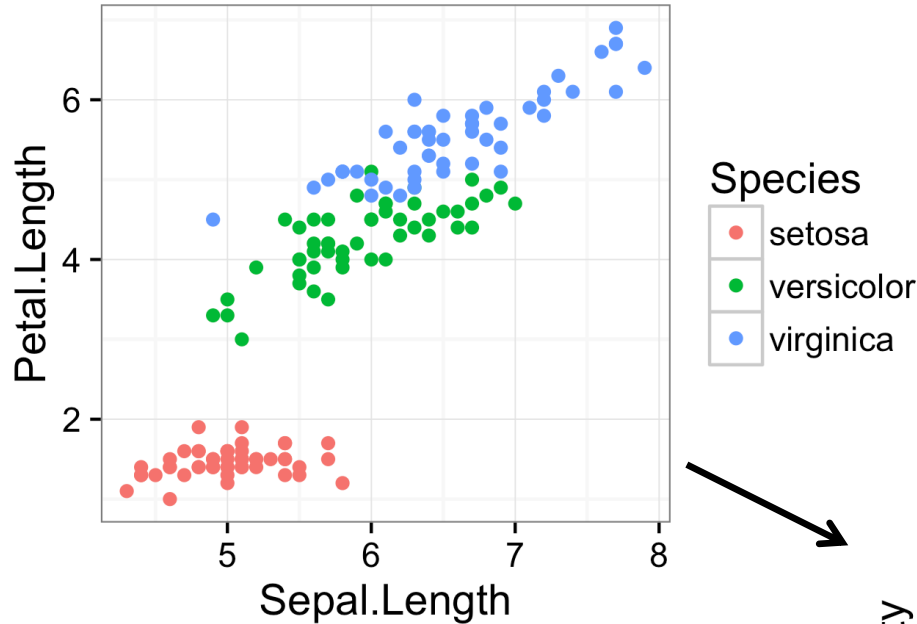
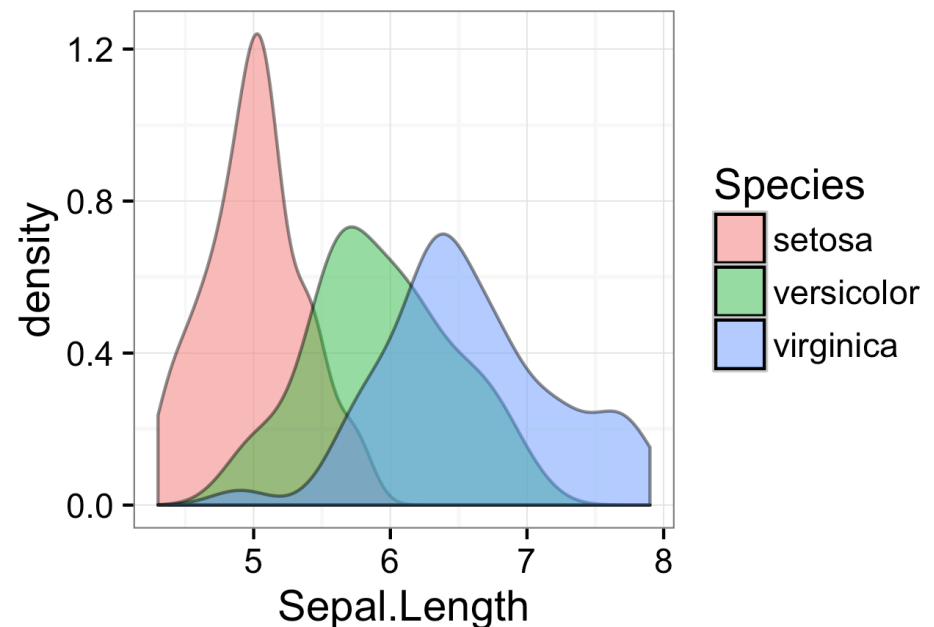


