

# Introduction to relational plots and subplots

INTRODUCTION TO DATA VISUALIZATION WITH SEABORN

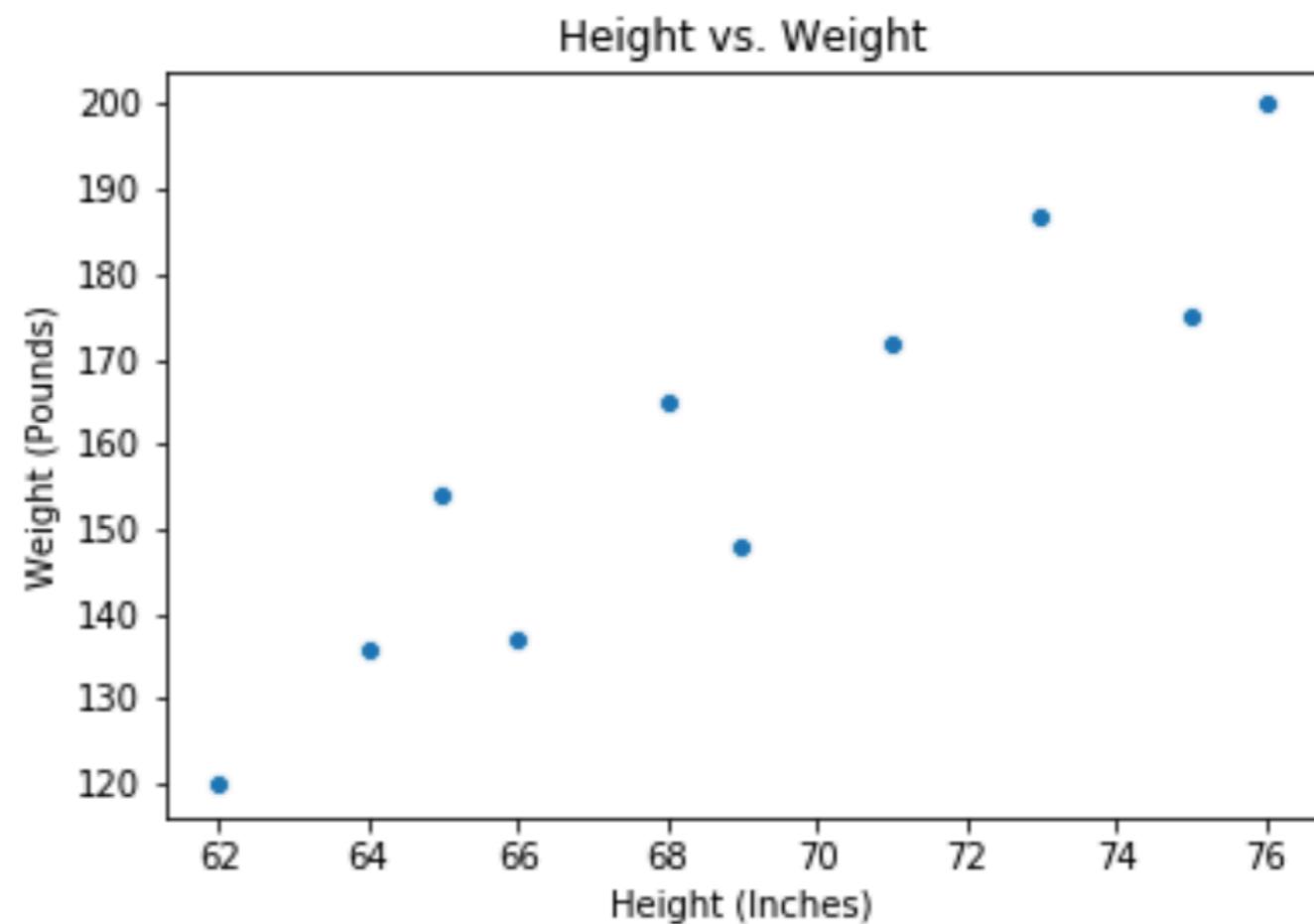


**Erin Case**  
Data Scientist

# Questions about quantitative variables

## Relational plots

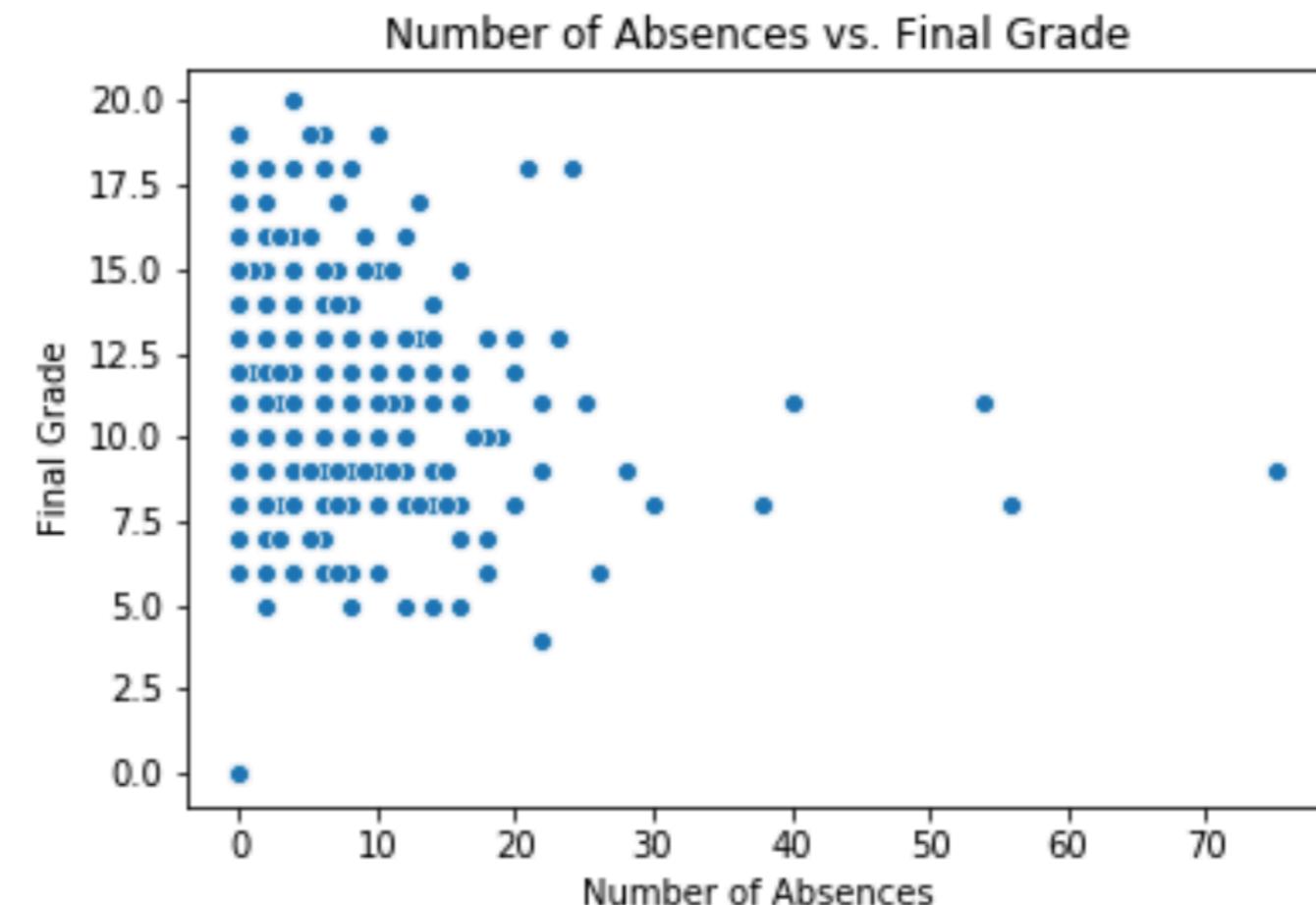
- Height vs. weight



# Questions about quantitative variables

## Relational plots

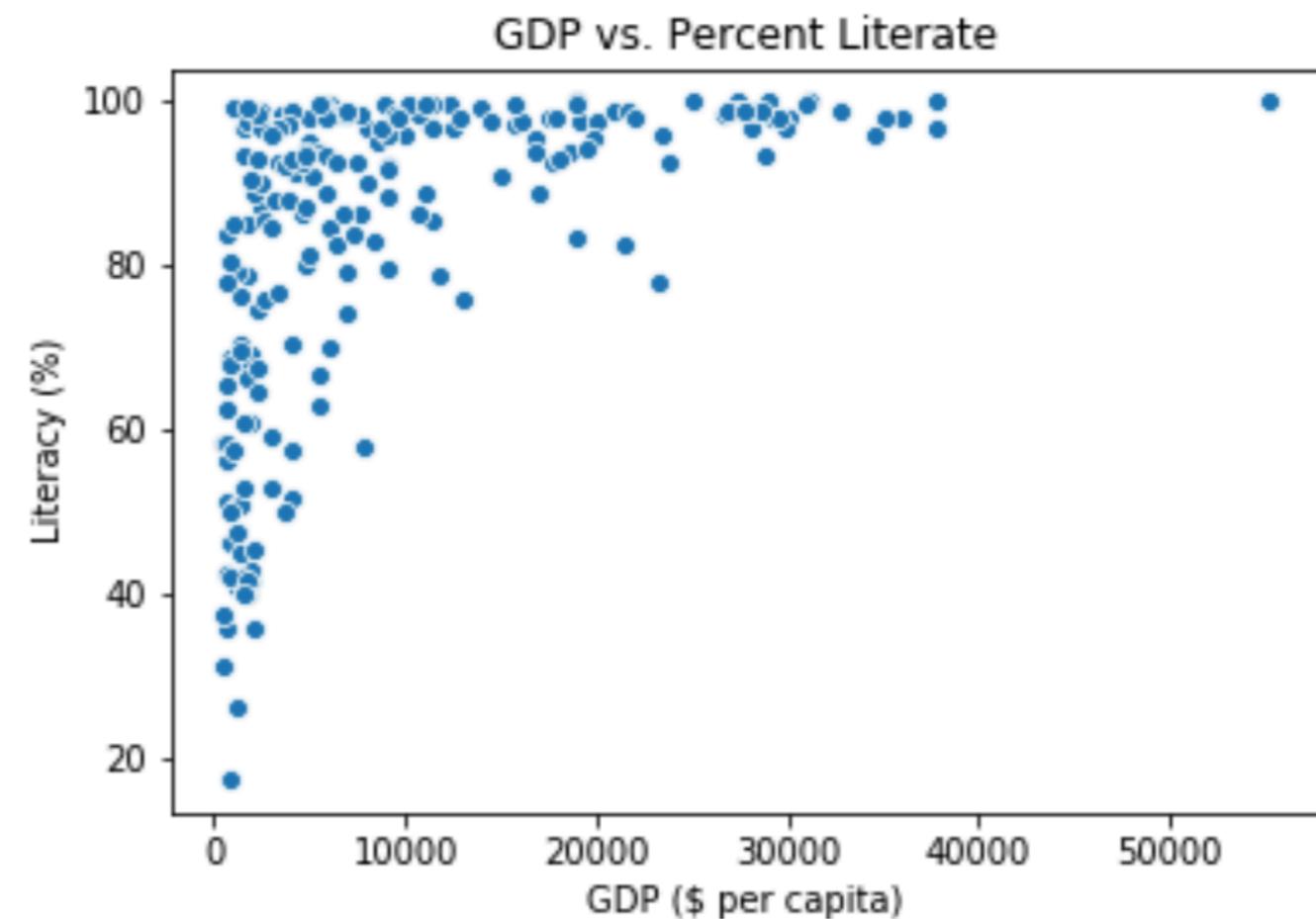
- Height vs. weight
- Number of school absences vs. final grade

