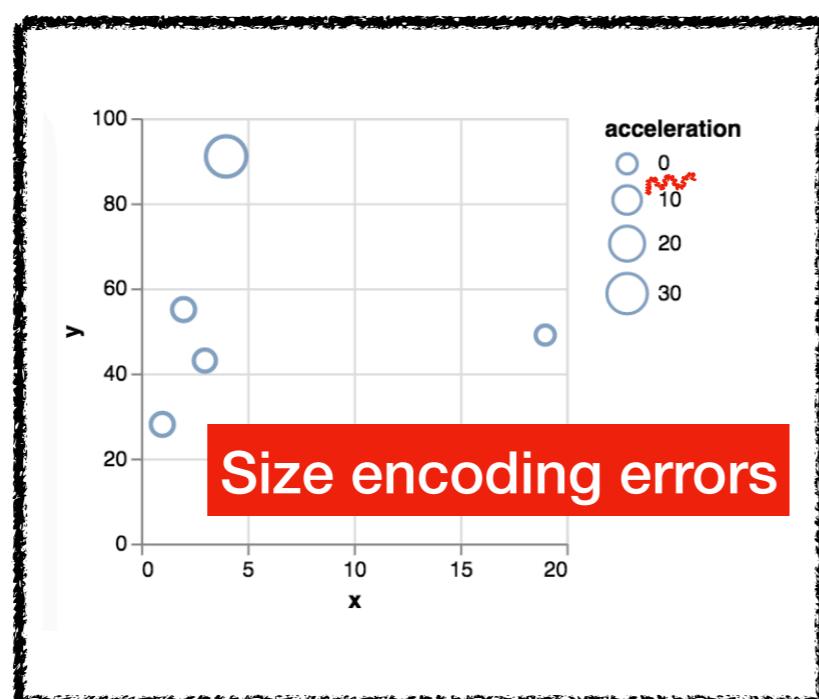
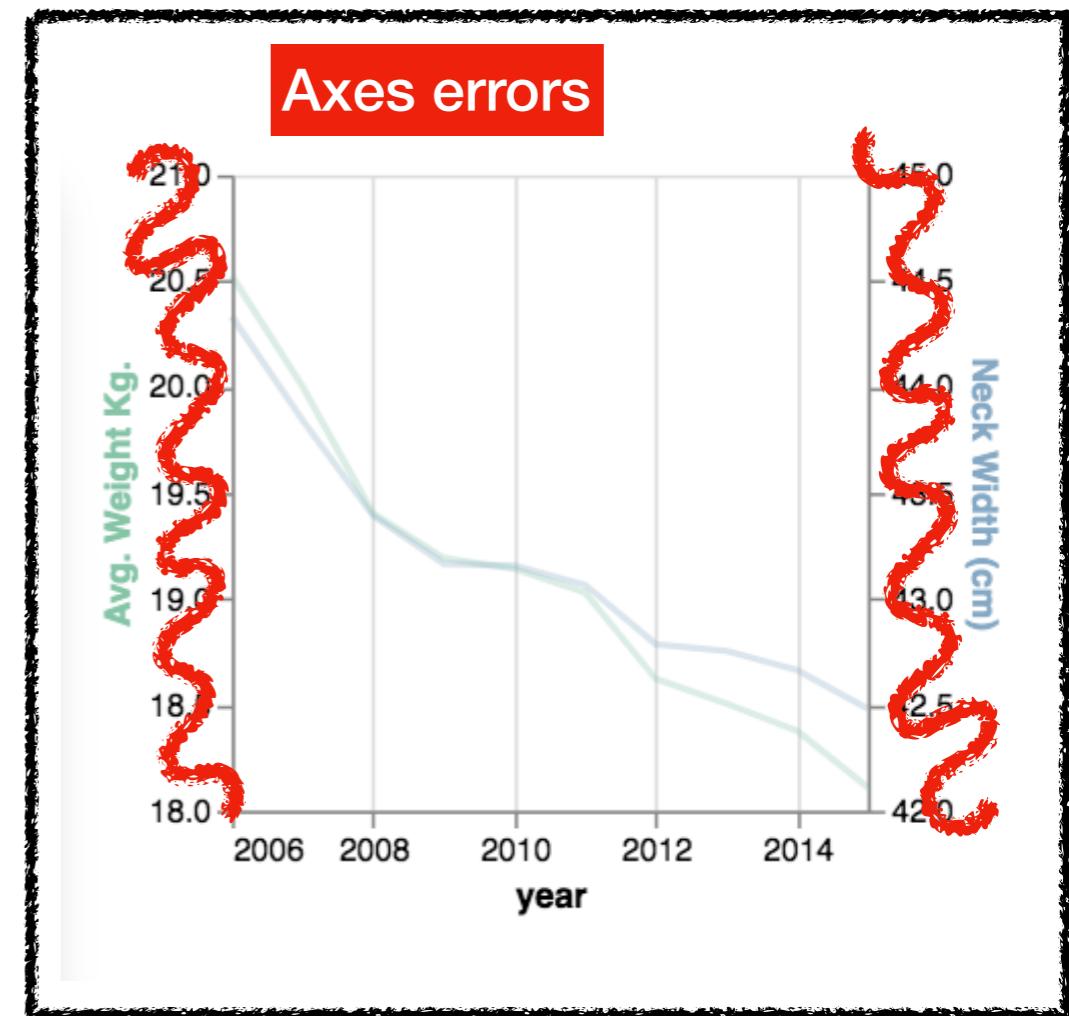
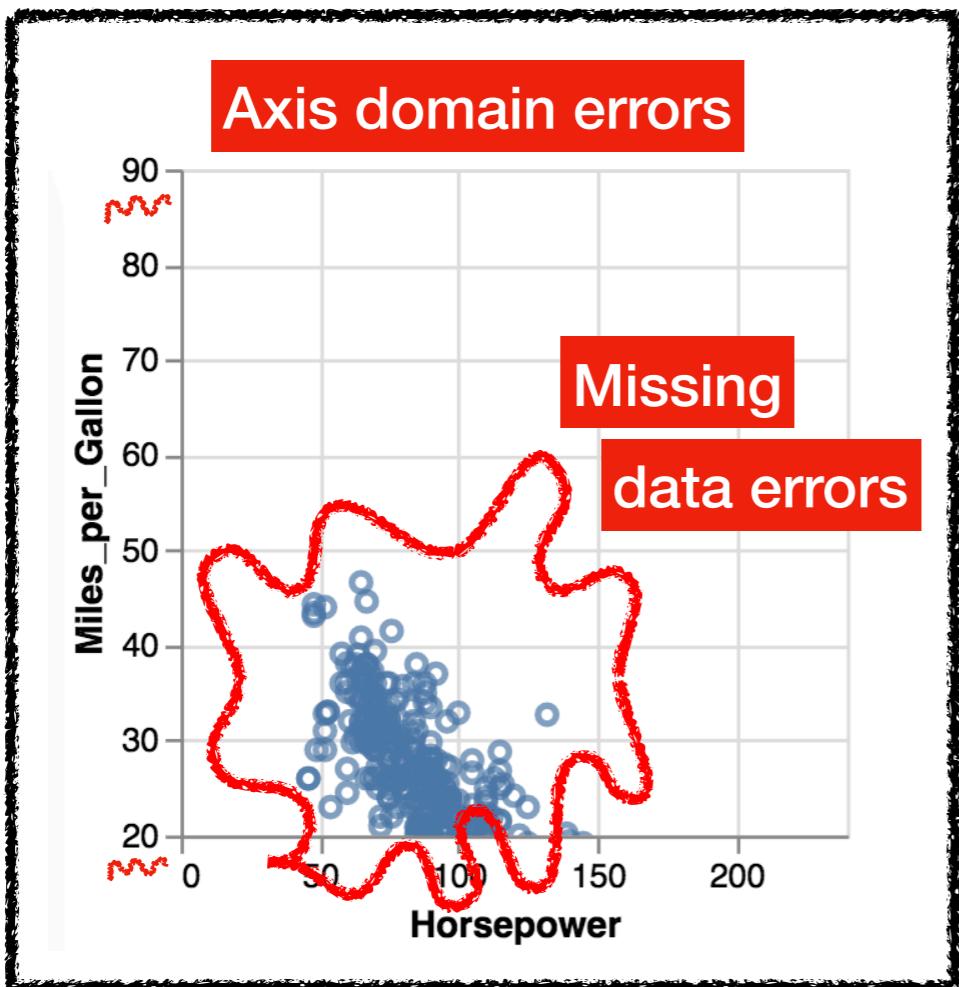
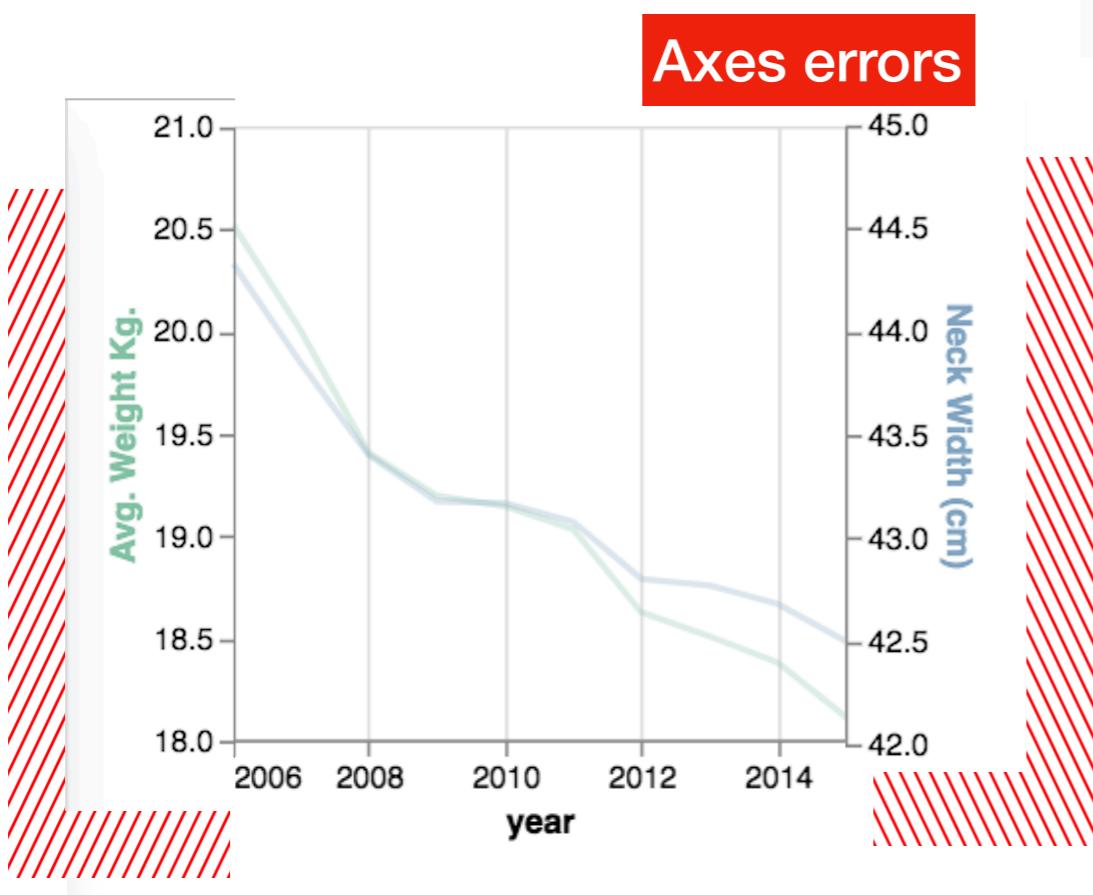
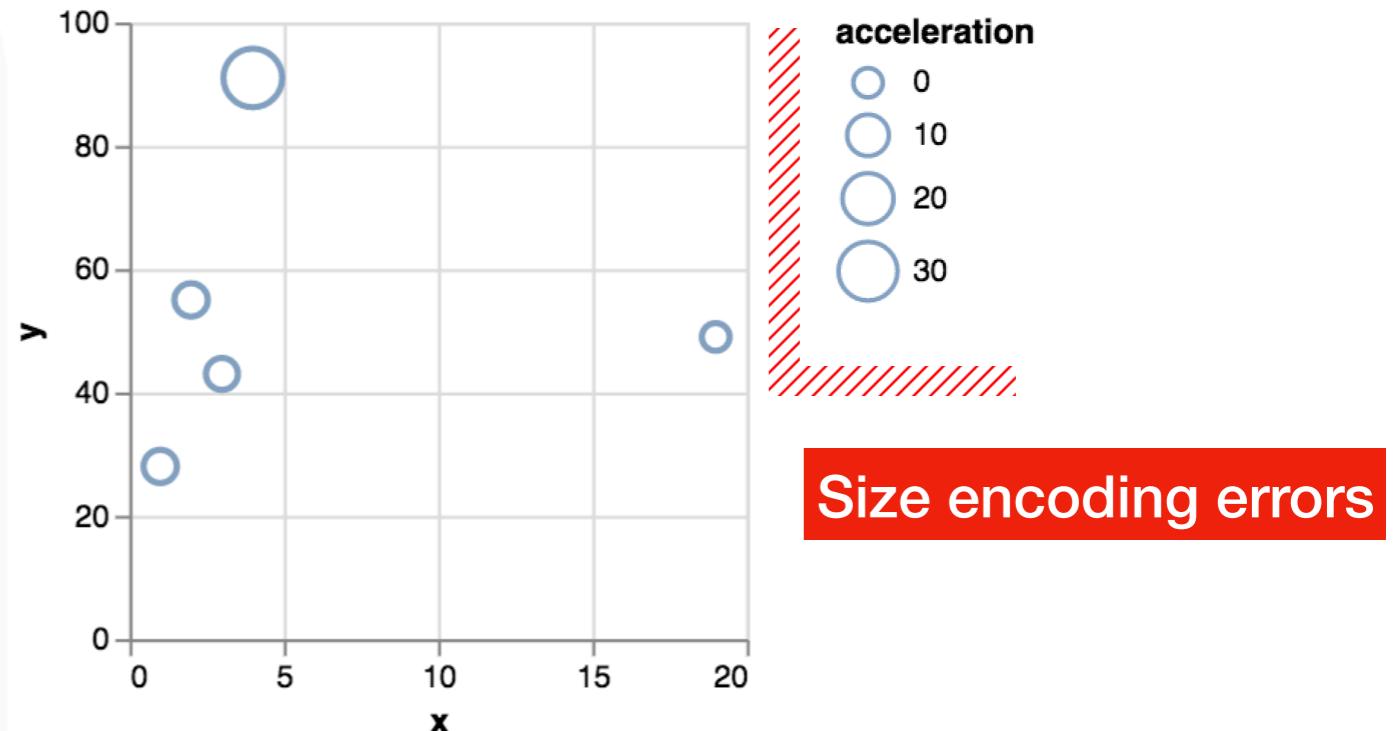
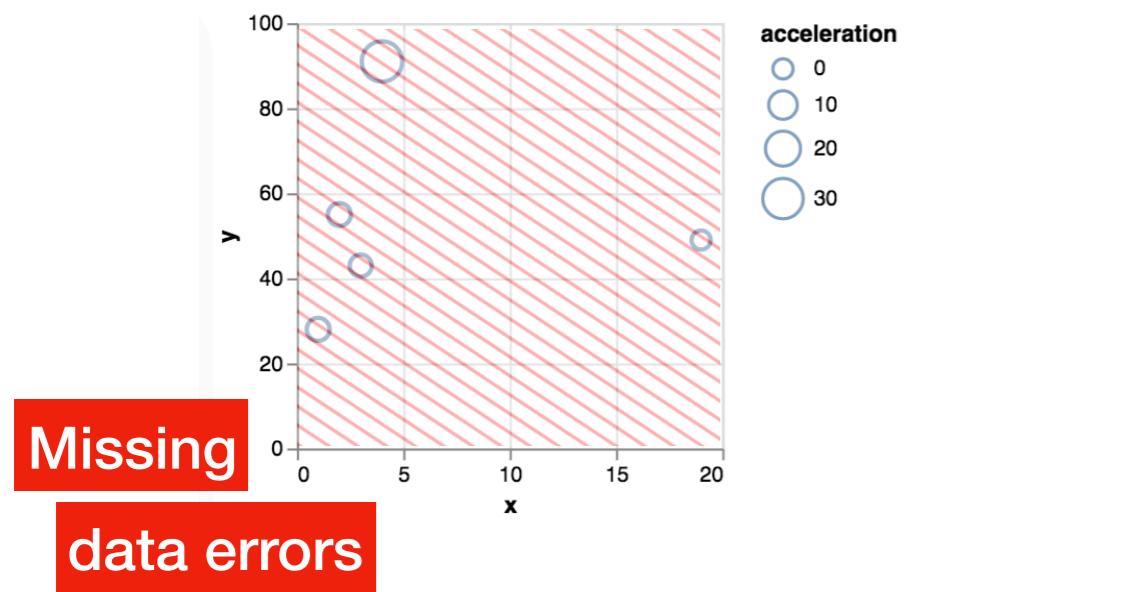


