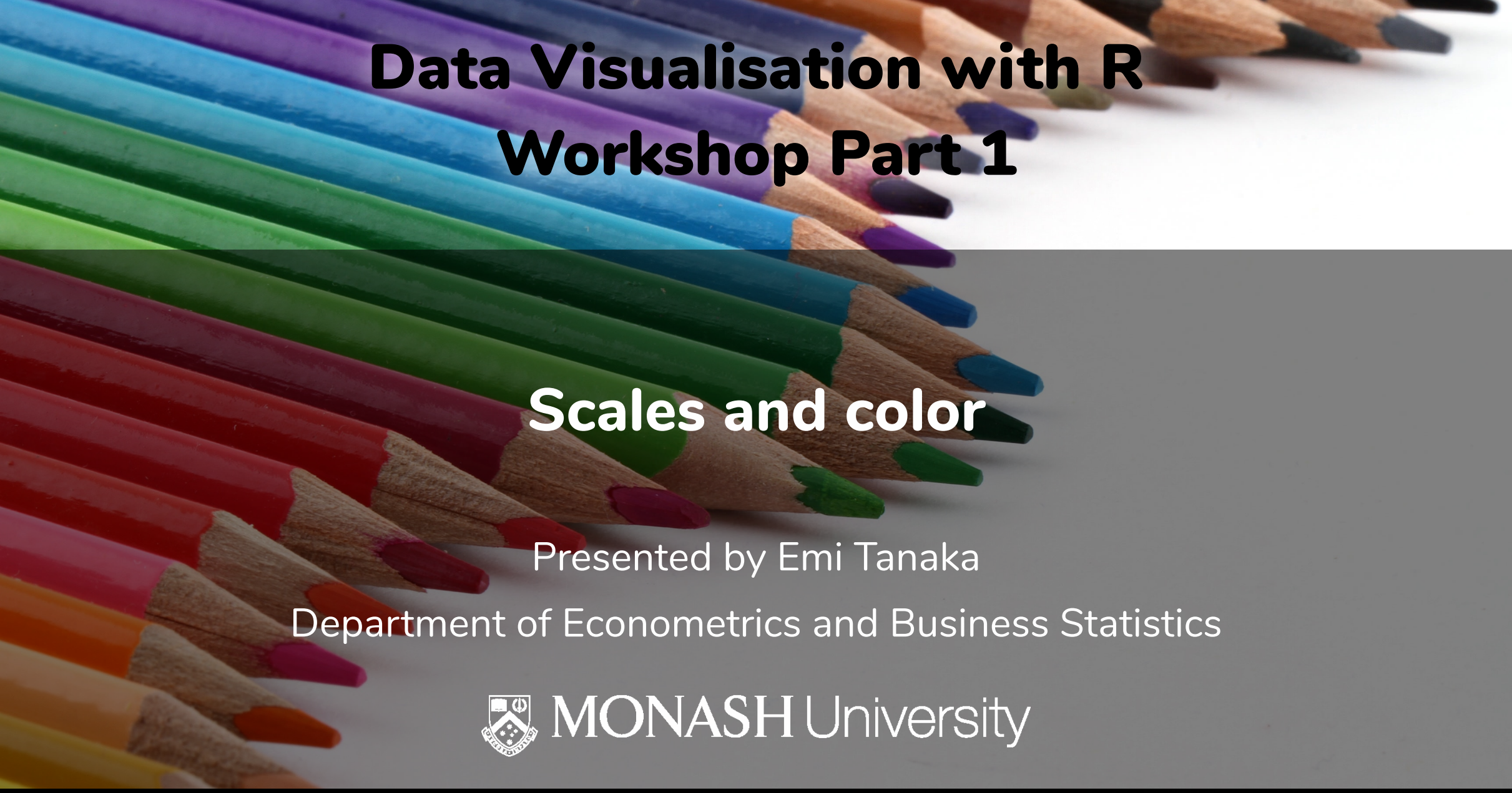
Data Visualisation with R Workshop Part 1



Scales and color

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6th Dec 2021 @ Statistical Society of Australia NSW Branch | Zoom

