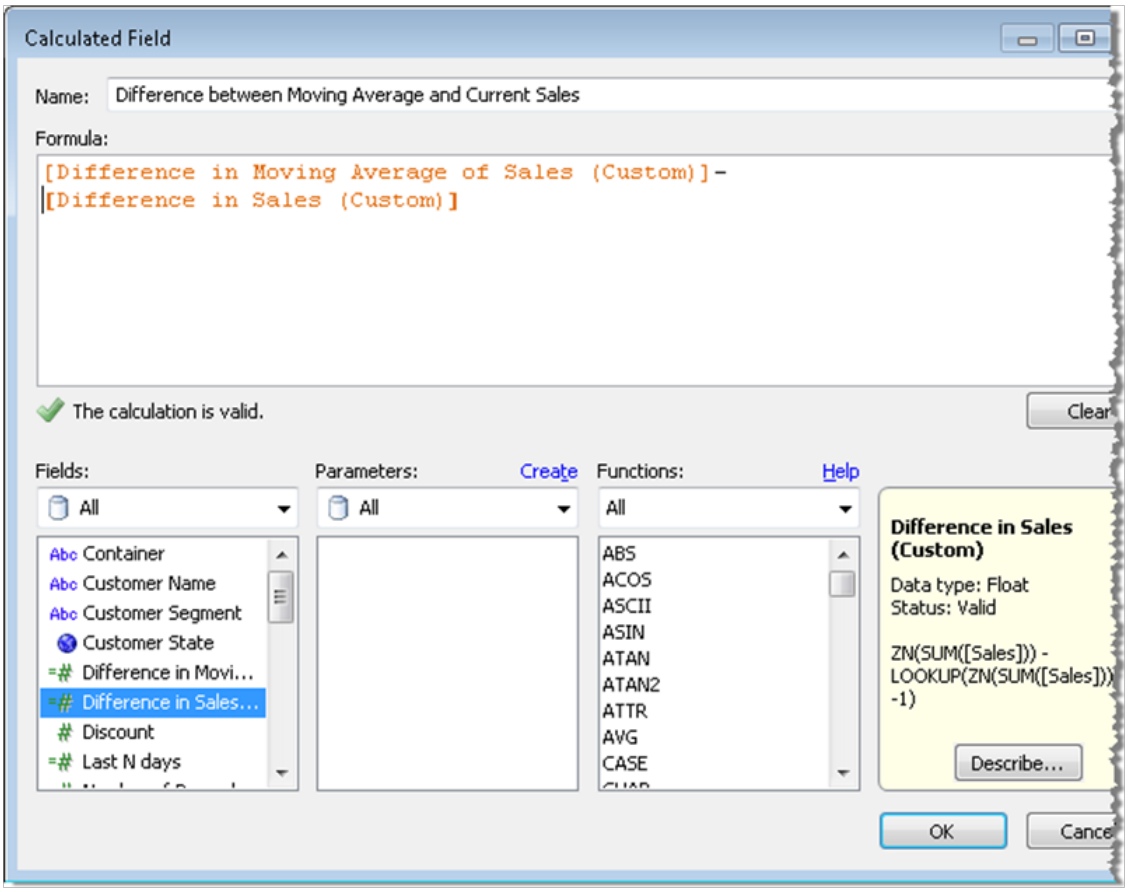
- Click **Customize**
- In the **Calculated Field** dialog box, in the **Name** text box, type **Difference in Moving Average of Sales (Custom)**.
- The suggested calculation is correct for our purposes.



- Click **OK**.

Step 3 - Our view now contains 2 calculated measures. The Difference in Sales and the Difference in Moving Average of Sales. Now we can compare the difference in sales from year to year to the moving average of sales from year to year

- Select **Analysis** > **Create Calculated Field**.
- In the **Calculated Field** dialog box, make the following selections to create this formula:
  1. In the **Name** text box, type **Difference between Moving Average and Current Sales**.
  2. Click the **Formula** text box.
  3. In the **Fields** list, double-click **Difference in Moving Average of Sales (Custom)**.
  4. Type a minus sign.
  5. In the **Fields** list, double-click **Difference in Sales (Custom)**.



- Click **OK**.
- In the **Measures** pane, double-click **Difference between Moving Average and Current Sales along Table (across).**