squiggles as signifiers

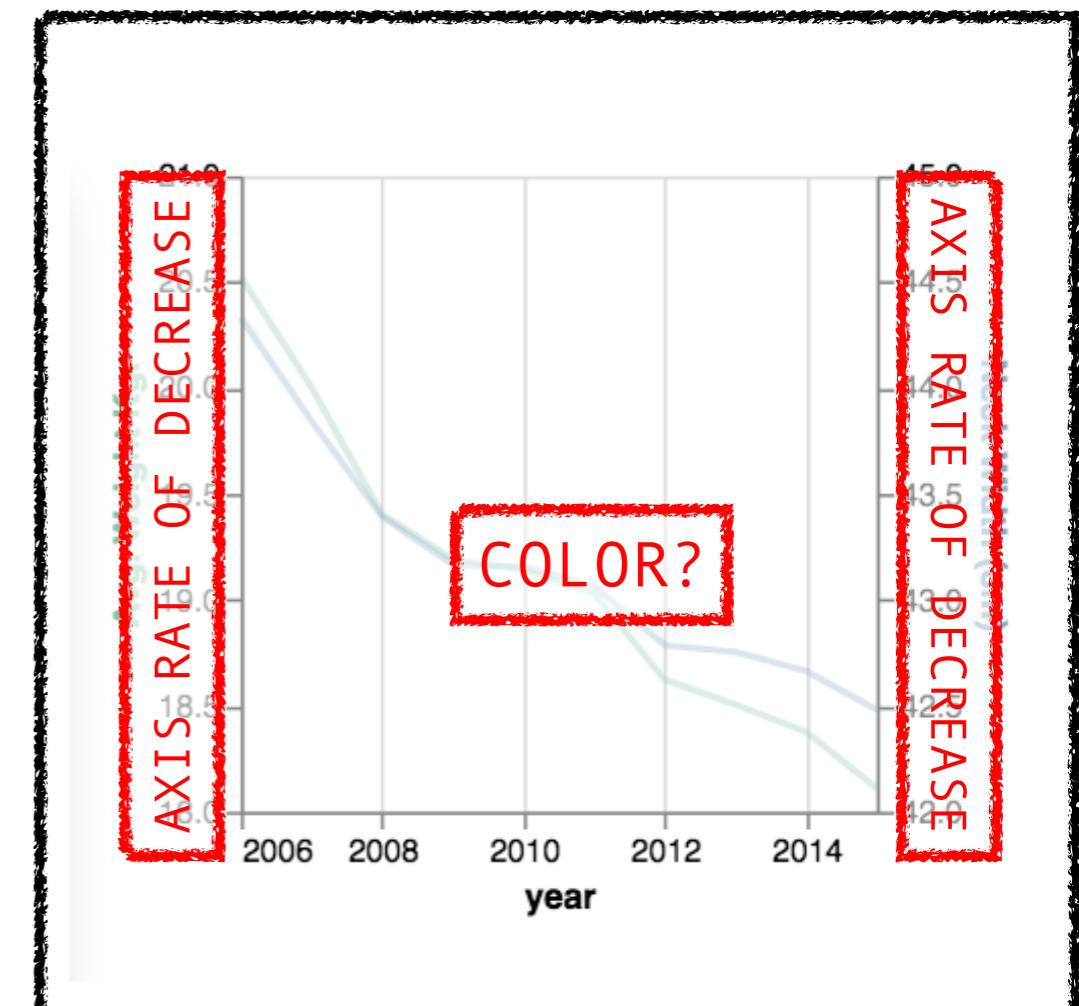
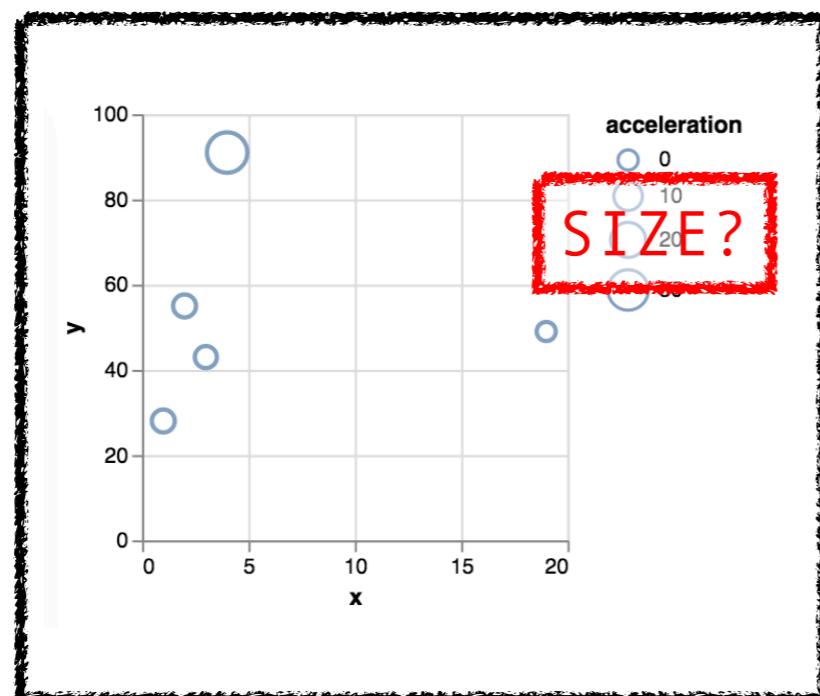
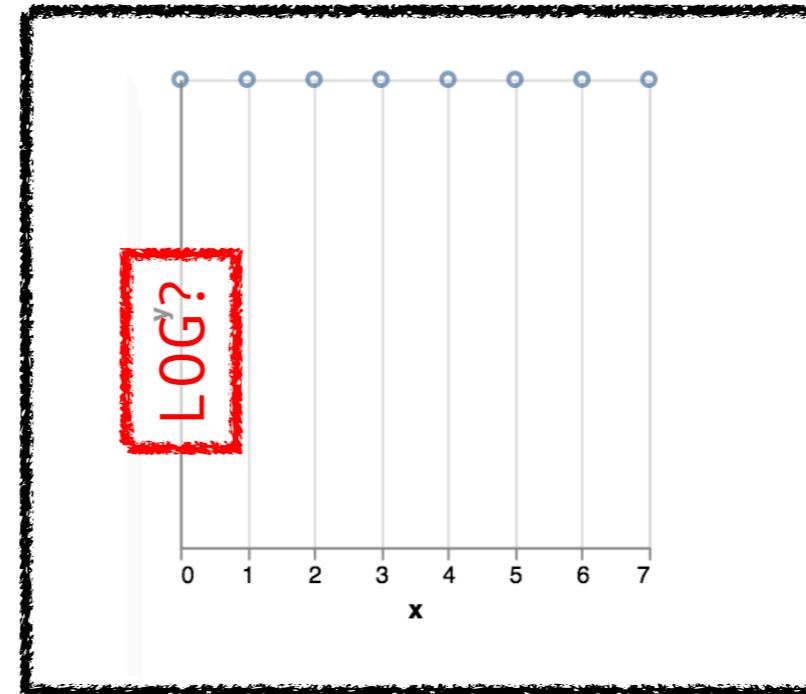
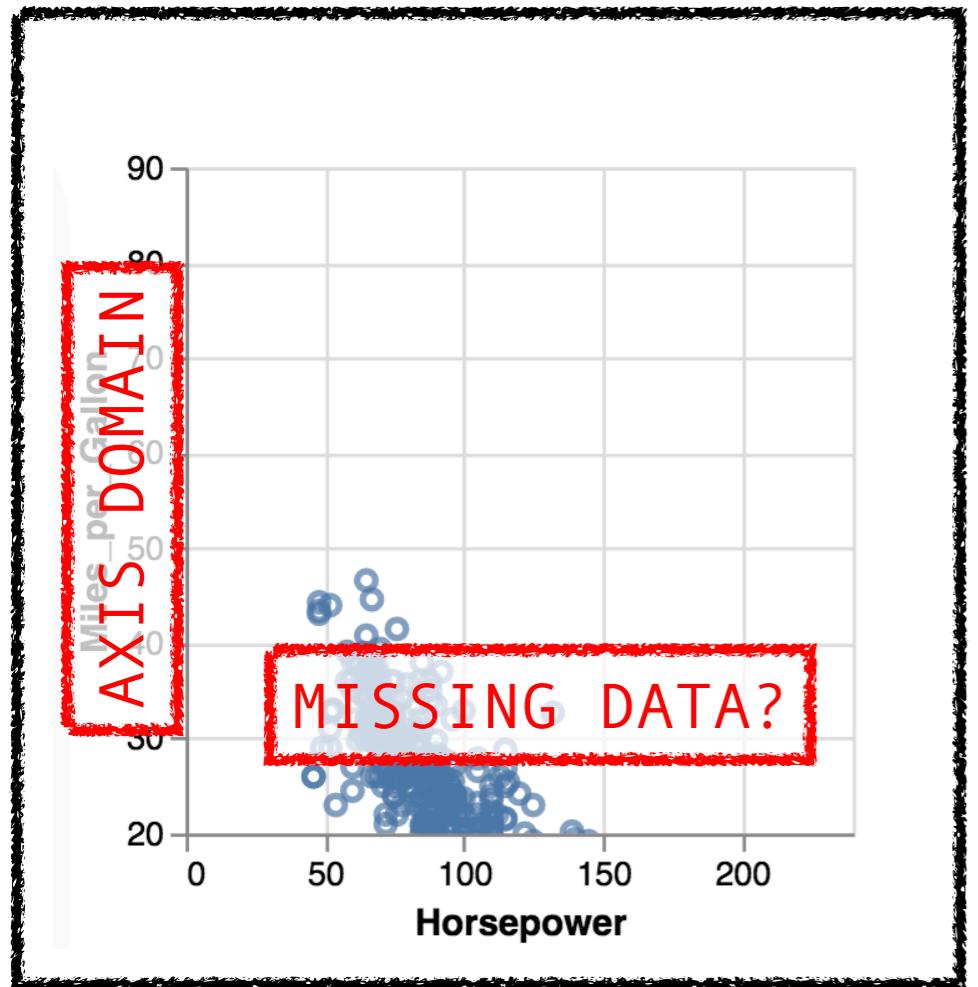