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Scales

💎 Diamonds data

The `diamonds` data is part of `ggplot2` 📦

```
glimpse(diamonds)

## Rows: 53,940
## Columns: 10
## $ carat   <dbl> 0.23, 0.21, 0.23, 0.29, 0.31, 0.24, 0.24, 0.26, 0.22, 0.23, 0.…
## $ cut     <ord> Ideal, Premium, Good, Premium, Good, Very Good, Very Good, Ver…
## $ color   <ord> E, E, E, I, J, J, I, H, E, H, J, J, F, J, E, E, I, J, J, J, I,…
## $ clarity <ord> SI2, SI1, VS1, VS2, SI2, VVS2, VVS1, SI1, VS2, VS1, SI1, VS1, …
## $ depth   <dbl> 61.5, 59.8, 56.9, 62.4, 63.3, 62.8, 62.3, 61.9, 65.1, 59.4, 64…
## $ table   <dbl> 55, 61, 65, 58, 58, 57, 57, 55, 61, 61, 55, 56, 61, 54, 62, 58…
## $ price   <int> 326, 326, 327, 334, 335, 336, 336, 337, 337, 338, 339, 340, 34…
## $ x       <dbl> 3.95, 3.89, 4.05, 4.20, 4.34, 3.94, 3.95, 4.07, 3.87, 4.00, 4.…
## $ y       <dbl> 3.98, 3.84, 4.07, 4.23, 4.35, 3.96, 3.98, 4.11, 3.78, 4.05, 4.…
## $ z       <dbl> 2.43, 2.31, 2.31, 2.63, 2.75, 2.48, 2.47, 2.53, 2.49, 2.39, 2.…
```

Scales

- Scales control the mapping from data to aesthetics.

```
scale_<aesthestic>_<type>
```

```
g <- ggplot(diamonds, aes(carat, price) ) + geom_hex()
```

```
g + scale_y_continuous() +
  scale_x_continuous()
```


```
g + scale_x_reverse() +
  scale_y_continuous(trans="log10")
```

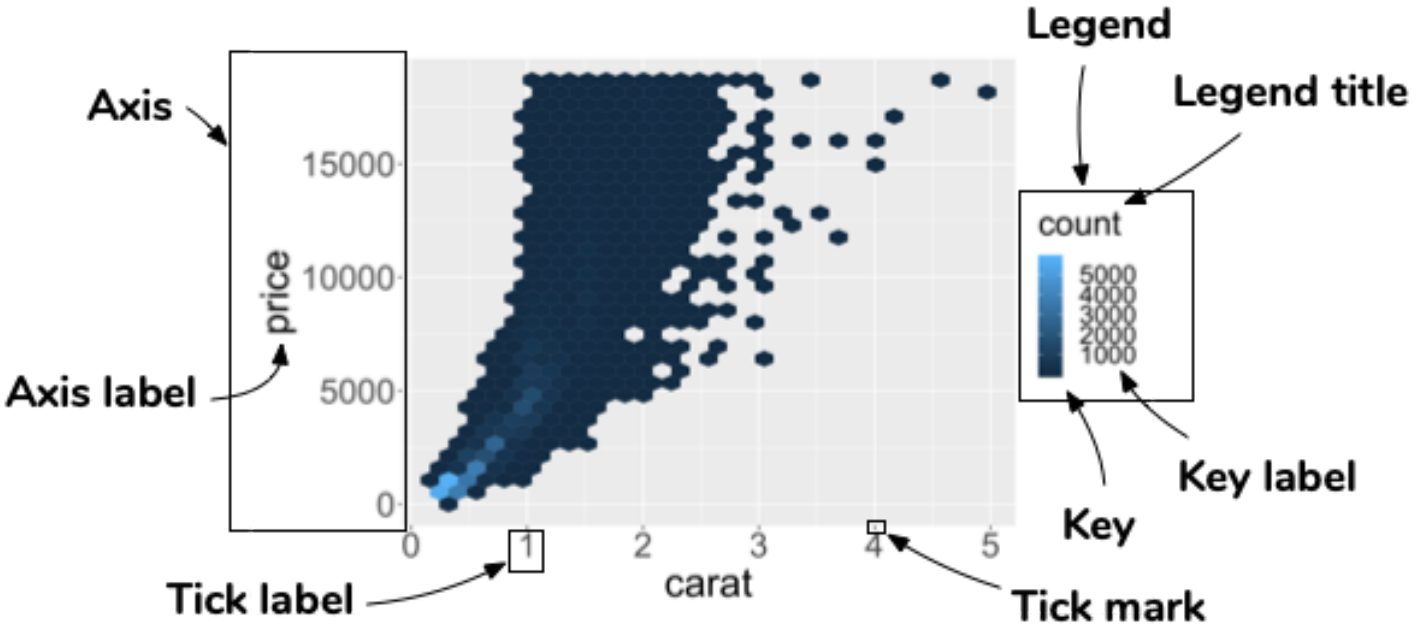

```
g + scale_y_log10() +
  scale_x_sqrt()
```

scale

scales	
scale_alpha, scale_alpha_continuous, scale_alpha_binned, scale_alpha_discrete, scale_alpha_ordinal, scale_alpha_datetime, scale_alpha_date	Alpha transparency scales
scale_x_binned, scale_y_binned	Positional scales for binning continuous data (x & y)
scale_colour_brewer, scale_fill_brewer, scale_colour_distiller, scale_fill_distiller, scale_colour_fermenter, scale_fill_fermenter, scale_color_brewer, scale_color_distiller, scale_color_fermenter	Sequential, diverging and qualitative colour scales from ColorBre
scale_colour_continuous, scale_fill_continuous, scale_colour_binned, scale_fill_binned, scale_color_continuous, scale_color_binned	Continuous and binned colour scales

