



Deneb Cheat Sheet



ENTERPRISE DNA

Deneb website: <https://deneb-viz.github.io/>

Vega-Lite website: <https://vega.github.io/vega-lite/>

Enterprise DNA Forum Deneb Showcase category: <https://forum.enterprisedna.co/c/deneb-showcase/58>

GENERAL

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The required 3 basic **block** types of a Deneb/Vega-Lite specification are data, mark, and encoding:

```
{
  "data": { "name": "dataset",
  "mark": { "type": "bar",
  "encoding": {
    "y": { "field": "Country", "type": "nominal",
    "x": { "field": "Total Sales", "type": "quantitative",
    "color": { "field": "Channel", "type": "nominal" } }
  }
}
```

There are several **mark** types in Vega-Lite, including:

- **common**: bar, line, arc, circle, text, area
- **other**: point, rect, rule, square, tick, geoshape
- **composite**: boxplot, errorband, errorbar

<https://bit.ly/3Bm9xuG>

There are 4 **field-mapping** types:

- **nominal**: the category of the data (use if string)
- **quantitative**: the value of the data (use if numeric)
- **temporal**: the value of the data (use if date)
- **ordinal**: a ranked order for data sorting

<https://bit.ly/3Bvx7VM>

SORTING

To sort an axis by a field, add a **sort** block to its' encoding block:

```
"sort": {
  "op": "sum",
  "field": "Total Sales",
  "order": "descending"
}
```

FORMATTING

To **format** a data value using Power BI format strings, add to its' definition in the encoding block:

```
"encoding": {
  "x": {
    "field": "Total Sales",
    "type": "quantitative",
    "axis": {
      "format": "#0,0.0M",
      "formatType": "pbiFormat" } } }
}
```

<https://bit.ly/3cUwwD3>

TOOLTIPS

To enable **tooltips**, add a property to the mark block:

```
"mark": { "type": "bar", "tooltip": true }
```

To customize tooltips, add a **tooltip** block to the encoding block:

```
"tooltip": {
  { "field": "Country", "type": "nominal",
  { "field": "Total Sales", "type": "quantitative", "title":
  "Sales" } }
}
```

<https://bit.ly/3bppOnT>

LAYERS

To create a visual using multiple overlapping marks, create a **layer** consisting of an array of specifications, one for each mark:

```
{
  "data": { "name": "dataset",
  "layer": [
    {
      "name": "TOTAL SALES",
      "mark": {
        "type": "bar",
        "size": { "expr": "bandwidth('y') " },
        "encoding": {
          "x": { "field": "Total Sales", "type": "quantitative",
          "y": { "field": "Country", "type": "ordinal",
          "color": { "value": "blue" } }
        }
      },
      {
        "name": "EXPORT SALES",
        "mark": {
          "type": "bar",
          "size": { "expr": "bandwidth('y') * 0.5 " },
          "encoding": {
            "x": { "field": "Export Sales", "type": "quantitative",
            "y": { "field": "Country", "type": "ordinal",
            "color": { "value": "red" } }
          }
        }
      ]
    }
  ]
}
```

To **share** encoding between multiple marks, move the relevant sections of the encoding block outside the layer block:

```
{
  "data": { "name": "dataset",
  "encoding": {
    "y": { "field": "Country", "type": "ordinal" },
    "layer": [
      {
        "name": "TOTAL SALES",
        "mark": {
          "type": "bar",
          "size": { "expr": "bandwidth('y') " },
          "encoding": {
            "x": { "field": "Total Sales", "type": "quantitative",
            "color": { "value": "blue" } }
          }
        },
      {
        "name": "EXPORT SALES",
        "mark": {
          "type": "bar",
          "size": { "expr": "bandwidth('y') * 0.5 " },
          "encoding": {
            "x": { "field": "Export Sales", "type": "quantitative",
            "color": { "value": "red" } }
          }
        }
      ]
    }
  ]
}
```

(NOTE 1: Layer order is respected by Deneb/Vega-Lite, and layers are rendered in order from first [i.e., bottom] to last [i.e., top])