shading/cross hatch



This isn't generalizable to many errors, but it is interesting. Shading isn't used often in chart stylings, particularly this kind, so it stands out.

words



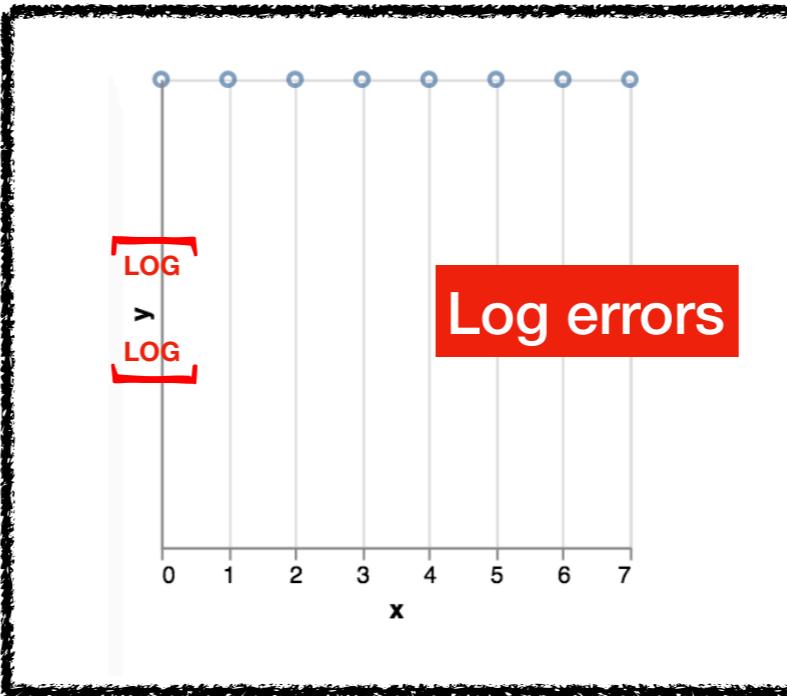
square brackets [] as a signifier

[↑ Axis domain errors

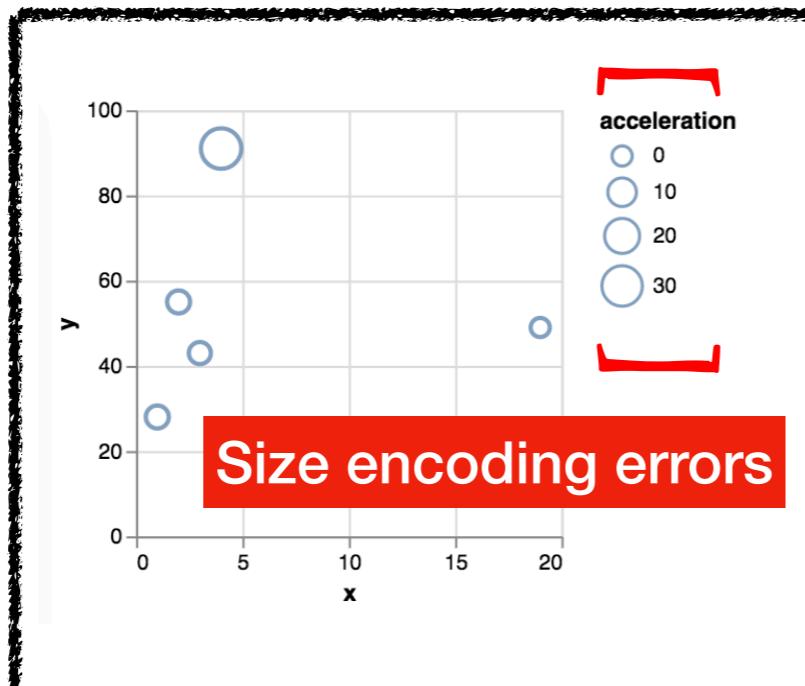


[LOG
v LOG

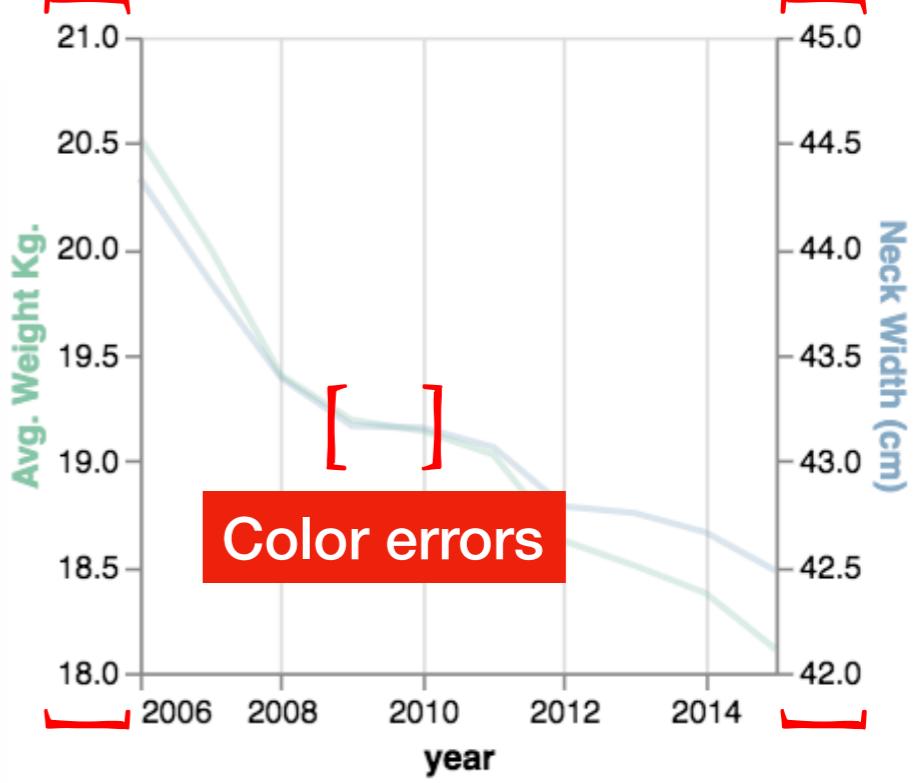
Log errors



