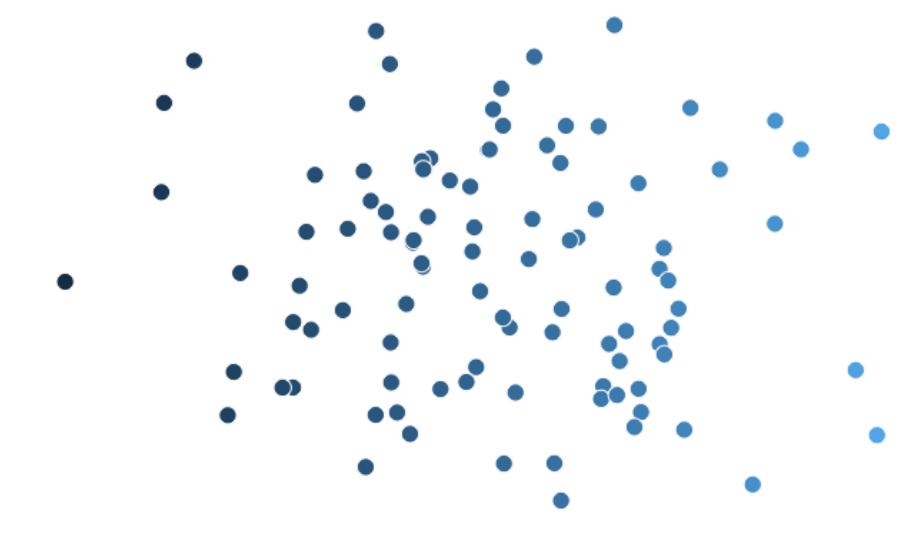
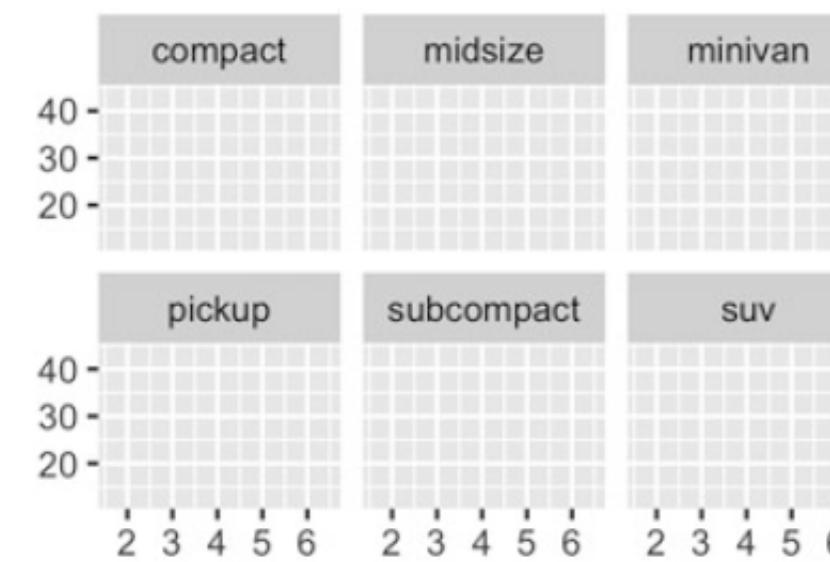


Building blocks

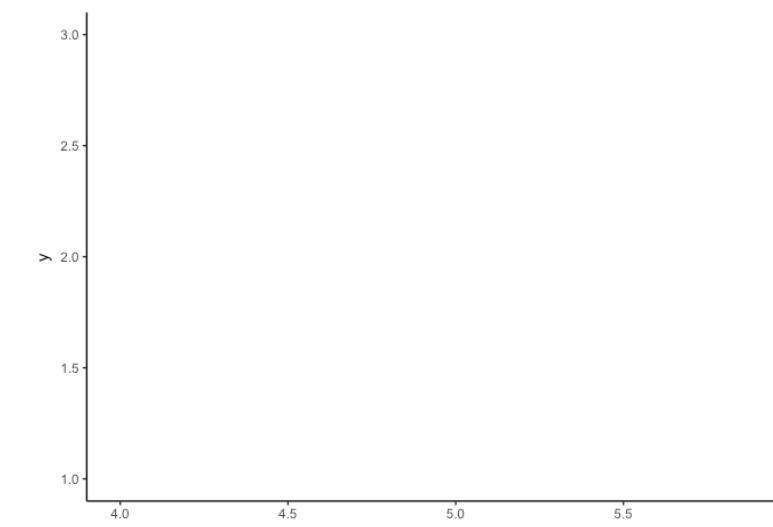
Layer(s)



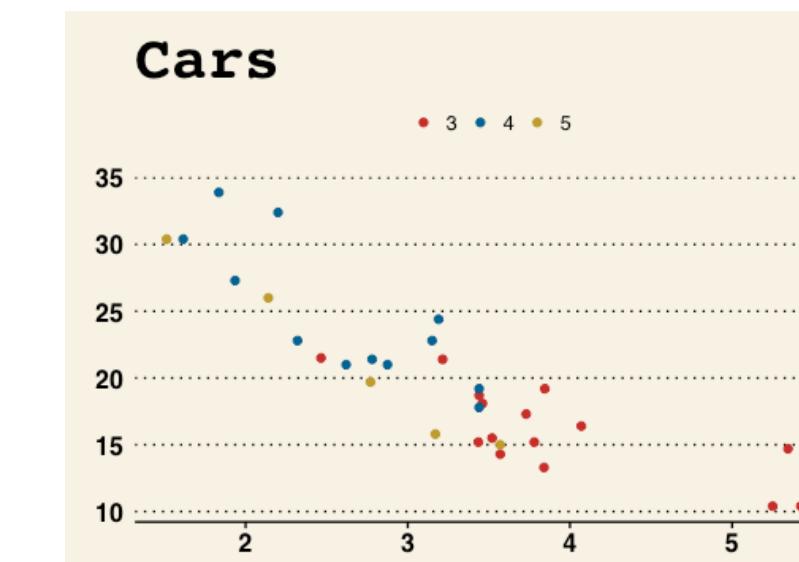
Facet



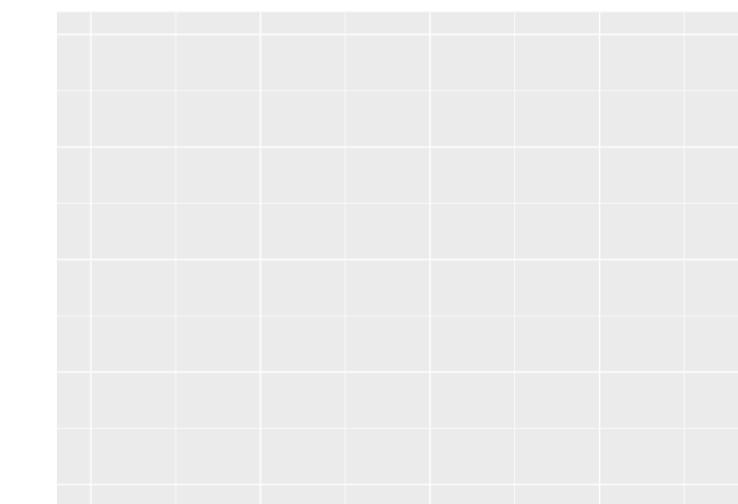
Scale(s)



