# Introduction to relational plots and subplots

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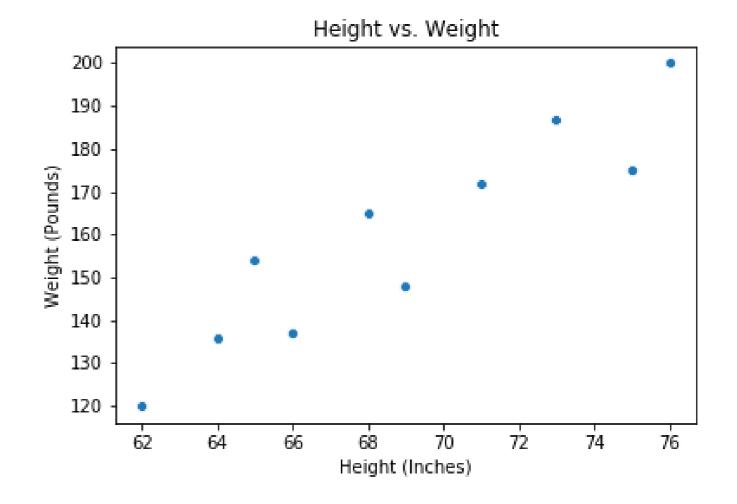
**Erin Case**Data Scientist



## Questions about quantitative variables

Relational plots

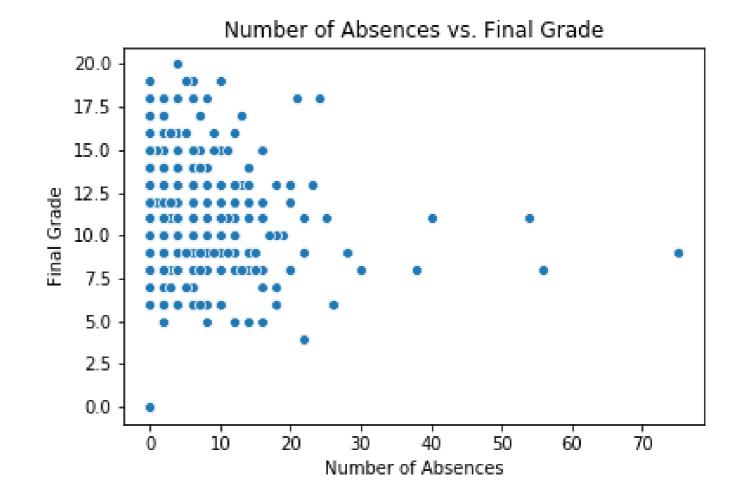
Height vs. weight



#### Questions about quantitative variables

Relational plots

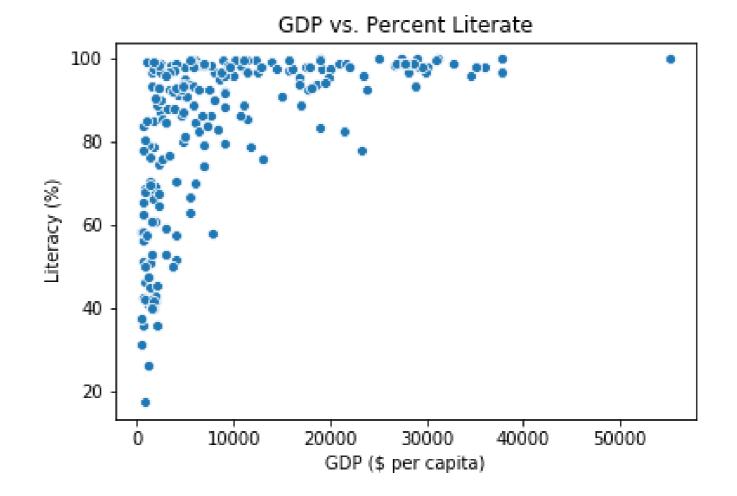
- Height vs. weight
- Number of school absences vs. final grade

