

# Data Visualisation with R

Workshop Part 1



5

# Publication-ready plots

# The ggplot object

i

- **Modifiable**: ggplot object can be modified
- **Generalisable**: ggplot2 uses a cohesive and complex system under the hood to make many kinds of plots
- **Extensible**: the system can be extended to make specialised plots or add more features if the same "grammar" is adopted

# Motor Trend Car Road Tests

The `mtcars` is from the datasets  (loaded by default)

```
mtcars_df <- mtcars %>% rownames_to_column("car")
glimpse(mtcars_df)

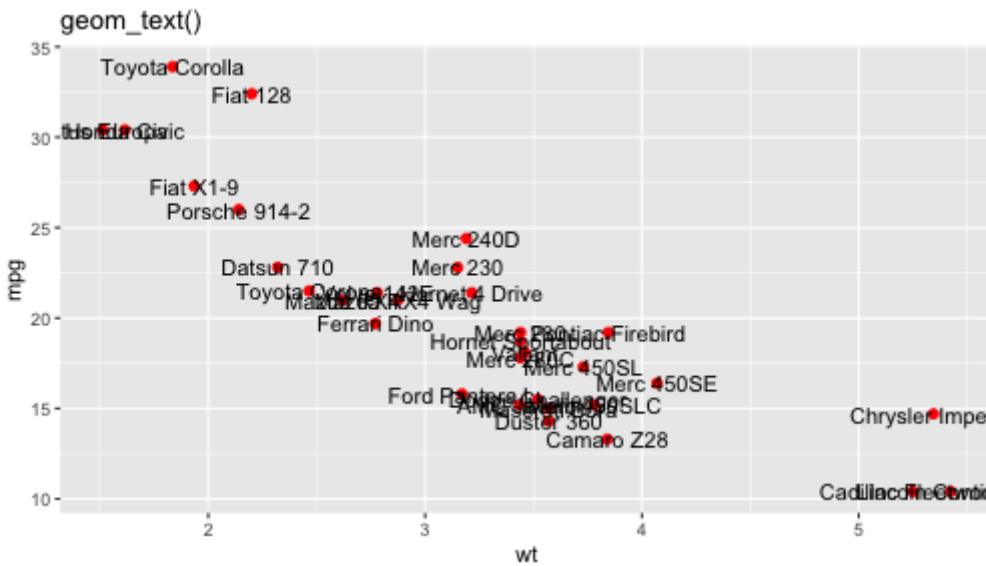
## Rows: 32
## Columns: 12
## $ car    <chr> "Mazda RX4", "Mazda RX4 Wag", "Datsun 710", "Hornet 4 Drive", "Ho...
## $ mpg   <dbl> 21.0, 21.0, 22.8, 21.4, 18.7, 18.1, 14.3, 24.4, 22.8, 19.2, 17.8, ...
## $ cyl    <dbl> 6, 6, 4, 6, 8, 6, 8, 4, 4, 6, 6, 8, 8, 8, 8, 8, 4, 4, 4, 4, 8, ...
## $ disp   <dbl> 160.0, 160.0, 108.0, 258.0, 360.0, 225.0, 360.0, 146.7, 140.8, 16...
## $ hp     <dbl> 110, 110, 93, 110, 175, 105, 245, 62, 95, 123, 123, 180, 180, 180...
## $ drat   <dbl> 3.90, 3.90, 3.85, 3.08, 3.15, 2.76, 3.21, 3.69, 3.92, 3.92, 3.92, ...
## $ wt     <dbl> 2.620, 2.875, 2.320, 3.215, 3.440, 3.460, 3.570, 3.190, 3.150, 3...
## $ qsec   <dbl> 16.46, 17.02, 18.61, 19.44, 17.02, 20.22, 15.84, 20.00, 22.90, 18...
## $ vs     <dbl> 0, 0, 1, 1, 0, 1, 0, 1, 1, 1, 0, 0, 0, 0, 0, 1, 1, 1, 1, 0, ...
## $ am     <dbl> 1, 1, 1, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 1, 1, 1, 0, 0, ...
## $ gear   <dbl> 4, 4, 4, 3, 3, 3, 4, 4, 4, 4, 3, 3, 3, 3, 3, 4, 4, 4, 4, 3, ...
## $ carb   <dbl> 4, 4, 1, 1, 2, 1, 4, 2, 2, 4, 4, 3, 3, 3, 4, 4, 4, 1, 2, 1, 1, 2, ... 4/17
```

