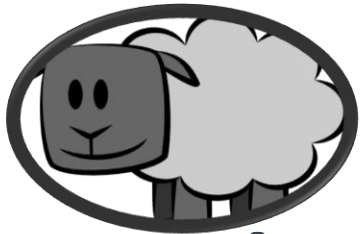# Calculation Groups

Jason Romans

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Senior BI Engineer
Builder of Models

The Dax Shepherd

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https://thedaxshepherd.net/

Live in Nashville, TN

Started as SQL Server DBA

Transitioned to the Microsoft BI Stack

Work on everything from SQL Server Integration Services, SQL Server Database, Analysis Services, and Power BI

Agenda

1. Why Calculation Groups
2. Creating Calculation Groups
3. Multiple Calculation Groups
4. DAX Code
5. Best Practices
6. Conclusion

Agenda

It starts with one measure…

Sales Amount

Now, need to create a version for different time periods

Sales Amount MTD – Month to Date

Sales Amount QTD – Quarter to Date

Sales Amount YTD – Year to Date

Sales Amount SPLY – Same Period Last Year

Can you do the same for this measure?

Total Cost

- Total Cost QTD
- Total Cost MTD
- Total Cost YTD
- Total Cost SPLY

And Now These…

- Margin
- Margin %
- Volume
- EBITDA

It starts to get a little tangled

Difficult to Manage Variations

For each measure

--you may have at least 5
variations

Not easy to switch between on visual

If you have YTD measures
   -- want to see Same Period Last Year

We need a better way

The Pattern is the Same

- Sales Amount | YTD
- Total Cost | YTD
- Margin | YTD

It is the measure that changes

Sales Amount YTD
Total Cost YTD
Margin YTD

Placeholder for the Meaure

Measure_Variable??

Sales Amount	YTD
Total Cost	YTD
Margin	YTD

Rest of the Code is the Same

```
CALCULATE (
        Measure_Variable,
        DATESYTD ('Date'[Date]))
```

Sales Amount YTD

Total Cost YTD

Margin YTD

Only Need to Write Pattern One Time

```
YTD =
CALCULATE (
    Measure_Variable,
    DATESYTD ( 'Date'[Date] )
)
```

Introducing **SELECTEDMEASURE()**

```
YTD =
CALCULATE (
    SELECTEDMEASURE(),
    DATESYTD ( 'Date'[Date] )
)
```

This is the business use case Calculation Groups are designed to solve

Less measures to mantain

But there is more – you can use them in unique ways like a slicer for the user to choose between

Calculation Groups

- Reuse already established Measures

- Apply it to multiple measures

- Control formatting

What Does this Look Like

Time Intelligence – 1 Measure
Sales Amount

Year	Current	QTD	YTD	SPLY
2018	**4,984,304.80**	**1,237,622.62**	**4,984,304.80**	**3,033,305.02**
Jan	636,983.88	636,983.88	636,983.88	
Feb	788,062.88	1,425,046.76	1,425,046.76	
Mar	269,320.40	1,694,367.17	1,694,367.17	
Apr	27,644.10	27,644.10	1,722,011.26	
May	510,486.78	538,130.88	2,232,498.04	168,392.56
Jun	413,325.23	951,456.11	2,645,823.27	263,600.69
Jul	348,977.82	348,977.82	2,994,801.09	204,281.19
Aug	392,499.67	741,477.49	3,387,300.76	312,793.50
Sep	359,381.42	1,100,858.91	3,746,682.18	334,423.50
Oct	394,691.65	394,691.65	4,141,373.83	402,067.05
Nov	329,846.47	724,538.12	4,471,220.30	438,804.70
Dec	513,084.50	1,237,622.62	4,984,304.80	908,941.83
Total	**4,984,304.80**	**1,237,622.62**	**4,984,304.80**	**3,033,305.02**

Time Intelligence
- ■ Current
- ☐ MTD
- ■ QTD
- ■ YTD
- ■ SPLY

Time Intelligence – 2 Measures
Sales Amount & Total Cost

Time Intelligence	YTD		SPLY			Time Intelligence
Year	Sales Amount	Total Cost	Sales Amount	Total Cost		☐ Current
						☐ MTD
						☐ QTD
⊟ **2018**	**4,984,304.80**	**2,193,394.99**	**3,033,305.02**	**1,335,411.56**		■ YTD
Jan	636,983.88	278,700.85				■ SPLY
Feb	1,425,046.76	618,998.60				
Mar	1,694,367.17	737,421.60				
Apr	1,722,011.26	748,655.63				
May	2,232,498.04	969,453.25	168,392.56	69,007.25		
Jun	2,645,823.27	1,154,001.07	263,600.69	116,482.16		
Jul	2,994,801.09	1,304,716.63	204,281.19	89,144.35		
Aug	3,387,300.76	1,477,938.90	312,793.50	143,531.77		
Sep	3,746,682.18	1,639,576.74	334,423.50	147,223.18		
Oct	4,141,373.83	1,813,779.76	402,067.05	182,879.12		
Nov	4,471,220.30	1,962,431.50	438,804.70	197,499.12		
Dec	4,984,304.80	2,193,394.99	908,941.83	389,644.61		
Total	**4,984,304.80**	**2,193,394.99**	**3,033,305.02**	**1,335,411.56**		

2 Measures with
Time Intelligence and Statistics (MAX, MIN, AVG)

	Both MAX	No Time Intelligence		YTD	
Time Intelligence	Current			YTD	
Year	Sales Amount	Total Cost		Sales Amount	Total Cost
⊟ **2018**	**788,062.88**	**340,297.75**		**788,062.88**	**340,297.75**
Jan	636,983.88	278,700.85		636,983.88	278,700.85
Feb	788,062.88	340,297.75		788,062.88	340,297.75
Mar	269,320.40	118,423.00		788,062.88	340,297.75
Apr	27,644.10	11,234.03		788,062.88	340,297.75
May	510,486.78	220,797.62		788,062.88	340,297.75
Jun	413,325.23	184,547.82		788,062.88	340,297.75
Jul	348,977.82	150,715.56		788,062.88	340,297.75
Aug	392,499.67	173,222.27		788,062.88	340,297.75
Sep	359,381.42	161,637.84		788,062.88	340,297.75
Oct	394,691.65	174,203.02		788,062.88	340,297.75
Nov	329,846.47	148,651.74		788,062.88	340,297.75
Dec	513,084.50	230,963.49		788,062.88	340,297.75
Total	**788,062.88**	**340,297.75**		**788,062.88**	**340,297.75**