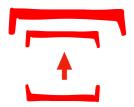
Size encoding errors



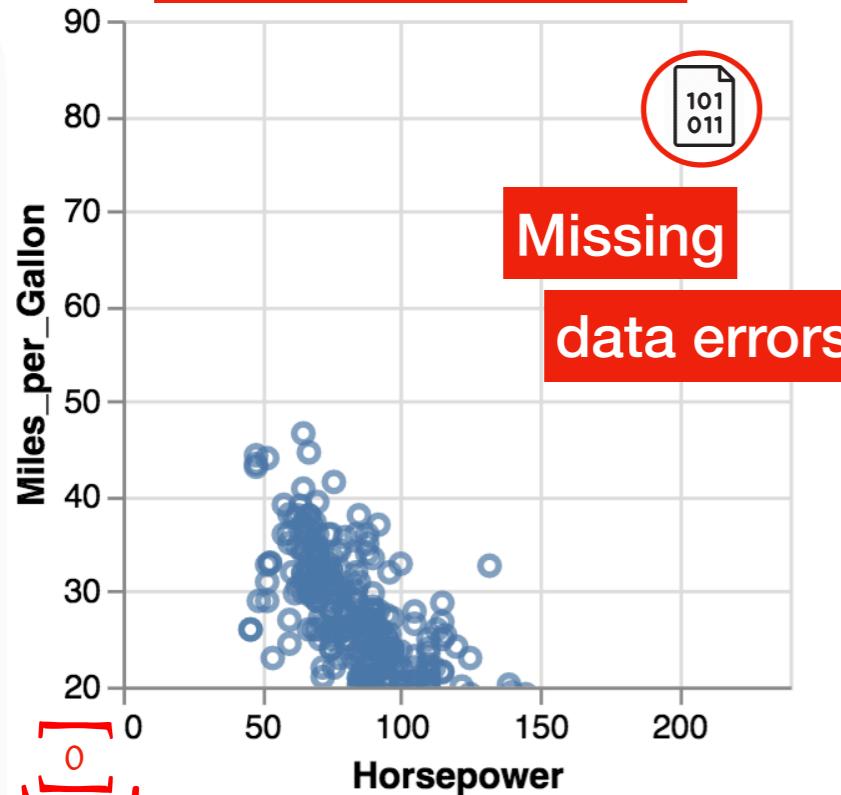
Axes errors



reintroducing icons



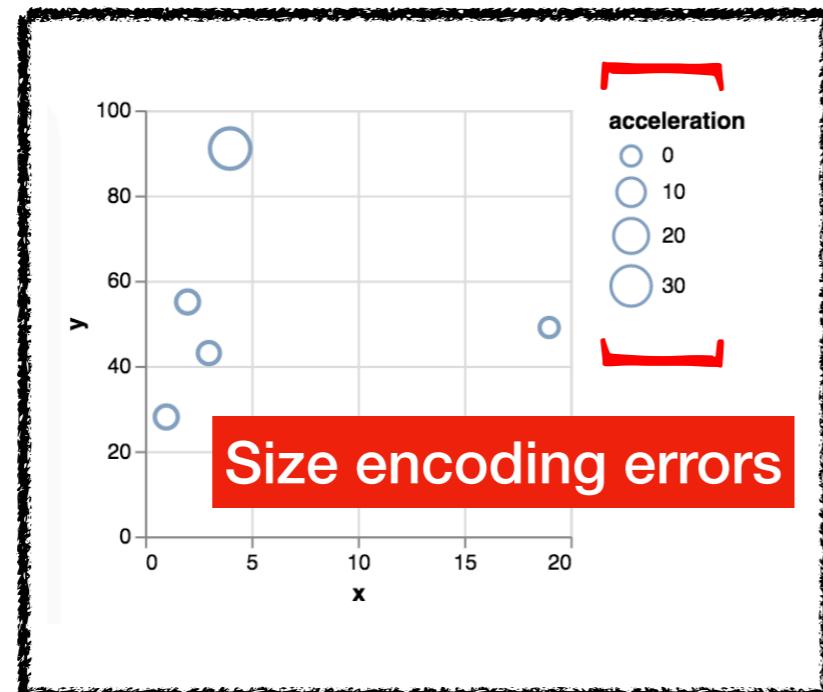
Axis domain errors



Log errors



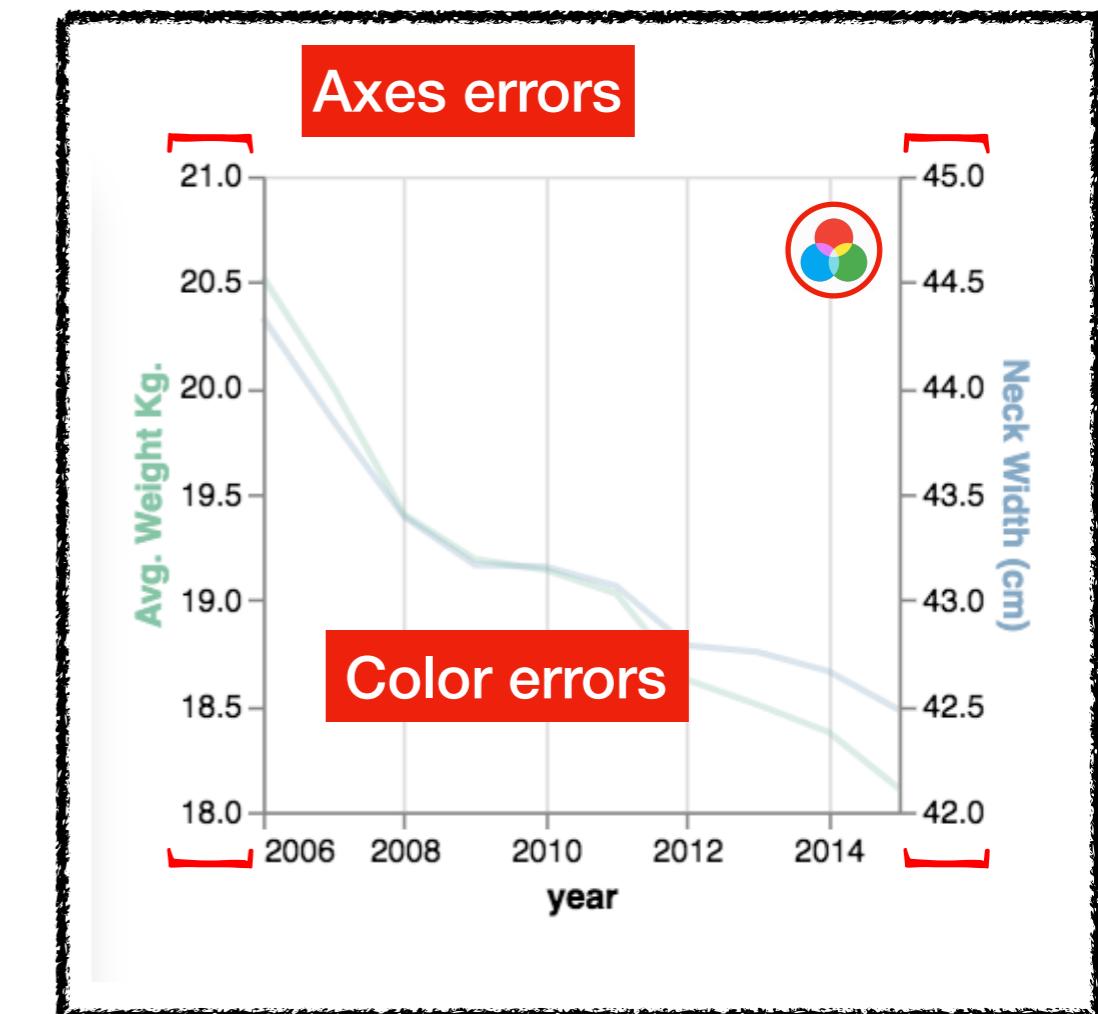
Axes errors



Size encoding errors

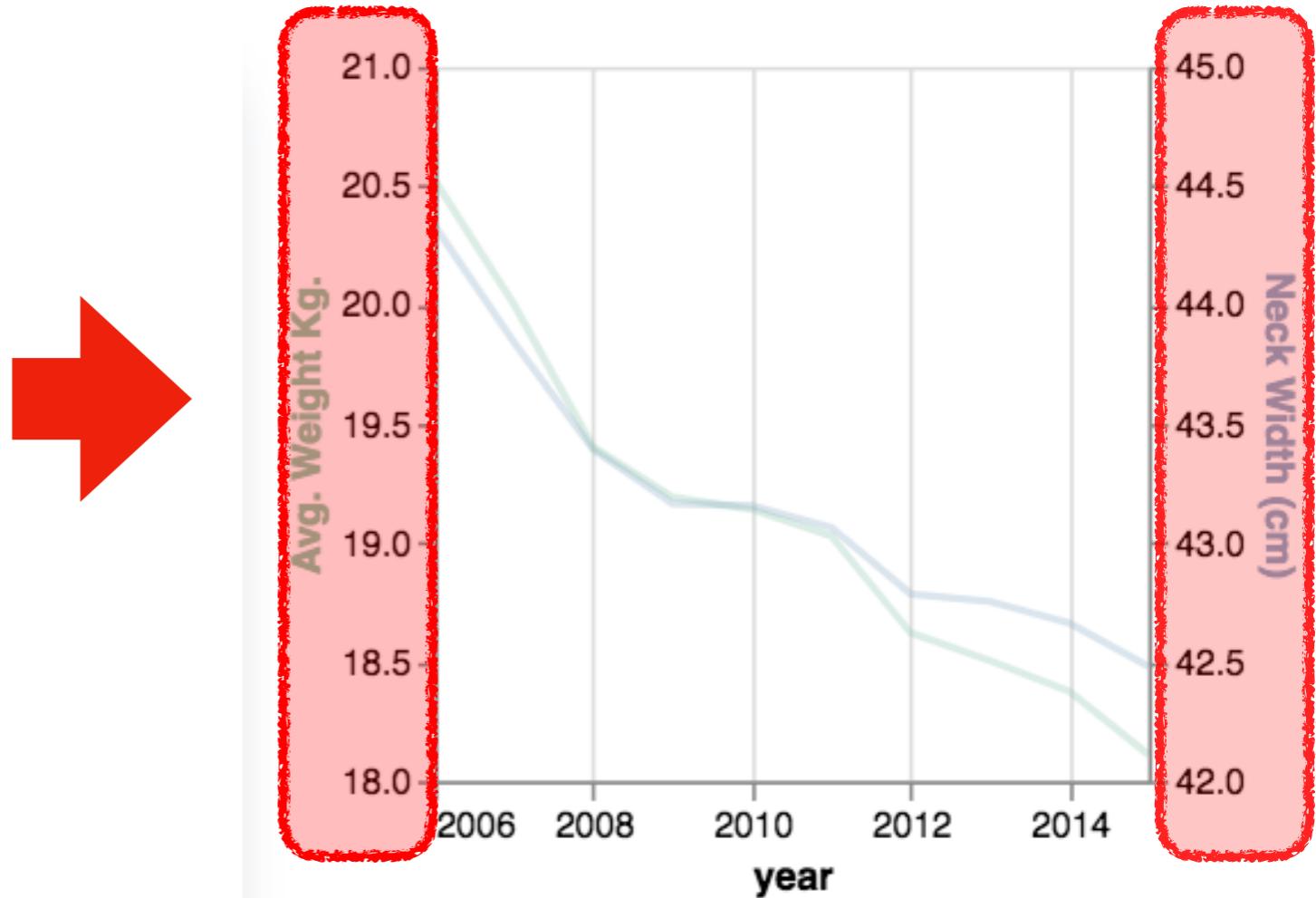
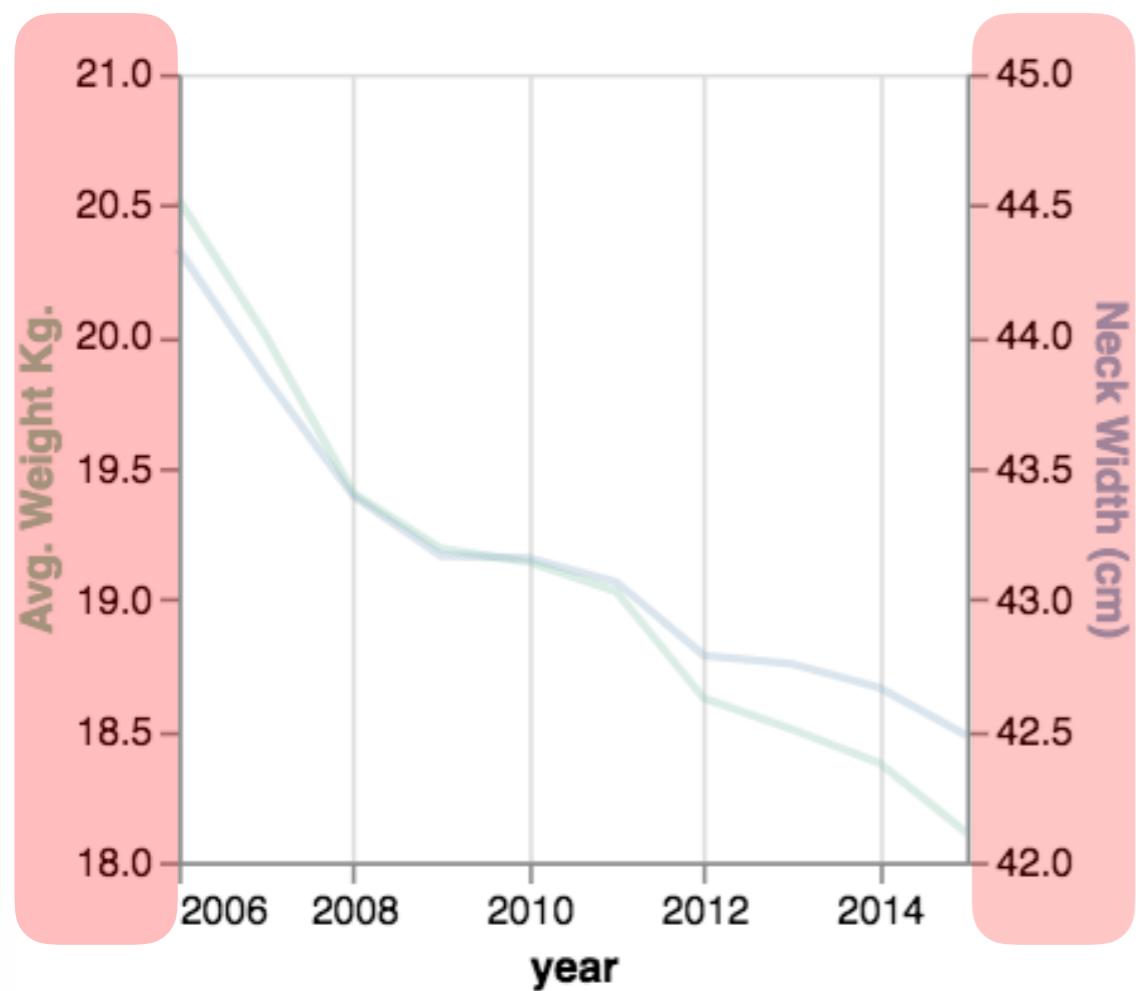


