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# Free Training: Conceptual Topics with LOD Expressions Transcript

Welcome to this video on Level of Detail Expressions. This video is intended to be the first of several videos diving into deeper explanations of more technical aspects of LOD Expressions. To learn the fundamentals, please see the video Introduction to LOD Expressions.

Level of Detail Expressions extend Tableau's calculation language by introducing the capability to specify the exact level of aggregation within a calculation itself.

## Syntax

An LOD expression is established by curly braces.

- The first piece inside the braces is the keyword, then the dimension declaration, followed by a colon, then the aggregate expression.
- Let's work through each piece of the syntax backwards, starting with the most recognizable part.

The aggregate expression portion of an LOD Expression should be familiar

- This can be anything from a simple SUM([Sales]) to a complex calculation.
- Here's an example of a calculation in the aggregate expression, in this case providing the date of a customer's second order
  - Note that aggregate expressions cannot contain ATTR or table calculations.

The dimension declaration identifies the dimensions that define the level of detail to use when performing the aggregation.

- If no dimensions are declared (either with a FIXED keyword or no keyword specified), the LOD Expression is considered Table Scoped, which is a complete aggregate of the data.
- Multiple dimensions can be listed in the dimension declaration, separated by commas, but all dimensions must be from the same data source, and combined fields cannot be used.
- Only field names can be used in the dimension declaration: no calculations (though calculated fields can be used), no aggregations, sets, parameters, or table calculations.
  - For many of these, this restriction is because LOD Expressions are executed very early in the query pipeline, so values that are only established later on cannot be referenced.

The keyword can be one of three options: FIXED, INCLUDE, or EXCLUDE.

- These keywords are very powerful, and to truly understand all the implications of using a given keyword, we recommend watching all the LOD videos in this section as each addresses different aspects of keyword behavior.

## Dimension or Measure

Level of Detail Expressions that use EXCLUDE or INCLUDE keywords will always result in measures. They also cannot be binned because they have relative dimensionality.

FIXED keyword expressions will default to be dimensions or measures based on the aggregate expression.

- If the aggregate expression would yield a measure, the overall expression will be a measure, such as Number of

## Orders per Customer

- If the aggregate expression would yield a dimension (such as string, Boolean, or date data types), the overall expression will be a dimension, such as Second Purchase.
- Regardless of the default behavior, FIXED LOD Expressions can be converted to either a dimension or measure.
- Numeric FIXED LOD Expressions can also be binned unless the aggregate expression is a date.

## LOD Expressions and Filtering

The keywords also impact where LOD expressions are evaluated in regards to filtering order of operations.

There are several different kinds of filters in Tableau and they are executed in the following order, from top to bottom.

- If you're familiar with SQL, you can think of
  - dimension filters as the WHERE clause in a query
  - and measure filters as the HAVING clause

FIXED calculations happen before dimension filters.

- Effectively, any filter on the shelf will be ignored (if it's not a context or data-level filter) when computing the FIXED results.
- This behavior is desired and necessary to make FIXED behave as expected.

For example,

- here we have a view that shows the percent of total shipping costs broken out by order priority and a breakdown of shipping costs and profit.
- The percent total of shipping cost is calculated by taking a SUM of Shipping cost and dividing by (remember the ATTR here is simply an aggregation) the LOD Expression of the FIXED (table scoped) sum of shipping cost,
- If we filter out an order priority, say, medium, we want our percent of total to still refer to the total of all order priorities even if we filter out the marks from the view.
- If the FIXED LOD Expression (or rather, table scoped, in this case) filtered after the dimension of Order priority, we couldn't retain that overall total.

Include and Exclude LOD Expressions are evaluated after dimension filters and before measure filters.

## Conclusion

Thank you for watching this LOD training video. To fully understand LOD expressions, it's important to know how Tableau reconciles the Level of Detail of the LOD Expression and the LOD of the view. We invite you to continue with next video on Aggregation and Replication of LOD Expressions to learn more.

