# COMM101: Data Visualization with ggplot

Welcome to the grammar of graphics

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

#### **Key concepts**

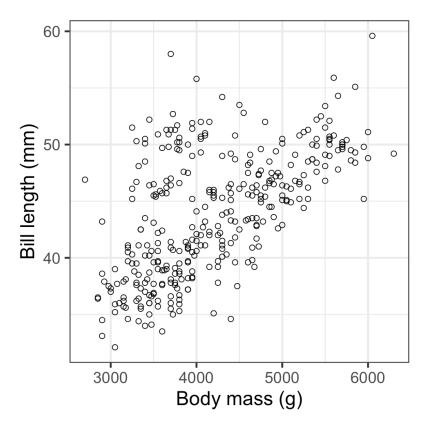
- 1) Components data, geometries, mapping
- 2) Refine scales and themes
- 3)Best practices labeling, visual interpretation, negative space

### 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"-axises, 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

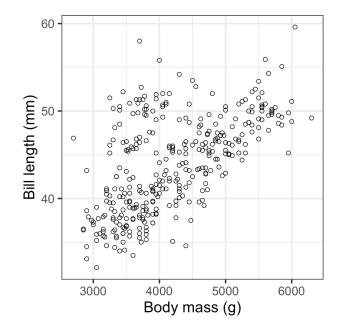
#### **Scales and themes**

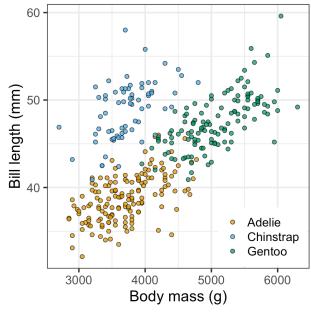
species	body_mass_g	bill_length_mm
Adelie	3750	39.1
Gentoo	5400	49.9
Chinstrap	3500	46.5

Same: data, geometry, x/y mappings

#### Different:

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



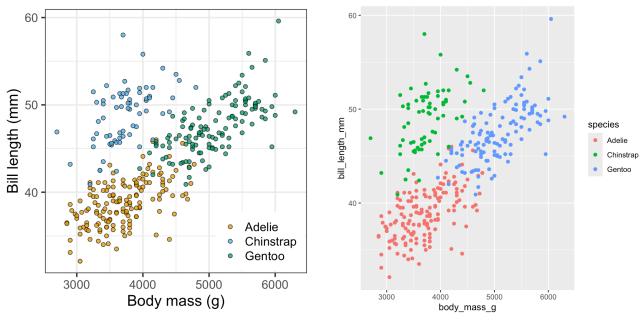


#### **Scales and themes**

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

Themes - customize the overall visual appearance

## **Visualization best practices**

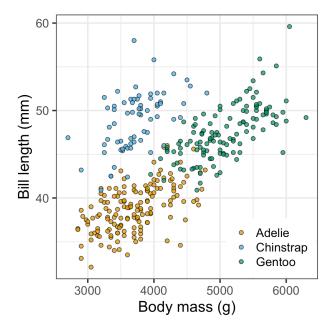


- 1) labeling
- 2) visual interpretation
- 3) Negative space

### Recap

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

species	body_mass_g	bill_length_mm
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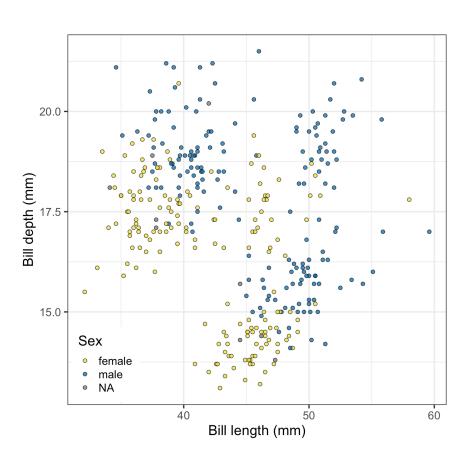


## New vocabulary and lingering questions

New vocabulary Geometries Scales Themes	Lingering questions

#### **Exercises**

Describe the grammar of graphics components (data, geometries, mapping, scales, theme) in the figure below.