Are Calculation Groups New

- Since about 2019

- Needed to use Tabular Editor

- Power BI Desktop October 2023 Release (Preview)
  - Will increase the adoption rate

Agenda

Two Ways

Tabular Editor	Power BI Desktop (Preview)
• Up till the October 2023 release - only way	• October 2023 release or newer

Creating in Power BI Desktop

Power BI Desktop Enable Preview - Options
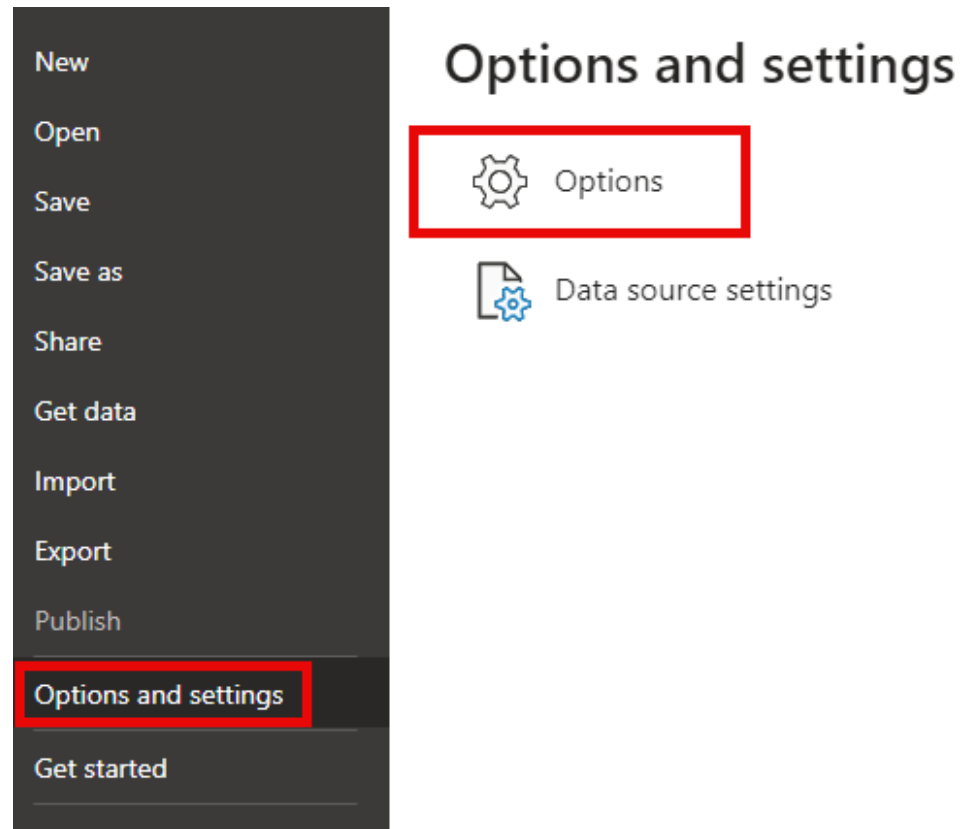
Power BI Enable Preview
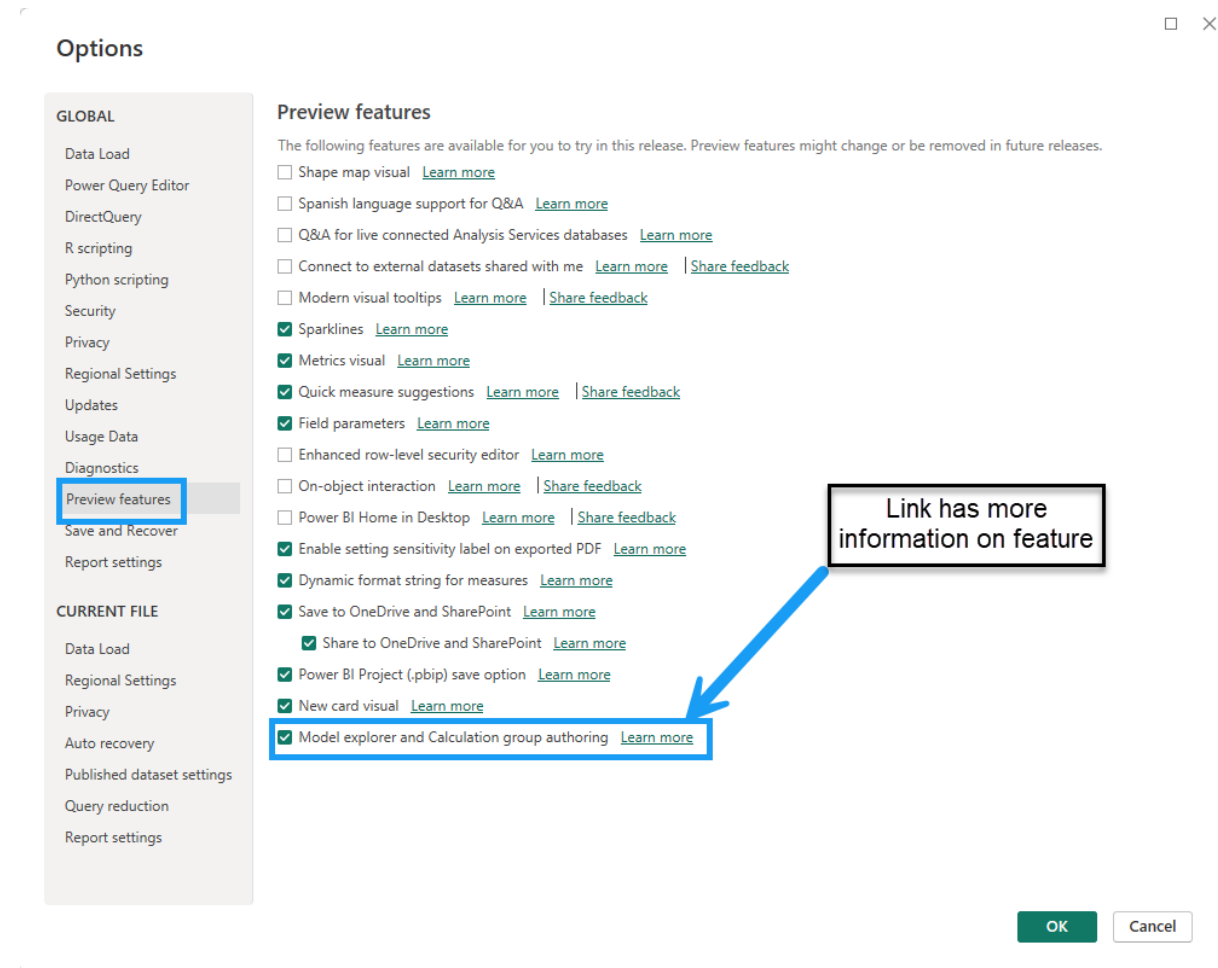
Power BI – Model Explorer Not Enabled
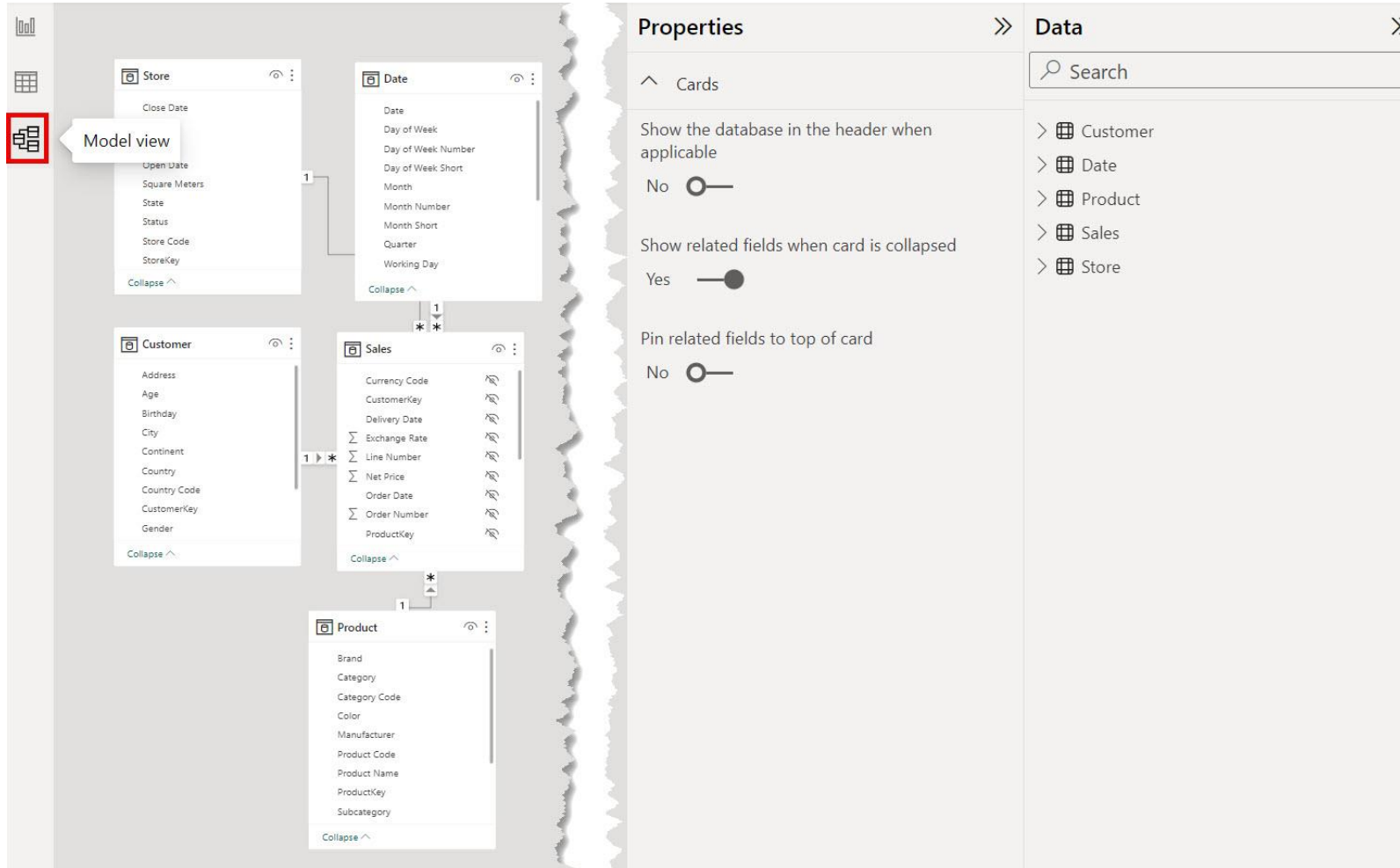
Power BI – Model View - Tables

