

Analysis of bootcamp survey

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Goals

- Download and clean data from 2017 R Bootcamp Survey
- Visualize data
- Prepare reports in `ioslides_presentation`, `pdf_document`, and `word_document` formats

Preliminaries

Load required packages.

```
library(tidyverse)
library(googleheets)
```

Load data and examine

The survey data are stored in a Google Sheet. We'll use the `googleheets` package to open it and create a data frame. Documentation about the package can be found [here](#).

There are some idiosyncrasies in using the `googleheets` package in an R Markdown document because it requires interaction with the console, so I created a separate R script, `Get_bootcamp_googleSheet.R` to extract the survey data, clean it, and save it to a CSV under `data/survey.csv`. We can then just load this file. But, let's look at `R/Clean_survey_data.R`.

I also created a test data file, `data/survey-test.csv` so I could see how everything worked before y'all filled out your responses. The `R/Make_test_survey.R` file shows how I did this. It's a great, reproducible practice to simulate the data you expect, then run it through your pipeline.

```
# Created test data set for testing.
# survey <- read_csv("../data/survey-test.csv")
# Or choose data from respondents
survey <- read_csv("../data/survey.csv")

## Parsed with column specification:
## cols(
##   Timestamp = col_character(),
```

```
## `Your current level of experience/expertise with R` = col_character(),
## `Your enthusiasm for Game of Thrones` = col_integer(),
## `Age in years` = col_integer(),
## `Preferred number of hours spent sleeping/day` = col_character(),
## `Favorite day of the week` = col_character(),
## `Are your data tidy?` = col_character()
## )
```

```
survey
```

```
## # A tibble: 35 x 7
##       Timestamp `Your current level of experience/expertise with R`
##       <chr>                                <chr>
## 1      <NA>                                <NA>
## 2 8/13/2017 23:29:24                        some
## 3 8/14/2017 12:01:12                        some
## 4 8/15/2017 12:42:09                        some
## 5 8/15/2017 17:13:08                        none
## 6 8/15/2017 19:03:40                       limited
## 7 8/15/2017 23:36:07                        some
## 8 8/15/2017 23:45:05                       limited
## 9 8/16/2017 0:26:01                         pro
## 10 8/16/2017 1:09:44                       none
## # ... with 25 more rows, and 5 more variables: `Your enthusiasm for Game
## #   of Thrones` <int>, `Age in years` <int>, `Preferred number of hours
## #   spent sleeping/day` <chr>, `Favorite day of the week` <chr>, `Are your
## #   data tidy?` <chr>
```

The `str()` or 'structure' command is also a great way to see what you've got.

```
str(survey)
```

```
## Classes 'tbl_df', 'tbl' and 'data.frame':   35 obs. of  7 variables:
## $ Timestamp                : chr  NA "8/13/2017 23:29:24" "8/14/2017 12:01:12" ...
## $ Your current level of experience/expertise with R: chr  NA "some" "some" "some" ...
## $ Your enthusiasm for Game of Thrones              : int  NA 10 10 10 10 10 10 3 9 10 ...
## $ Age in years                                       : int  NA 28 22 24 28 24 23 25 37 25 ...
## $ Preferred number of hours spent sleeping/day     : chr  NA "8!!!" "7" "10" ...
## $ Favorite day of the week                         : chr  NA "Friday" "Friday" "Saturday" ...
## $ Are your data tidy?                             : chr  NA "Yes" "That's a personal question" "No"
## - attr(*, "spec")=List of 2
## ..$ cols      :List of 7
## .. ..$ Timestamp                : list()
## .. ..$- attr(*, "class")= chr  "collector_character" "collector"
## .. ..$ Your current level of experience/expertise with R: list()
## .. ..$- attr(*, "class")= chr  "collector_character" "collector"
## .. ..$ Your enthusiasm for Game of Thrones              : list()
## .. ..$- attr(*, "class")= chr  "collector_integer" "collector"
## .. ..$ Age in years                                       : list()
## .. ..$- attr(*, "class")= chr  "collector_integer" "collector"
## .. ..$ Preferred number of hours spent sleeping/day     : list()
## .. ..$- attr(*, "class")= chr  "collector_character" "collector"
## .. ..$ Favorite day of the week                         : list()
## .. ..$- attr(*, "class")= chr  "collector_character" "collector"
## .. ..$ Are your data tidy?                             : list()
## .. ..$- attr(*, "class")= chr  "collector_character" "collector"
```

```
## ..$ default: list()
## .. ..- attr(*, "class")= chr "collector_guess" "collector"
## ..- attr(*, "class")= chr "col_spec"
```

Clearly, we need to do some cleaning before we can do anything with this.