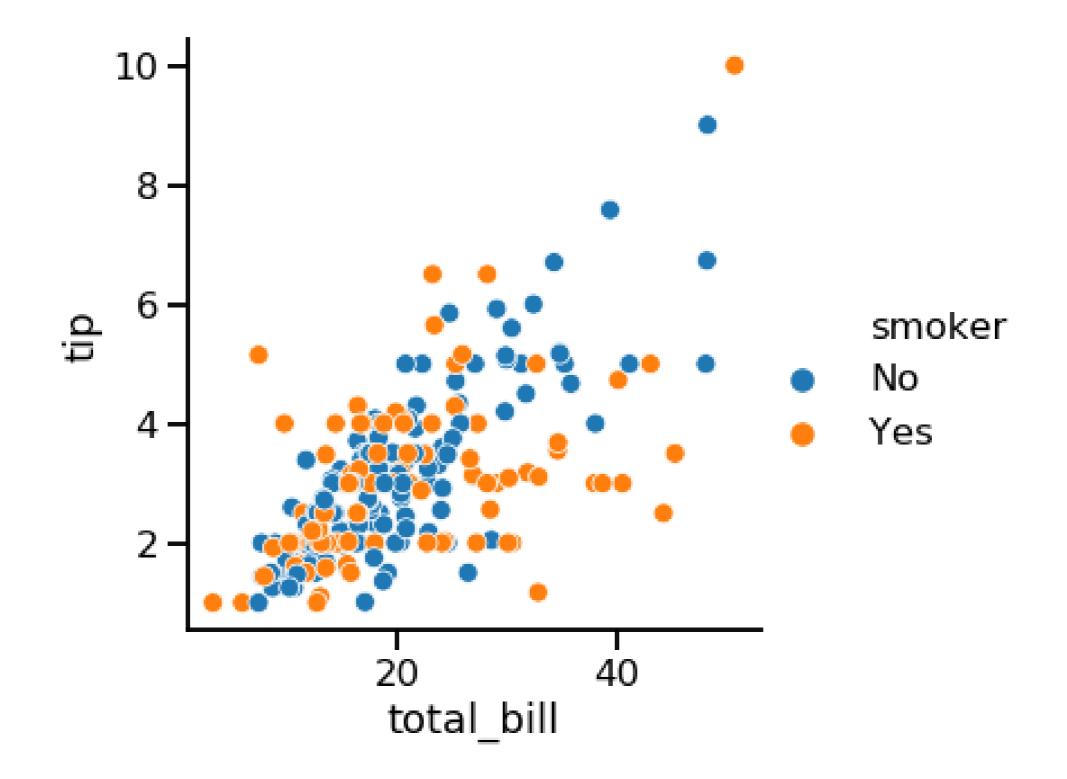


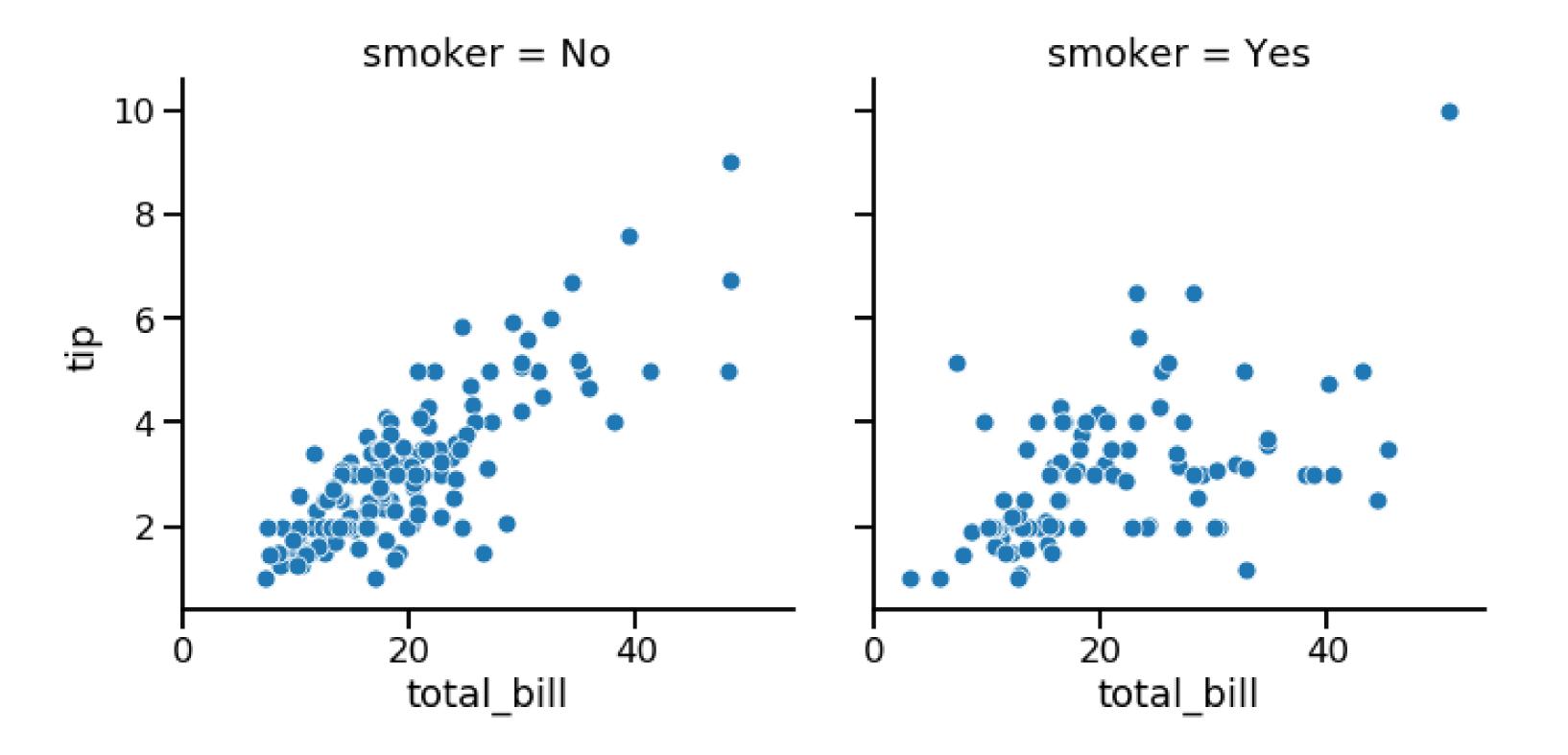
#### Questions about quantitative variables

Relational plots

- Height vs. weight
- Number of school absences vs. final grade
- GDP vs. percent literate







# Introducing relplot()

Create "relational plots": scatter plots or line plots

```
Why use relplot() instead of scatterplot()?
```

relplot() lets you create subplots in a single figure

## scatterplot() vs. relplot()

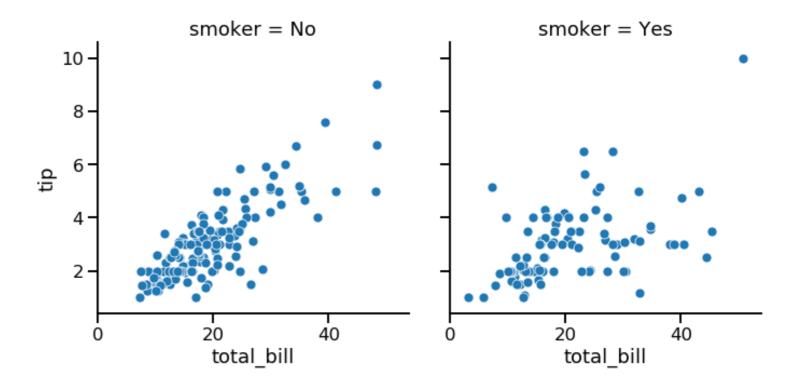
Using scatterplot()

