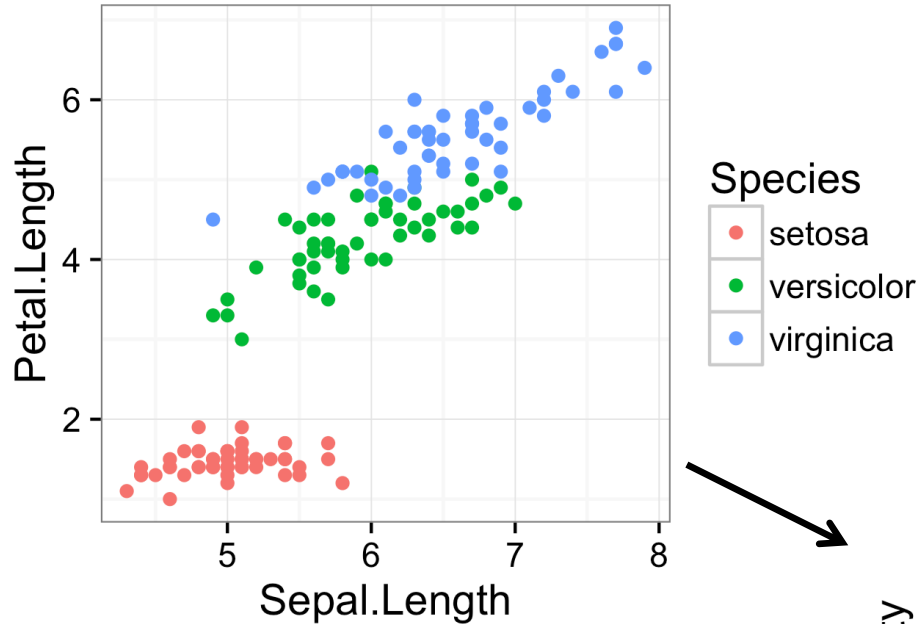
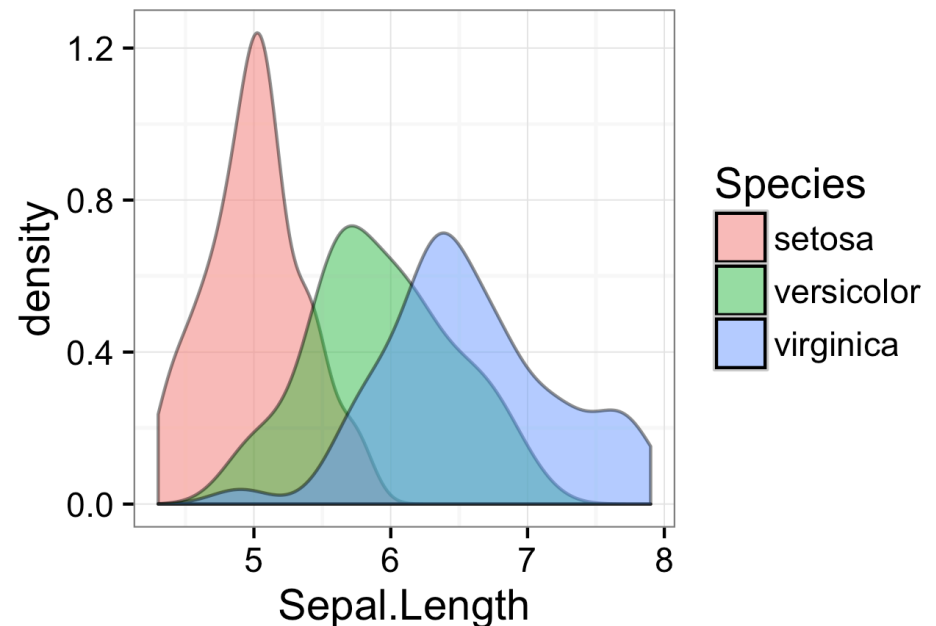


