

COMM101: Data Visualization with ggplot

Welcome to the grammar of graphics

MARINCS 100B | Intro to Marine Data Science | Winter 2025

Key concepts

1) Components - data,
geometries, mapping

2) Refine - scales and
themes

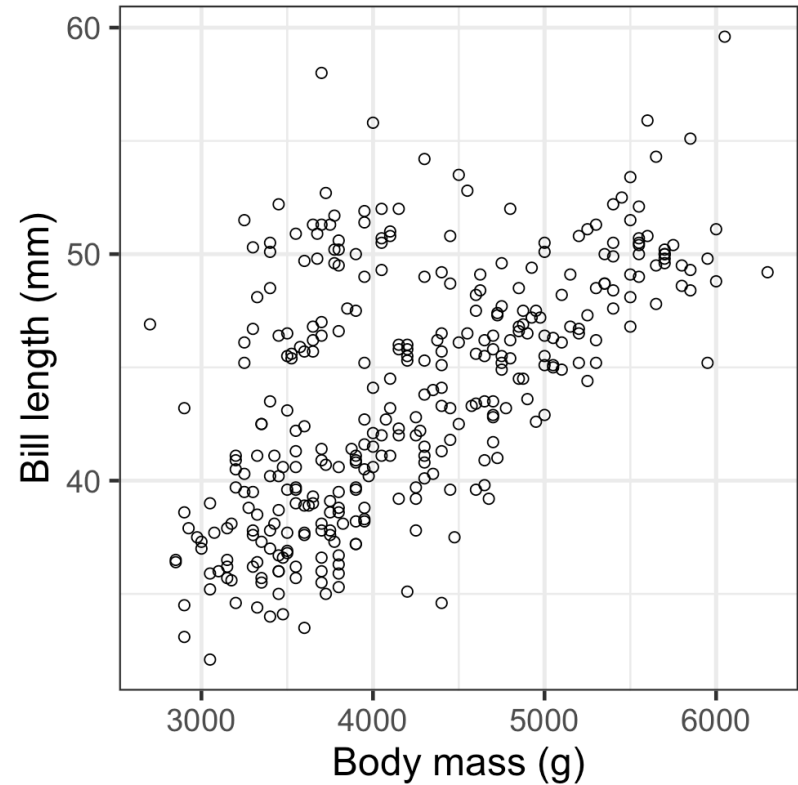
3) Best practices - labeling,
visual interpretation,
negative space



Data, mapping, and geometries

species	body_mass_g	bill_length_mm
Adelie	3750	39.1
Gentoo	5400	49.9
Chinstrap	3500	46.5

Data



Mappings “aesthetic”-
axes, column names

Geometries (individual points)

Data, mapping, and geometries

Data - data frame itself

Geometries - visual form of the data in the figure (e.g. points in a scatter plot)

Mapping - connections between data and geometries

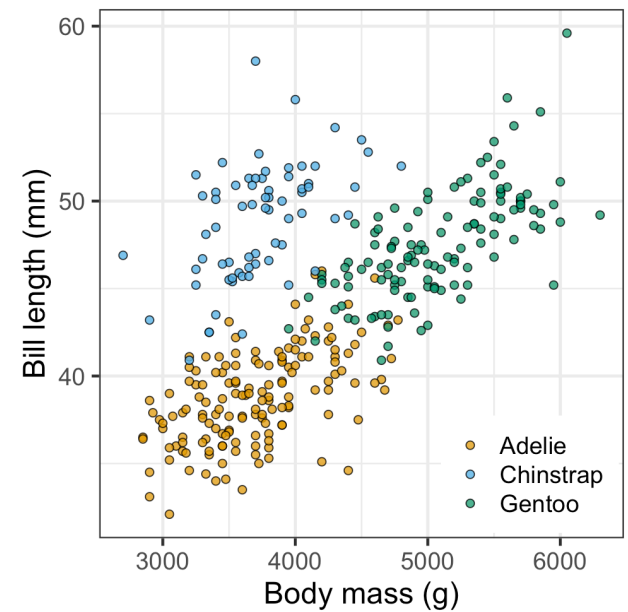
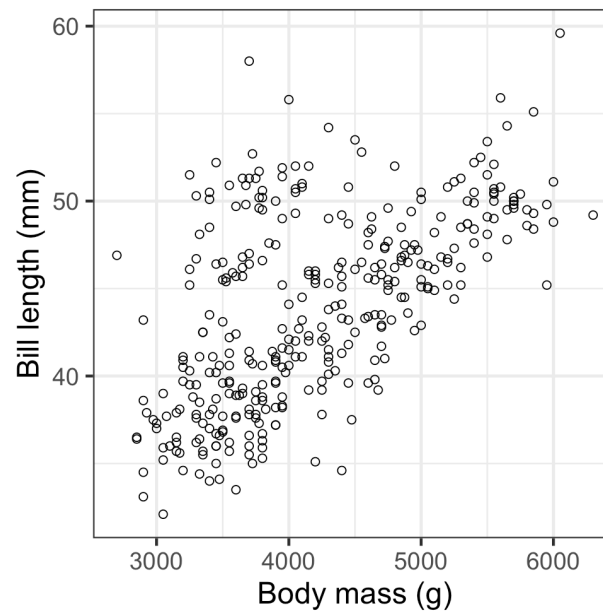
Scales and themes