Power BI – Model View – Model Explorer

Model Explorer Off – No Calculation Group
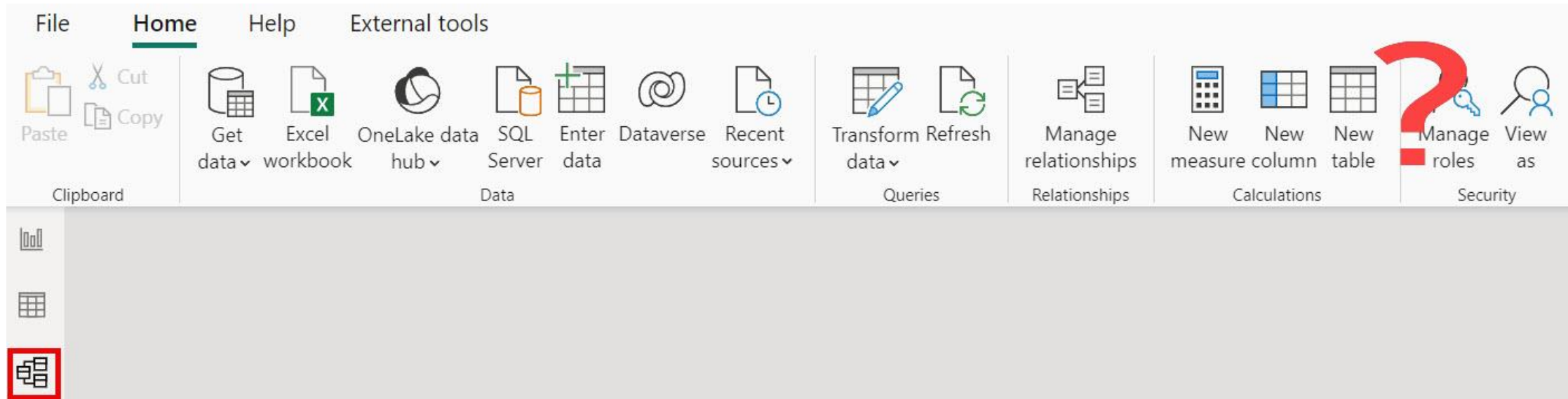
Click Calculation Group
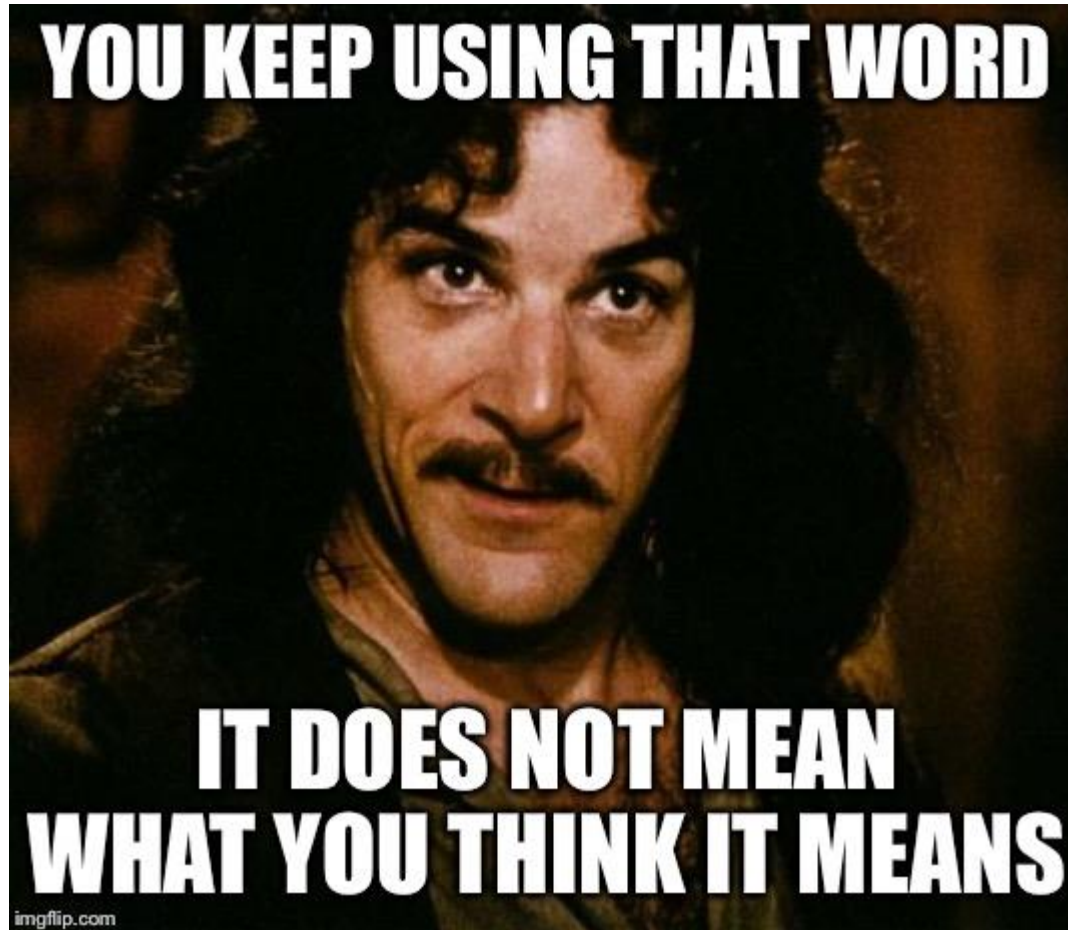
Discourage Implicit Measures

This change will discourage implicit measures ✕

When you add a calculation group, implicit measures will be discouraged in this model. This means you'll need to create explicit measures to aggregate data columns.

Yes   Cancel
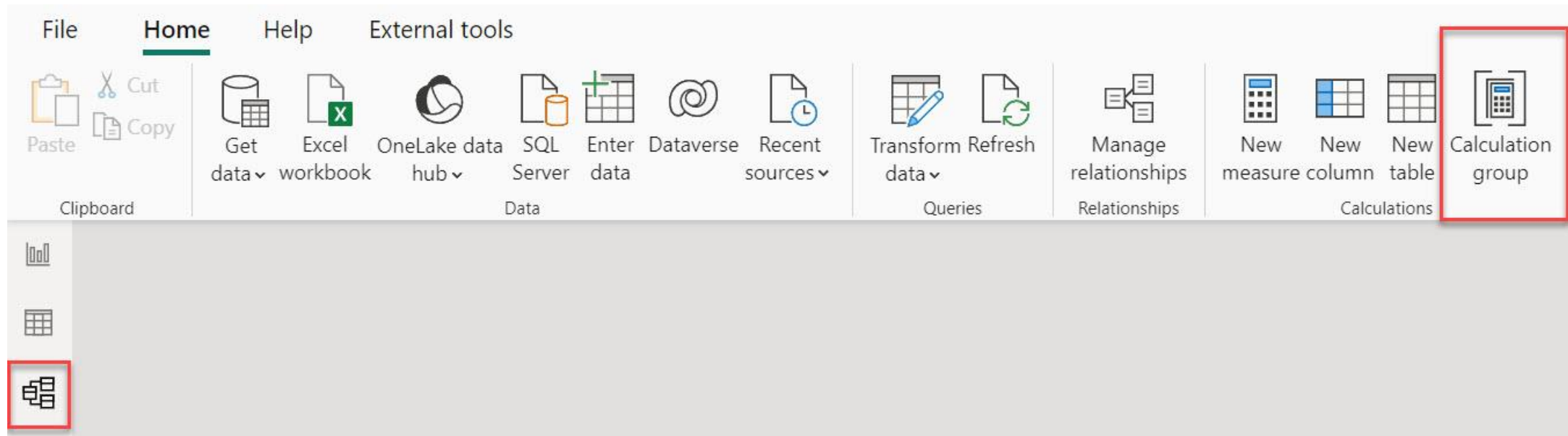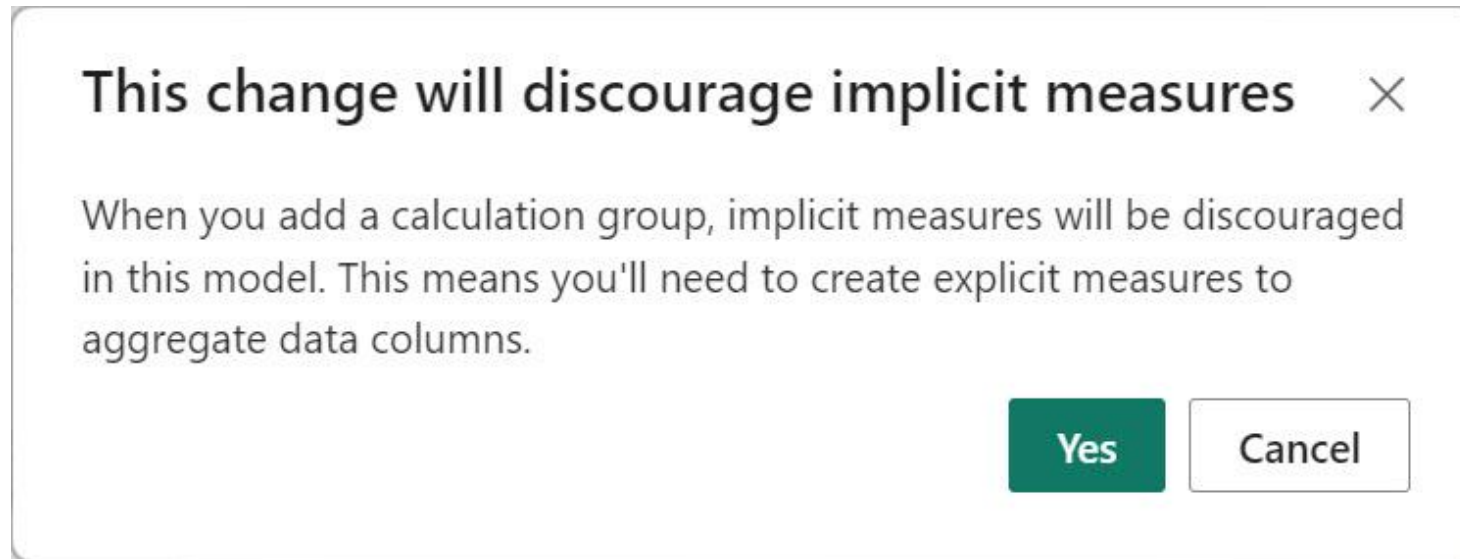
A little bit to unpack here

