First explorations

IMPROVING YOUR DATA VISUALIZATIONS IN PYTHON

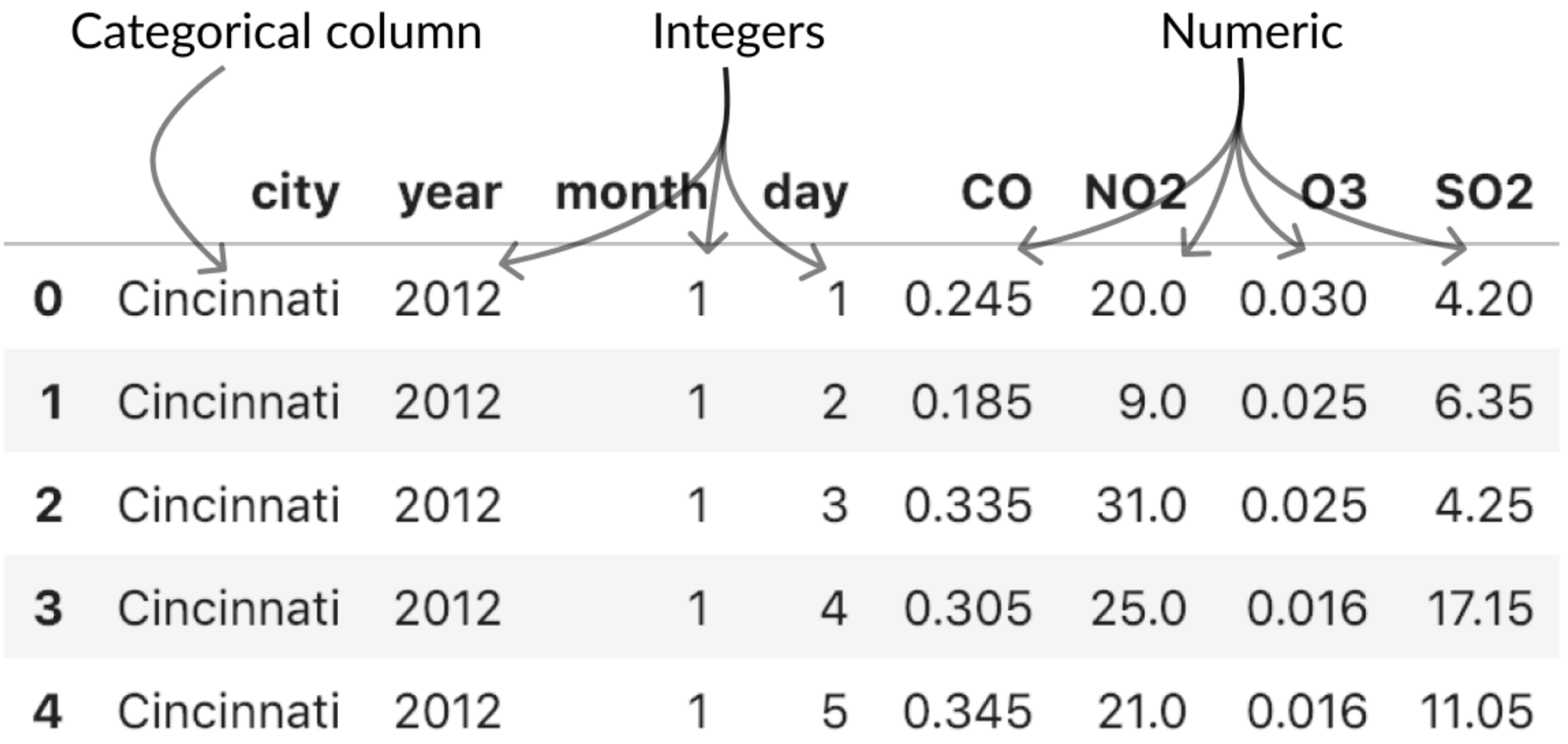
Nick Strayer
Instructor

First explorations of a dataset

- Take a broad view
- Show as much info as possible
- Don't fuss over appearances

Using your head()

```
pollution.head()
```

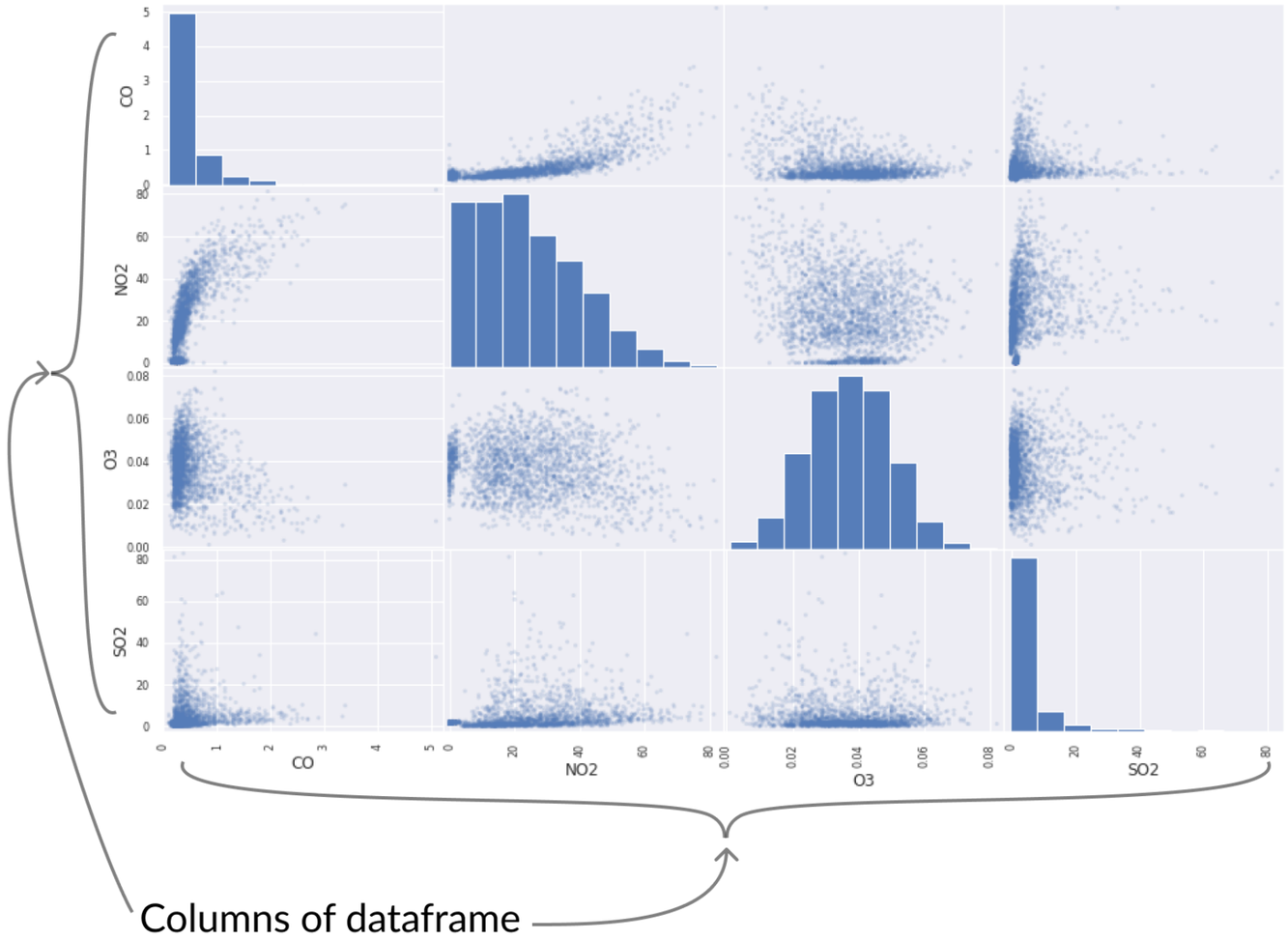


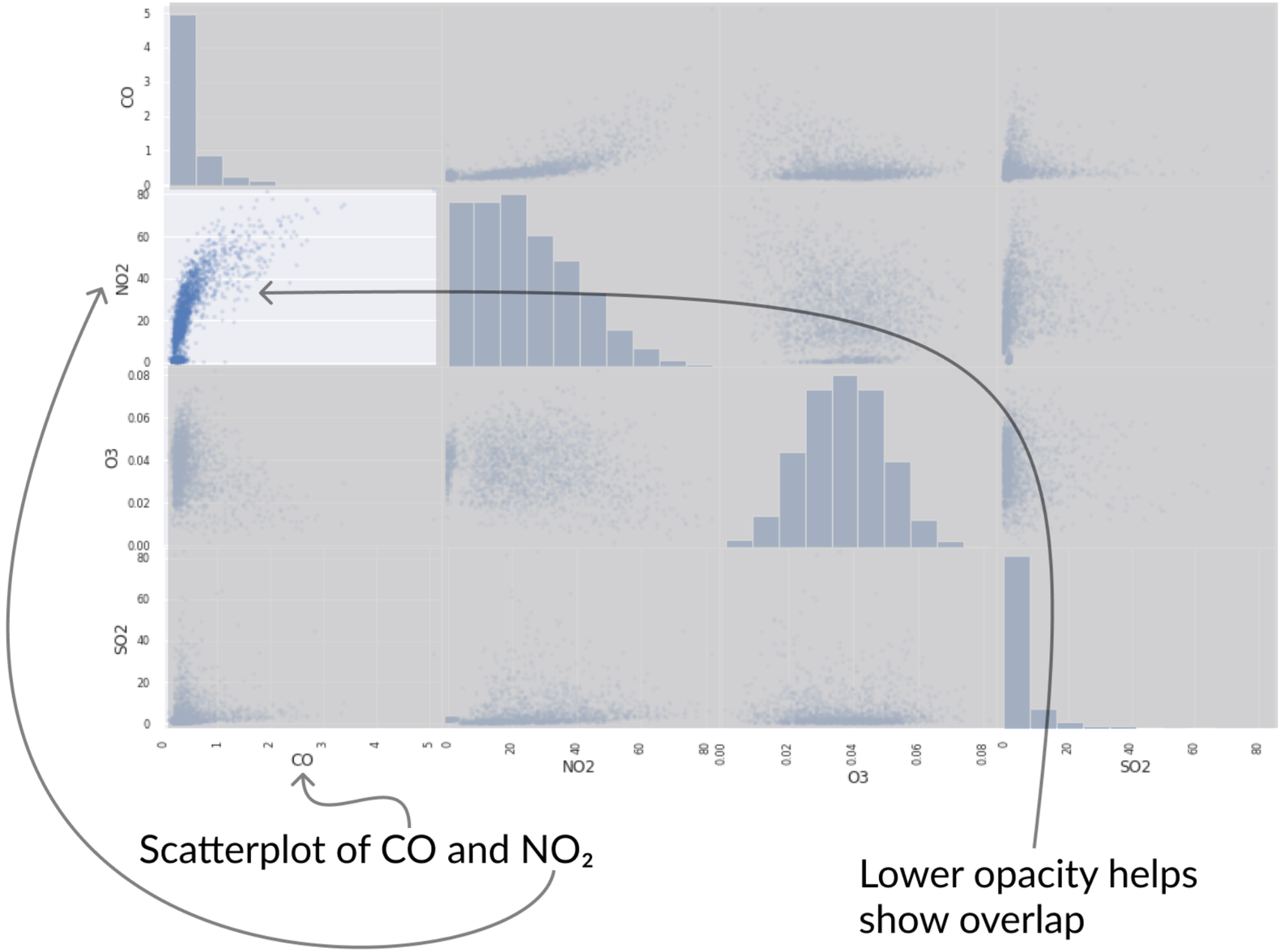
	city	year	month	day	CO	NO2	O3	SO2
0	Cincinnati	2012	1	1	0.245	20.0	0.030	4.20
1	Cincinnati	2012	1	2	0.185	9.0	0.025	6.35
2	Cincinnati	2012	1	3	0.335	31.0	0.025	4.25
3	Cincinnati	2012	1	4	0.305	25.0	0.016	17.15
4	Cincinnati	2012	1	5	0.345	21.0	0.016	11.05

