Introduction to relational plots and subplots

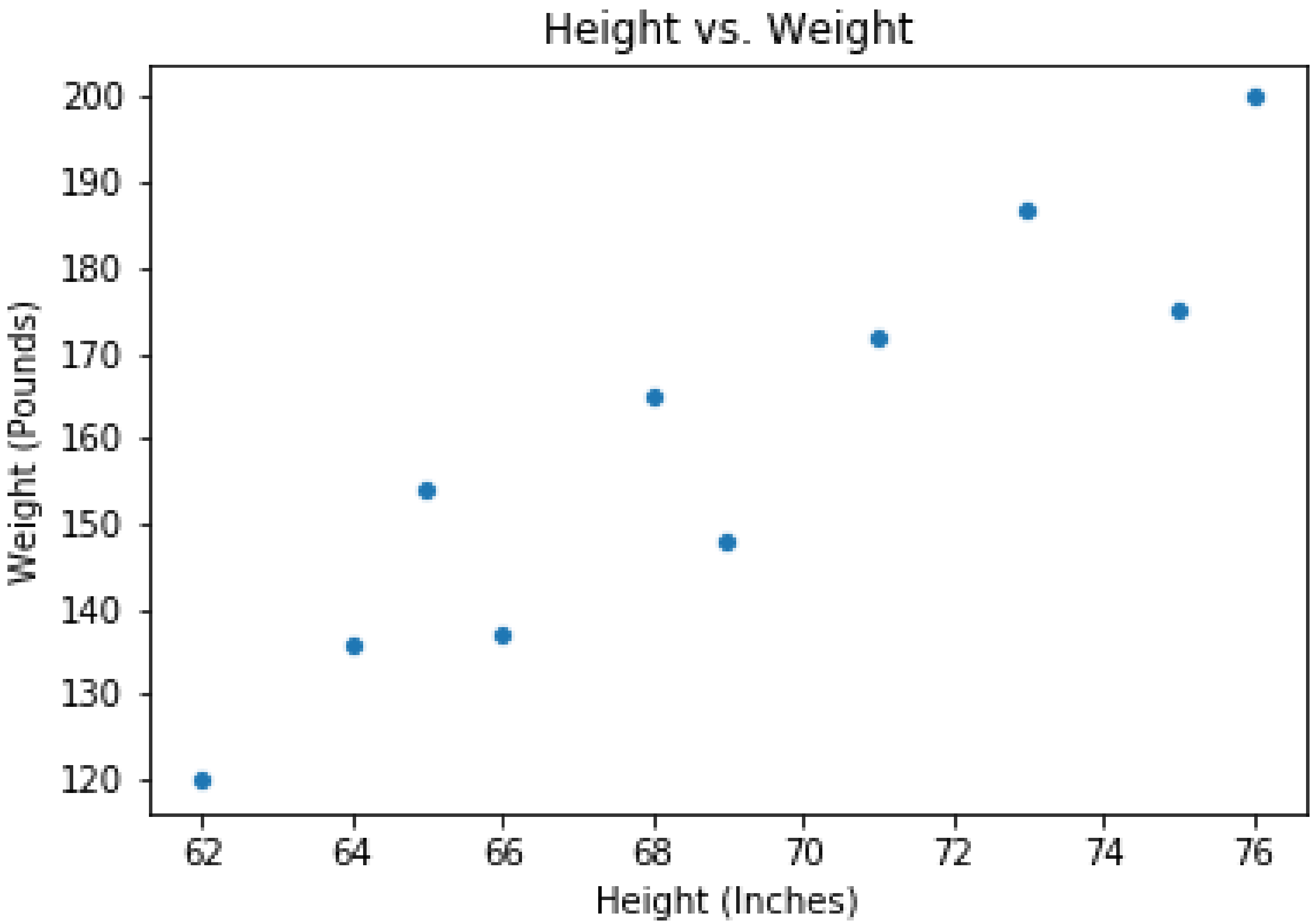
INTRODUCTION TO DATA VISUALIZATION WITH SEABORN

Erin Case
Data Scientist

Questions about quantitative variables

Relational plots

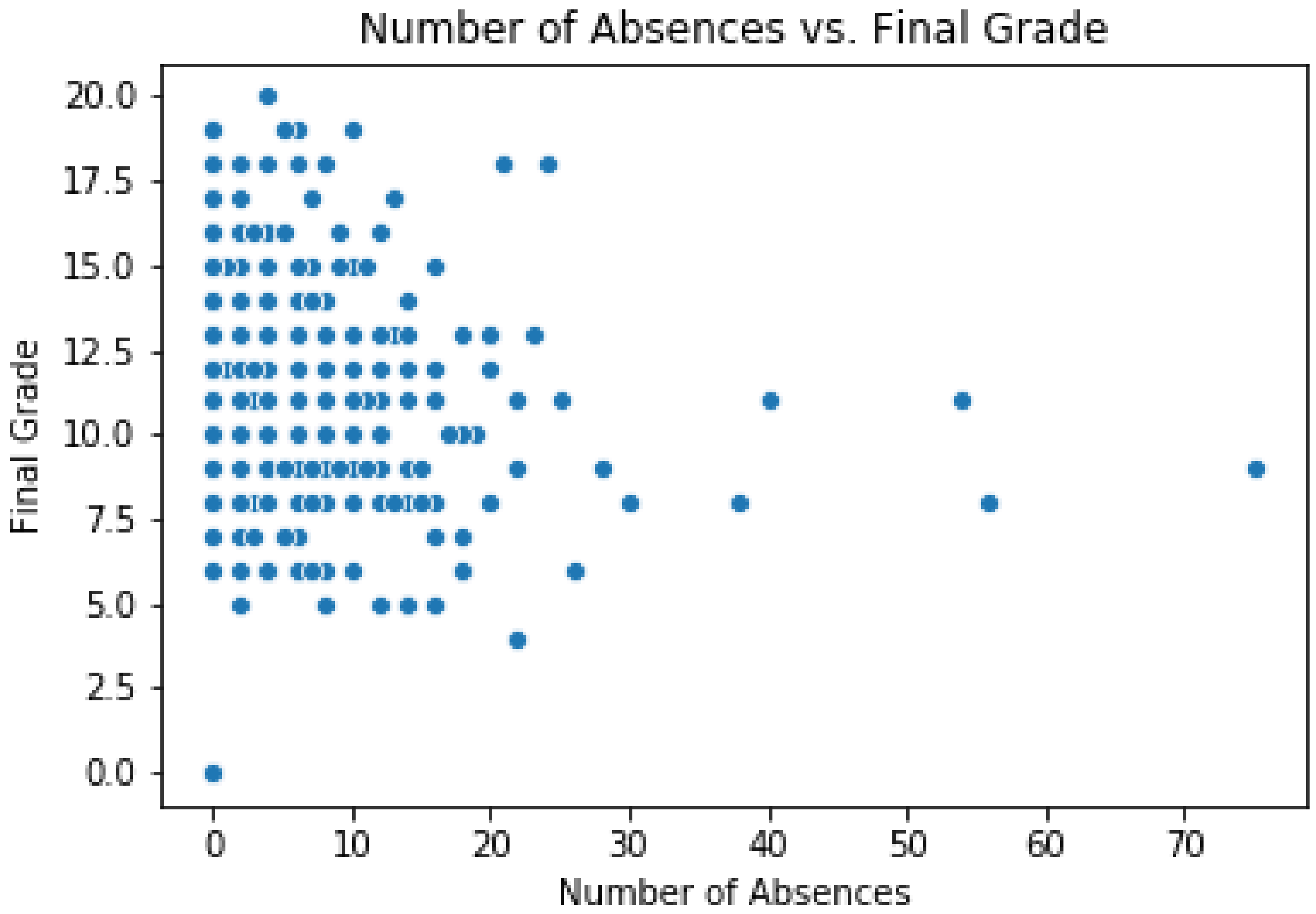
- Height vs. weight



Questions about quantitative variables

Relational plots

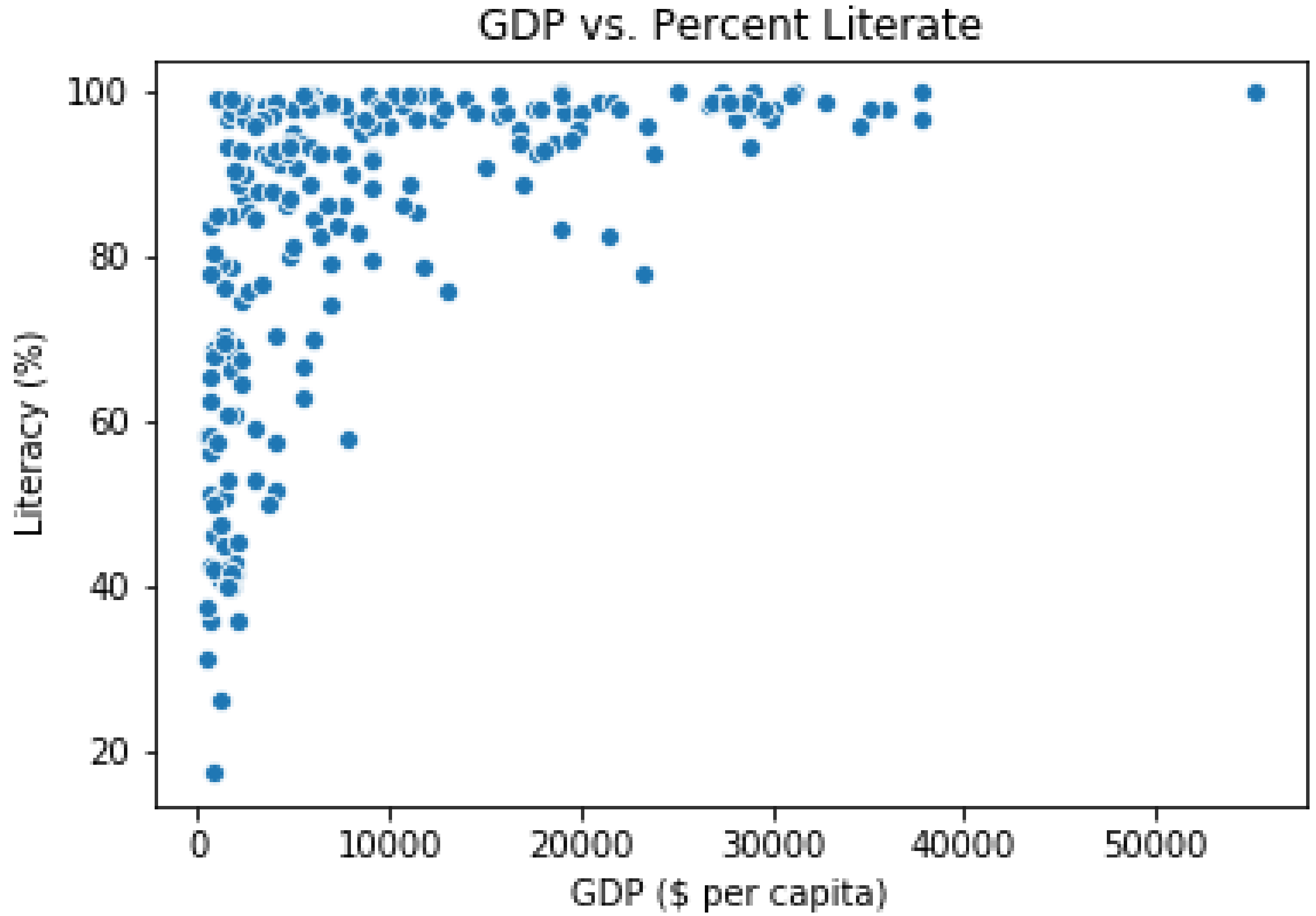
- Height vs. weight
- Number of school absences vs. final grade

