Lab 2: Data visualization

Not graded, just practice

Katie Schuler

2024-09-05

Practice your new ggplot skills with these practice exam questions! Best to open a fresh Google Colab notebook and test things out! Refer to the study guide to find answers as well.

> Tip
>
> More than one answer may be correct!

Materials from lab

- Brittany's materials

1 Setup

We will continue working with the `ratings` dataset from the visualization lecture (part of the `languageR` package).

```
library(ggplot2)
library(languageR)
```

It contains the following variables:

```
str(ratings)
```

```
'data.frame':   81 obs. of  14 variables:
 $ Word            : Factor w/ 81 levels "almond","ant",..: 1 2 3 4 5 6 7 8 9 10 ...
 $ Frequency       : num  4.2 5.35 6.3 3.83 3.66 ...
 $ FamilySize      : num  0 1.39 1.1 0 0 ...
```

```
$ SynsetCount     : num  1.1 1.1 1.1 1.39 1.1 ...
$ Length          : int  6 3 5 7 9 7 6 6 3 6 ...
$ Class           : Factor w/ 2 levels "animal","plant": 2 1 2 2 2 2 1 2 1 1 ...
$ FreqSingular    : int  24 69 315 26 19 24 53 74 155 37 ...
$ FreqPlural      : int  42 140 231 19 19 6 78 77 103 14 ...
$ DerivEntropy    : num  0 0.562 0.496 0 0 ...
$ Complex         : Factor w/ 2 levels "complex","simplex": 2 2 2 2 2 2 2 2 2 2 ...
$ rInfl           : num  -0.542 -0.7 0.309 0.3 0 ...
$ meanWeightRating: num  1.49 3.35 2.19 1.32 1.44 ...
$ meanSizeRating  : num  1.89 3.63 2.47 1.76 1.87 ...
$ meanFamiliarity : num  3.72 3.6 5.84 4.4 3.68 4.12 2.12 5.68 3.2 2.2 ...
```

2 Data viz day 1

1. Fill in the blanks below with one of the following words: `data`, `aesthetics`, `geom`.

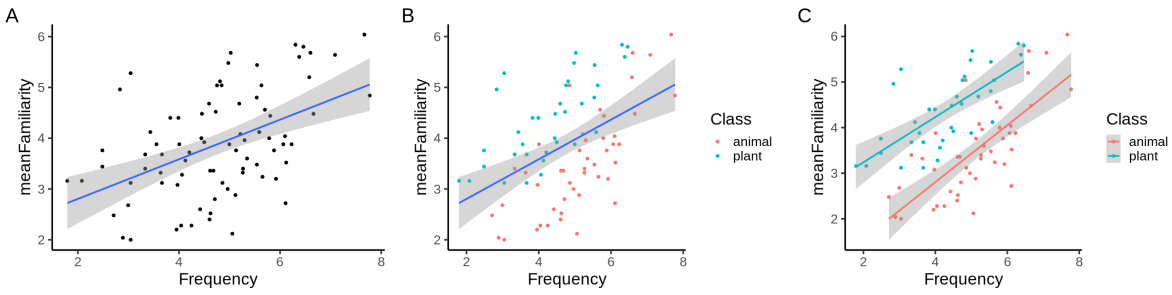
   The basic ggplot involves: (1) using your _____, (2) defining how variables are mapped to visual properties (_____), and (3) determining the geometrical object that a plot uses to represent data (_____)

2. When ggplot2 maps a categorical variable to an aesthetic, it automatically assigns a unique value of the aesthetic to each level of the variable. What is this process called?

   - (A) level assignment
   - (B) variable aestheticization
   - (C) autofill
   - (D) scaling

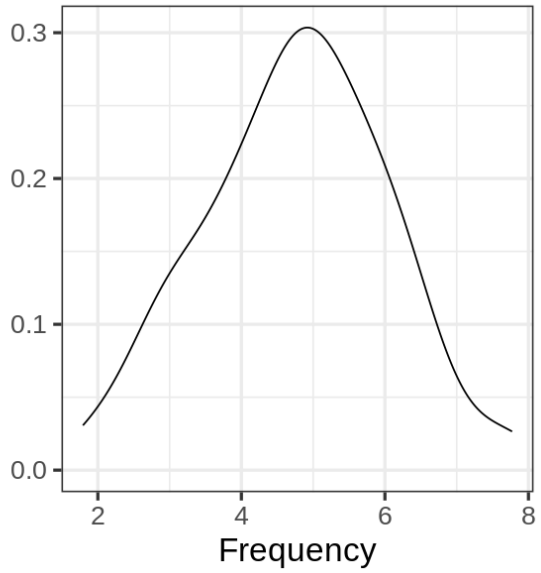
3. The code below generated which of the following figures?

```
ggplot(
    data = ratings,
    mapping = aes(x = Frequency, y = meanFamiliarity)
) +
    geom_point(mapping = aes(color = Class)) +
    geom_smooth(method = "lm") +
    theme_classic(base_size=20)
```