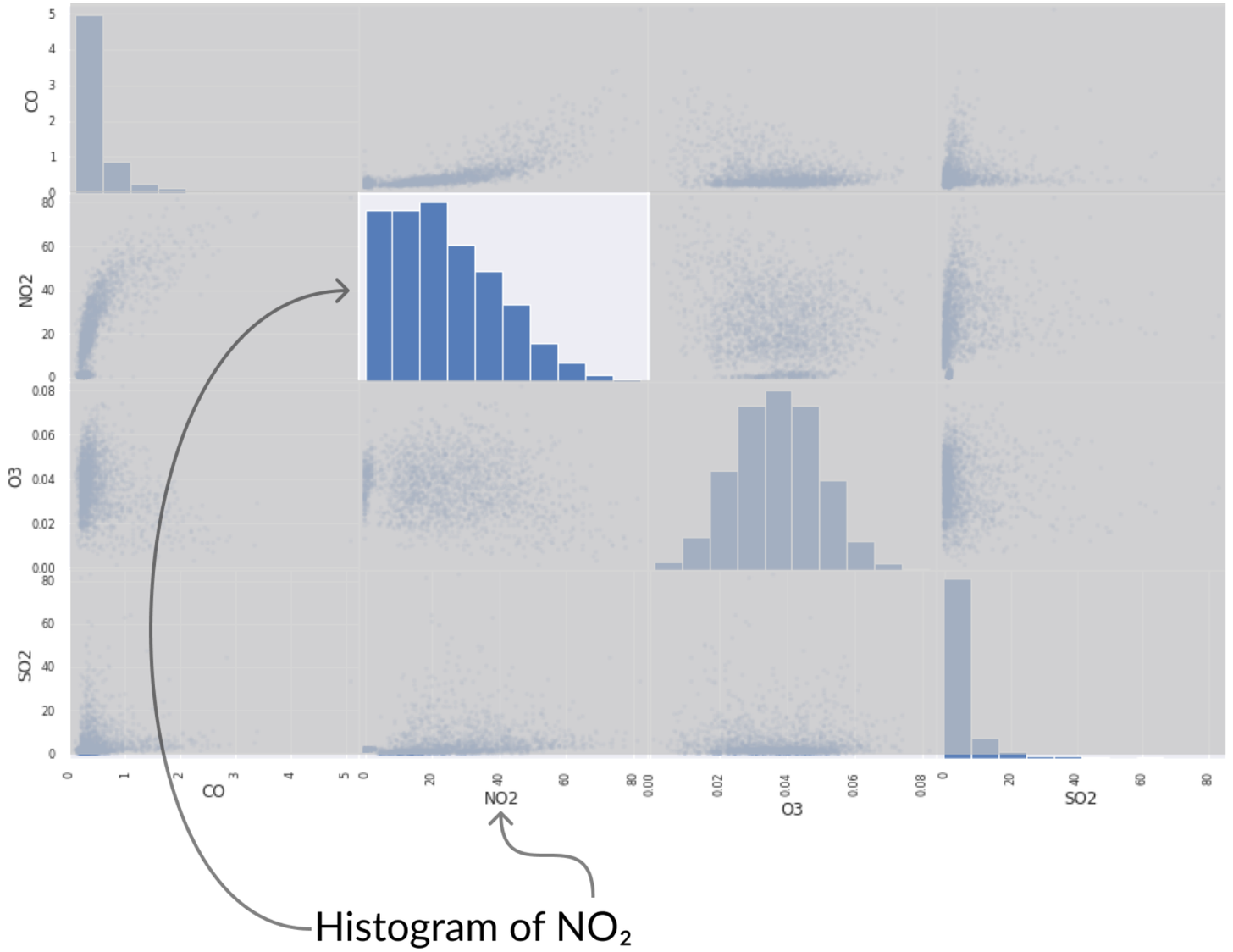
```
# Just show median
pollution.describe(percentiles=[0.5]
                   # Describe all columns
                   include='all')
```

	city	year	month	day	...
count	8888	8888.000000	8888.000000	8888.000000	
unique	8	NaN	NaN	NaN	
top	Houston	NaN	NaN	NaN	
freq	1433	NaN	NaN	NaN	
mean	NaN	2013.621737	6.657516	187.187894	
std	NaN	1.084081	3.328182	101.739060	
min	NaN	2012.000000	1.000000	1.000000	
50%	NaN	2014.000000	7.000000	192.000000	
max	NaN	2015.000000	12.000000	366.000000	

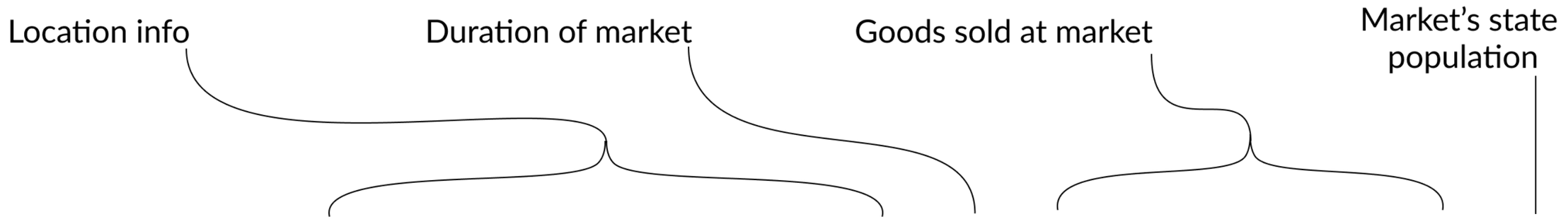
```
pd.plotting.scatter_matrix(pollution, alpha = 0.2);
```




CO
NO2
O3
SO2
Scatterplot of CO and NO_2
Lower opacity helps show overlap


CO
NO2
O3
SO2
Histogram of NO_2

```
markets.head()
```



name	city	county	state	lat	lon	months_open	Bakedgoods	...	num_items_sold	state_pop
Island Market	Key Largo	Monroe	Florida	-80.427218	25.109214	6	1	...	18	19893297.0
COFFO Harvest Farmers' Market	Florida City	Miami-Dade	Florida	-80.482299	25.449850	12	0	...	7	19893297.0
COFFO Harvest Farmers' Market	Homestead	Miami-Dade	Florida	-80.483400	25.463500	12	0	...	7	19893297.0
Verde Gardens Farmers Market	Homestead	Miami-Dade	Florida	-80.395607	25.506727	12	0	...	5	19893297.0
Verde Community Farm and Market	Homestead	Miami-Dade	Florida	-80.395607	25.506727	9	0	...	5	19893297.0

Let's explore our data

IMPROVING YOUR DATA VISUALIZATIONS IN PYTHON

Exploring the patterns

IMPROVING YOUR DATA VISUALIZATIONS IN PYTHON

Nick Strayer
Instructor

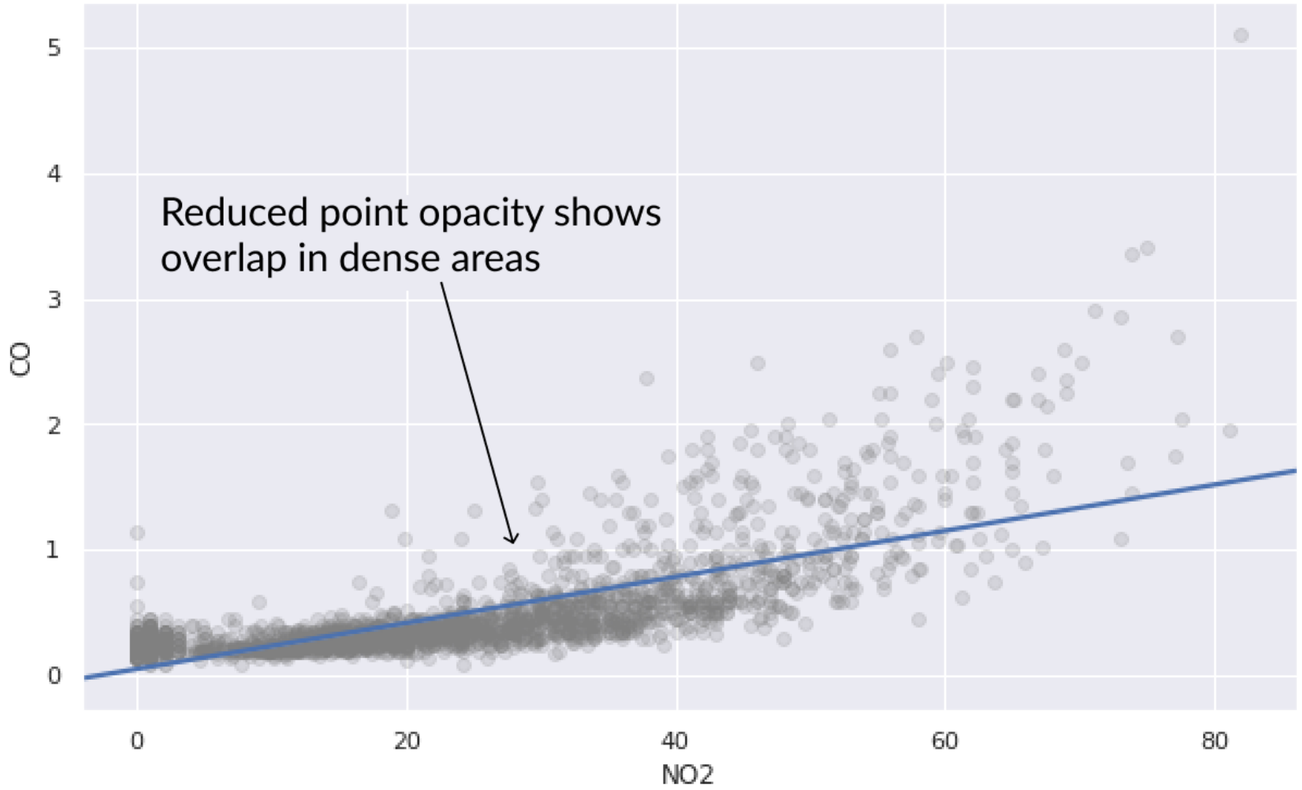
Digging in deeper

- Investigating correlations
- Are correlations driven by confounding?
- Anything surprising?

Target audiences

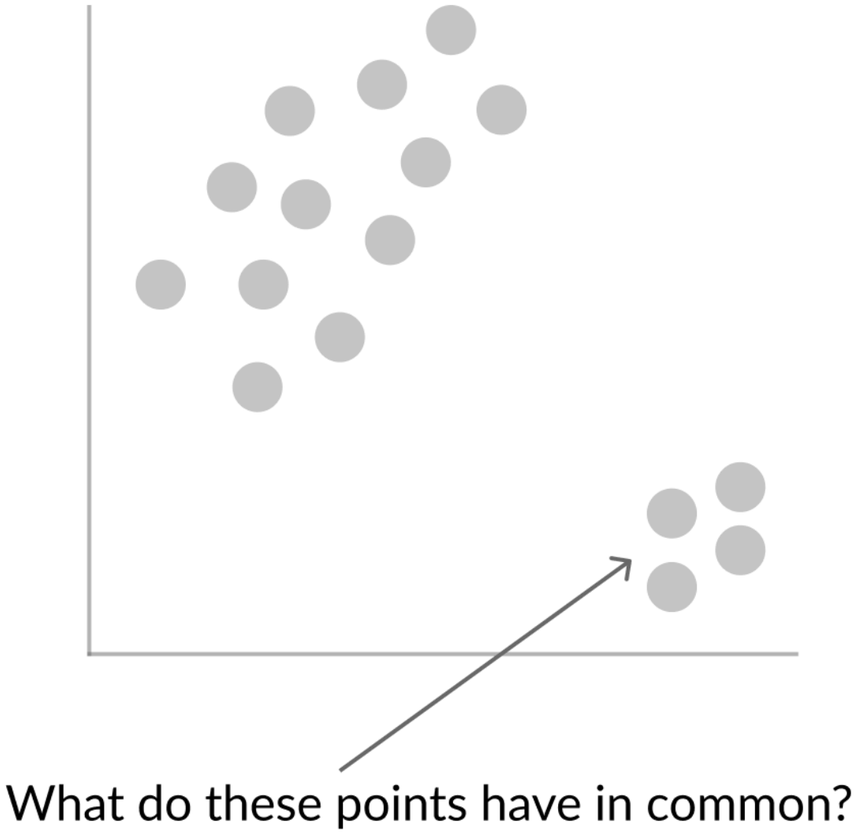
- Shared with peers
- Be smart about design decisions
- Remember they aren't as familiar with data

```
sns.regplot('NO2', 'CO', ci=False, data=pollution,

            # Lower opacity of points

            scatter_kws={'alpha':0.2, 'color':'grey'} )
```