Theme

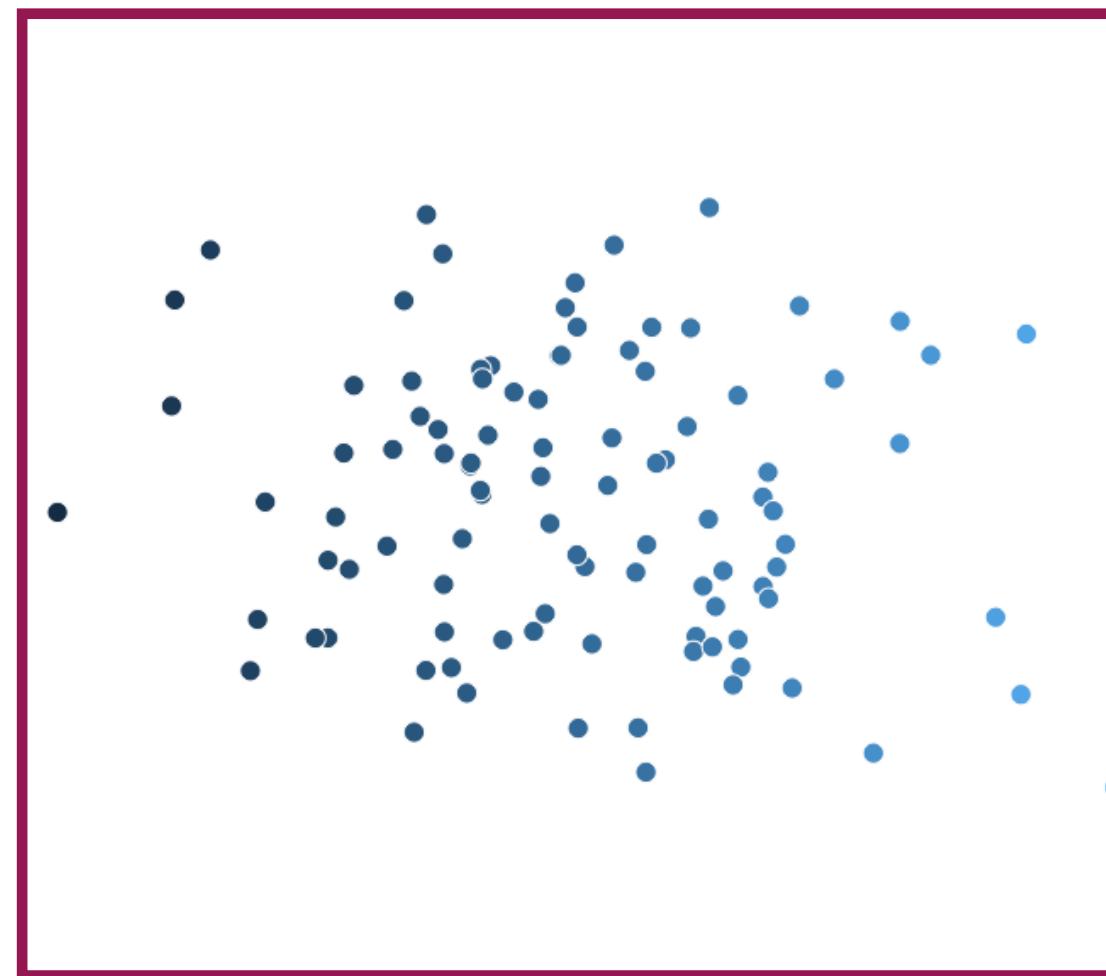


Coord



Layers

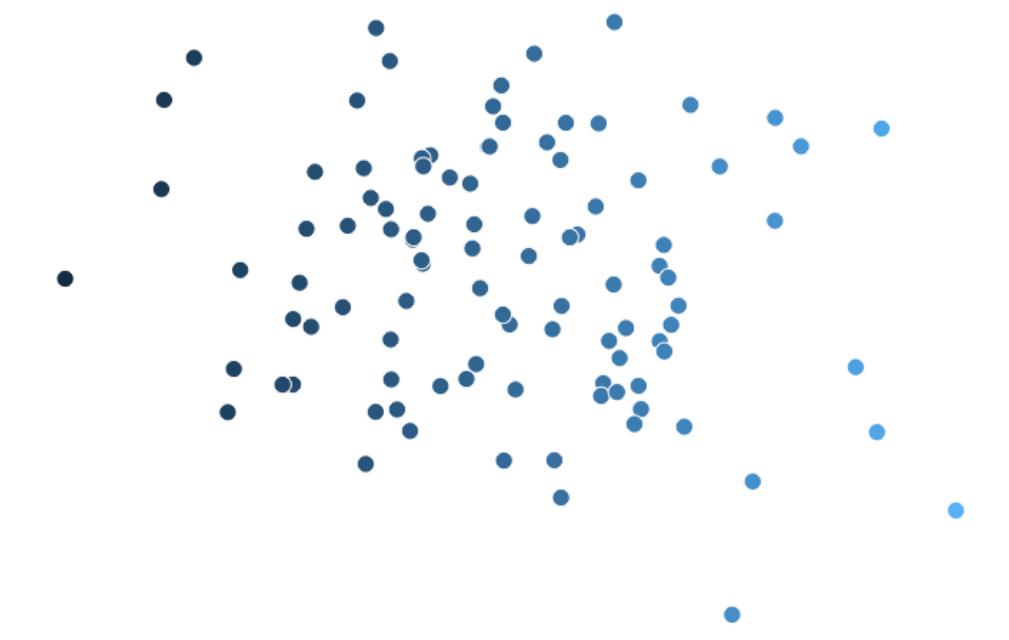
Each layer consists of:



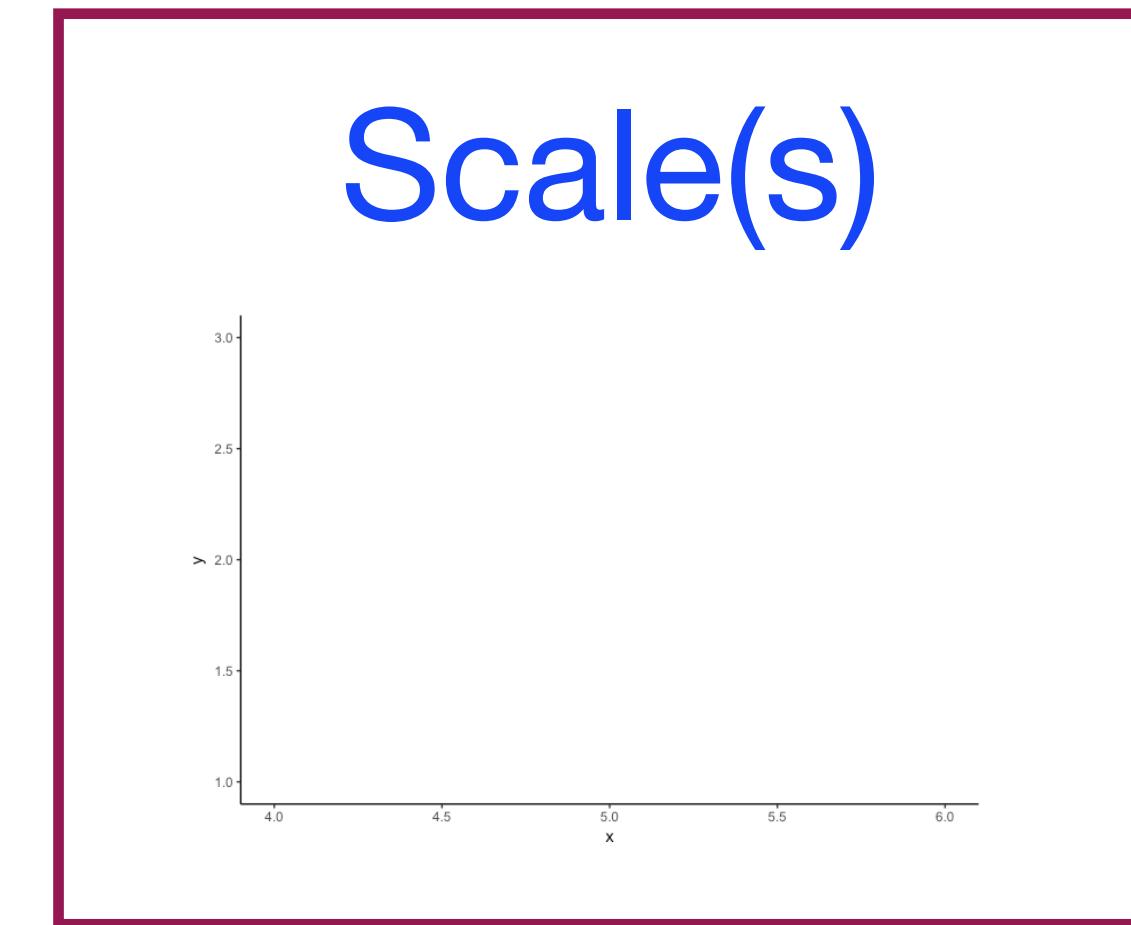
1. GEOM
2. AESTHETIC
MAPPING
3. DATA
4. STAT
5. POSITION