# ggrepel



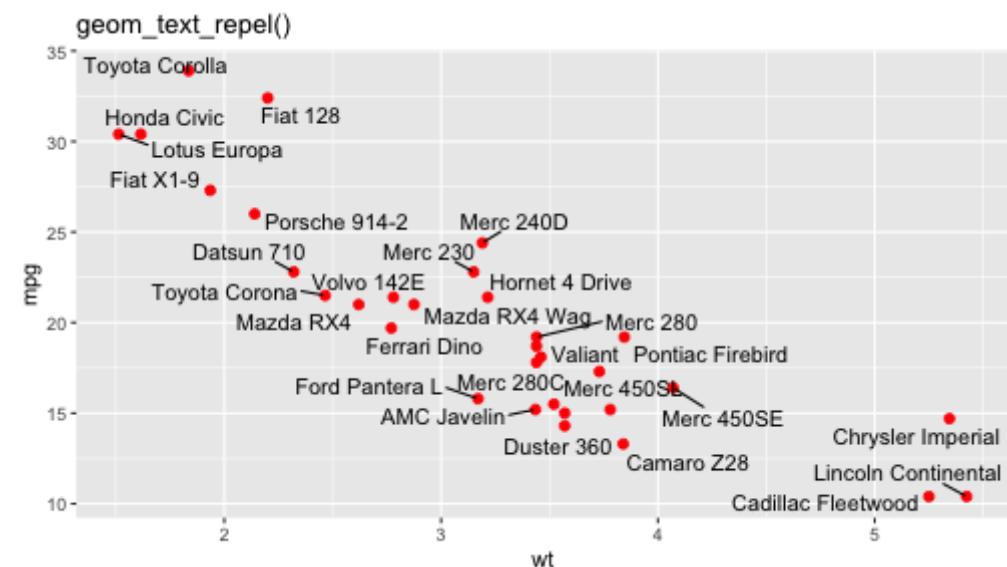
one of my favorites!

```
ggplot(mtcars_df, aes(wt, mpg)) +  
  geom_point(size = 2, color = "red") +  
  geom_text(aes(label = car)) +  
  ggtitle("geom_text()")
```



