



# Plotting and Color in R

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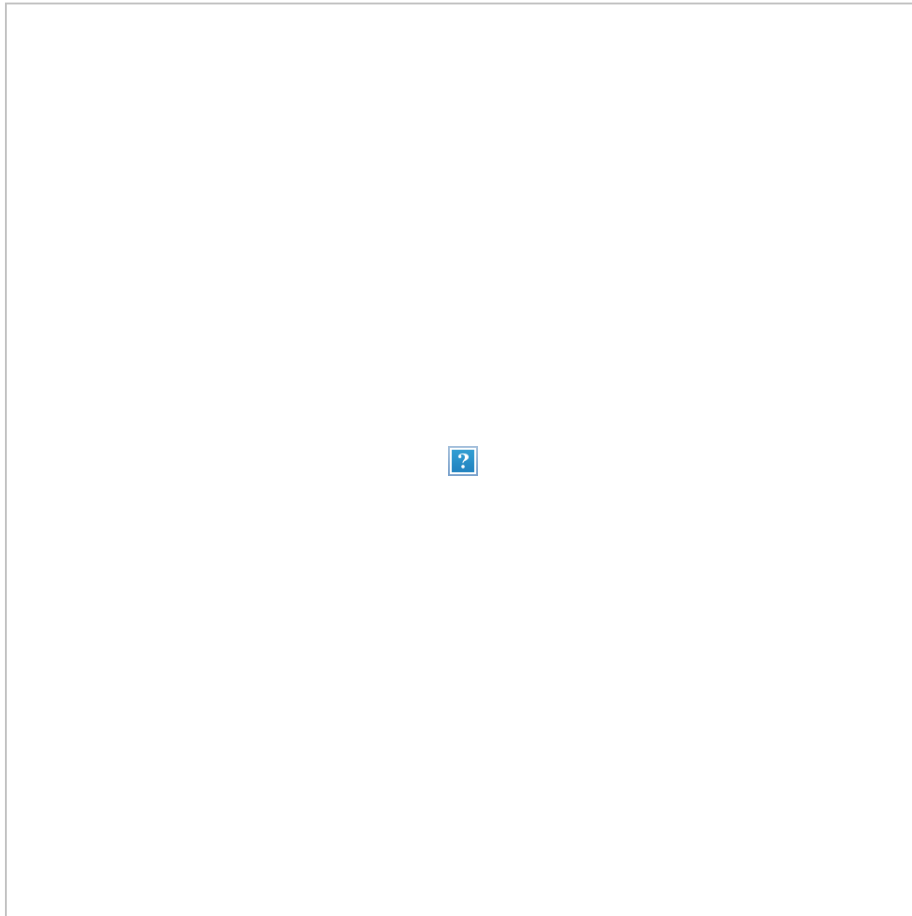
# Plotting and Color

- The default color schemes for most plots in R are horrendous
  - I don't have good taste and even I know that
- Recently there have been developments to improve the handling/specification of colors in plots/graphs/etc.
- There are functions in R and in external packages that are very handy

# Colors 1, 2, and 3



# Default Image Plots in R



# Color Utilities in R

- The `grDevices` package has two functions
  - `colorRamp`
  - `colorRampPalette`
- These functions take palettes of colors and help to interpolate between the colors
- The function `colors()` lists the names of colors you can use in any plotting function

# Color Palette Utilities in R

- `colorRamp`: Take a palette of colors and return a function that takes values between 0 and 1, indicating the extremes of the color palette (e.g. see the 'gray' function)
- `colorRampPalette`: Take a palette of colors and return a function that takes integer arguments and returns a vector of colors interpolating the palette (like `heat.colors` or `topo.colors`)

# colorRamp

[,1] [,2] [,3] corresponds to [Red] [Blue] [Green]

```
> pal <- colorRamp(c("red", "blue"))
```

```
> pal(0)
```

```
      [,1] [,2] [,3]  
[1,]  255    0    0
```

```
> pal(1)
```

```
      [,1] [,2] [,3]  
[1,]    0    0  255
```

```
> pal(0.5)
```

```
      [,1] [,2] [,3]  
[1,] 127.5    0 127.5
```