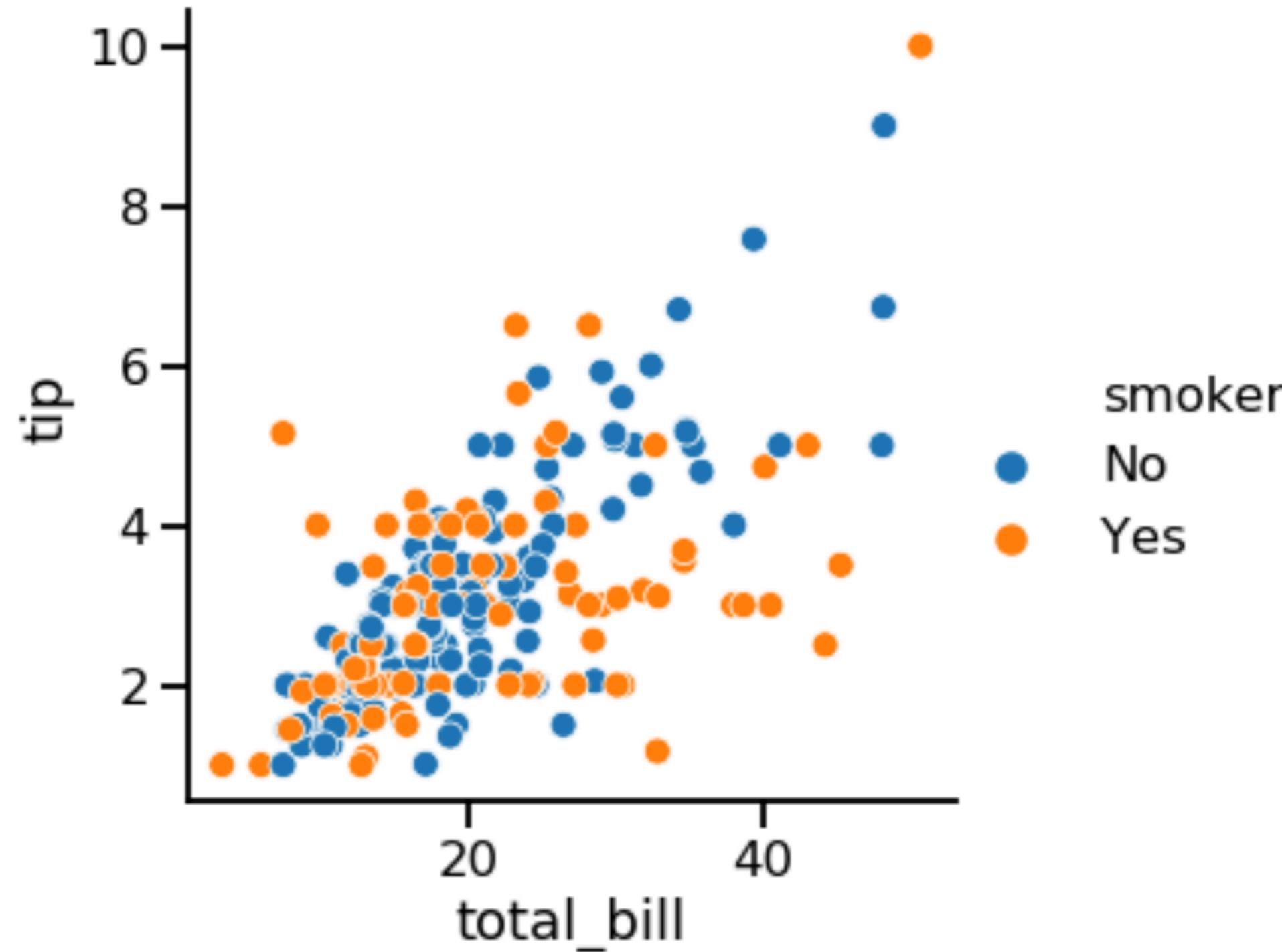


# Questions about quantitative variables

## Relational plots

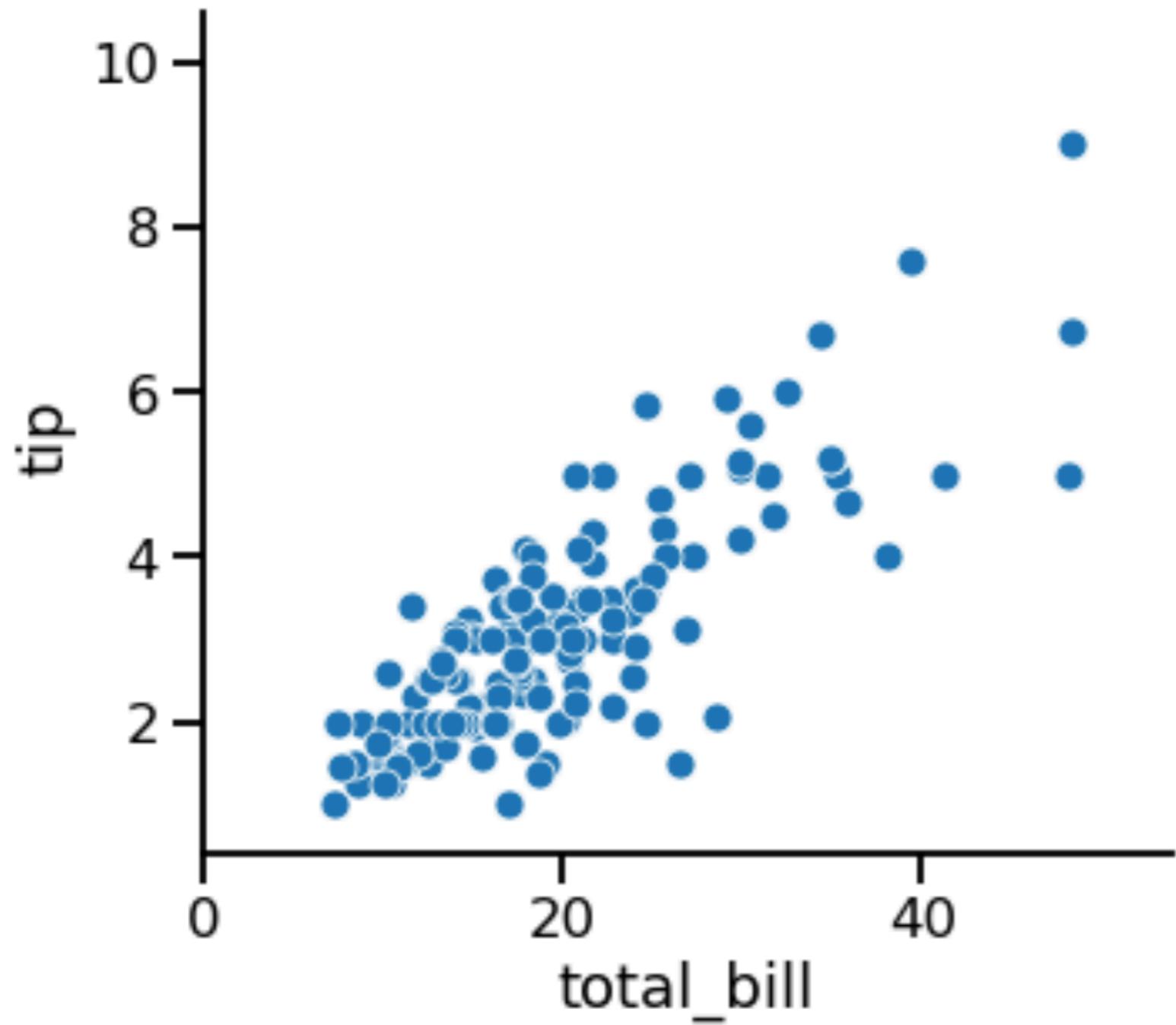
- Height vs. weight
- Number of school absences vs. final grade
- GDP vs. percent literate



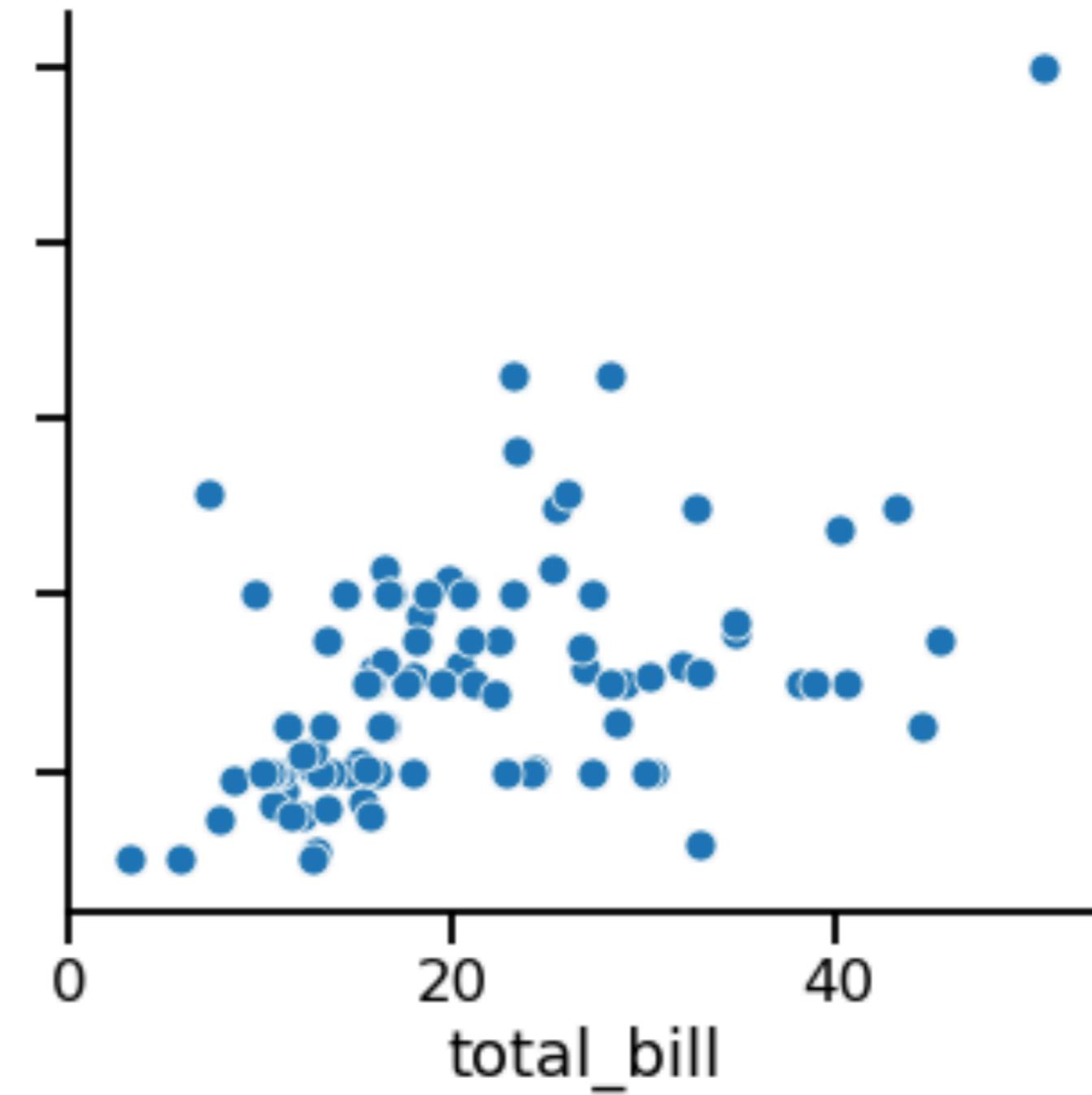


<sup>1</sup> Waskom, M. L. (2021). seaborn: statistical data visualization. <https://seaborn.pydata.org/>

smoker = No



smoker = Yes



<sup>1</sup> Waskom, M. L. (2021). seaborn: statistical data visualization. <https://seaborn.pydata.org/>

# 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()`

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

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

plt.show()
```

Using `relplot()`

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

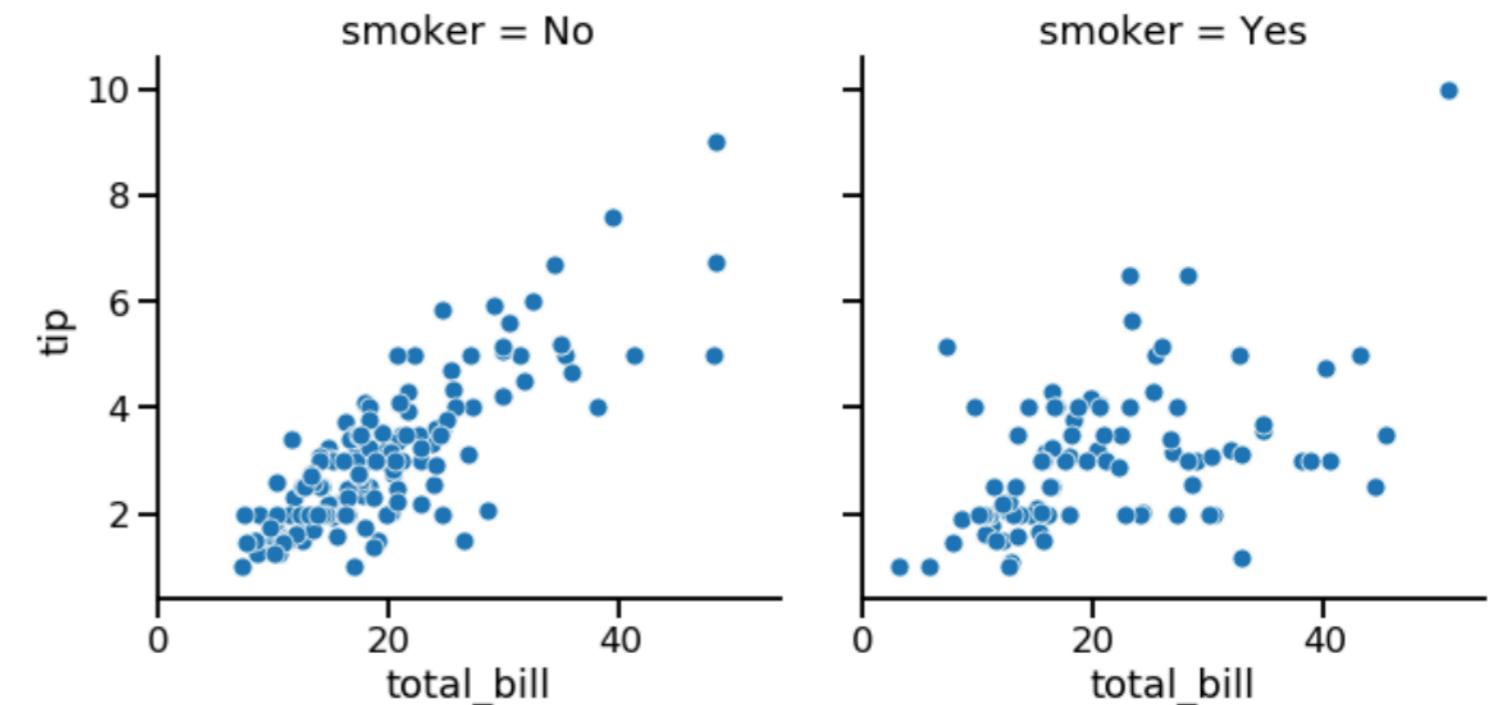
sns.relplot(x="total_bill",
             y="tip",
             data=tips,
             kind="scatter")

plt.show()
```