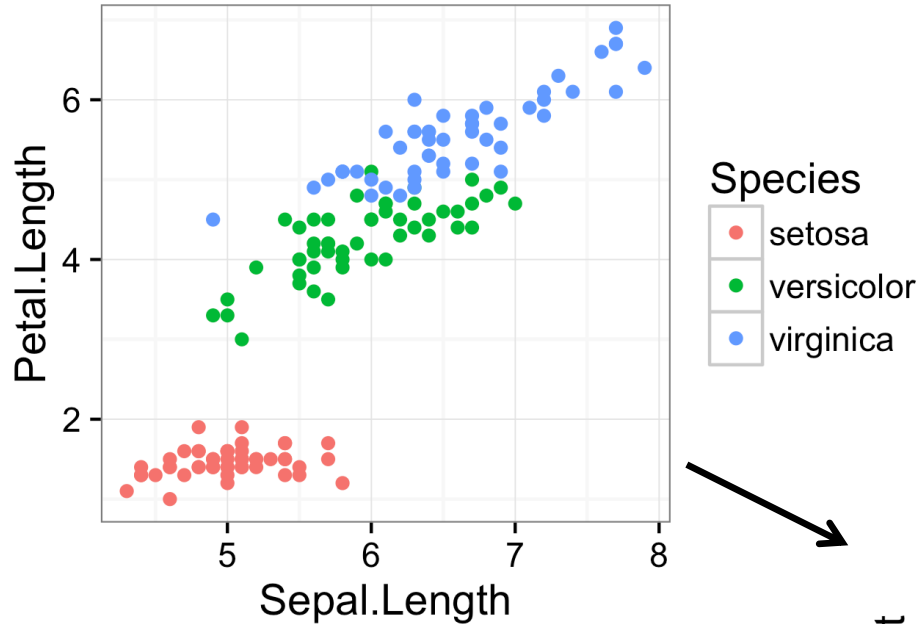
We often need to do statistical transformations before plotting



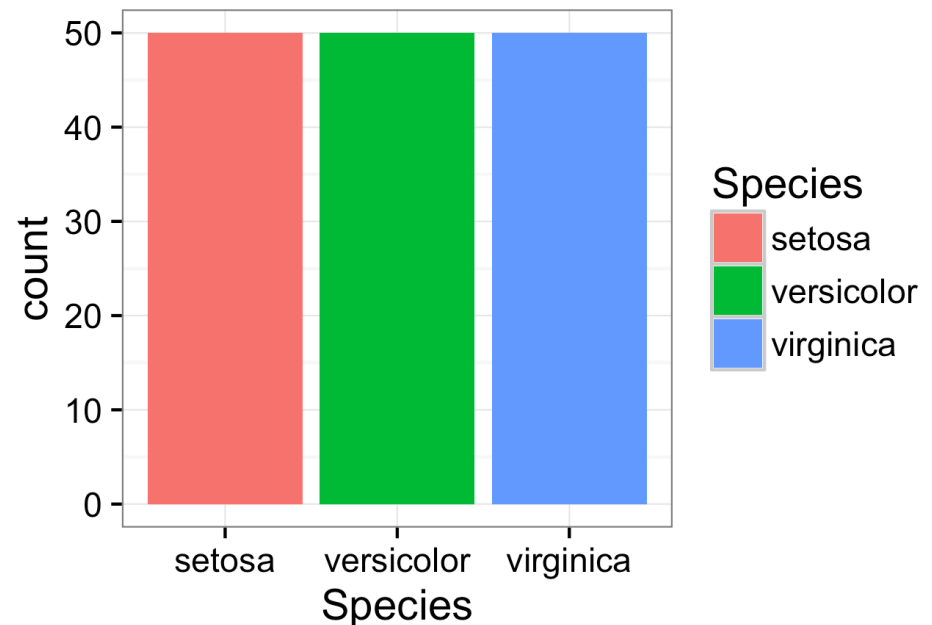
density of
data points



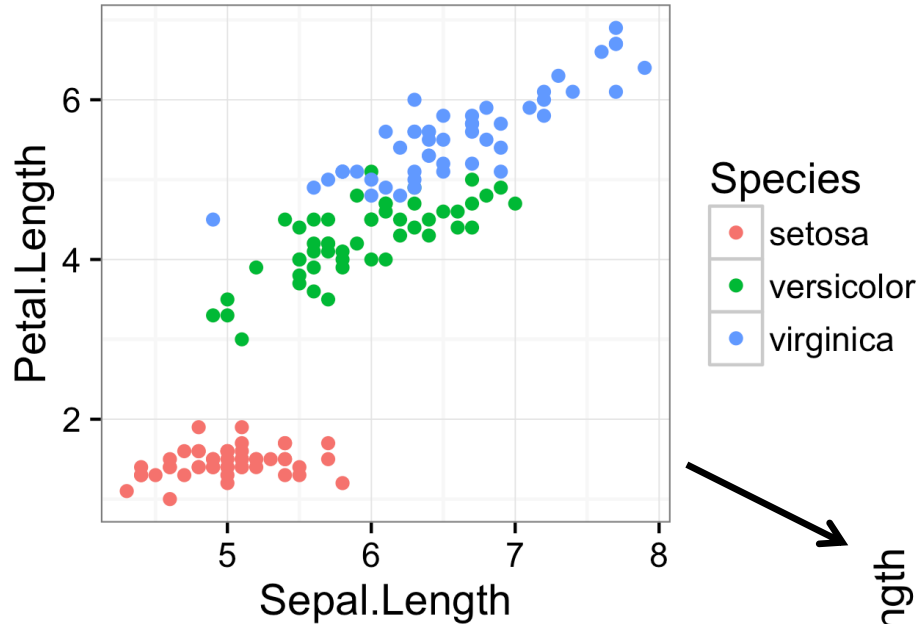
We often need to do statistical transformations before plotting