Building blocks

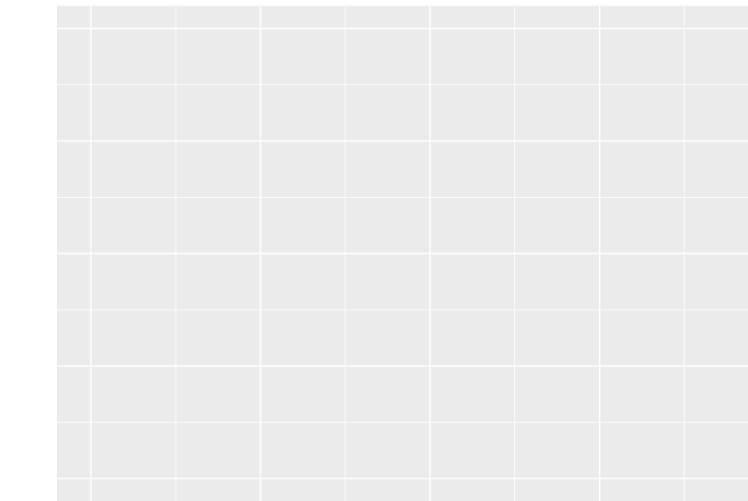
Layer(s)



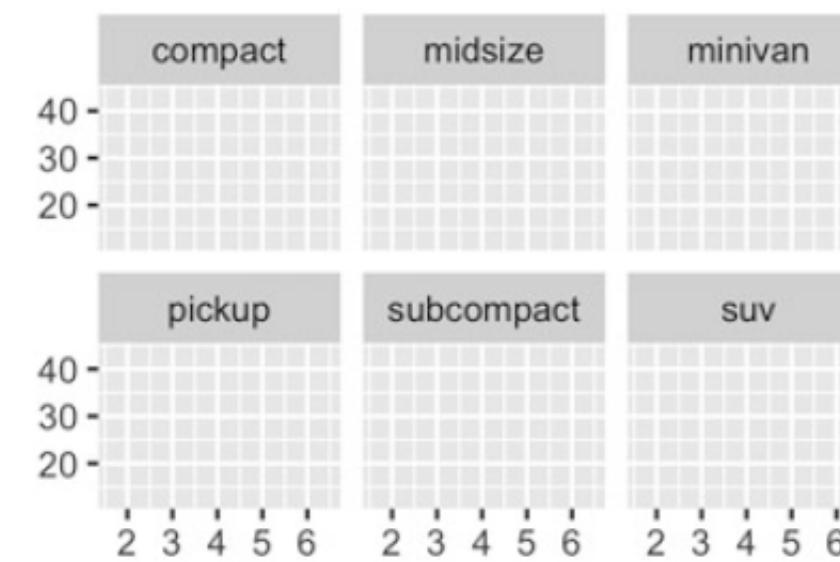
Scale(s)



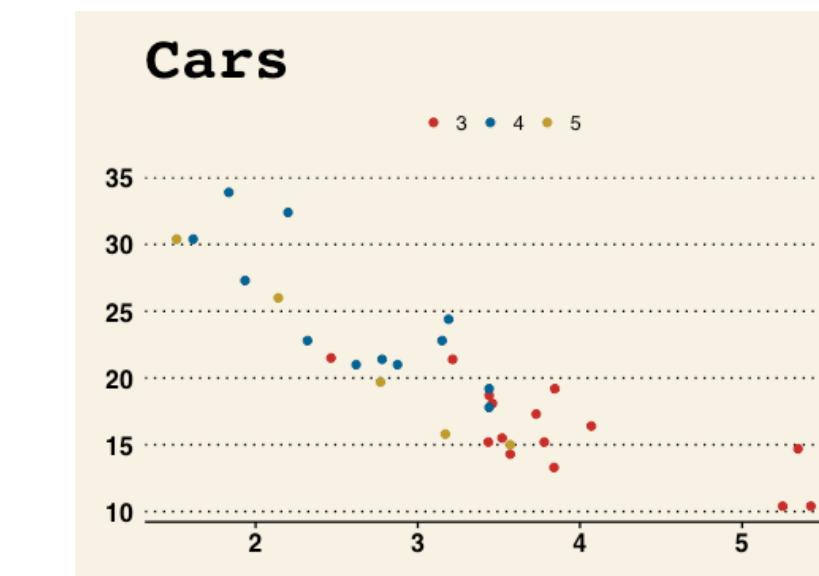
Coord



Facet



Theme



Scales

- One per aesthetic mapping
- The scale must match the data type (continuous or discrete)