species	body_mass_g	bill_length_mm
Adelie	3750	39.1
Gentoo	5400	49.9
Chinstrap	3500	46.5

Same: data, geometry, x/y mappings

Different:

- added a mapping, (added color)
- color scale
- Theme to position the legend

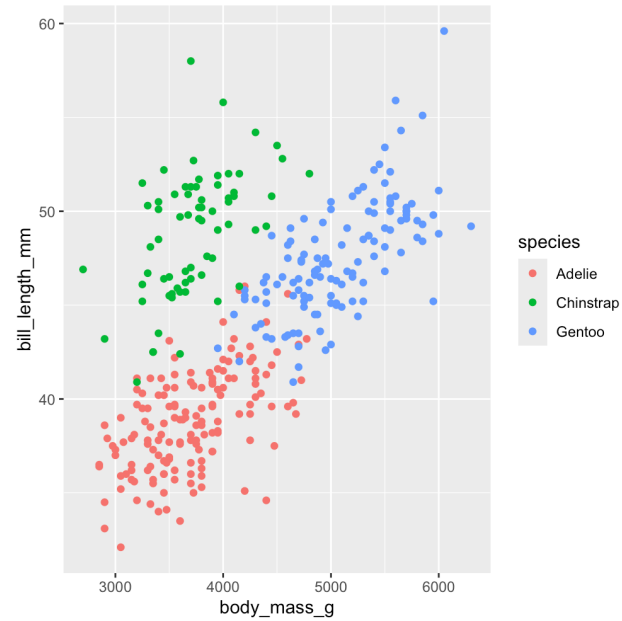
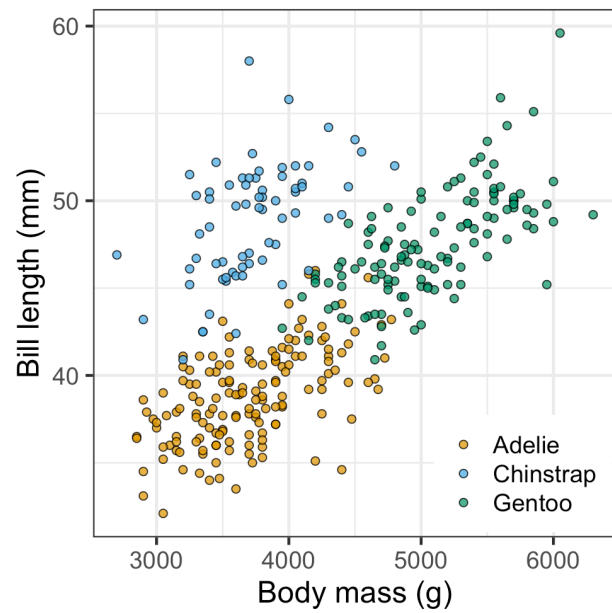


Scales and themes

Scales - customize how mappings interact with geometries (e.g. specifying color)

Themes - customize the overall visual appearance

Visualization best practices

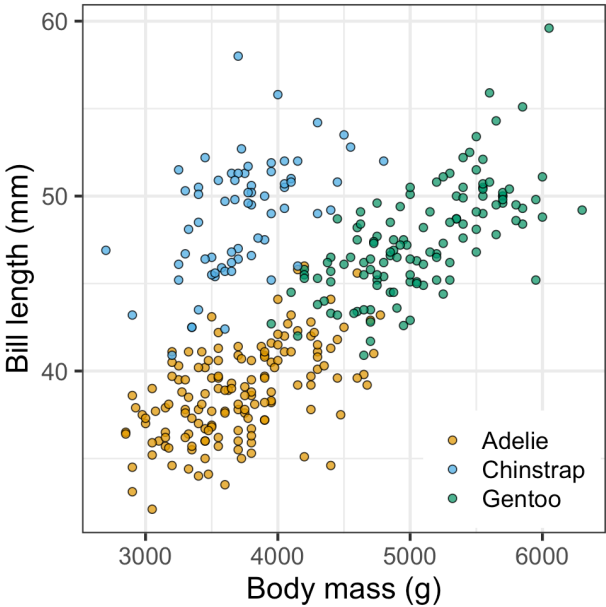


- 1) labeling
- 2) visual interpretation
- 3) Negative space

Recap

- 1) Figures always include data, geometries, and mappings
- 2) Refine the visual appearance using scales and themes
- 3) Best practices

species	body_mass_g	bill_length_mm
Adelie	3750	39.1
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New vocabulary and lingering questions