# colorRamp

```
> pal(seq(0, 1, len = 10))  
      [,1] [,2]      [,3]  
[1,] 255.00000 0      0  
[2,] 226.66667 0  28.33333  
[3,] 198.33333 0  56.66667  
[4,] 170.00000 0  85.00000  
[5,] 141.66667 0 113.33333  
[6,] 113.33333 0 141.66667  
[7,] 85.00000  0 170.00000  
[8,] 56.66667 0 198.33333  
[9,] 28.33333 0 226.66667  
[10,] 0.00000 0 255.00000
```

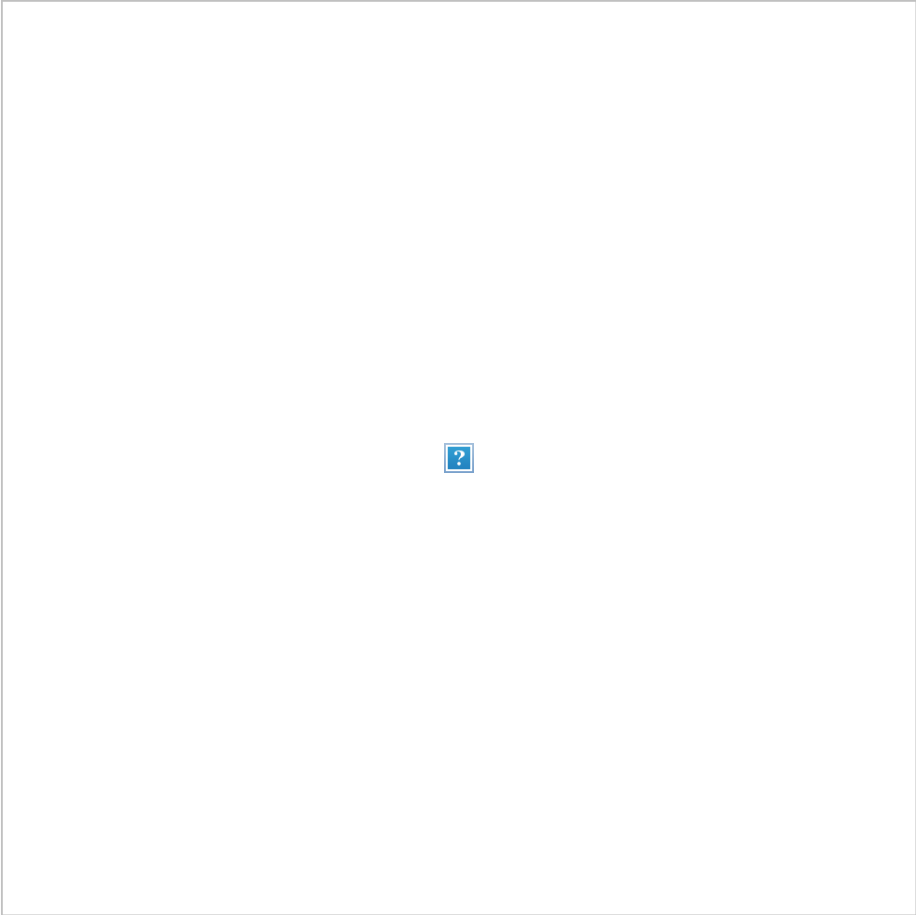


# colorRampPalette

```
> pal <- colorRampPalette(c("red", "yellow"))  
  
> pal(2)  
[1] "#FF0000" "#FFFF00"  
  
> pal(10)  
[1] "#FF0000" "#FF1C00" "#FF3800" "#FF5500" "#FF7100"  
[6] "#FF8D00" "#FFAA00" "#FFC600" "#FFE200" "#FFFF00"
```

# RColorBrewer Package

- One package on CRAN that contains interesting/useful color palettes
- There are 3 types of palettes
  - Sequential
  - Diverging
  - Qualitative
- Palette information can be used in conjunction with the `colorRamp()` and `colorRampPalette()`