Using relplot()

```
import seaborn as sns
import matplotlib.pyplot as plt
sns.relplot(x="total_bill",
            y="tip",
            data=tips,
            kind="scatter")
plt.show()
```

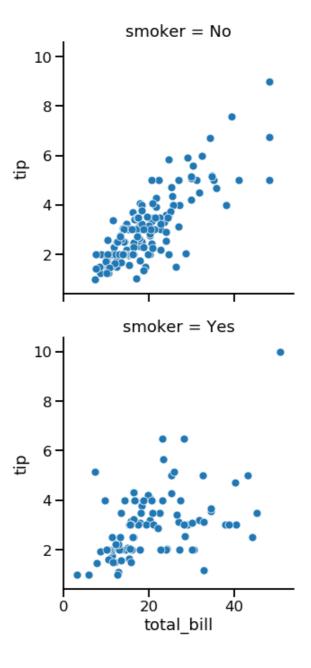
#### Subplots in columns

```
import seaborn as sns
import matplotlib.pyplot as plt
sns.relplot(x="total_bill",
            y="tip",
            data=tips,
            kind="scatter",
            col="smoker")
plt.show()
```



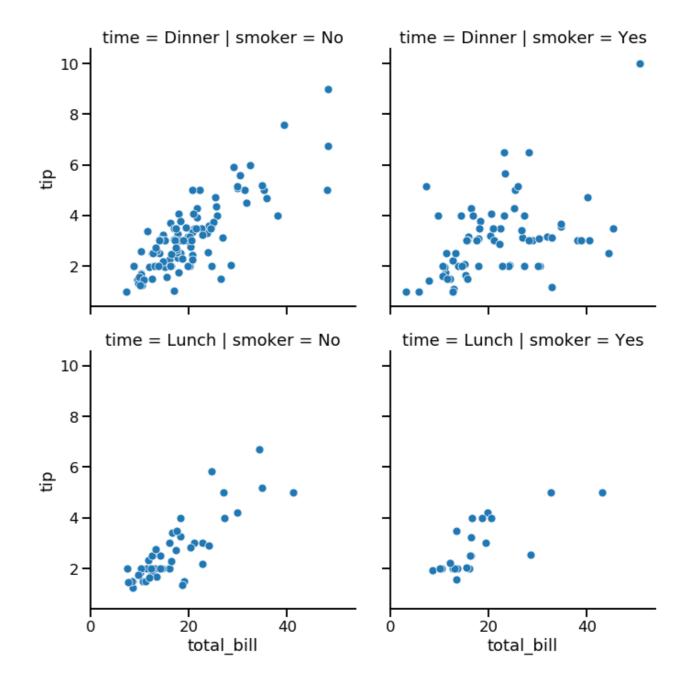
#### Subplots in rows

```
import seaborn as sns
import matplotlib.pyplot as plt
sns.relplot(x="total_bill",
            y="tip",
            data=tips,
            kind="scatter",
            row="smoker")
plt.show()
```

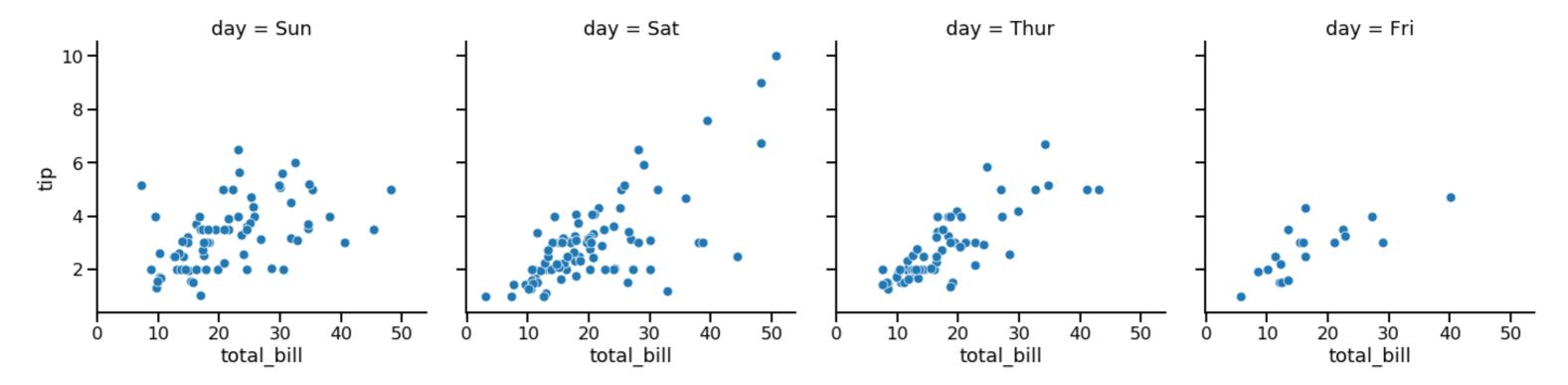


#### Subplots in rows and columns

```
import seaborn as sns
import matplotlib.pyplot as plt
sns.relplot(x="total_bill",
            y="tip",
            data=tips,
            kind="scatter",
            col="smoker",
            row="time")
plt.show()
```