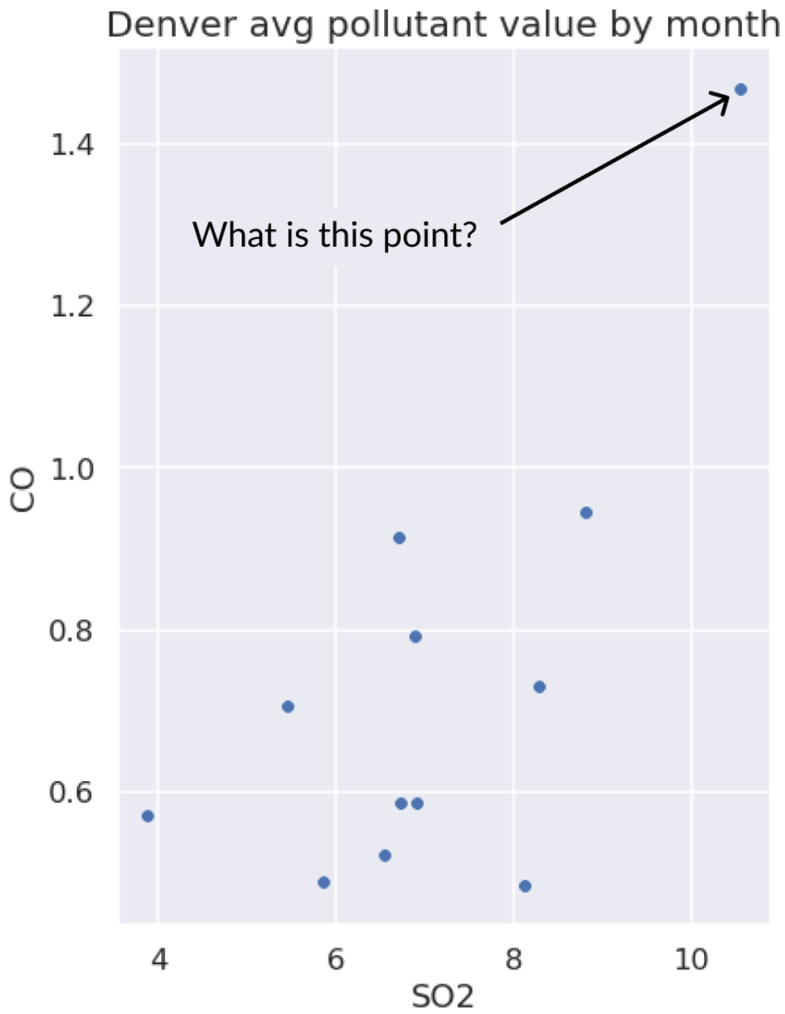


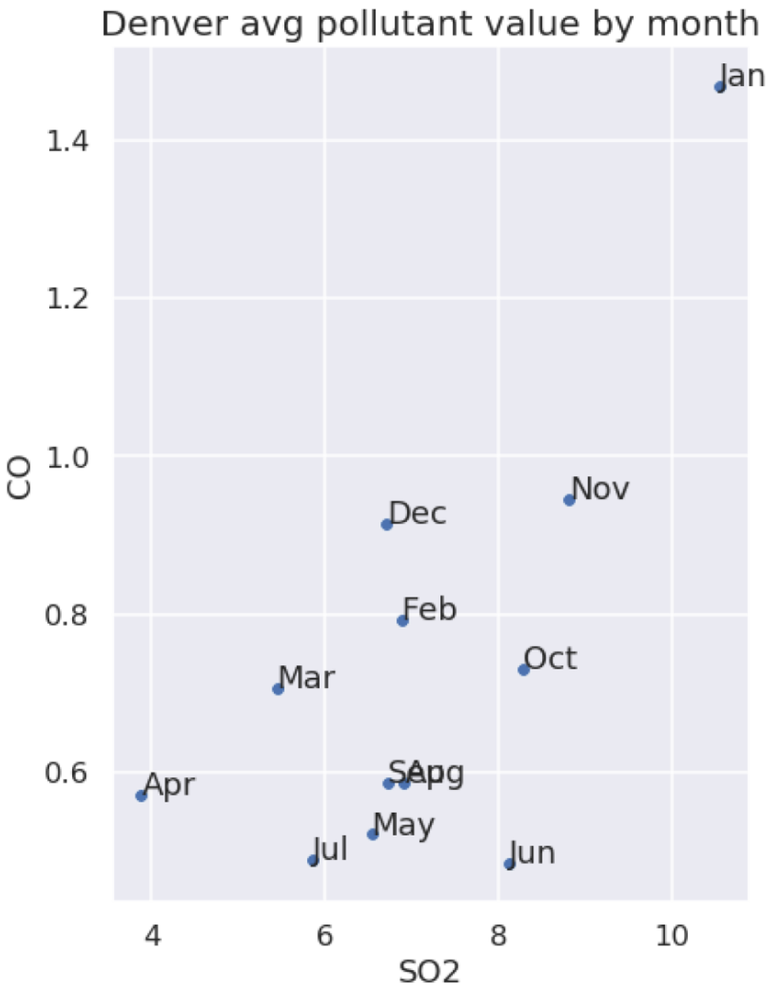
Profiling patterns

- Found interesting pattern in data
- How to quickly explore and explain the pattern?
- Use text!

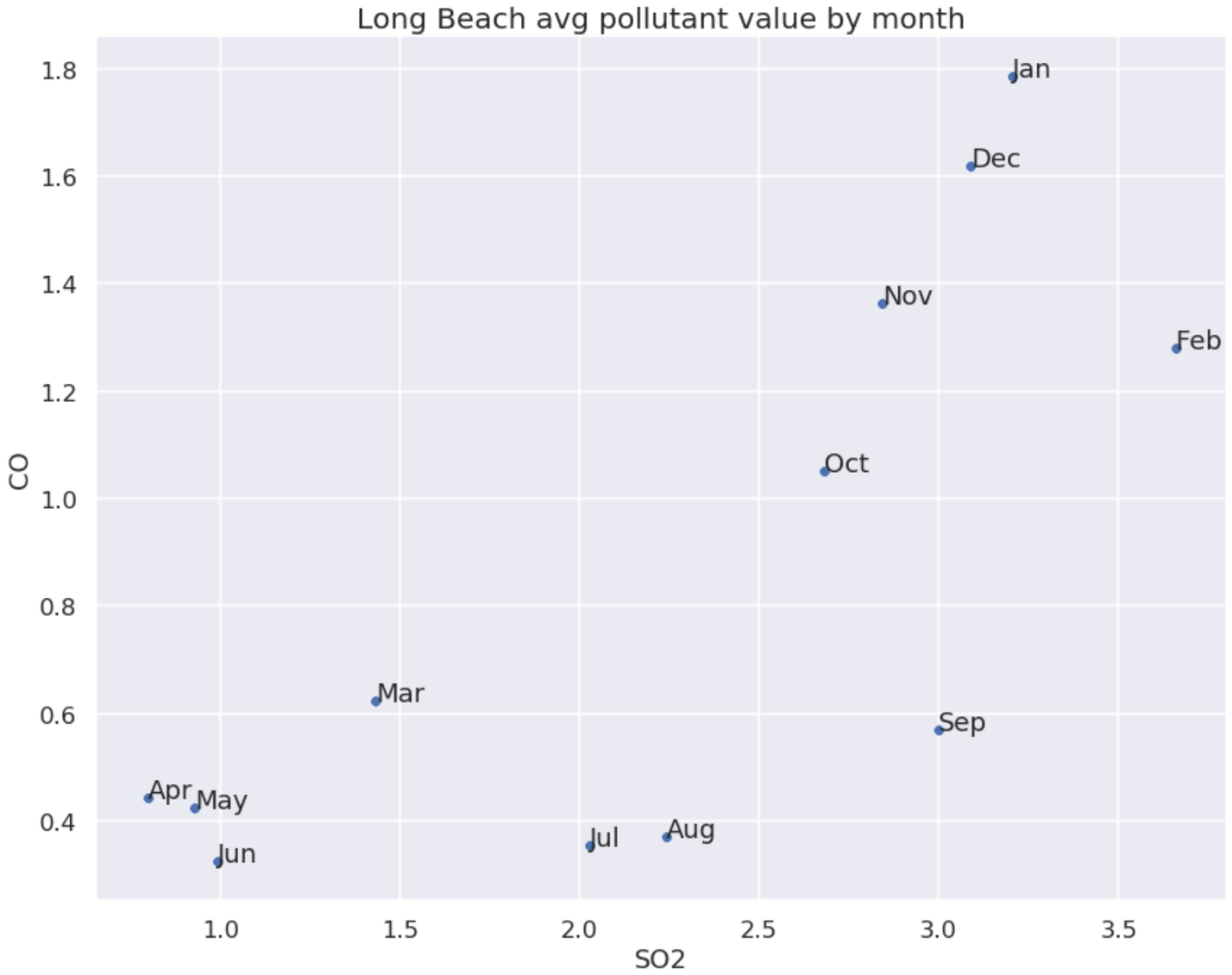


Using text scatters to id outliers





```
g = sns.scatterplot("SO2","CO", data=long_beach_avgs)


# Iterate over the rows of our data
for _, row in long_beach_avgs.iterrows():
    # Unpack columns from row
    month, SO2, CO = row

    # Draw annotation in correct place
    g.annotate(month, (SO2,CO))

plt.title('Long Beach avg SO2 by CO')
```


Long Beach avg pollutant value by month
CO
SO2
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
1.0
1.5
2.0
2.5
3.0
3.5
Jan
Dec
Nov
Feb
Oct
Mar
Sep
Apr
May
Jun
Jul
Aug

Let's dig in

IMPROVING YOUR DATA VISUALIZATIONS IN PYTHON

Making your visualizations efficient

IMPROVING YOUR DATA VISUALIZATIONS IN PYTHON

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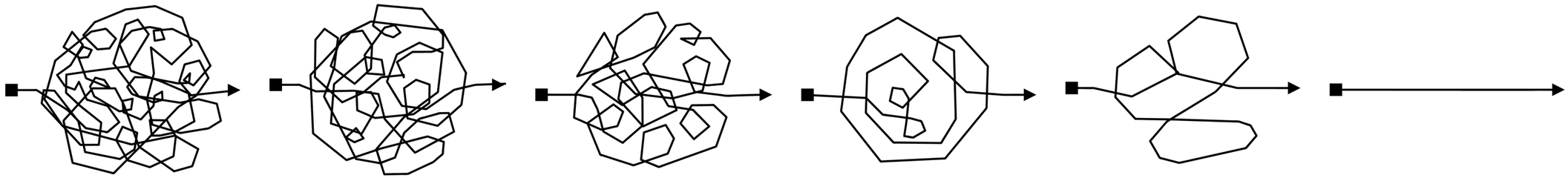
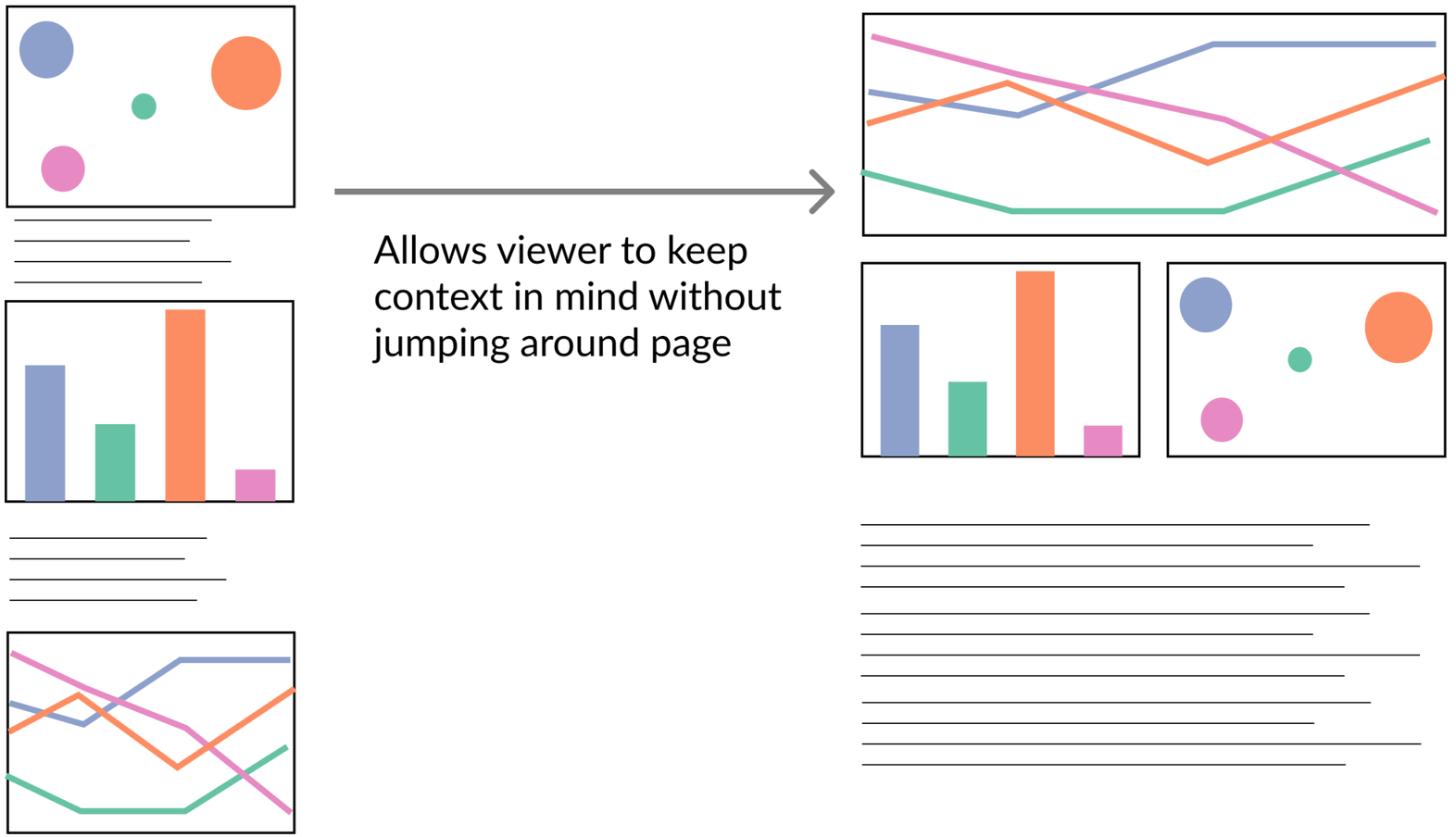
Instructor

What is efficient?