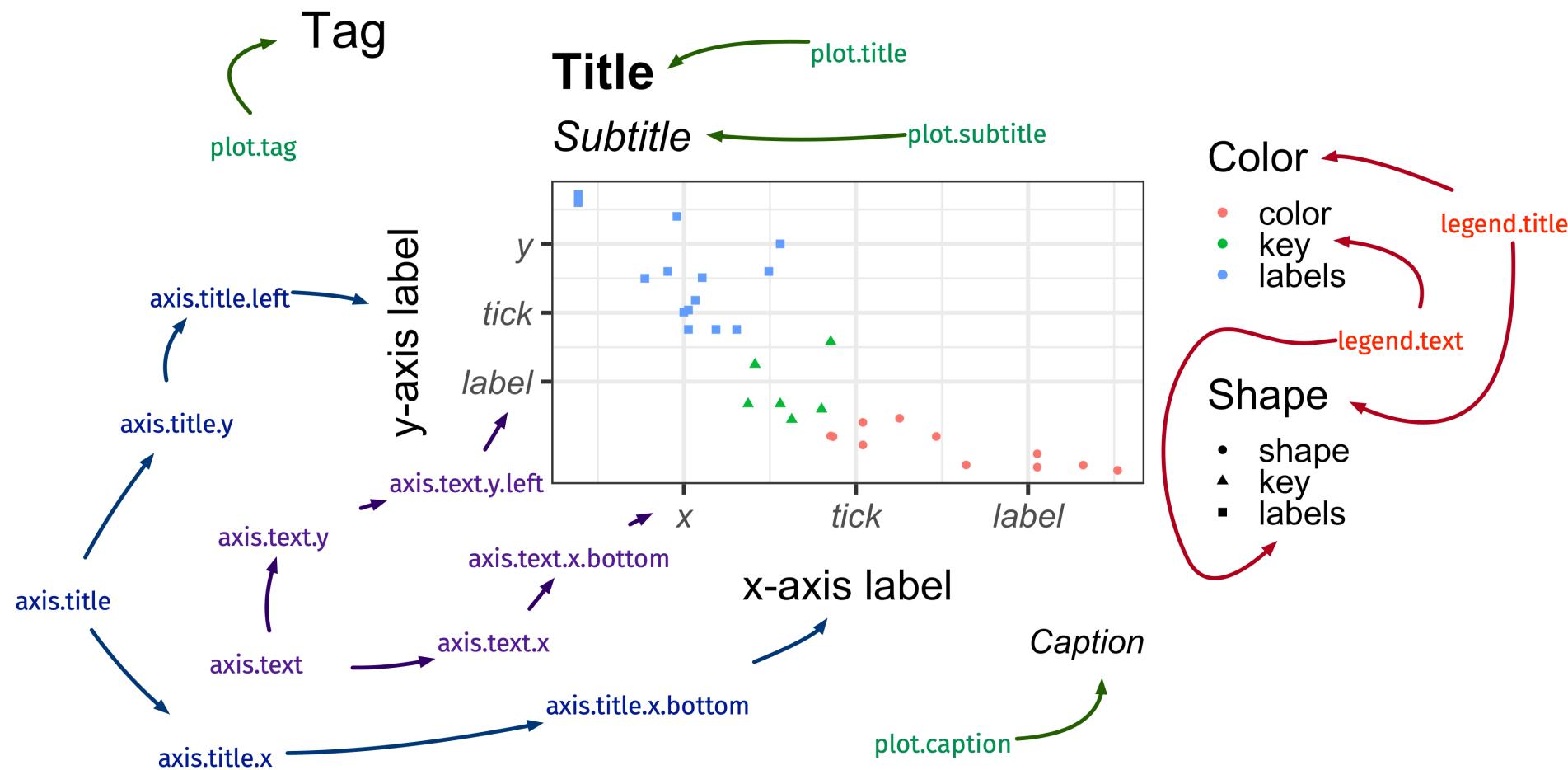
There are many **extension packages!**

```
library(ggrepel)  
set.seed(1)  
ggplot(mtcars_df, aes(wt, mpg)) +  
  geom_point(size = 2, color = "red") +  
  geom_text_repel(aes(label = car)) +  
  ggtitle("geom_text_repel()")
```