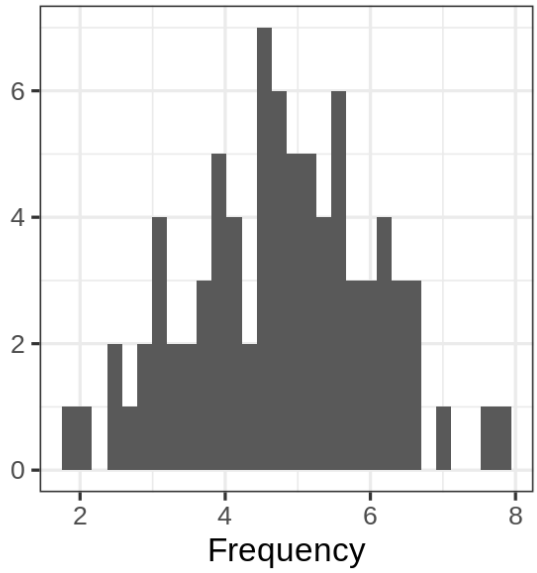
- (A) A
- (B) B
- (C) C

4. Suppose we want to map the variable `Complex` to the color aesthetic in a scatterplot. Which of the following arguments could we pass to `geom_point()`?
   - (A) color = Complex
   - (B) mapping=aes(color = Complex)
   - (C) color = mapping(Complex)
   - (D) aes(color=Complex)
5. To adjust the size of the font to 20pt in the complete theme `theme_minimal()`, what argument should we include?
   - (A) `base_size=20`
   - (B) `size=20`
   - (C) `font_family_size=20`
   - (D) None of the above
6. Which geoms are depicted in the following figure?



- (A) geom_histogram()
- (B) geom_density()
- (C) geom_bar()
- (D) geom_smooth()
- (E) geom_point()

7. Which geoms are depicted in the following figure?



- (A) geom_histogram()
- (B) geom_density()
- (C) geom_bar()
- (D) geom_smooth()
- (E) geom_point()

3 Data viz day 2

3.1 Plot 1

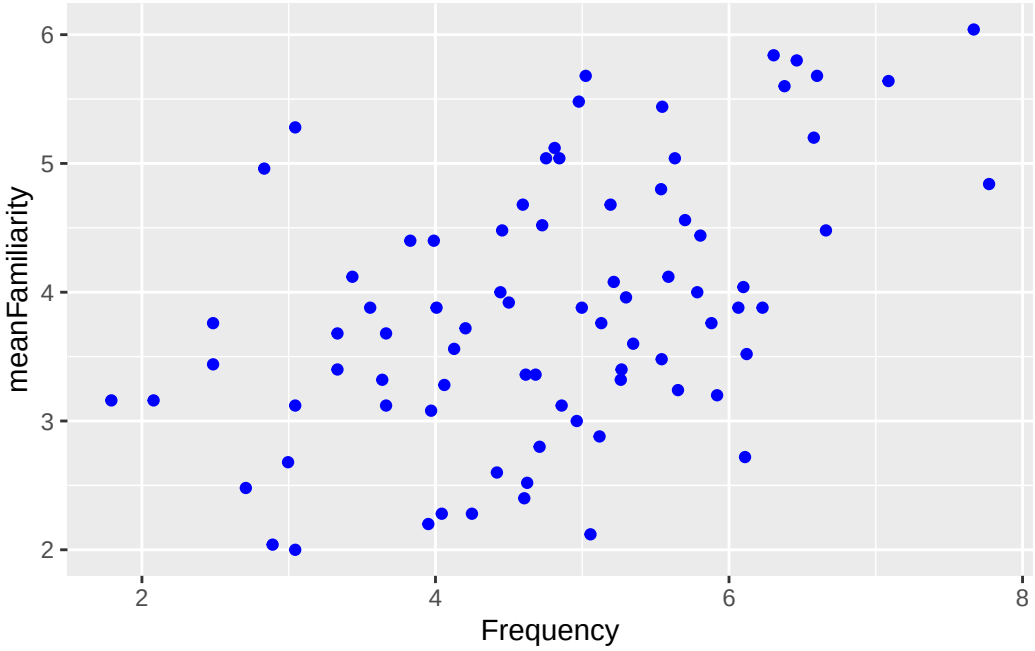
Given code blocks a, b, and c; and the plot below:

```
# CODE BLOCK a --------------------------#
ggplot(
    data = ratings,
    mapping = aes(x = Frequency, y = meanFamiliarity)
    ) +
    geom_point(color = "blue")

# CODE BLOCK b --------------------------#
```

```
ggplot(
    data = ratings,
    mapping = aes(x = Frequency, y = meanFamiliarity, color = "blue")
    )

# CODE BLOCK c --------------------------#
ggplot(
    data = ratings,
    mapping = aes(x = Frequency, y = meanFamiliarity)
    ) +
    geom_point()
```



