Data Visualisation: Assignment 2

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Part I: Qualitative Palette, Tints, Shades, and Tones

In this first part, I have used `www.colorizer.org` to create four different palettes of six colours each: Qualitative Palette, Tints, Shades and Tones.

Figure 1: Qualitative. Hex Values: #9f1d1d, #7c0e73,#121287, #18609a, #147b5f, #714c1e

Figure 2: Tints. Hex Values: #12e227, #62d06d, #73bf7b, #8abc8f, #a6c9aa, #c8dfca

Figure 3: Shades. Hex Values: #12e227, #0eb31f, #0c991a, #0a8016, #086612, #053b0

Figure 4: Tones. Hex Values:#12e227, #27b936, #37a442, #4c9a54, #5c8a60, #6e776

Based on the learning material provided this week, and last week, can your palettes be used for encoding qualitative and quantitative data? In my opinion, these palettes can be used for encoding qualitative (Figure 1) and quantitative (Figure 2, 3, and 4) data:

- The Qualitative Palette has colours clearly distinct from each other, the choice of colours do not seem to imply any sense of order or importance.
- Tints Palette has enough differentiation between colours and gets progressively whiter.
- Shades Palette has enough differentiation between colours and gets progressively darker.
- Tones Palette has enough differentiation between colours and gets progressively greyer and more muted.
- In general, lightness and brightness have been adjusted correctly so the colours are not too bright to the eye.

However, I would do an adjustment to Tints since, while they are getting whiter, they should get brighter too. It does not seem to be the case when comparing the first and last colour of the palette. In general, Qualitative colours are a bit dark, maybe I should have added more brightness.