# Themes

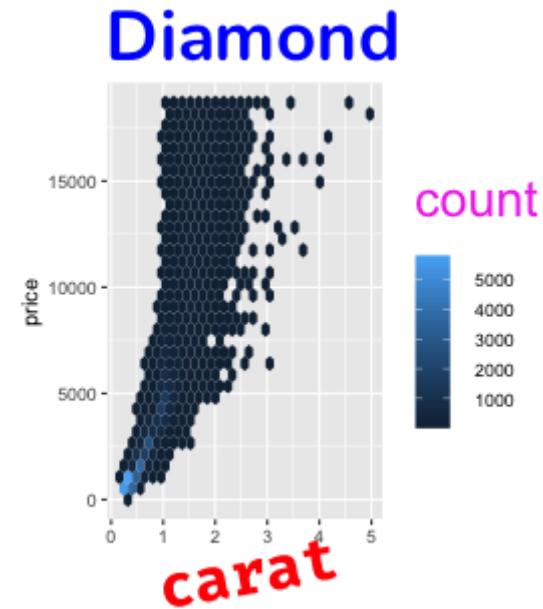
# theme: modify the *look* of texts



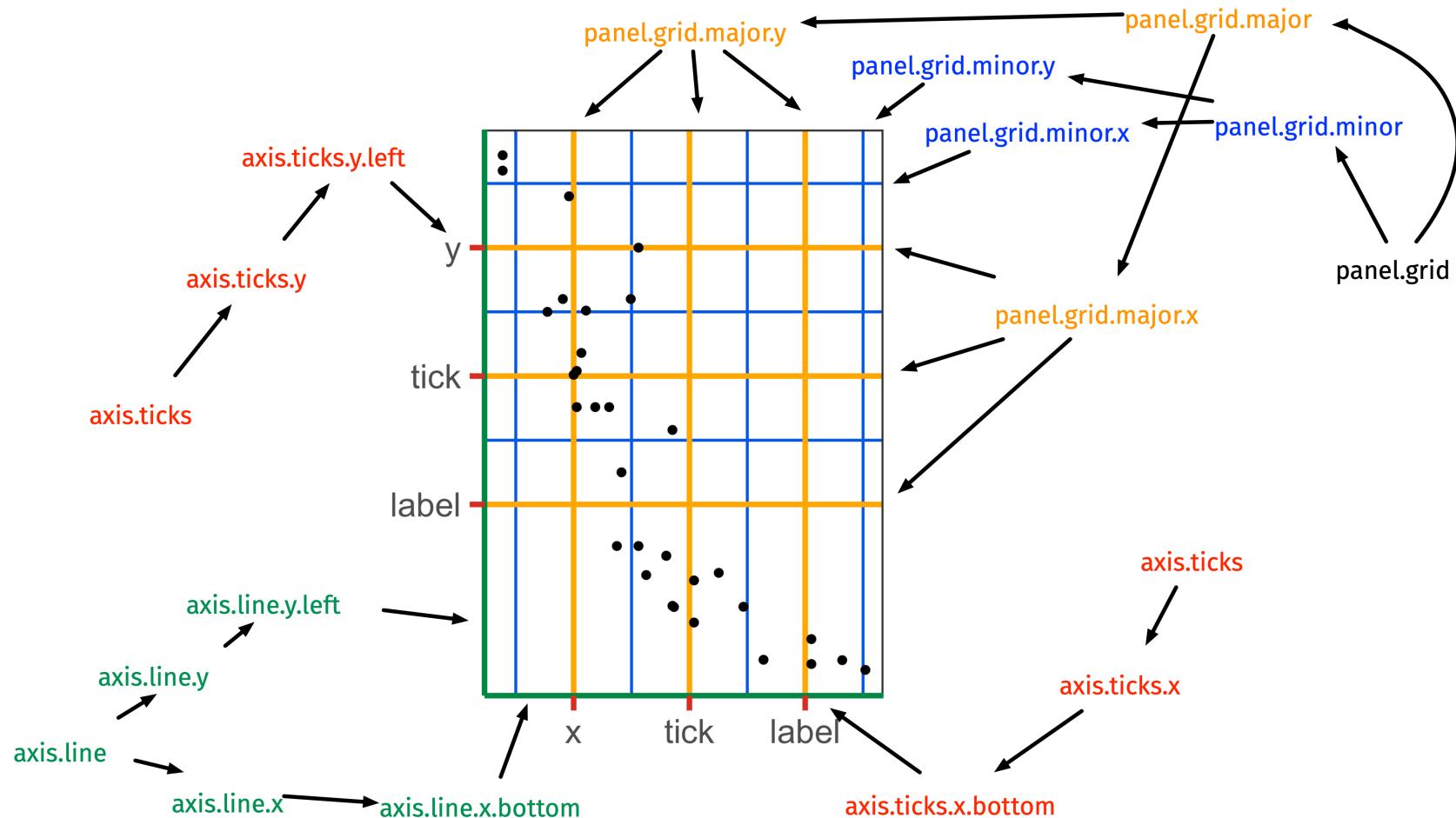
`element_text()`

# element\_text()

```
ggplot(diamonds, aes(carat, price)) +  
  geom_hex() +  
  labs(title = "Diamond") +  
  theme(axis.title.x = element_text(size = 30,  
                                      color = "red",  
                                      face = "bold",  
                                      angle = 10,  
                                      family = "Fira Code"),  
        legend.title = element_text(size = 25,  
                                    color = "#ef42eb",  
                                    margin = margin(b = 5)),  
        plot.title = element_text(size = 35,  
                                  face = "bold",  
                                  family = "Nunito",  
                                  color = "blue"  
        ))
```