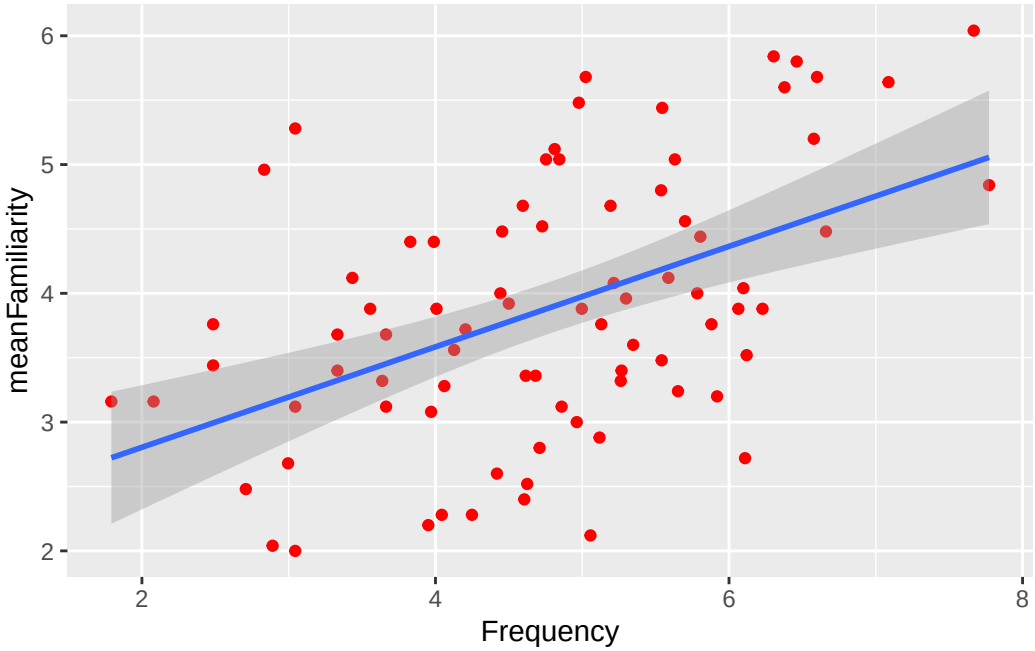
1. Which of the code blocks above generate the plot ?
    - (A) a
    - (B) b
    - (C) c
2. In the plot above, is the color aesthetic mapped, set, or both?
    - (A) mapped

- (B) set
- (C) both

3. In the plot above, which of the following aesthetics should we set to make the points more transparent?
    - (A) color
    - (B) fill
    - (C) alpha
    - (D) shape
4. In plot A above, which of the following would change the x axis label to "FQ"?
    - (A) add a `labs()` layer with `x="FQ"` argument
    - (B) add a `labs()` layer with `y="FQ"` argument
    - (C) change the mapping argument from `x="Frequency"` to `x="FQ"`

3.2 Plot 2

Given the following plot:



1. In the plot above, which geom(s) are used to represent the data?
   - (A) geom_histogram()
   - (B) geom_density()
   - (C) geom_bar()
   - (D) geom_point()
   - (E) geom_smooth()
2. True or false, the blue line in the plot above is mapped to the Class aesthetic?
   - (A) True
   - (B) False
3. In the plot above, which of the following variables is mapped to the x aesthetic?
   - (A) Frequency
   - (B) meanFamiliarity