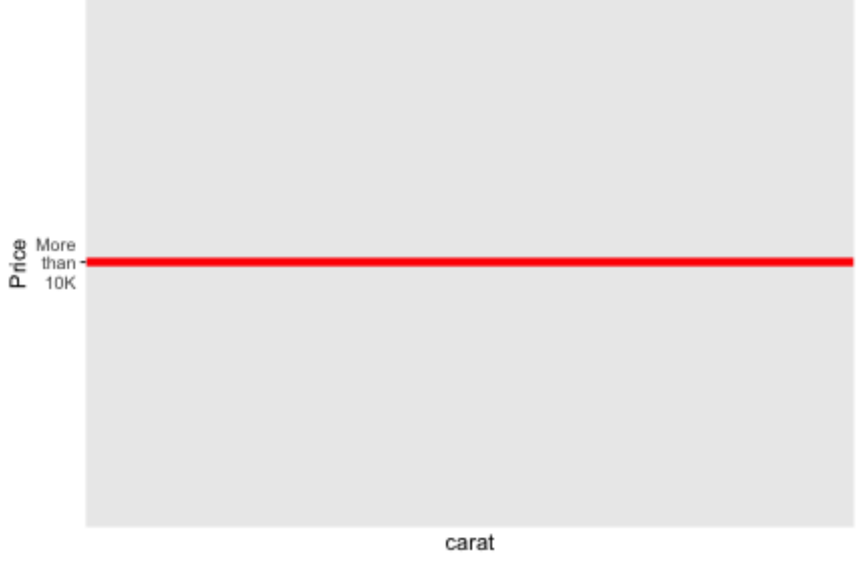
Guide: an axis or a legend

- The scale creates a guide: an axis or legend.
- So to modify these you generally use `scale_*` or other handy functions (`guides`, `labs`, `xlab`, `ylab` and so on).



Modify axis

```
g +
  scale_y_continuous(name = "Price",
                     breaks = c(0, 10000),
                     labels = c("0", "More\n than\n 10K")) +
  geom_hline(yintercept = 10000, color = "red", size = 2)
```



Nicer formatting functions in `scales` 📦

```
g +
  scale_y_continuous(
    label = scales::dollar_format()
  )
```

Modifying legend

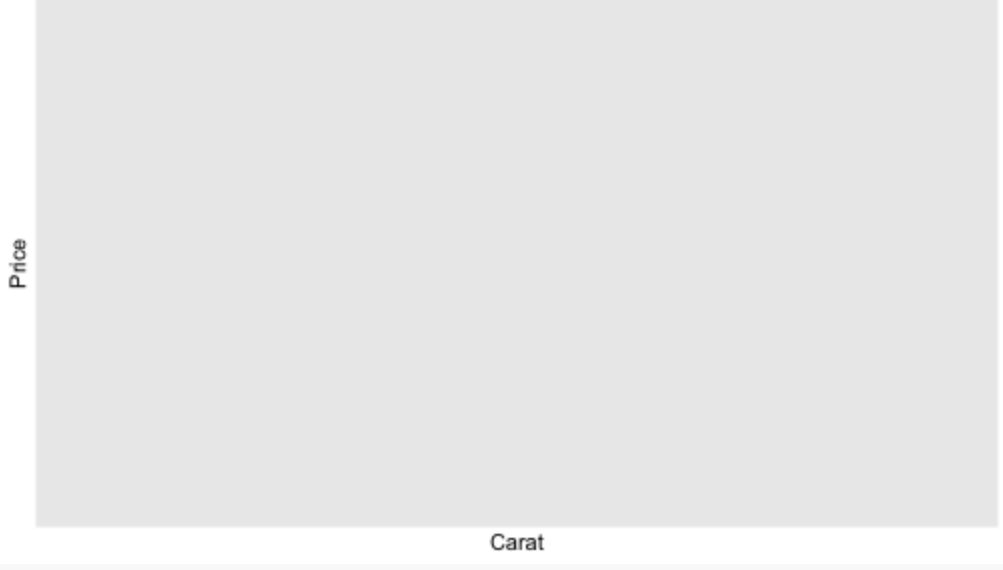
```
g +
  scale_fill_continuous(
    breaks = c(0, 10, 100, 1000, 4000),
    trans = "log10"
  )
```

Removing legend

```
g +
  scale_fill_continuous(
    guide = "none"
  )
```

Alternative control of guides

```
g +
  ylab("Price") + # Changes the y axis label
  labs(x = "Carat", # Changes the x axis label
       fill = "Count") # Changes the legend name
```




```
g + guides(fill = "none") # remove the legend
```

