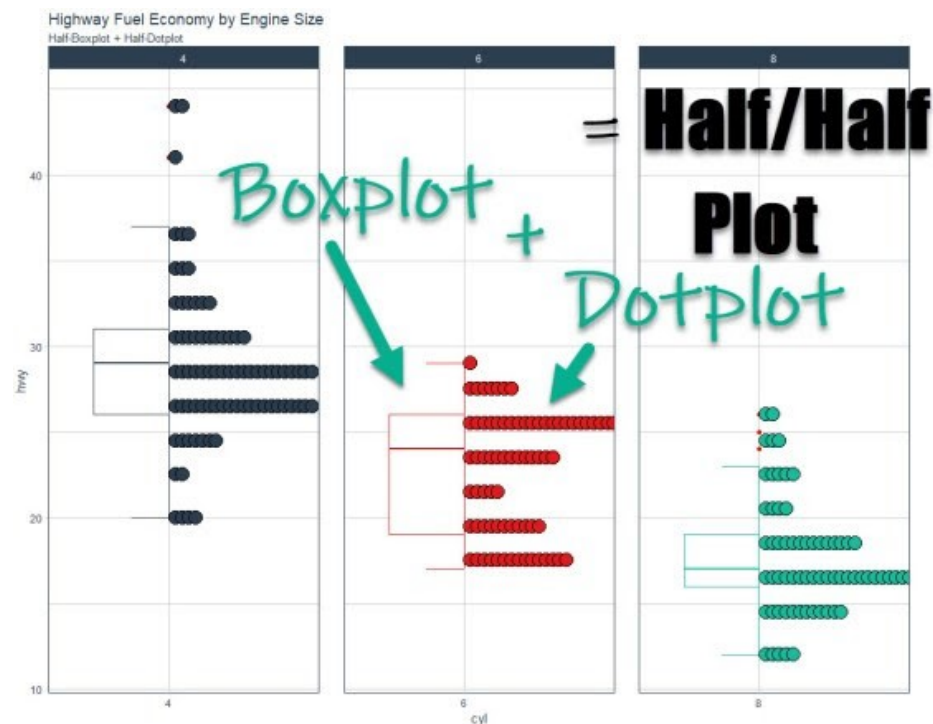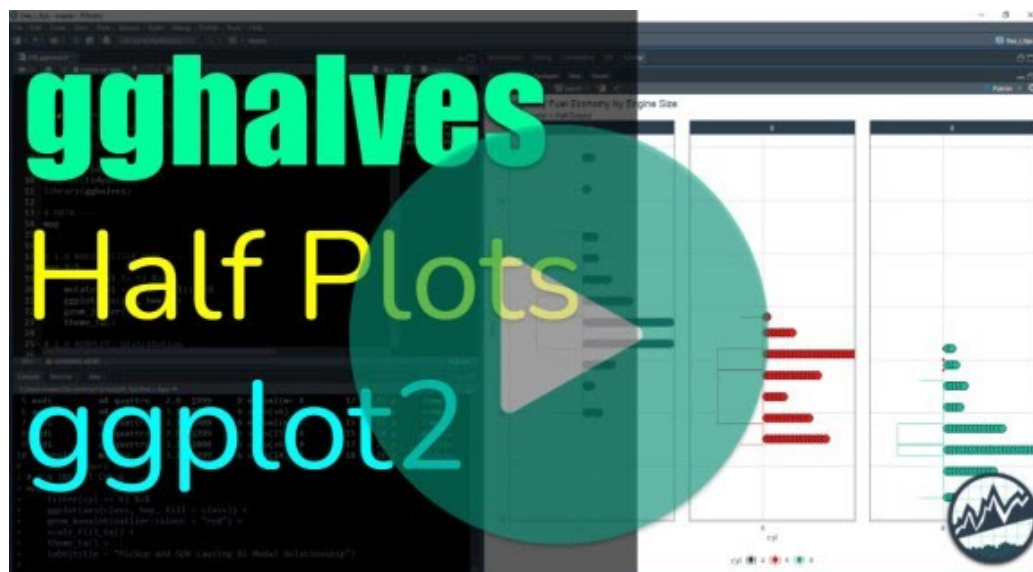# What is gghalves?