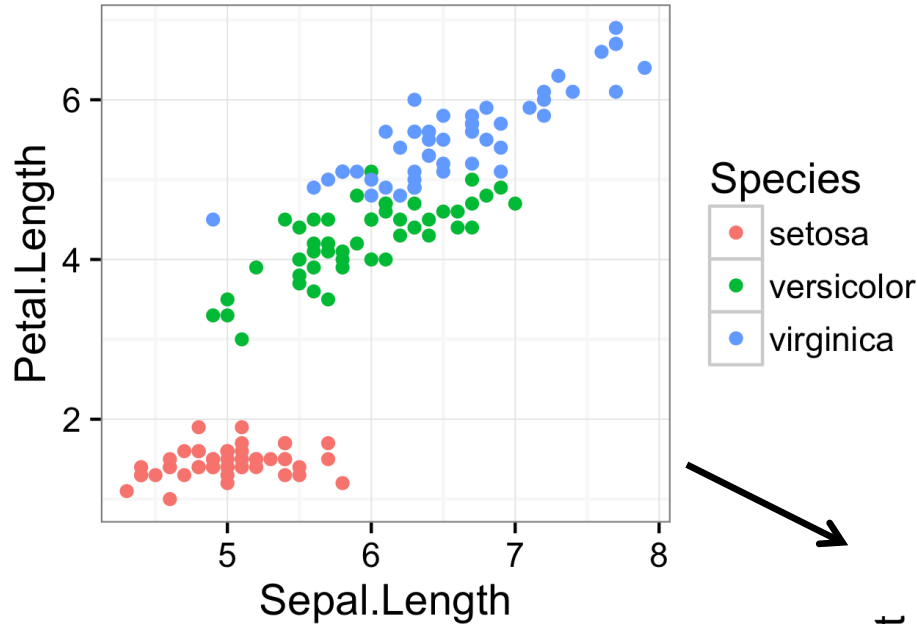
# We often need to do statistical transformations before plotting



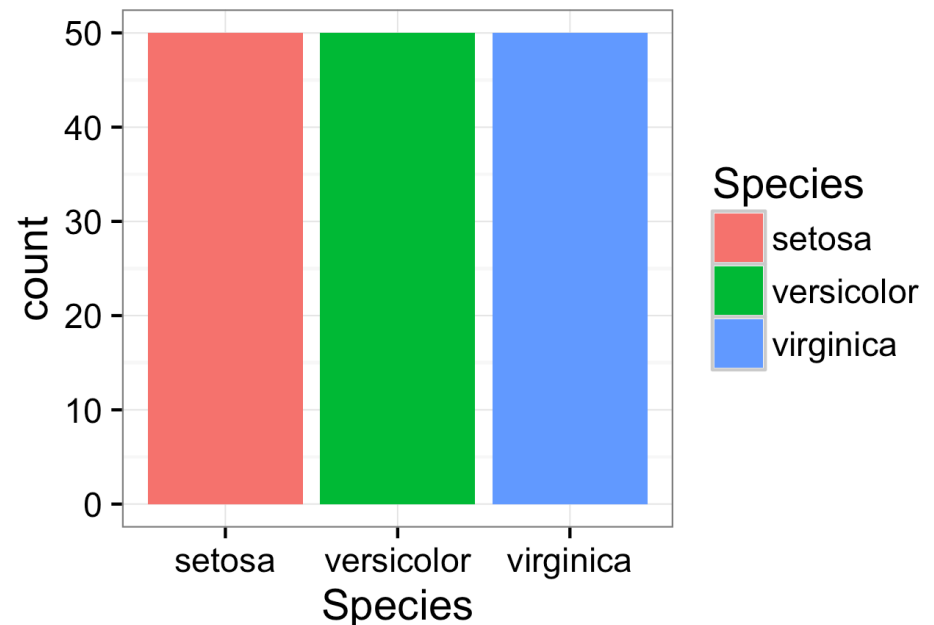
density of  
data points



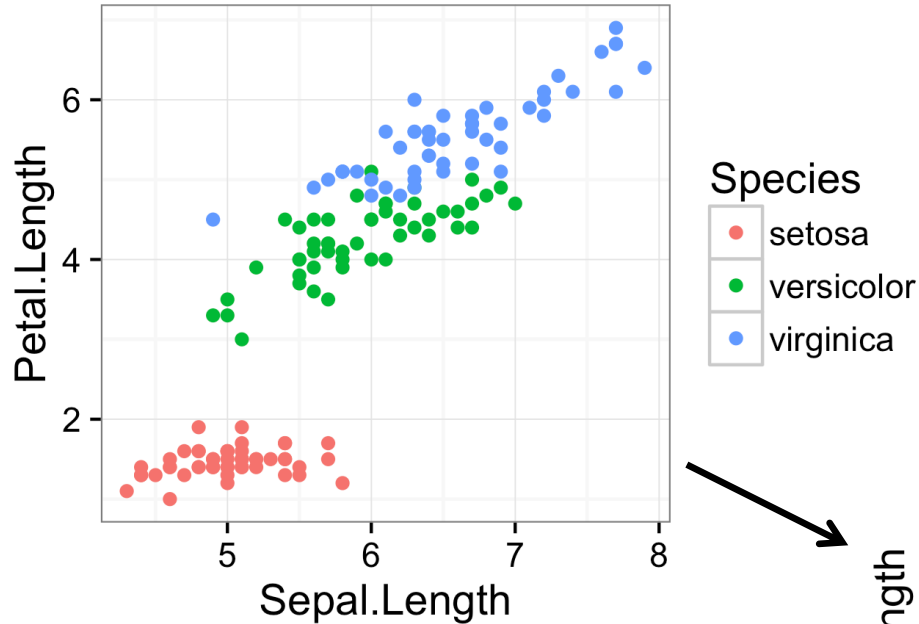
# We often need to do statistical transformations before plotting



