PSC4375: Visualizing Distributions

Week 3: Lecture 5

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Studying political efficacy

- 2002 WHO survey of people in China and Mexico
- Goal: determine feelings of political efficacy
- Question: "How much say do you have in getting the government to address issues that interest you?"
  1. No say at all
  2. little say
  3. some say
  4. a lot of say
  5. unlimited say

Data

- Load the data:

```
library(tidyverse)
data(vignettes, package = "qss")
head(vignettes)
```

```
##   self alison jane moses china age
## 1    1      5    5     2     0  31
## 2    1      1    5     5     0  54
## 3    2      3    1     1     0  50
## 4    2      4    2     1     0  22
## 5    2      3    3     3     0  52
## 6    1      3    1     5     0  50
```

```
## Also works if you downloaded the data:
# vignettes <- read.csv("data/vignettes.csv")
```

Contingency table

- `count()` shows how many units are in each category of a variable:

```
vignettes %>%
  count(self)
```

```
##   self   n
## 1    1 327
## 2    2 210
## 3    3 130
## 4    4  56
## 5    5  58
```

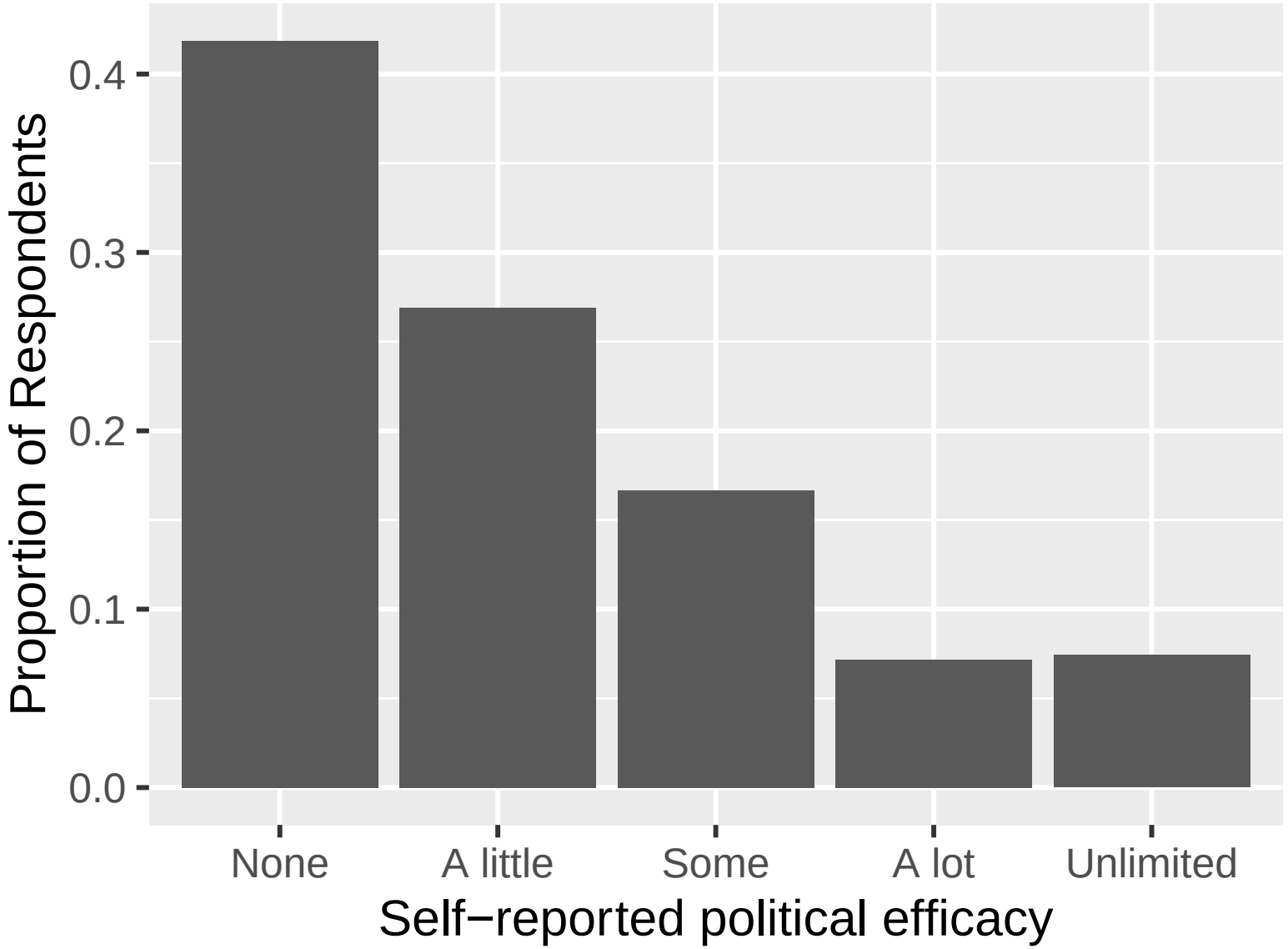
Contingency table (continued)