- Reduce the effort needed to see story
- Re-organize plots to keep focus
- Improve 'ink' to info ratio
- Don't compromise the message

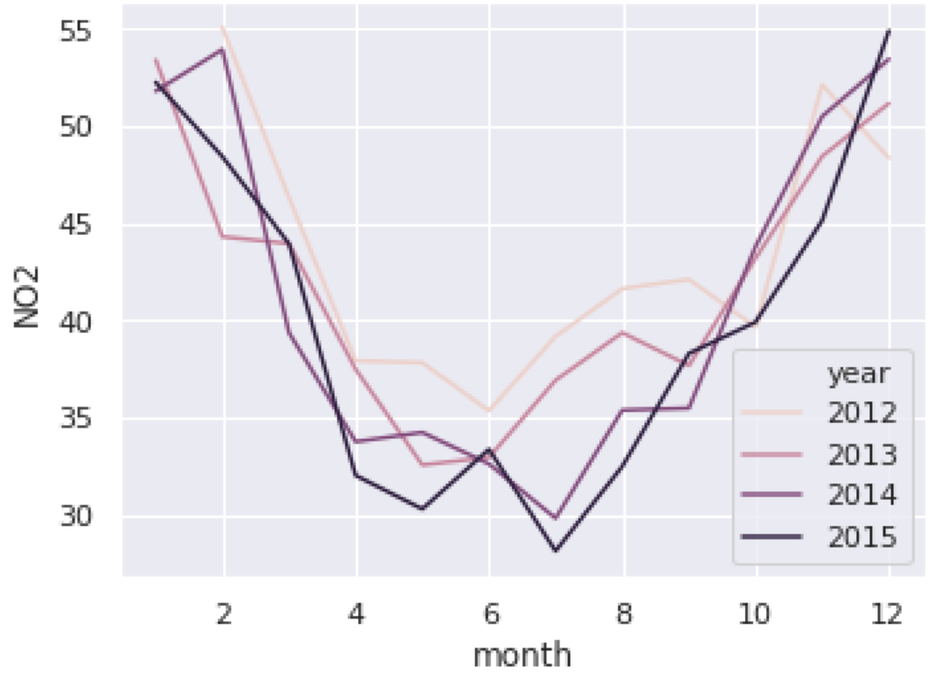


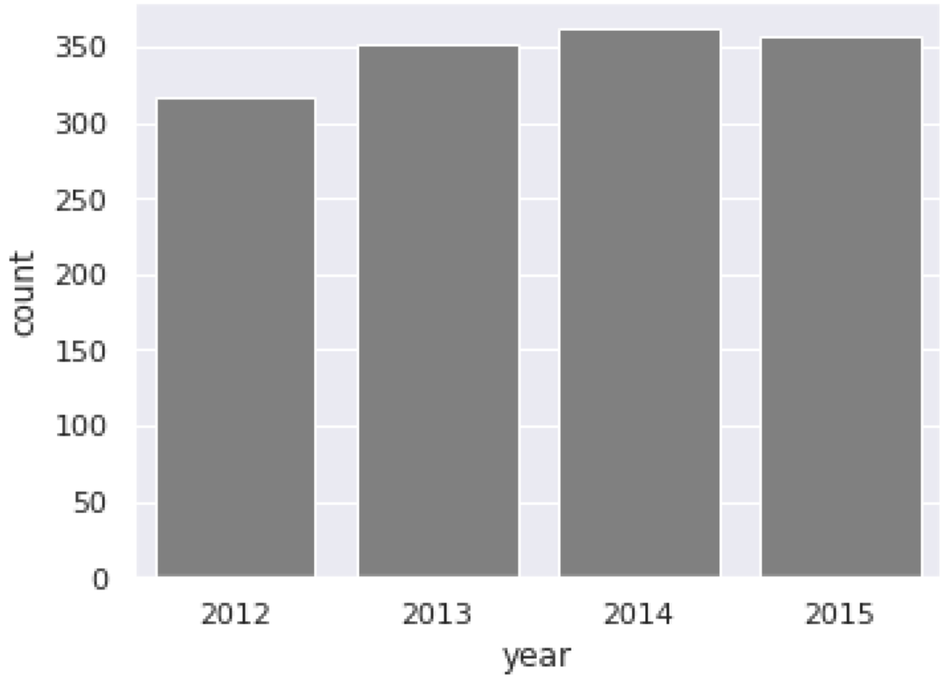
Combining plots



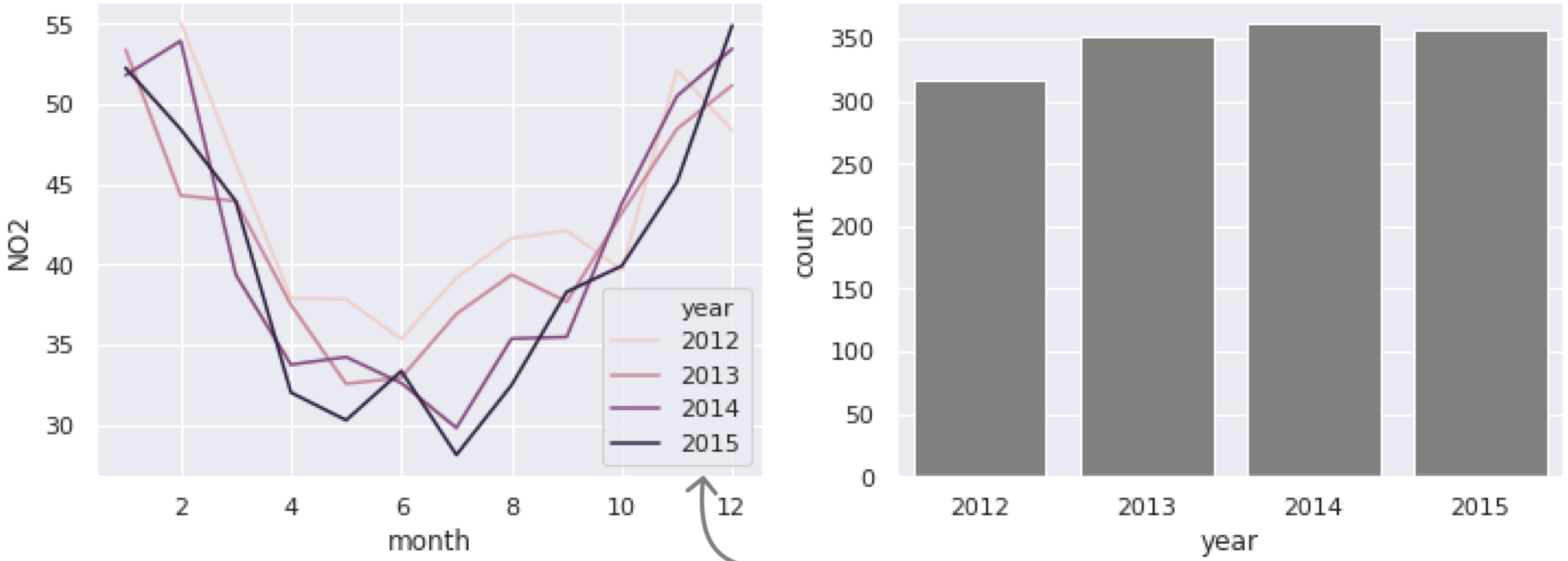
Allows viewer to keep context in mind without jumping around page

```
# Create a subplot w/ one row & two columns.
f, (ax1, ax2) = plt.subplots(1, 2)

# Pass each axes to respective plot
sns.lineplot('month', 'NO2', 'year', ax=ax1, data=pol_by_month)

sns.barplot('year', 'count', ax=ax2, data=obs_by_year)
```





Clear unnecessary legends



Year value is written in both **legend** and bar plot **axis**

```
sns.lineplot('month', 'NO2', 'year', ax=ax1, data=pol_by_month, palette='RdBu',)
sns.barplot('year', 'count', 'year', ax=ax2, data=obs_by_year,
            palette='RdBu', dodge=False)
# Remove legends for both plots
ax1.legend_.remove()
ax2.legend_.remove()
```