Color errors



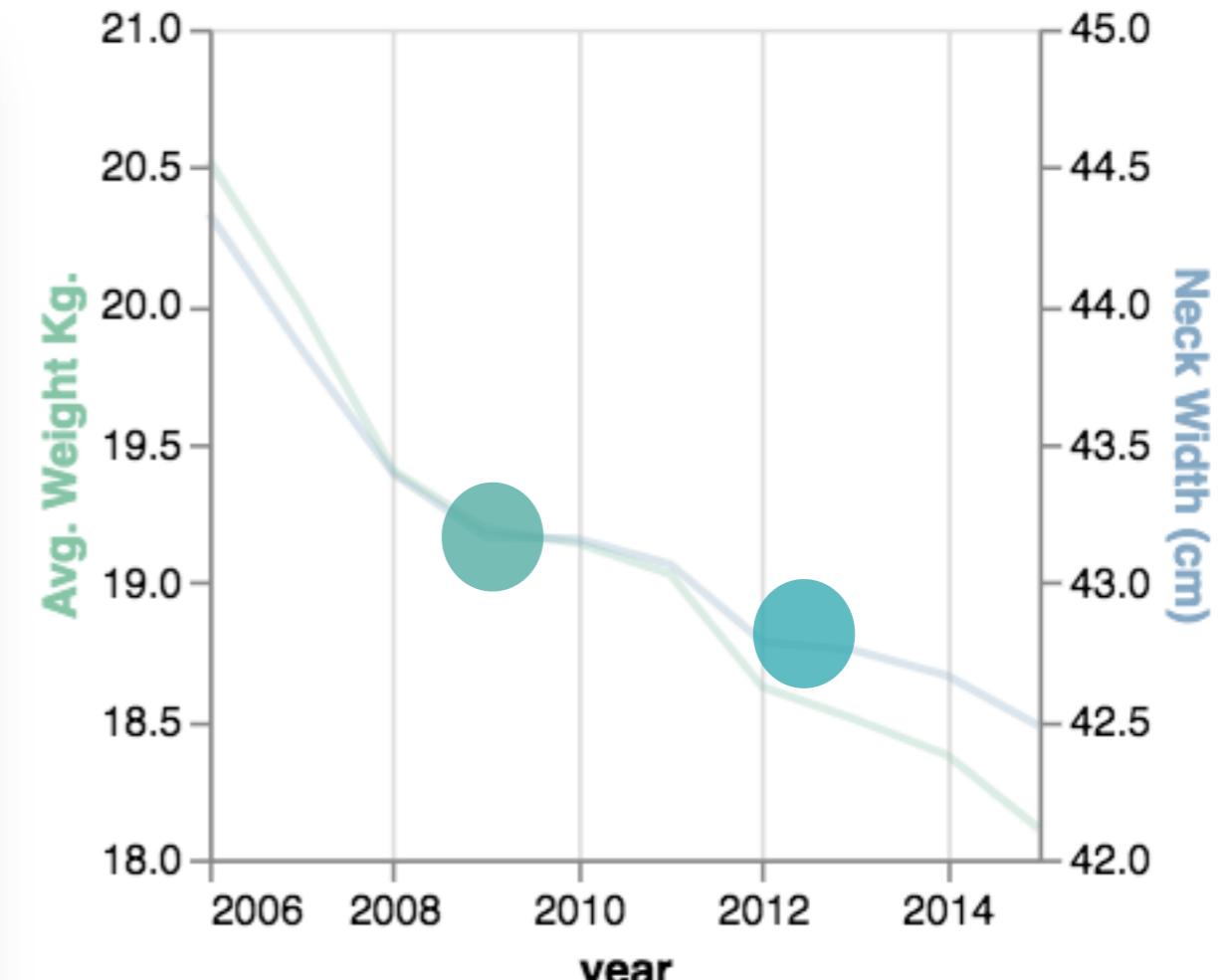
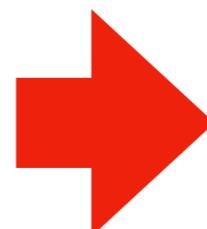
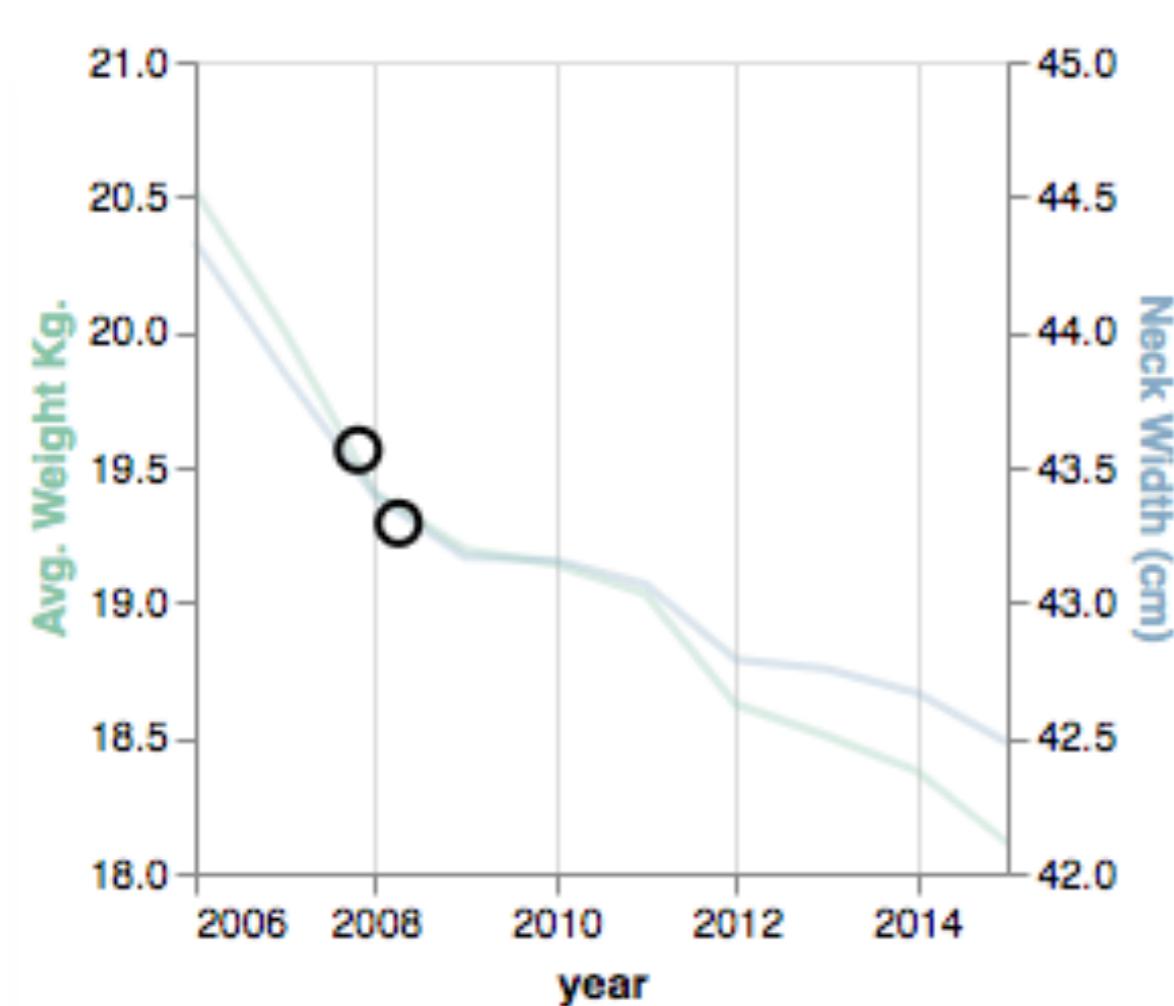
Revisiting the overlay:

One concern with this design was that it could be confused with part of the actual visualization. If we change it slightly, for example using a wavy border (an uncommon choice in visualizations), we benefit from both the highlighting from the overlay and the border



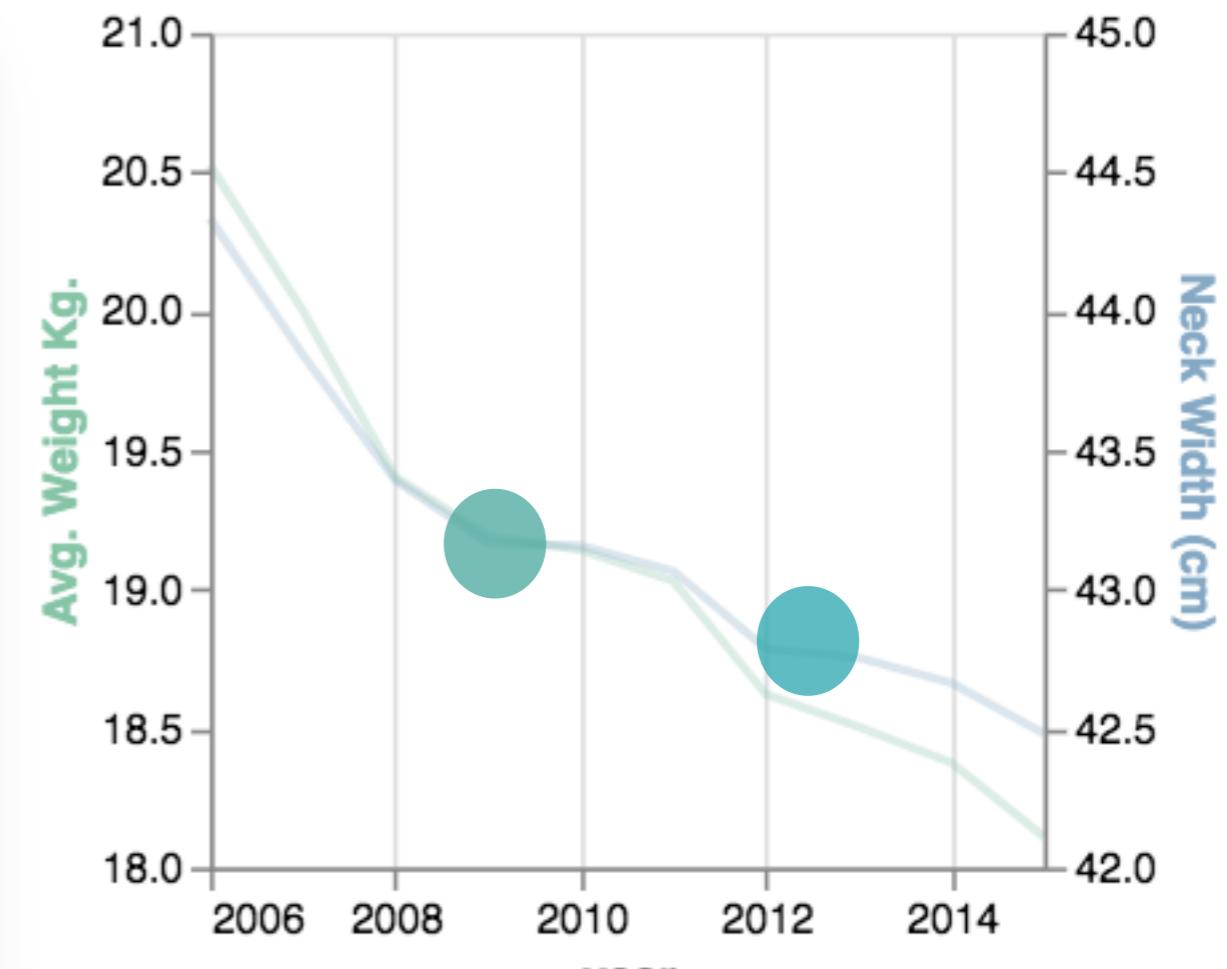
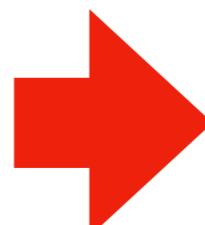
Color:

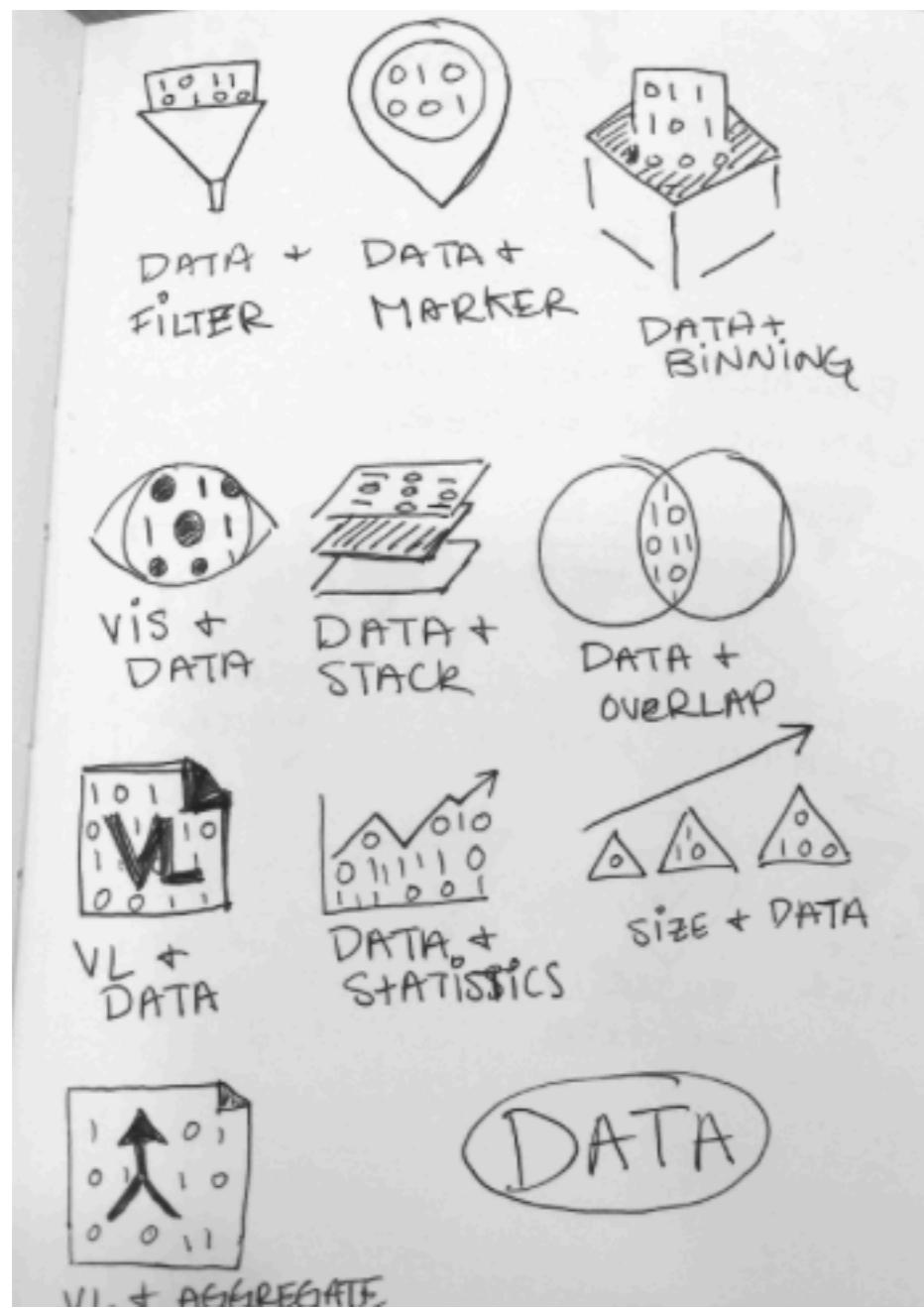
Without the interaction of the rules, it's difficult to realize the error is related to color selection. Instead, using the colors in the visualization and larger circles, we can better show the issue. This only works for line graphs well, however.



No zero on axis:

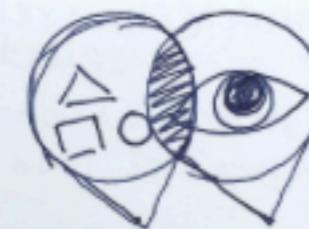
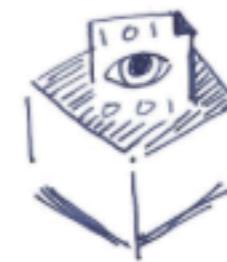
Without the interaction of the rules, it's difficult to realize the error is related to color selection. Instead, using the colors in the visualization and larger circles, we can better show the issue. This only works for line graphs well, however.







BASICALLY, EVERYTHING
CAN GO IN FILTER.



VL &
STACK &
BINNING &
VIS BASICS

MARKER +
VIS +
OVERLAP
+ SHAPE

Uh oh, this might not be the best way to show your data!

Your data are quantitative, but you're using type: "area". We suggest these alternatives:

type: "rect"

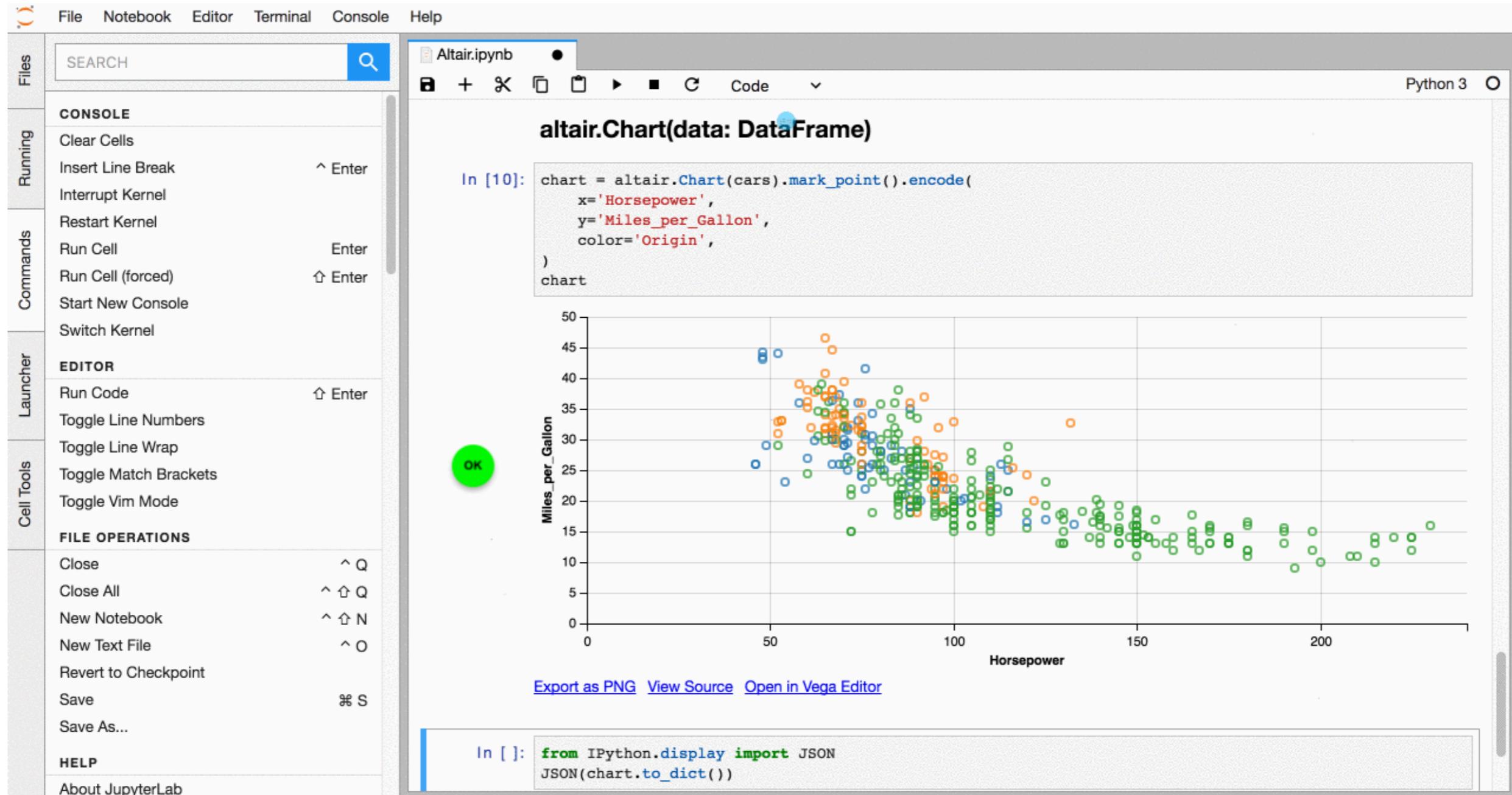
When working with qualitative data, the best charts are Bar graphs, Side-by-side bar graphs, and Pie charts. We recommend a bar graph because your data are categorical! It makes sense to bin them.