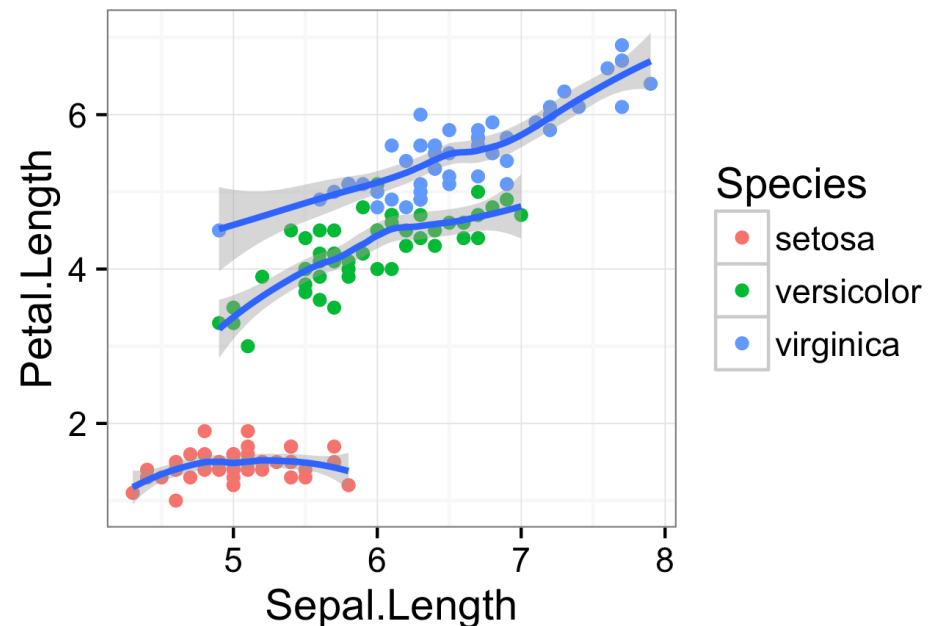
count of number
of different types



We often need to do statistical transformations before plotting

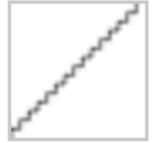


statistical smoothing/
trend lines



In ggplot2, these transformations are done with stats

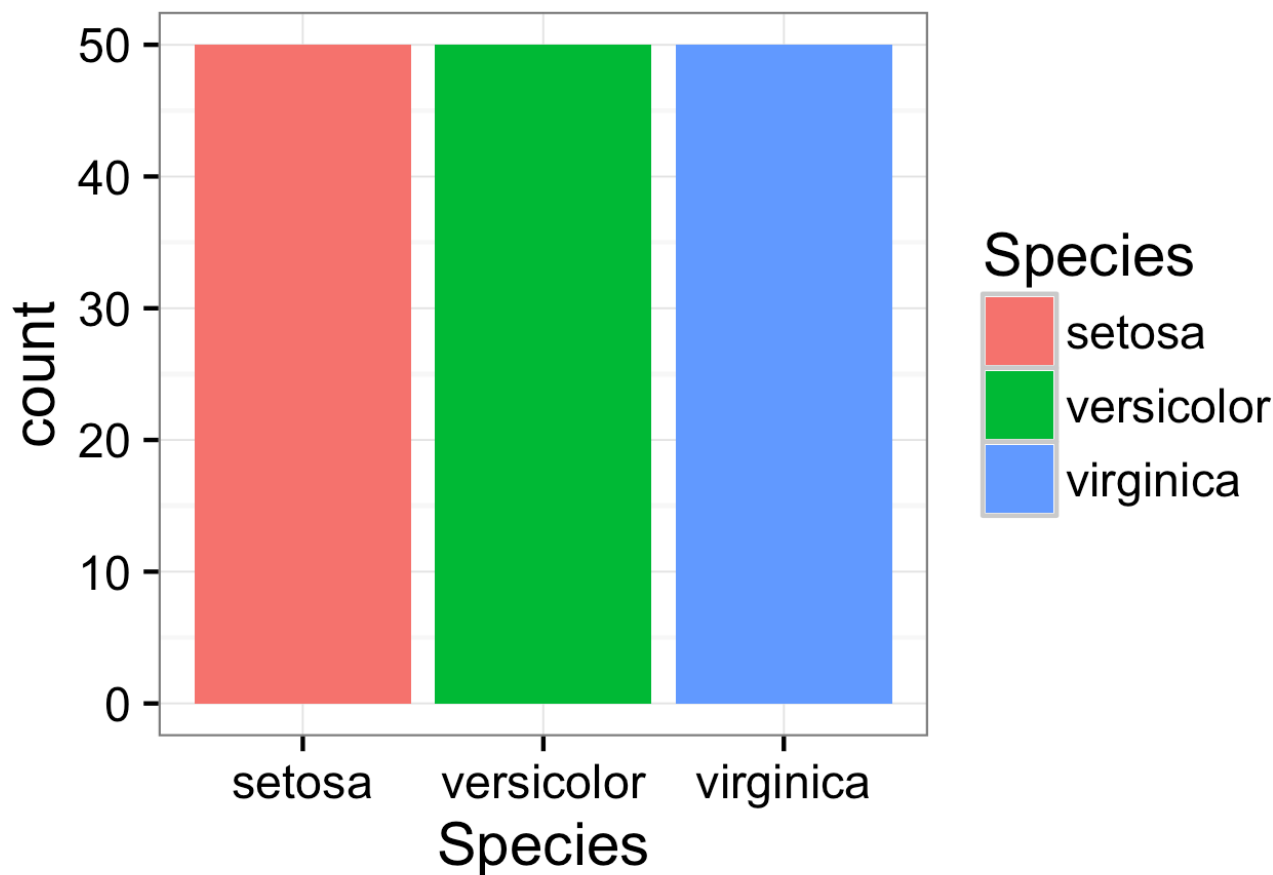
- `stat_ecdf`
Empirical Cumulative Density Function
- `stat_ellipse`
Plot data ellipses.
- `stat_function`
Superimpose a function.
- `stat_identity`
Identity statistic.
- `stat_qq` (`geom_qq`)
Calculation for quantile-quantile plot.
- `stat_summary_2d` (`stat_summary2d`, `stat_summary_hex`)
Bin and summarise in 2d (rectangle & hexagons)
- `stat_unique`
Remove duplicates.