What is an Implicit Measure?

Implicit Measure Example

Measure with formatting

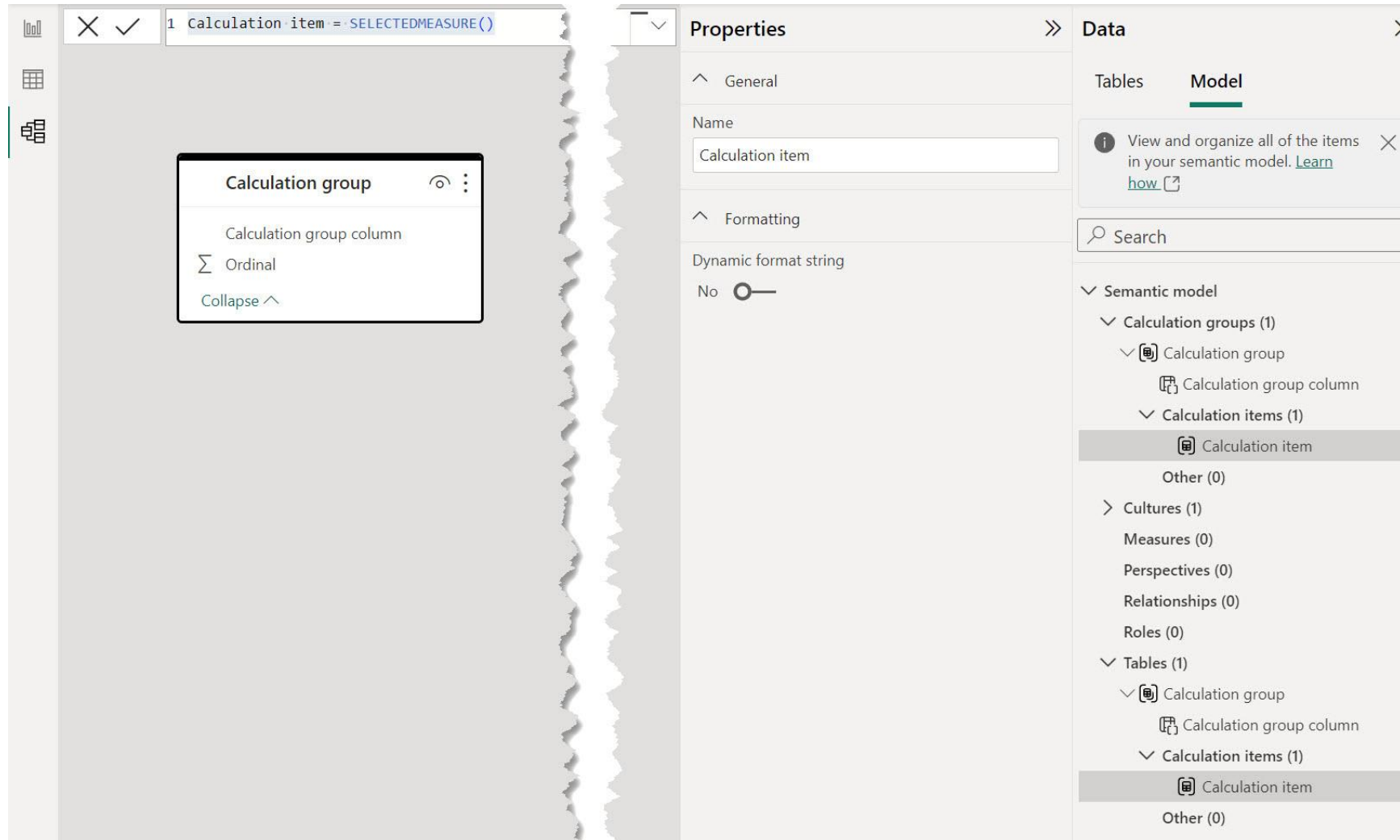| Year	Count of Quantity	Count of Quantity	Sum of Unit Cost	Total Quantity
2017	**10**	**2781**	**$414,250.11**	**8,599**
May	10	127	$17,740.371	406
Jun	10	254	$36,632.162	790
Jul	10	215	$29,543.376	659
Aug	10		$46,432.916	1,001
Sep	10	330	$47,392.8505	1,016
Oct	10	350	$54,882.921	1,116
Nov	10	393	$60,455.6185	1,179
Dec	10	798	$121,169.895	2,432
2018	**10**	**5756**	**$714,666.855**	**17,922**
Jan	10	616	$94,177.396	1,904
Feb	10	708	$106,474.482	2,314
Mar	10	259	$36,448.617	818
Apr	9	50	$4,657.09	138
May	10	590	$66,370.44	1,896
Jun	10	525	$61,193.05	1,628
Jul	10	433	$47,452.8	1,407