Geometries are the individual data points

Data is the information used to build this graph represented in tabular form

Mapping uses the data from the legend and the geometries to allow for an easily interpreted figure by adding color.

Scale is used to modify how the mapped data is visdually displayed such as adjusting the negative space

Theme is used to adjust the titles to be more comprehendable and adding the legend inside the graph.

# COMM101: Data Visualization with ggplot

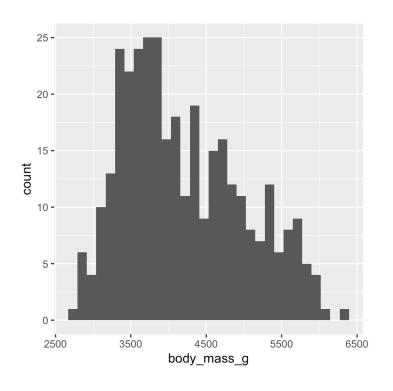
**Introducing ggplot** 

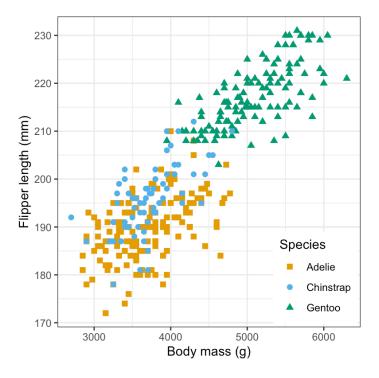
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#### **Key concepts**

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

# Demo in R





#### Recap

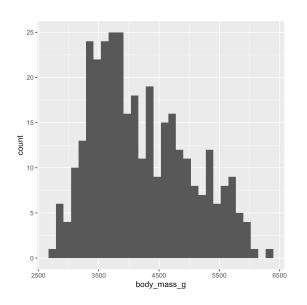
- ggplot is R's implementation of the grammar of graphics
   Build up plots by adding layers
   How to choose geometries to best represent our variables

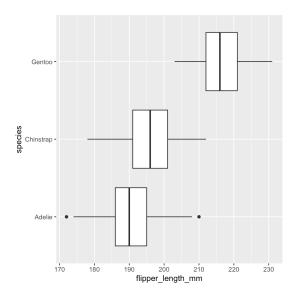
## New vocabulary and lingering questions

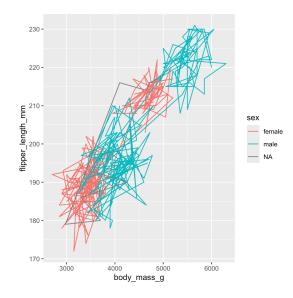
New vocabulary	Lingering questions
Grammar of graphics ggplot	

#### **Exercises**

Here are three figures. Edit the code in comm101b.R so the outputs match the figures below.







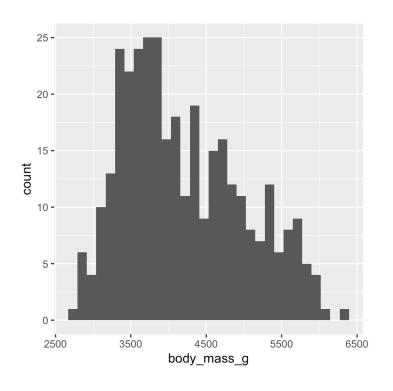
# COMM101: Data Visualization with ggplot

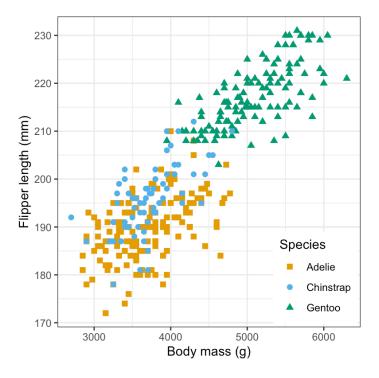
**Customization with scales and themes** 

### **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	Lingering questions
Scales Themes Geometries	

#### **Exercises**

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