<sup>1</sup> Waskom, M. L. (2021). *seaborn: statistical data visualization*. <https://seaborn.pydata.org/>

# Subplots in columns

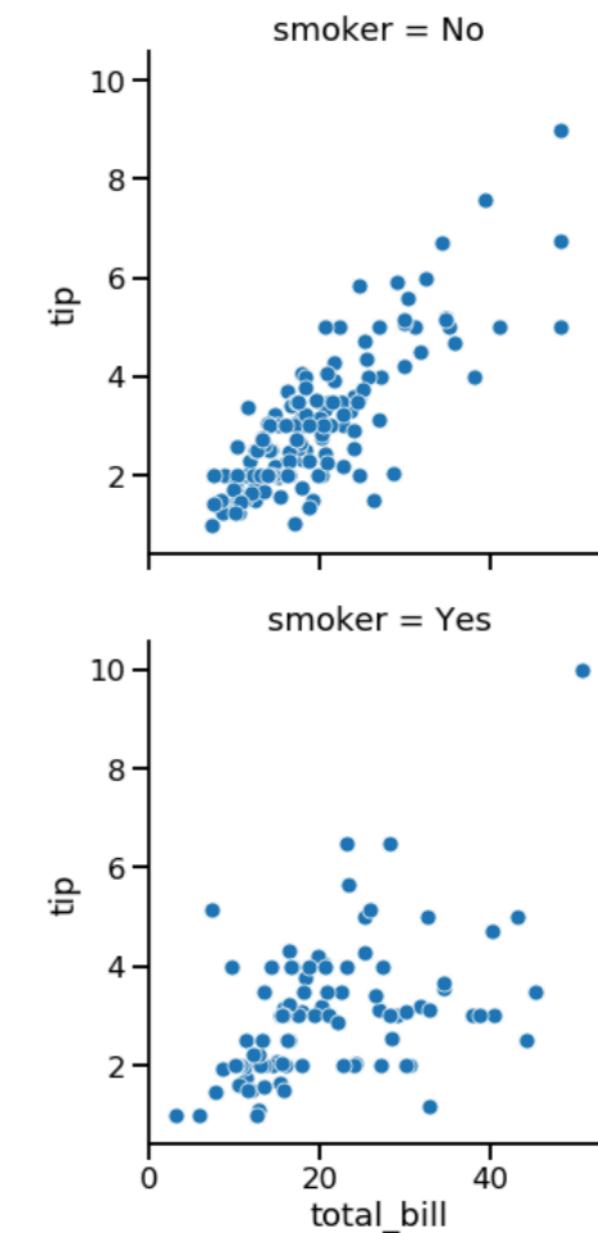
```
import seaborn as sns  
import matplotlib.pyplot as plt  
  
sns.relplot(x="total_bill",  
             y="tip",  
             data=tips,  
             kind="scatter",  
             col="smoker")  
  
plt.show()
```



<sup>1</sup> Waskom, M. L. (2021). seaborn: statistical data visualization. <https://seaborn.pydata.org/>

# Subplots in rows

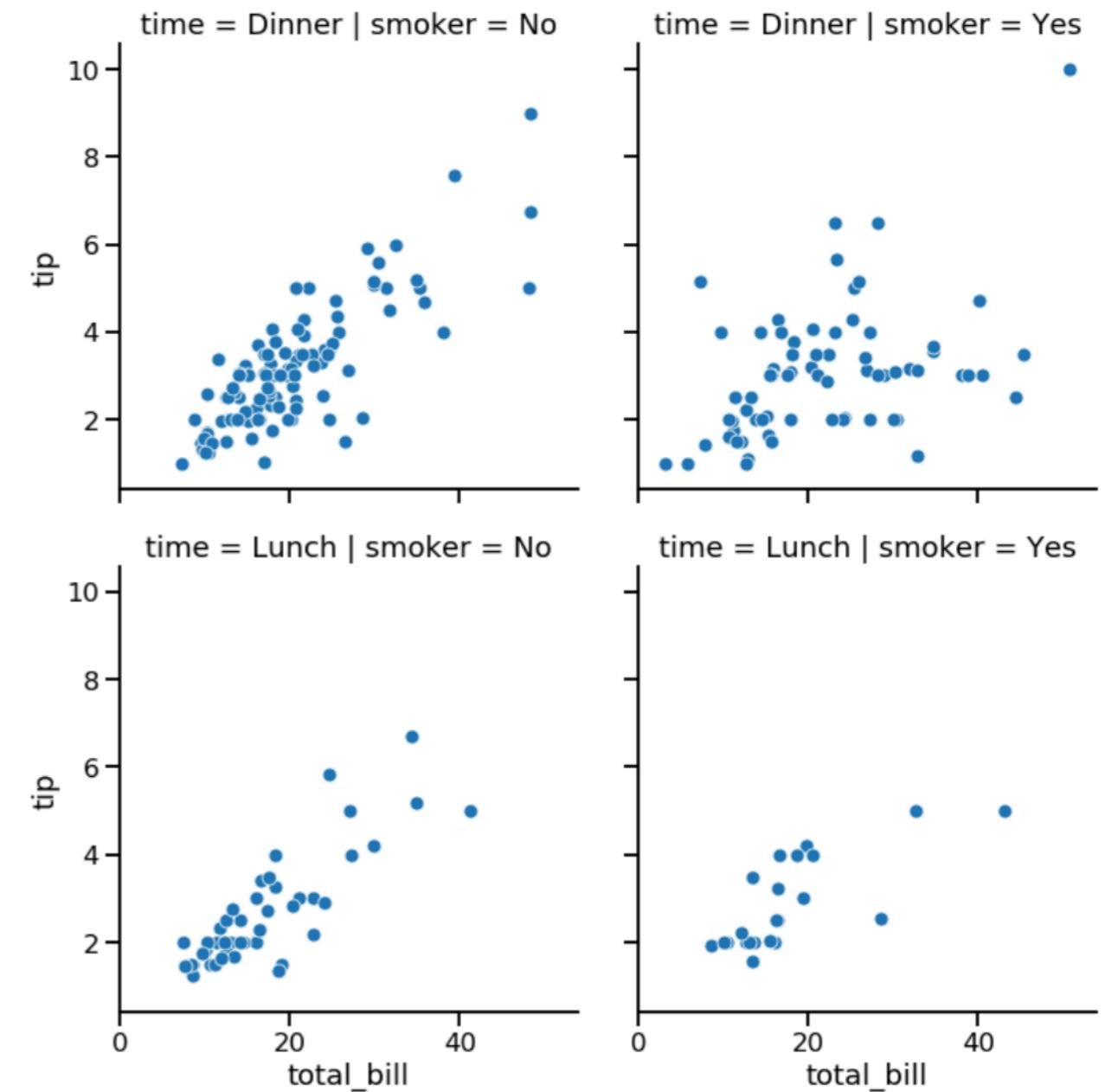
```
import seaborn as sns  
import matplotlib.pyplot as plt  
  
sns.relplot(x="total_bill",  
             y="tip",  
             data=tips,  
             kind="scatter",  
             row="smoker")  
  
plt.show()
```



<sup>1</sup> Waskom, M. L. (2021). seaborn: statistical data visualization. <https://seaborn.pydata.org/>

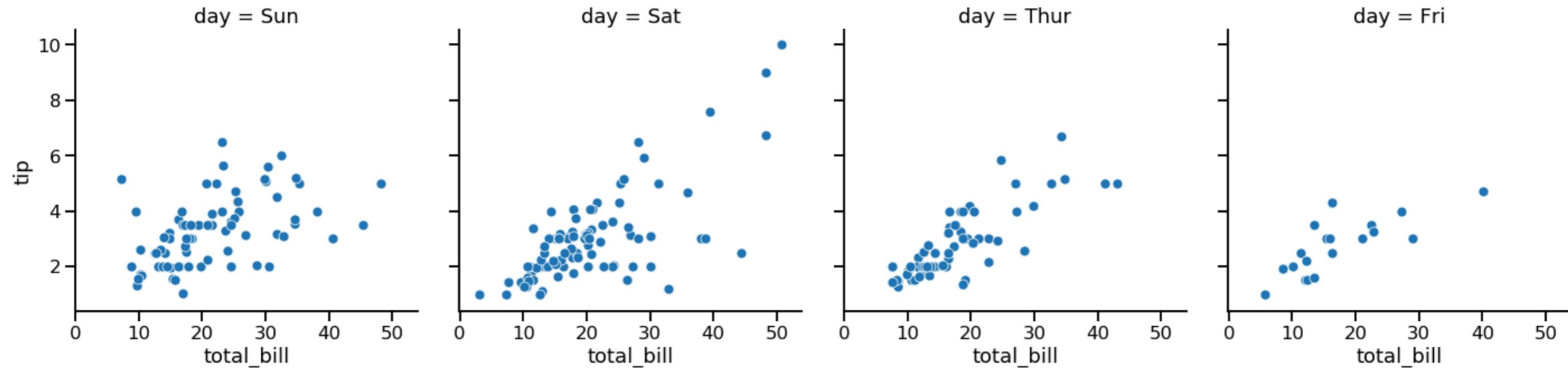
# Subplots in rows and columns

```
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()
```



<sup>1</sup> Waskom, M. L. (2021). seaborn: statistical data visualization. <https://seaborn.pydata.org/>

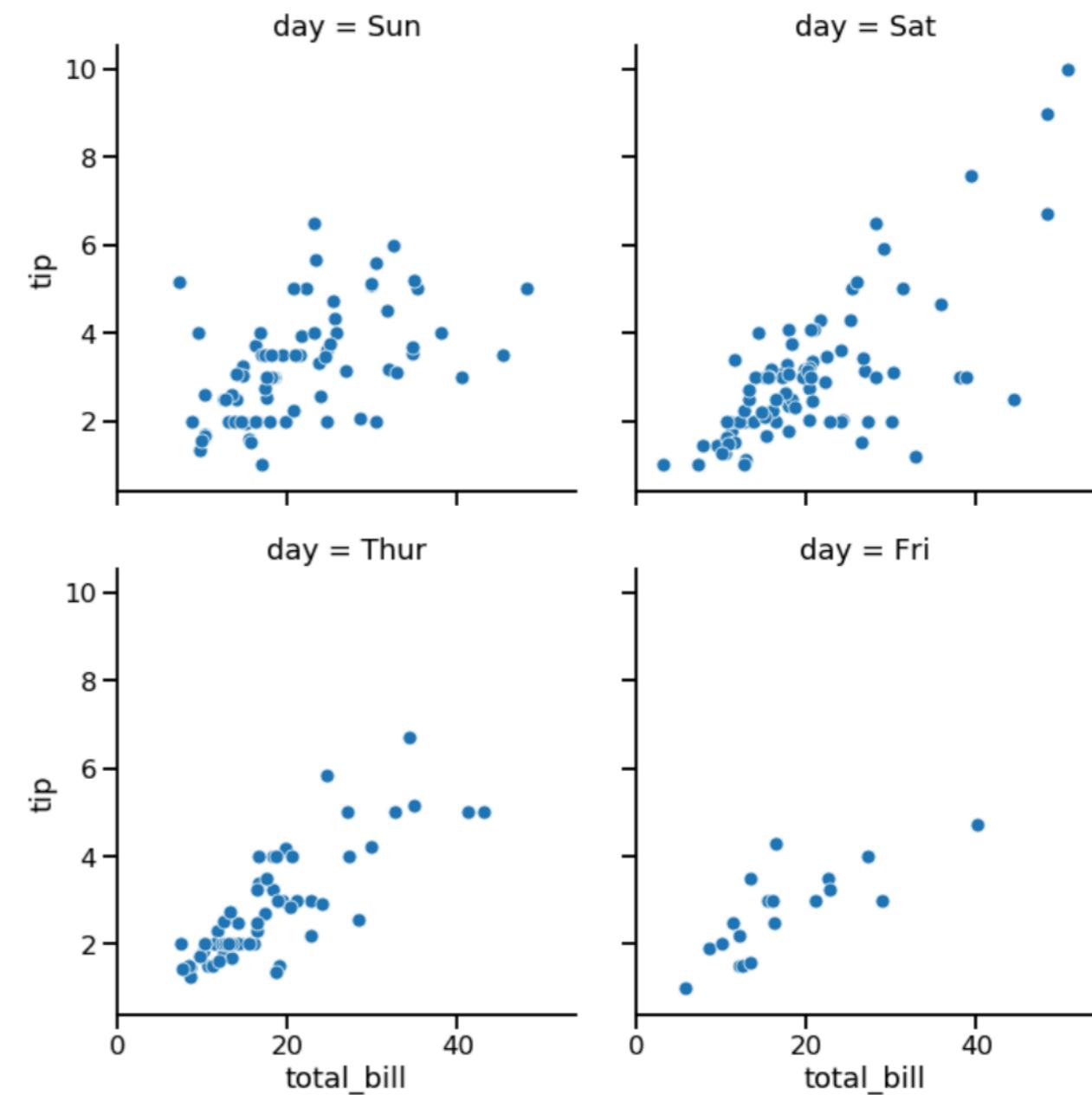
# Subgroups for days of the week



<sup>1</sup> Waskom, M. L. (2021). seaborn: statistical data visualization. <https://seaborn.pydata.org/>