Let's practice

IMPROVING YOUR DATA VISUALIZATIONS IN PYTHON

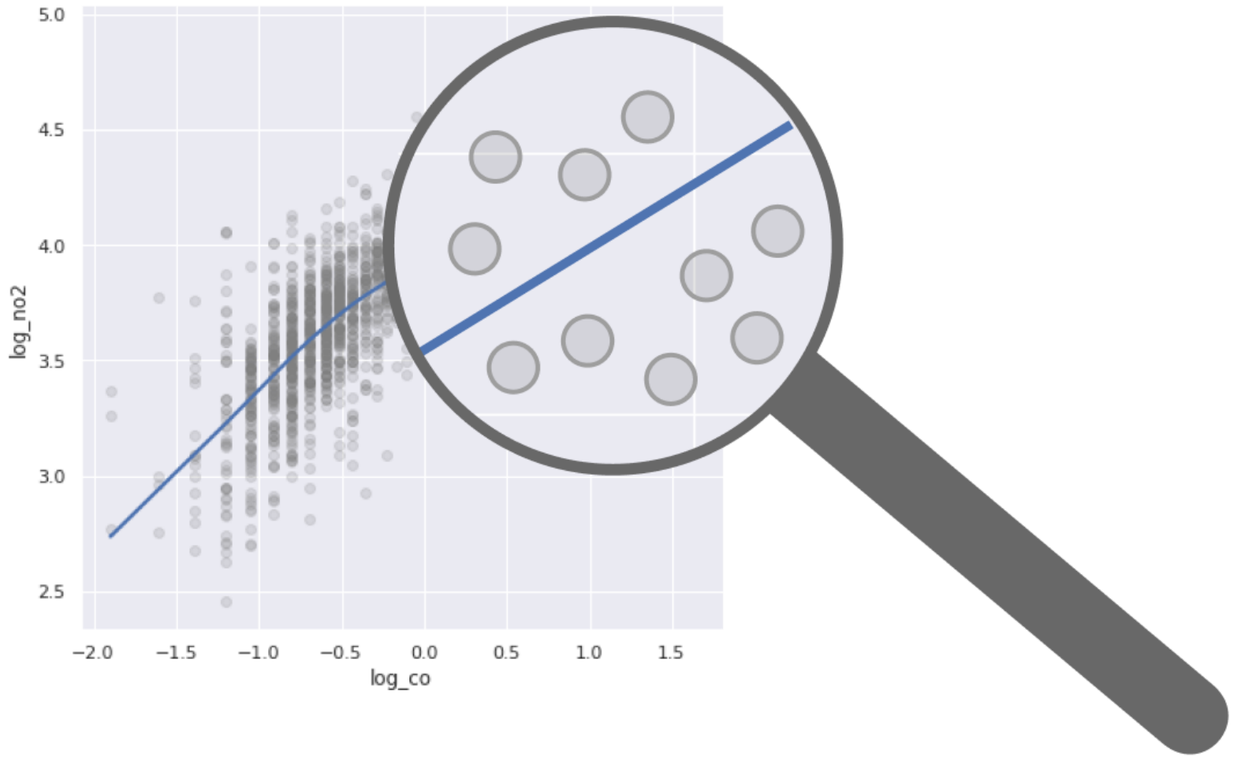
Tweaking your plots

IMPROVING YOUR DATA VISUALIZATIONS IN PYTHON

Nick Strayer
Instructor

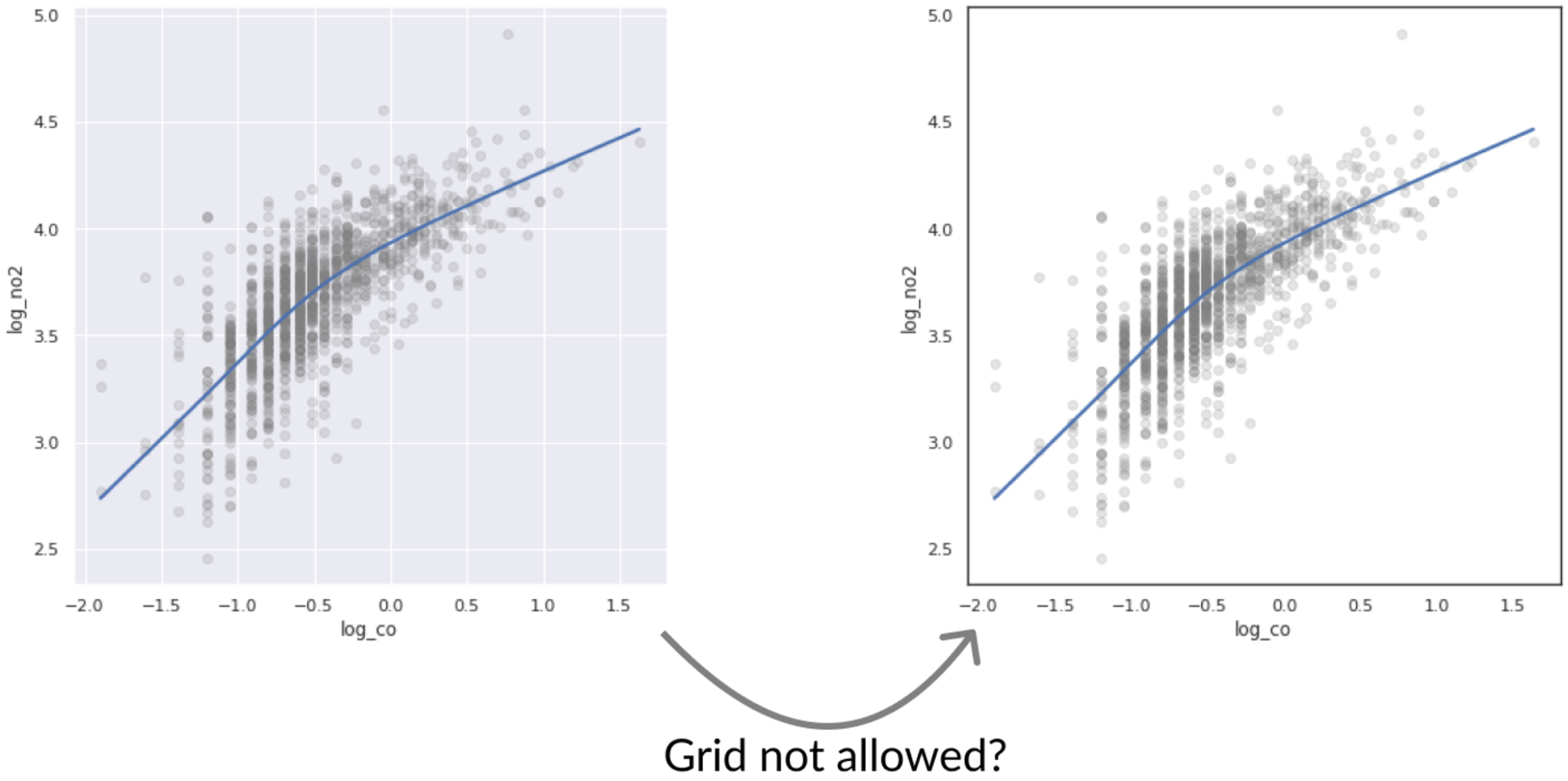
Looking at the small things

- Put yourself into the viewer's shoes



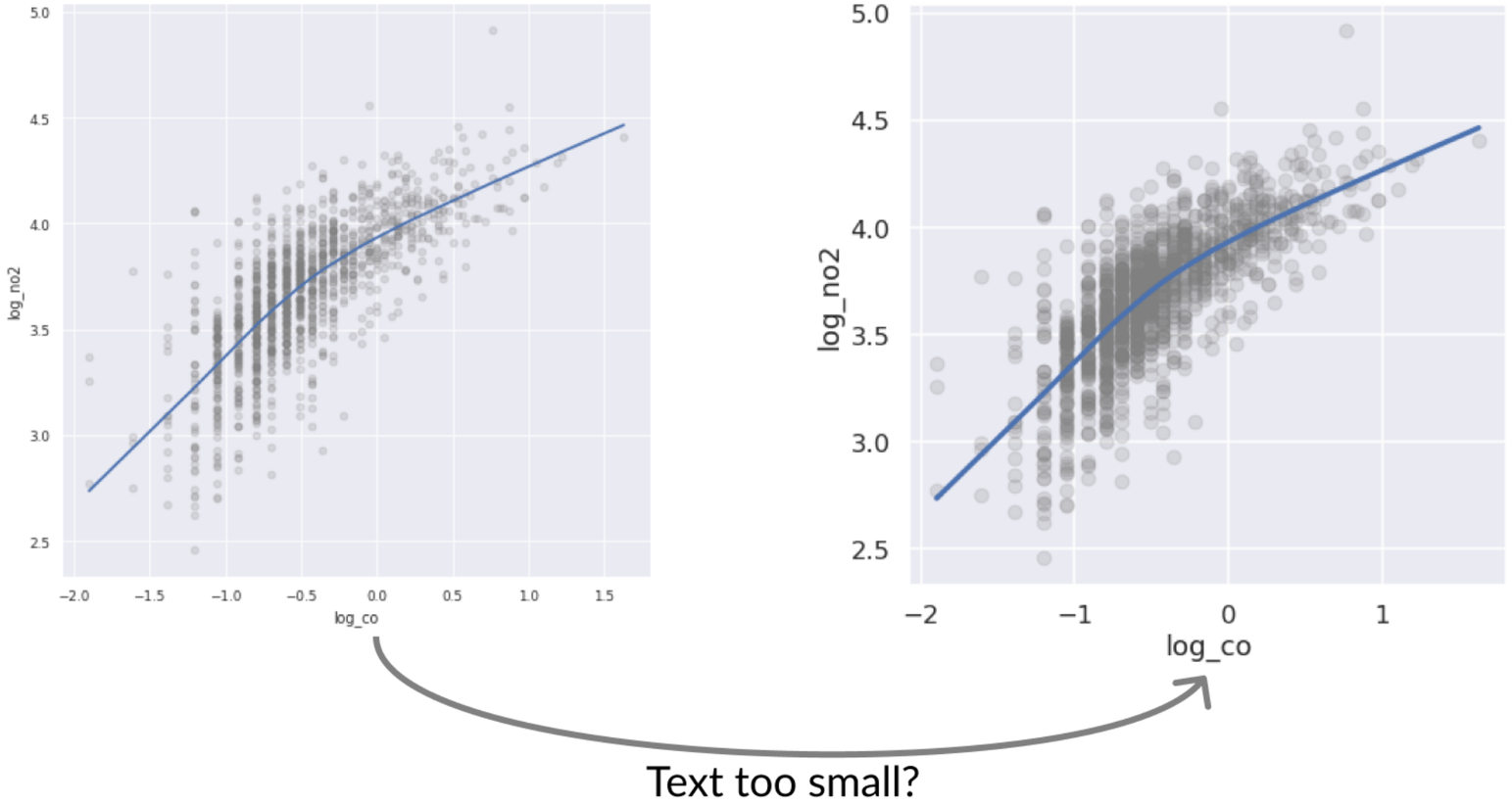
Is the aesthetic appropriate?

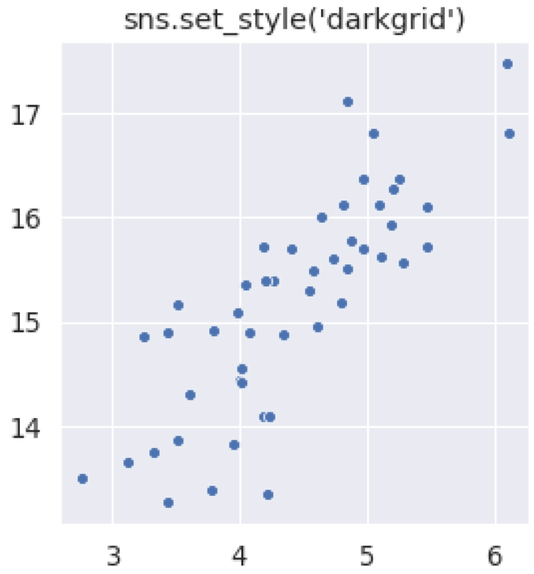
- Is the aesthetic appropriate for the context?

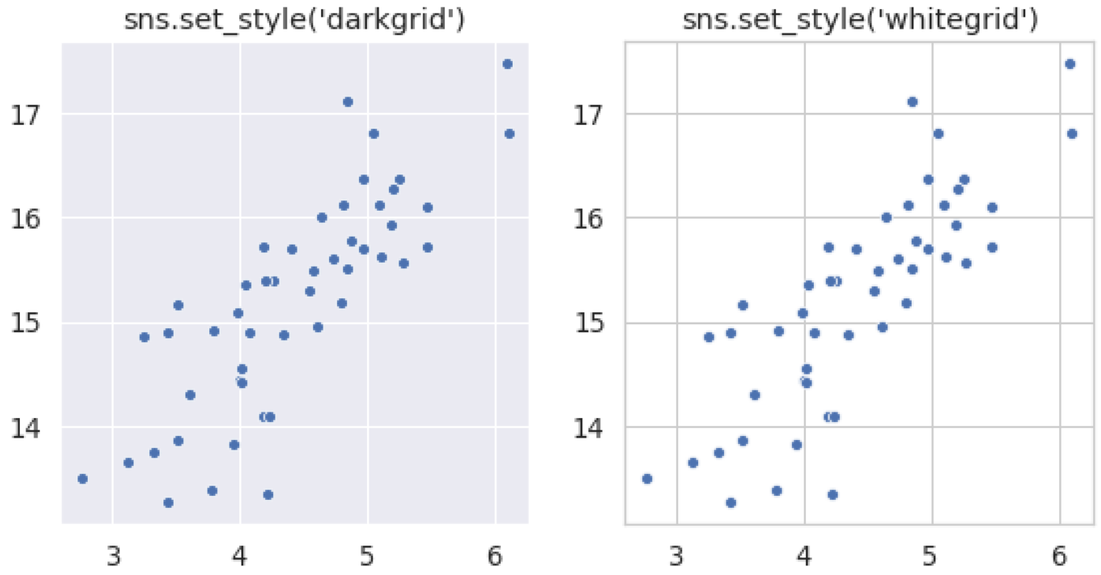


Font-sizes

- Is everything legible?