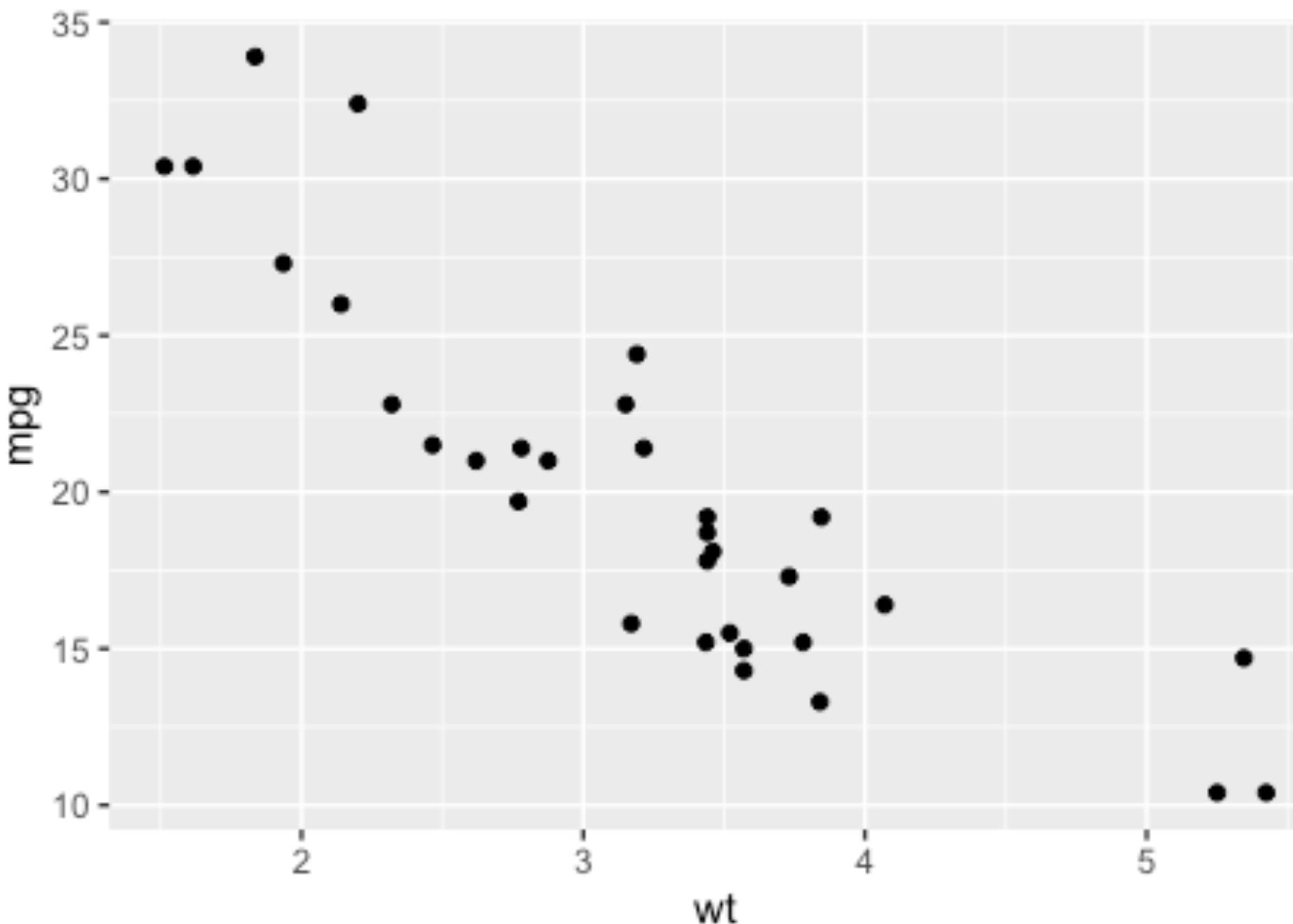
<u>MAPPING</u>	<u>SCALE</u>
x	<code>scale_x_date()</code>
y	<code>scale_y_continuous()</code>
color	<code>scale_color_manual()</code>
fill	<code>scale_fill_viridis_c()</code>

x and y scales

- For continuous data, use `scale_y_continuous()` or `scale_x_continuous()` to
 - set axis limits `limits = c(,)`
 - change tick mark locations `breaks = c(,)`

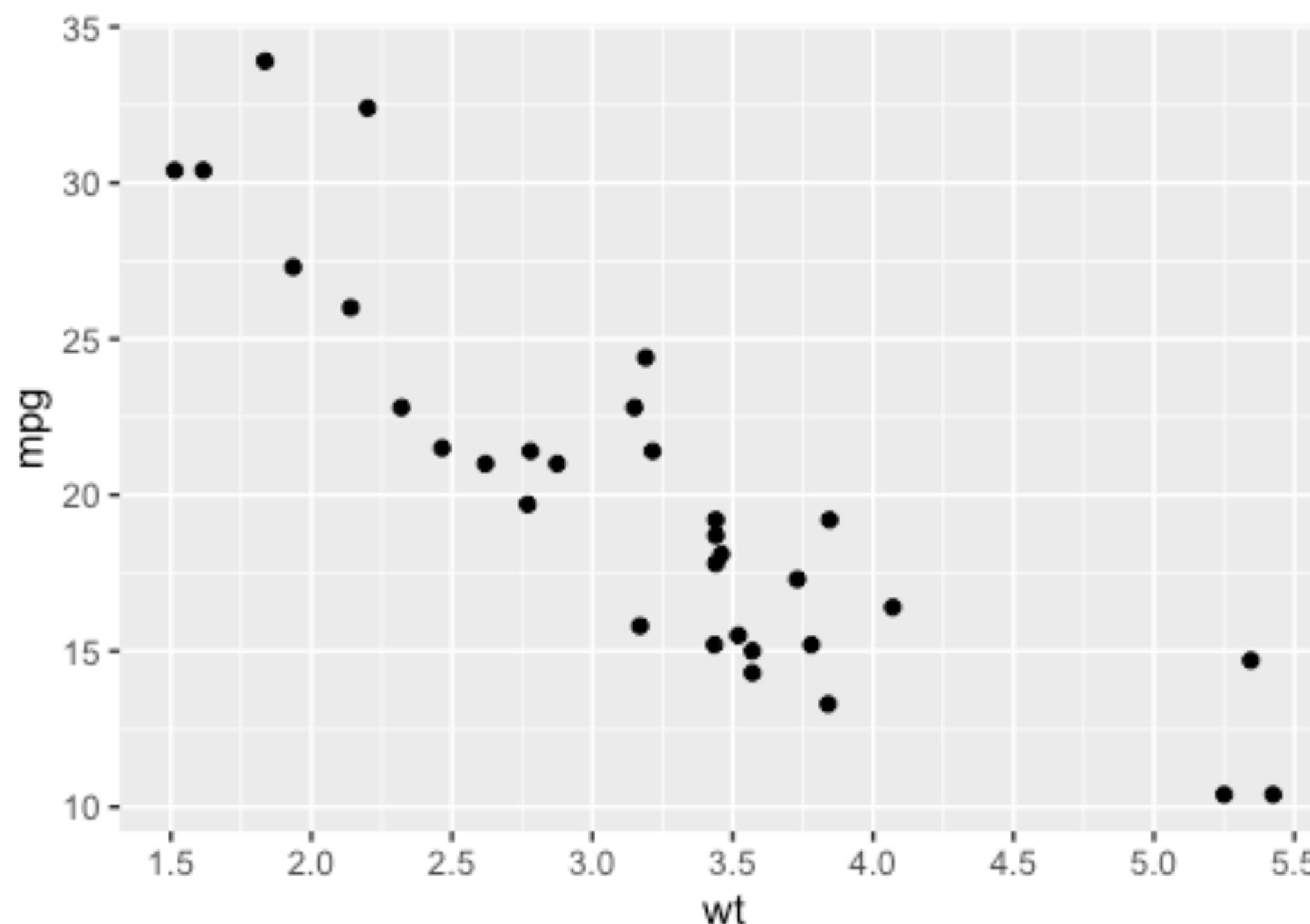
x and y scales

```
ggplot(mtcars, aes(x = wt, y = mpg)) +  
  geom_point()
```