# Wrapping columns

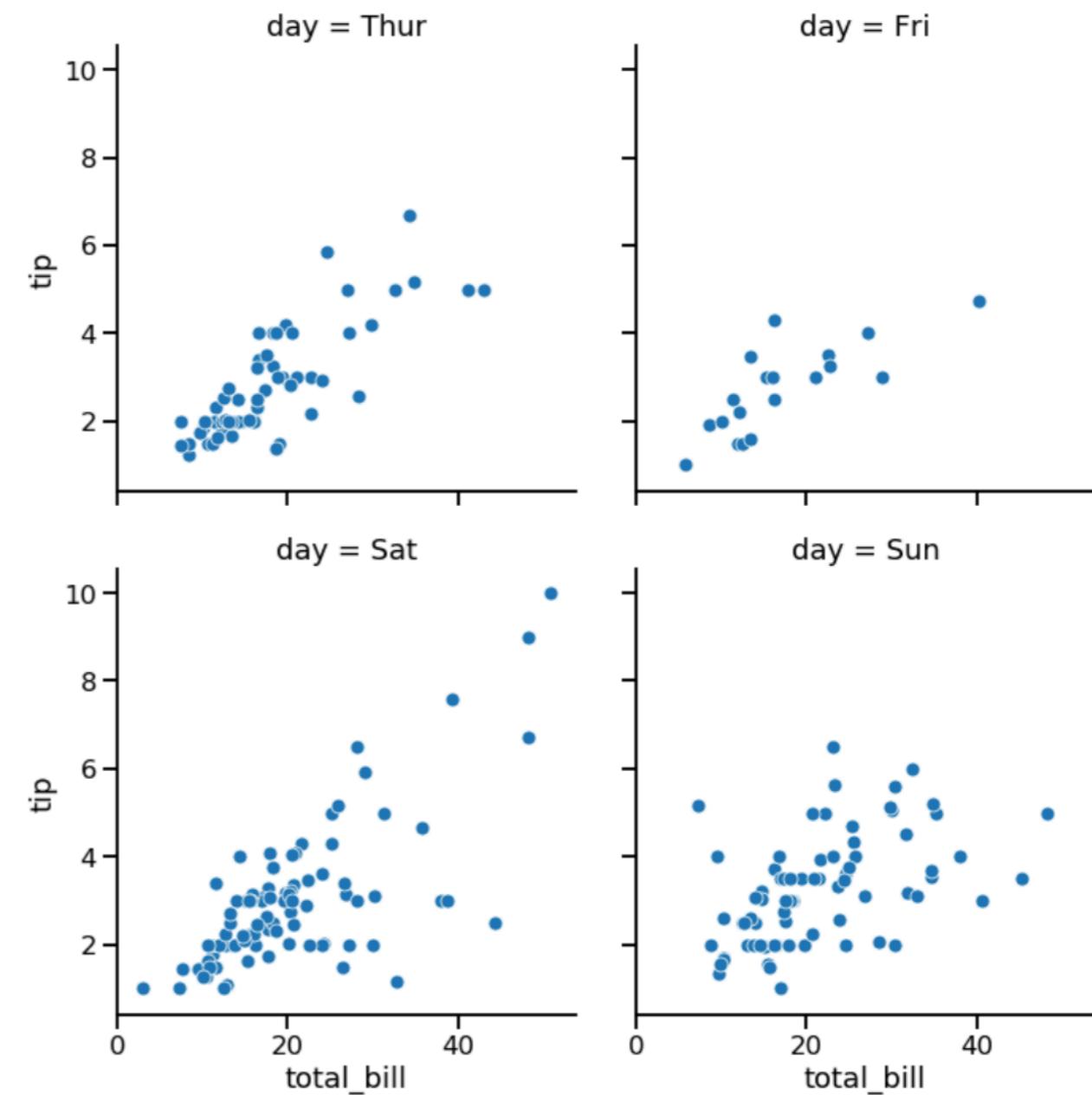
```
import seaborn as sns  
  
import matplotlib.pyplot as plt  
  
sns.relplot(x="total_bill",  
             y="tip",  
             data=tips,  
             kind="scatter",  
             col="day",  
             col_wrap=2)  
  
plt.show()
```



<sup>1</sup> Waskom, M. L. (2021). seaborn: statistical data visualization. <https://seaborn.pydata.org/>

# 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()
```



<sup>1</sup> Waskom, M. L. (2021). seaborn: statistical data visualization. <https://seaborn.pydata.org/>

# **Let's practice!**

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# Customizing scatter plots

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Data Scientist

# Scatter plot overview

Show relationship between two quantitative variables

We've seen:

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

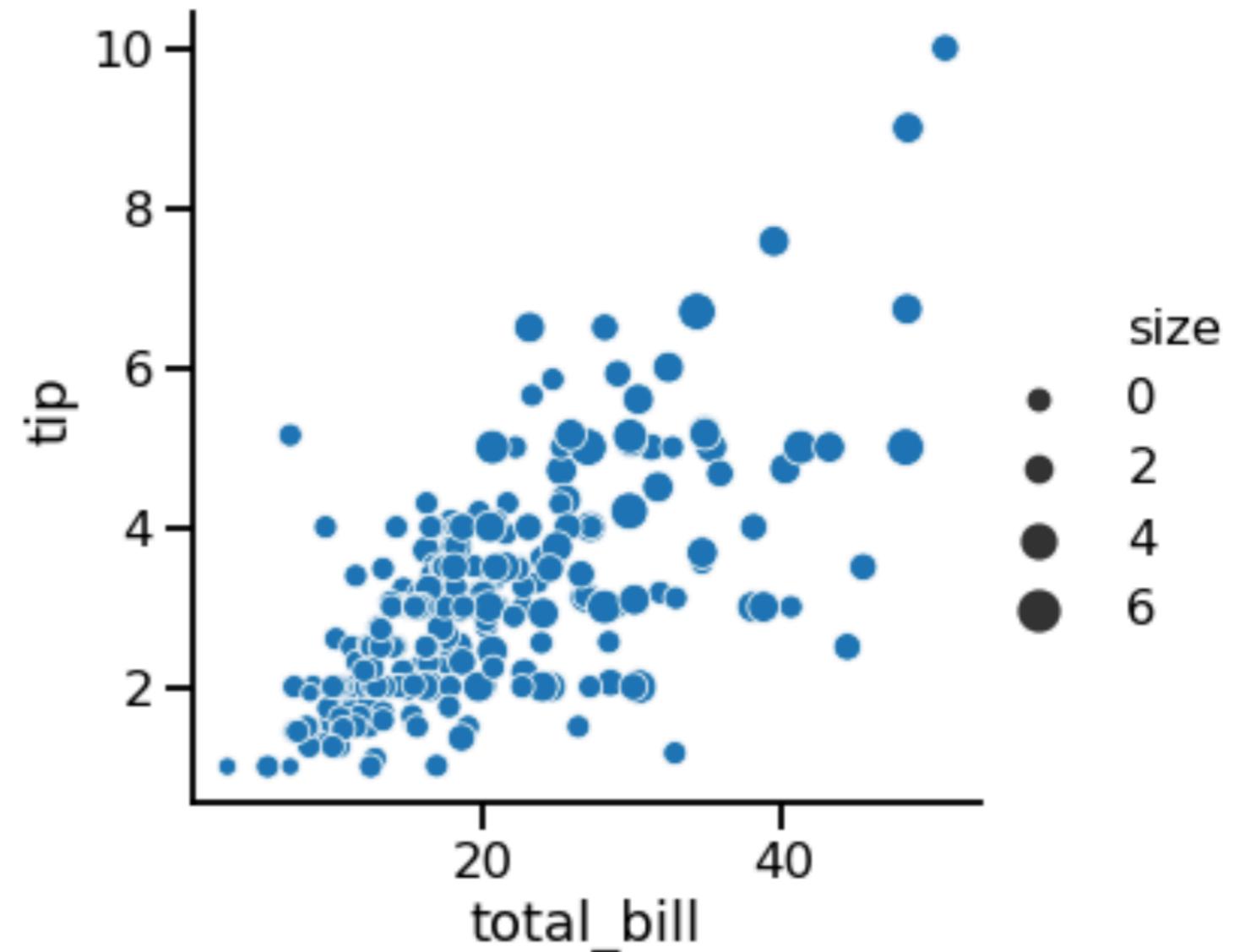
New Customizations:

- 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()
```



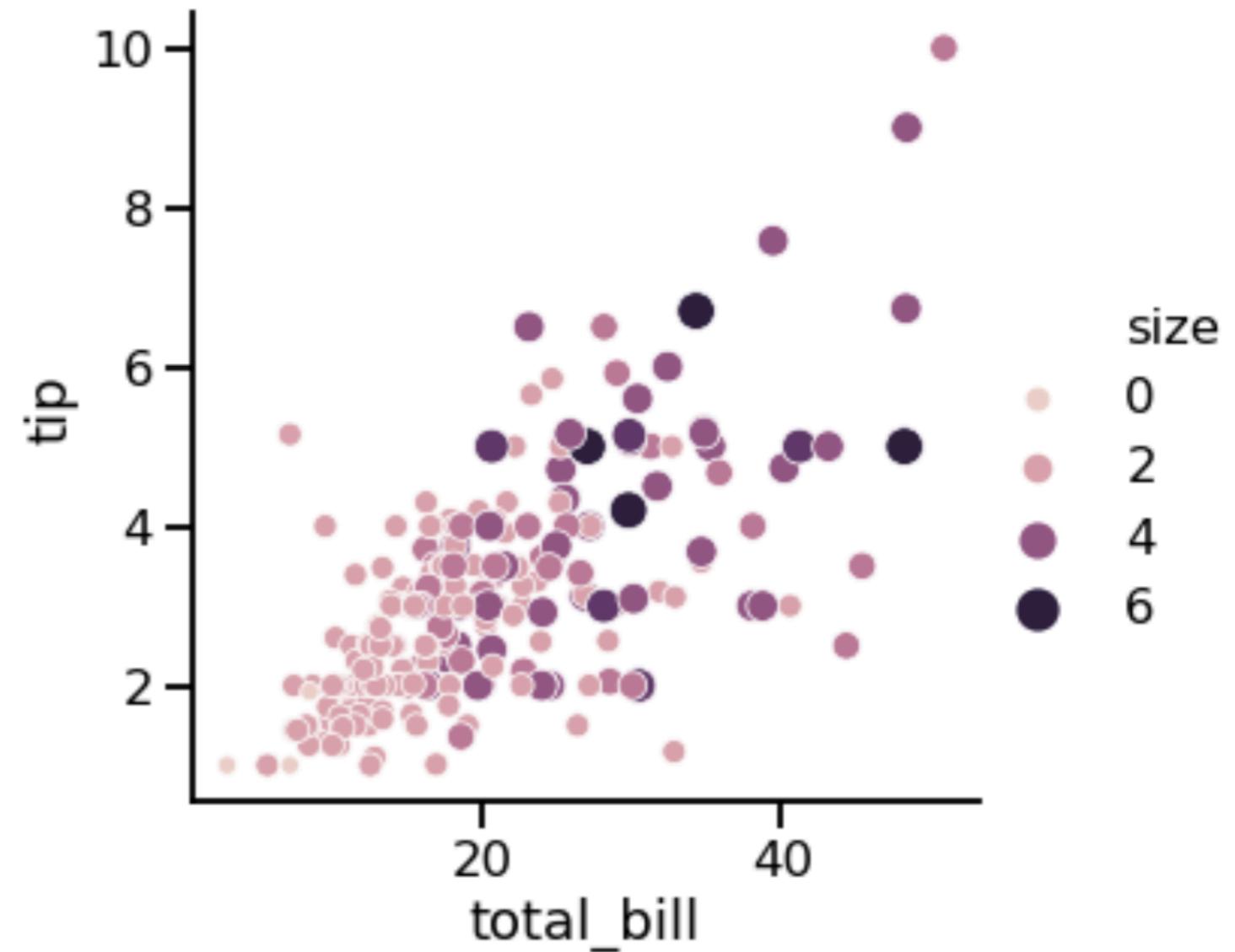
<sup>1</sup> Waskom, M. L. (2021). seaborn: statistical data visualization. <https://seaborn.pydata.org/>