Let's start by renaming variables

```
names(survey) <- c("Timestamp",
                  "R_exp",
                  "GoT",
                  "Age_yrs",
                  "Sleep_hrs",
                  "Fav_day",
                  "Tidy_data")
```

```
# complete.cases() drops NAs
```

```
survey <- survey[complete.cases(survey),]
survey
```

```
## # A tibble: 34 x 7
##       Timestamp    R_exp  GoT Age_yrs Sleep_hrs Fav_day
##       <chr>      <chr> <int>  <int>    <chr>   <chr>
## 1 8/13/2017 23:29:24  some    10     28    8!!!  Friday
## 2 8/14/2017 12:01:12  some    10     22     7    Friday
## 3 8/15/2017 12:42:09  some    10     24    10    Saturday
## 4 8/15/2017 17:13:08  none    10     28     9    Saturday
## 5 8/15/2017 19:03:40 limited  10     24     9    Saturday
## 6 8/15/2017 23:36:07  some    10     23    6-7   Friday
## 7 8/15/2017 23:45:05 limited   3     25     8    Friday
## 8 8/16/2017 0:26:01   pro     9     37     7    Friday
## 9 8/16/2017 1:09:44  none    10     25     9    Saturday
## 10 8/16/2017 8:51:05 limited   1     23    7.5   Thursday
## # ... with 24 more rows, and 1 more variables: Tidy_data <chr>
```

Now, lets make sure we have numbers where we expect them.

```
survey$Sleep_hrs <- readr::parse_number(survey$Sleep_hrs)
survey
```

```
## # A tibble: 34 x 7
##       Timestamp    R_exp  GoT Age_yrs Sleep_hrs Fav_day
##       <chr>      <chr> <int>  <int>    <dbl>   <chr>
## 1 8/13/2017 23:29:24  some    10     28    8.0    Friday
## 2 8/14/2017 12:01:12  some    10     22    7.0    Friday
## 3 8/15/2017 12:42:09  some    10     24   10.0    Saturday
## 4 8/15/2017 17:13:08  none    10     28    9.0    Saturday
## 5 8/15/2017 19:03:40 limited  10     24    9.0    Saturday
## 6 8/15/2017 23:36:07  some    10     23    6.0    Friday
## 7 8/15/2017 23:45:05 limited   3     25    8.0    Friday
## 8 8/16/2017 0:26:01   pro     9     37    7.0    Friday
## 9 8/16/2017 1:09:44  none    10     25    9.0    Saturday
## 10 8/16/2017 8:51:05 limited   1     23    7.5    Thursday
## # ... with 24 more rows, and 1 more variables: Tidy_data <chr>
```

Looks good.

We may want to make the R_exp variable ordered.

```
(survey_responses <- unique(survey$R_exp))
```

```
## [1] "some"    "none"    "limited"  "pro"
```

This shows us the different survey response values.

```
survey$R_exp <- ordered(survey$R_exp, levels=c("none",  
                                                "limited",  
                                                "some",  
                                                "lots",  
                                                "pro"))
```