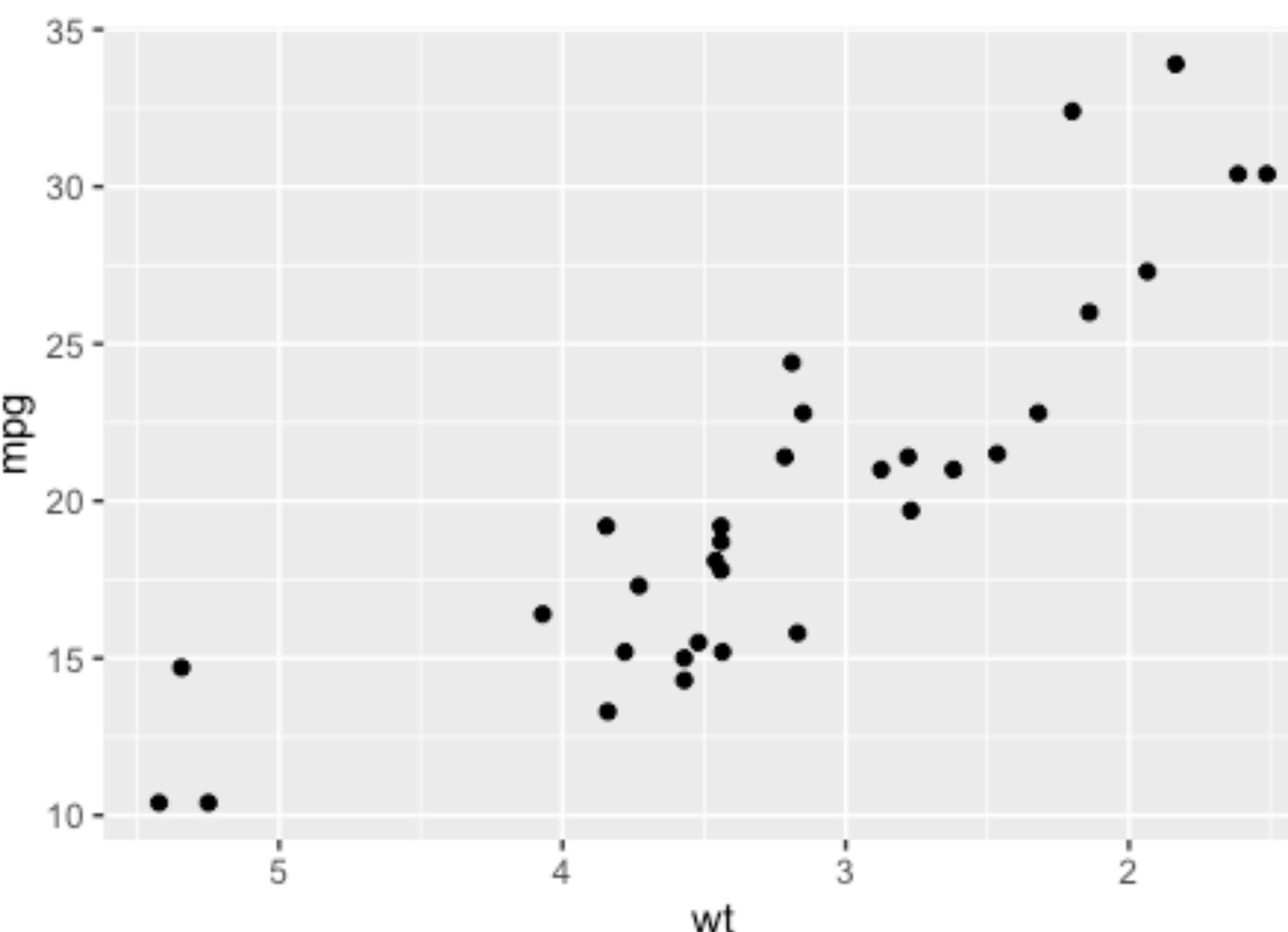
x and y scales

```
ggplot(mtcars, aes(x = wt, y = mpg)) +  
  geom_point() +  
  scale_x_continuous(breaks = seq(1, 6, .5))
```



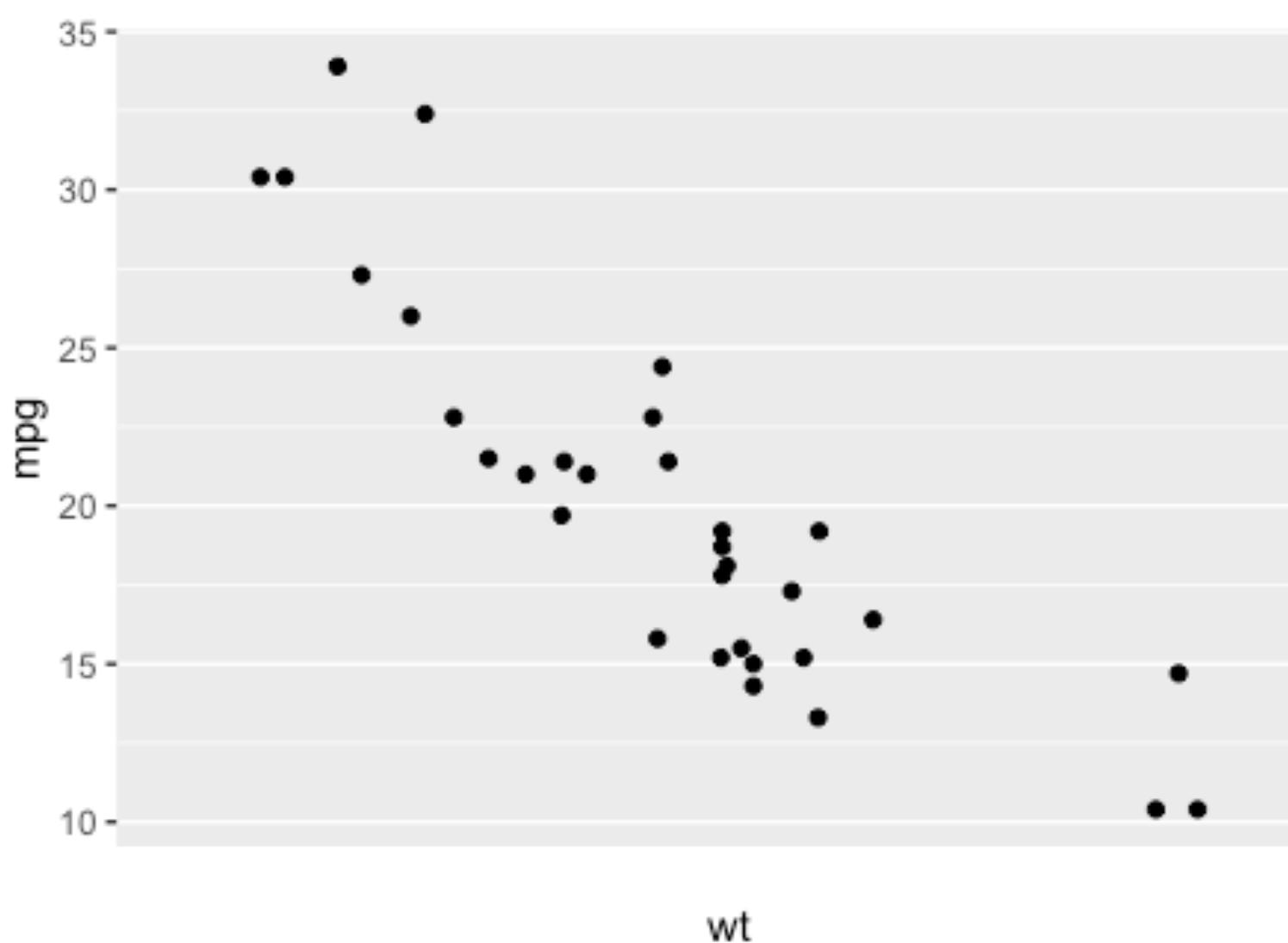
x and y scales

```
ggplot(mtcars, aes(x = wt, y = mpg)) +  
  geom_point() +  
  scale_x_reverse()
```



x and y scales

```
ggplot(mtcars, aes(x = wt, y = mpg)) +  
  geom_point() +  
  scale_x_discrete(limits = c(-5, 15))  
#> Warning: Continuous limits supplied to discrete scale.  
#> i Did you mean `limits = factor(...)` or  
`scale_*_continuous()`?
```