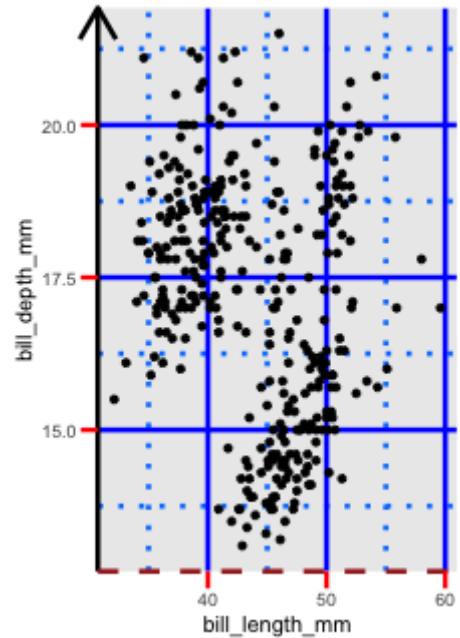
# theme: modify the *look* of the lines



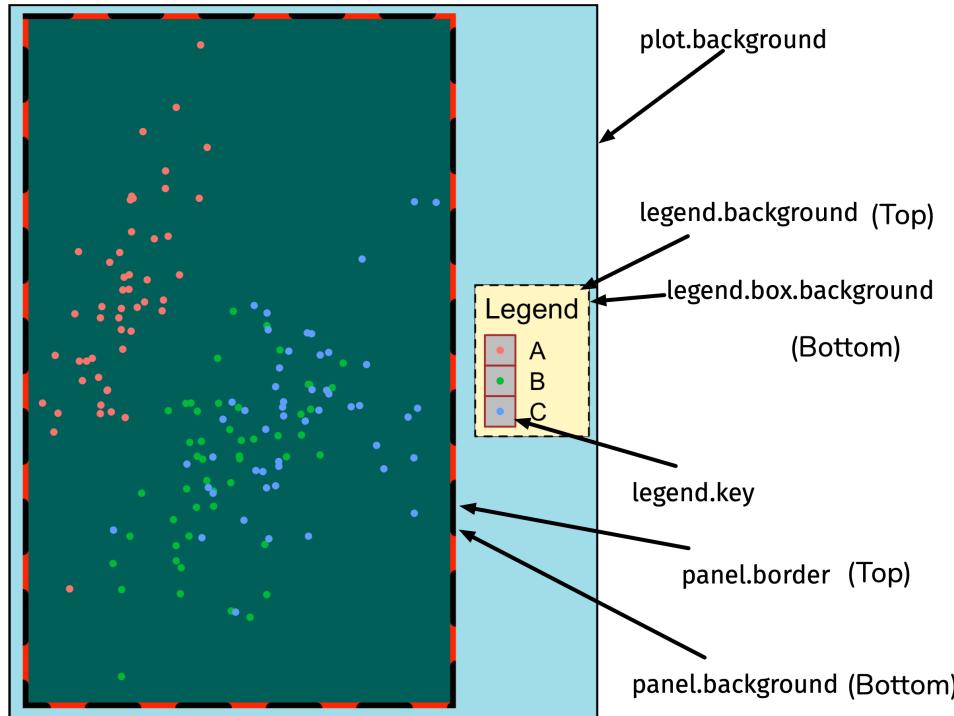
element\_line()

# element\_line()

```
ggplot(penguins, aes(bill_length_mm, bill_depth_mm)) +  
  geom_point() +  
  theme(axis.line.y = element_line(color = "black",  
                                    size = 1.2,  
                                    arrow = grid::arrow()),  
        axis.line.x = element_line(linetype = "dashed",  
                                    color = "brown",  
                                    size = 1.2),  
        axis.ticks = element_line(color = "red", size = 1.1),  
        axis.ticks.length = unit(3, "mm"),  
        panel.grid.major = element_line(color = "blue",  
                                       size = 1.2),  
        panel.grid.minor = element_line(color = "#0080ff",  
                                       size = 1.2,  
                                       linetype = "dotted"))
```