Visualization

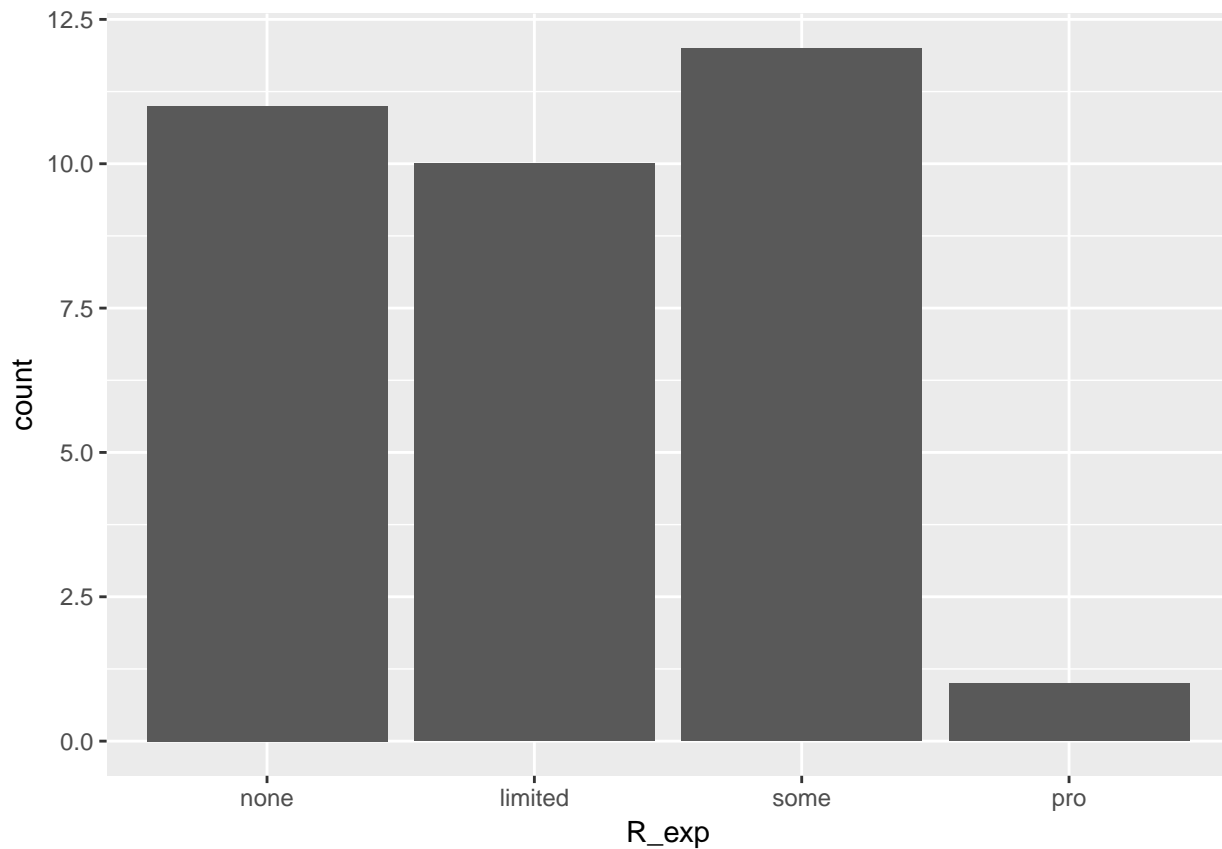
Now, we follow Mike Meyer's advice: "Plot your data!"

Descriptive plots

```
R_exp_hist <- survey %>%  
  ggplot() +  
  aes(x=R_exp) +  
  geom_histogram(stat = "count") # R_exp is discrete
```

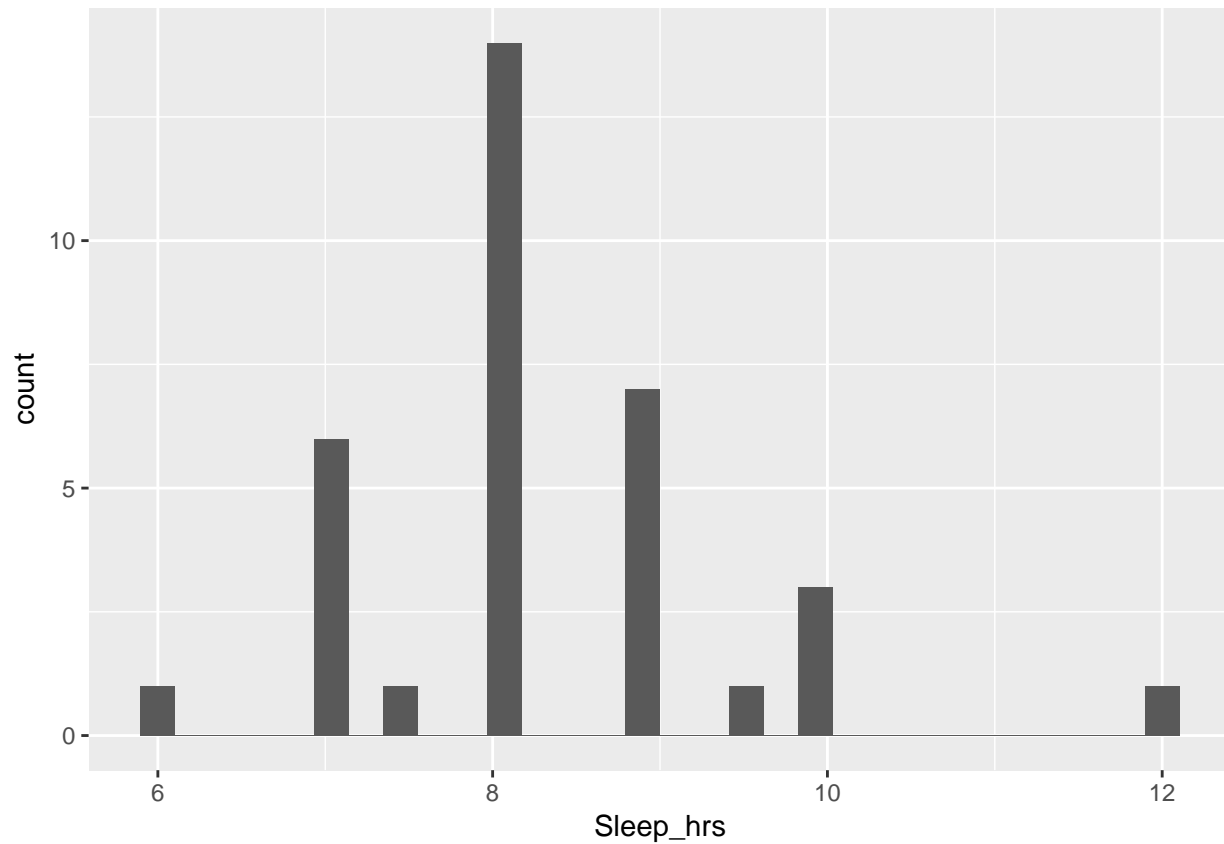
```
## Warning: Ignoring unknown parameters: binwidth, bins, pad
```

```
R_exp_hist
```