Distinct   **Non-Distinct**   **Sum**

Visualizations

Build visual

Rows
- Year
- Month Short

Columns
- Add data fields here

Values
- Count of Quantity
- Count of Quantity
- Sum of Unit Cost
- Total Quantity

Implicit Versus Explicit Measures

- Implicit – Drag the value column to visual and it automatically aggregates it
  - It is creating the calculation for you

- Explicit
  - Control formatting
  - Only expose measures to developers and users
  - Can change the logic of the measure – Like a SQL View
  - Explicit Measures Podcast

"Discourage" Implicit Measures

This change will **discourage implicit measures** ✕

When you add a calculation group, implicit measures will be discouraged in this model. This means you'll need to create explicit measures to aggregate data columns.

Yes   Cancel

Discourage Implicit Measures

Discourage Implicit Measures

This change will **Prohibit** implicit measures ✕

When you add a calculation group, implicit measures will be discouraged in this model. This means you'll need to create explicit measures to aggregate data columns.

Yes   Cancel

Discourage

Discourage Implicit Measures Behavior

Year	$0.95	$1.425	$1.99	$2.94	$3.35
2018	**8.24**	**7.70**	**5.13**	**29.40**	**229.41**
Jan					
Feb					
Mar		7.70			
Apr					
May	2.85		5.13		42.21

Visualizations

Build visual

Rows
- Year
- Month Short
- Unit Cost

Columns
- Unit Price

Values
- Sales Amount

Cannot put the fields on Values. Must put on Columns, Rows, etc.

Return to Creating Calculation Group
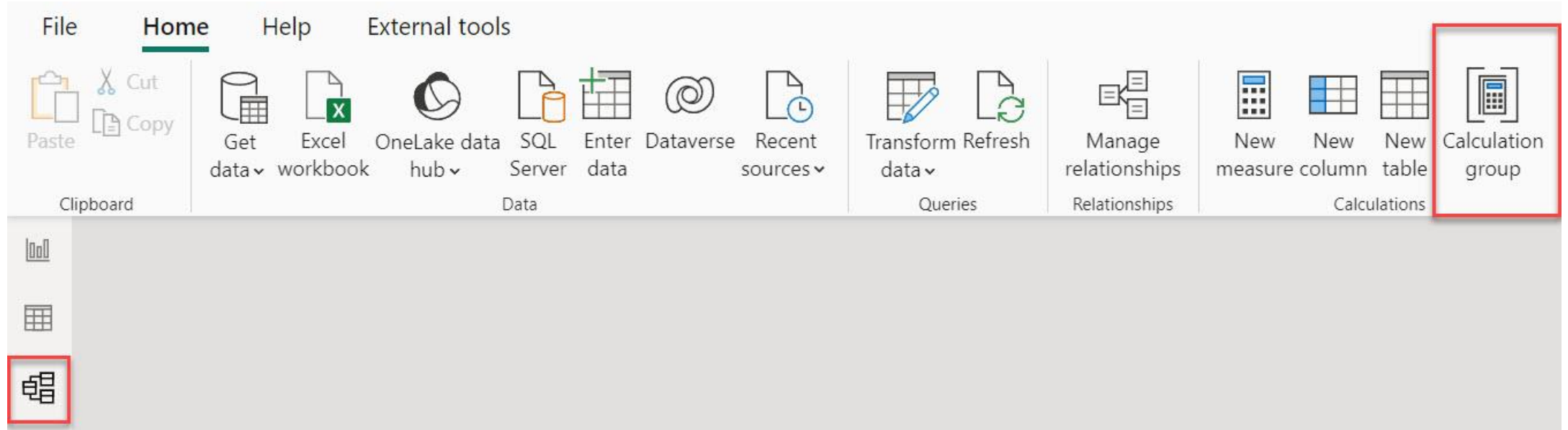
We accept this change

This change will discourage implicit measures ✕

When you add a calculation group, implicit measures will be discouraged in this model. This means you'll need to create explicit measures to aggregate data columns.

Yes   Cancel

New Calculation Group View

Calculation Group is Just a table

Table has a column for Calculation Items

Calculation Item is just a value in the table

Formula for new Calculation Item

Model Explorer Settings

Model Properties

Discourage Implicit Measures Setting

We can flip this switch back to No if we delete all Calculation Groups

Discourage Implicit Measures Error

Error

The Model 'Model' property DiscourageImplicitMeasures cannot be changed from true to false until all calculation groups in the model are deleted.