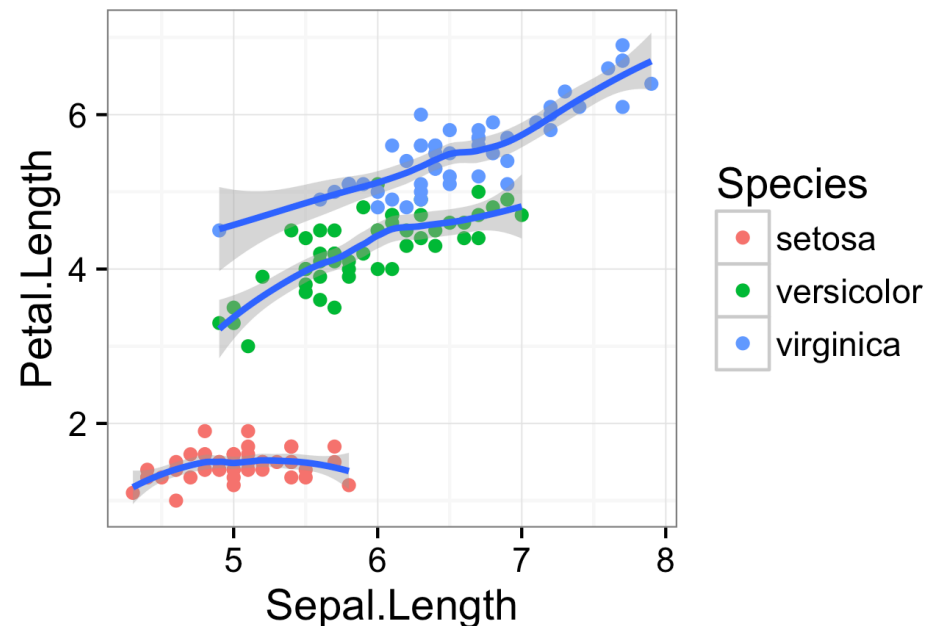
count of number  
of different types



# We often need to do statistical transformations before plotting

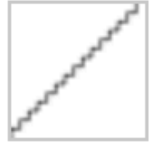


statistical smoothing/  
trend lines



# In ggplot2, these transformations are done with stats

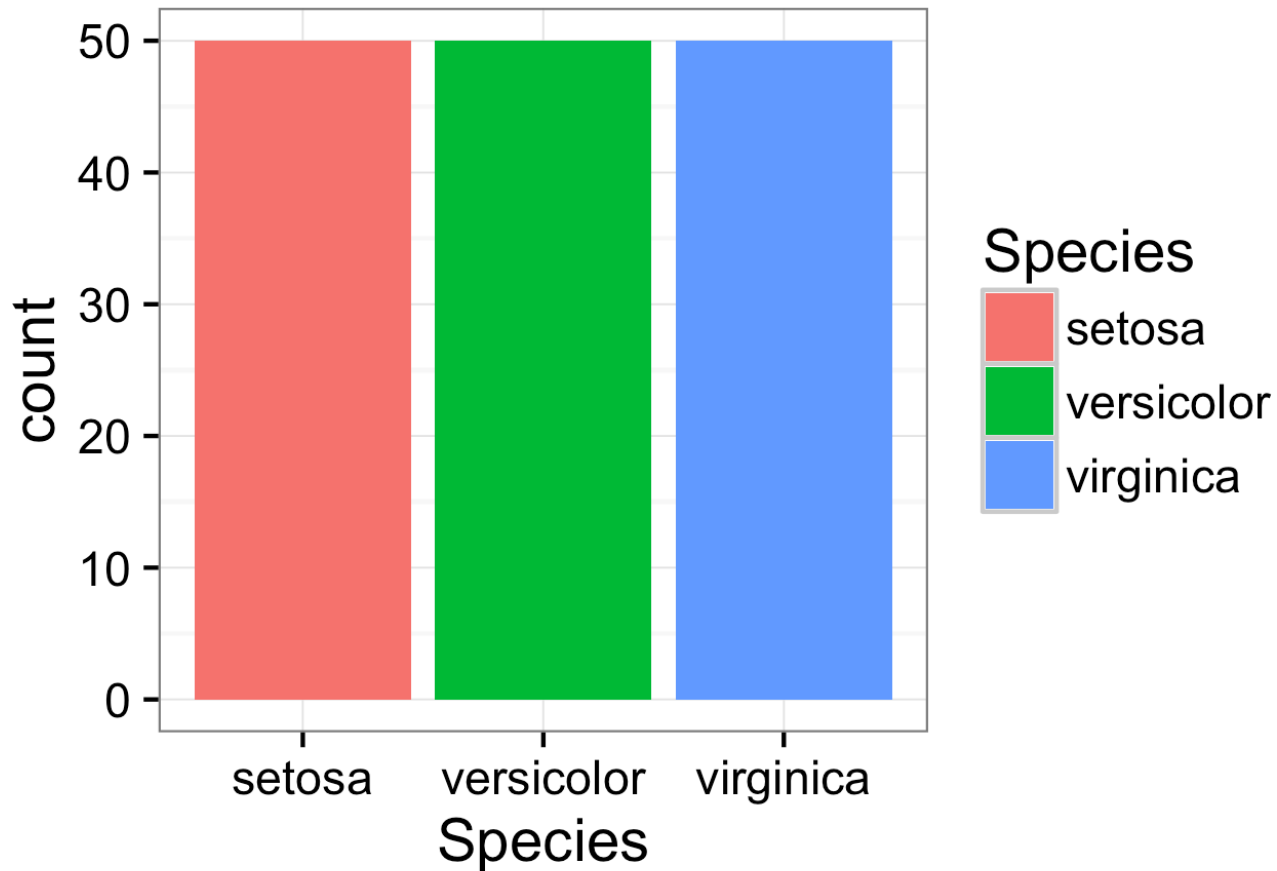
- `stat_ecdf`  
Empirical Cumulative Density Function
- `stat_ellipse`  
Plot data ellipses.
- `stat_function`  
Superimpose a function.