# 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")

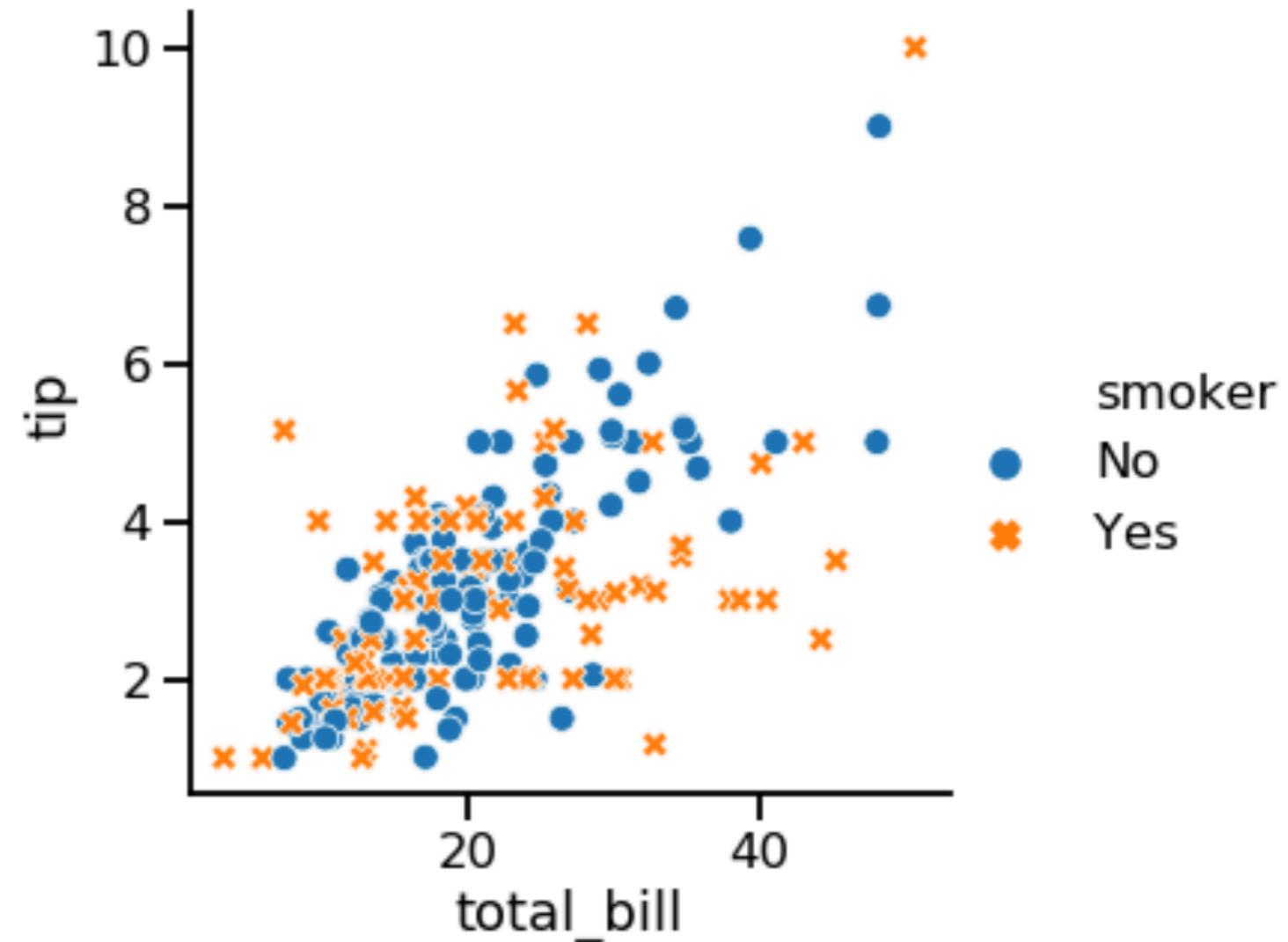
plt.show()
```



<sup>1</sup> Waskom, M. L. (2021). seaborn: statistical data visualization. <https://seaborn.pydata.org/>

# Subgroups with point style

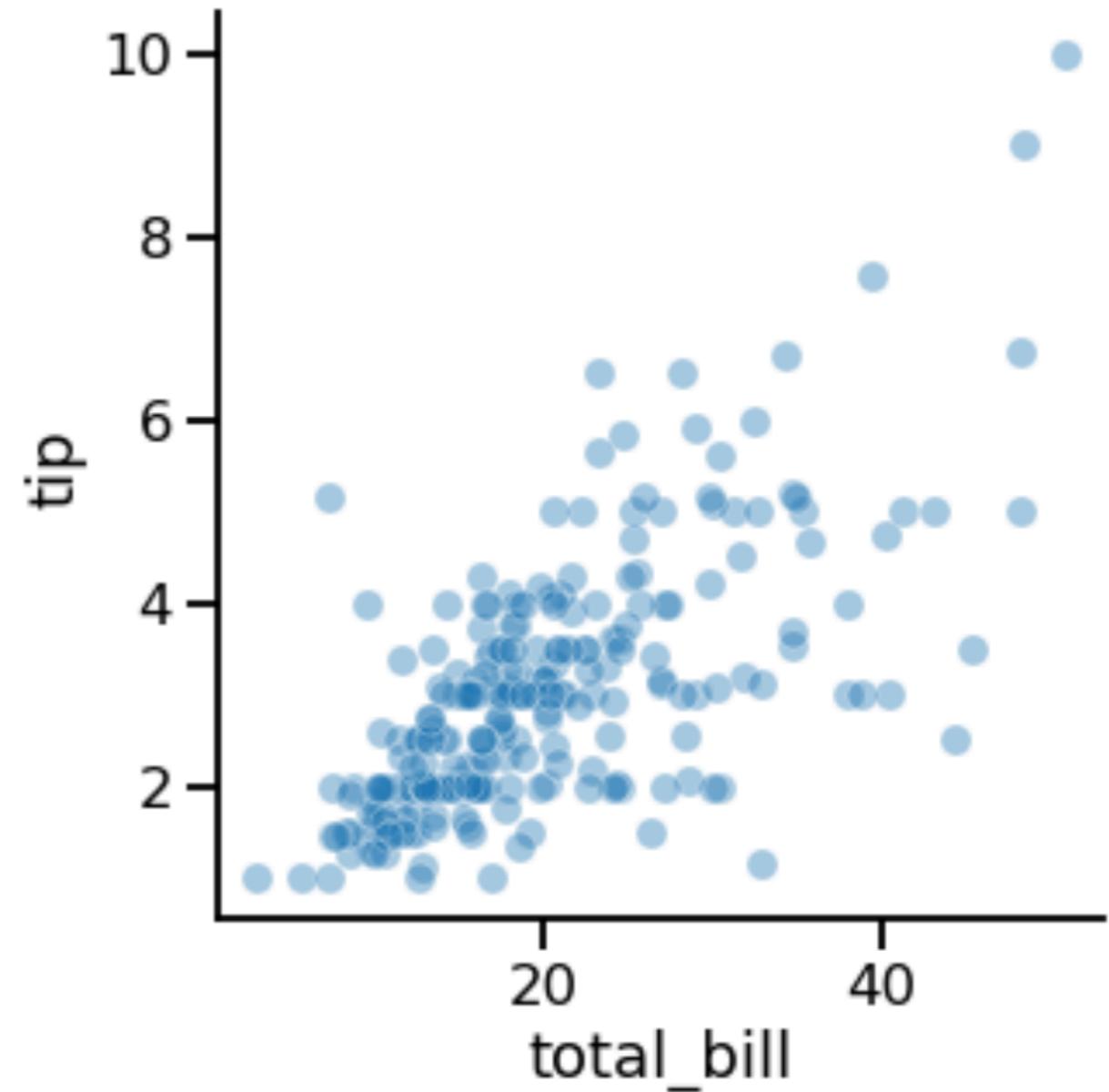
```
import seaborn as sns  
import matplotlib.pyplot as plt  
  
sns.relplot(x="total_bill",  
             y="tip",  
             data=tips,  
             kind="scatter",  
             hue="smoker",  
             style="smoker")  
  
plt.show()
```



<sup>1</sup> Waskom, M. L. (2021). seaborn: statistical data visualization. <https://seaborn.pydata.org/>

# 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()
```



<sup>1</sup> Waskom, M. L. (2021). seaborn: statistical data visualization. <https://seaborn.pydata.org/>

# **Let's practice!**

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# Introduction to line plots

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Data Scientist

# What are line plots?

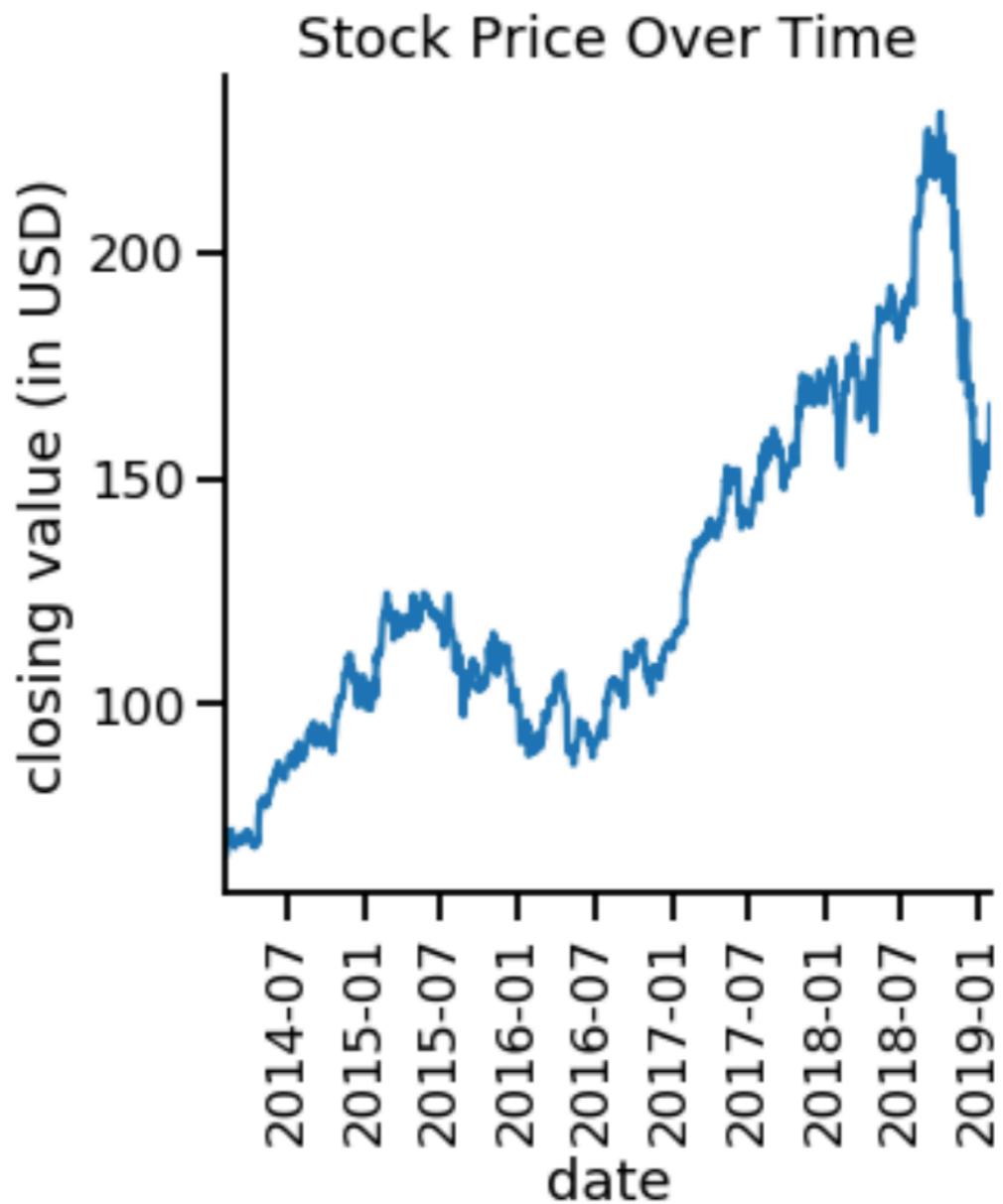
Two types of relational plots: scatter plots and line plots