Close
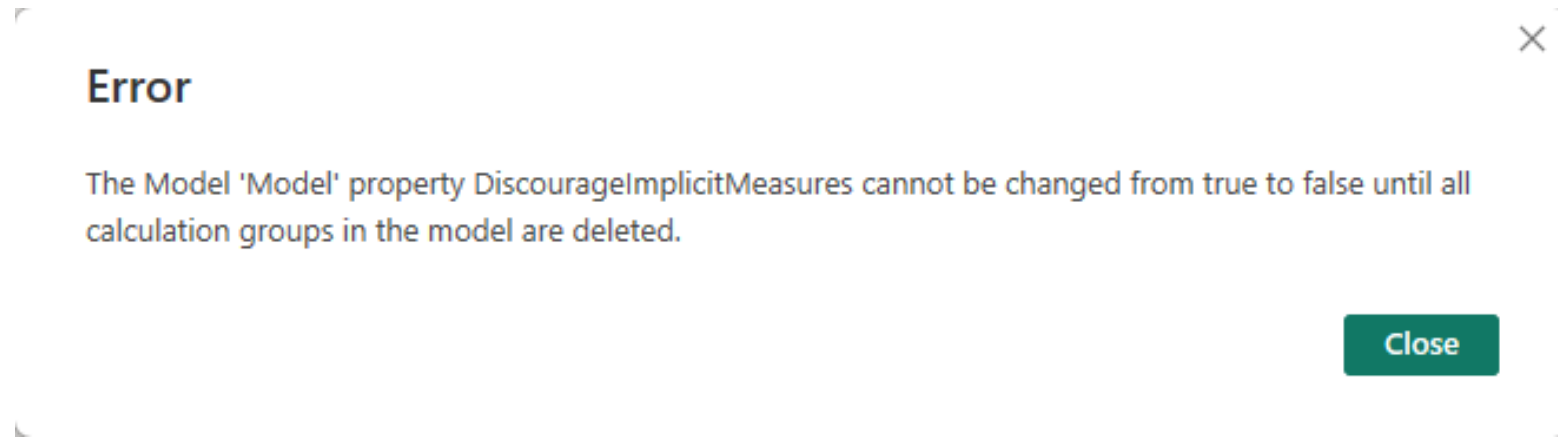
Can reenable if all Calculation Groups Deleted
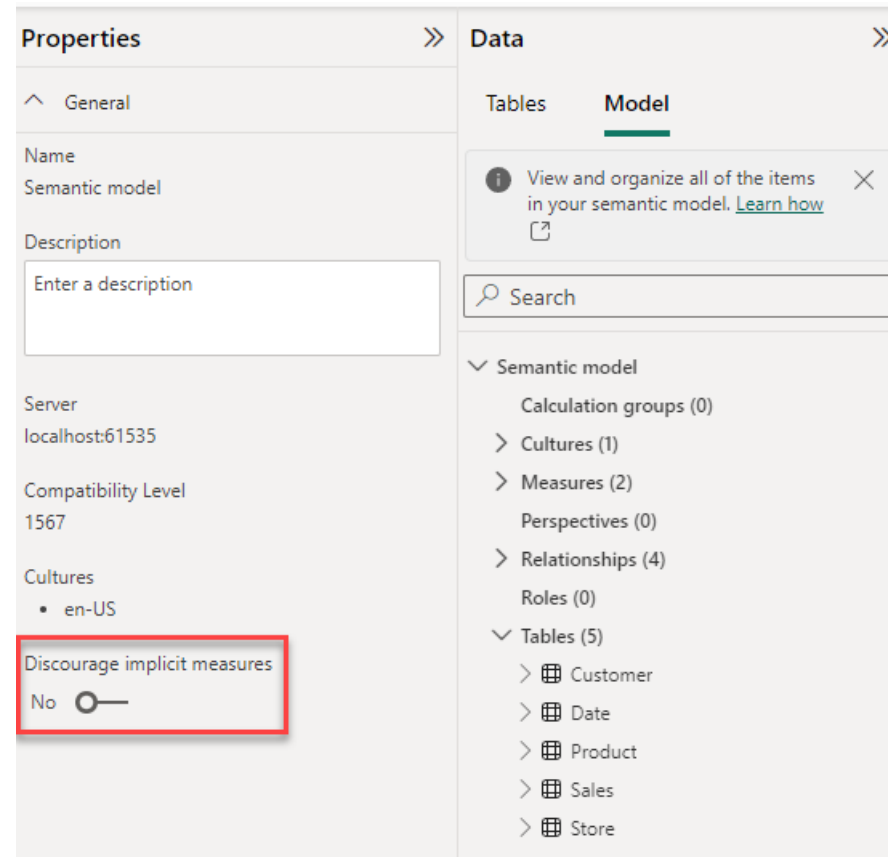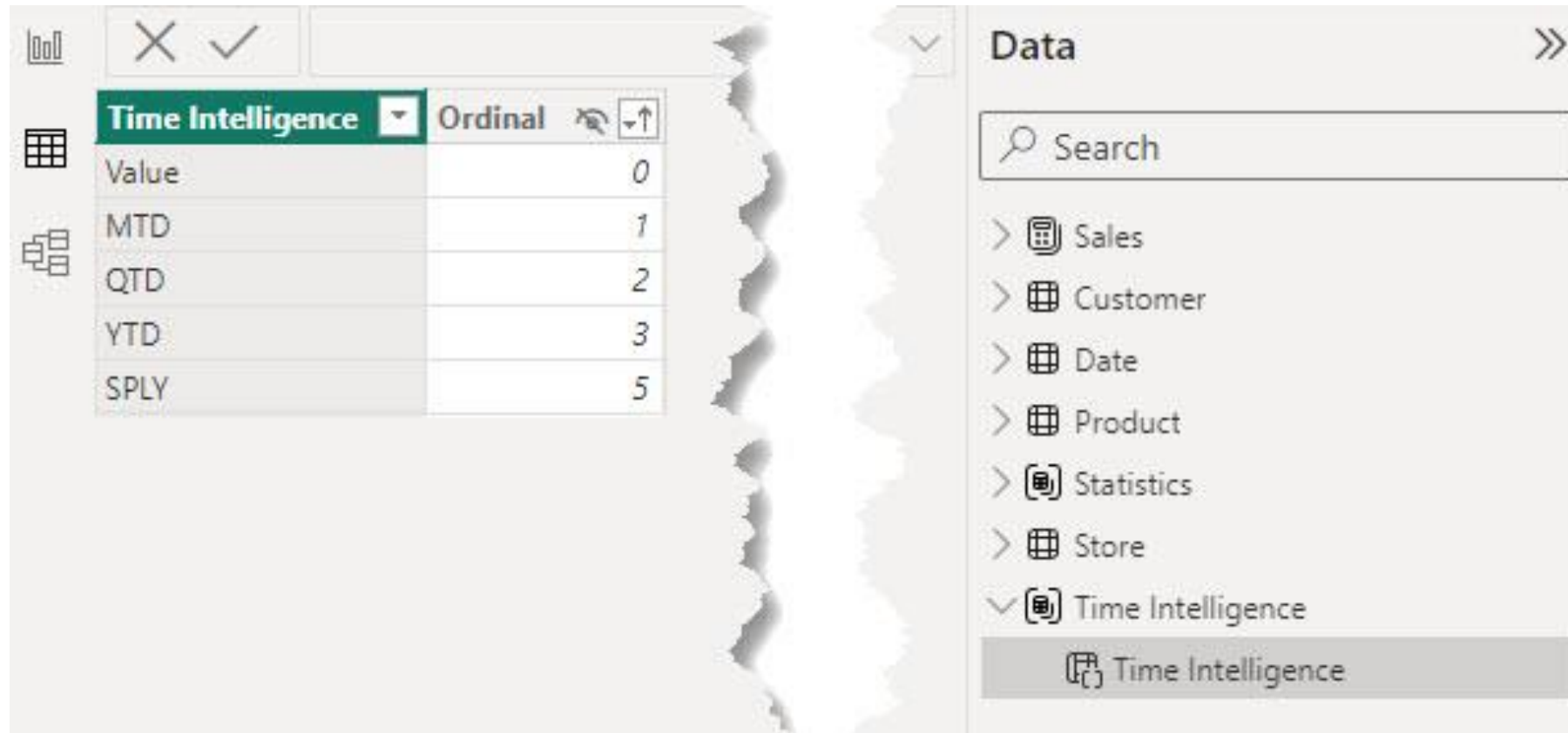
Power BI Desktop Demo