sns.set_style('darkgrid')
17
16
15
14
3
4
5
6


sns.set_style('darkgrid')
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6
sns.set_style('whitegrid')
17
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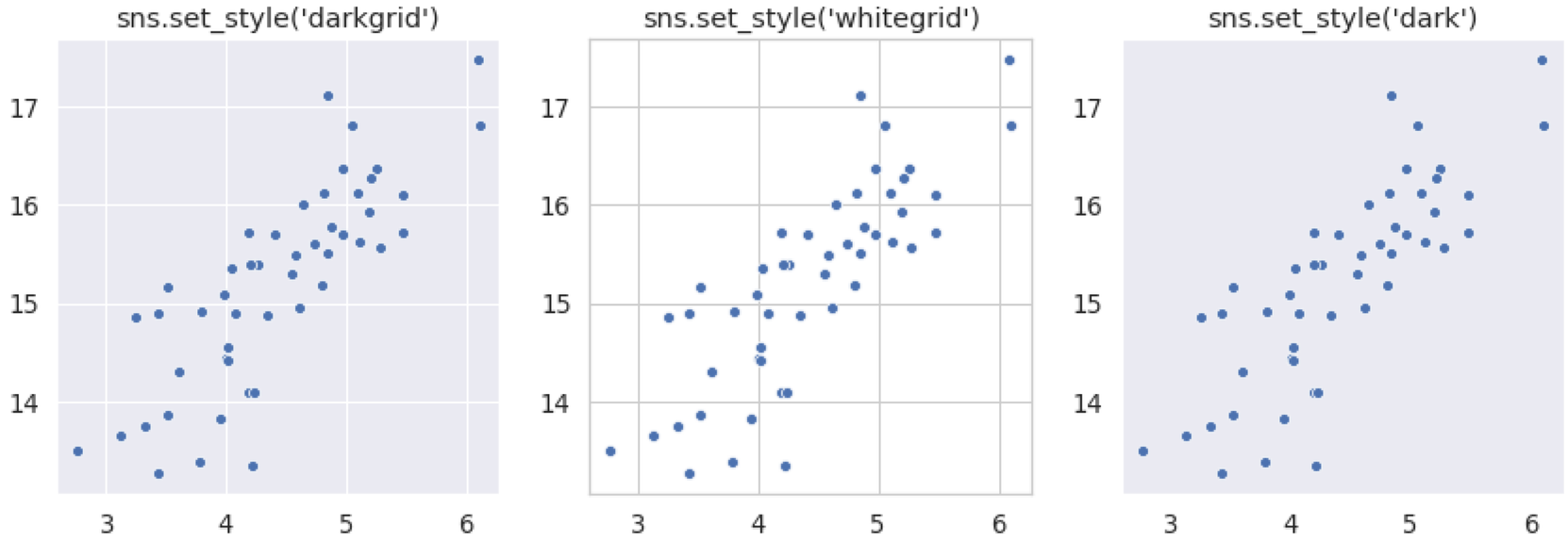
sns.set_style('darkgrid')
sns.set_style('whitegrid')
sns.set_style('dark')
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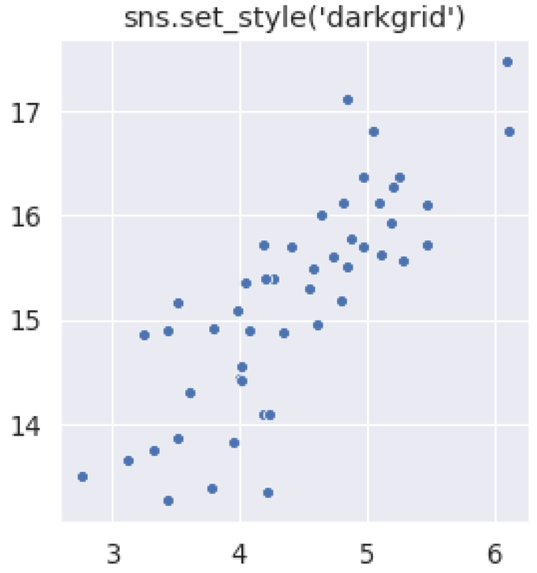
sns.set_style('darkgrid')
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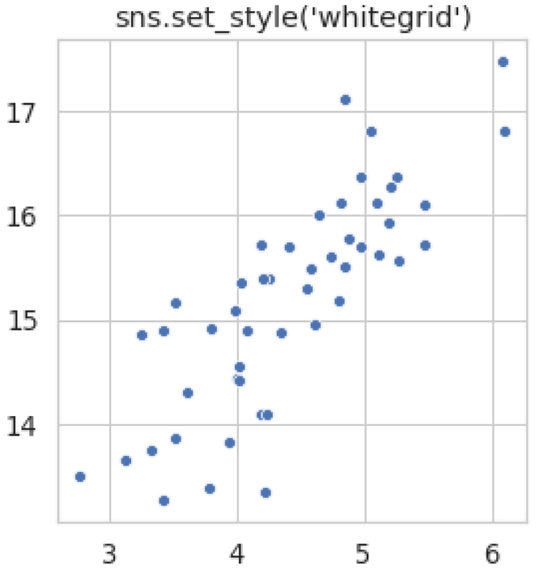
sns.set_style('whitegrid')
17
16
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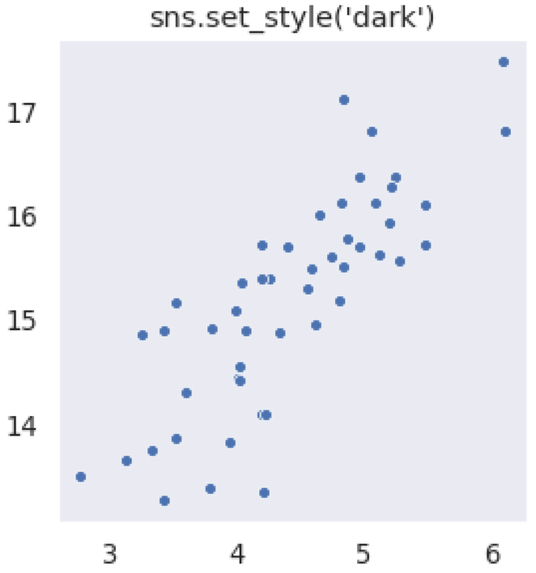
sns.set_style('dark')
17
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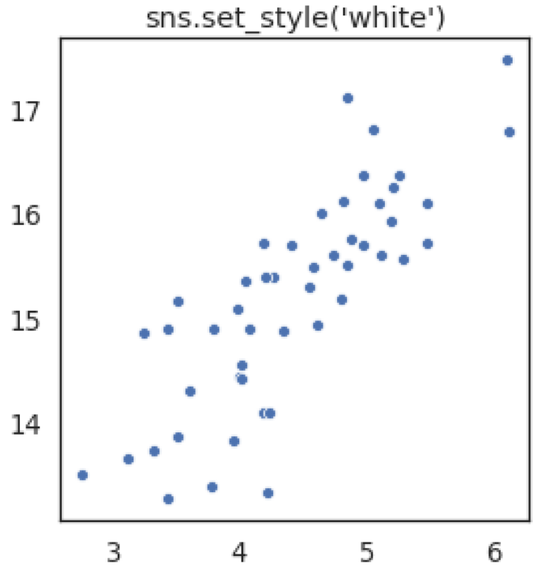
sns.set_style('white')
17
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14
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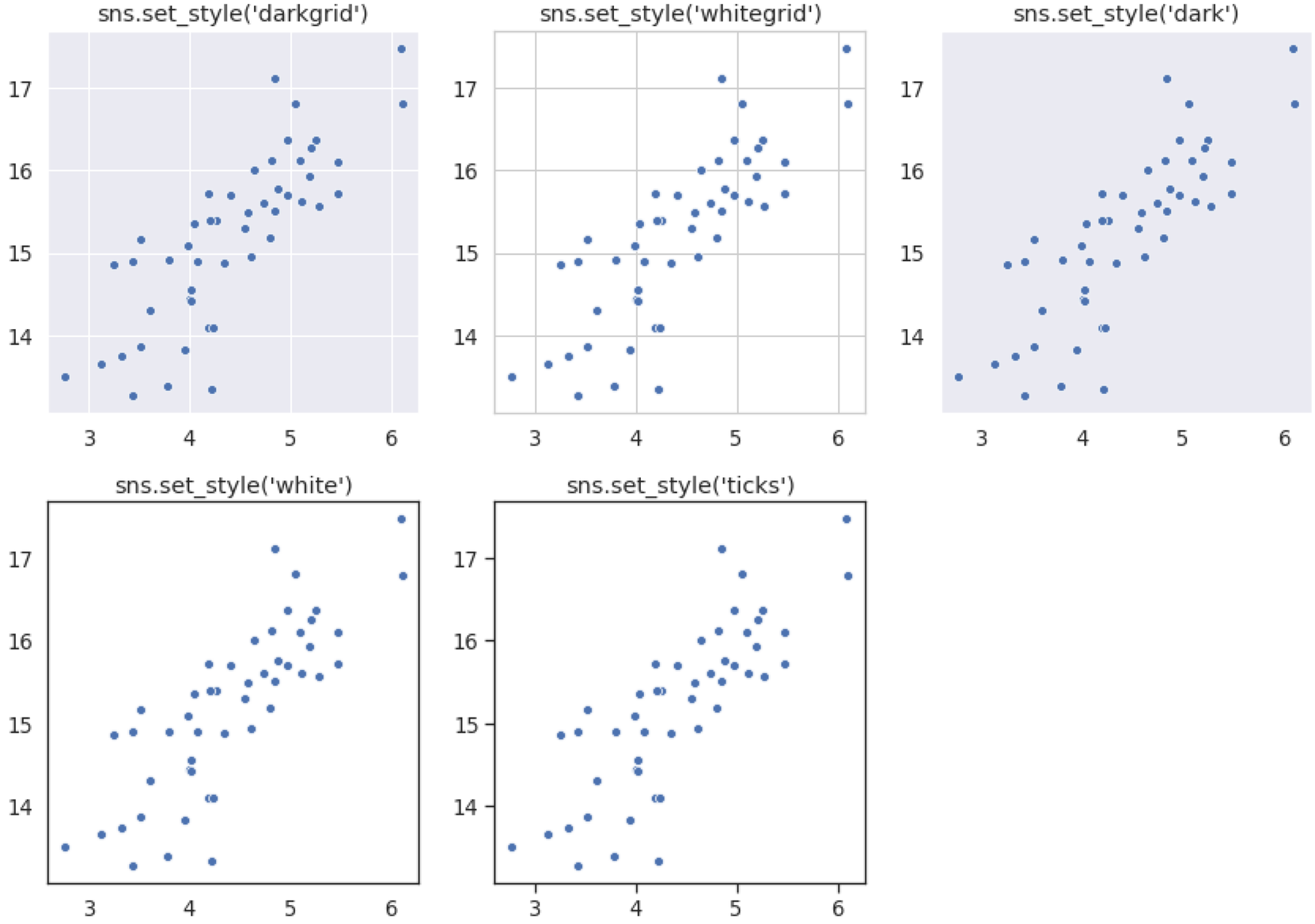
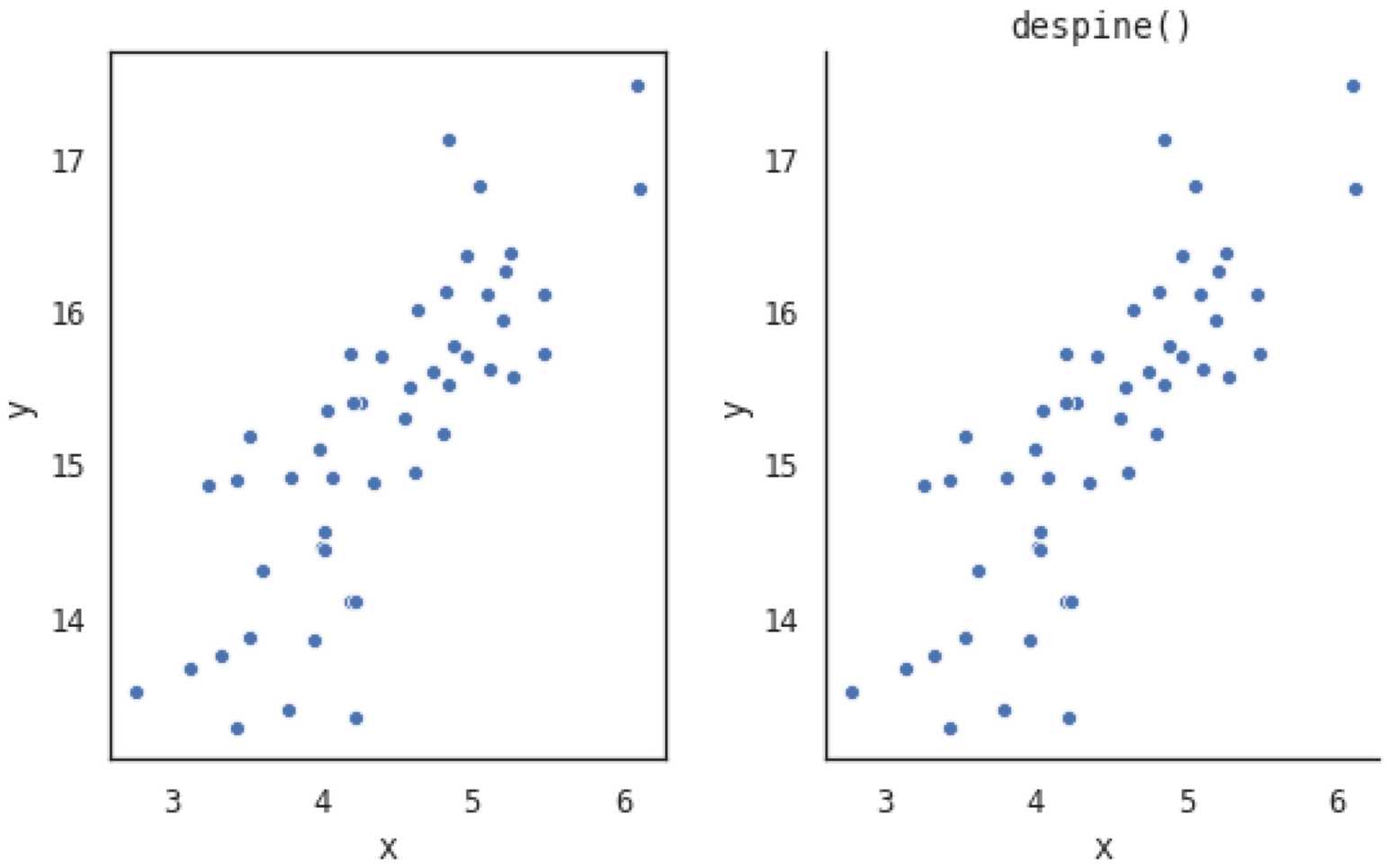
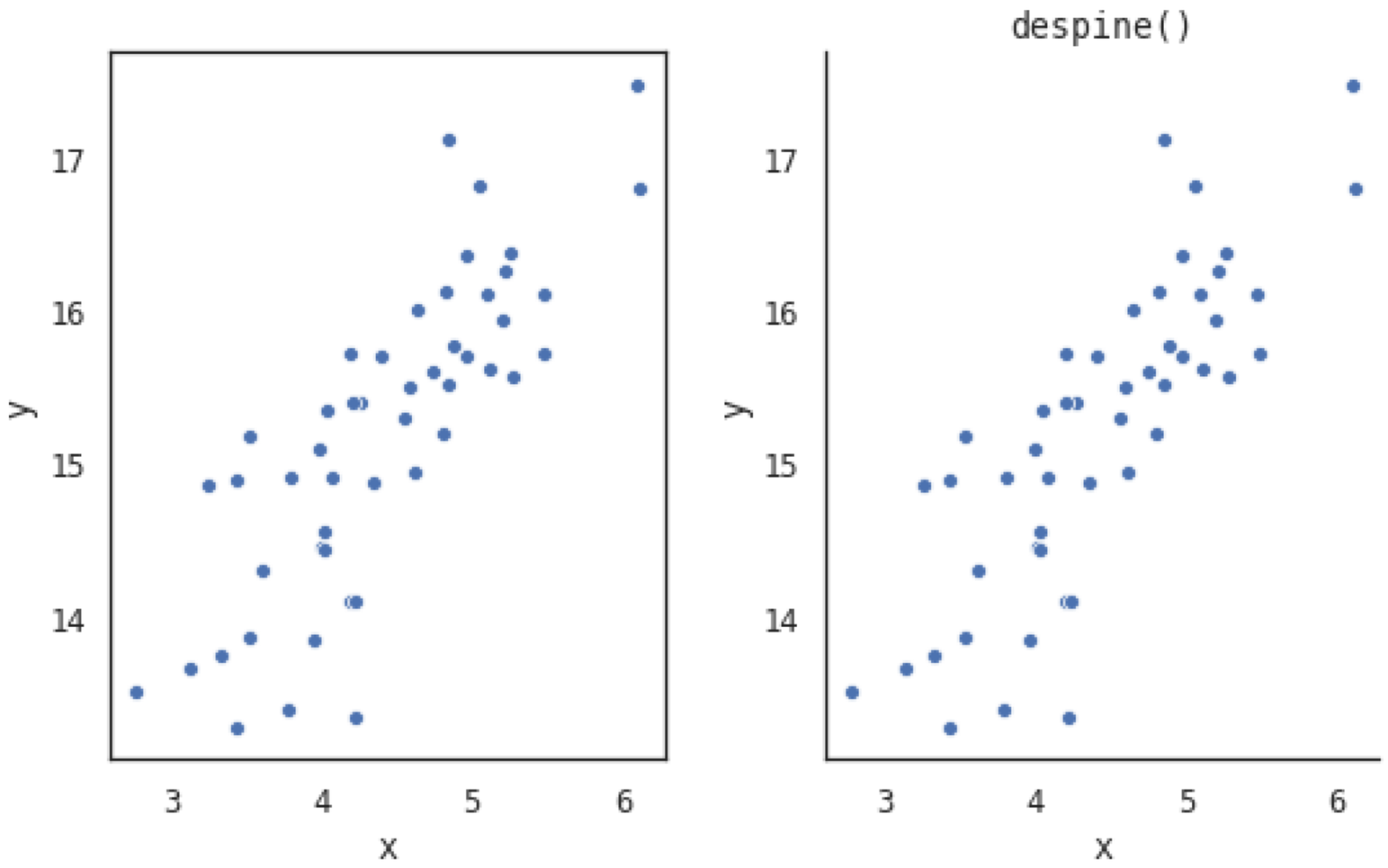