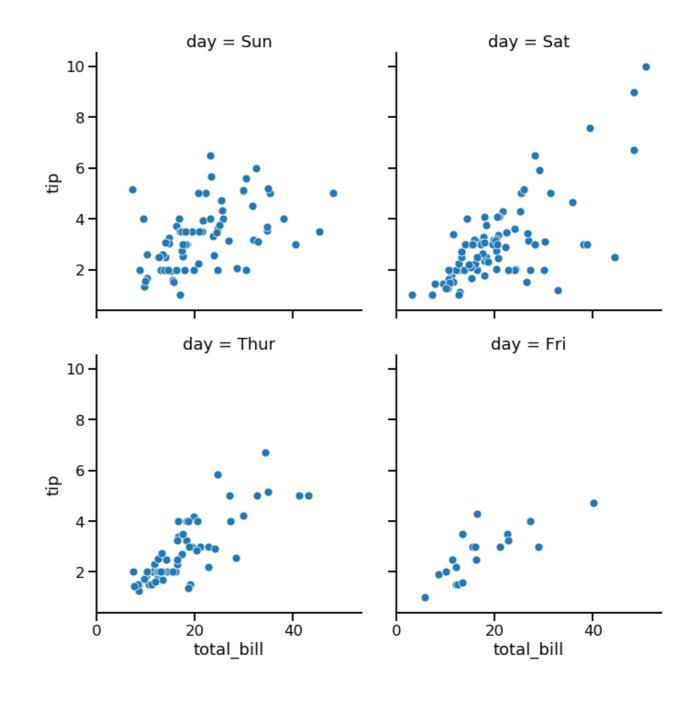


#### Subgroups for days of the week



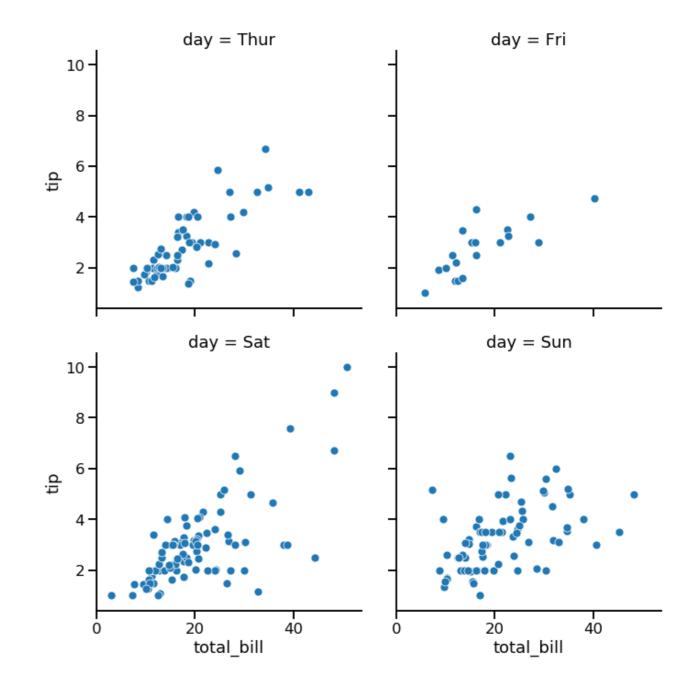
#### Wrapping columns

```
import seaborn as sns
import matplotlib.pyplot as plt
sns.relplot(x="total_bill",
            y="tip",
            data=tips,
            kind="scatter",
            col="day",
            col_wrap=2)
plt.show()
```



#### Ordering columns

```
import seaborn as sns
import matplotlib.pyplot as plt
sns.relplot(x="total_bill",
            y="tip",
            data=tips,
            kind="scatter",
            col="day",
            col_wrap=2,
            col_order=["Thur",
                       "Fri",
                        "Sat",
                       "Sun"])
plt.show()
```



# Let's practice!

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# Customizing scatter plots

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#### Scatter plot overview

Show relationship between two quantitative variables

#### We've seen:

- Subplots (col and row)
- Subgroups with color (hue)

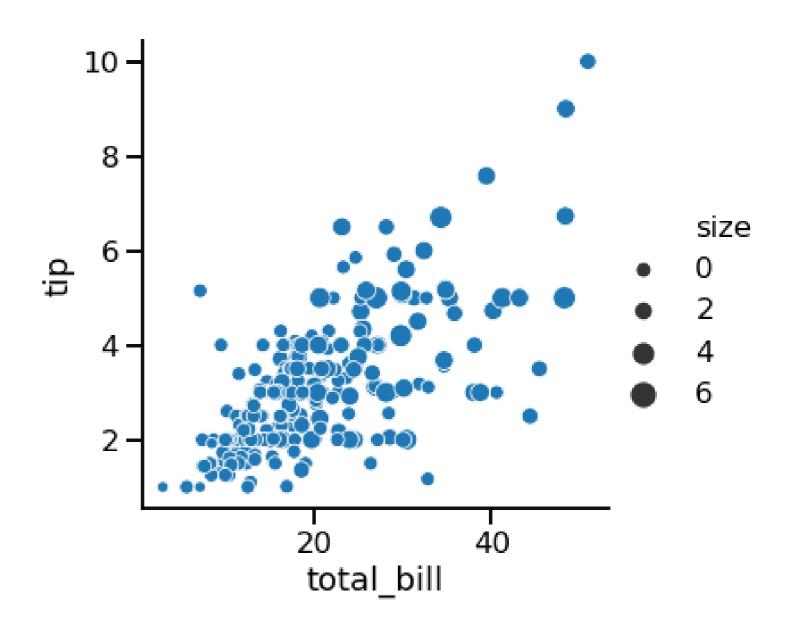
#### **New Customizations:**

- Subgroups with point size and style
- Changing point transparency

Use with both scatterplot() and relplot()