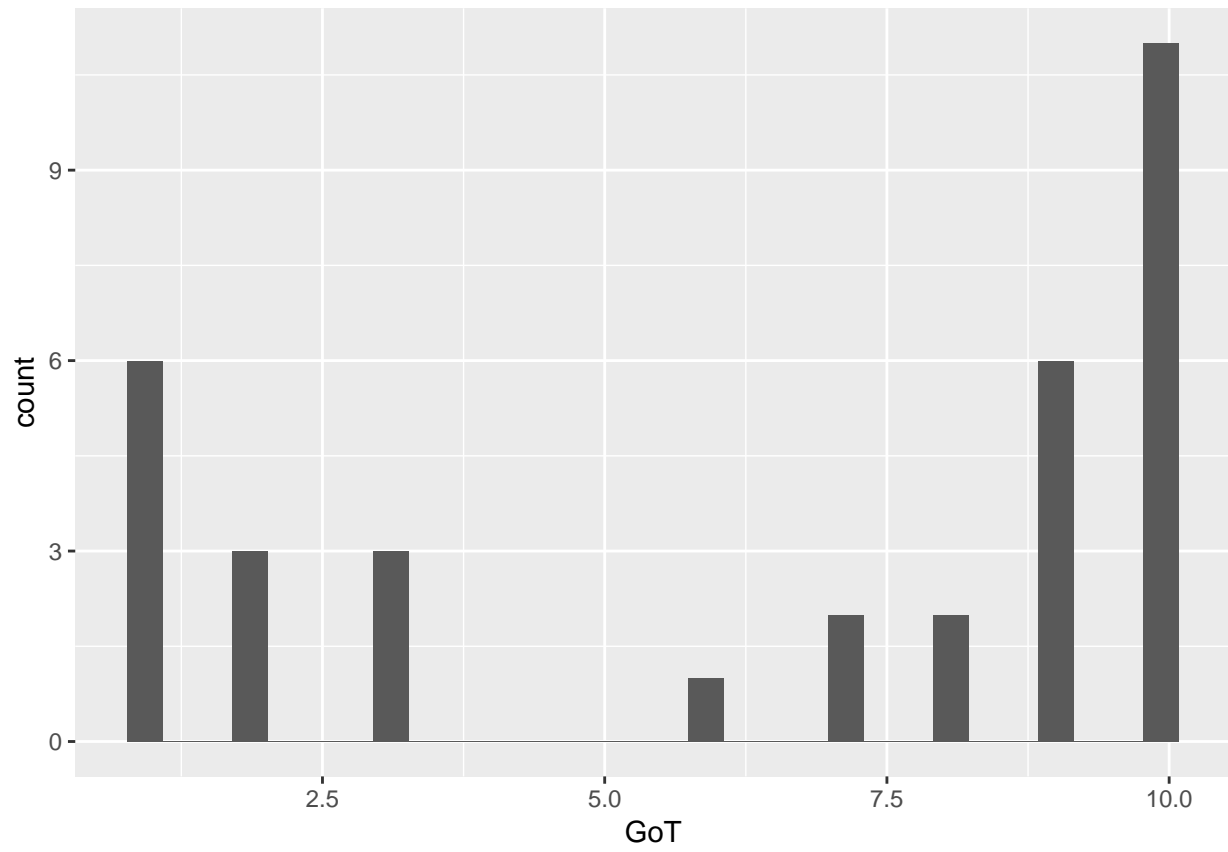
```
Sleep_hrs_hist <- survey %>%
  ggplot() +
  aes(x=Sleep_hrs) +
  geom_histogram() # Sleep_hrs is continuous
Sleep_hrs_hist
```

```
## `stat_bin()` using `bins = 30`. Pick better value with `binwidth`.
```



```
Got_hist <- survey %>%
  ggplot() +
  aes(x=GoT) +
  geom_histogram()
Got_hist
```

```
## `stat_bin()` using `bins = 30`. Pick better value with `binwidth`.
```