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Color space

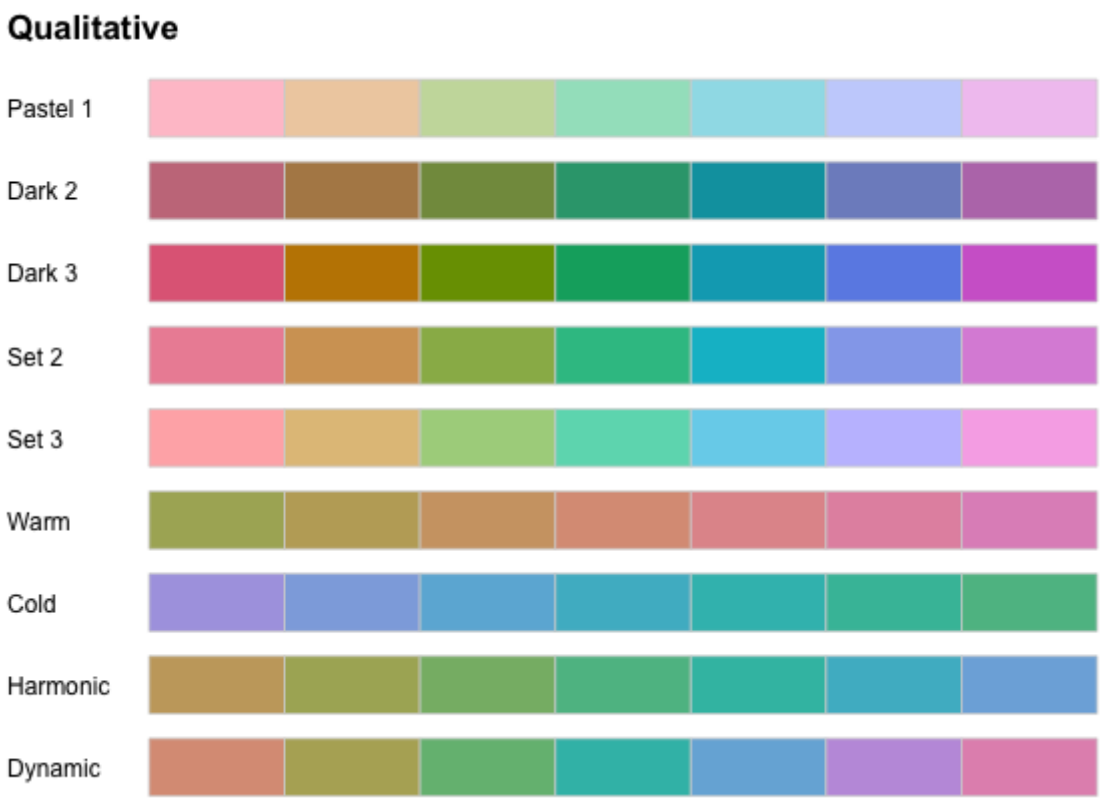
Zeileis, Fisher, Hornik, Ihaka, McWhite, Murrell, Stauffer, Wilke (2019). colorspace: A Toolbox for Manipulating and Assessing Colors and Palettes. *arXiv 1903.06490*

Zeileis, Hornik, Murrell (2009). Escaping RGBland: Selecting Colors for Statistical Graphics. *Computational Statistics & Data Analysis* 53(9) 3259-3270

Qualitative palettes

designed for categorical variable with no particular ordering

```
colorspace::hcl_palettes("Qualitative", plot = "TRUE", n = 7)
```