- `stat_identity`  
Identity statistic.
- `stat_qq` (geom\_qq)  
Calculation for quantile-quantile plot.
- `stat_summary_2d` (stat\_summary2d, stat\_summary\_hex)  
Bin and summarise in 2d (rectangle & hexagons)
- `stat_unique`  
Remove duplicates.



$$f(x) = x$$

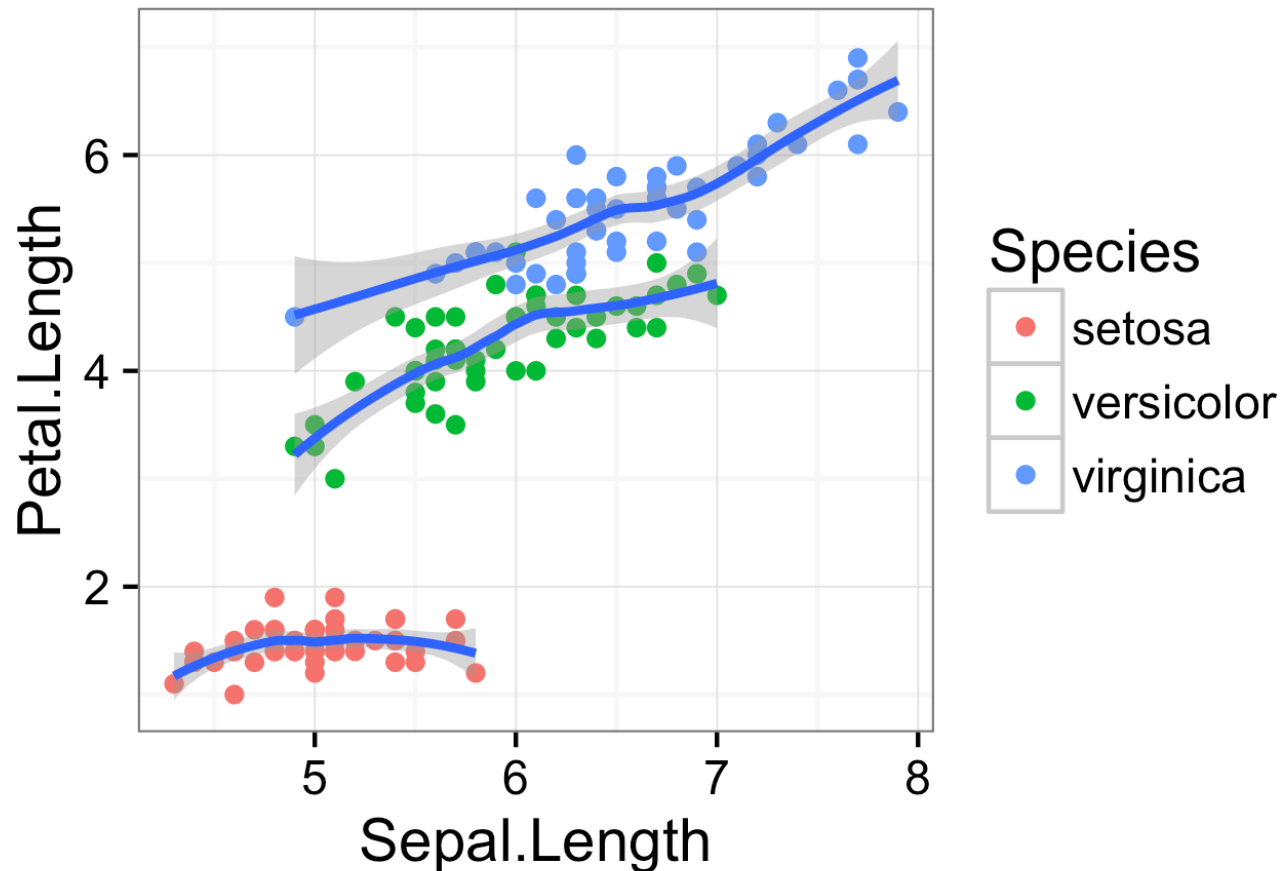
# In most cases we just need to call the appropriate geom and it calls a stat

```
ggplot(iris, aes(x=Species, fill=Species)) +  
  geom_bar()
```