# RColorBrewer and colorRampPalette

```
> library(RColorBrewer)

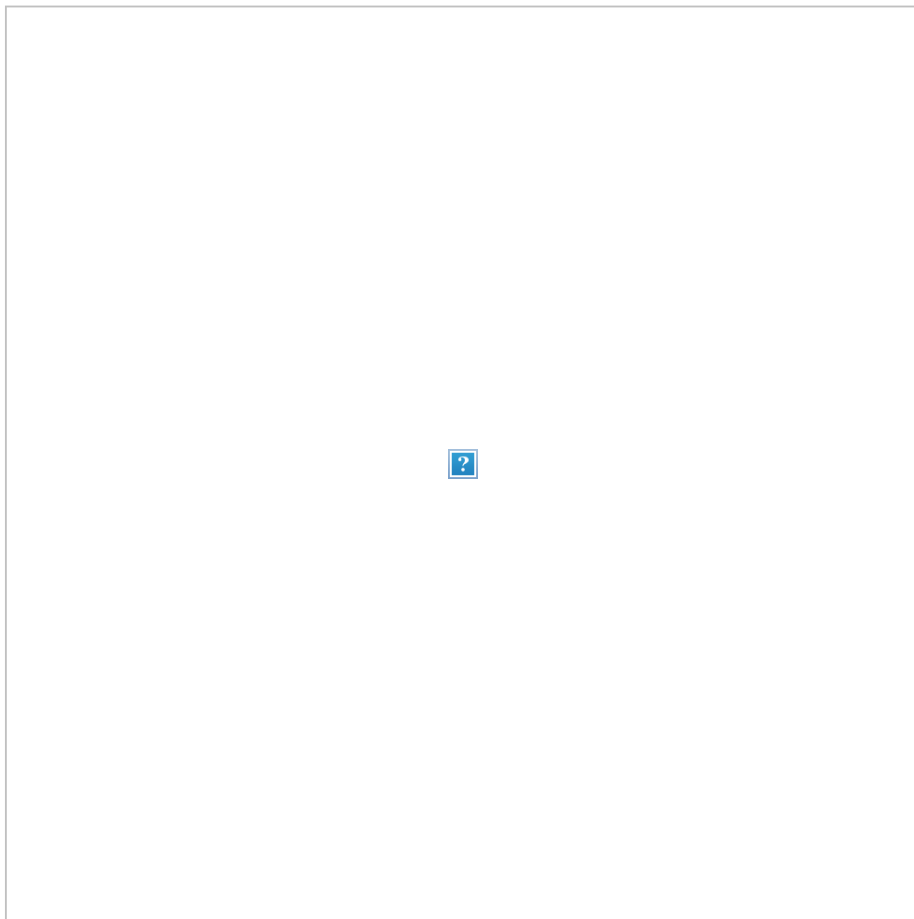
> cols <- brewer.pal(3, "BuGn")

> cols
[1] "#E5F5F9" "#99D8C9" "#2CA25F"

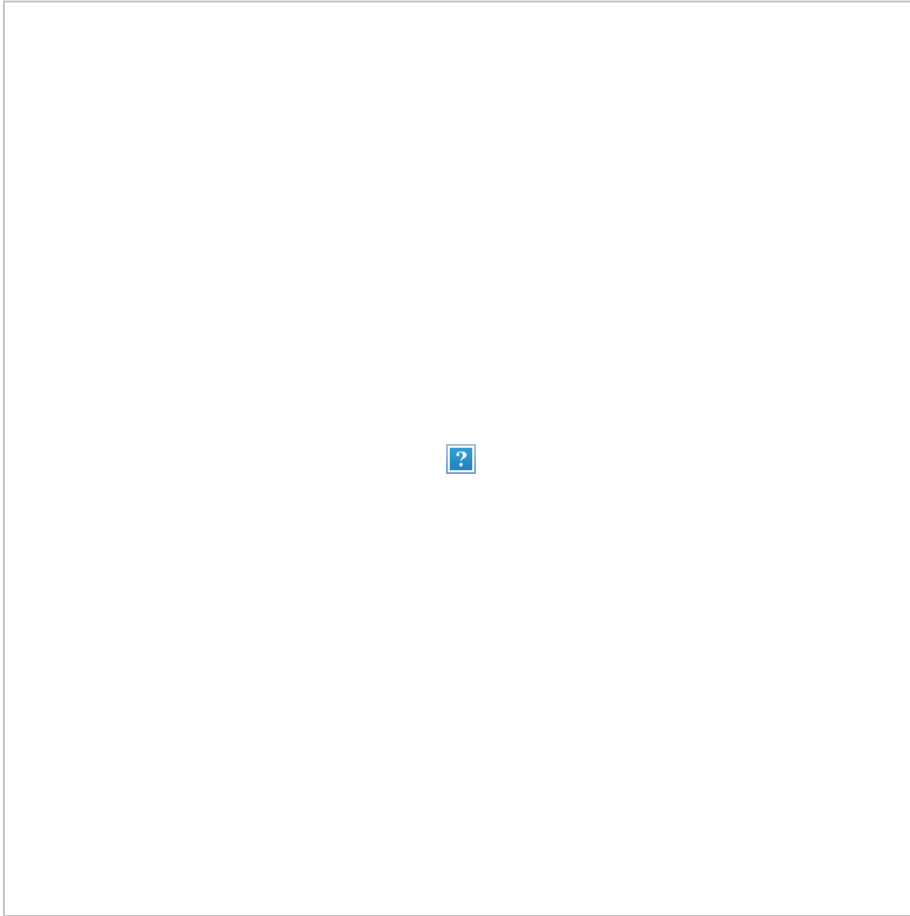
> pal <- colorRampPalette(cols)

> image(volcano, col = pal(20))
```