Sequential palettes

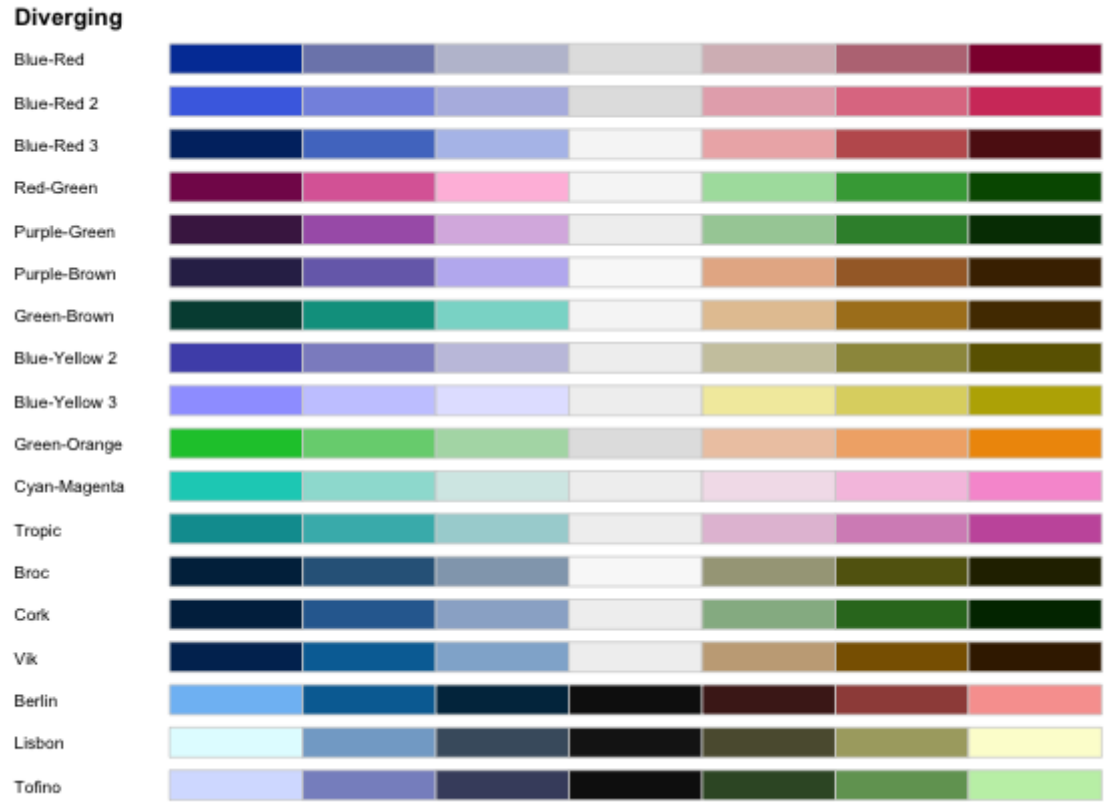
designed for ordered categorical variable or number going from low to high (or vice-versa)

```
colorspace::hcl_palettes("Sequential", plot = "TRUE", n = 7)
```

Diverging palettes

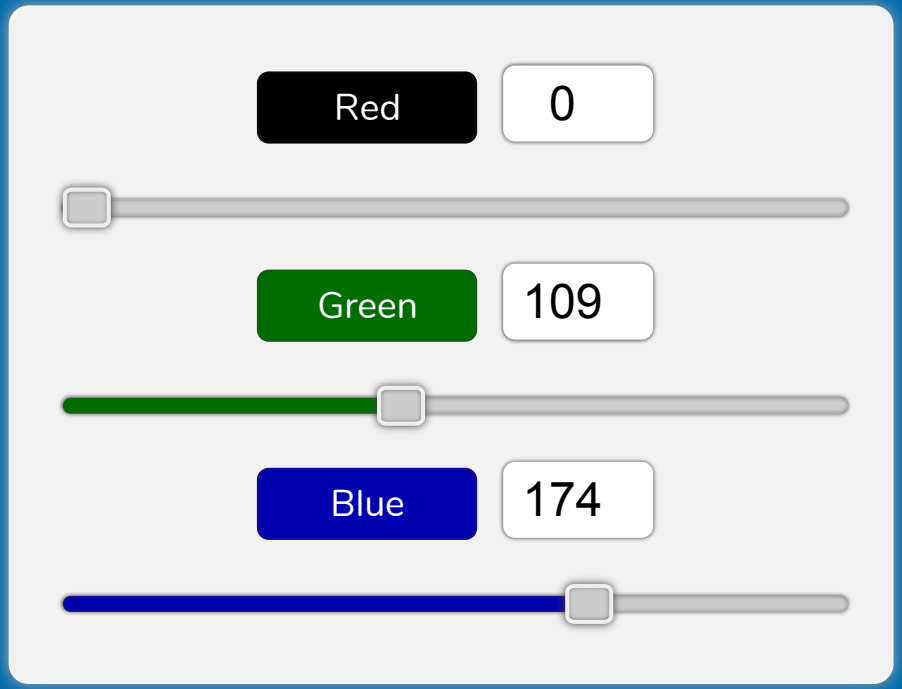
designed for ordered categorical variable or number going from low to high (or vice-versa) with a neutral value in between

```
colorspace::hcl_palettes("Diverging", plot = "TRUE", n = 7)
```