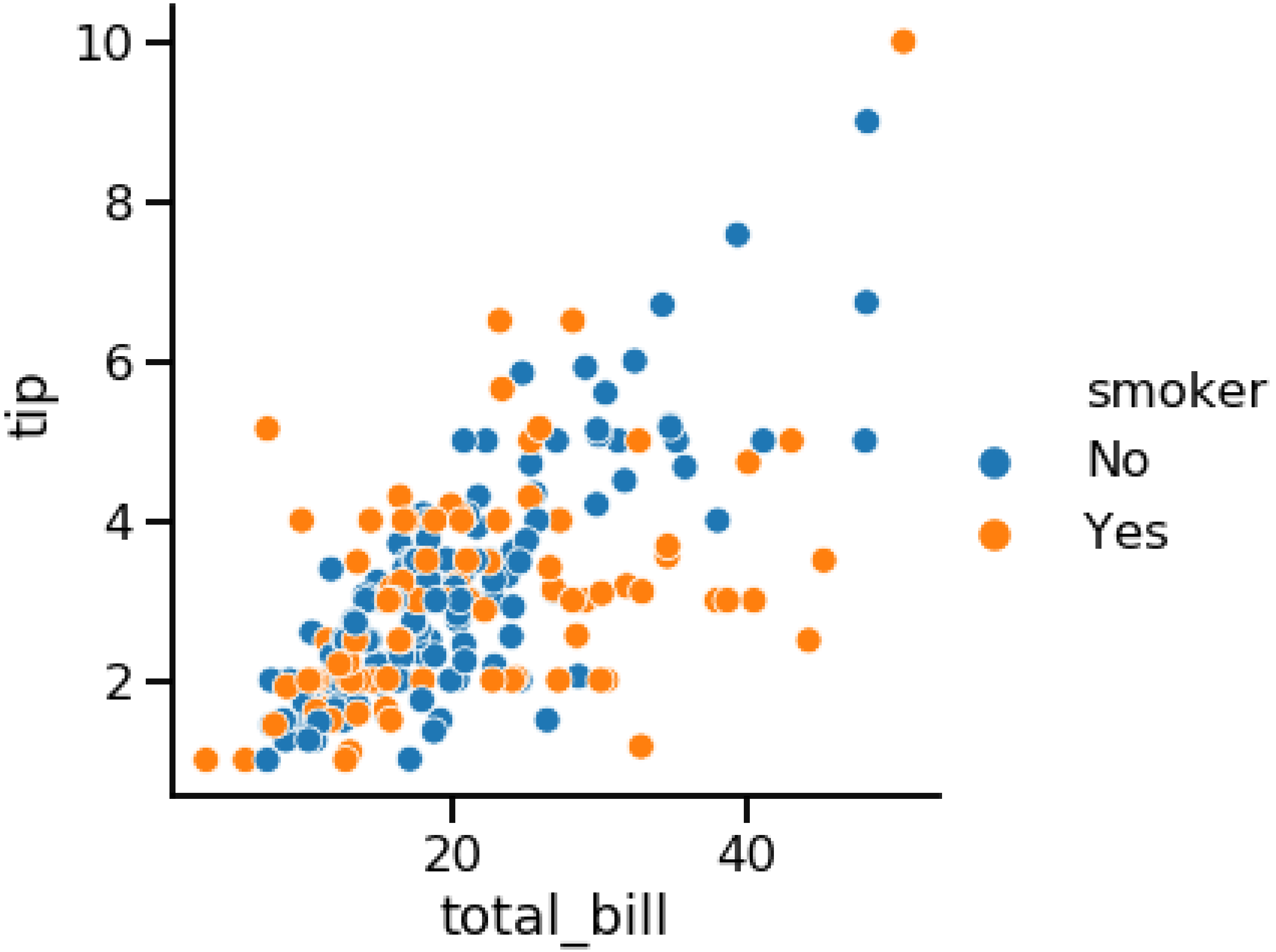


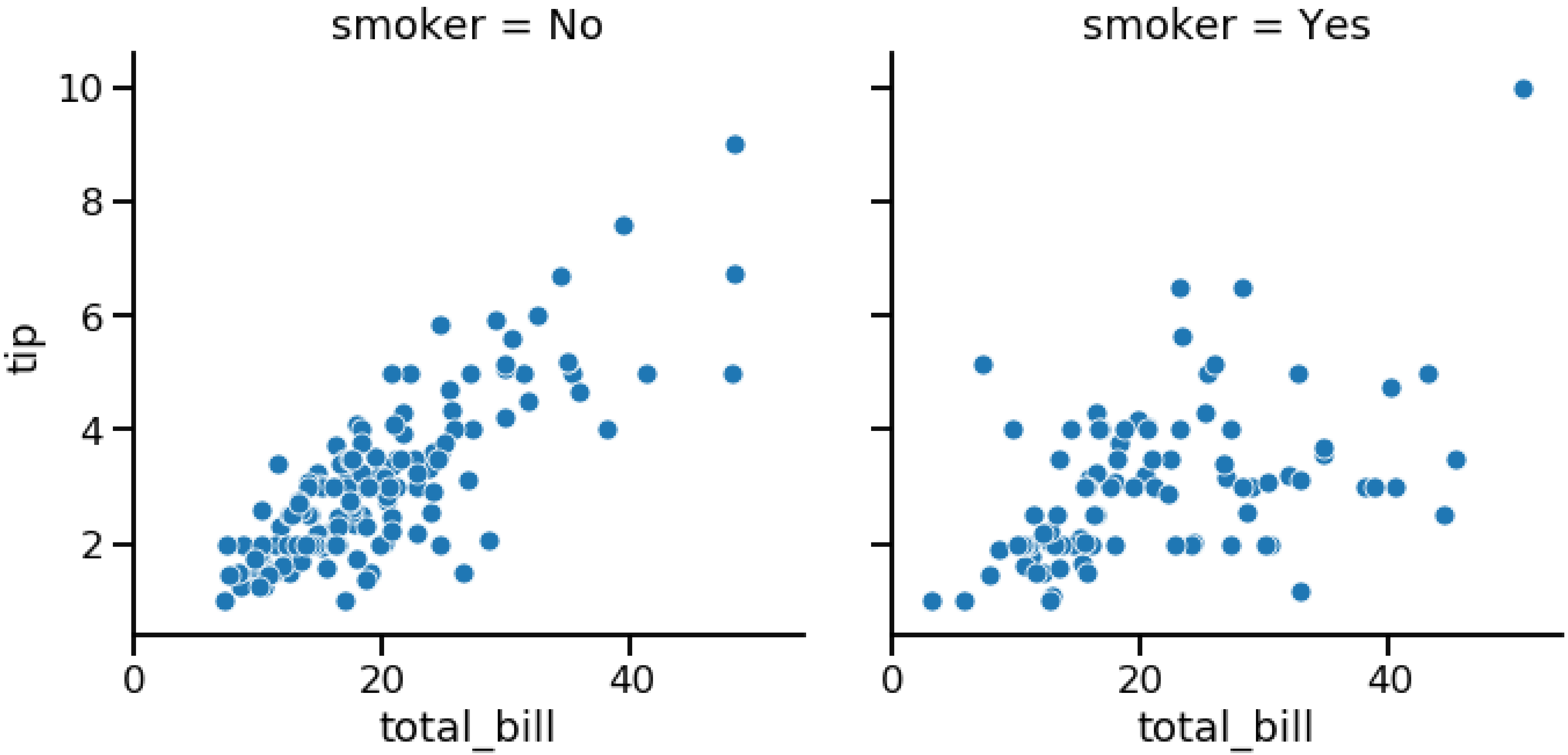
Questions about quantitative variables

Relational plots

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




10
8
6
4
2
tip
20
40
total_bill
smoker
● No
● Yes


smoker = No
smoker = Yes
tip
10
8
6
4
2
0
20
40
total_bill
0
20
40
total_bill

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()`

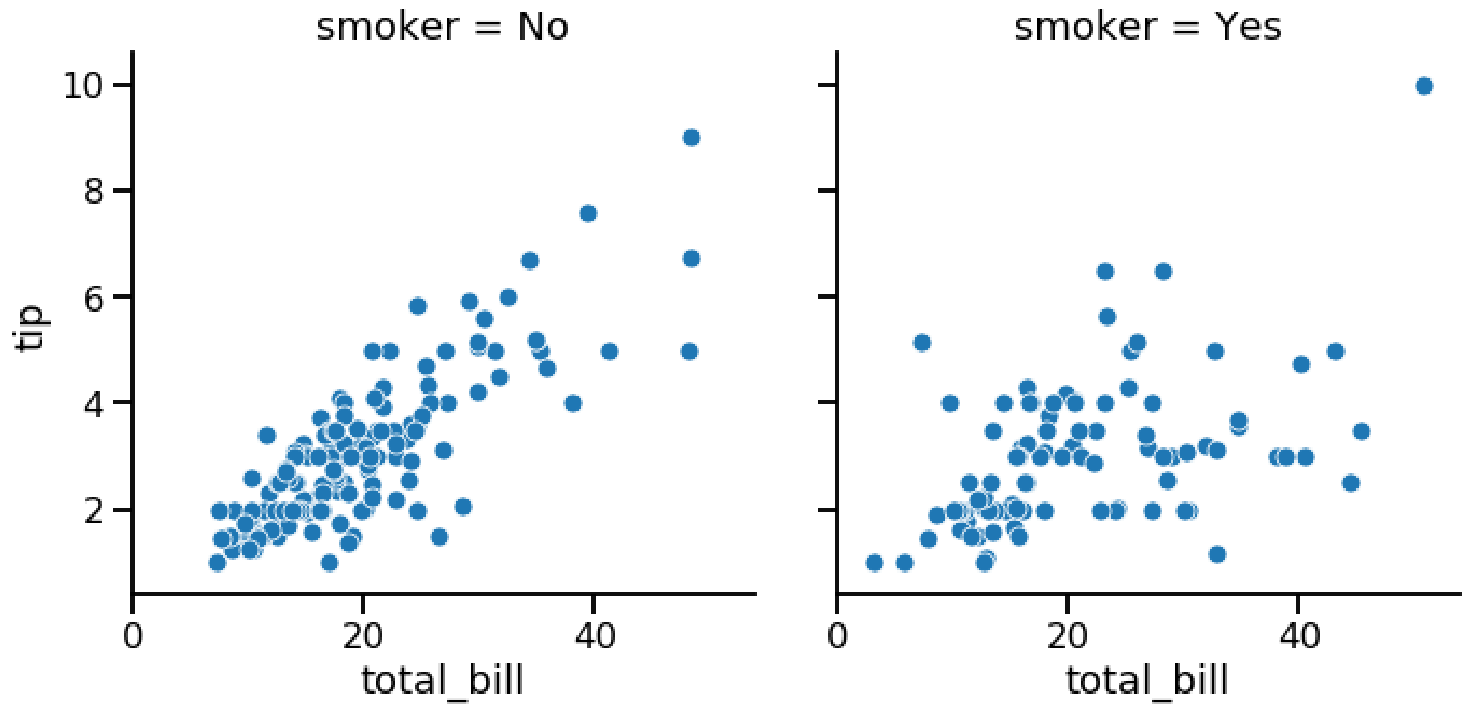
```python
import seaborn as sns
import matplotlib.pyplot as plt

sns.scatterplot(x="total_bill",
                y="tip",
                data=tips)

plt.show()
```

Using `relplot()`

```python
import seaborn as sns
import matplotlib.pyplot as plt

sns.relplot(x="total_bill",
            y="tip",
            data=tips,
            kind="scatter")

plt.show()
```

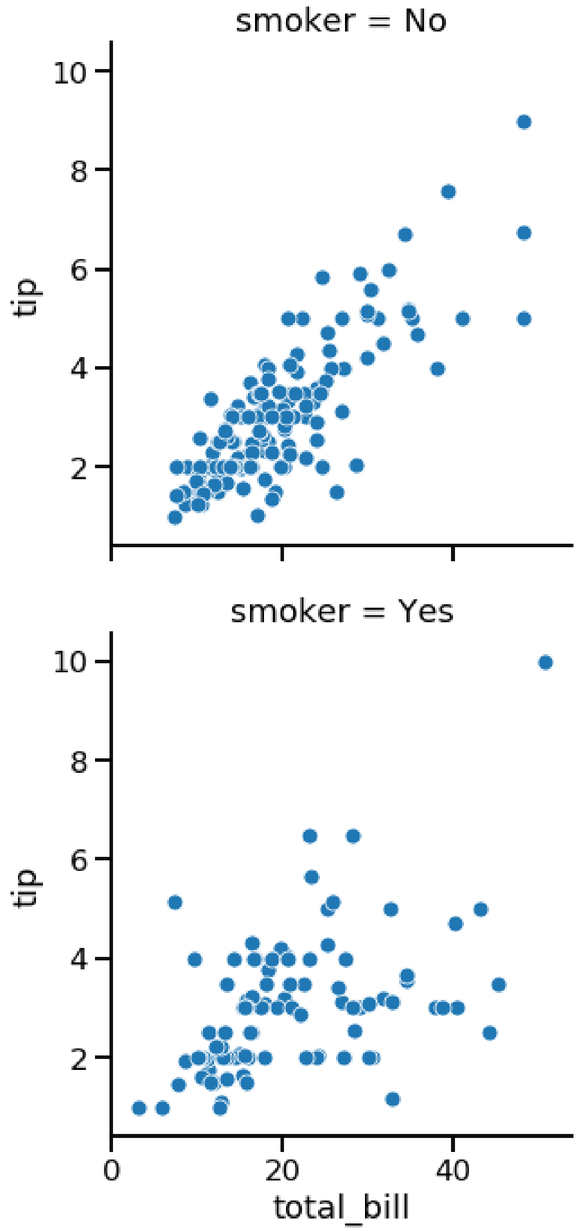
Subplots in columns

```
import seaborn as sns
import matplotlib.pyplot as plt

sns.relplot(x="total_bill",
            y="tip",
            data=tips,
            kind="scatter",
            col="smoker")

plt.show()
```