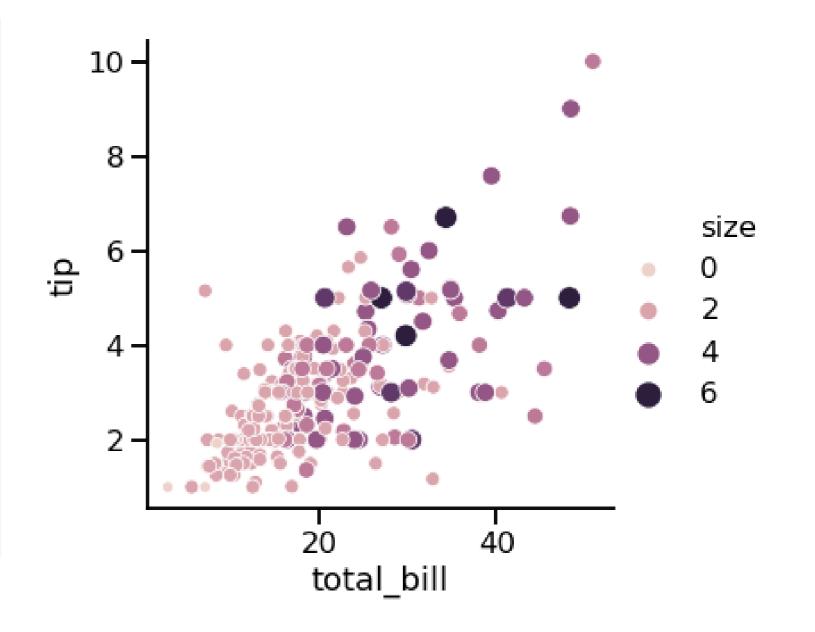
#### Subgroups with point size

```
import seaborn as sns
import matplotlib.pyplot as plt
sns.relplot(x="total_bill",
            y="tip",
            data=tips,
            kind="scatter",
            size="size")
plt.show()
```



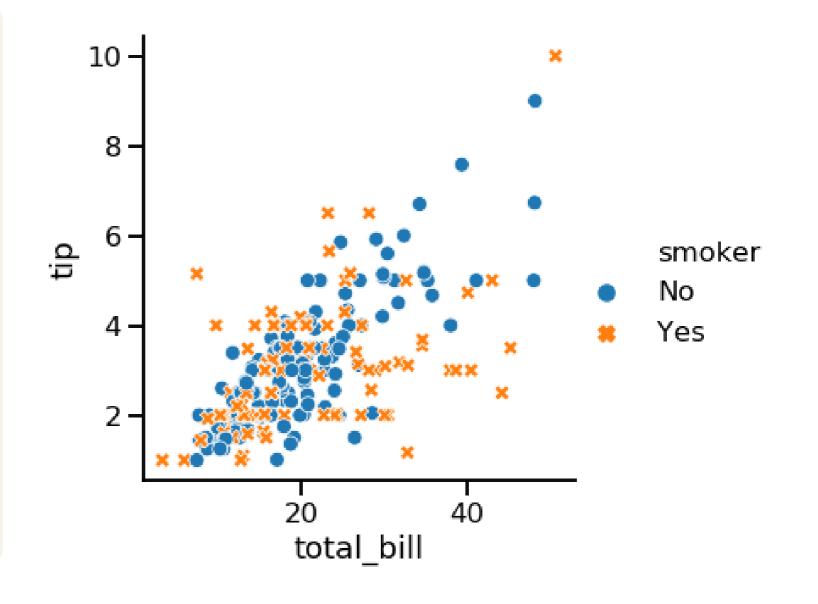
#### Point size and hue

```
import seaborn as sns
import matplotlib.pyplot as plt
sns.relplot(x="total_bill",
            y="tip",
            data=tips,
            kind="scatter",
            size="size",
            hue="size")
plt.show()
```



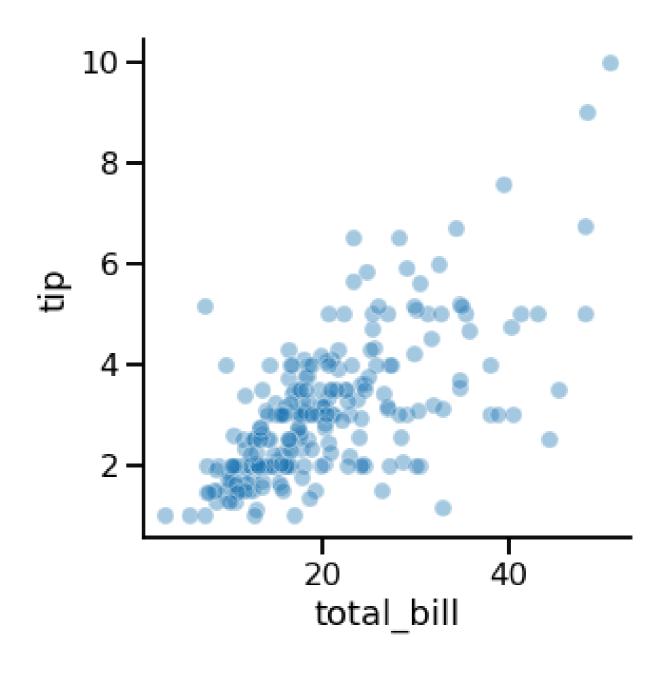
#### Subgroups with point style

```
import seaborn as sns
import matplotlib.pyplot as plt
sns.relplot(x="total_bill",
            y="tip",
            data=tips,
            kind="scatter",
            hue="smoker",
            style="smoker")
plt.show()
```



#### Changing point transparency

```
import seaborn as sns
import matplotlib.pyplot as plt
# Set alpha to be between 0 and 1
sns.relplot(x="total_bill",
            y="tip",
            data=tips,
            kind="scatter",
            alpha=0.4
plt.show()
```



# Let's practice!

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# Introduction to line plots

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#### What are line plots?