Ordinal

Who's out of order

- Determines the order that Calculation Items are displayed

- Hidden column
  - Automatically Orders Calculation Items by this column

Ordinal – Just a hidden column in the table

Power BI Change Ordinal – Right Click
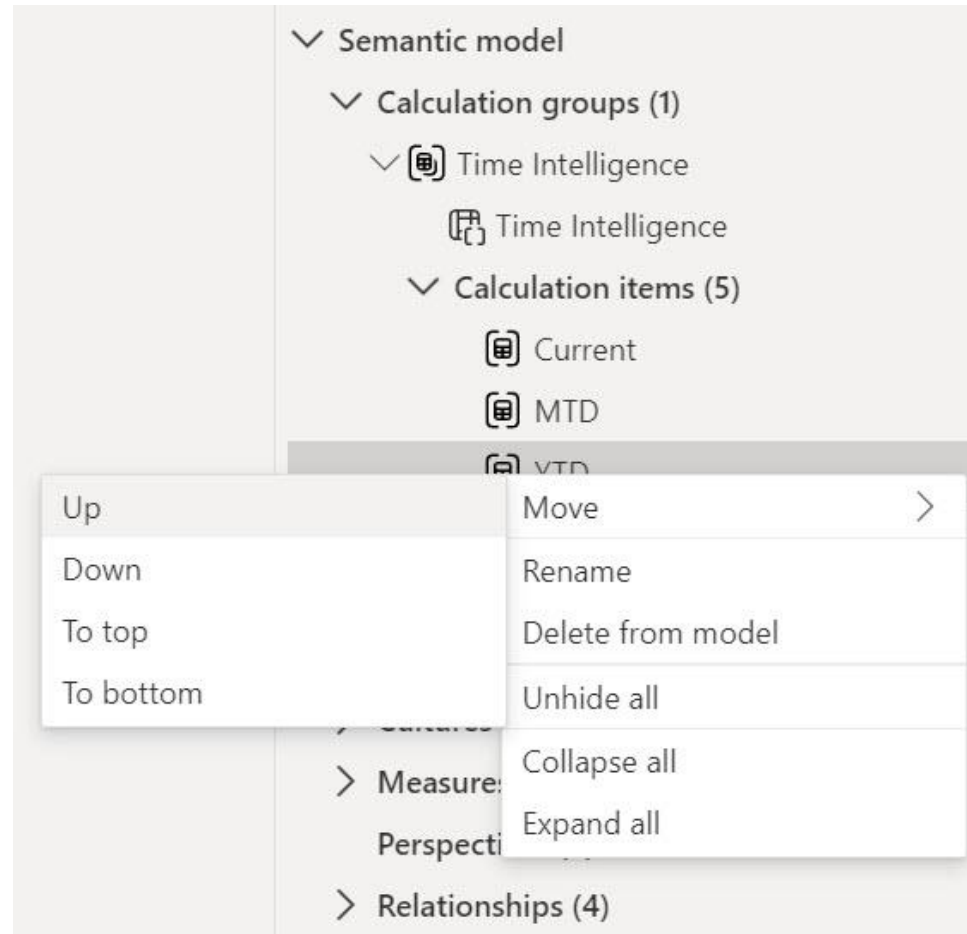
Power BI Change Ordinal – Drag and Drop

Custom Format Strings

Custom Format Strings

- If we don't want the format of the original measure

Example Custom Format Strings

Example Measure is [Sales Amount]

CY = SELECTEDMEASURE()
PY = SELECTEDMEASURE() for SPLY
YOY = CY – PY
YOY % = DIVIDE(CY-PY, PY)

YOY % Format String = `"0.00 %"`

Power BI: Format Strings

Dynamic Format String

- DAX expression to determine the format string

- SELECTEDMEASUREFORMATSTRING()
  - Returns measure format string

- Example Use
  - Only on these measures append this Unit of Measure

ISSELECTEDMEASURE()

ISSELECTEDMEASURE()

IF (
   NOT ISSELECTEDMEASURE ([Margin %]),
   DO THIS,
   Otherwise
      Maybe SELECTEDMEASURE()
)

ISSELECTEDMEASURE()

```
Average =
IF (
    NOT ISSELECTEDMEASURE ( [Margin %] ),
    AVERAGEX (
        VALUES ( 'Date'[Year Month Number] ),
        SELECTEDMEASURE ()
    ),
    SELECTEDMEASURE ()
)
```

Multiple Calculation Groups

How to Handle Precedence

Precedence

Which Calculation Group gets applied first?

Is it peanut butter surrounded by chocolate or chocolate surrounded by Peanut Butter

Precedence

Precedence

Higher number has priority

Set at group level

Cant change individual items

Precedence

May need to simulate the application of Calculation Items in DAX code

Higher Precedence becomes the shell

    Lower Precedence gets inserted

Higher Precedence for Time Intelligence

    Lower for Stats

    i.e. YTD should be applied first and then the calculation

Precedence and Dynamic Format Strings

- Precedence also determines which dynamic format string is applied to the combined DAX expression for each measure. The highest precedence calculation group dynamic format string is the only one applied. If a measure itself has a dynamic format string, it's considered a lower precedence to any calculation group in the model.
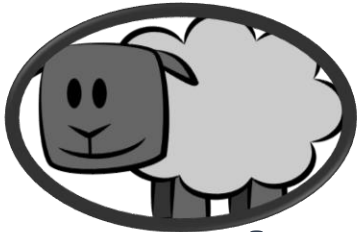
Sideway Recursion

- Each Calculation Item can only be called once

- Benefit code runs

- Negative is that no warning is issued

- Best Practice – Do not use Calculation Groups in Measures

Applying Multiple Calculation Items

- If you try to apply multiple Calculation Items it will return the original Measure

- For Example
  - Apple YTD and QTD to Sales Amount

Thank you

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The DAX Shpeherd