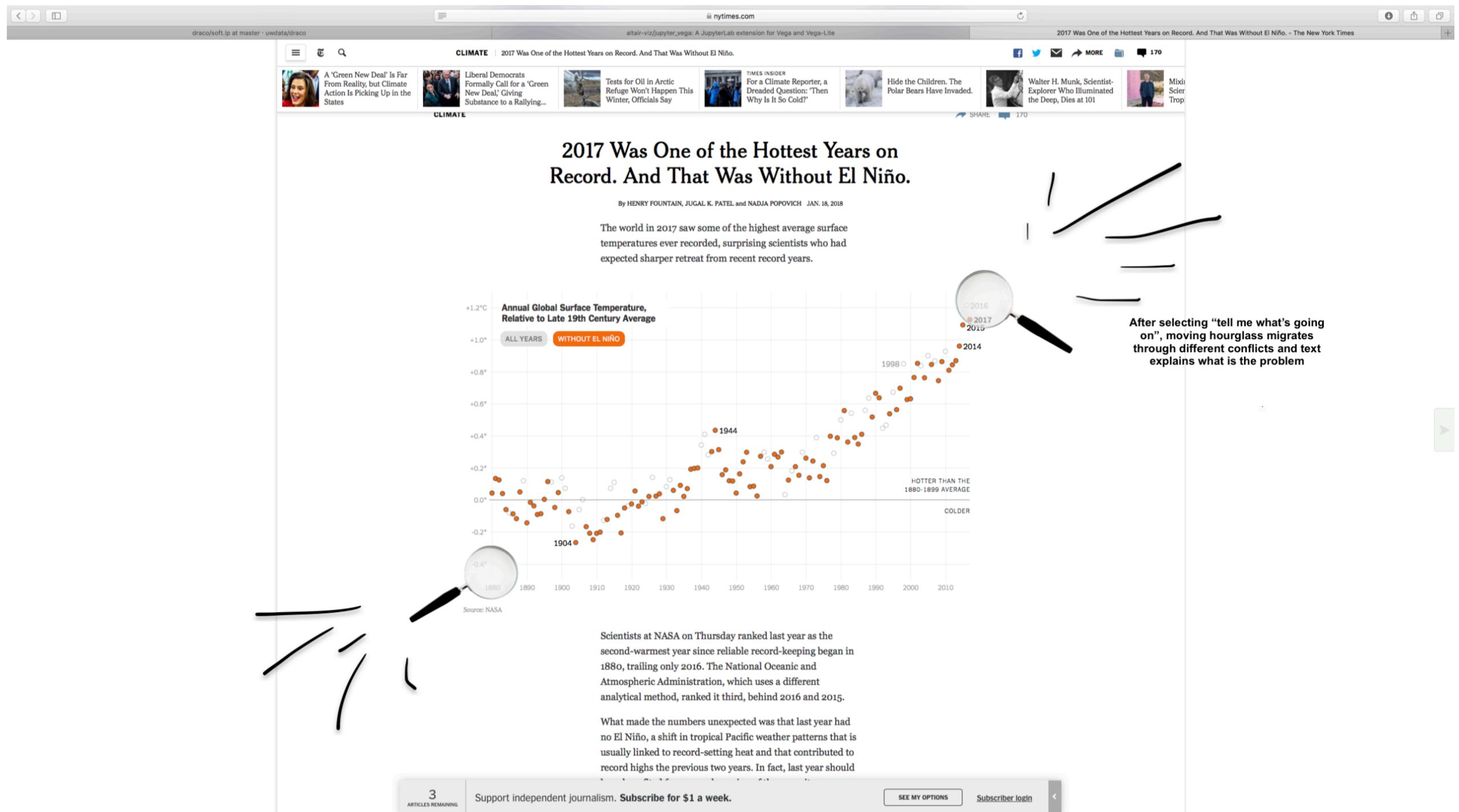
```

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20 ],
21
22
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26     "value": {},
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49 ],
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55
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65         "y2": {"scale": "yscale", "value": 0}
66       },
67       "update": {
68         "fill": {"value": "steelblue"}
69       },
70       "hover": {
71         "fill": {"value": "red"}
72       }
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74   },
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91           {"test": "datum > tooltip", "value": 1}
92         ]
93       }
94     }
95   }
96 ]

```

Vega version 4.4.0 Renderer: Canvas





File Notebook Editor Terminal Console Help

SEARCH

Files

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- Clear Cells
- Insert Line Break
- Interrupt Kernel
- Restart Kernel
- Run Cell
- Run Cell (forced)
- Start New Console
- Switch Kernel

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- Run Code
- Toggle Line Numbers
- Toggle Line Wrap
- Toggle Match Brackets
- Toggle Vim Mode

Launcher

FILE OPERATIONS

- Close
- Close All
- New Notebook
- New Text File
- Revert to Checkpoint
- Save
- Save As...

Cell Tools

HELP

About JupyterLab

Altair.ipynb • Python 3

In [10]:

```
chart = altair.Chart(cars
    x='Horsepower',
    y='Miles_per_Gallon',
    color='Origin',
)
chart
```

What's going on?

altair.Chart(data: Data) → altair.Chart

Miles_per_Gallon

Horsepower

Export as PNG View Source Open in Vega Editor

In []:

```
from IPython.display import JSON
JSON(chart.to_dict())
```

draco/soft.ip at master · uwdata/draco

nytimes.com

altair-viz/jupyter_vega: A JupyterLab extension for Vega and Vega-Lite

CLIMATE | 2017 Was One of the Hottest Years on Record. And That Was Without El Niño.

A 'Green New Deal' Is Far From Reality, but Climate Action Is Picking Up in the States

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Tests for Oil in Arctic Refuge Won't Happen This Winter, Officials Say

TIMES INSIDER For a Climate Reporter, a Dreaded Question: 'Then Why Is It So Cold?'

Hide the Children. The Polar Bears Have Invaded.

Walter H. Munk, Scientist-Explorer Who Illuminated the Deep, Dies at 101

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By HENRY FOUNTAIN, JUGAL K. PATEL and NADJA POPOVICH JAN. 18, 2018

The world in 2017 saw some of the highest average surface temperatures ever recorded, surprising scientists who had expected sharper retreat from recent record years.

Annual Global Surface Temperature, Relative to Late 19th Century Average

ALL YEARS WITHOUT EL NIÑO

+1.2°C +1.0° +0.8° +0.6° +0.4° +0.2° 0.0° -0.2° -0.4°

1880 1890 1900 1910 1920 1930 1940 1950 1960 1970 1980 1990 2000 2010

1904 1944 1998 2016 2017 2015 2014

HOTTER THAN THE 1880-1899 AVERAGE

COLDER

Source: NASA

Scientists at NASA on Thursday ranked last year as the second-warmest year since reliable record-keeping began in 1880, trailing only 2016. The National Oceanic and Atmospheric Administration, which uses a different analytical method, ranked it third, behind 2016 and 2015.

What made the numbers unexpected was that last year had no El Niño, a shift in tropical Pacific weather patterns that is usually linked to record-setting heat and that contributed to record highs the previous two years. In fact, last year should

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FILE OPERATIONS

- Close ^ Q
- Close All ^ ⇧ Q
- New Notebook ^ ⇧ N
- New Text File ^ O
- Revert to Checkpoint
- Save ⌘ S
- Save As...

HELP

- About JupyterLab

Altair.ipynb • Python 3

altair.Chart(data: DataFrame)

In [10]:

```
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    x='Horsepower',
    y='Miles_per_Gallon',
    color='Origin',
)
chart
```

Miles_per_Gallon

Horsepower

[Export as PNG](#) [View Source](#) [Open in Vega Editor](#)

In []:

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draco/soft.ip at master · uwdata/draco

nytimes.com

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+0.4°C
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0.0°C
-0.2°C
-0.4°C

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1904 1944 1998 2014 2015 2016 2017

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COLDER

Source: NASA

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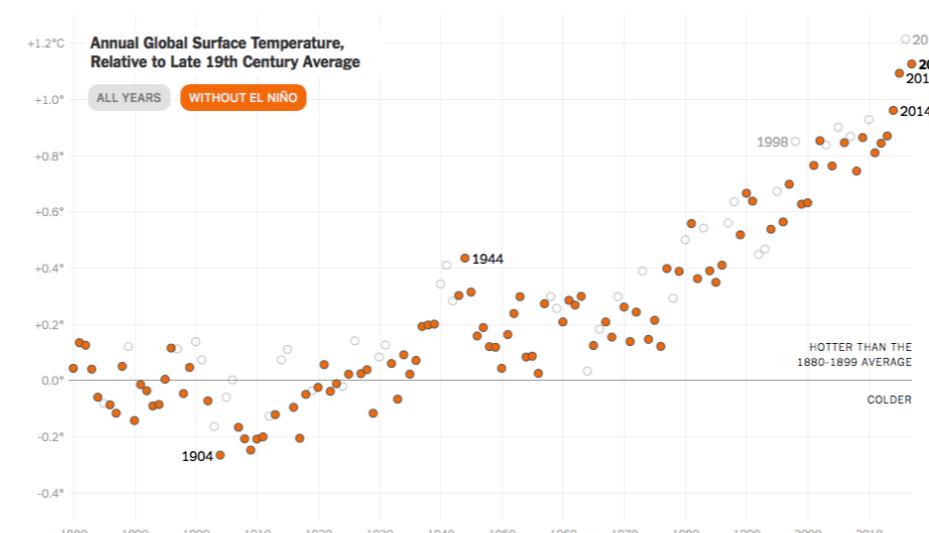
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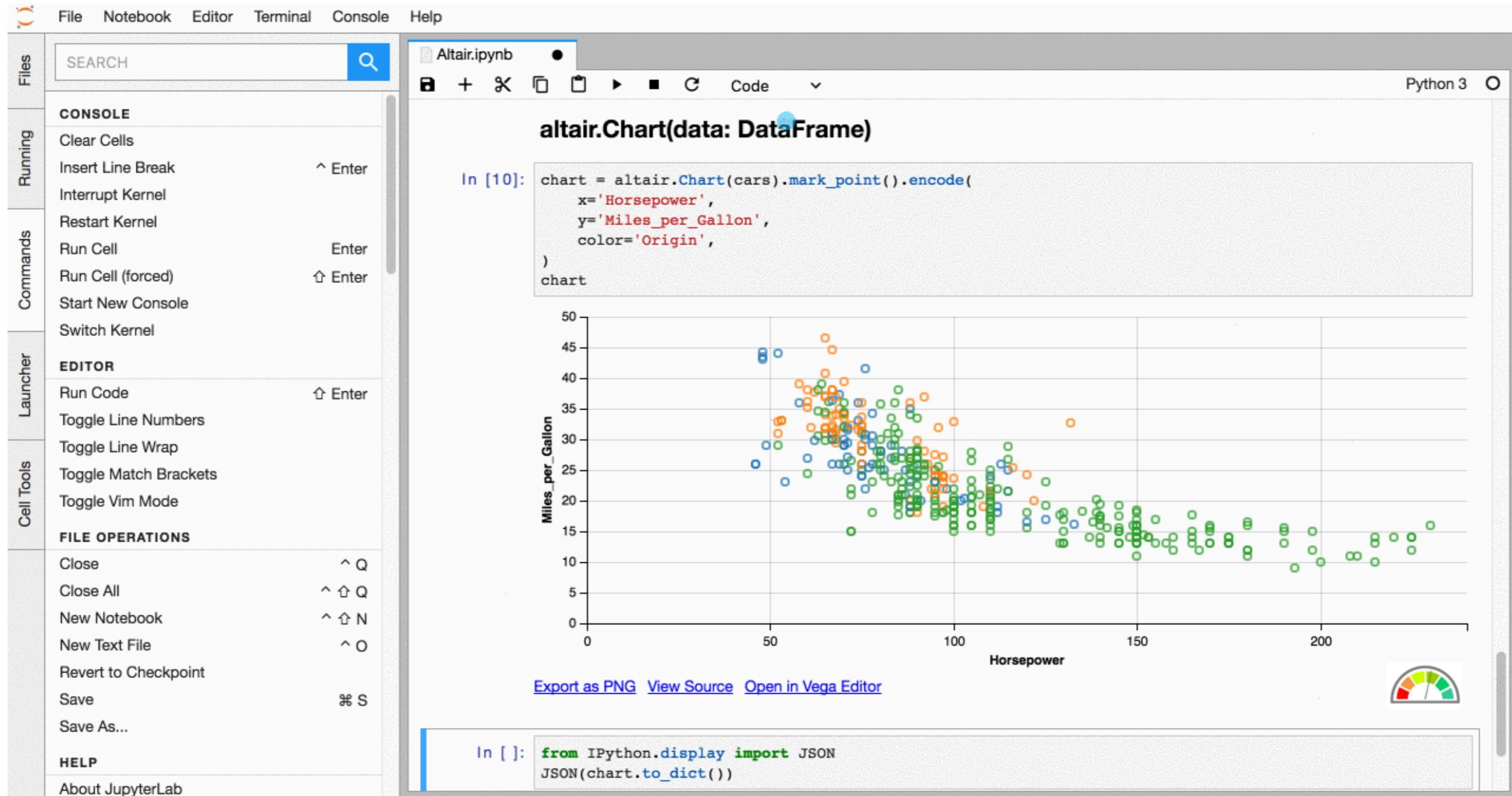
3 ARTICLES REMAINING