New vocabulary

Geometries

Scales

Themes

Lingering questions

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Introducing ggplot

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Key concepts

- 1) ggplot is an R implementation of the grammar of graphics
- 2) Adding layers (e.g. geometries, scales, etc.)
- 3) Choosing geometries to represent variables (and combinations)

Recap

- 1) ggplot is R's implementation of the grammar of graphics
- 2) Build up plots by adding layers
- 3) How to choose geometries to best represent our variables

New vocabulary and lingering questions

New vocabulary

Grammar of graphics
ggplot

Lingering questions

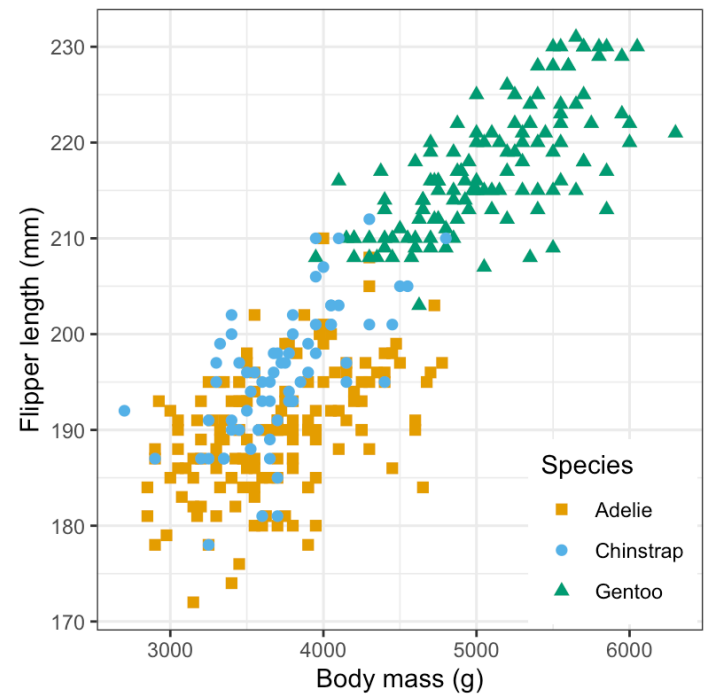
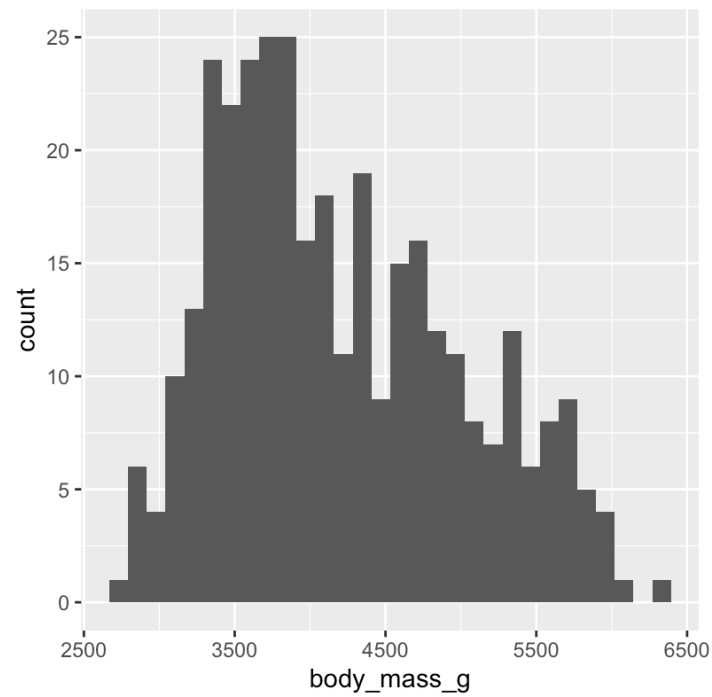
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Customization with scales and themes

Key concepts

- 1) Visual presentation matters
- 2) Scales customize the mapping btw data and geometries
- 3) Themes customize the overall appearance

Demo in R



Recap

- 1) Visual presentation is important for interpretation
- 2) Scales - relationship btw mappings and geometries
- 3) Themes - overall appearance

New vocabulary and lingering questions

New vocabulary

Scales
Themes
Geometries

Lingering questions

Exercises

comm101c.R contains the code to make the figure below. Edit the code to use scales and themes to improve the visual presentation.