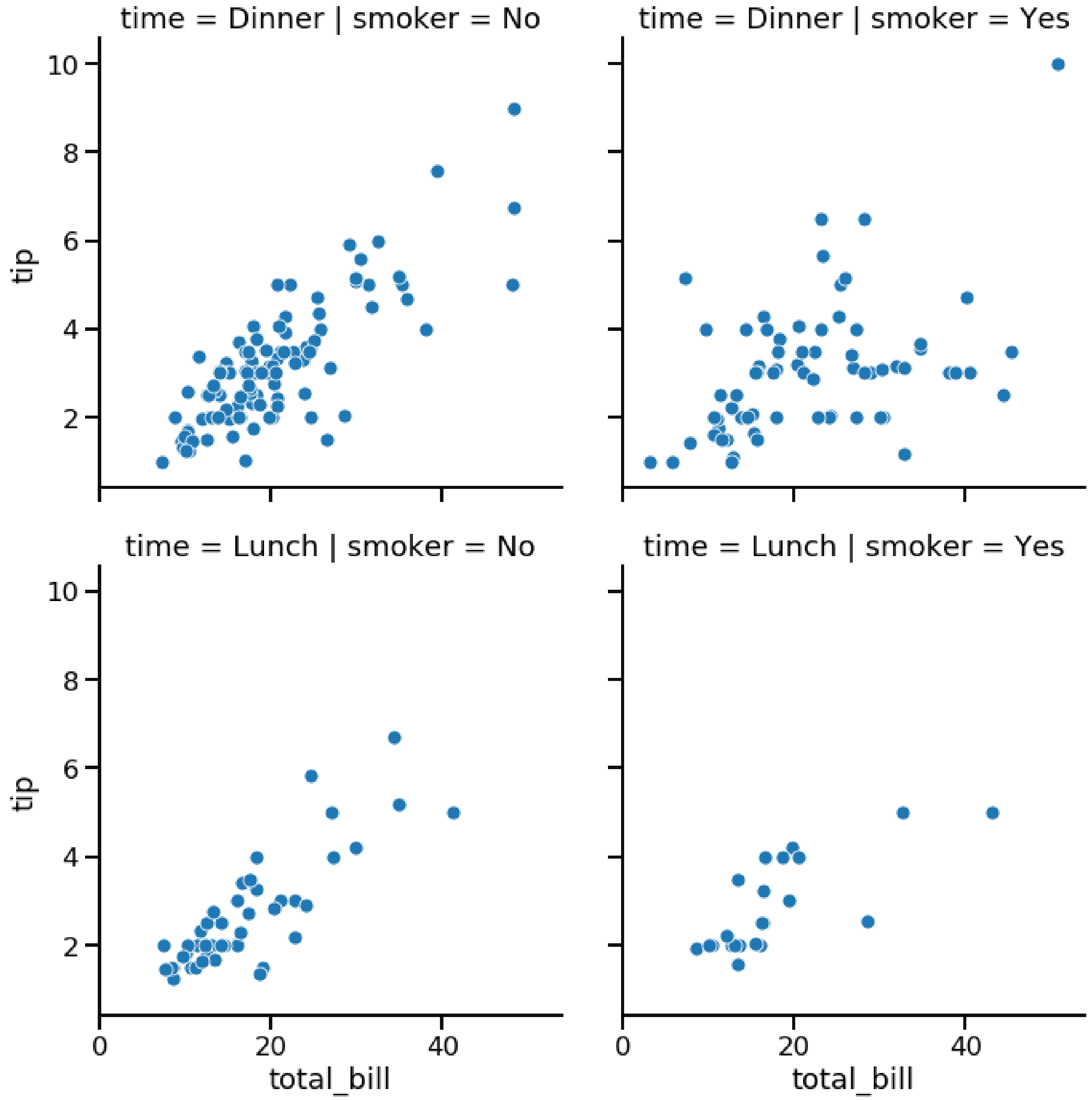
Subplots in rows

```python
import seaborn as sns
import matplotlib.pyplot as plt

sns.relplot(x="total_bill",
            y="tip",
            data=tips,
            kind="scatter",
            row="smoker")

plt.show()
```

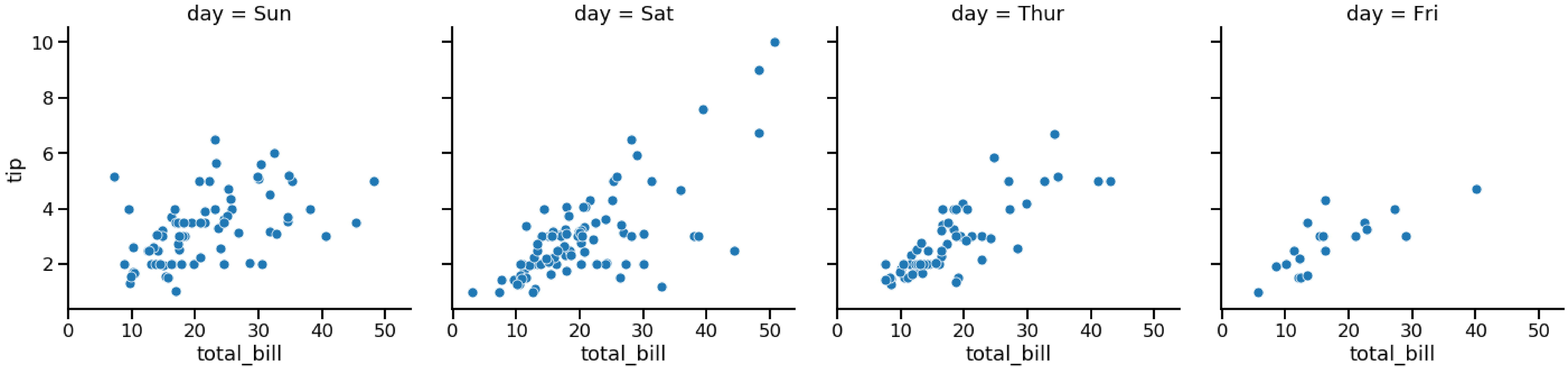


Subplots in rows and columns

```
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()
```



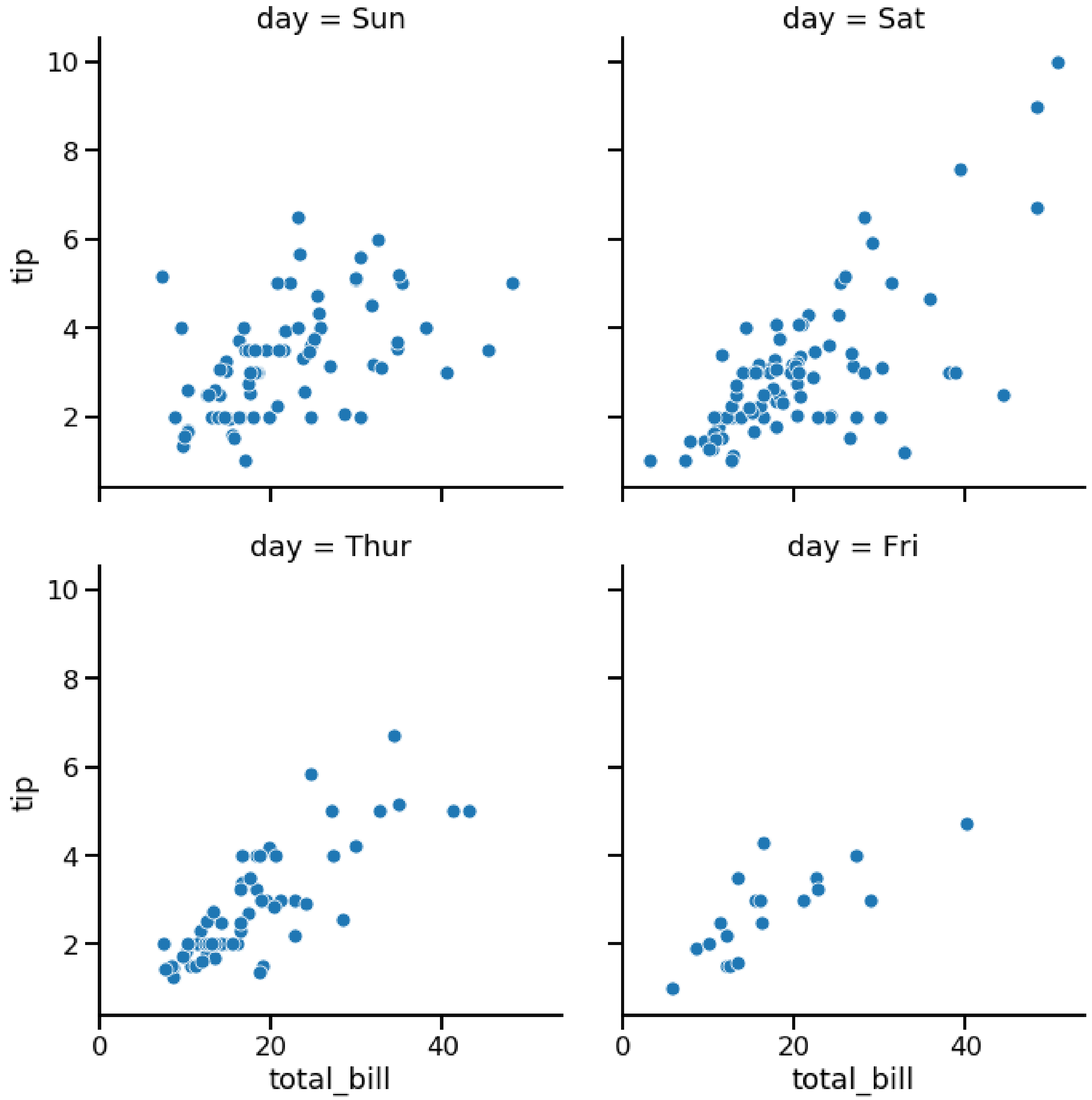
Subgroups for days of the week



Wrapping columns

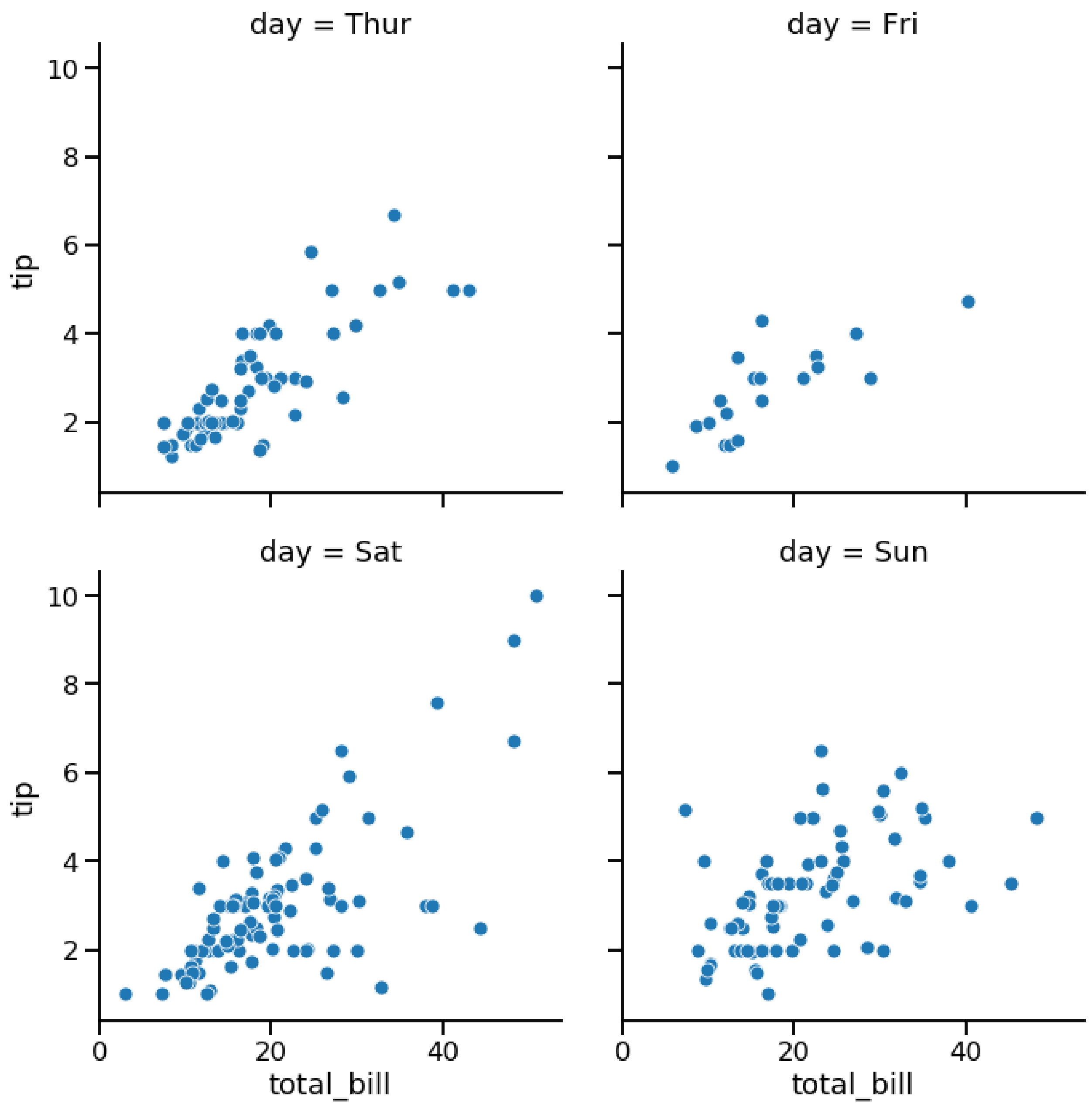
```
import seaborn as sns
import matplotlib.pyplot as plt

sns.relplot(x="total_bill",
            y="tip",
            data=tips,
            kind="scatter",
            col="day",
            col_wrap=2)

plt.show()
```