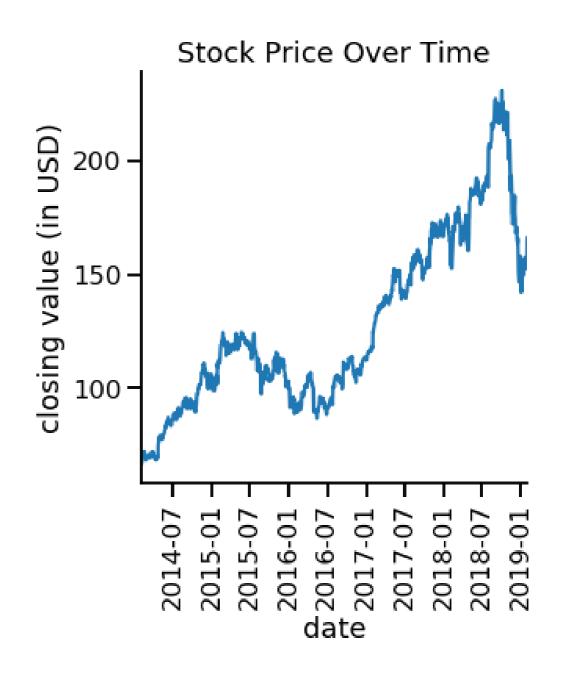
Two types of relational plots: scatter plots and line plots

#### **Scatter plots**

 Each plot point is an independent observation

#### Line plots

 Each plot point represents the same "thing", typically tracked over time

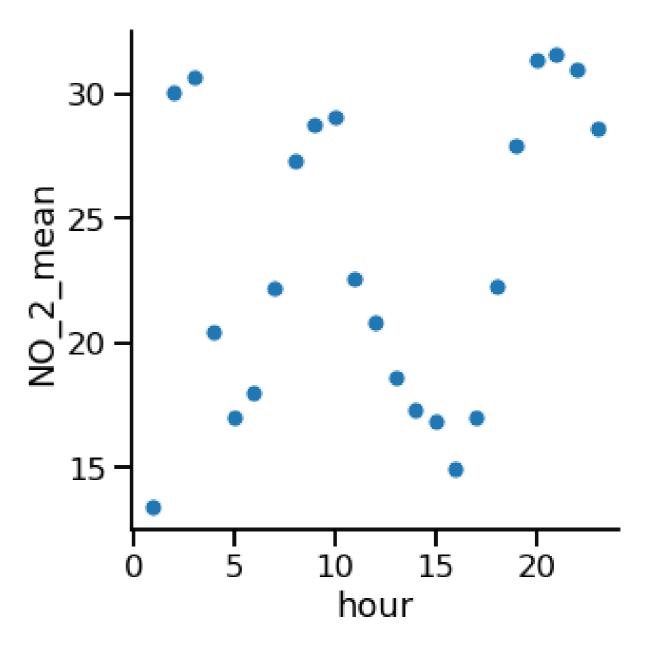


#### Air pollution data

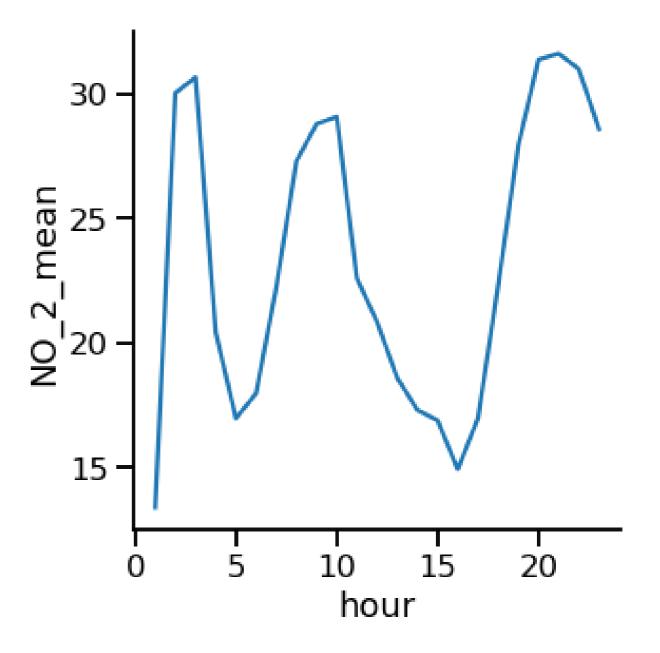
- Collection stations throughout city
- Air samples of nitrogen dioxide levels

	hour	NO_2_mean
0	1	13.375000
1	2	30.041667
2	3	30.666667
3	4	20.416667
4	5	16.958333

#### Scatter plot



#### Line plot

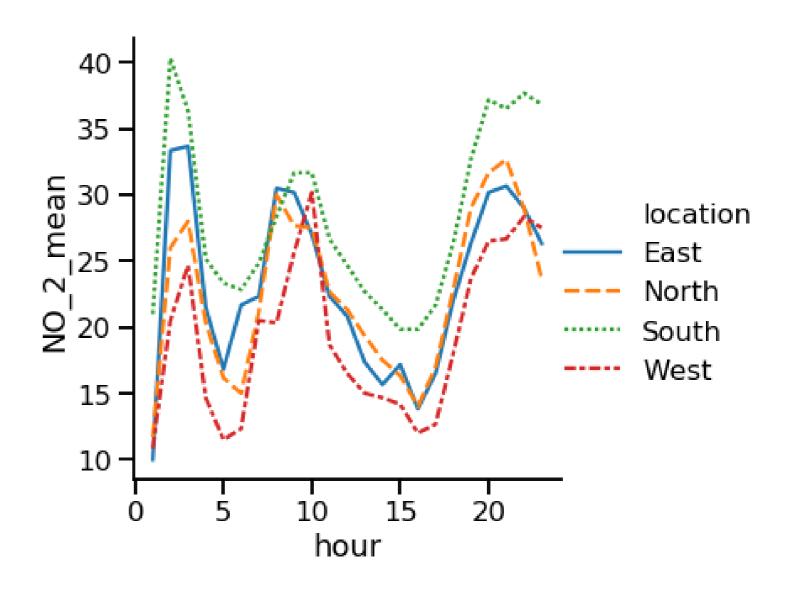


## Subgroups by location

	hour	location	NO_2_mean
0	1	East	10.000000
1	1	North	11.666667
2	1	South	21.000000
3	1	West	10.833333
4	2	East	33.333333