- using group_by we can convert these counts into proportions of units:

```
vignettes %>%
  group_by(self) %>%
  count() %>%
  ungroup() %>%
  mutate(prop = n / sum(n))
```

```
## # A tibble: 5 x 3
##    self     n   prop
##   <int> <int>  <dbl>
## 1     1   327 0.419
## 2     2   210 0.269
## 3     3   130 0.166
## 4     4    56 0.0717
## 5     5    58 0.0743
```

Useful way to visualize this information: barplot



Barplots in R

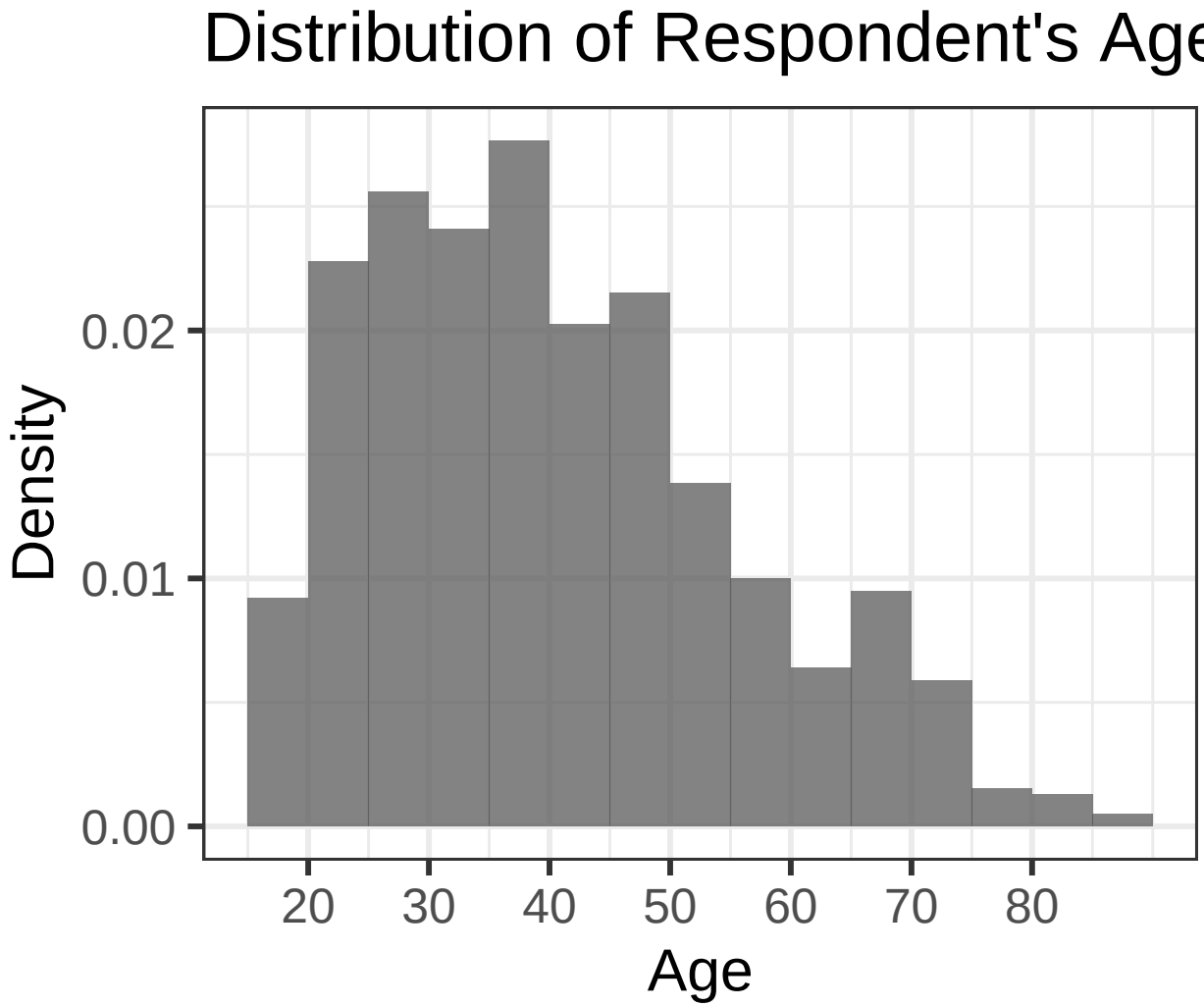
- The `barplot()` function can help us visualize a categorical variable:

```
vignettes %>%
  ggplot(aes(x = as.factor(self),
             y=..prop..,
             group = 1)) +
  geom_bar() +
  scale_x_discrete(labels = c("None", "A little",
                   "Some", "A lot", "Unlimited")) +
  xlab("Self-reported political efficacy") +
  ylab("Proportion of Respondents")
```