RGB color space

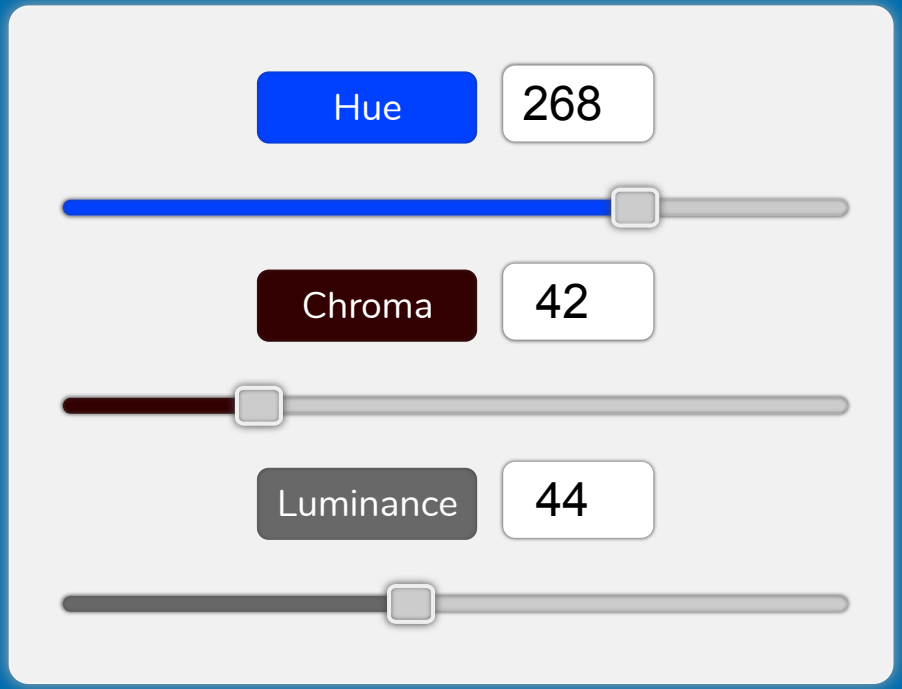
made for screen projection



Code adapted from https://github.com/Golobro/rgbcolorslider

HCL color space

made for human visual system



Color conversion using https://github.com/gka/chroma.js

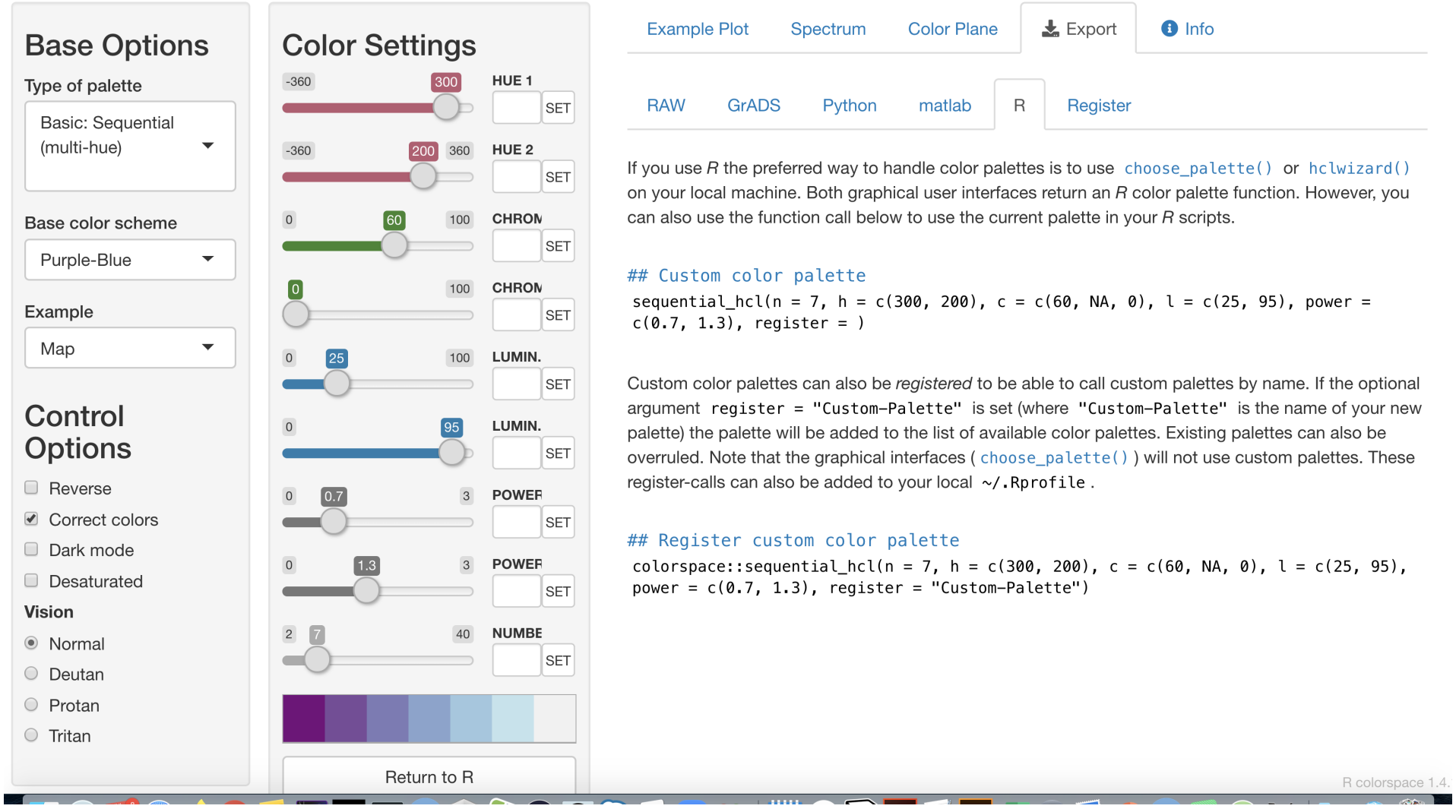
colorspace 

Interactively choose/create a palette using the HCL color space.

```
library(colorspace)
hcl_wizard() # OR choose_palette()
```