Part II: Ggplot Default Palette

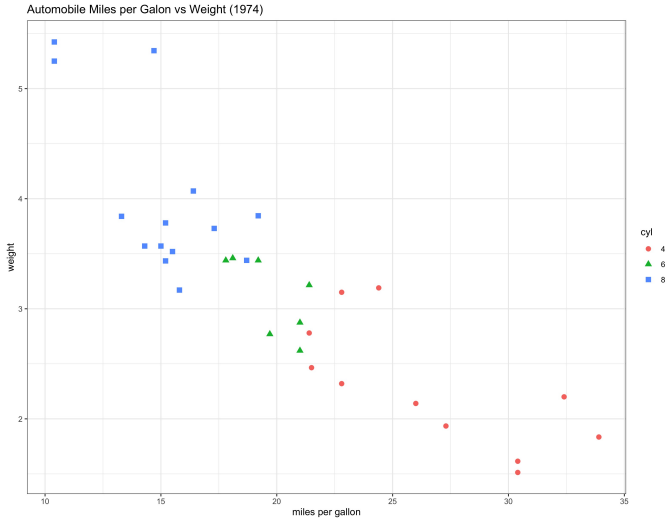

Figure 5: Ggplot with default colours

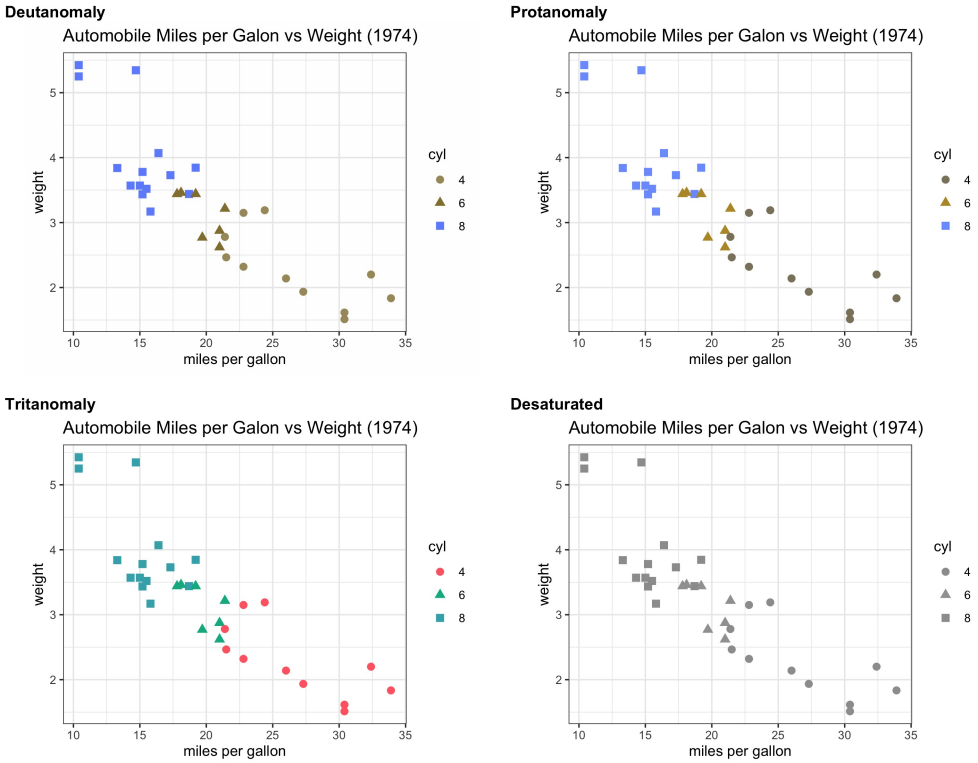

Figure 6: Ggplot colour blindness simulation

The colours used for this plot are the default colours given by ggplot - in this case the exact colours are #00BA38, #F8766D, and #619CFF.

This plot is not CVD-accessible:

- People with Deutanomaly and Protanomaly can easily confuse the colours given to number of cylinders 4 and 6.
- People with Tritanomaly can easily confuse the colours given to number of cylinders 6 and 8.
- The colours can not be distinguished after printing the plot in Black & White.