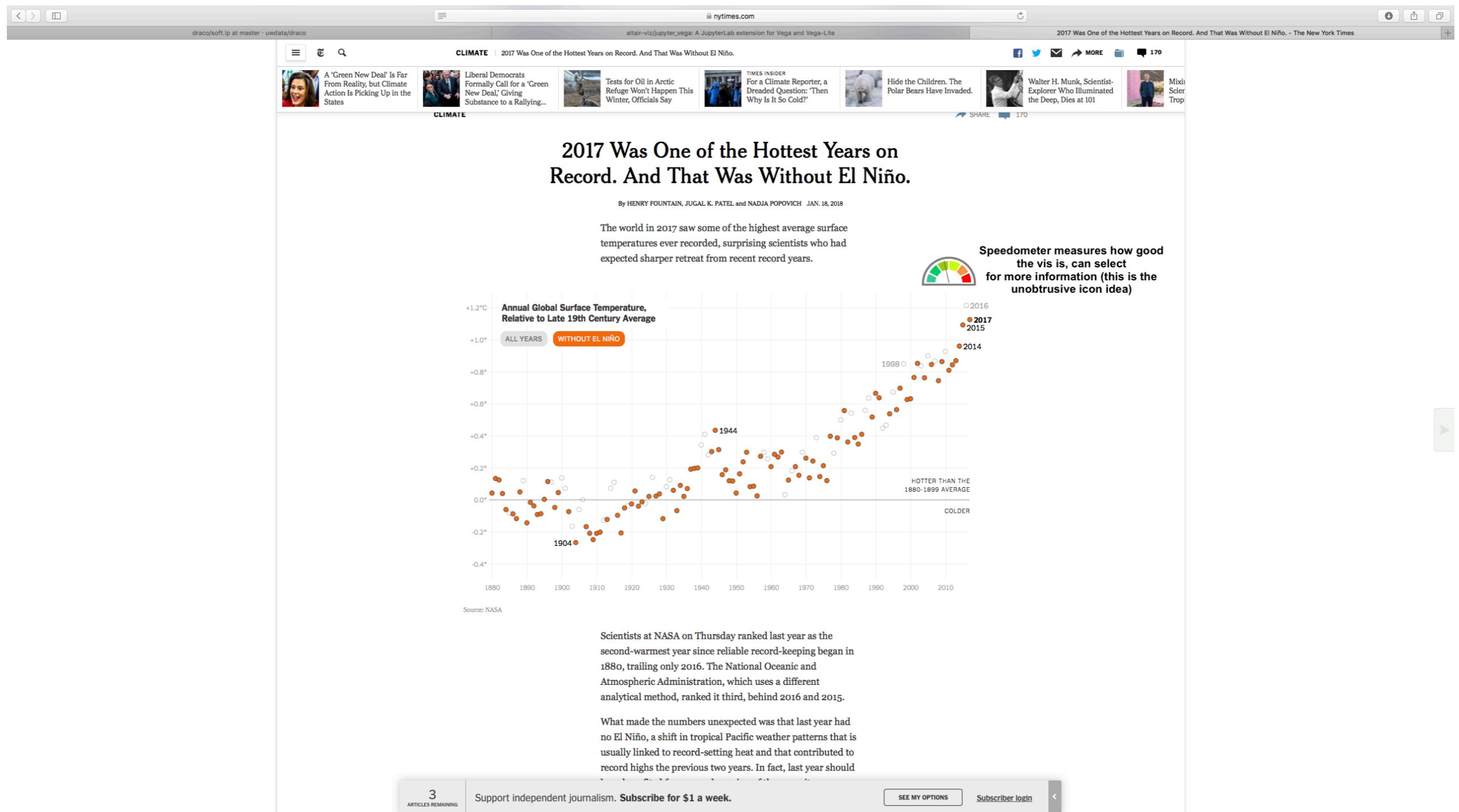
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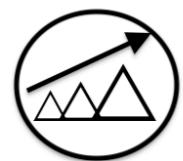
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Size



Shape



Marker



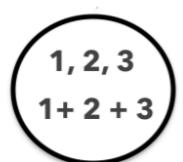
Statistic



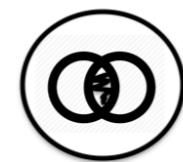
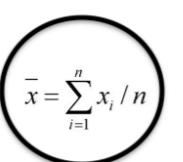
Filter + Transformation



Binning



Aggregate, Count



Overlap



Vega Lite Limitations



Stack



Data, Field



Visualization Basics

Vega Editor Document Issues · tensorflow/lucid How Redux Works: A Com... Tallbird Special Sauce: Ned Porte... Building a code editor wi... Monaco Editor Monarch editor | Monaco Editor Al... Colorization Clarification Westminster College - C... Vega Editor

<https://vega.github.io/editor/#/edited>

Vega Clear Format Run Auto Export Share

Examples Gist Vega Docs

```

2   "$schema": "https://vega.github.io/schema/vega/v4.json",
3   "width": 400,
4   "height": 200,
5   "padding": 5,
6
7   "data": [
8     {
9       "name": "table",
10      "values": [
11        {"category": "A", "amount": 28},
12        {"category": "B", "amount": 55},
13        {"category": "C", "amount": 43},
14        {"category": "D", "amount": 91},
15        {"category": "E", "amount": 81},
16        {"category": "F", "amount": 53},
17        {"category": "G", "amount": 19},
18        {"category": "H", "amount": 87}
19      ]
20    },
21
22
23   "signals": [
24     {
25       "name": "tooltip",
26       "value": {},
27       "on": [
28         {"events": "rect:mouseover", "update": "datum"},
29         {"events": "rect:mouseout", "update": "{}"}
30       ]
31     }
32   ],
33
34   "scales": [
35     {
36       "name": "xscale",
37       "type": "band",
38       "domain": {"data": "table", "field": "category"},
39       "range": "width",
40       "padding": 0.05,
41       "round": true
42     },
43     {
44       "name": "yscale",
45       "domain": {"data": "table", "field": "amount"},
46       "nice": true,
47       "range": "height"
48     }
49   ],
50
51   "axes": [
52     {"orient": "bottom", "scale": "xscale" },
53     {"orient": "left", "scale": "yscale" }
54   ],
55
56   "marks": [
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58       "type": "rect",
59       "from": {"data": "table"},
60       "encode": {
61         "enter": {
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63           "width": {"scale": "xscale", "band": 1},
64           "y": {"scale": "yscale", "field": "amount"},
65           "y2": {"scale": "yscale", "value": 0}
66         },
67         "update": {
68           "fill": {"value": "steelblue"}
69         },
70         "hover": {
71           "fill": {"value": "red"}
72         }
73     }
74   ]

```

Here's what changed: you had type: "area" now you're using type: "rect".

Accept Changes?

Yes **No**

Vega version 4.4.0 Renderer: SVG

LOGS DATA VIEWER

Vega

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Microsoft/monaco-editor: A... Extending TypeScript suppo... getModelMarkers not work... monaco-css/languageFeatu... monaco-editor/monaco.d.ts... JSON language support for... vega/editor: Editor/IDE for V... Registration information | M... Touchstone@MIT : Please A... Registration load & light lo... Add/drop/change | MIT Regi... best free tax online 2018 -... Vega Editor Examples Gist Vega Docs

```

1 {
2   "$schema": "https://vega.github.io/schema/vega/v4.json",
3   "width": 400,
4   "height": 200,
5   "padding": 5,
6
7   "data": [
8     {
9       "name": "table",
10      "values": [
11        {"category": "A", "amount": 28},
12        {"category": "B", "amount": 55},
13        {"category": "C", "amount": 43},
14        {"category": "D", "amount": 91},
15        {"category": "E", "amount": 81},
16        {"category": "F", "amount": 53},
17        {"category": "G", "amount": 19},
18        {"category": "H", "amount": 87}
19      ]
20    }
21  ],
22
23  "signals": [
24    {
25      "name": "tooltip",
26      "value": {},
27      "on": [
28        {"events": "rect:mouseover", "update": "datum"},
29        {"events": "rect:mouseout", "update": "{}"}
30      ]
31    }
32  ],
33
34  "scales": [
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37      "type": "band",
38      "domain": {"data": "table", "field": "category"},
39      "range": "width",
40      "padding": 0.05,
41      "round": true
42    },
43    {
44      "name": "yscale",
45      "domain": {"data": "table", "field": "amount"},
46      "nice": true,
47      "range": "height"
48    }
49  ],
50
51  "axes": [
52    {"orient": "bottom", "scale": "xscale"},
53    {"orient": "left", "scale": "yscale"}
54  ],
55
56  "marks": [
57    {
58      "type": "area",
59      "from": {"data": "table"},
60      "encode": {
61        "enter": {
62          "x": {"scale": "xscale", "field": "category"},
63          "width": {"scale": "xscale", "band": 1},
64          "y": {"scale": "yscale", "field": "amount"},
65          "y2": {"scale": "yscale", "value": 0}
66        },
67        "update": {
68          "fill": {"value": "steelblue"}
69        },
70        "hover": {
71          "fill": {"value": "red"}
72        }
73      }
74    }
75  ]

```

Oh hey, your chart doesn't look so hot. How about some changes?

Yeah! Walk me through it!

Just Fix It

No.

LOGS DATA VIEWER

Vega version 4.4.0 Renderer: Canvas

Microsoft/monaco-editor: A... Extending TypeScript suppo... getModelMarkers not work... monaco-css/languageFeatu... monaco-editor/monaco.d.ts... JSON language support for... vega/editor: Editor/IDE for V... Registration information | M... Touchstone@MIT : Please A... Registration load & light lo... Add/drop/change | MIT Regi... best free tax online 2018 ~... Vega Editor

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```

1 {
2   "$schema": "https://vega.github.io/schema/vega/v4.json",
3   "width": 400,
4   "height": 200,
5   "padding": 5,
6
7   "data": [
8     {
9       "name": "table",
10      "values": [
11        {"category": "A", "amount": 28},
12        {"category": "B", "amount": 55},
13        {"category": "C", "amount": 43},
14        {"category": "D", "amount": 91},
15        {"category": "E", "amount": 81},
16        {"category": "F", "amount": 53},
17        {"category": "G", "amount": 19},
18        {"category": "H", "amount": 87}
19      ]
20    },
21
22    "signals": [
23      {
24        "name": "tooltip",
25        "value": {},
26        "on": [
27          {"events": "rect:mouseover", "update": "datum"},
28          {"events": "rect:mouseout", "update": "{}"}
29        ]
30      }
31    ],
32
33    "scales": [
34      {
35        "name": "xscale",
36        "type": "band",
37        "domain": {"data": "table", "field": "category"},
38        "range": "width",
39        "padding": 0.05,
40        "round": true
41      },
42      {
43        "name": "yscale",
44        "domain": {"data": "table", "field": "amount"},
45        "nice": true,
46        "range": "height"
47      }
48    ],
49
50    "axes": [
51      {"orient": "bottom", "scale": "xscale"},
52      {"orient": "left", "scale": "yscale"}
53    ],
54
55    "marks": [
56      {
57        "type": "area",
58        "from": {"data": "table"},
59        "encode": {
60          "enter": {
61            "x": {"scale": "xscale", "field": "category"},
62            "width": {"scale": "xscale", "band": 1},
63            "y": {"scale": "yscale", "field": "amount"},
64            "y2": {"scale": "yscale", "value": 0}
65          },
66          "update": {
67            "fill": {"value": "steelblue"}
68          },
69          "hover": {
70            "fill": {"value": "red"}
71          }
72        }
73      }
74    ]
75  }
76}
```

We recommend using
type: "rect"
instead, because your data are categorical. You'll get
something like the graph below!

Vega version 4.4.0 Renderer: Canvas

colab.research.google.com

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CODE TEXT CELL CELL

COMMENT SHARE A

a = alt.Chart(data).mark_circle().encode(
y='life_expect',
x='year:O')
b = alt.Chart(data).mark_line().encode(
x = 'year:O',
y = 'mean(life_expect)'
)
a+b

Say this is a compound rule break,
where shape and filter are points of
conflict

When user hovers over rule, there's
a dropdown of some sort that shows which rules have
been broken to create this compound and by interacting
with those elements you can see how "fixing" the breakage
impacts the visualization, either directly or in a small screen example