LIVE DEMO

hcl_wizard



Choose your palette > Export > R > Copy the command

Registering your own palette

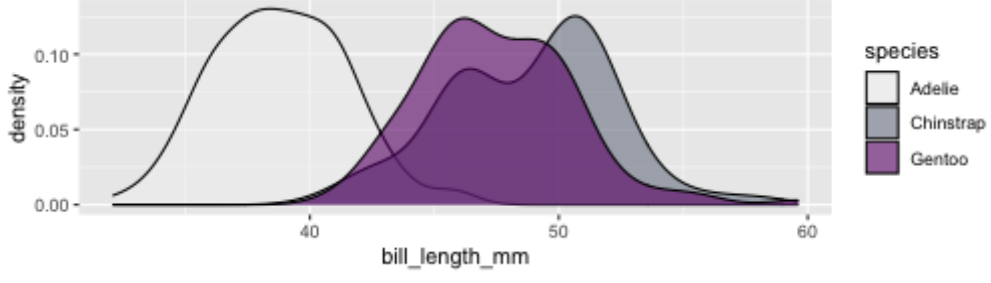
```
library(colorspace)
# register your palette
sequential_hcl(n = 7,
               h = c(300, 200),
               c = c(60, 0),
               l = c(25, 95),
               power = c(2.1, 0.8),
               register = "my-set")
# now generate from your palette
sequential_hcl(n = 3,
               palette = "my-set")

## [1] "#6B0077" "#7C8393" "#F1F1F1"
```

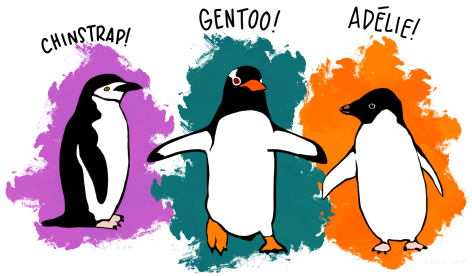
```
hcl_palettes(n = 5, palette = "my-set", plot = T)
```

Combining with `ggplot`:

```
ggplot(penguins,
       aes(bill_length_mm, fill = species)) +
 geom_density(alpha = 0.6) +
  # notice here you don't need to specify the n!
 scale_fill_discrete_sequential(palette = "my-set")
```



Manually selecting colors

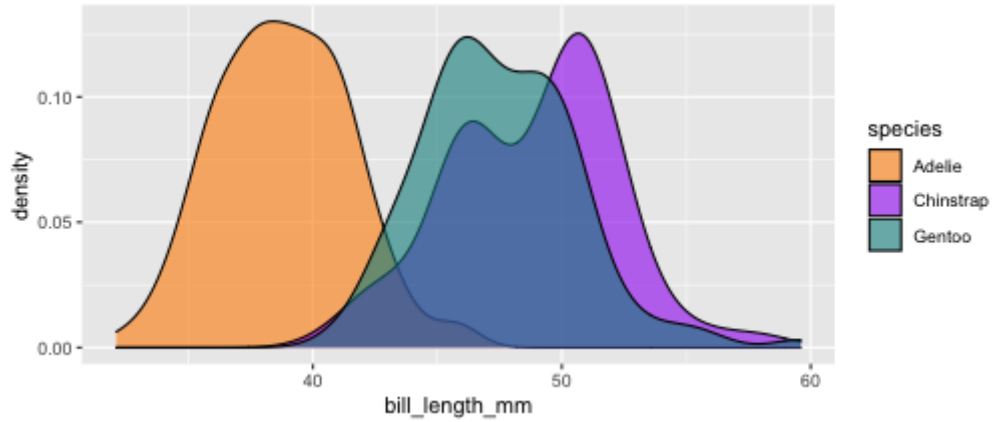



```
g <- ggplot(penguins,
       aes(bill_length_mm, fill = species)) +
 geom_density(alpha = 0.6) +
 scale_fill_manual(
   breaks = c("Adelie", "Chinstrap", "Gentoo"), # optional but makes it more robust
   values = c("darkorange", "purple", "cyan4"))
g
```