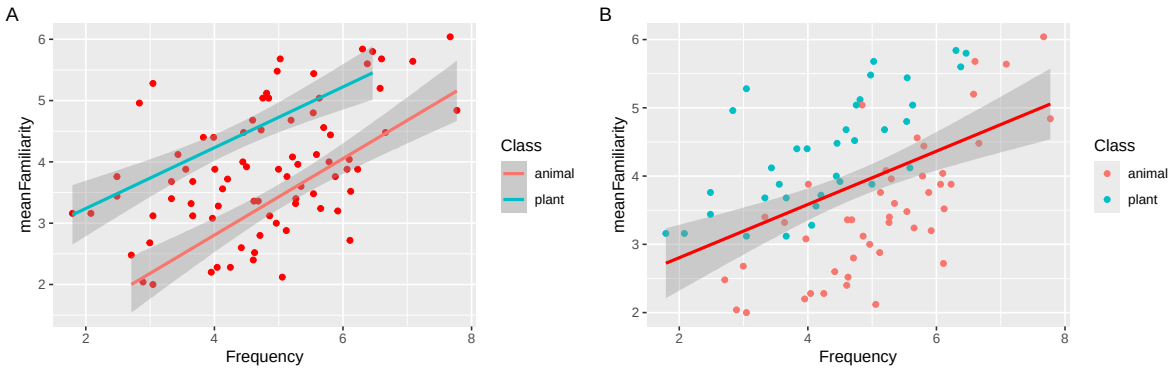
- (C) FreqSingular
- (D) FreqPlural

4. True or false, in the plot above, the default statistical transformation in the geom responsible for the red dots is "identity".
   - (A) True
   - (B) False

3.3 Code block 1

Suppose we run the following code.

```
ggplot(
    data = ratings,
    mapping = aes(x = Frequency, y = meanFamiliarity, color = Class)
    ) +
    geom_point() +
    geom_smooth(method = "lm", color = "red")
```



1. Which of the following plots will be returned?
   - (A) A
   - (B) B
2. Which aesthetic is mapped and which is set?
   - (A) Class is set to color and the smoothing line is mapped to red

- (B) Class is mapped to color and the smoothing line is set to red
- (C) Both are mapped
- (D) Both are set

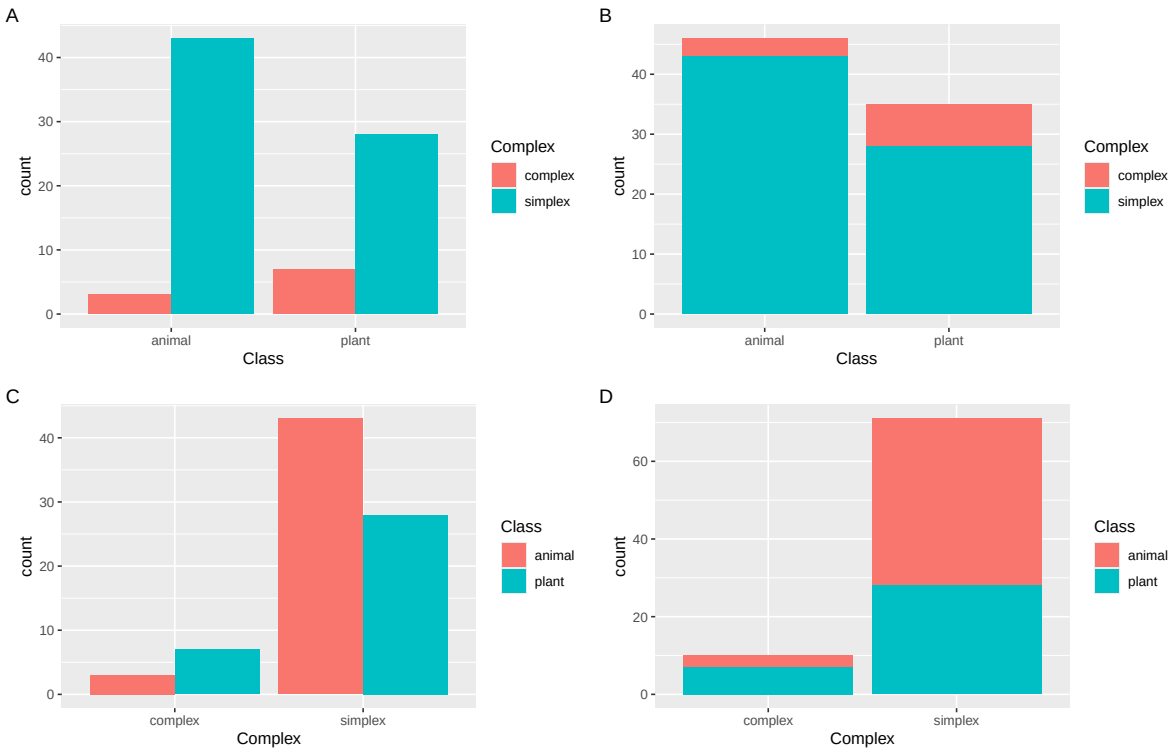
3. Which aesthetic is global and which is local?
    - (A) Color is mapped to the class variable globally, and set to red locally
    - (B) Color is mapped to the class variable locally, and set to red globally
    - (C) Both are global
    - (D) Both are local