## Scatter plots

- Each plot point is an independent observation

## Line plots

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



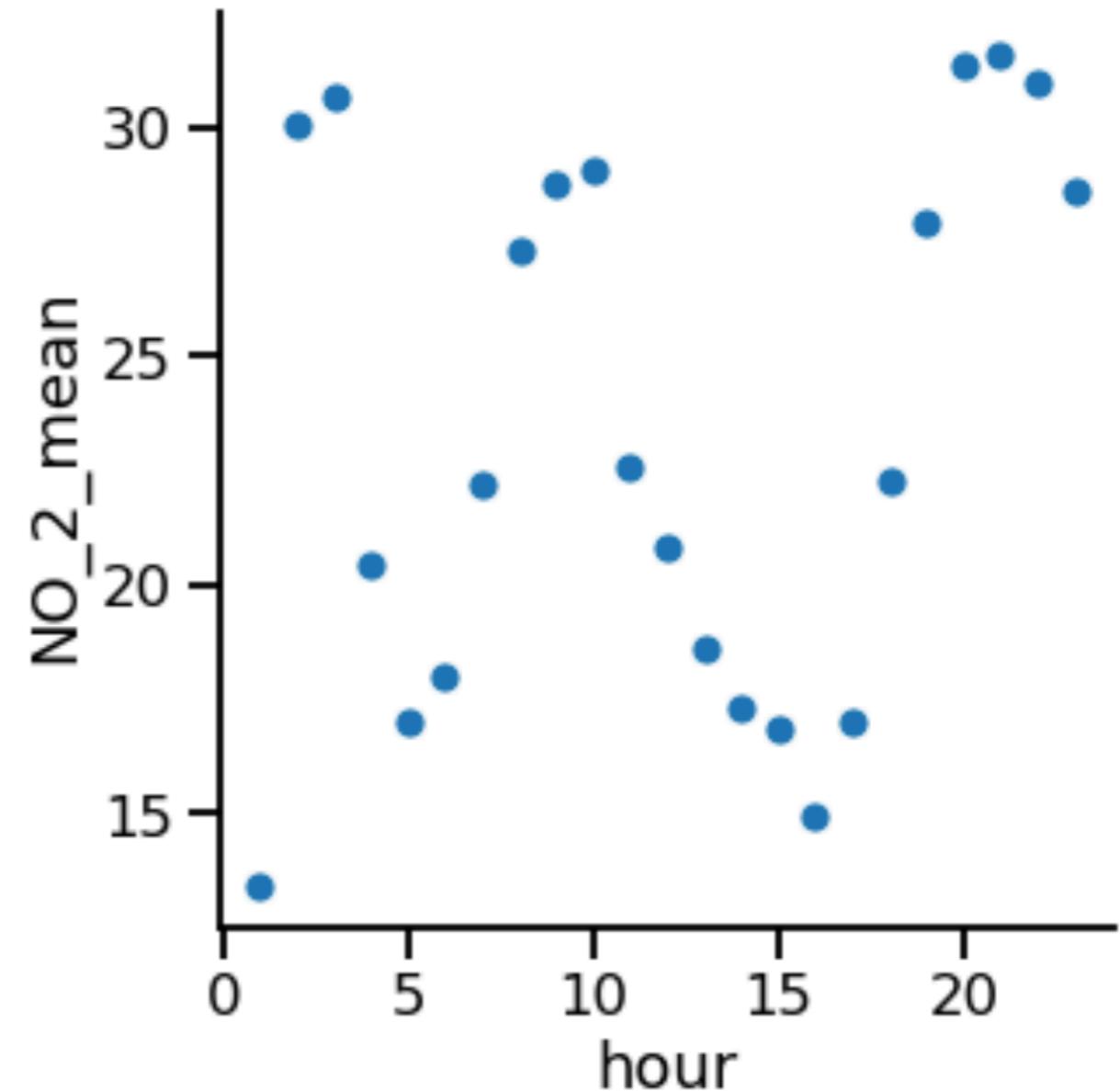
# Air pollution data

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

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

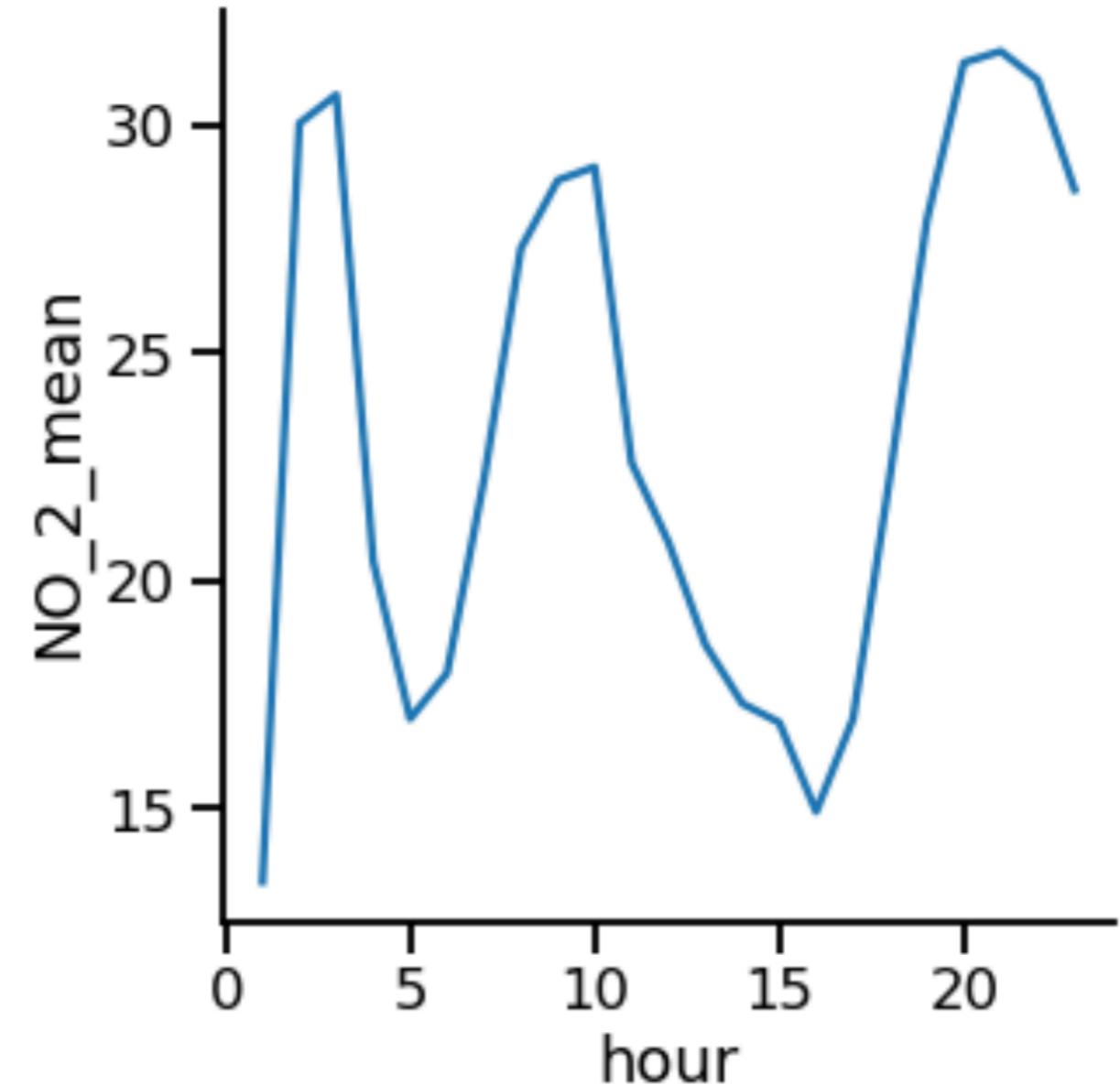
# Scatter plot

```
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

```
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()
```

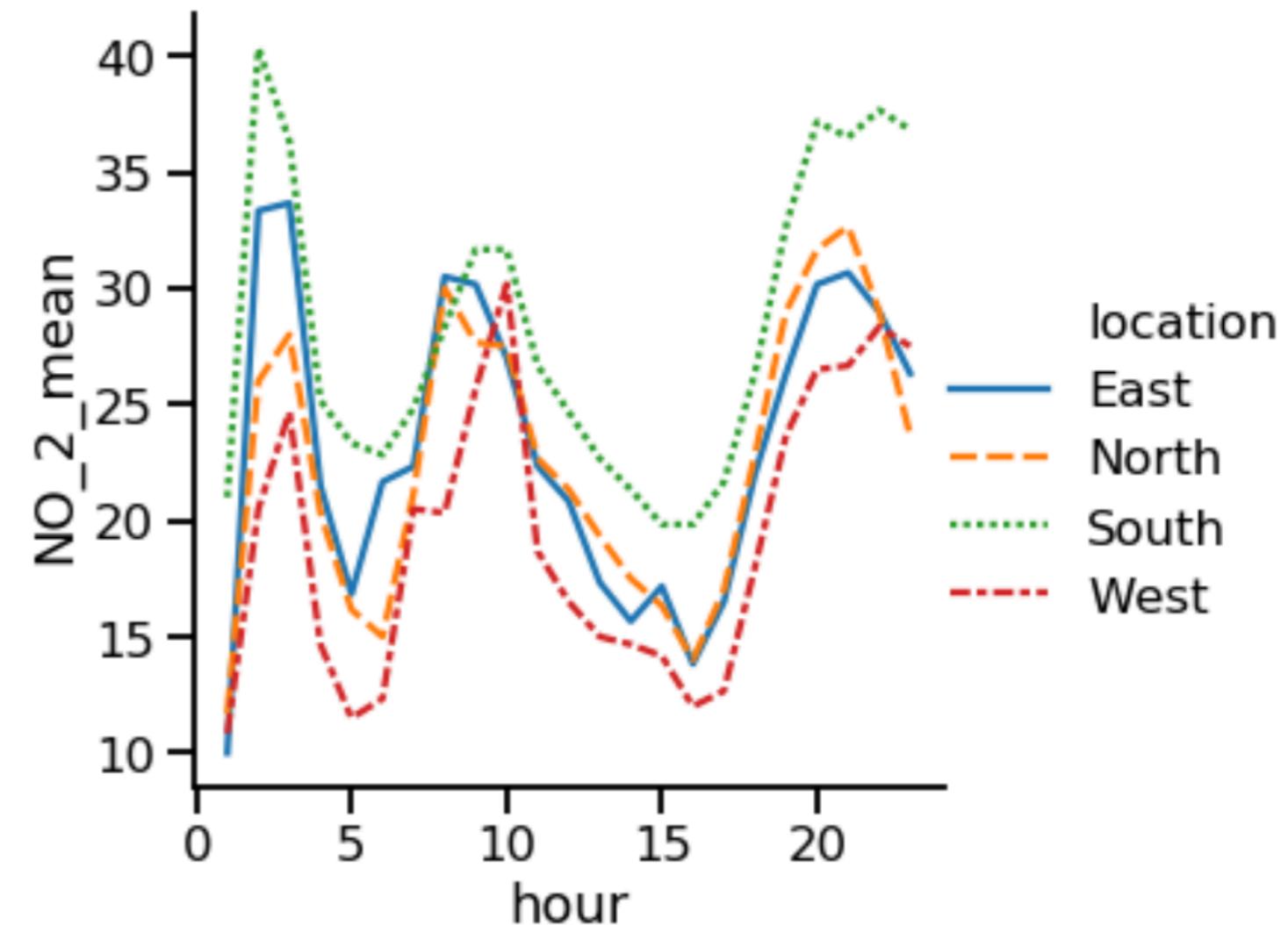


# Subgroups by location

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

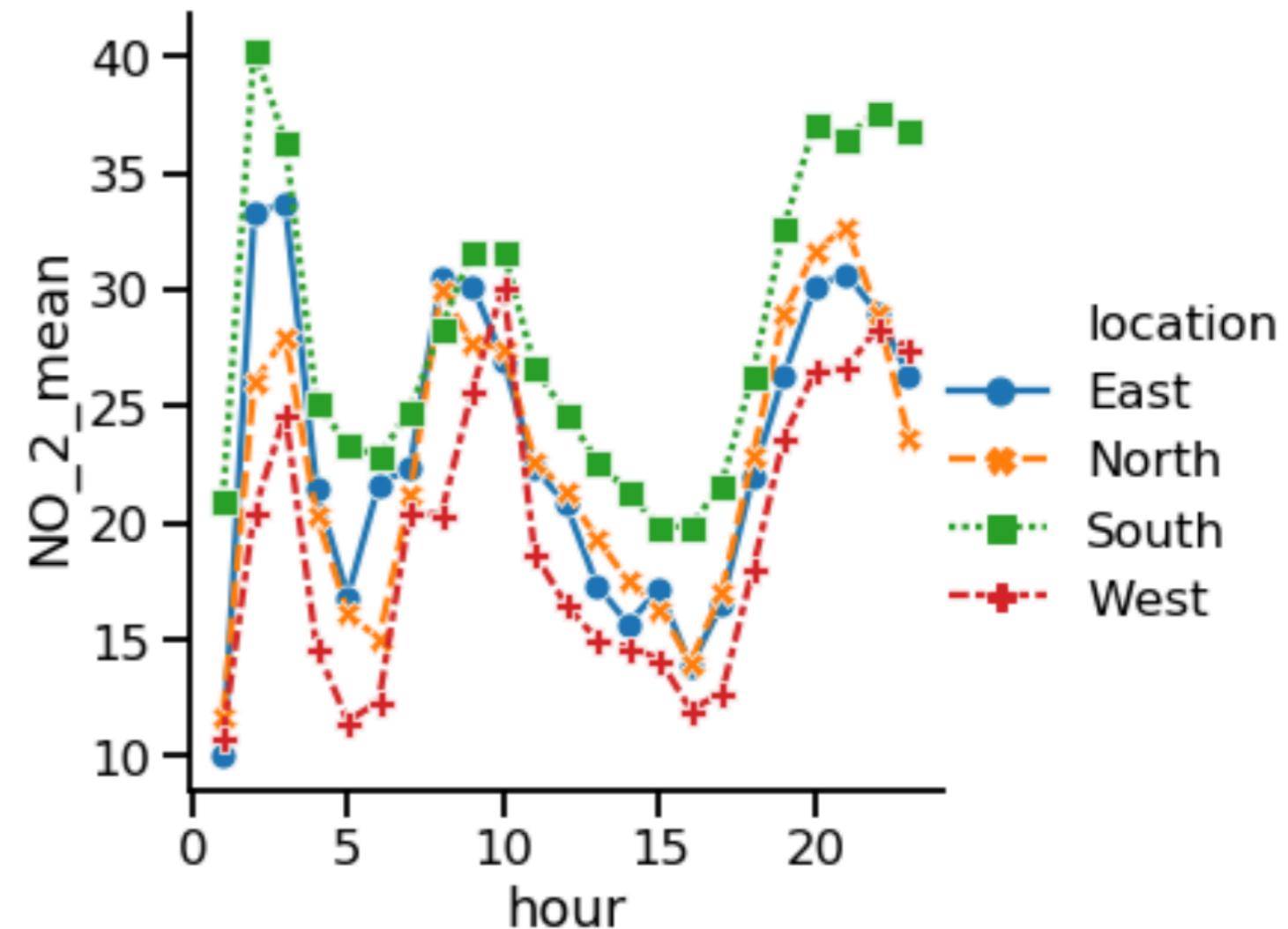
# Subgroups by location