Part II: Okabe and Ito Palette

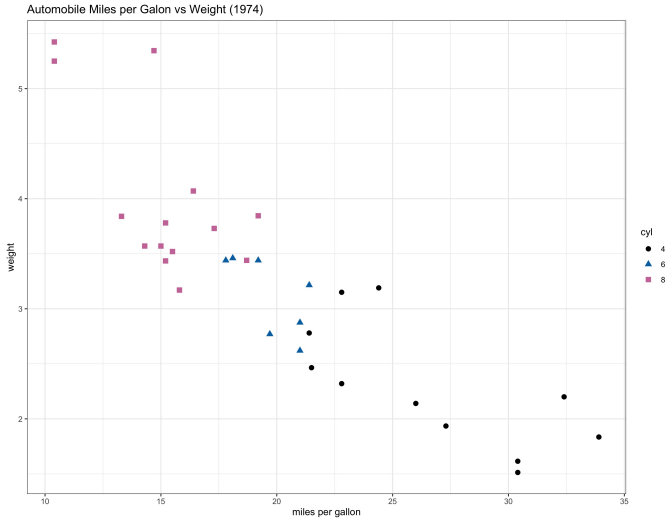

Figure 7: Okabe and Ito Palette

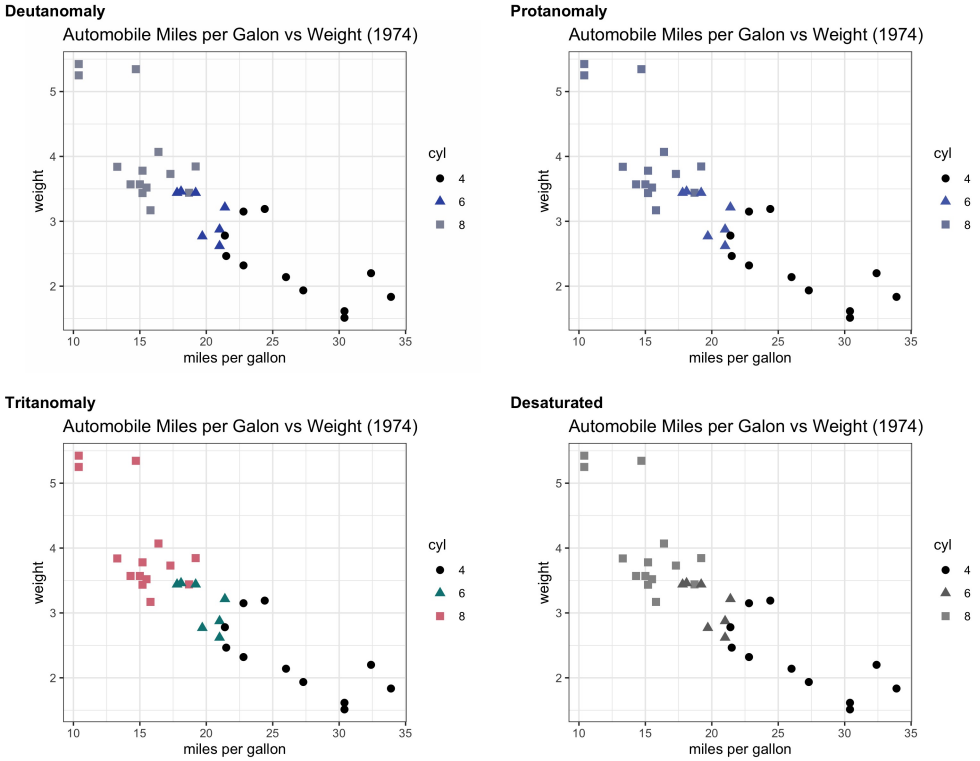

Figure 8: Okabe and Ito colour blindness simulation

The colours used for this plot have been selected from Okabi and Ito's Palette: #000000, #0072B2, #CC79A7

This plot is CVD-accessible:

- People with Deutanomaly and Protanomaly can distinct between the three colours. However, the colours given to number of cylinders 4 and 6 are quite similar.
- People with Tritanomaly can perfectly distinct the three colours.
- It's hard to distinct the colours after printing the plot in Black & White.