$$f(x) = x$$

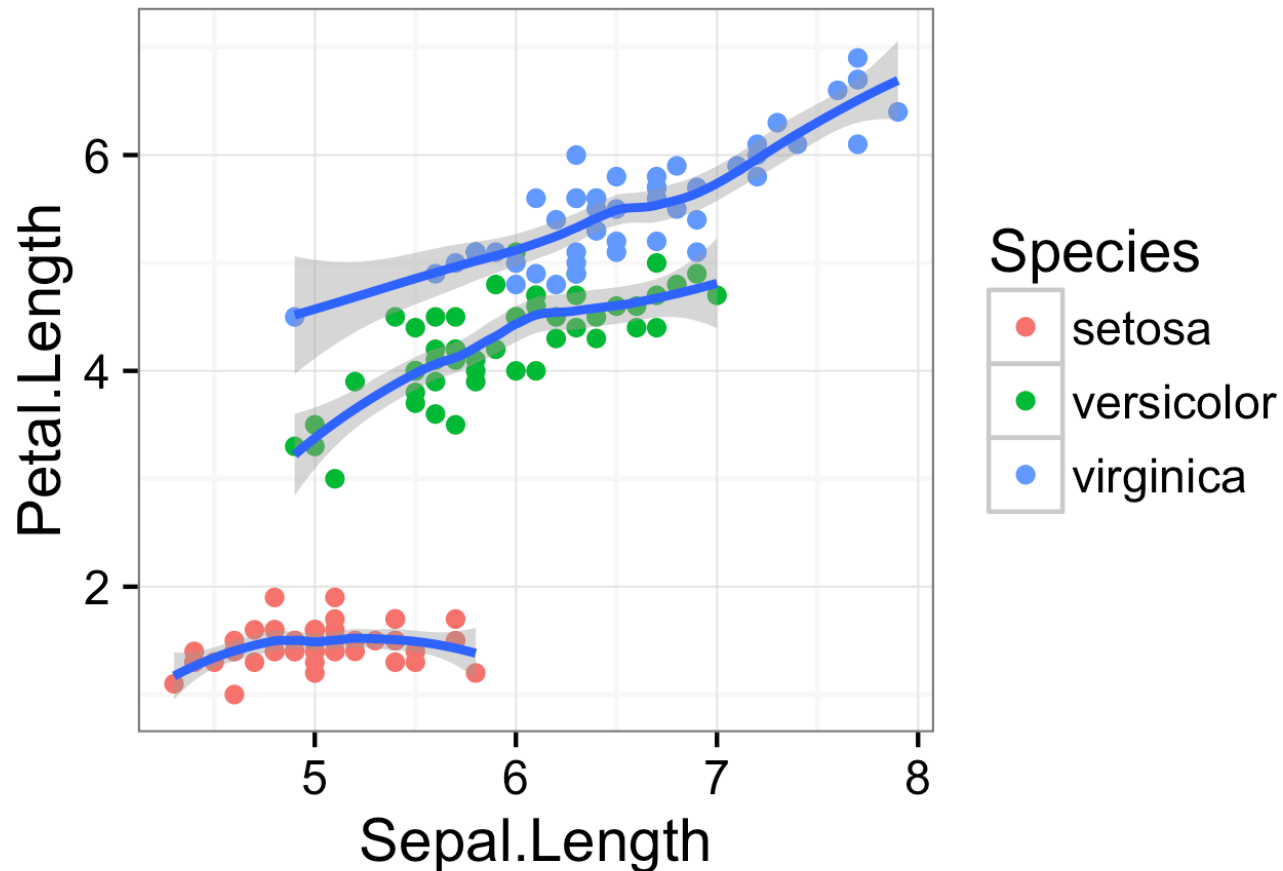
In most cases we just need to call the appropriate geom and it calls a stat