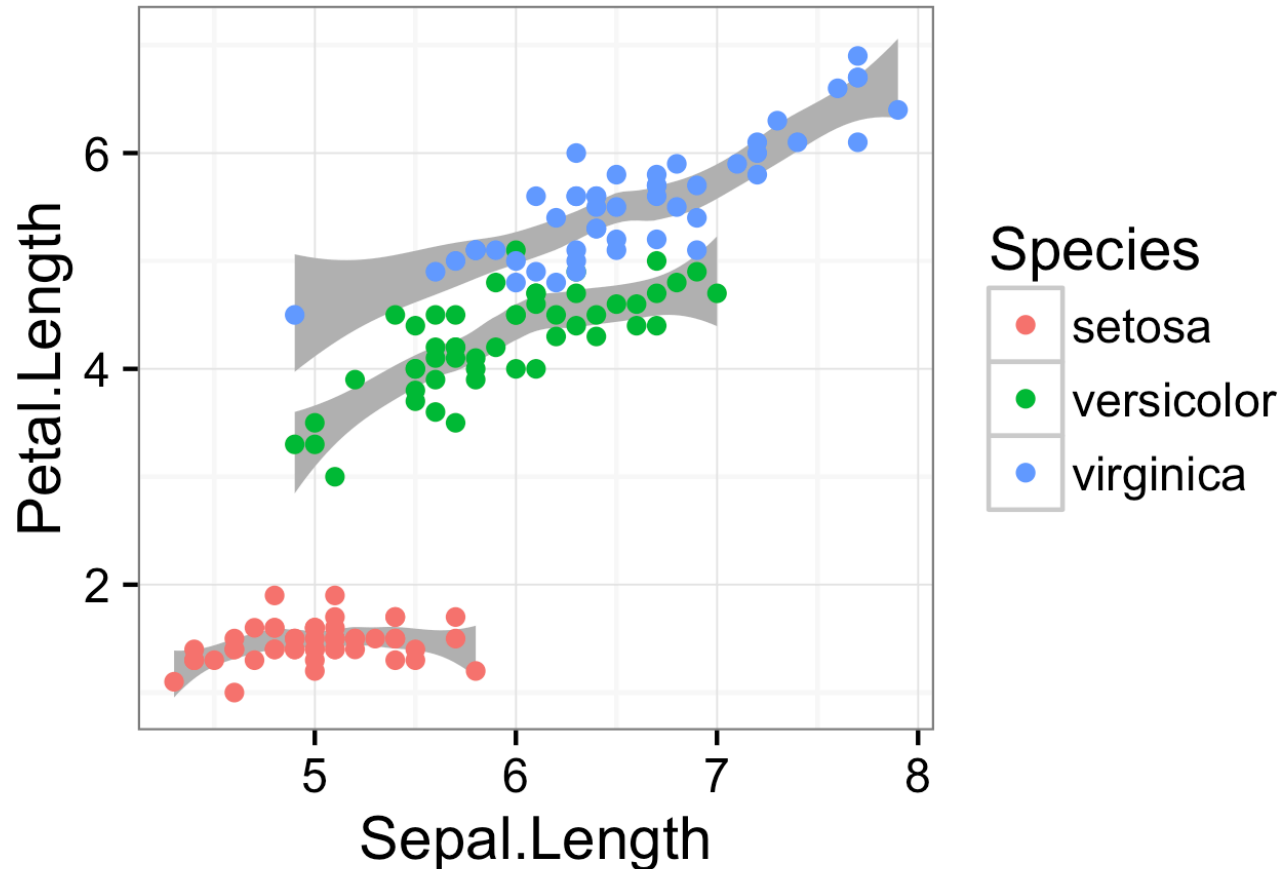
# In most cases we just need to call the appropriate geom and it calls a stat

```
ggplot(iris, aes(x=Sepal.Length, y=Petal.Length)) +  
  geom_point(aes(color=Species)) +  
  geom_smooth(aes(group=Species))
```