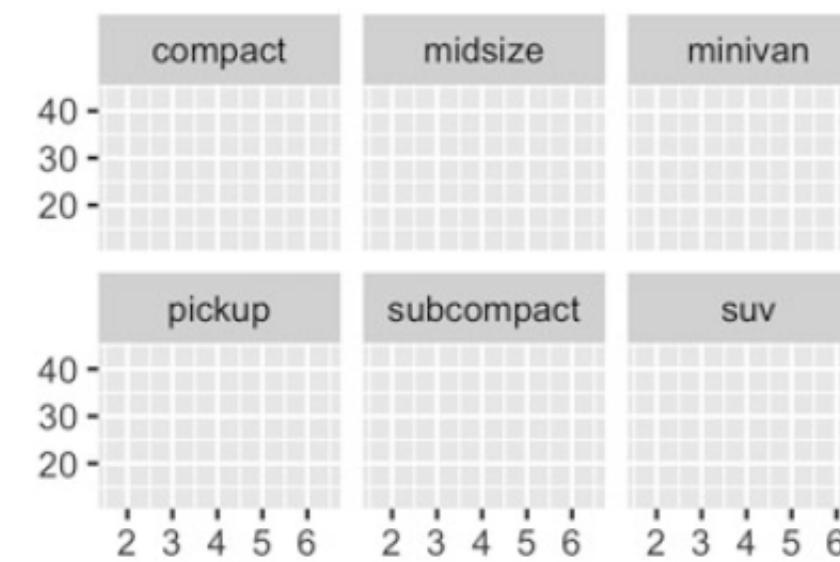


Building blocks

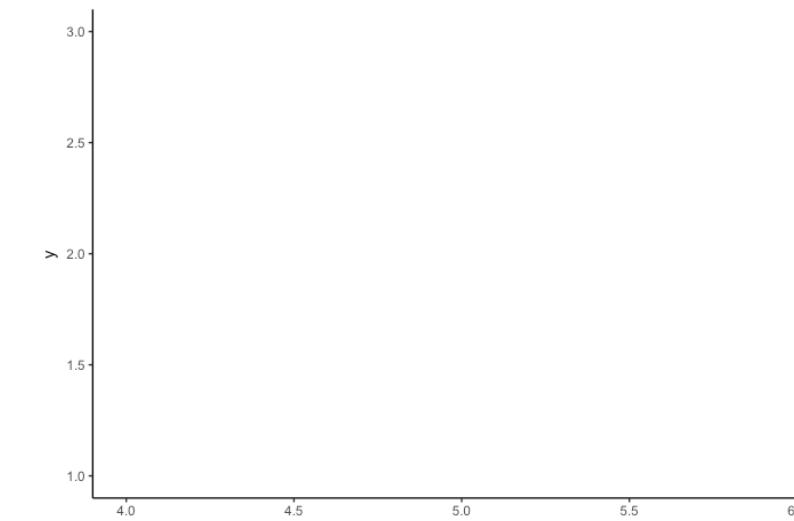
Layer(s)



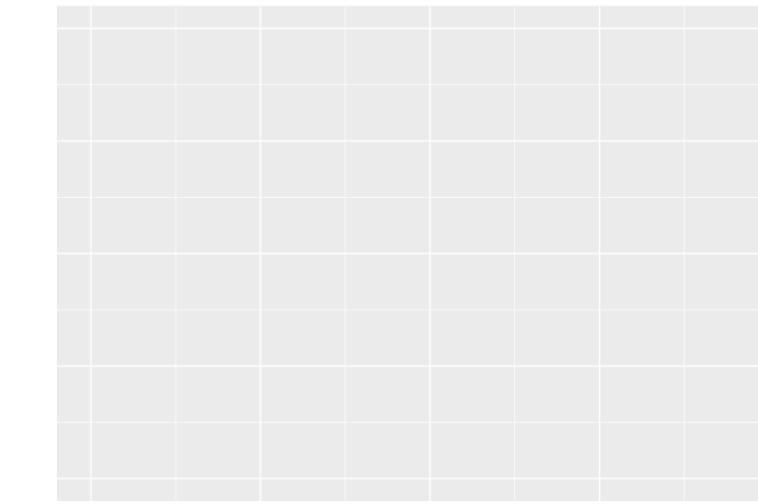
Facet



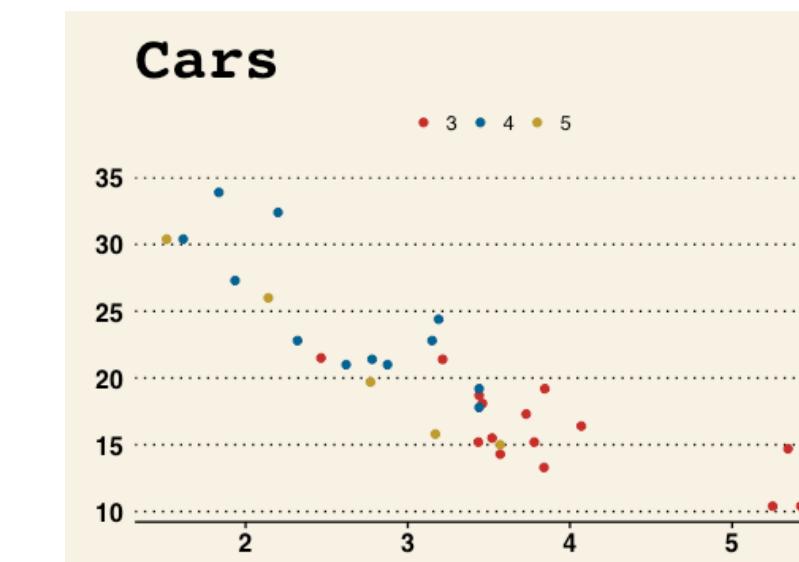
Scale(s)