`gghalves` is a new R package that makes it easy to compose your own half-plots using `ggplot2`.

gghalves Video Tutorial
For those that prefer Full YouTube Video Tutorials.

Learn how to use `gghalves` in our free 8-minute YouTube video.
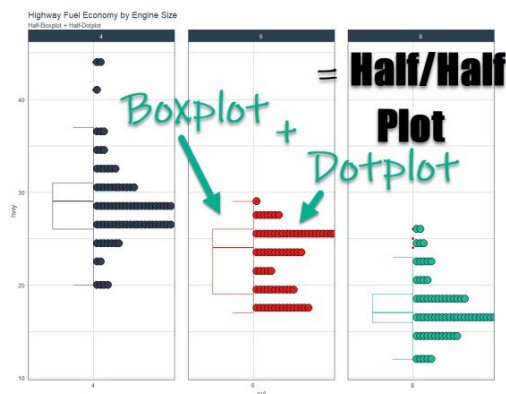

(Click image to play tutorial)

Watch our full YouTube Tutorial

What are Half Plots?
Combining two plots side-by-side.

Half/Half Plots are a way to showcase two plots side-by-side. Here's a common example:

1. Showing a **Boxplot** to identify outliers and quantiles
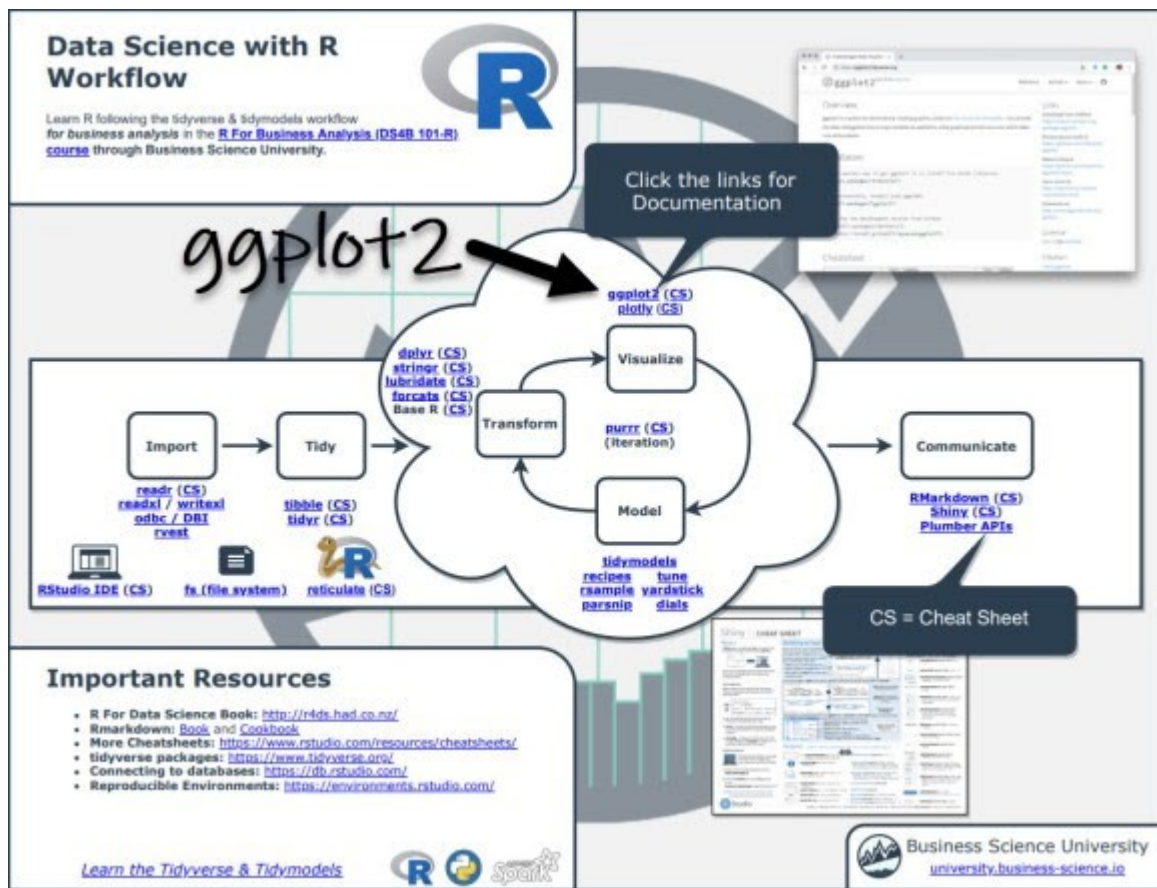
2. Showing a **Dotplot** to identify distribution