sns.set_style('darkgrid')
sns.set_style('whitegrid')
sns.set_style('dark')
sns.set_style('white')
sns.set_style('ticks')
17
16
15
14
3
4
5
6

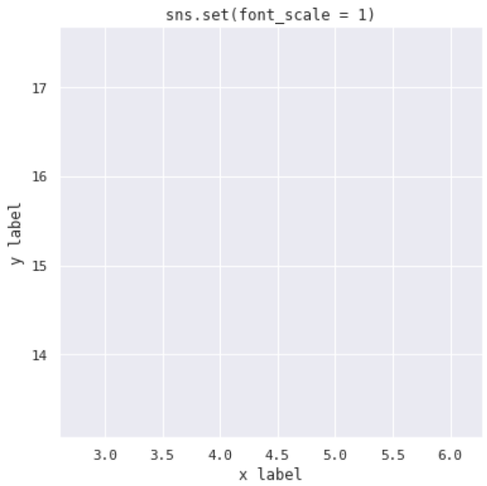
Removing spines from plots

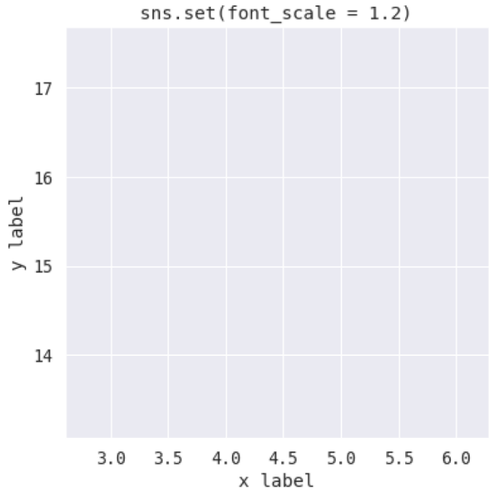


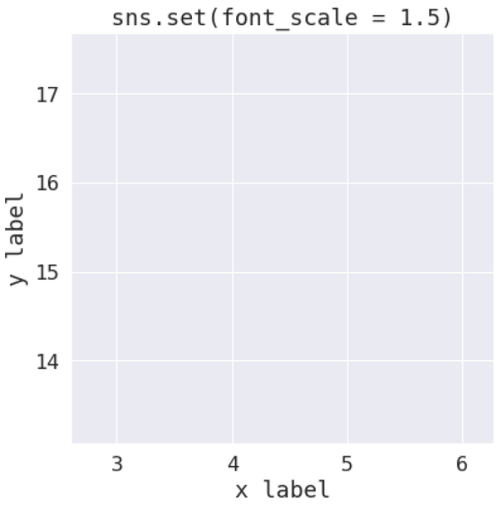
Removing spines from plots

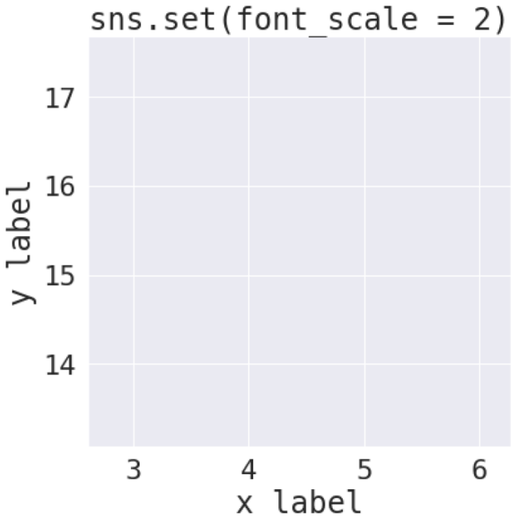


Setting font-size









Let's tweak some plots

IMPROVING YOUR DATA VISUALIZATIONS IN PYTHON

Wrap-Up

IMPROVING YOUR DATA VISUALIZATIONS IN PYTHON

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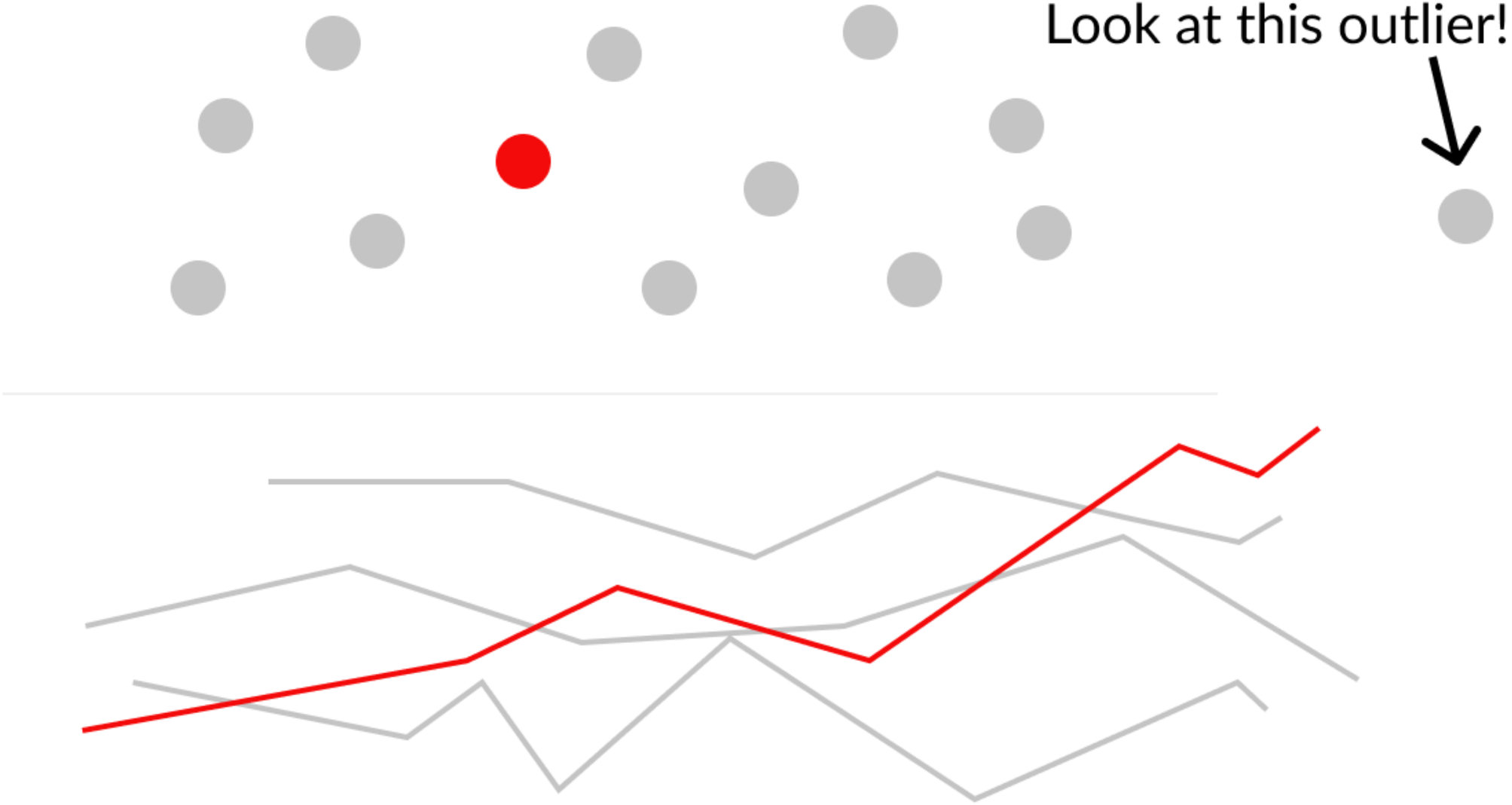
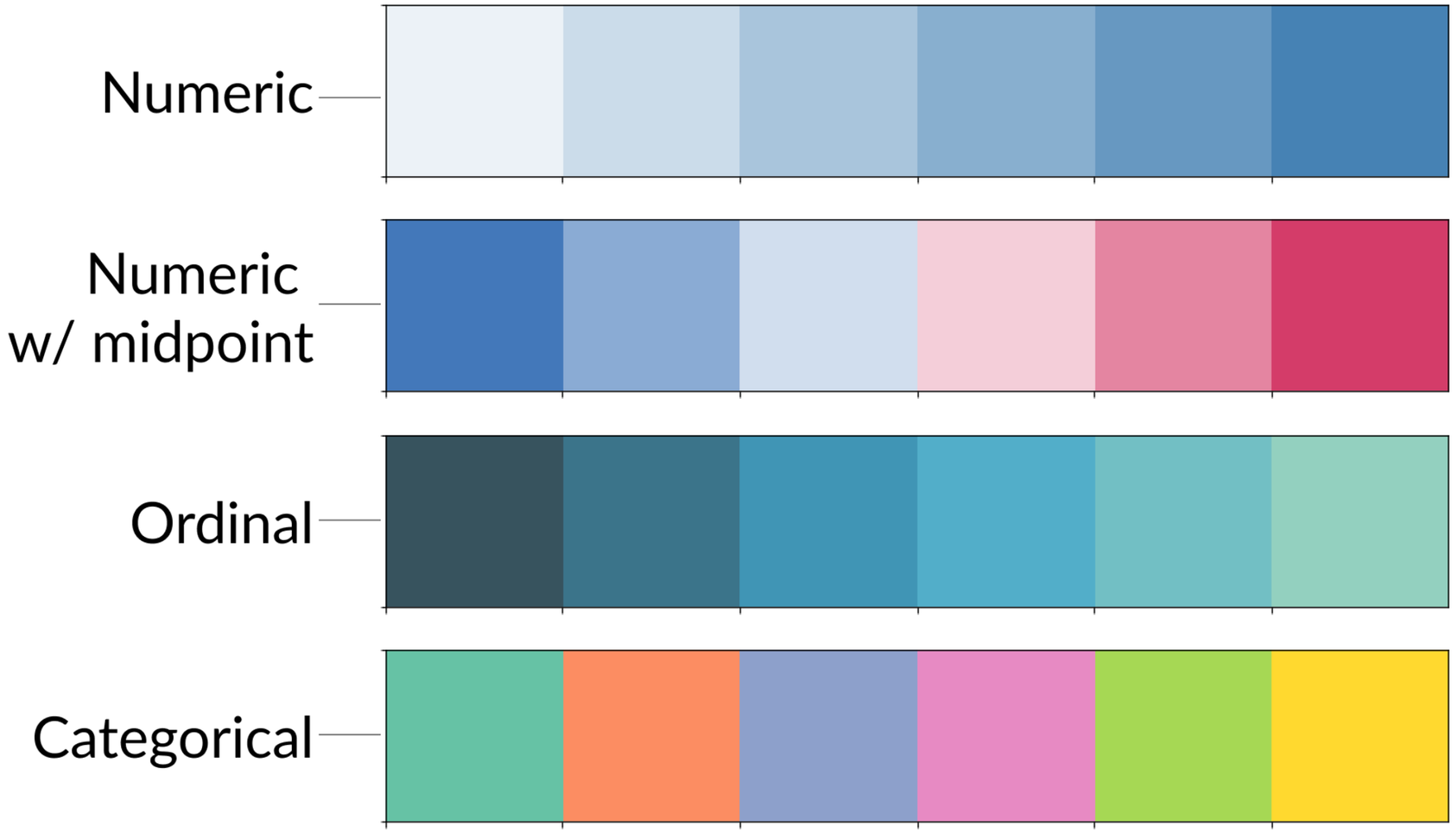
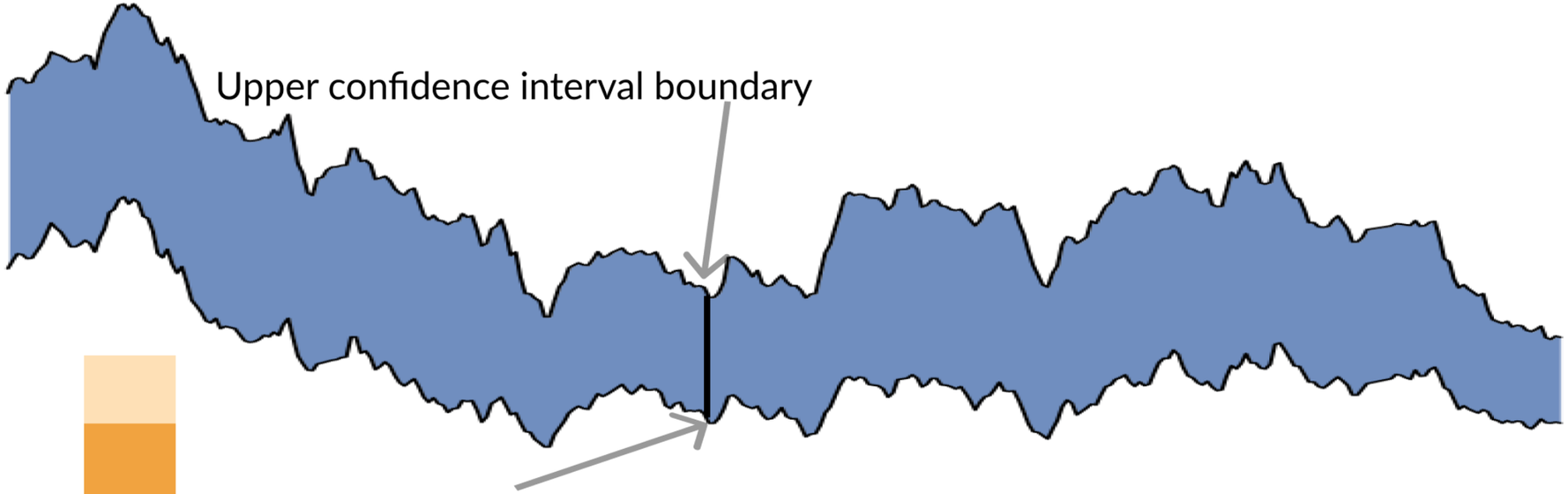
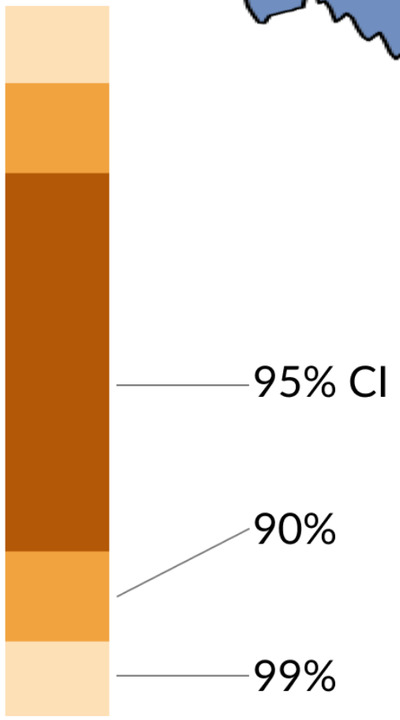
Instructor

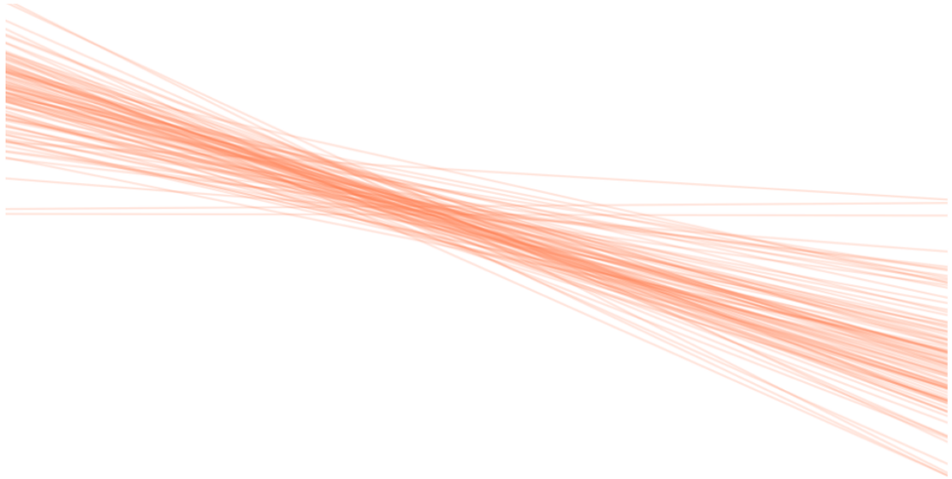