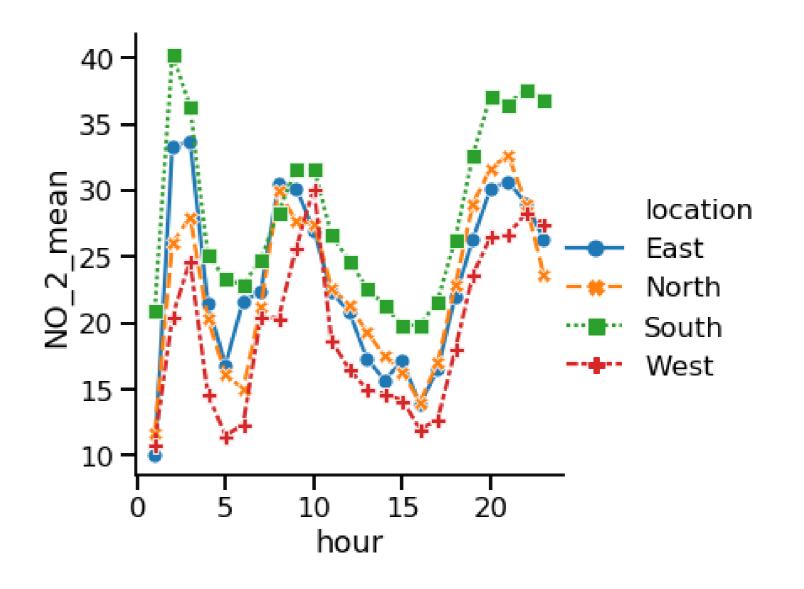
#### Subgroups by location

```
import matplotlib.pyplot as plt
import seaborn as sns
sns.relplot(x="hour", y="NO_2_mean",
            data=air_df_loc_mean,
            kind="line",
            style="location",
            hue="location")
plt.show()
```



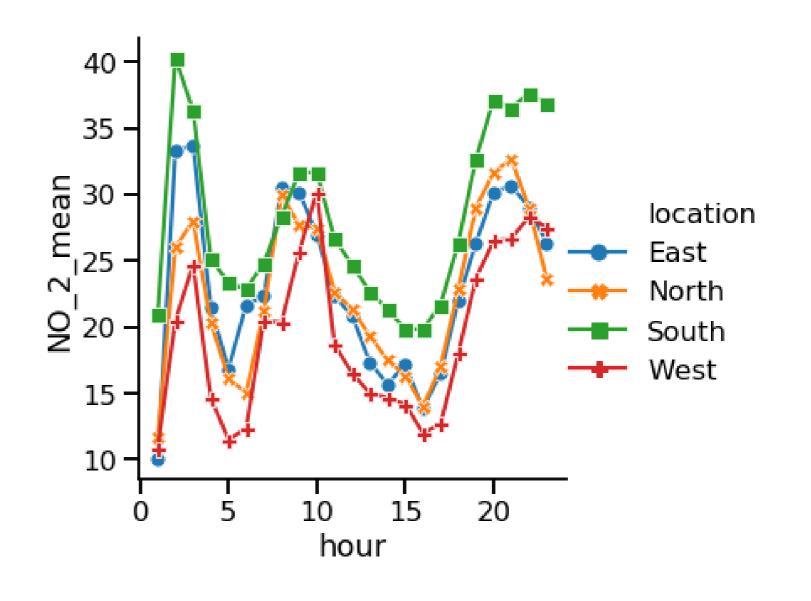
### Adding markers

```
import matplotlib.pyplot as plt
import seaborn as sns
sns.relplot(x="hour", y="NO_2_mean",
            data=air_df_loc_mean,
            kind="line",
            style="location",
            hue="location",
            markers=True)
plt.show()
```



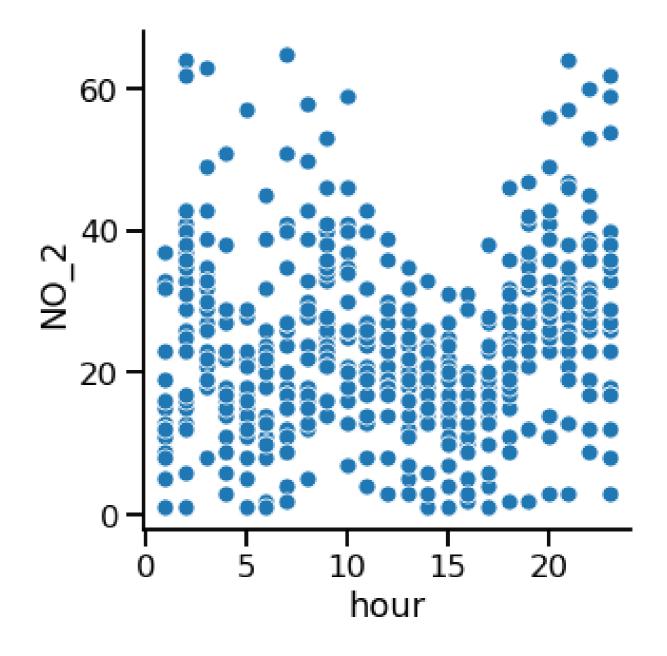
### Turning off line style

```
import matplotlib.pyplot as plt
import seaborn as sns
sns.relplot(x="hour", y="NO_2_mean",
            data=air_df_loc_mean,
            kind="line",
            style="location",
            hue="location",
            markers=True,
            dashes=False)
plt.show()
```