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



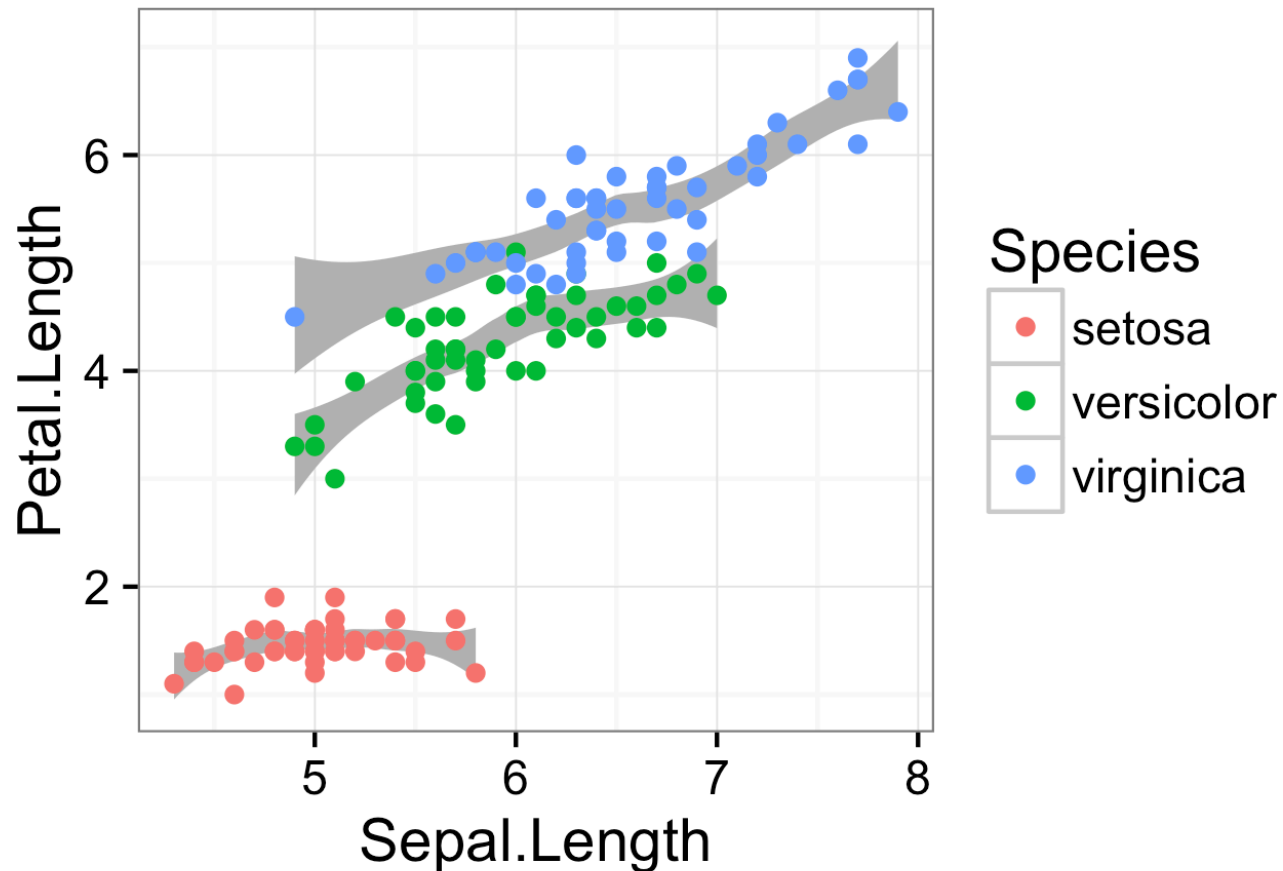
In most cases we just need to call the appropriate geom and it calls a stat