(NOTE 2: Encoding in Deneb/Vega-Lite follows a cascading model where the inner encoding **inherits** the outer encoding, but can also **override** the outer encoding)

OPACITY

To set the transparency of a visual:

- adjust the **opacity** of the mark
- ```
"mark": { "type": "bar", "opacity": 0.3 }
```

OR

- add an **opacity** block to the **encoding** block:

```
"encoding": {
 "x": { "field": "Total Sales_highlight",
 "opacity": {
 "condition": {
 "test": { "field": "__selected__", "equal": "off",
 "value": 0 },
 "value": 1 } } }
}
```

<https://bit.ly/3DxRD9c>

### TITLE

To set a visual title, add a **title** block:

```
"title": {
 "text": "Total Sales by Country",
 "anchor": "start",
 "align": "left"
}
```

### WIDGET

To create an **input widget**, add to the parameters block:

```
{ "name": "tension", "value": 0,
 "bind": { "input": "range", "min": 0, "max": 1, "step": 0.1 } }
}
```

<https://bit.ly/3zIP4is>

### TEMPLATE

To export a **template** of your Deneb visual for reuse:

- click the **Generate JSON Template** icon in the Visual Editor toolbar
- complete the fields on the **Template Information** and **Dataset (Columns and Measures)** tabs
- copy all JSON code from the **Generated Template** tab and paste into a text editor, saving the file with a **.json** extension

To use an existing **template** in your Deneb visual:

- when first editing a Deneb visual, click the **Import From Template** tab in the **Create New Specification** dialog
- click the **Select JSON Template** link in the **Create New Specification** dialog
- browse to the saved location of the desired **.json** file and click on the **.json** file

<https://bit.ly/3Seugge>

### EDITOR FONT SIZE

To set the font size in the Deneb Visual Editor, use the **JSON Editor Font Size** drop-down in the **Properties Pane**



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LINK \ EXTEND \ COLOUR \ SPECIFIC

## LINKED CHARTS

To link 2 charts together, add a **selection brush** to the first visual:

```
"selection": { "brush": {
 "type": "interval", "encodings": ["x"] } }
```

And use the selection in a **filter transform** in the second visual:

```
"transform": [{ "filter": { "param": "brush" } }]
```

<https://bit.ly/3JhxaGC>

## EXTEND DATA/ENHANCE VISUAL

To extend a dataset with derived fields, add a **transform** block:

- To refer to an existing dataset field, use the format **datum['field name']** (**datum.field\_name** can be used only if there are no spaces in the field name)

```
"transform": [
 { "calculate": "2*3.14159*datum['Ring1 Percent']",
 "as": "Ring1 Radians" },
 { "calculate": "2*3.14159*datum['Ring2 Percent']",
 "as": "Ring2 Radians" },
 { "calculate": "2*3.14159*datum['Ring3 Percent']",
 "as": "Ring3 Radians" }]
```

<https://bit.ly/3ziGPrU>

(Many additional transformations are available, including aggregate, filter, flatten, fold, etc.)

<https://bit.ly/3Bu4Q21>

To enhance a visual with named values or expressions, add a **params** block:

```
"params": [
 { "name": "ring_max", "value": 200 },
 { "name": "ring_width", "value": 20 },
 { "name": "ring_gap", "value": 5 },
 { "name": "ring0_outer", "expr": "ring_max + 2" },
 { "name": "ring0_inner", "expr": "ring_max + 1" },
 { "name": "ring1_outer", "expr": "ring0_inner - ring_gap" }
]
```

<https://bit.ly/3Q7cPWl>

Add common math **constants** to expressions:

```
"transform": [
 { "calculate": "2*PI*datum['Ring1 Percent']",
 "as": "Ring1 Radians" }]
```

<https://bit.ly/3PT59I3>

## NAMED COLOURS

To use a **named** colour:

```
"mark": {
 "type": "area",
 "line": { "color": "darkgreen" } }
```

To use a built-in Vega-Lite colour **scheme**:

```
"color": {
 "field": "series",
 "scale": { "scheme": "category20b" } }
```

(There are several schemes available, including category20b, dark2, set1, set2, etc.)