Part II: Viridis Default Palette

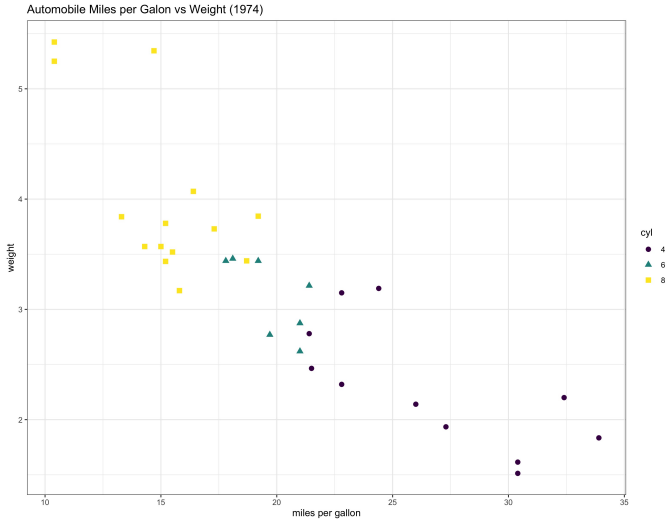

Figure 9: Viridis with default colours

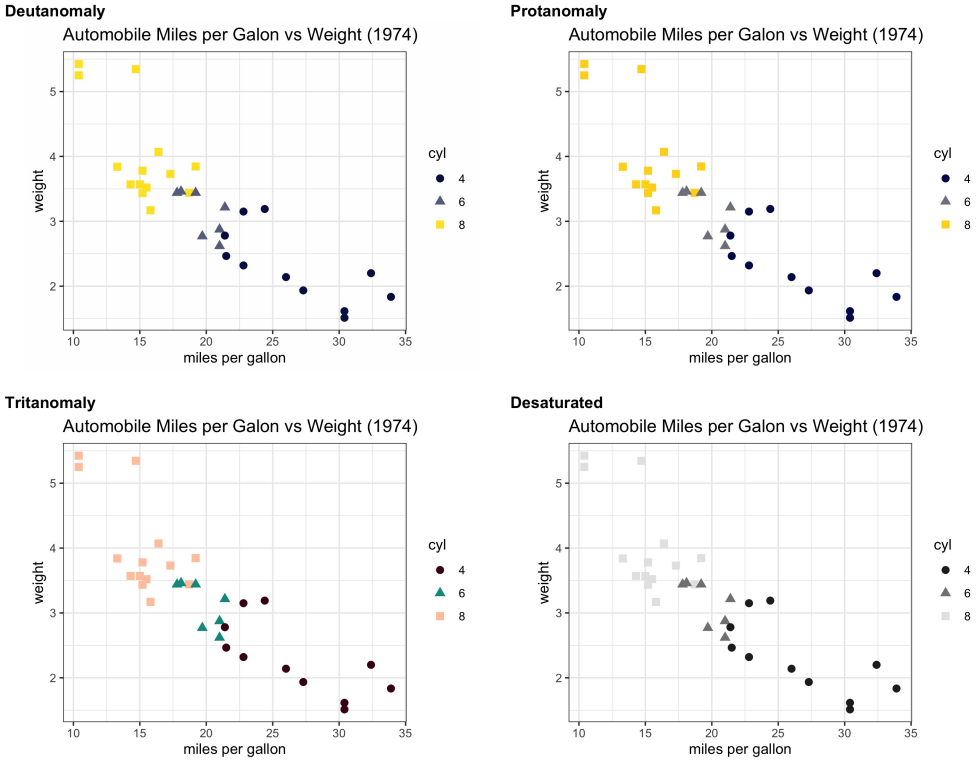

Figure 10: Viridis colour blindness simulation

The colours used for this plot are the default colours from the Viridis Palette: #440154FF, #1F9E89FF, #FDE725FF

This plot is CVD-accessible:

- People with Deutanomaly and Protanomaly can perfectly distinct the three colours.
- People with Tritanomaly can perfectly distinct the three colours.
- It's easy to distinct the colours after printing the plot in Black & White.

Conclusion:
The best plot is the one provided in Figure 9. The default colours of Viridis Palette are clearly the best combination of colours for people with CVD as they are easy to distinct regardless of the CVD type. On top of that, the colours are easy to distinct after printing the plot in B&W.

Appendix: R Code

```
library(ggplot2)
library(colorblindr)
library(viridis)

#Changing Cyl Type to be Categorical
mtcars$cyl <- as.factor(mtcars$cyl)

#Creating plot 1 using Ggplot Default colors
g1 <- ggplot(mtcars, aes(x=mpg, y = wt,colour=cyl,shape = cyl))+
  xlab("miles per gallon")+
  ylab("weight")+
  geom_point(size=2.5)+
  ggtitle("Automobile Miles per Galon vs Weight (1974)")+
  theme_bw()
#Saving plot
ggsave("plot1_assignment.jpg")
#Creating color blindness simulation
cvd_grid(g1)
#Saving simulation
ggsave("plot1_assignment_cvd.jpg")


#Creating vector with chosen colors from Okabe and Ito Palette
cbPalette <- c("#000000", "#0072B2", "#CC79A7")
g2 <- ggplot(mtcars, aes(x=mpg, y = wt,colour=cyl,shape = cyl))+
  xlab("miles per gallon")+
  ylab("weight")+
  geom_point(size=2.5)+
  ggtitle("Automobile Miles per Galon vs Weight (1974)")+
  scale_color_manual(values=cbPalette)+
  theme_bw()
#Saving plot
ggsave("plot2_assignment.jpg")
#Creating color blindness simulation
cvd_grid(g2)
#Saving simulation
ggsave("plot2_assignment_cvd.jpg")

#Creating plot using Viridis Default colors
g3 <- ggplot(mtcars, aes(x=mpg, y = wt,colour=cyl,shape = cyl))+
  xlab("miles per gallon")+
  ylab("weight")+
  geom_point(size=2.5)+
  ggtitle("Automobile Miles per Galon vs Weight (1974)")+
  scale_color_viridis_d()+
  theme_bw()
#Saving plot
ggsave("plot3_assignment.jpg")
#Creating color blindness simulation
cvd_grid(g3)
#Saving simulation
ggsave("plot3_assignment_cvd.jpg")
```