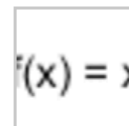
# However, sometimes it can be helpful to call the stat directly

```
ggplot(iris, aes(x=Sepal.Length, y=Petal.Length)) +  
  stat_smooth(aes(group=Species), geom="ribbon", fill='gray70') +  
  geom_point(aes(color=Species))
```



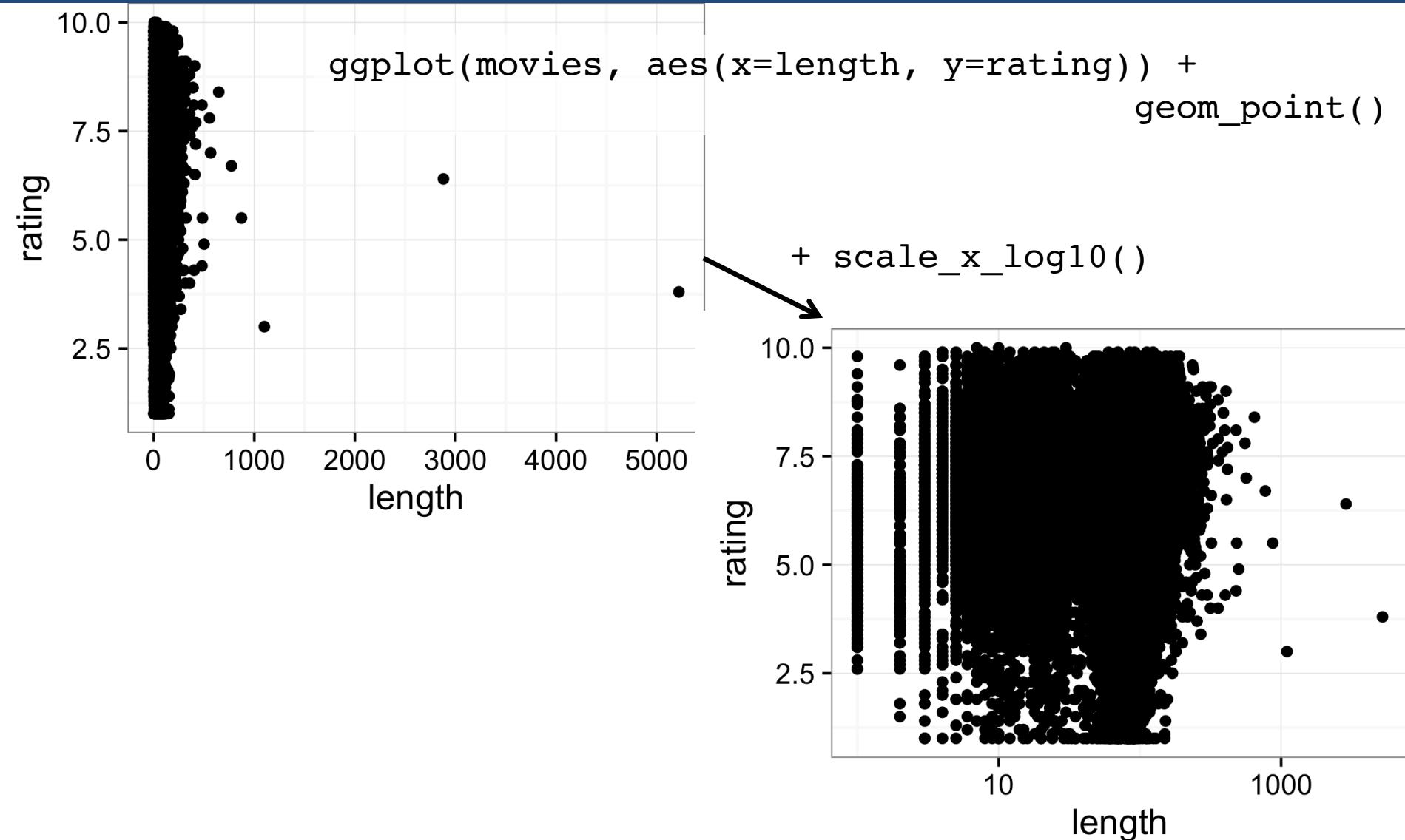
# Scales define how to map data onto aesthetics