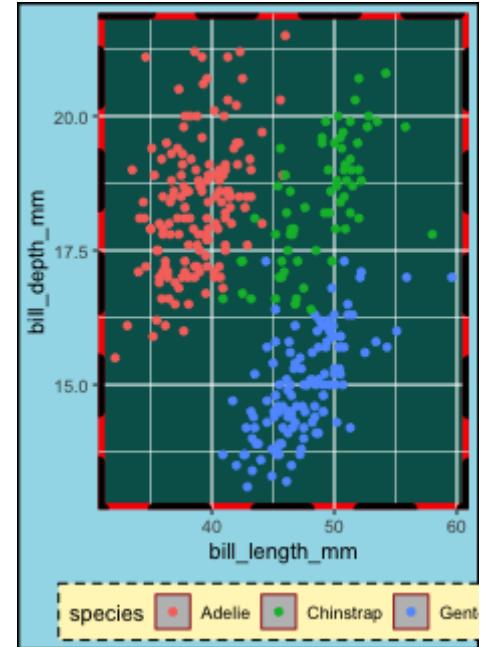
# theme: modify the *look* of the rectangular regions



`element_rect()`

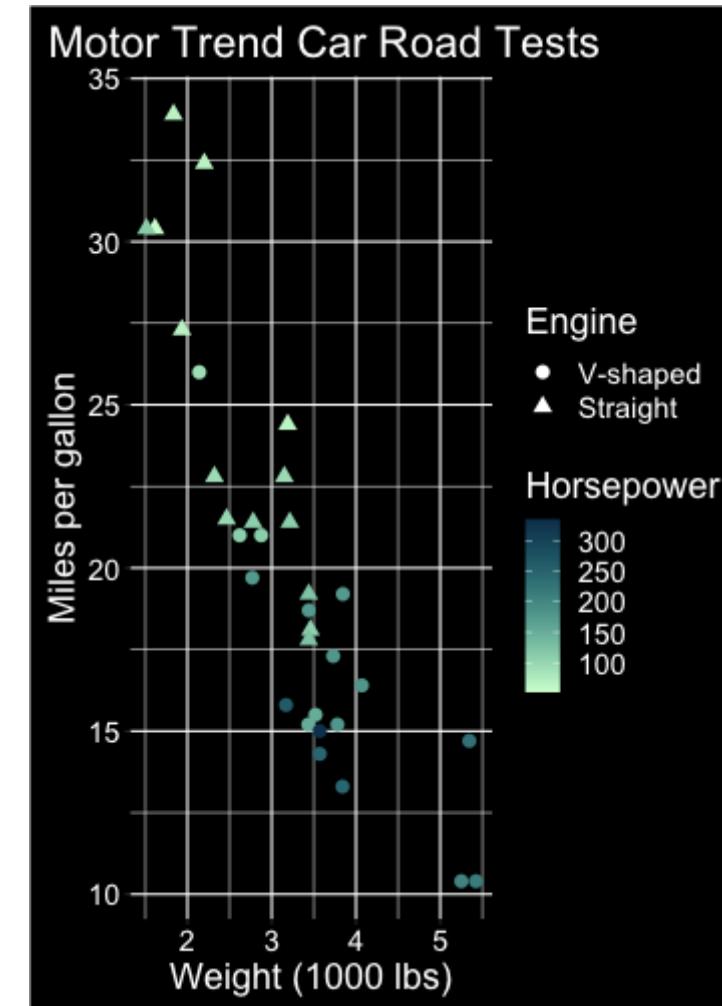
# element\_rect()

```
ggplot(penguins, aes(bill_length_mm, bill_depth_mm)) +  
  geom_point(aes(color = species)) +  
  theme(  
    legend.background = element_rect(fill = "#fff6c2",  
                                      color = "black",  
                                      linetype = "dashed"),  
    legend.key = element_rect(fill = "grey", color = "brown"),  
    panel.background = element_rect(fill = "#005F59",  
                                      color = "red", size = 3),  
    panel.border = element_rect(color = "black",  
                               fill = "transparent",  
                               linetype = "dashed", size = 3),  
    plot.background = element_rect(fill = "#a1dce9",  
                                      color = "black",  
                                      size = 1.3),  
    legend.position = "bottom")
```