Look at this outlier!

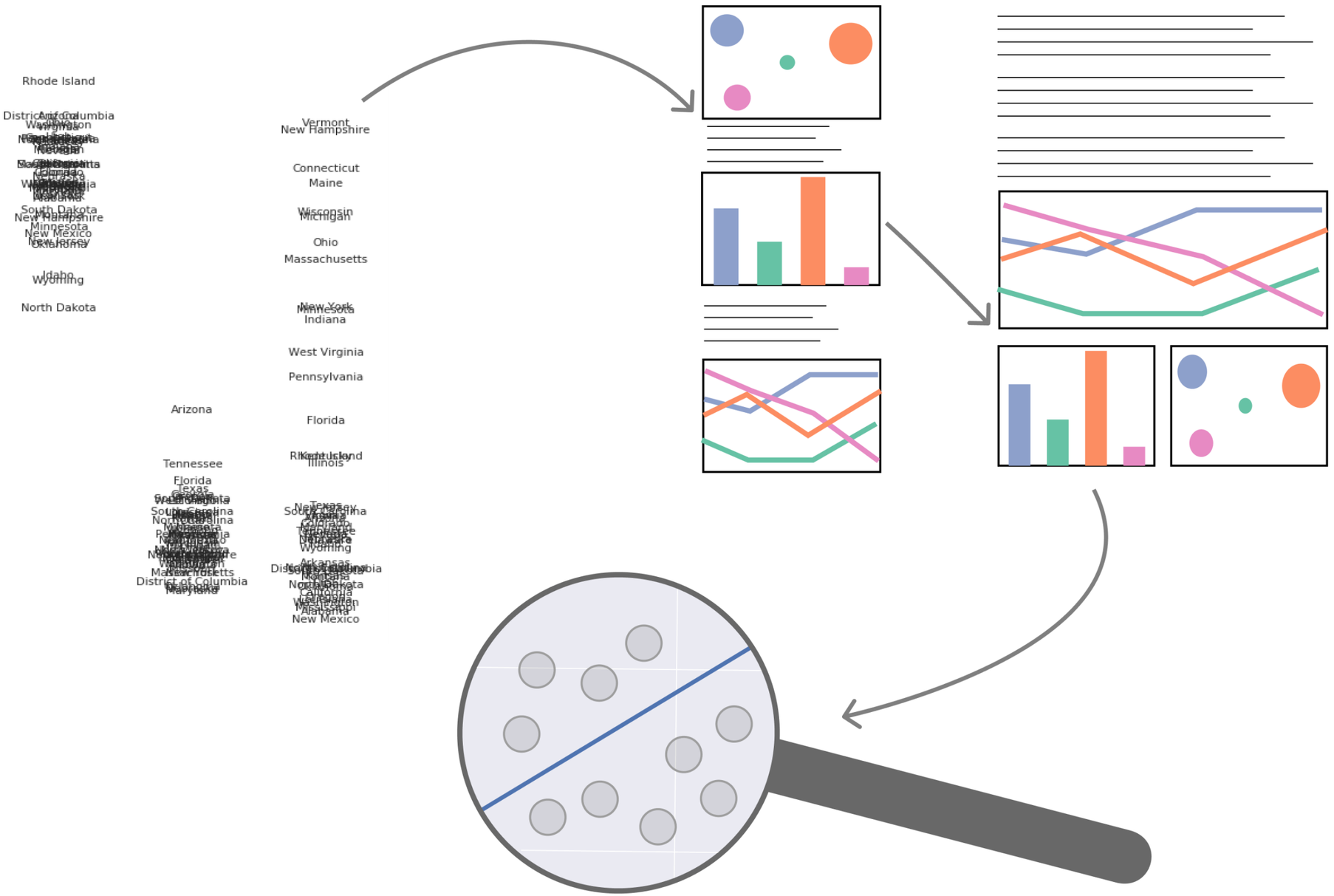
Using color responsibly




Upper confidence interval boundary
Lower confidence interval boundary


95% CI
90%
99%




Rhode Island
Vermont
New Hampshire
Connecticut
Maine
Wisconsin
Michigan
Ohio
Massachusetts
New York
Minnesota
Indiana
West Virginia
Pennsylvania
Arizona
Florida
Tennessee
Illinois
Texas
Wyoming
Arkansas
New Mexico
Idaho
North Dakota
South Dakota
Minnesota
Oklahoma
Maryland

Going further

Blogs

- **Flowing data**
  - Curated list of data visualizations.
- **Datawrapper Blog**
  - Articles that dig deep into visualization techniques and mistakes.

Twitter

- **#datavis**
  - An ongoing stream of cool projects and inspiration.

Thank you!

IMPROVING YOUR DATA VISUALIZATIONS IN PYTHON