how many subplots you want per row



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

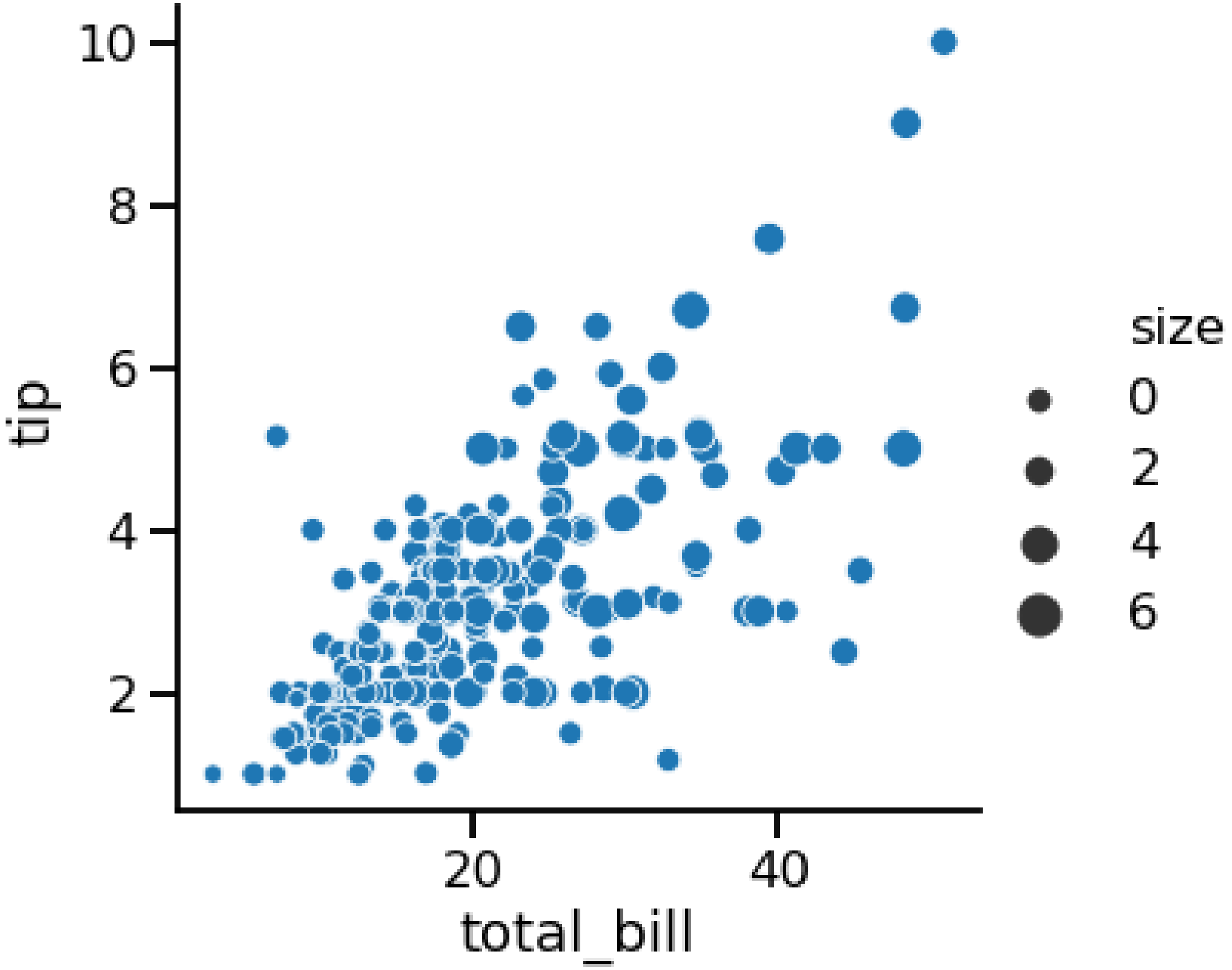
Use with both `scatterplot()` and `relplot()`

Subgroups with point size

```python
import seaborn as sns
import matplotlib.pyplot as plt

sns.relplot(x="total_bill",
            y="tip",
            data=tips,
            kind="scatter",
            size="size")

plt.show()
```

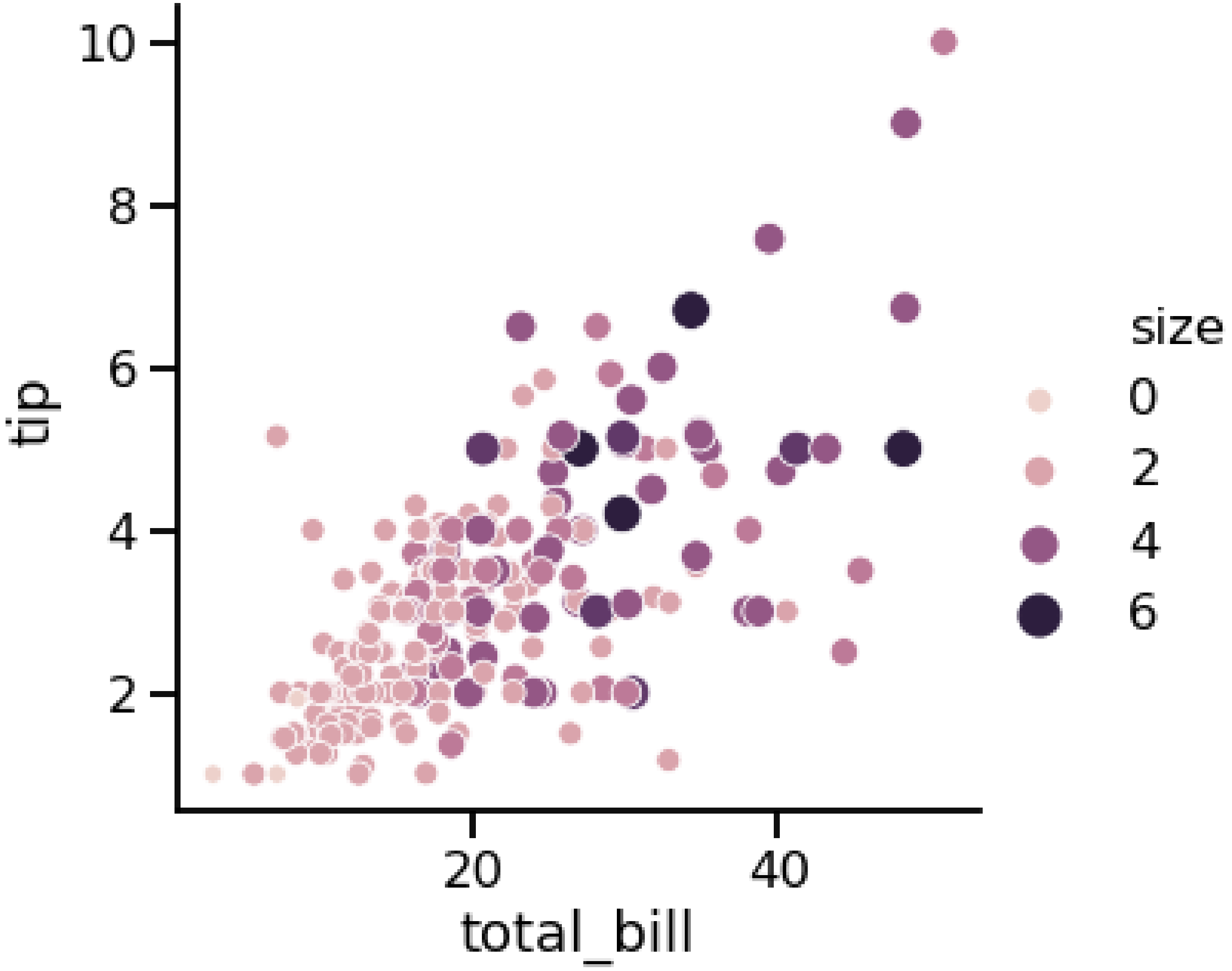


Point size and hue

```
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()
```

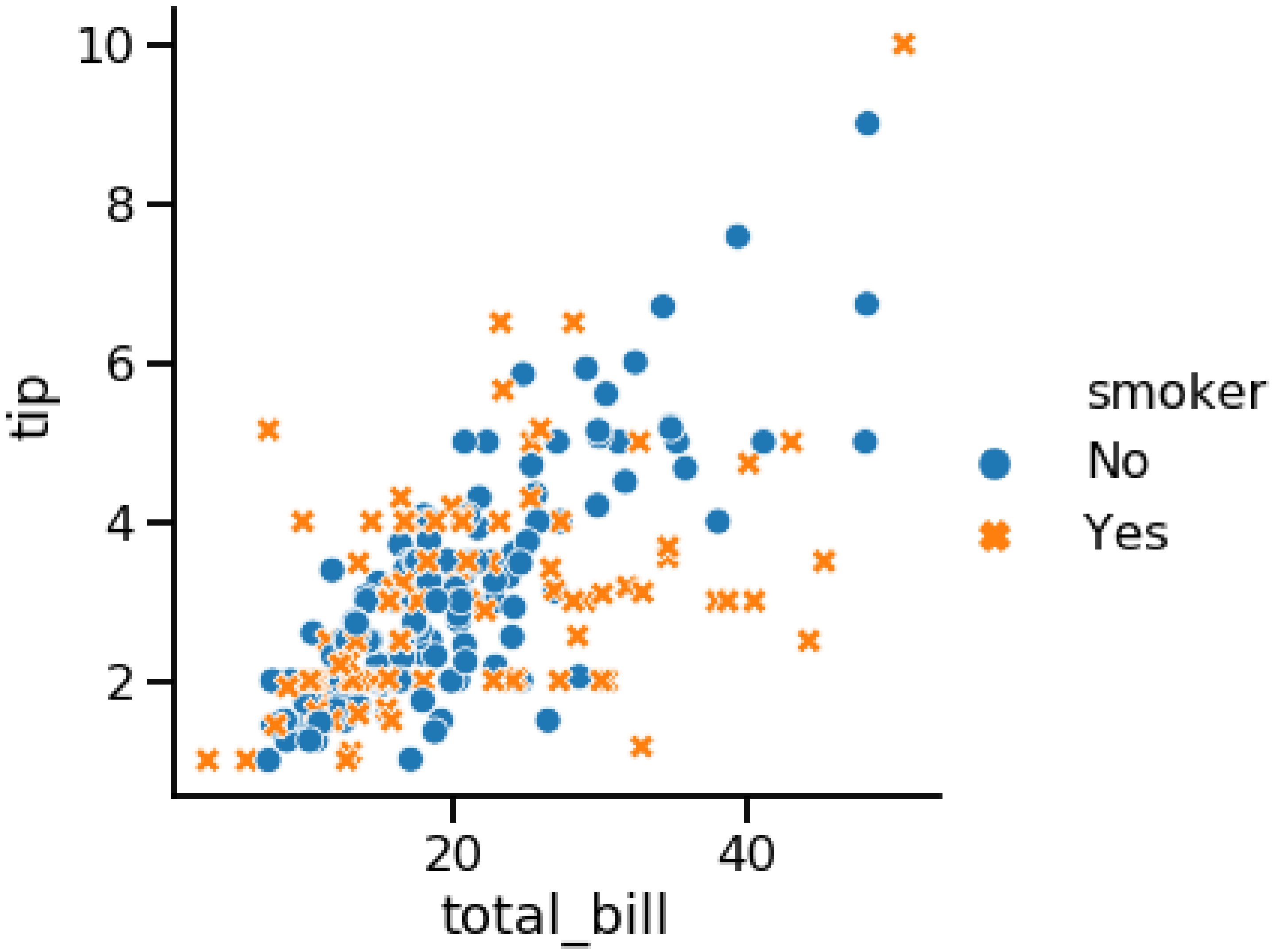


Subgroups with point style

```
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()
```