```
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()
```



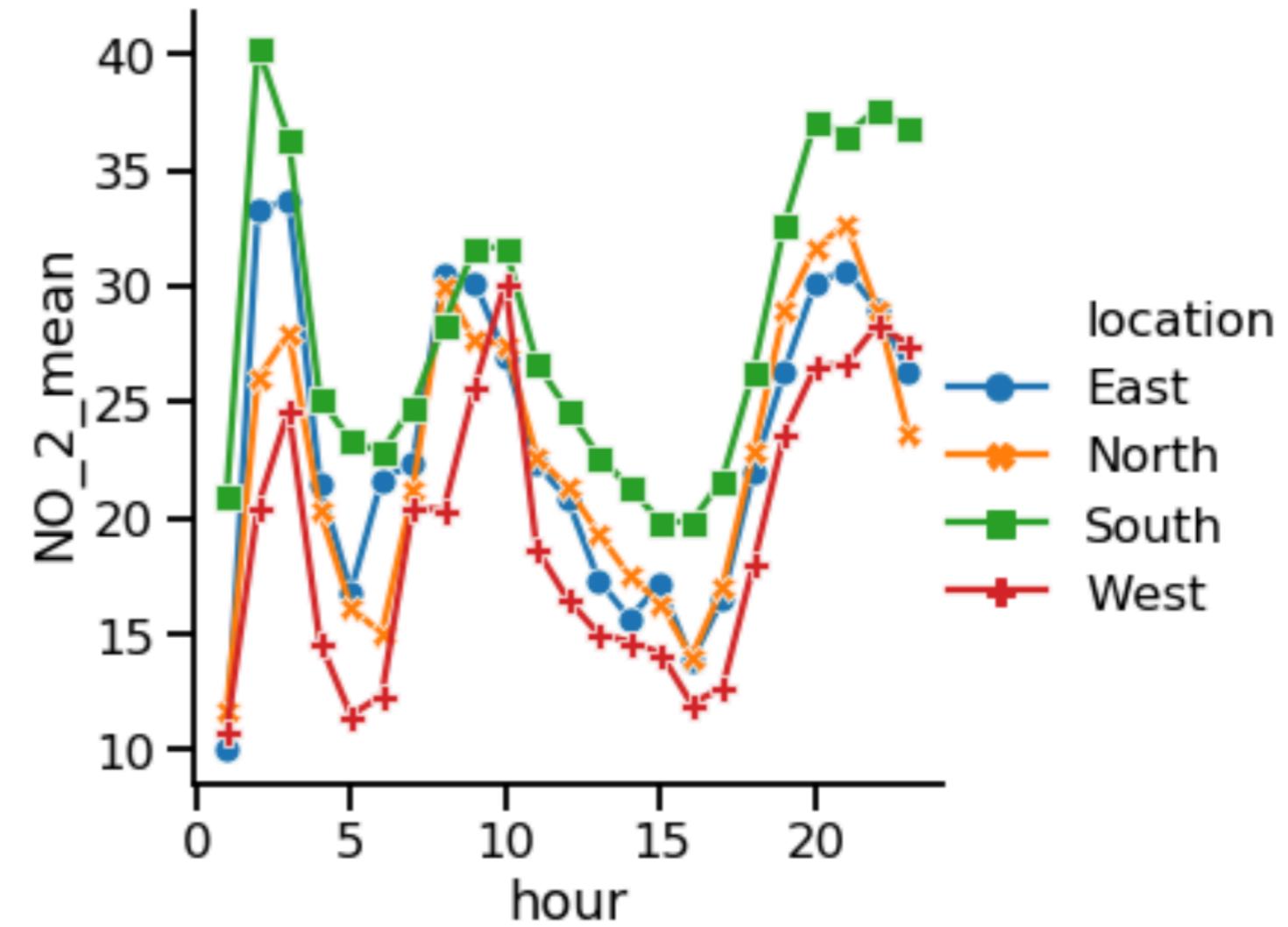
# Adding markers

```
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()
```



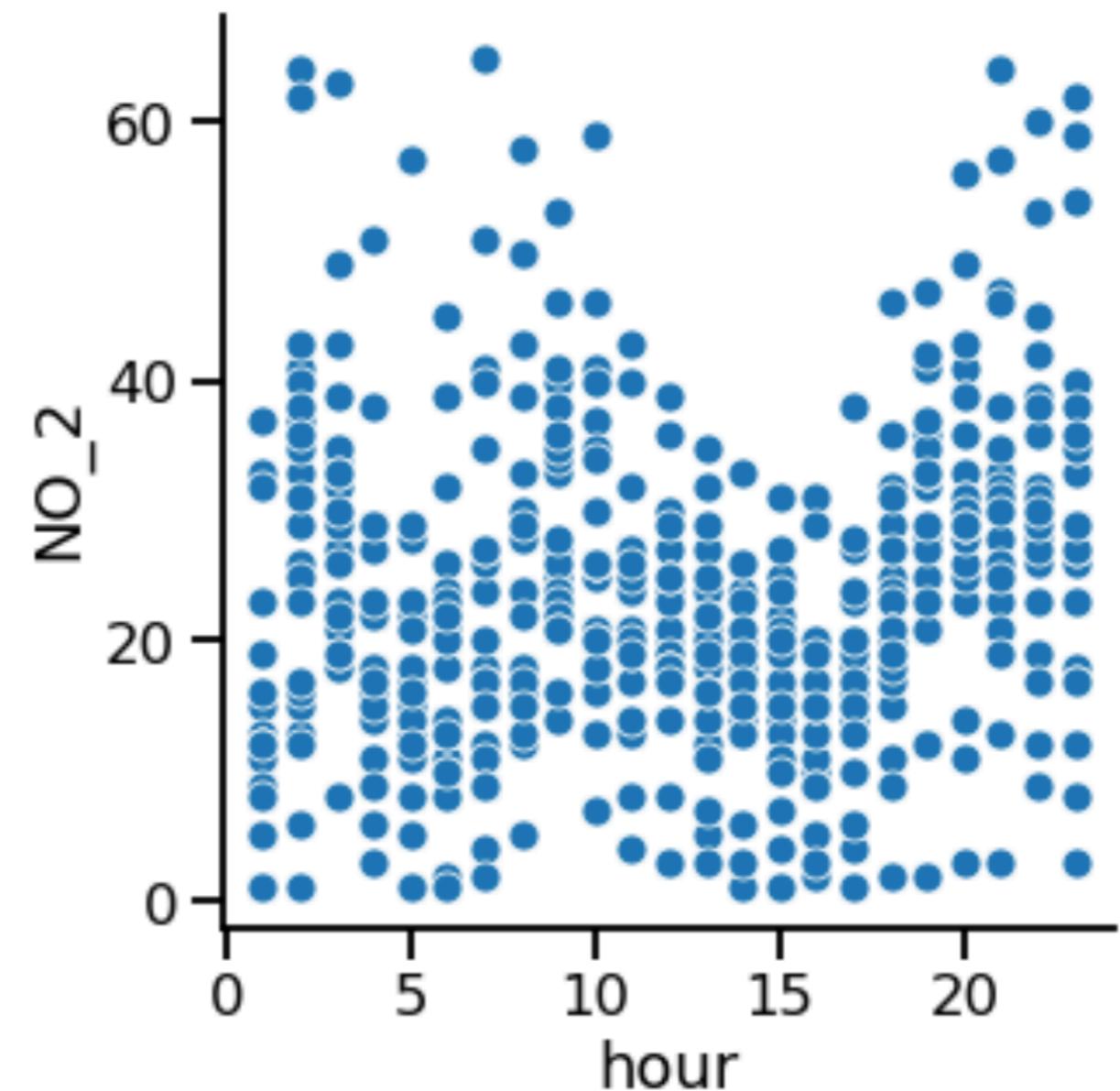
# Multiple observations per x-value

	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

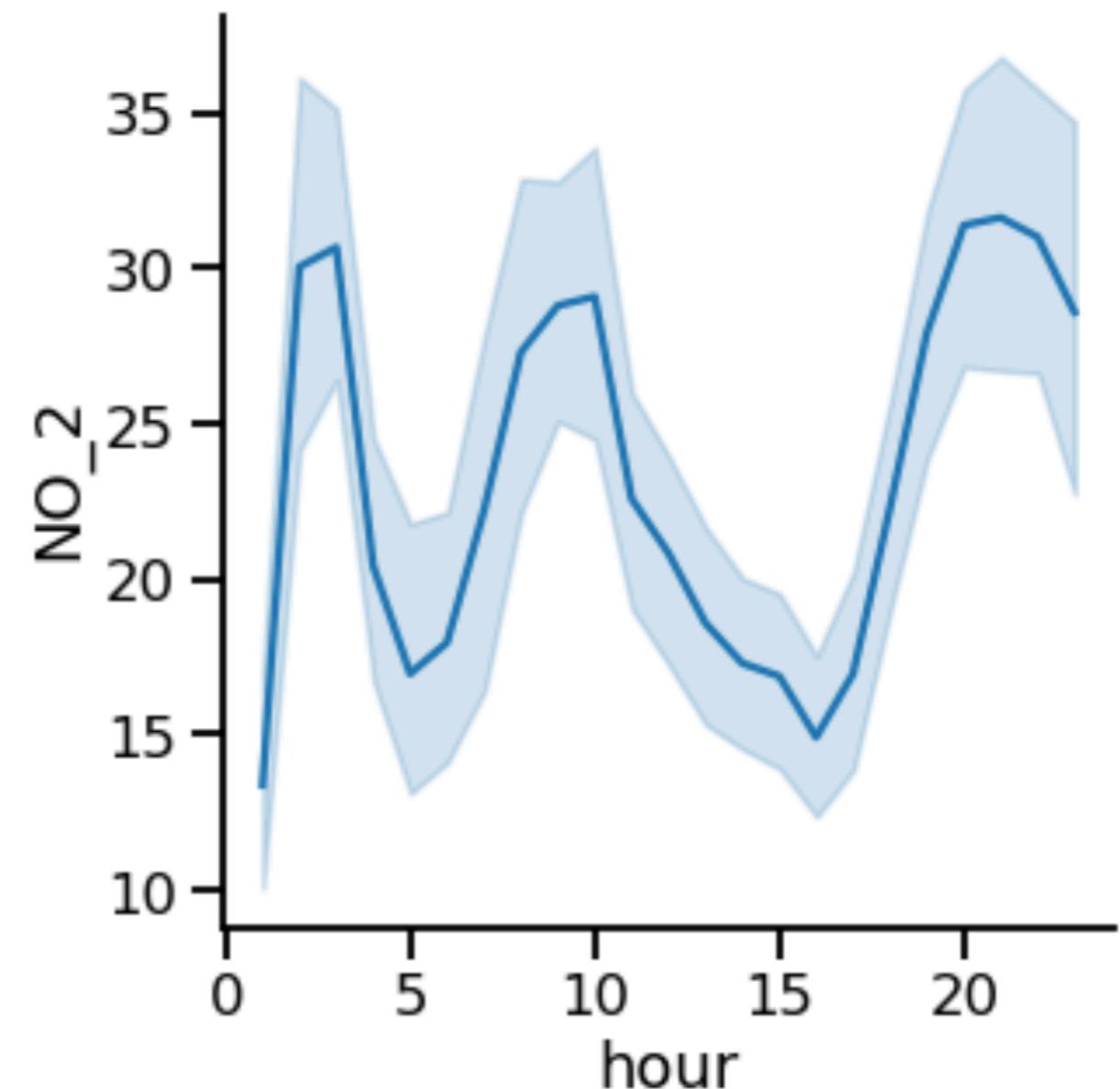
```
import matplotlib.pyplot as plt  
import seaborn as sns  
  