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



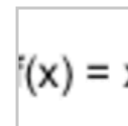
However, sometimes it can be helpful to call the stat directly

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

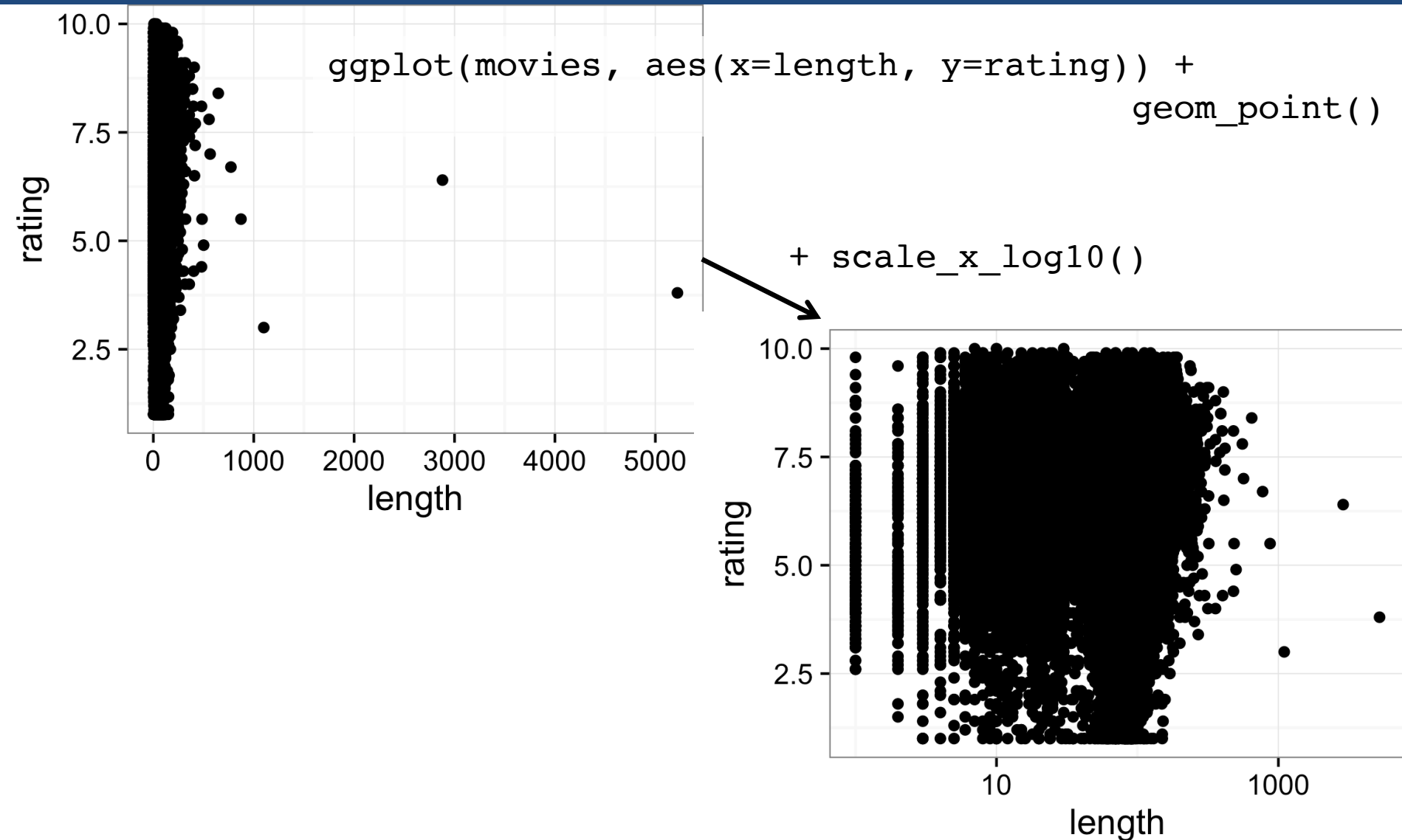


Scales define how to map data onto aesthetics

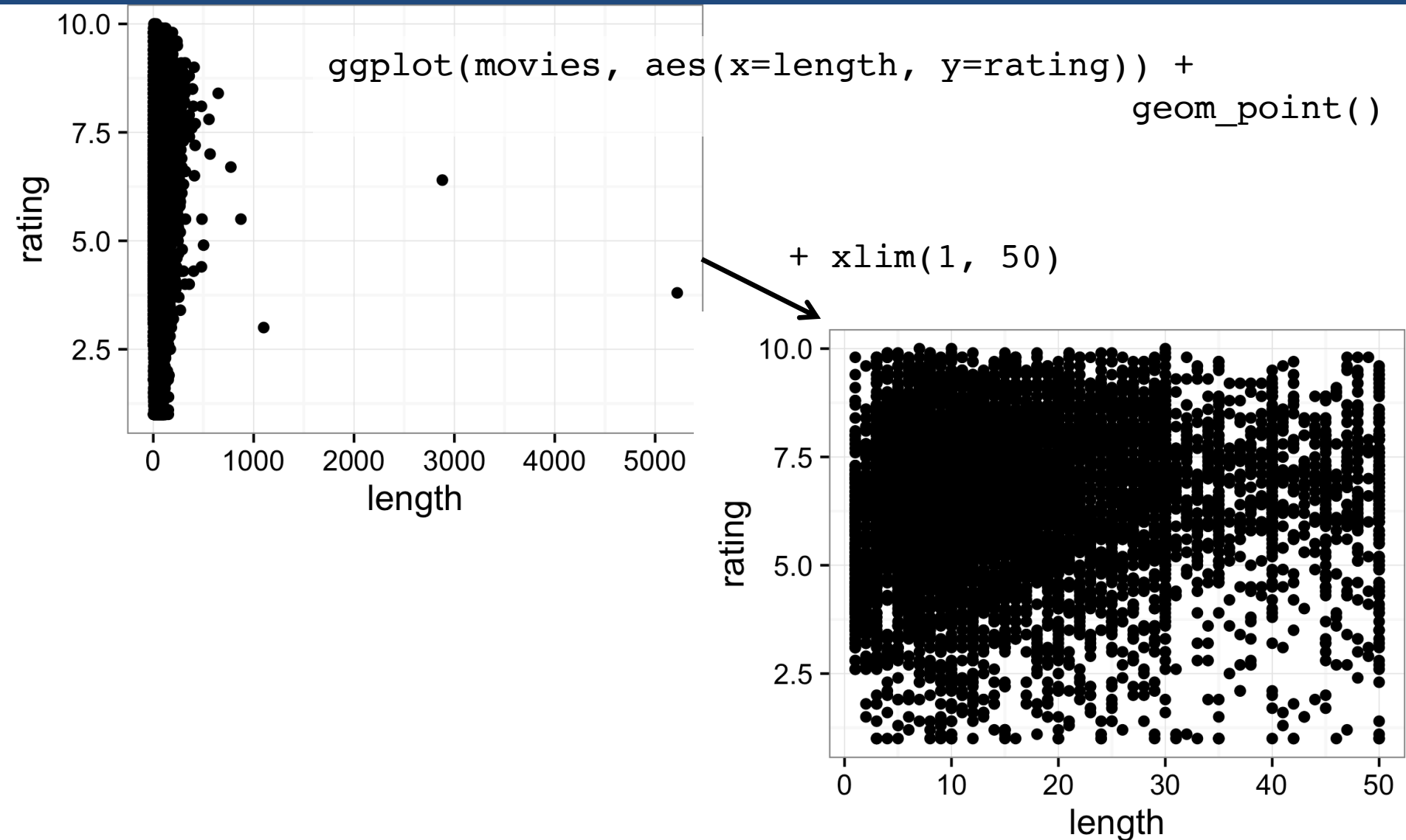
- `scale_colour_grey` (`scale_color_grey`, `scale_fill_grey`)
Sequential grey colour scale.
- `scale_colour_hue` (`scale_color_discrete`, `scale_color_hue`, `scale_colour_discrete`, `scale_fill_discrete`, `scale_fill_hue`)
Qualitative colour scale with evenly spaced hues.
- `scale_identity` (`scale_alpha_identity`, `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.