- Arguments:
  - `aes()`: the aestetic mapping of the plot (what you see)
  - `scale_x_discrete()`: changes the scale of the axis
  - `xlab()`, `ylab()` are axis labels

Histogram

- **Histograms** visualize density of a continuous/numeric variable



How to create histograms?

- How to create a histogram by hand:
  1. create bins along the variable of interest
  2. count number of observations in each bin
  3. **density** = bin height

$$\text{density} = \frac{\text{proportion of observations in bin}}{\text{bin width}}$$

- The areas of the bins = proportion of observations in those bins.
  - $\rightsquigarrow$ area of the blocks sum to 1 (100%)
  - Can lead to confusion: height of block can go above 1!
  - With equal-width bins, height is proportional to proportion in bin.

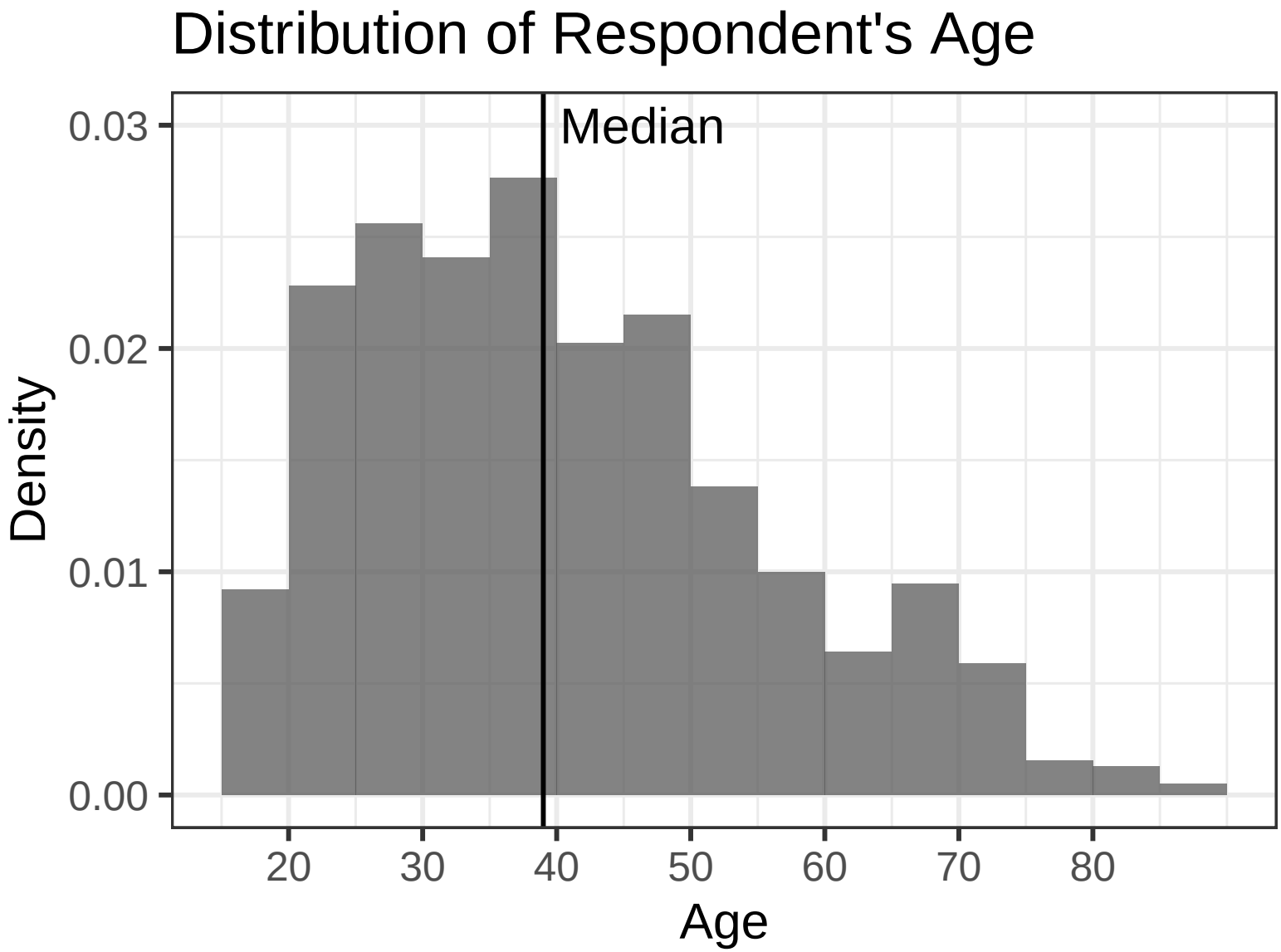
Histograms in R

- In ggplot, we use `geom_histogram()`:

```
vignettes %>%
  ggplot(aes(x = age,
             y = ..density..)) +
  geom_histogram(binwidth = 5, # how wide for each bin
                 boundary = 0, # bin position
                 alpha=0.75) + # reduces opaqueness
  scale_x_continuous(breaks = seq(20, 80,by = 10)) +
  labs(title = "Distribution of Respondent's Age",
       y = "Density",
       x = "Age") +
  theme_bw()
```

- Other arguments: -`labs` sets the titles for the plot (used `xlab` and `ylab` in previous plot) -`scale_x_continuous` sets the scale for the

Histograms in R: adding a vertical `median` line



Histograms in R: adding a vertical median line

```
vignettes %>%
  ggplot(aes(x = age,
             y = ..density..)) +
  geom_histogram(binwidth = 5, # how wide for each bin
                 boundary = 0, # bin position
                 alpha=0.75) + # reduces opaqueness
  geom_vline(xintercept = median(vignettes$age)) +
  annotate(geom = "text", x = median(vignettes$age),
           y=.03, label = "Median", hjust = -0.1) +
  scale_x_continuous(breaks = seq(20, 80,by = 10)) +
  labs(title = "Distribution of Respondent's Age",
       y = "Density",
       x = "Age") +
  theme_bw()
```

Boxplot