Coord



Theme

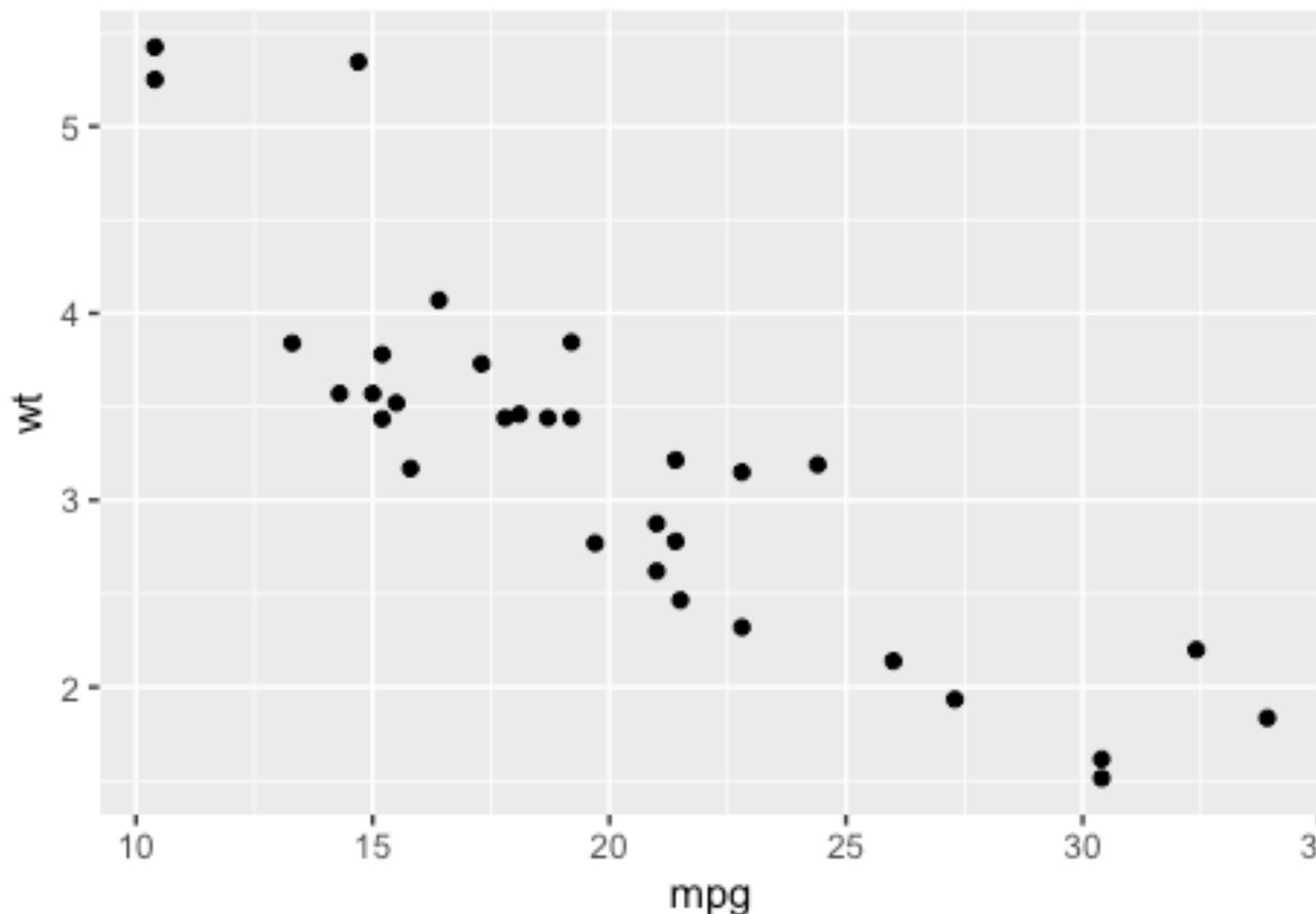


Coordinate systems

- The default coordinate system is `coord_cartesian`.
- It is rare to need to change it.
- `coord_flip()` is a common option that keeps the Cartesian system but switches x and y.

coordinate systems

```
ggplot(mtcars, aes(x = wt, y = mpg)) +  
  geom_point() +  
  coord_flip()
```

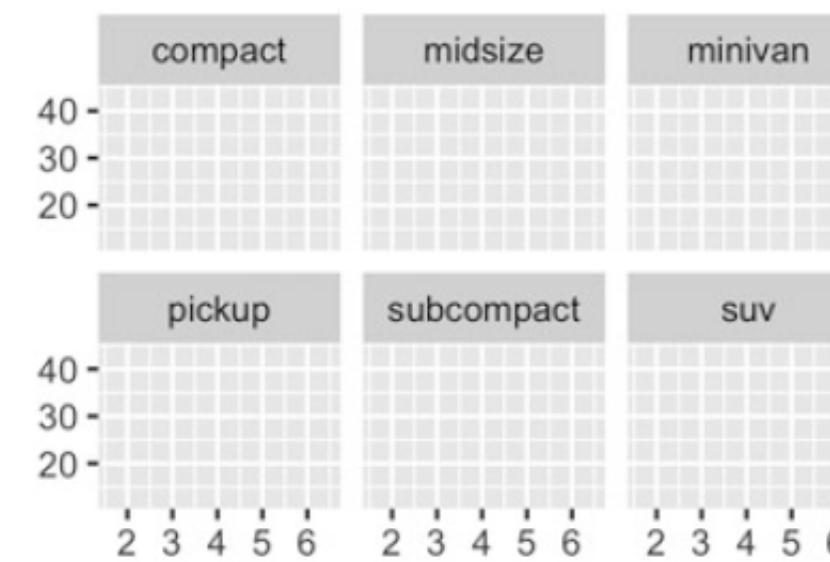


Building blocks

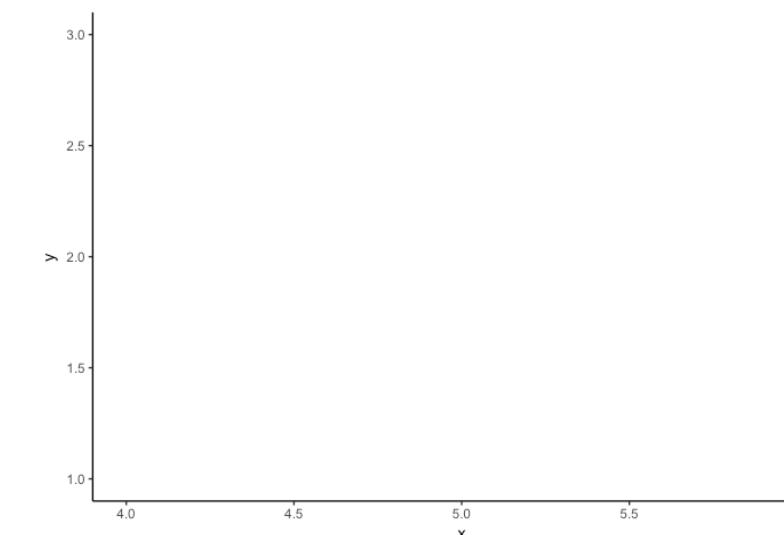
Layer(s)