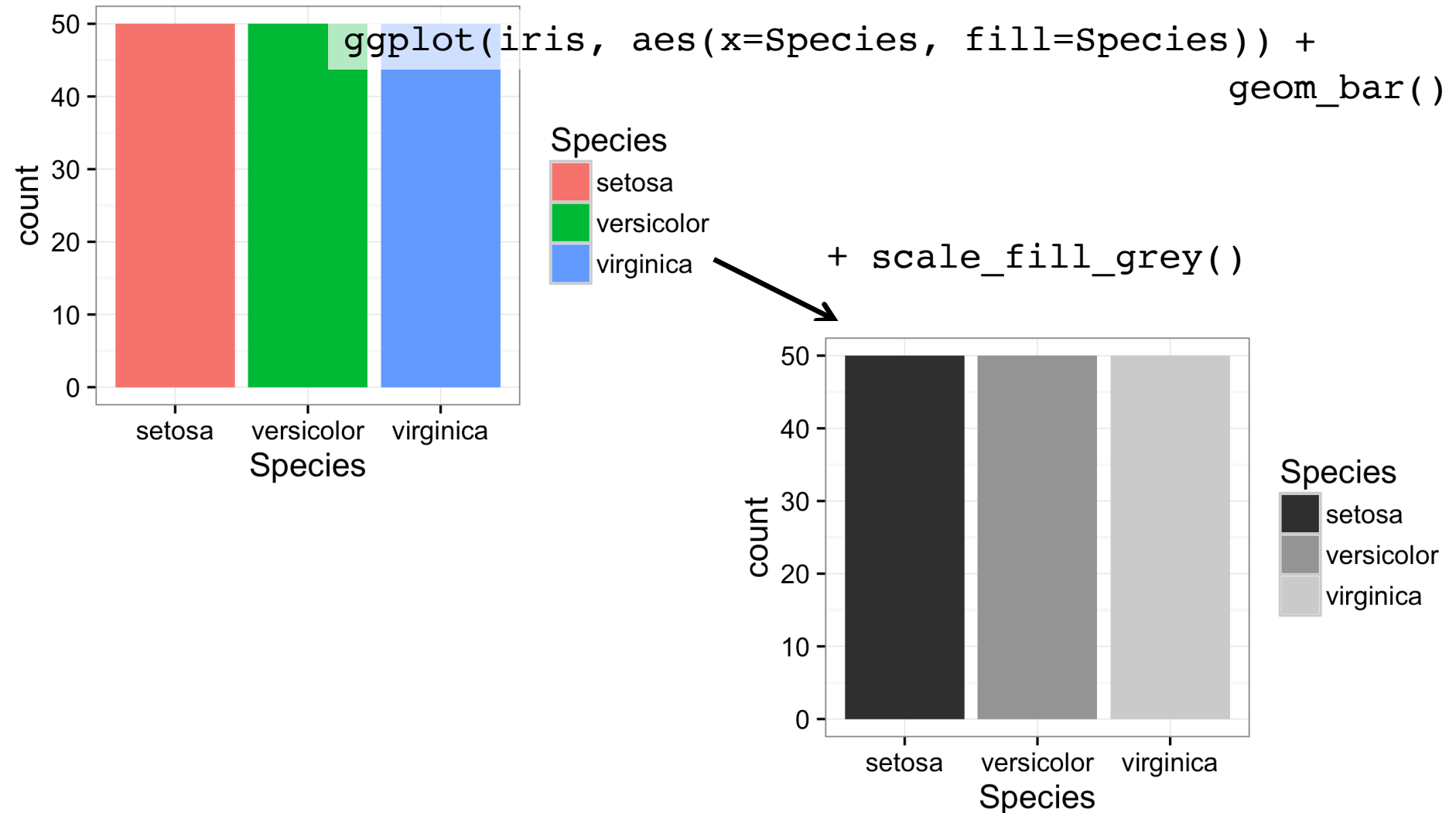
Example 1: Change scaling of x axis



Example 1: Change scaling of x axis



Example 2: Change color scaling



Example 2: Change color scaling