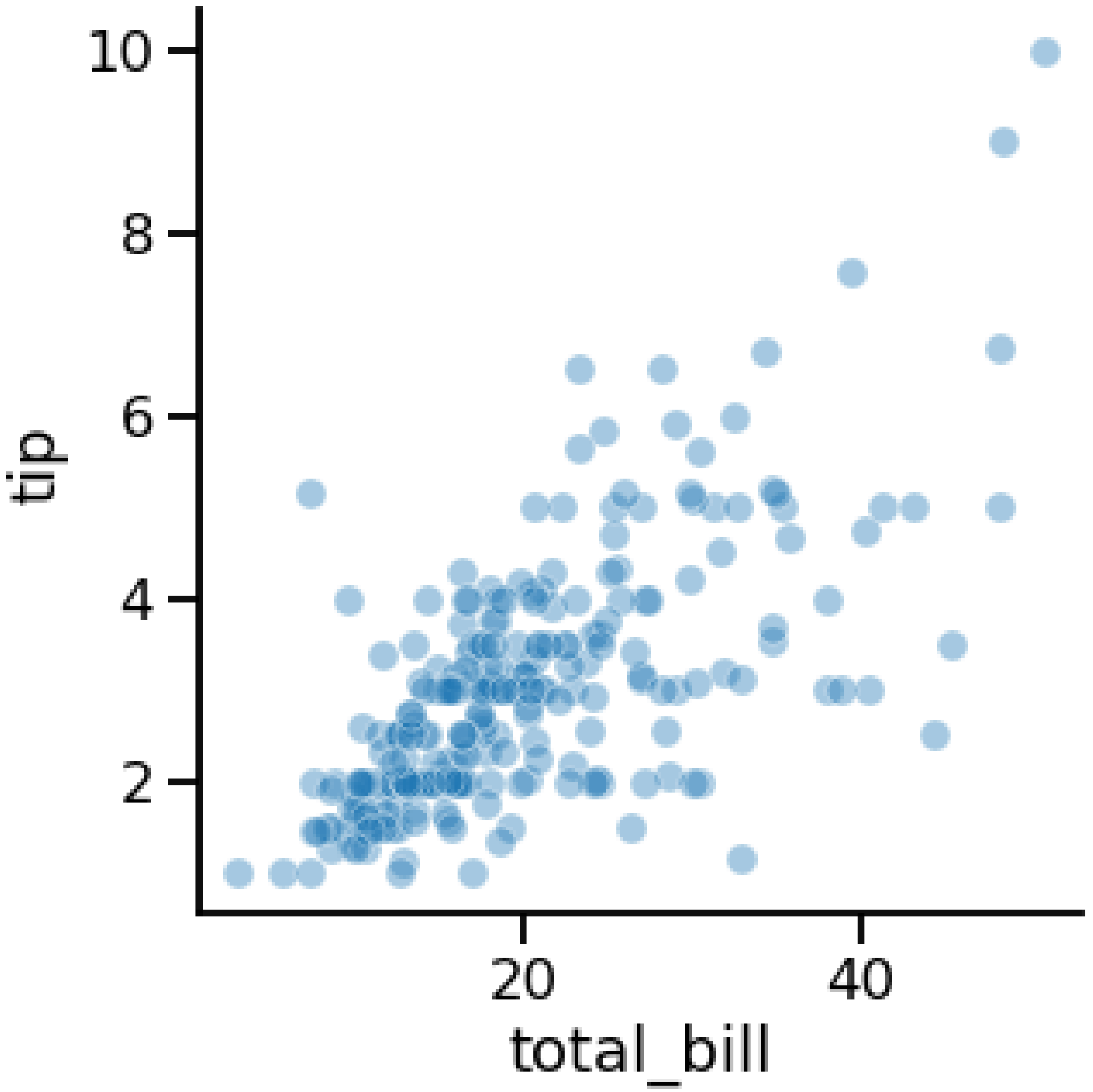


Changing point transparency

```python
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?

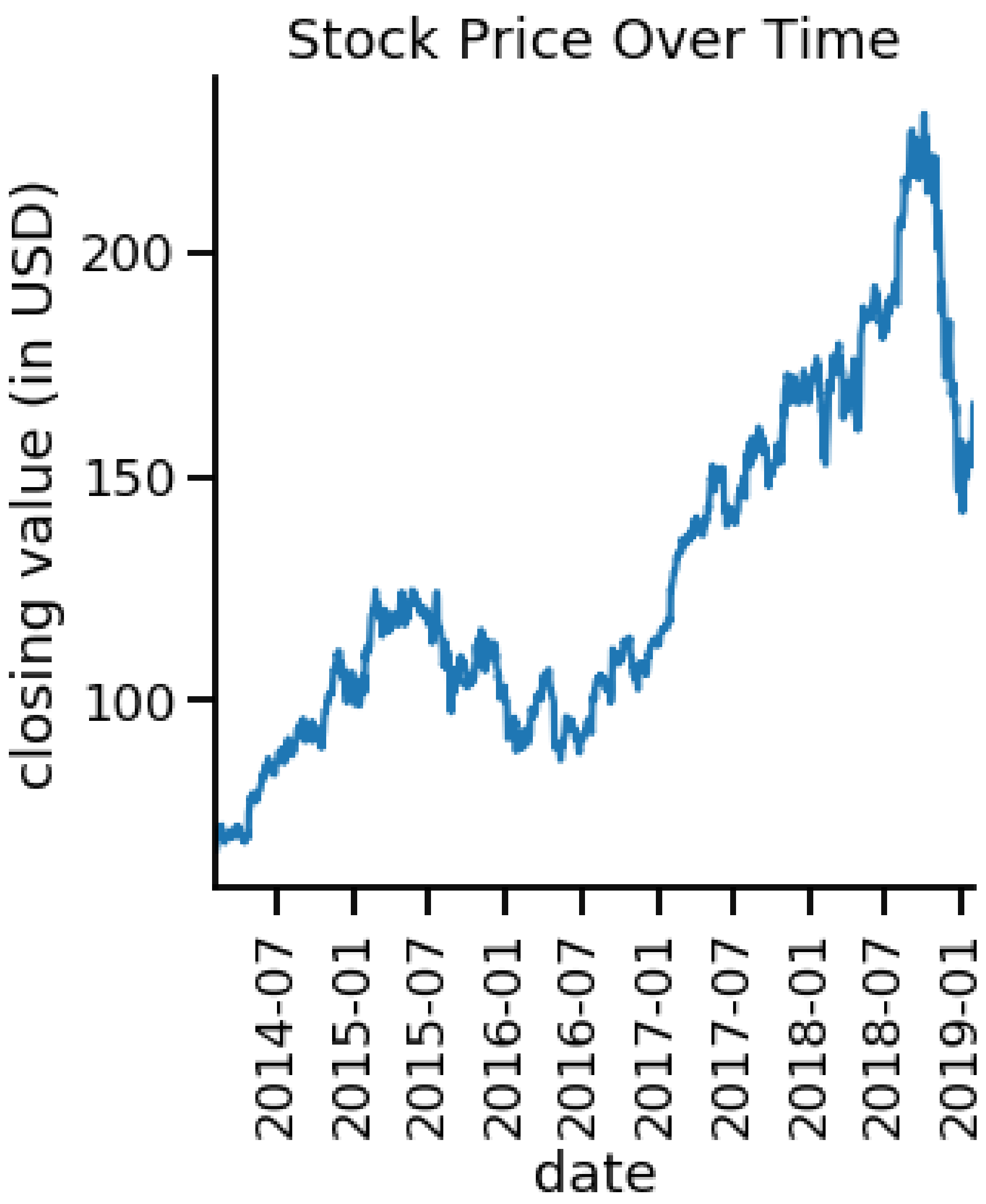
Two types of relational plots: scatter plots and line plots

Scatter plots

- Each plot point is an independent observation

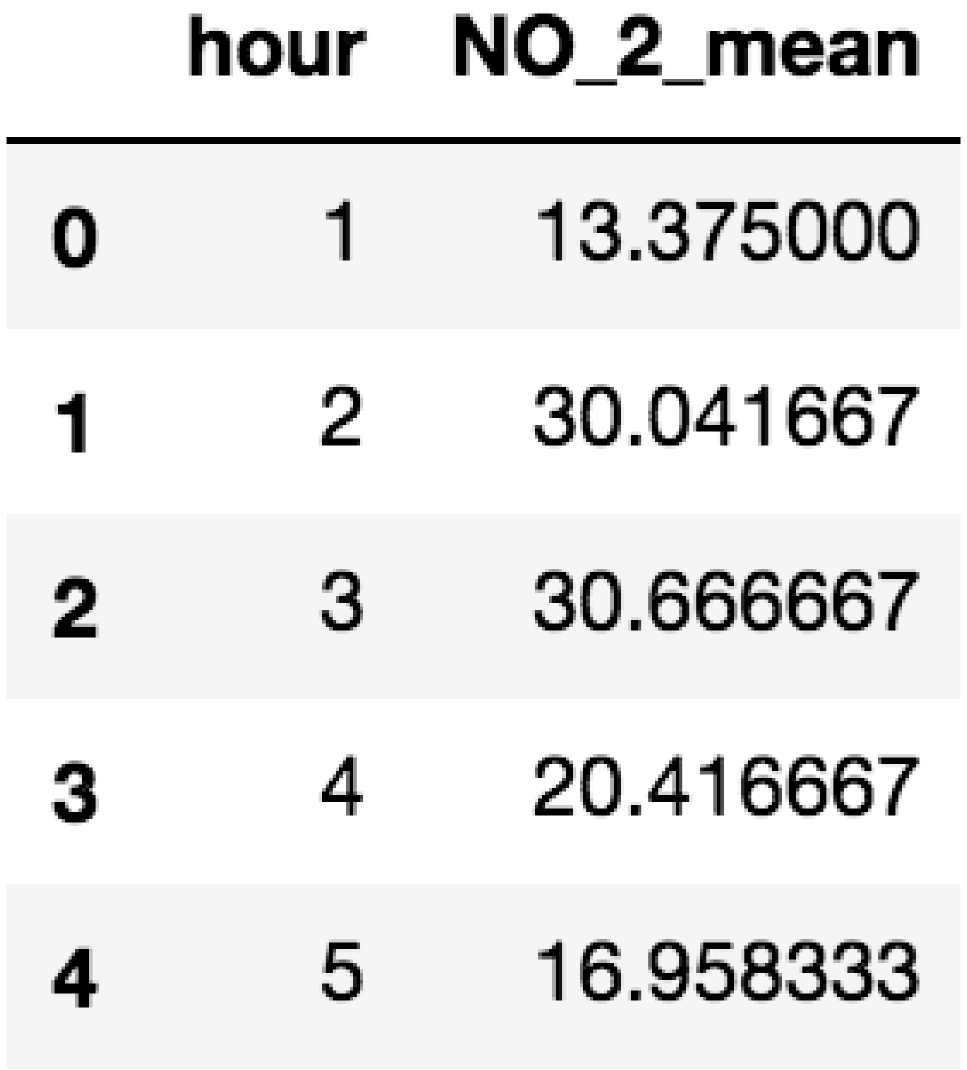
Line plots

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



Air pollution data

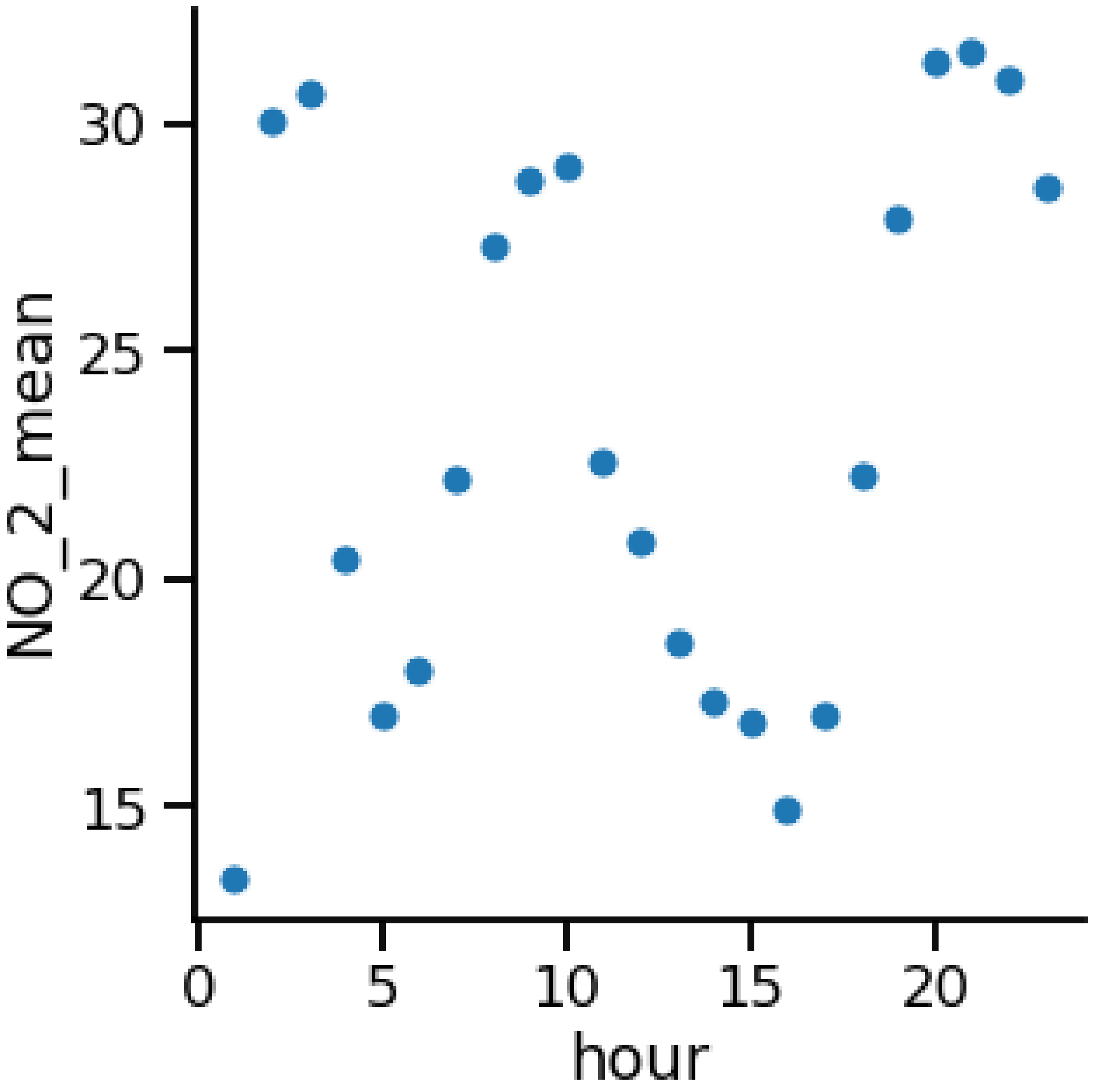
- Collection stations throughout city
- Air samples of nitrogen dioxide levels



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

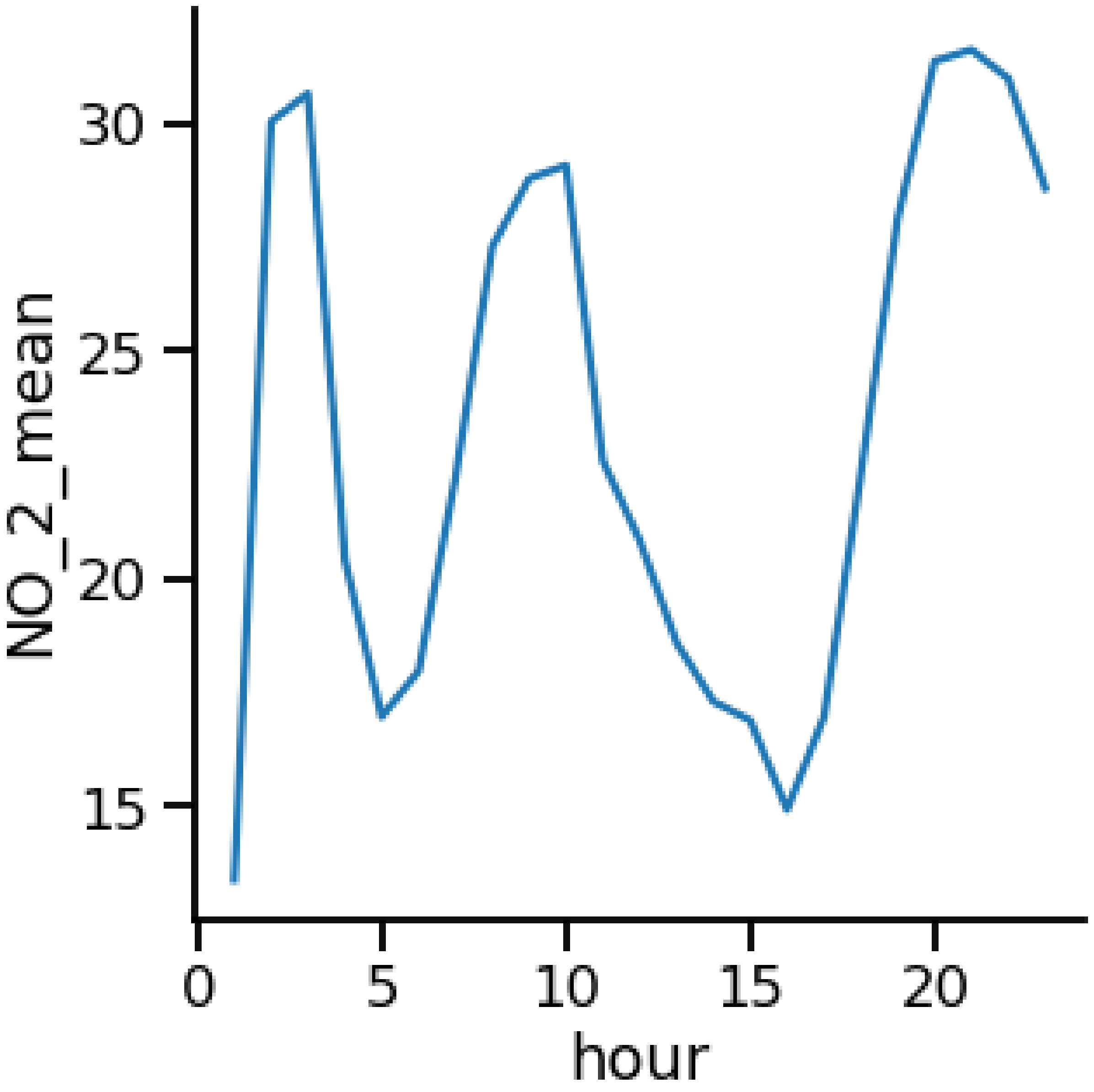
Scatter plot