# RColorBrewer and colorRampPalette



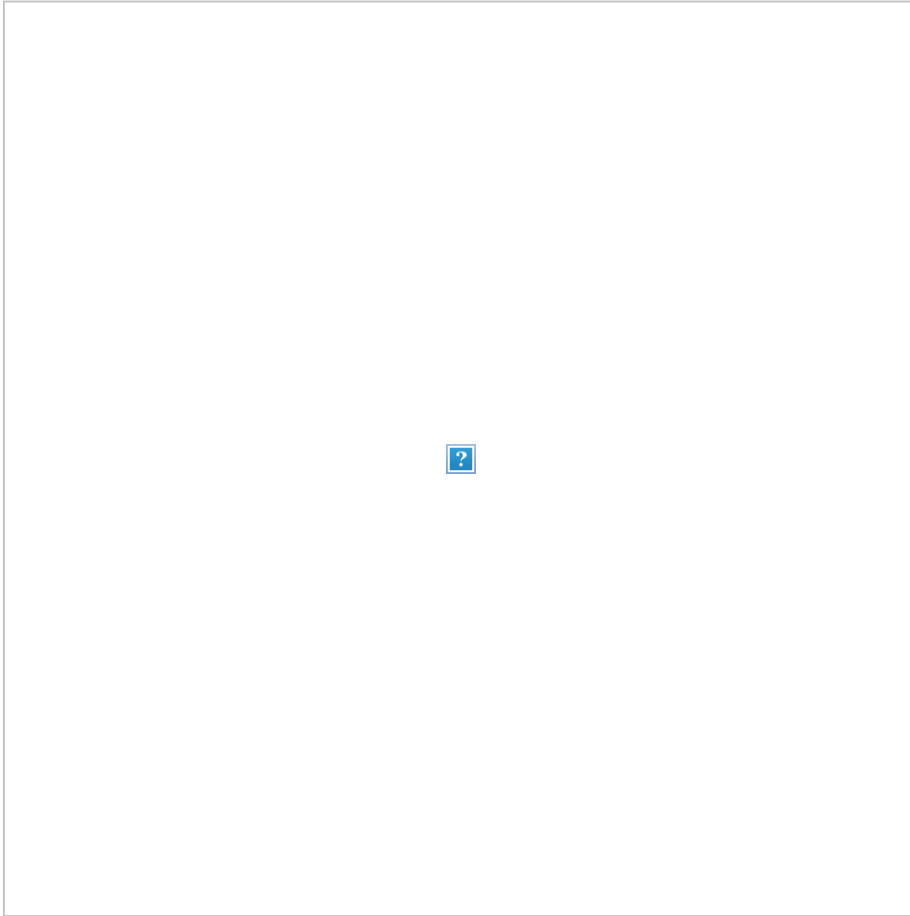
# The smoothScatter function



# Some other plotting notes

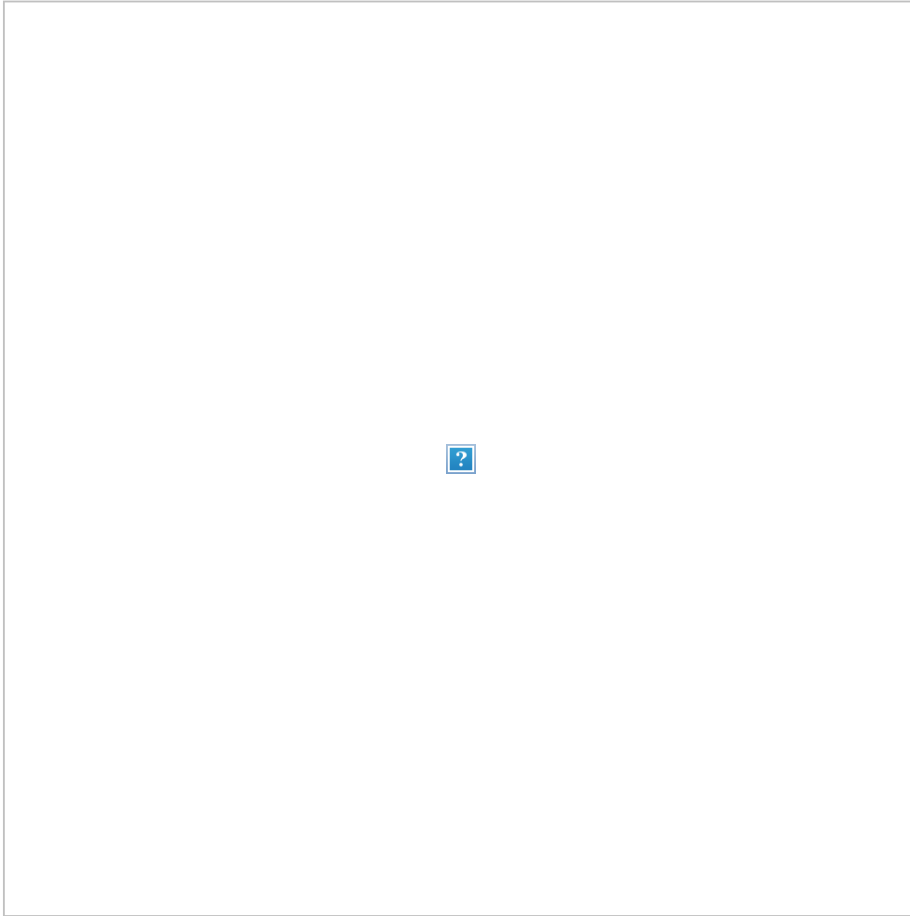
- The `rgb` function can be used to produce any color via red, green, blue proportions
- Color transparency can be added via the `alpha` parameter to `rgb`
- The `colorspace` package can be used for a different control over colors

# Scatterplot with no transparency





# Scatterplot with transparency



# Summary

- Careful use of colors in plots/maps/etc. can make it easier for the reader to get what you're trying to say (why make it harder?)
- The `RColorBrewer` package is an R package that provides color palettes for sequential, categorical, and diverging data
- The `colorRamp` and `colorRampPalette` functions can be used in conjunction with color palettes to connect data to colors
- Transparency can sometimes be used to clarify plots with many points