# Professional looking plots *without* Adobe Illustrator (or alike)

```
ggplot(mtcars_df,  
       aes(wt, mpg, shape = factor(vs), color = hp)) +  
  geom_point(size = 3) +  
  scale_color_continuous(palette = "Dark Mint") +  
  scale_shape_discrete(labels = c("V-shaped", "Straight")) +  
  labs(x = "Weight (1000 lbs)", y = "Miles per gallon",  
       title = "Motor Trend Car Road Tests",  
       shape = "Engine", color = "Horsepower") +  
  theme(text = element_text(size = 18, color = "white"),  
        rect = element_rect(fill = "black"),  
        panel.background = element_rect(fill = "black"),  
        legend.key = element_rect(fill = "black"),  
        axis.text = element_text(color = "white"),  
        plot.title.position = "plot",  
        plot.margin = margin(10, 10, 10, 10)) +  
  guides(shape =
```

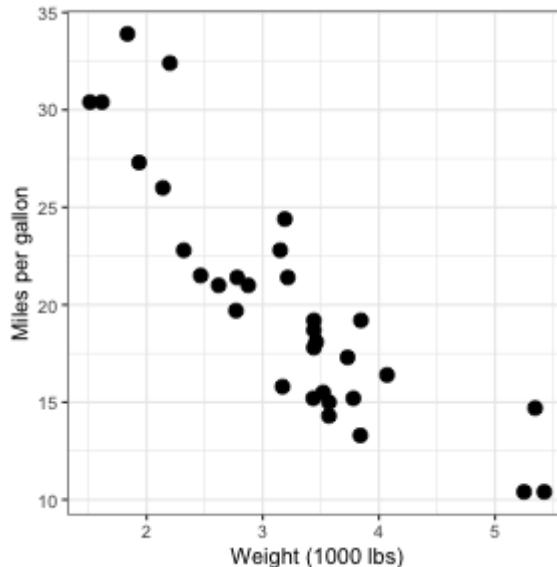


# Built-in themes

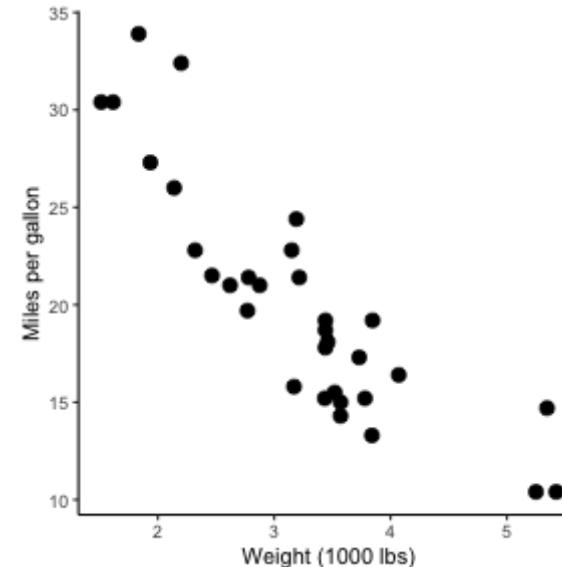
There are many existing themes  
(you can also make your own)

```
g <- ggplot(mtcars_df, aes(wt, mpg)) + geom_point(size = 3) +  
  labs(x = "Weight (1000 lbs)", y = "Miles per gallon")
```