- `scale_colour_grey` (`scale_color_grey`, `scale_fill_grey`)  
Sequential grey colour scale.
- `scale_colour_hue` (`scale_color_discrete`, `scale_color_hue`, `scale_colour_discrete`, `scale_fill_discrete`, `scale_fill_hue`)  
Qualitative colour scale with evenly spaced hues.
- `scale_identity` (`scale_alpha_identity`, `scale_color_identity`, `scale_colour_identity`, `scale_fill_identity`, `scale_linetype_identity`, `scale_shape_identity`, `scale_size_identity`)  
Use values without scaling.
- `scale_manual` (`scale_alpha_manual`, `scale_color_manual`, `scale_colour_manual`, `scale_fill_manual`, `scale_linetype_manual`, `scale_shape_manual`, `scale_size_manual`)  
Create your own discrete scale.
- `scale_linetype` (`scale_linetype_continuous`, `scale_linetype_discrete`)  
Scale for line patterns.
- `scale_shape` (`scale_shape_continuous`, `scale_shape_discrete`)  
Scale for shapes, aka glyphs.
- `scale_size` (`scale_radius`, `scale_size_area`, `scale_size_continuous`, `scale_size_discrete`)  
Scale for sizes.

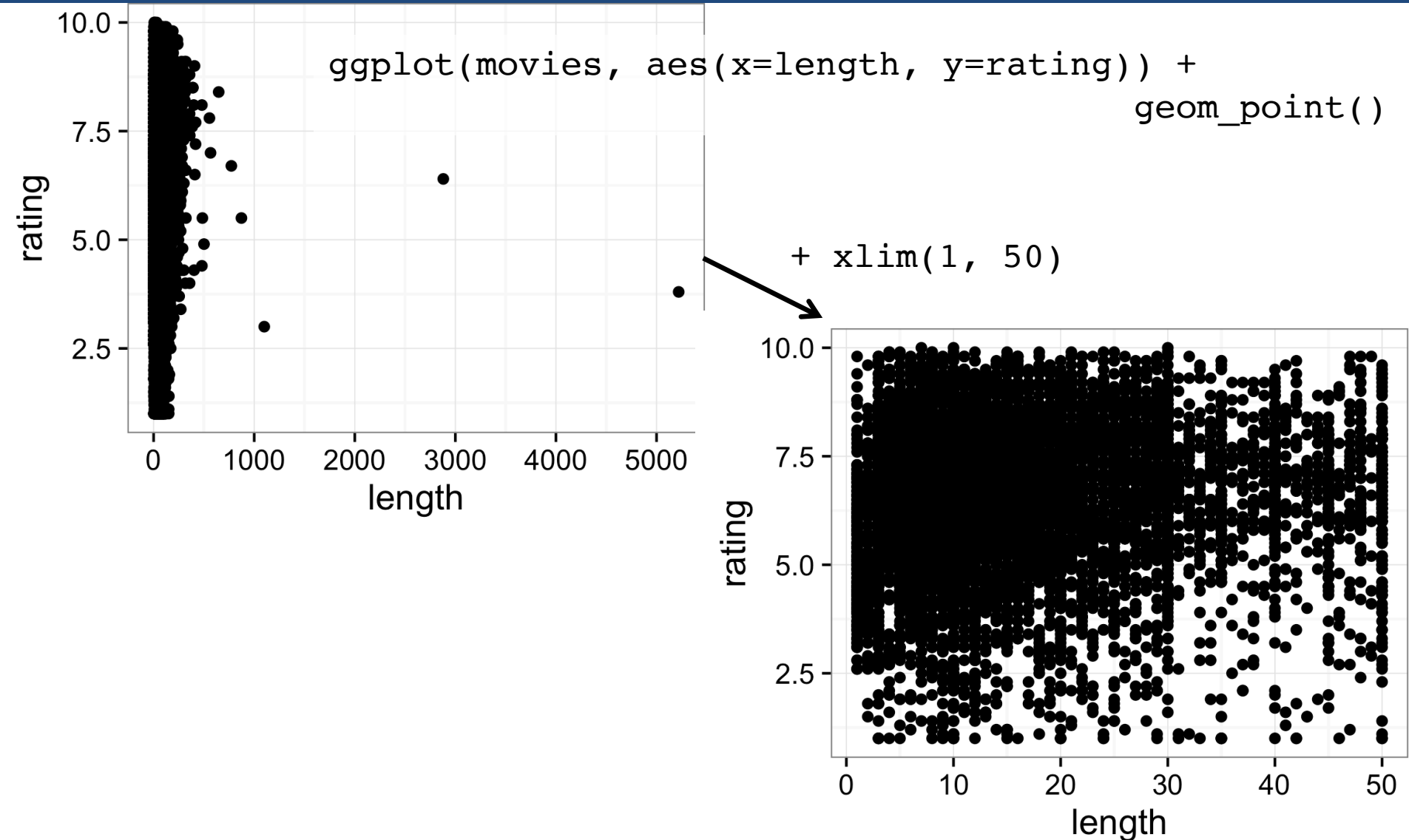




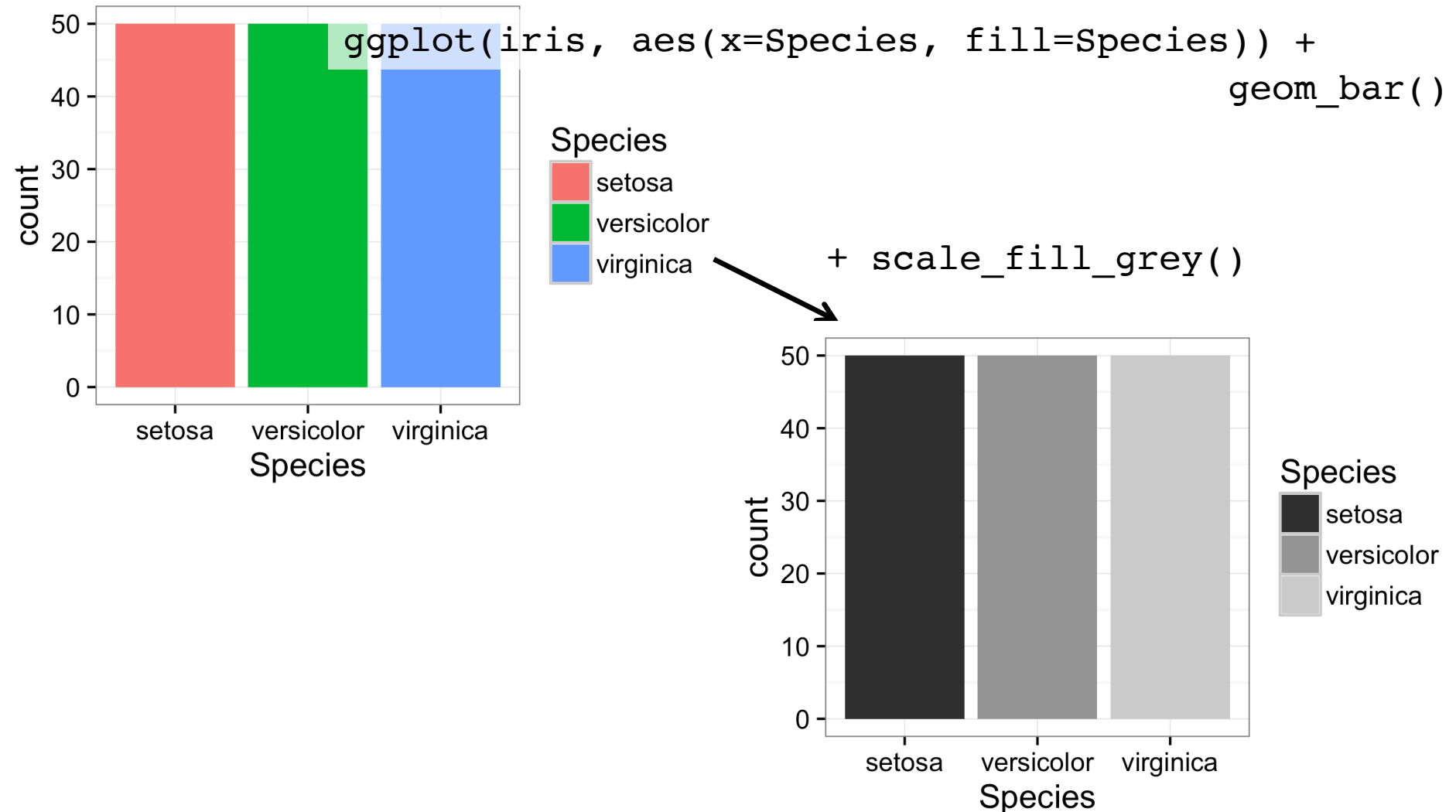
# Example 1: Change scaling of x axis



# Example 1: Change scaling of x axis



# Example 2: Change color scaling



# Example 2: Change color scaling