3.4 Code block 2

Suppose we run the following code block

```
ggplot(
    data = ratings,
    mapping = aes(x = Class, fill = Complex)
    ) +
    geom_bar()
```

1. Which plot will be returned?
    - (A) A
    - (B) B
    - (C) C
    - (D) D
2. What would happen if we added the layer `scale_fill_manual(values = c("green", "orange"))` to the following plot?
    - (A) error: no fill aesthetic specified
    - (B) complex would turn green and simplex would turn orange

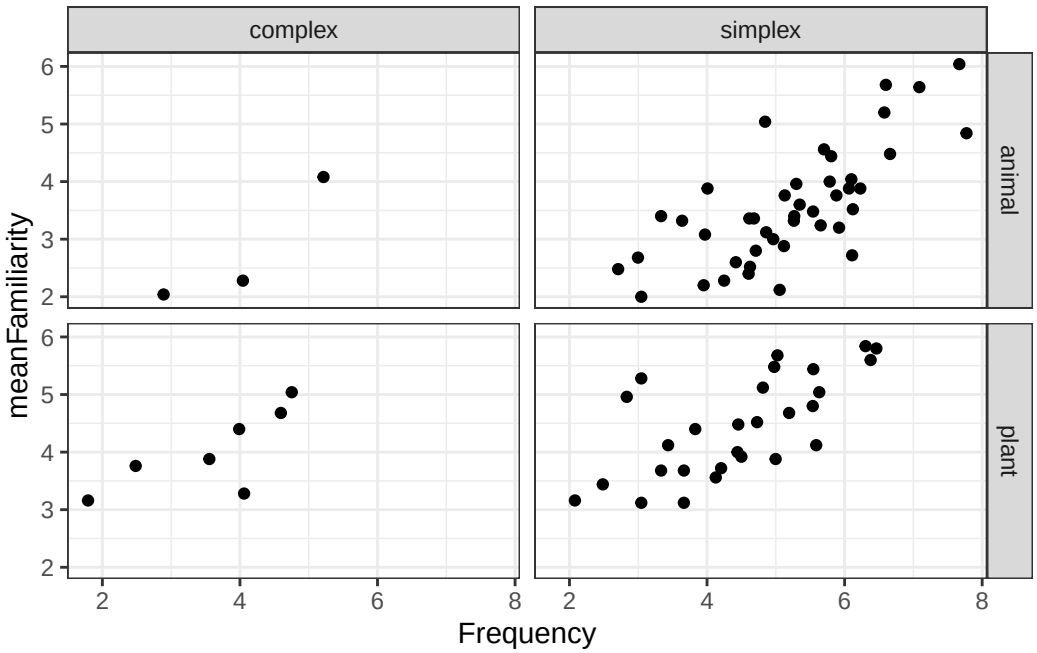


- (C) simplex would turn green and complex would turn orange
- (D) No change

3. What argument could we add to `geom_bar()` to add a black border around the bars?
   - (A) fill = `black`
   - (B) border_color = 'black'
   - (C) linetype = 'black'
   - (D) color = 'black'

3.5 Plot 3

Consider the following plot



1. To generate the facets in the plot above, which of the following lines of code must be included?

   - (A) `facet_grid(Complex ~ Class)`
   - (B) `facet_grid(Class ~ Complex)`
   - (C) `facet_grid(.~ Complex)`
   - (D) `facet_wrap(Class~Complex, ncol = 2)`

2. Which of the following geoms are added to the plot above?

   - (A) geom_histogram()
   - (B) geom_density()
   - (C) geom_bar()
   - (D) geom_smooth()
   - (E) geom_point()

3. Which built-in theme is applied to the following plot?

- (A) theme_grey()
- (B) theme_classic()
- (C) theme_void()
- (D) theme_bw()