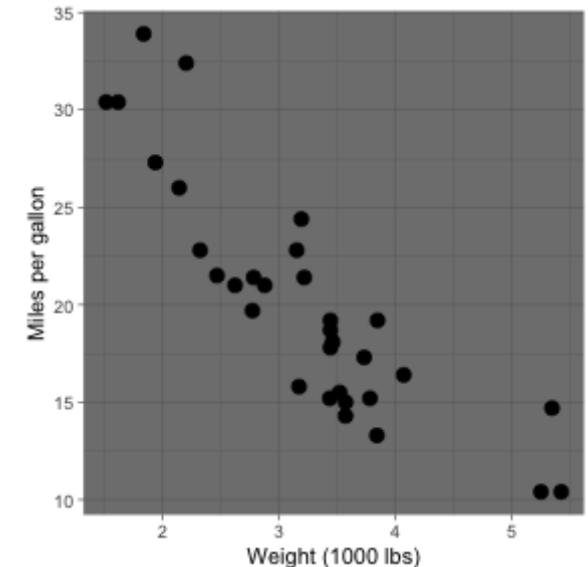
```
g + theme_bw()
```



```
g + theme_classic()
```



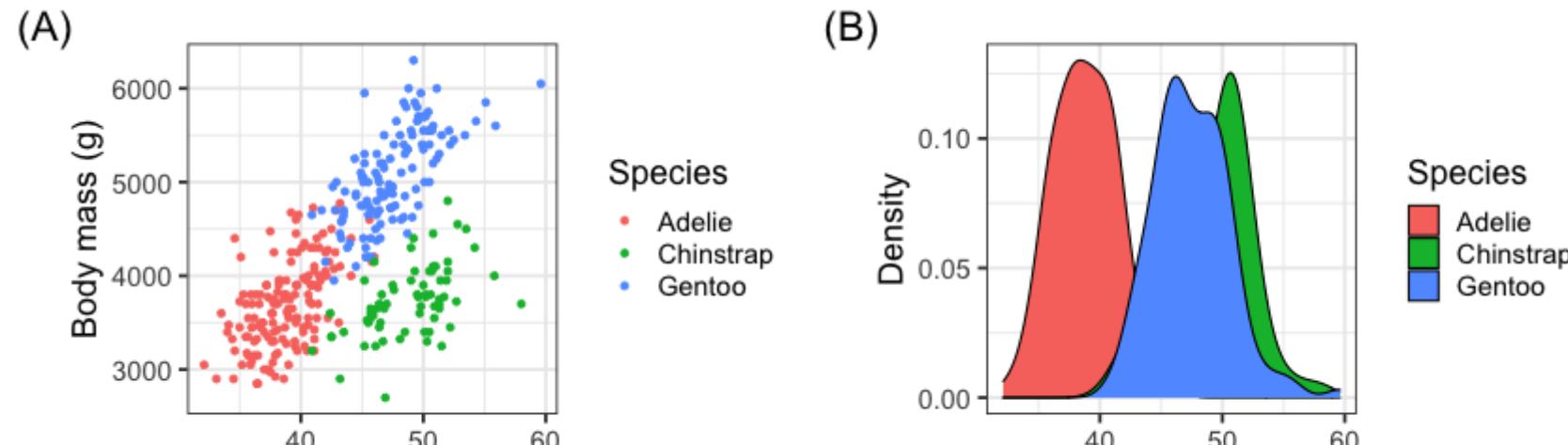
```
g + theme_dark()
```



# Combining plots with patchwork



```
library(patchwork)
g1 <- ggplot(penguins, aes(bill_length_mm, body_mass_g, color = species)) +
  geom_point() + theme_bw(base_size = 18) +
  labs(tag = "(A)", x = "Bill length (mm)", y = "Body mass (g)", color = "Species")
g2 <- ggplot(penguins, aes(bill_length_mm, fill = species)) +
  geom_density() + theme_bw(base_size = 18) +
  labs(tag = "(B)", x = "Bill length (mm)", y = "Density", fill = "Species")
g1 + g2
```





`</> Open part1-exercise-04.Rmd`

15 : 00

# Session Information

```
devtools::session_info()
```

```
## - Session info    

---

## hash: flag: Pakistan, man cook: medium skin tone, compass#### setting value## version R version 4.1.2 (2021-11-01)## os      macOS Big Sur 10.16## system x86_64, darwin17.0## ui      X11## language (EN)## collate en_AU.UTF-8## ctype   en_AU.UTF-8## tz      Australia/Melbourne## date   2022-02-20
```

These slides are licensed under