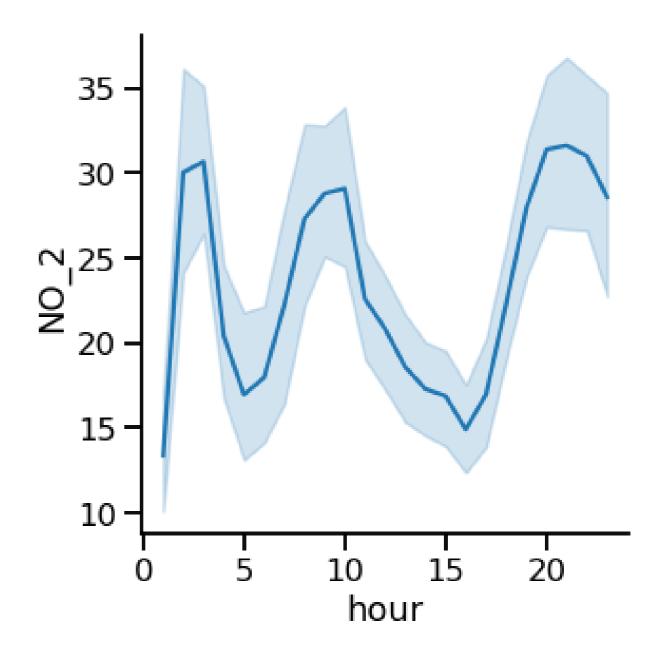


	hour	NO_2	station	location
0	1	15.0	28079004	South
1	1	33.0	28079008	South
2	1	11.0	28079011	South
3	1	12.0	28079016	South
4	1	23.0	28079017	South

#### **Scatter plot**

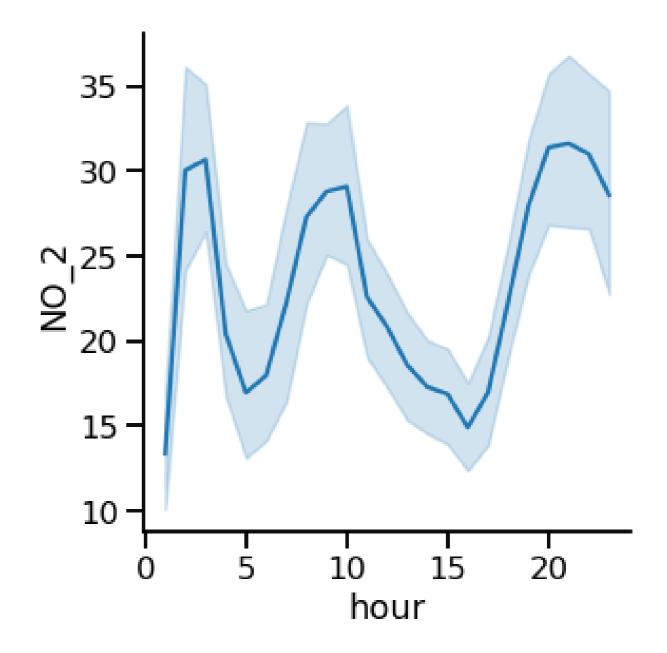


#### Line plot

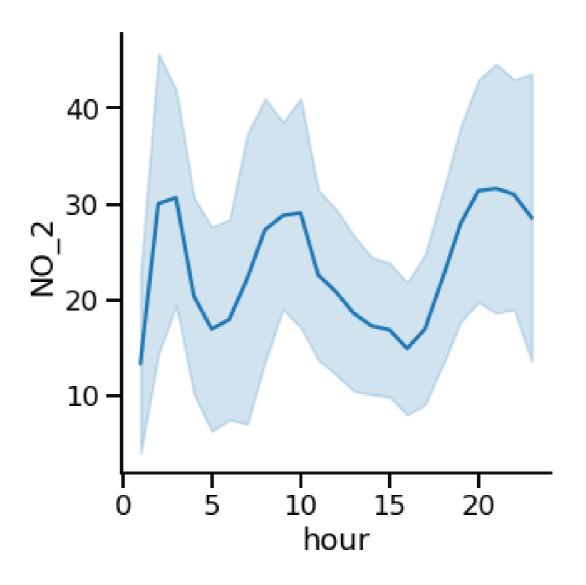


Shaded region is the confidence interval

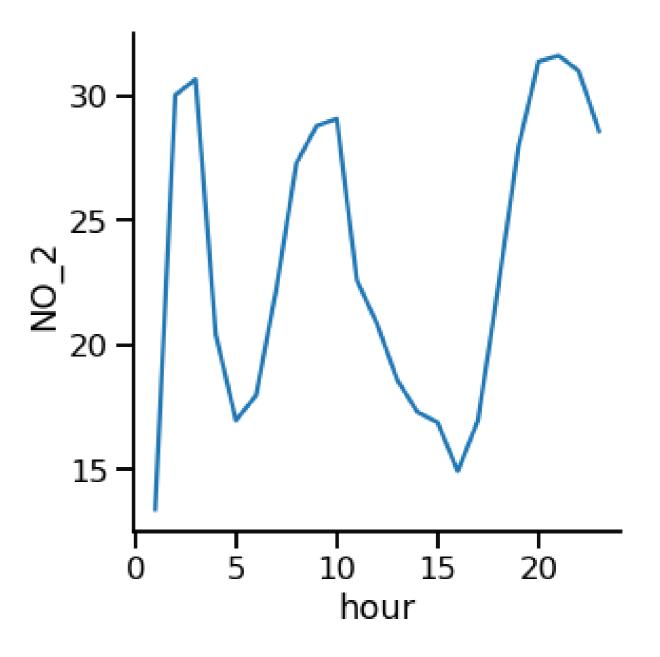
- Assumes dataset is a random sample
- 95% confident that the mean is within this interval
- Indicates uncertainty in our estimate



#### Replacing confidence interval with standard deviation



#### Turning off confidence interval



# Let's practice!

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