```
import matplotlib.pyplot as plt
import seaborn as sns

sns.relplot(x="hour", y="NO_2_mean",
            data=air_df_mean,
            kind="scatter")

plt.show()
```

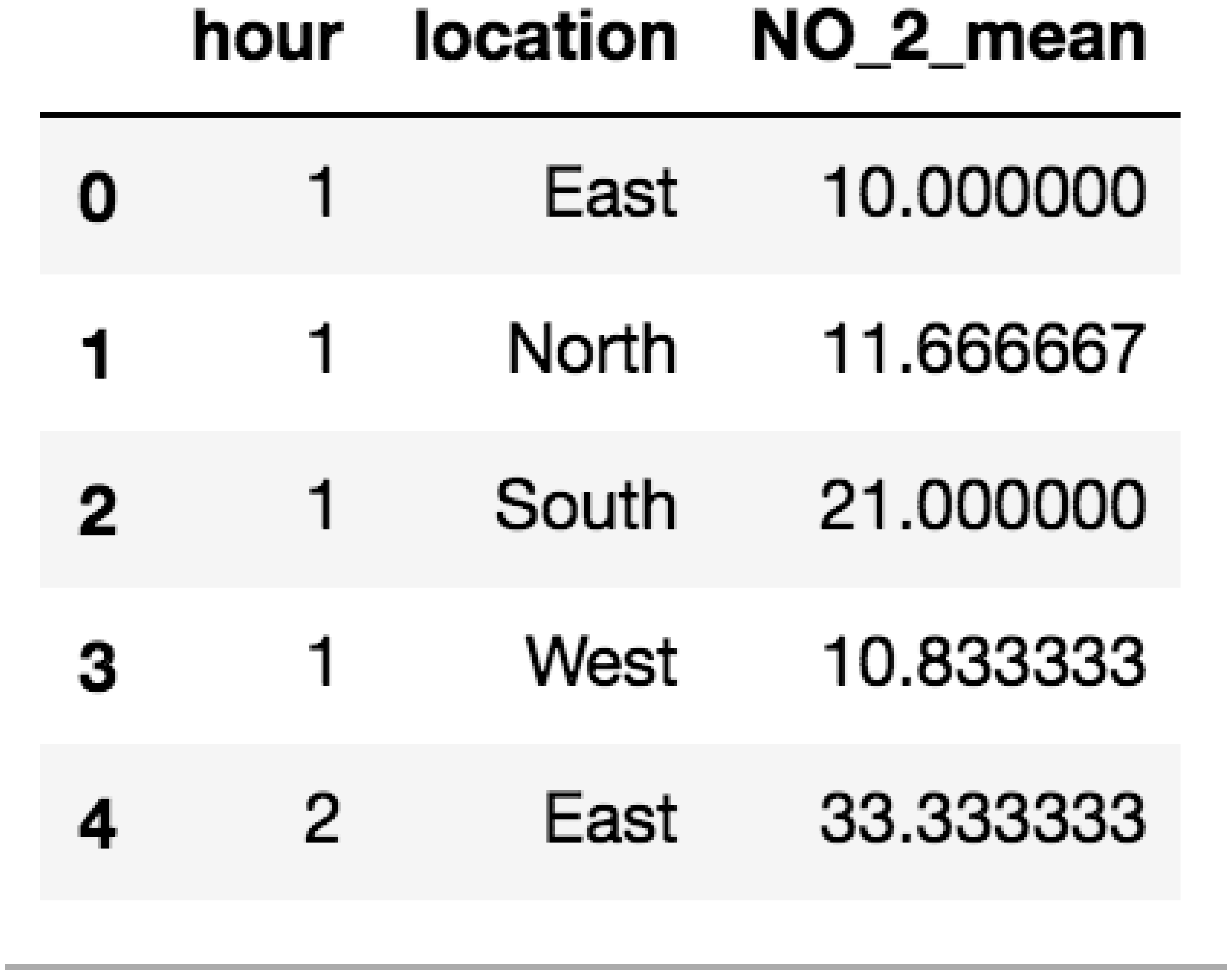


Line plot

```python
import matplotlib.pyplot as plt
import seaborn as sns

sns.relplot(x="hour", y="NO_2_mean",
            data=air_df_mean,
            kind="line")

plt.show()
```



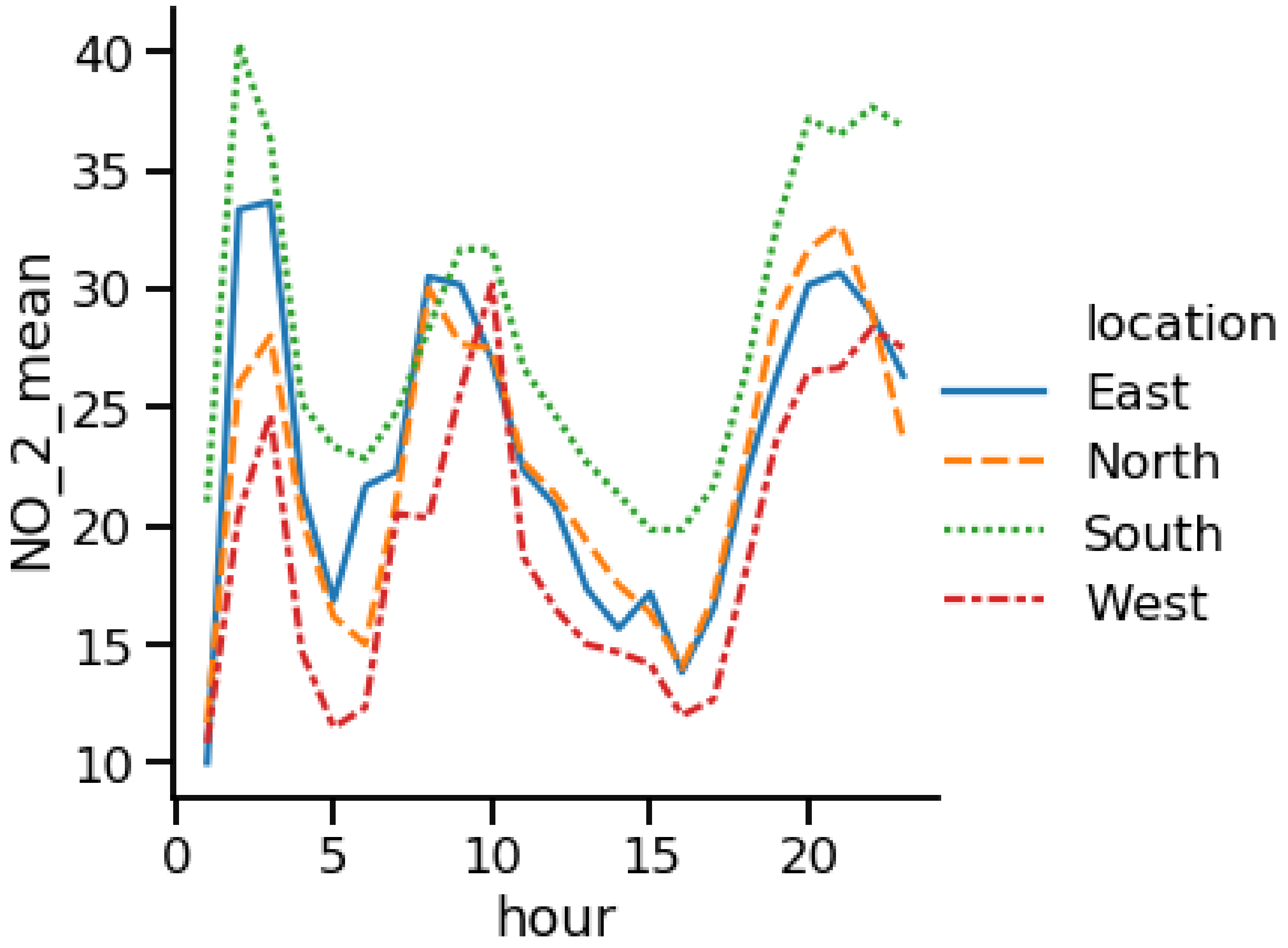
Subgroups by location



	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

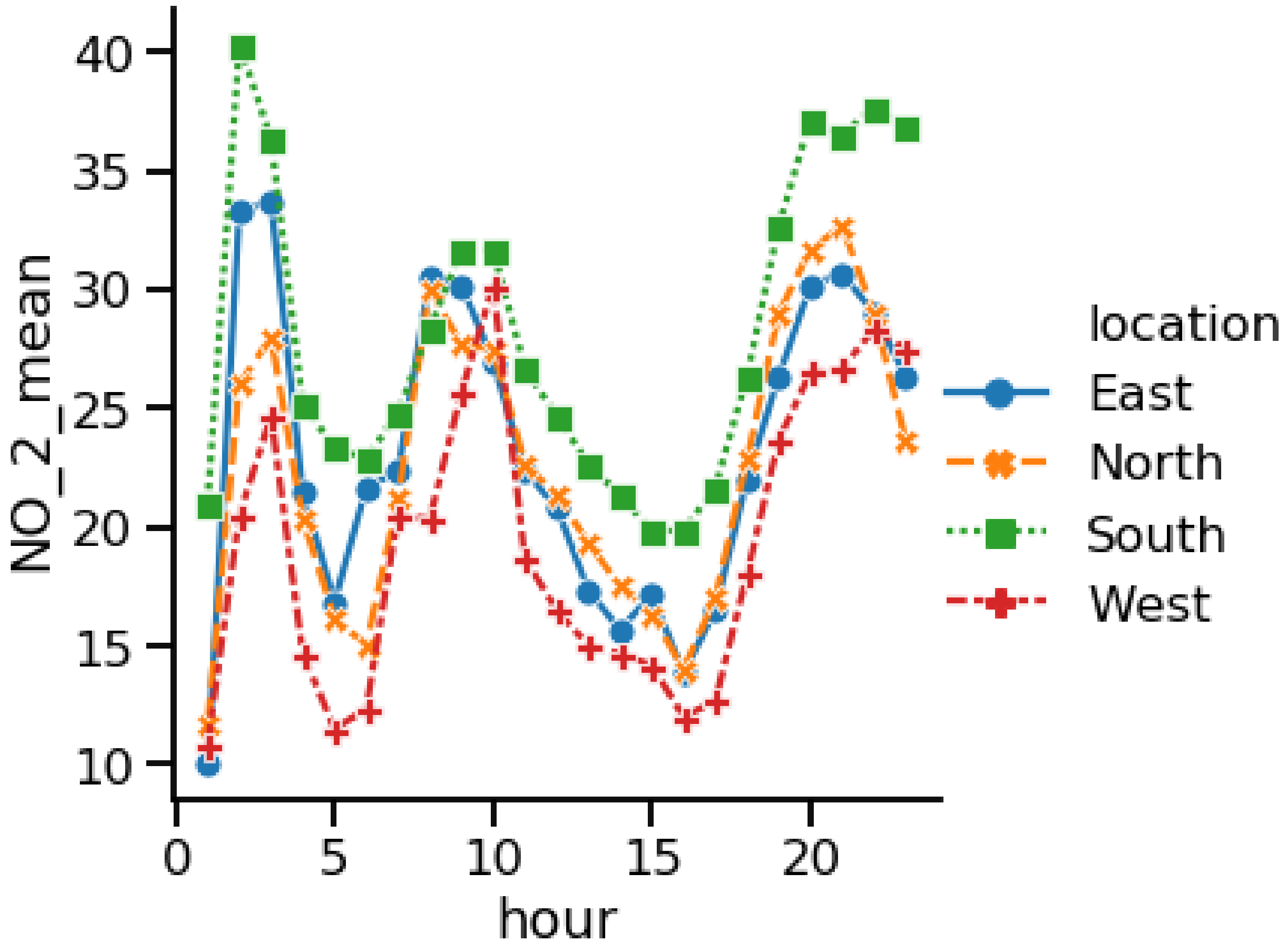
Subgroups by location