<https://bit.ly/3bpqK3l>

## THEME COLOURS

To use a specific Power BI **theme** colour, adjust the theme index (zero-based, so theme colour - 1):

```
"color": { "value": { "expr": "pbiColor(0)" } }
```

<https://bit.ly/3vp9llg>

## GRADIENT COLOURS

To add Power BI **gradient** colours, add to the color block:

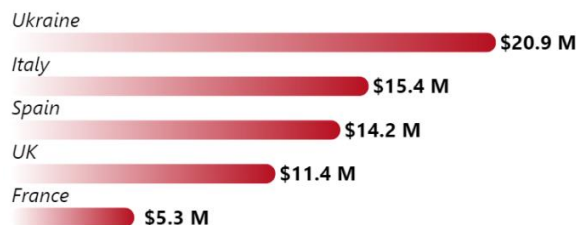
```
"scale": { "scheme": "pbiColorLinear" }
```

<https://bit.ly/3QJXNoE>

There are 4 integrations with the Power BI theme colours in Deneb:

- **pbiColorNominal**: matches the current theme colours
- **pbiColorOrdinal**: uses a ramped scale from the MAX to MIN divergent colour of the current theme, and EXCLUDES the MIDDLE colour
- **pbiColorLinear**: uses an interpolated gradient from the MAX to MIN divergent colour of the current theme, and EXCLUDES the MIDDLE colour
- **pbiColorDivergent**: same as **pbiColorLinear**, but INCLUDES the MIDDLE colour

<https://bit.ly/3bdEkPA>



## LINE CHARTS

To set the smoothing and tension of a line chart, add to the line mark block:

```
"interpolate": "cardinal",
"tension": 0.7
```

- options include basis, monotone, natural, step, etc.

<https://bit.ly/3RRZSRL>

To set the label format for a temporal axis,

```
"axis": { "format": "%y-%b-%d" }
```

<https://bit.ly/3cVA480>

## BAR CHARTS

To turn a bar chart into a **column** chart, exchange the X and Y encoding:

```
"encoding": {
 "x": { "field": "Country", "type": "nominal" },
 "y": { "field": "Total Sales", "type": "quantitative" } }
```

To set the column labels to **horizontal**, add to X encoding block:

```
"axis": {
 "labelAngle": 0 }
```

To **round** bar corners, add to bar mark:

```
"cornerRadius": 10 (all corners) OR
```

```
"cornerRadiusEnd": 25 (ends only)
```

<https://bit.ly/3DzuXpi>

To turn a bar chart into a **stacked** bar chart, add a color block to the encoding block:

```
"color": {
 "field": "Channel",
 "type": "nominal" }
```

<https://bit.ly/3zKU4D3>

To turn a stacked bar chart into a 100% stacked bar chart, add to the Y encoding block:

```
"stack": "normalize"
```

<https://bit.ly/3oJkx9e>

## CIRCULAR CHARTS

To set the size (outer radius) of a **pie** chart, add a radius or outer radius property to the arc mark block:

```
"mark": {
 "type": "arc",
 "outerRadius": 100 }
```

To turn a pie chart into a **donut** chart, add a radius2 or inner radius property to the arc mark block:

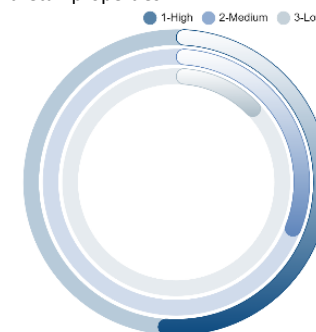
```
"innerRadius": 75
```

<https://bit.ly/3cUYRci>

To set the start and end of an **arc** segment (in radians; 0 = "north/up"), use the theta and theta2 properties.

<https://bit.ly/3vvE9X0>

```
"mark": {
 "type": "arc",
 "radius": 200,
 "radius2": 100,
 "theta": 0,
 "theta2": 5.9 }
```





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