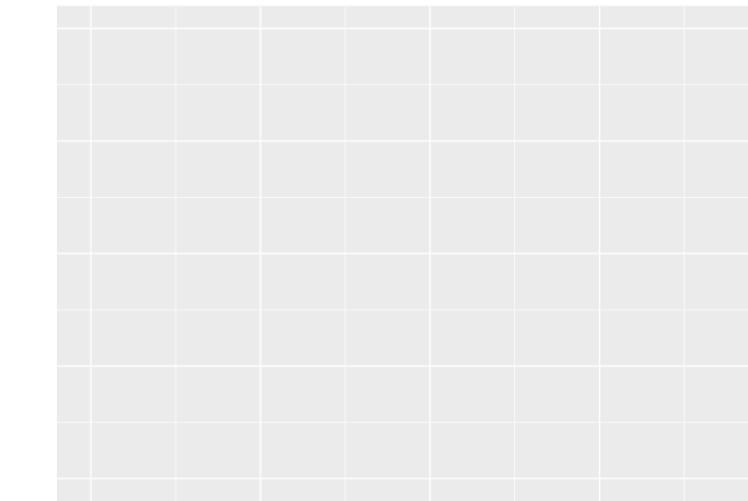
Facet



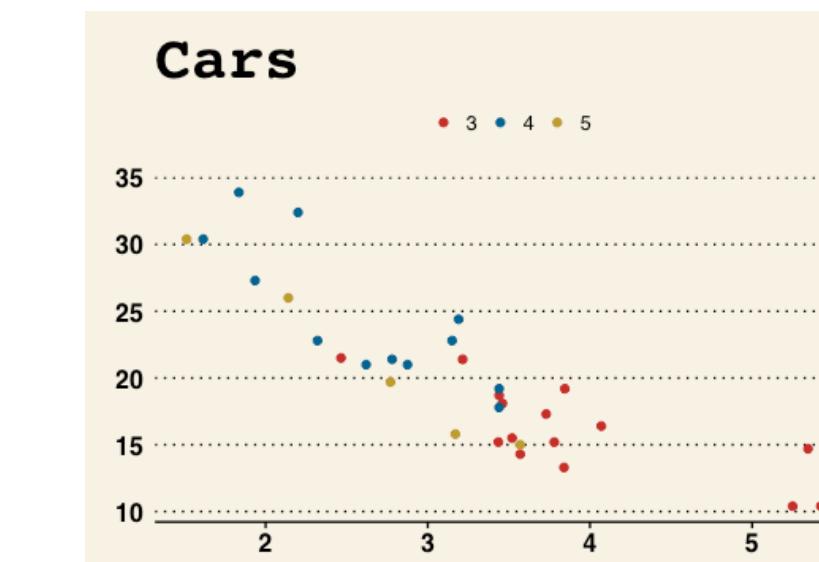
Scale(s)



Coord



Theme



Themes

- The default theme is `theme_grey(base_size = 11)`
- To increase the font size of all text elements, increase the base font size: + `theme_grey(14)`
- Other common built-in themes:
`theme_bw()` `theme_linedraw()`
`theme_classic()` `theme_void()`
- There are lots of other themes in the **ggthemes** package

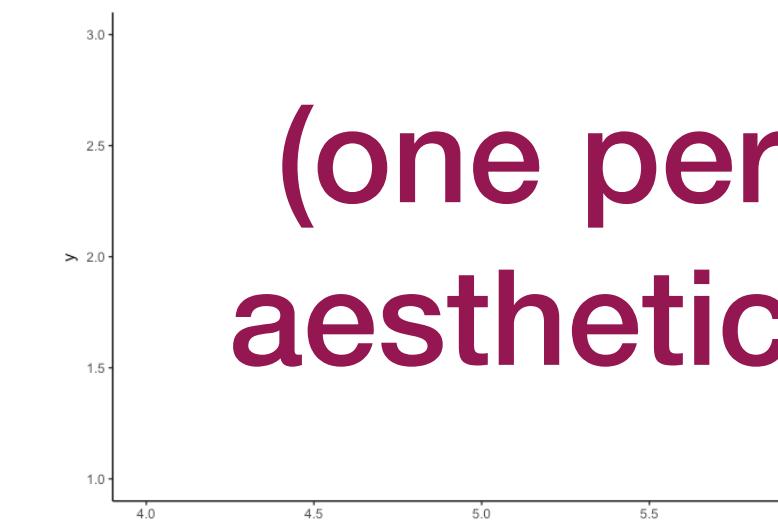
How many?



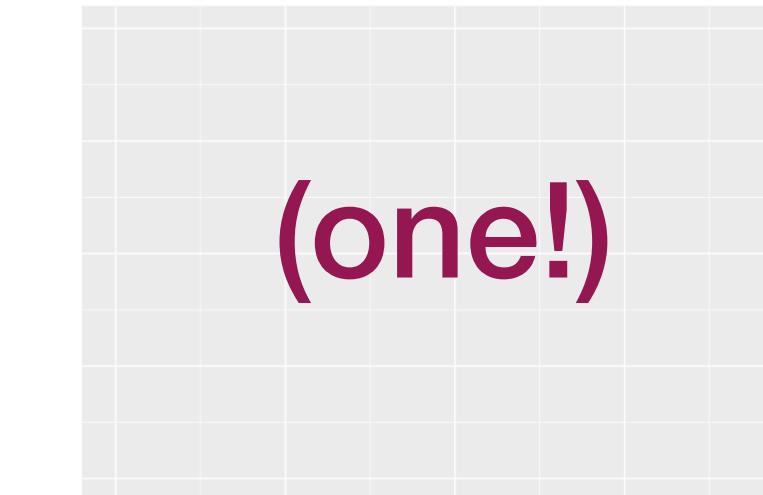
Layer(s)



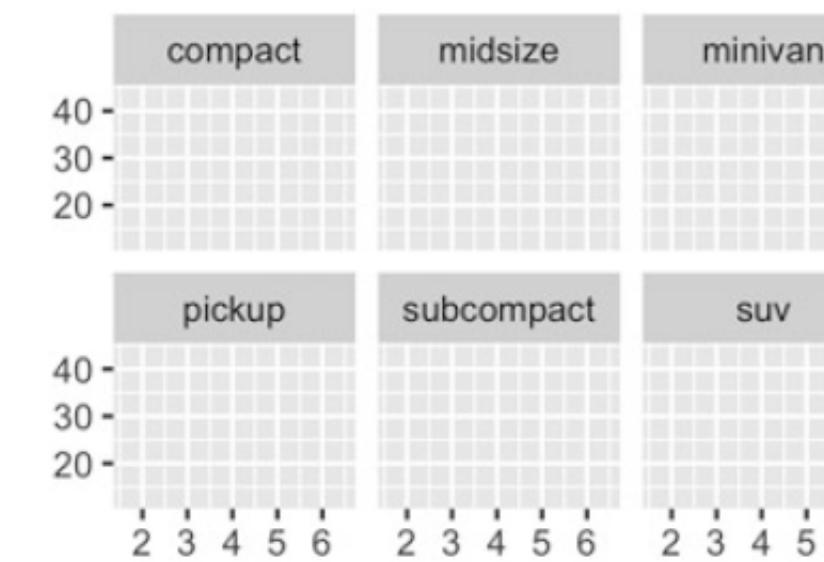
Scale(s)



Coord

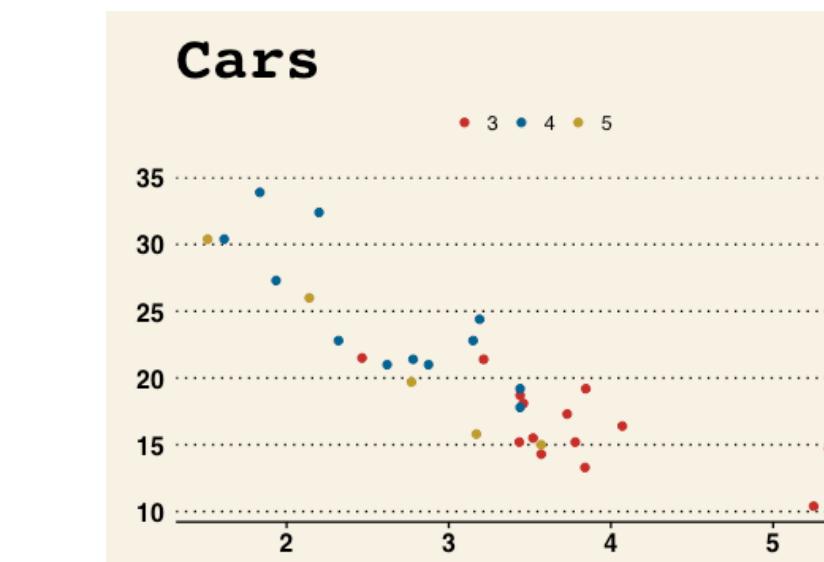


Facet



(one!)

Theme



(one, sort of)