```
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

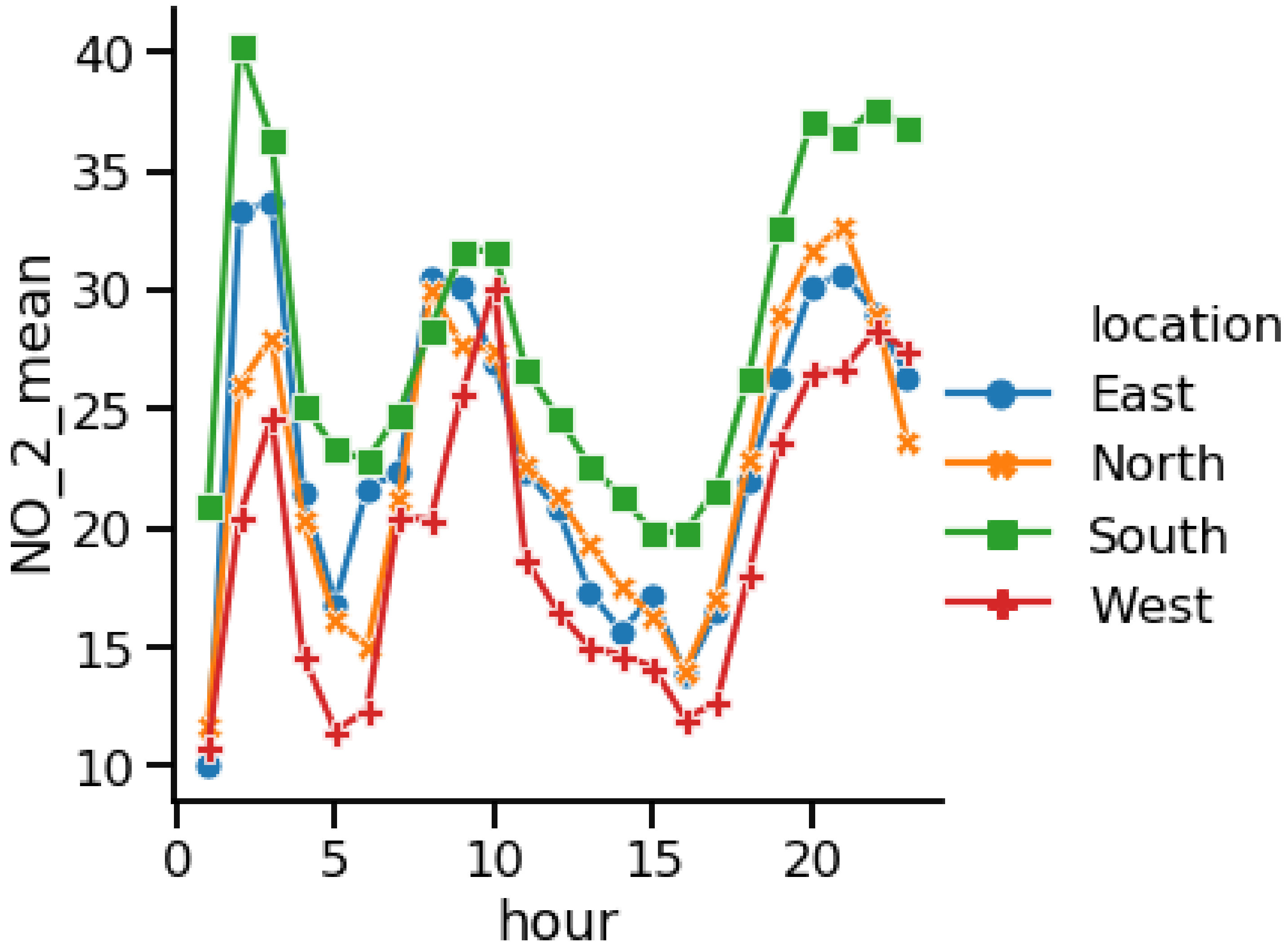
```python
import matplotlib.pyplot as plt
import seaborn as sns

sns.relplot(x="hour", y="NO_2_mean",
            data=air_df_loc_mean,
            kind="line",
            style="location",
            hue="location",
            markers=True)

plt.show()
```



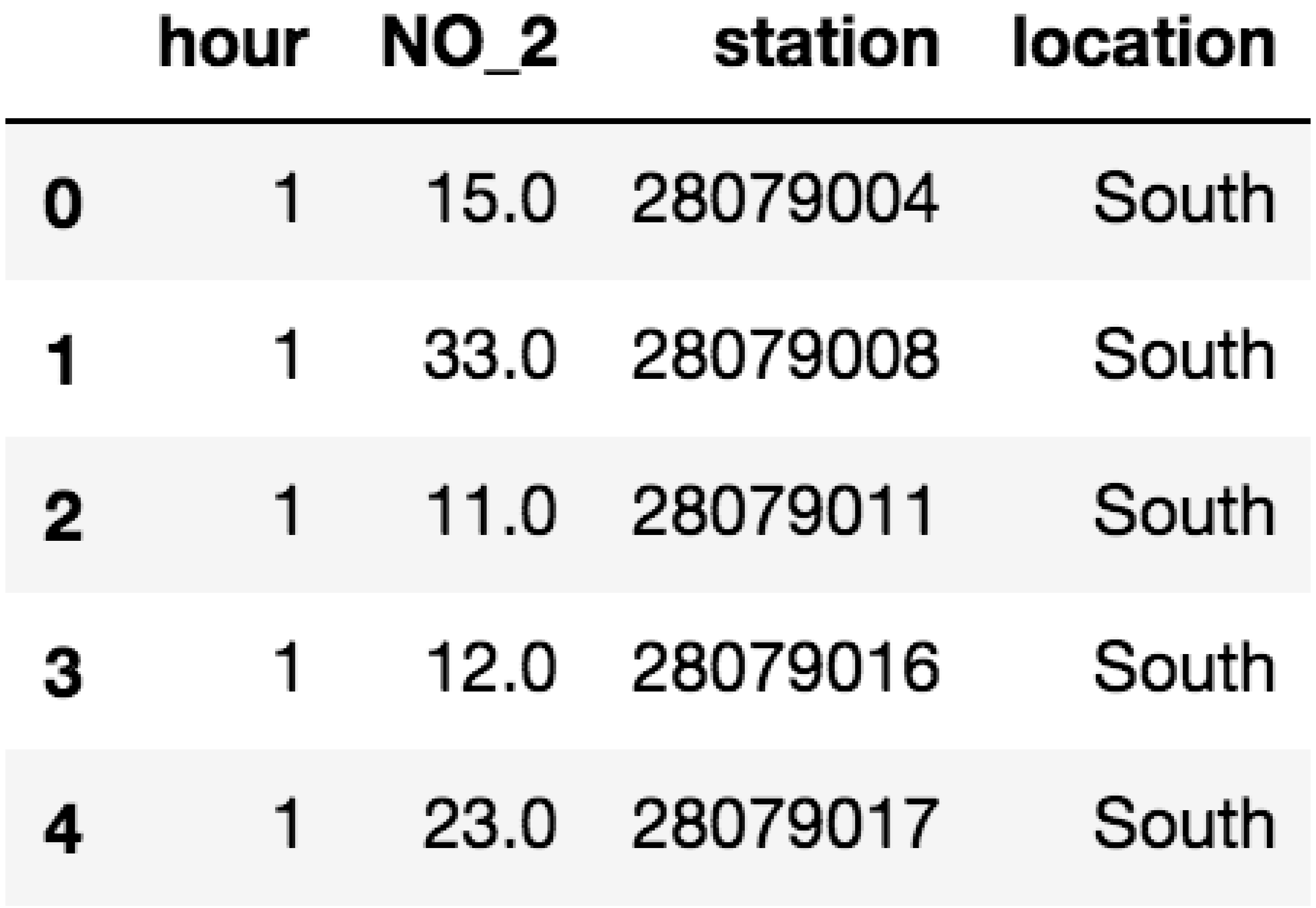
Turning off line style

```
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()
```

use solid lines



Multiple observations per x-value

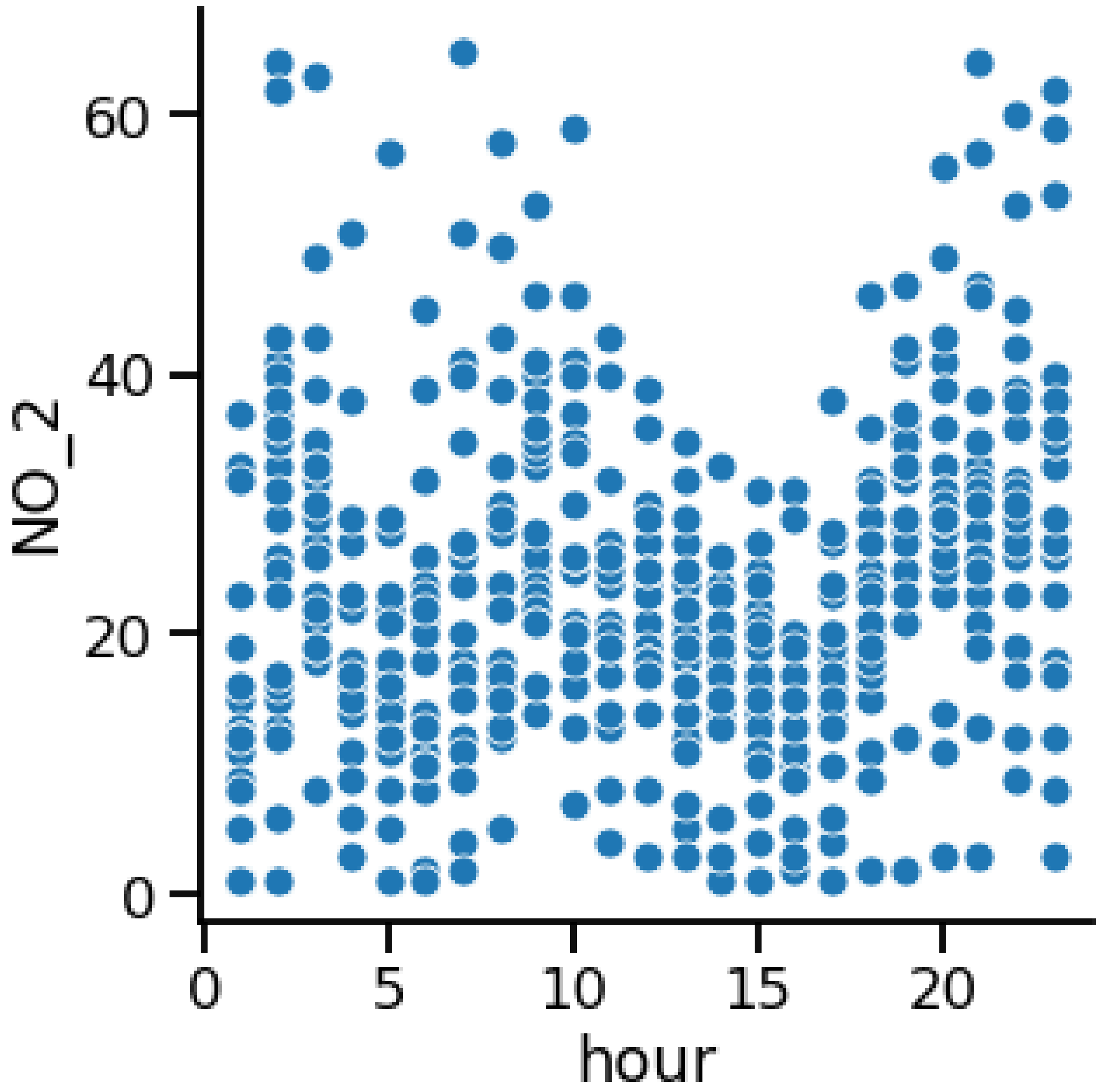


	hour	NO_2	station	location
0	1	15.0	28079004	South
1	1	33.0	28079008	South
2	1	11.0	28079011	South
3	1	12.0	28079016	South
4	1	23.0	28079017	South

Multiple observations per x-value

Scatter plot

```
import matplotlib.pyplot as plt
import seaborn as sns

sns.relplot(x="hour", y="NO_2",
            data=air_df,
            kind="scatter")

plt.show()
```

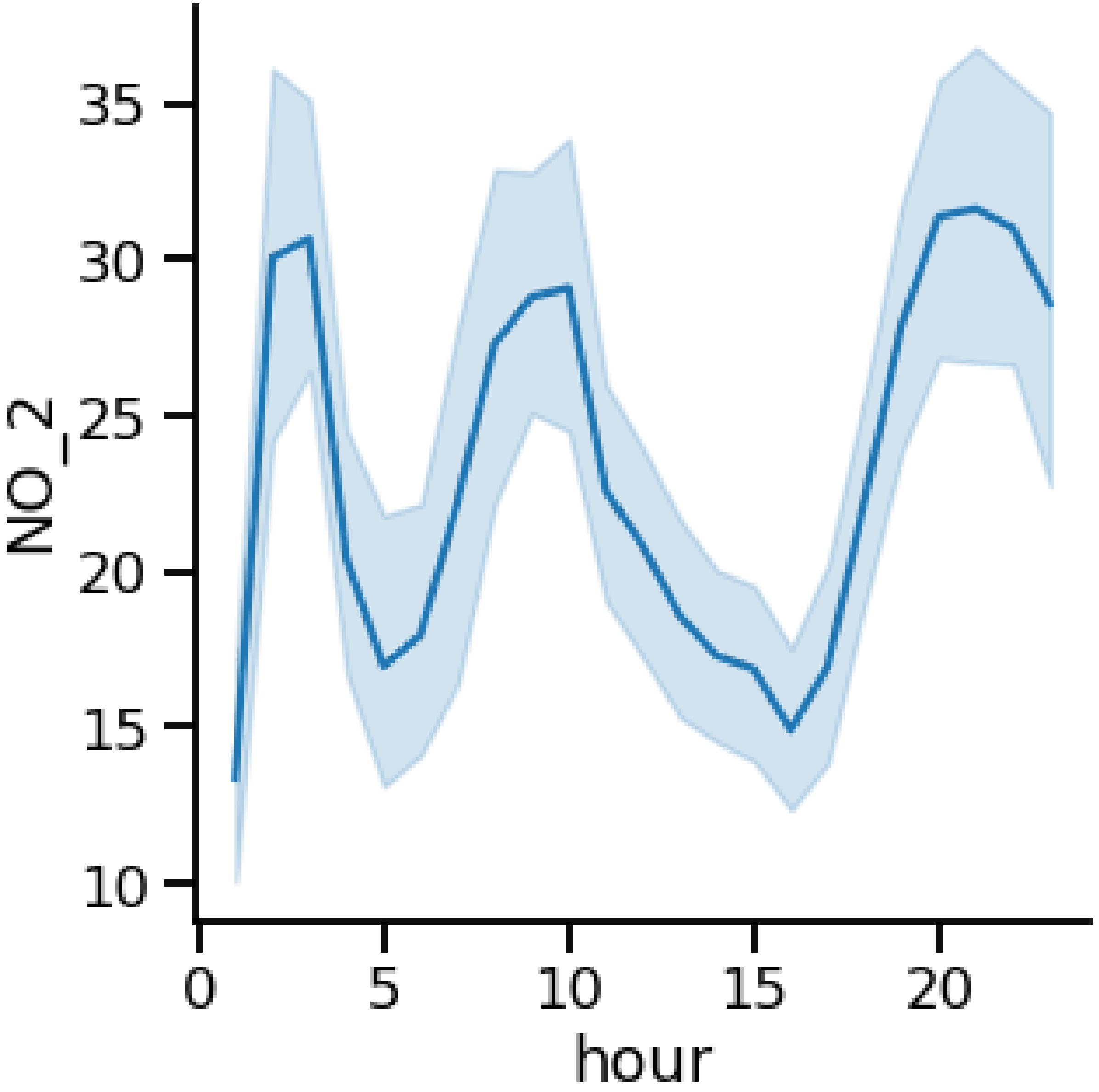


Multiple observations per x-value

Line plot

```
import matplotlib.pyplot as plt
import seaborn as sns

sns.relplot(x="hour", y="NO_2",
            data=air_df,
            kind="line")

plt.show()
```