We can easily do this with a half-plot thanks to `gghalves`.

Before we get started, get the R Cheat Sheet

`gghalves` is great for making customized `ggplot2` plots. But, you'll still need to learn how to wrangle data with `dplyr` and visualize data with `ggplot2`. For those topics, I'll use the Ultimate R Cheat Sheet to refer to `dplyr` and `ggplot2` code in my workflow.

Quick Example:

Download the Ultimate R Cheat Sheet **Then Click the "CS" next to "ggplot2"** opens the Data Visualization with GGplot2 Cheat Sheet.

Now you're ready to quickly reference `ggplot2` functions.

Onto the tutorial.

How gghalves works

The gghalves package extends ggplot2 by adding several new "geoms" (ggplot geometries) that allow us to add half plots. In this tutorial, we'll cover:

- geom_half_boxplot(): For creating half-boxplots
- geom_half_dotplot(): For creating half-dotplots

Pro Tip:

Simply type "geom_half" in your R console and hit Tab to show all of the half plotting geoms available.

Load the Libraries and Data

First, run this code to:

1. **Load Libraries:** Load gghalves, tidyverse and tidyquant.
2. **Import Data:** We're using the mpg dataset that comes with ggplot2.

```
 7 ▾ # LIBRARIES ----
 8
 9   library(tidyverse)
10   library(tidyquant)
11   library(gghalves)
12
13 ▾ # DATA ----
14   mpg
15
```

Get the code.

Make the Half-Boxplot / Half-Dotplot

Next, we can combine a half-boxplot and half-dotplot. This has the advantage of showing:

- **Quantiles and Outliers (Boxplot)**
- **Distribution (Dotplot)**

Business Goal

Suppose we have a question:

> What effect does **Engine Size (number of Cylinders)** have on **Vehicle Highway Fuel Economy (Highway MPG)**?

We can visualize this with gghalves by making half-plots of Cylinder vs Highway.

Half-Plot Visualization Code

Using the Ultimate R Cheat Sheet, we can make a ggplot from the ggplot2 data visualization cheat sheet. We'll add geom_half_boxplot() and geom_half_dotplot() to make the half-plots of Cylinder vs Highway.

```
33 ▾ # 3.0 HALF-BOXPLOT / HALF-DOTPLOT ----
34   mpg %>%
35       filter(cyl != 5) %>%
36       mutate(cyl = factor(cyl)) %>%
37       ggplot(aes(cyl, hwy, color = cyl)) +
38
39       geom_half_boxplot(outlier.color = "red") +
40       geom_half_dotplot(
41           aes(fill = cyl),
42           dotsize = 0.75,
43           stackratio = 0.5,
44           color = "black"
45       ) +
46
47       facet_grid(cols = vars(cyl), scales = "free_x") +
48       scale_color_tq() +
49       scale_fill_tq() +
50       theme_tq() +
51       labs(
52           title = "Highway Fuel Economy by Engine Size",
53           subtitle = "Half-Boxplot + Half-Dotplot"
54       )
```

Get the code.