sns.relplot(x="hour", y="NO_2",  
             data=air_df,  
             kind="scatter")  
  
plt.show()
```



# Multiple observations per x-value

## Line plot

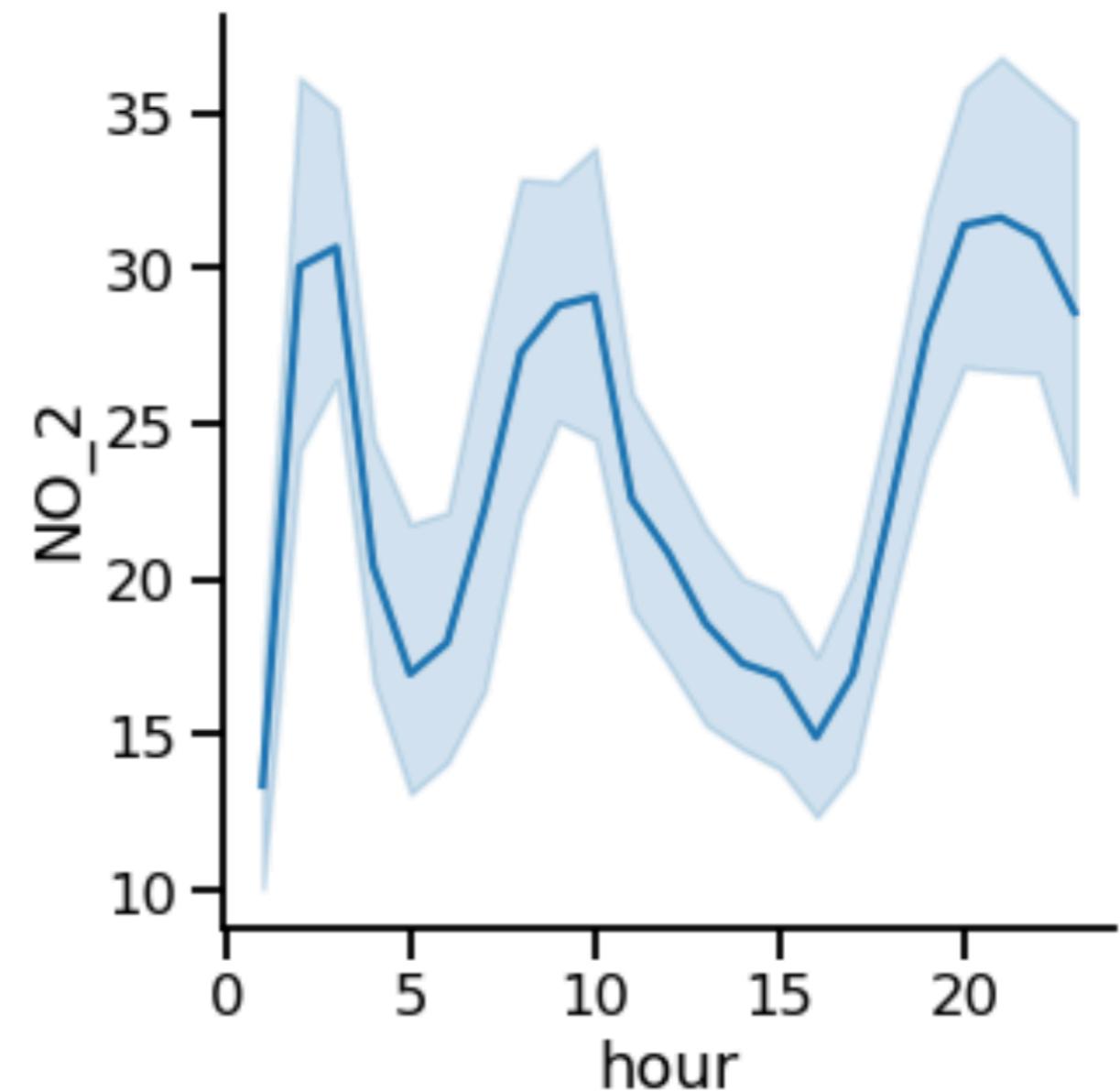
```
import matplotlib.pyplot as plt  
import seaborn as sns  
  
sns.relplot(x="hour", y="NO_2",  
             data=air_df,  
             kind="line")  
  
plt.show()
```



# Multiple observations per x-value

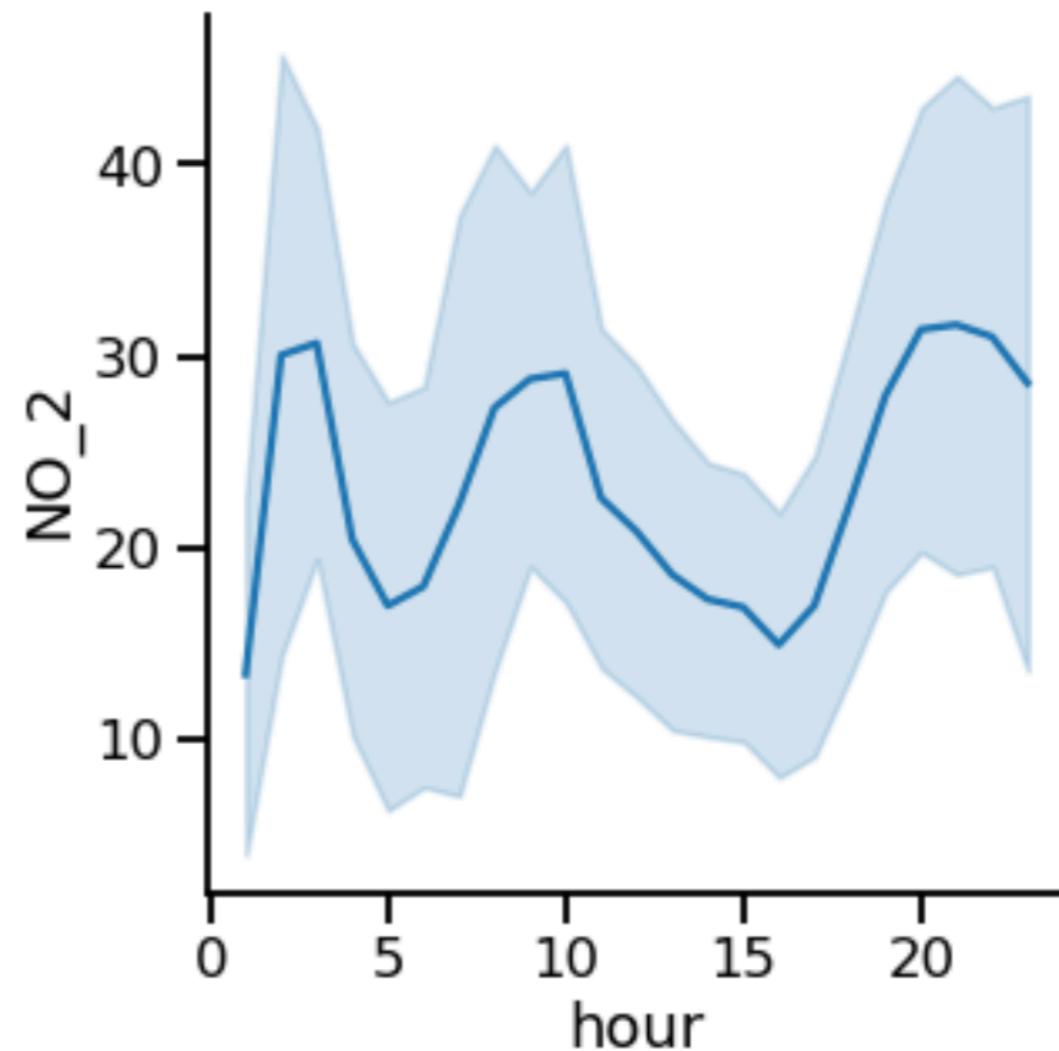
Shaded region is the confidence interval

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



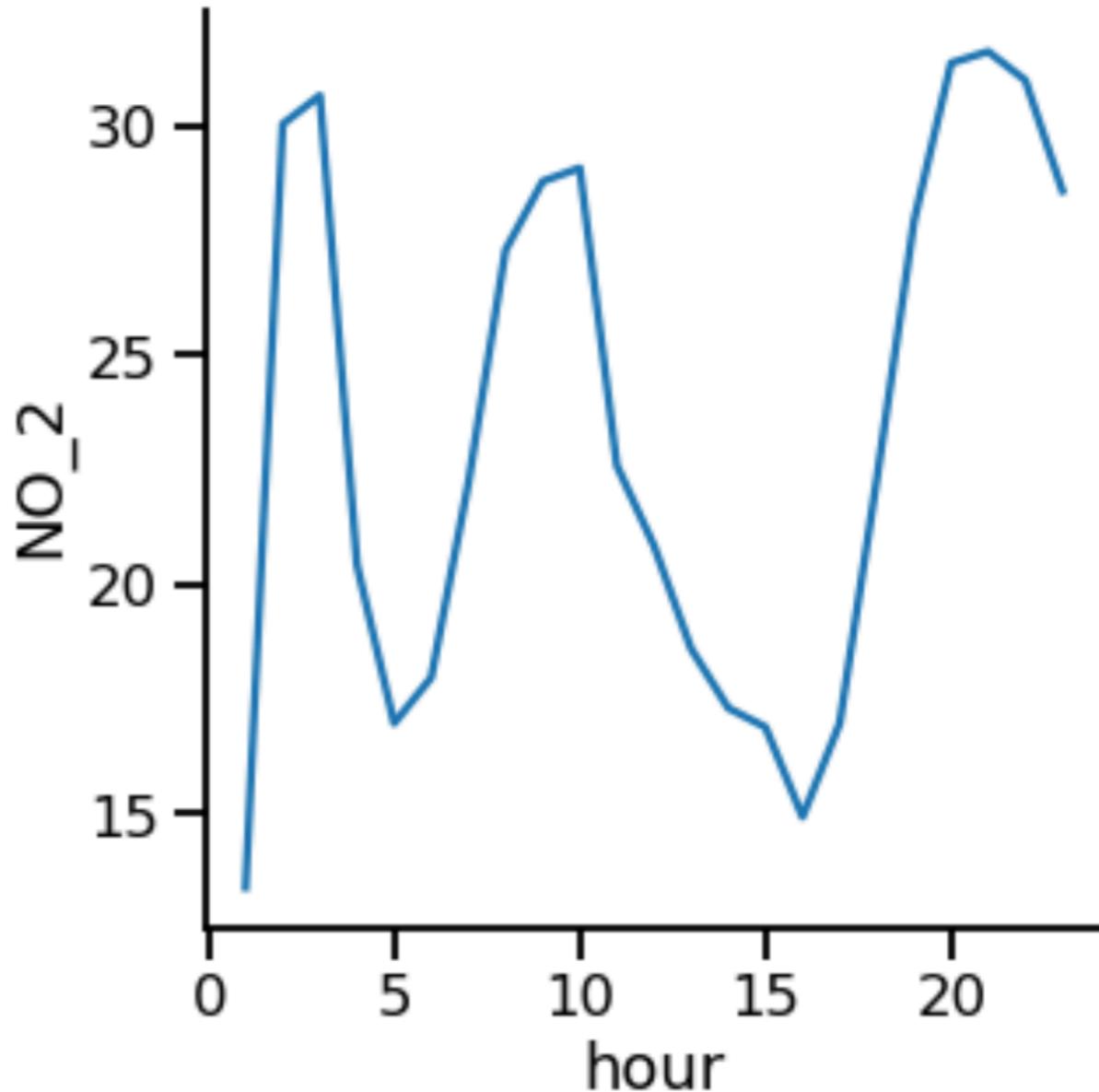
# Replacing confidence interval with standard deviation

```
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()
```



# Turning off confidence interval

```
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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