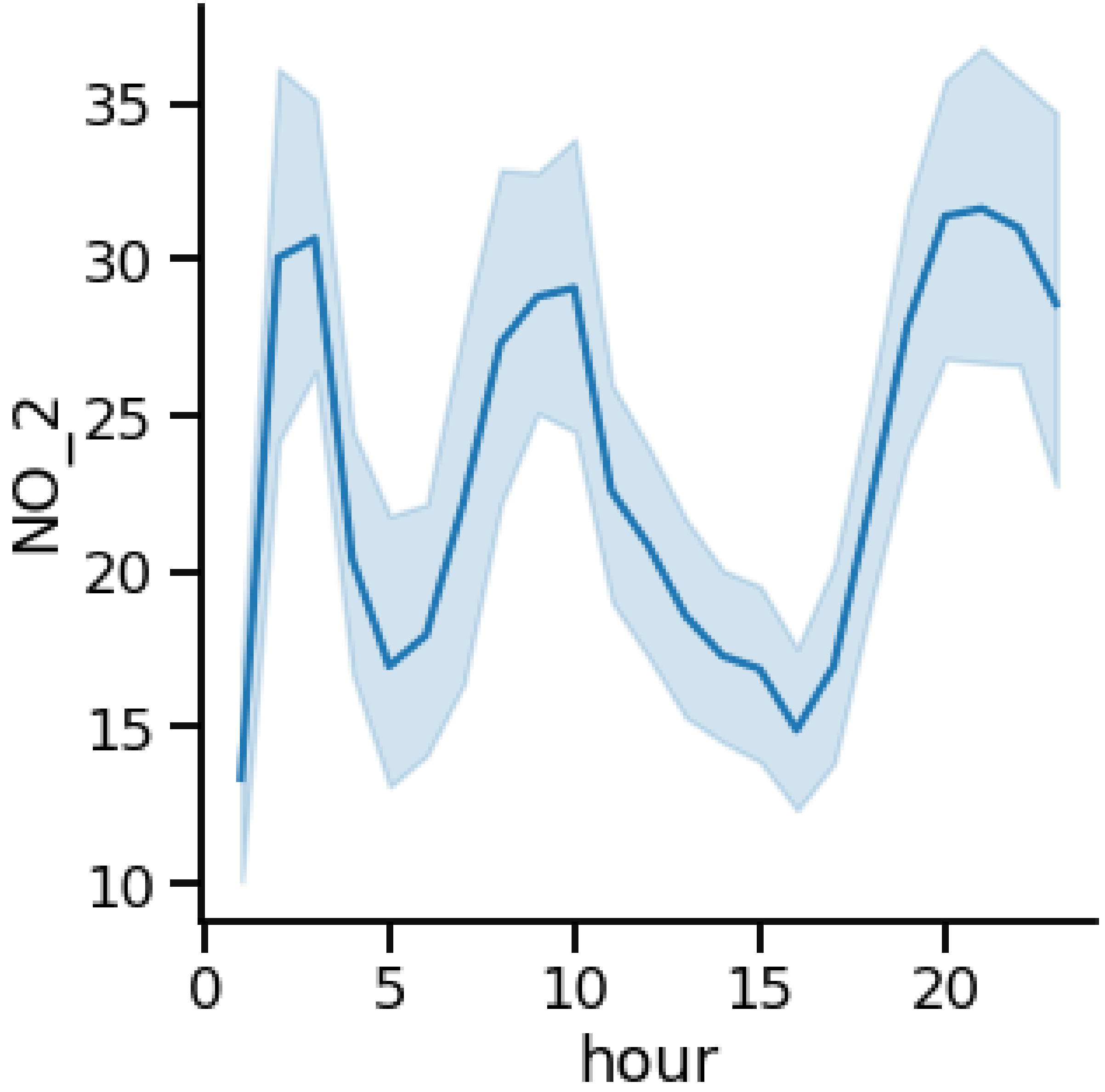
If a line plot is given multiple observations per x-value, it will aggregate them into a single summary measure.



Multiple observations per x-value

Shaded region is the confidence interval

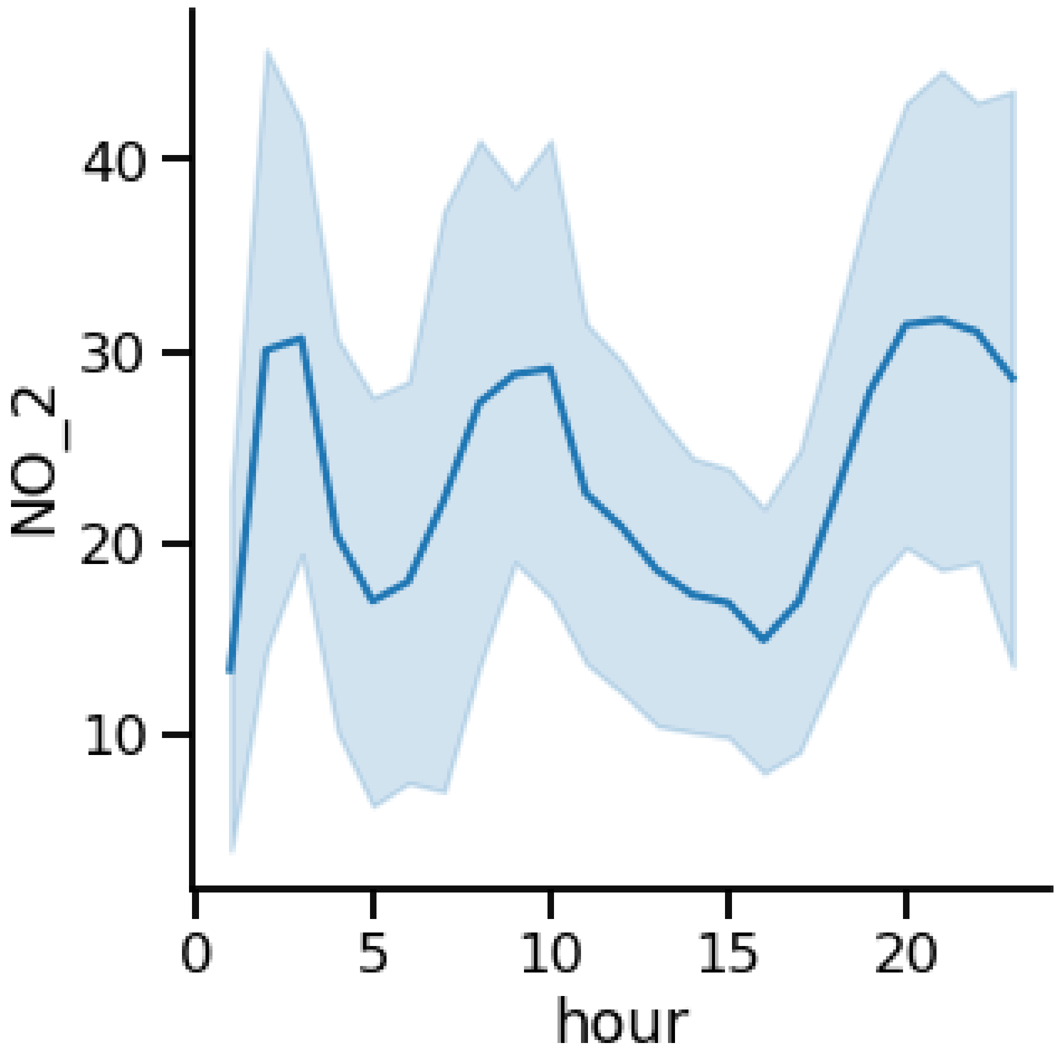
- Assumes dataset is a random sample
- 95% confident that the mean is within this interval
- Indicates uncertainty in our estimate



Replacing confidence interval with standard deviation

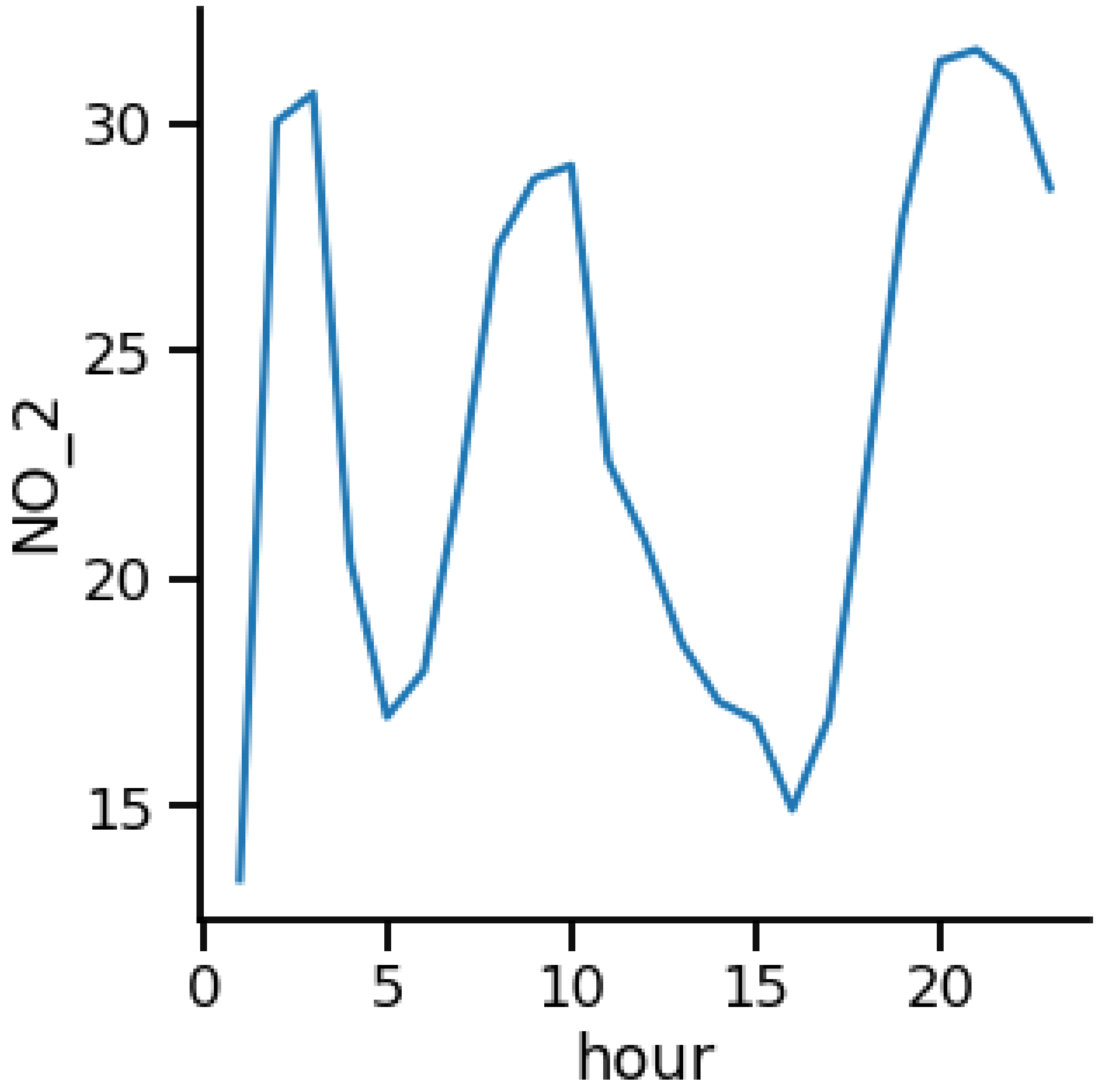
```
import matplotlib.pyplot as plt
import seaborn as sns

sns.relplot(x="hour", y="NO_2",
            data=air_df,
            kind="line",
            ci="sd")

plt.show()
```

Set the “ci” parameter equal to the string “sd” to make the shaded area represent the standard deviation, which shows the spread of the distribution of observations at each x value.



Turning off confidence interval

```python
import matplotlib.pyplot as plt
import seaborn as sns

sns.relplot(x="hour", y="NO_2",
            data=air_df,
            kind="line",
            ci=None)

plt.show()
```



Let's practice!

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