Half-Plot Visualization

Here is the visualization. We can explore to find an interesting relationship between Engine Size and Fuel Economy.

Get the code.

Insights: Bimodal Distribution of 6-Cylinder Engine Class

Generally speaking, fuel economy goes down as engine size increases. But, the 6-Cylinder engine has something unique going on that has been uncovered by the `gghalves::geom_half_dotplot()`.

The 6-Cylinder Engine class of car has a **bimodal distribution**, which is when there are two peaks. This generally indicates that there are two different populations within the group. We need to investigate with `ggplot2`.
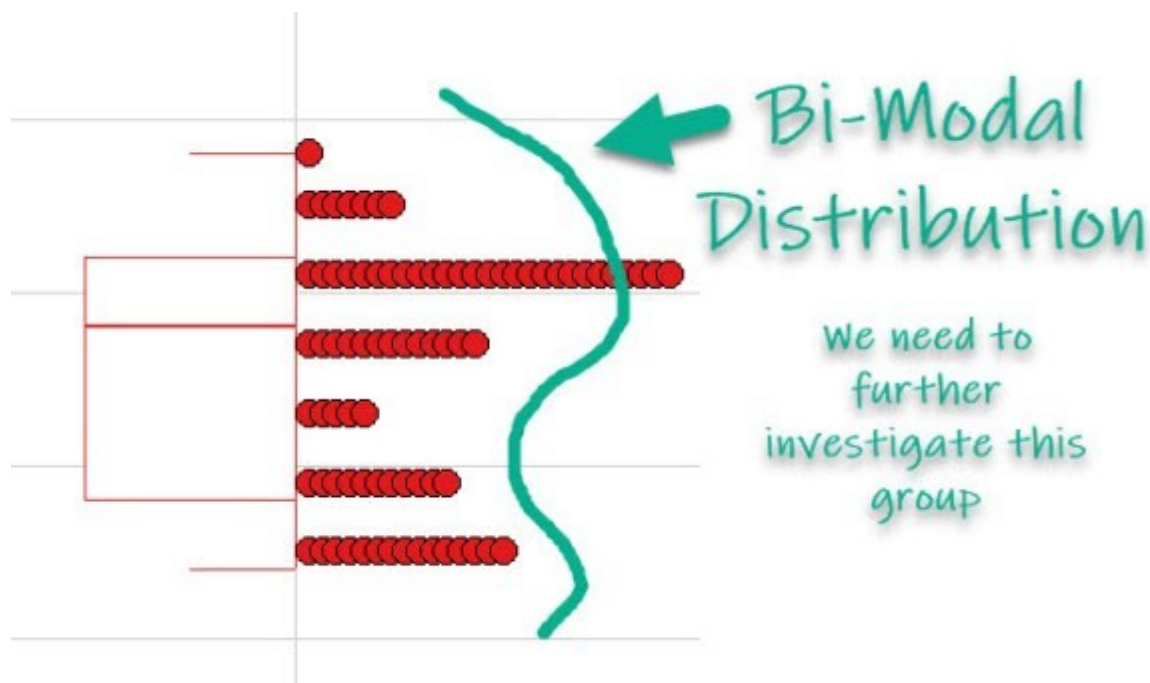
Get the code.

Exploring the Bimodal Relationship

We can explore the 6 Cylinder Vehicle Class a bit further to identify the cause of the Bimodal Distribution. It looks like:

- **SUV and Pickup classes** have much lower fuel economy
- **Compact, Midsize, Minivan, and Subcompact** have much higher fuel economy

6 Cylinder Vehicles: Pickup and SUV causing Bi-Modal Relationship