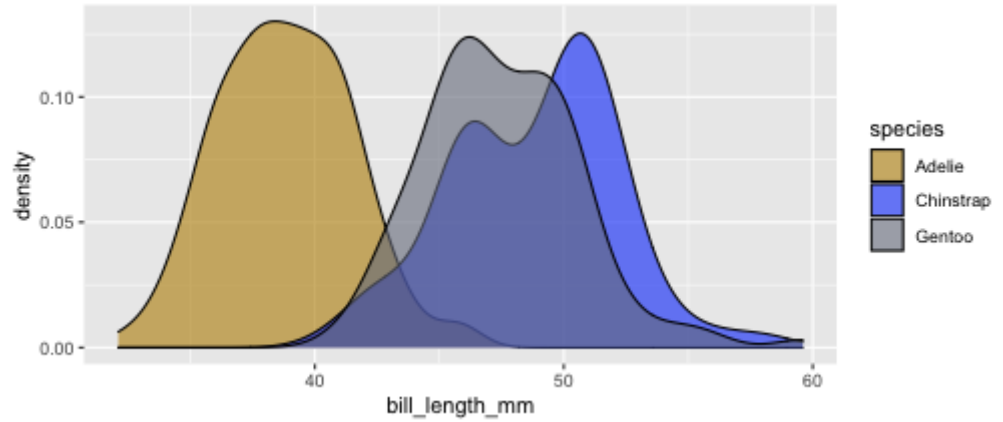
Check that it's colour blind friendly!

```
cols <- c("darkorange", "purple", "cyan4")
```

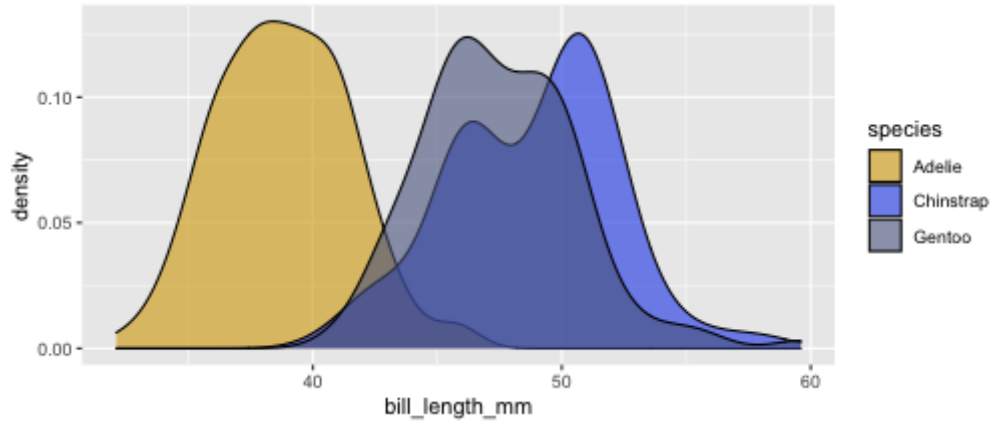
```
g # original
```



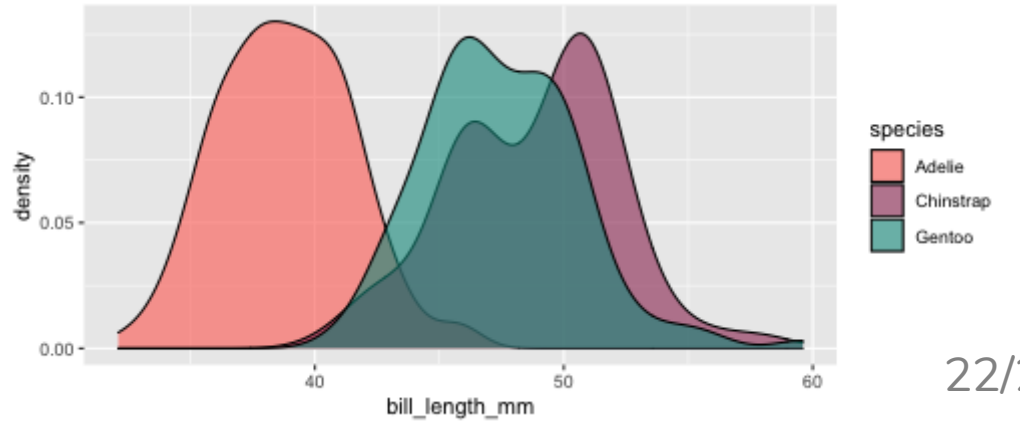

```
g + scale_fill_manual(values = protan(cols))
```




```
g + scale_fill_manual(values = deutan(cols))
```




```
g + scale_fill_manual(values = tritan(cols))
```



</> Open part1-exercise-03.Rmd

15:00

Session Information

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

```
## ─ Session info  ✏️  🌎  🎳  ─────────────────────────────────────────────
##  hash: pencil, globe showing Americas, bowling
##
##  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     2021-11-30
##  pandoc   2.11.4 @ /Applications/RStudio.app/Contents/MacOS/pandoc/ (via rmarkdown)
```