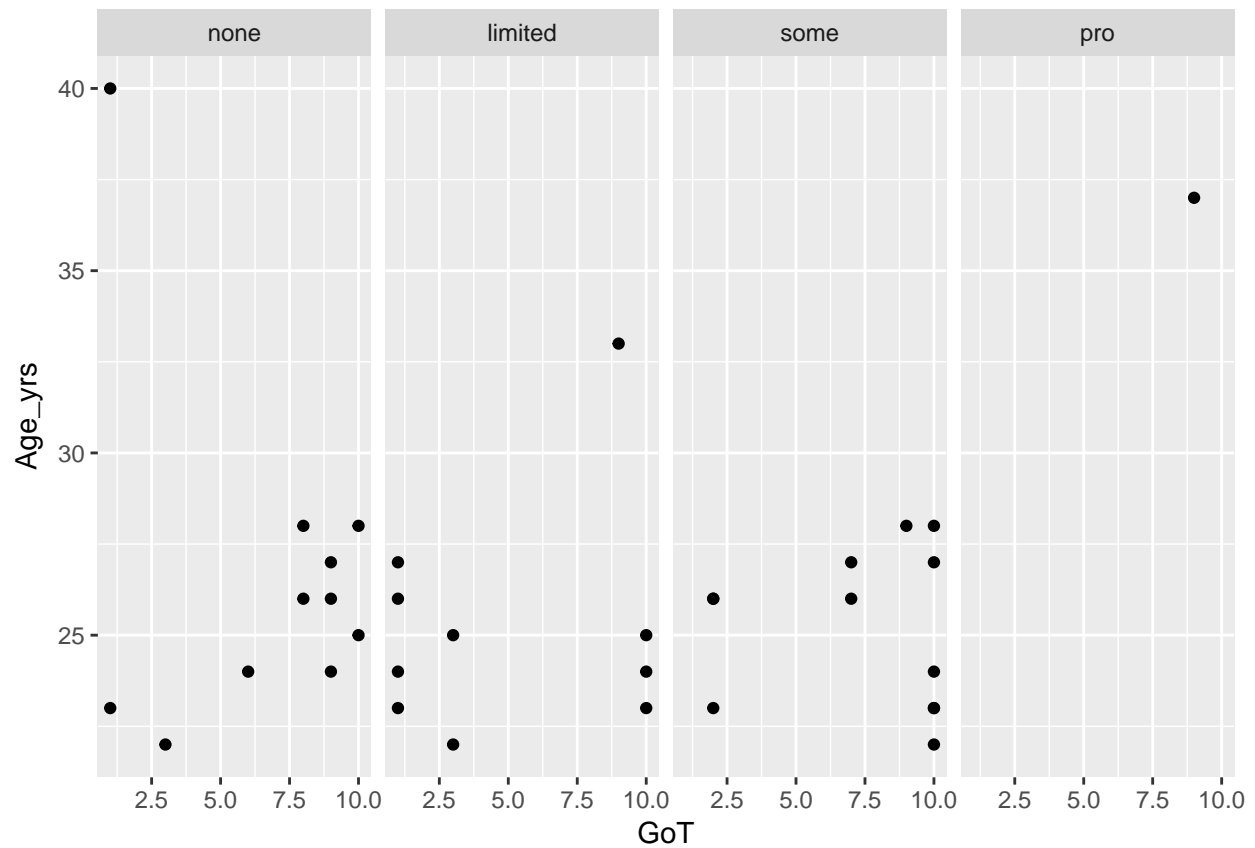


Looks like we are of two minds about GoT.



Figure 1:

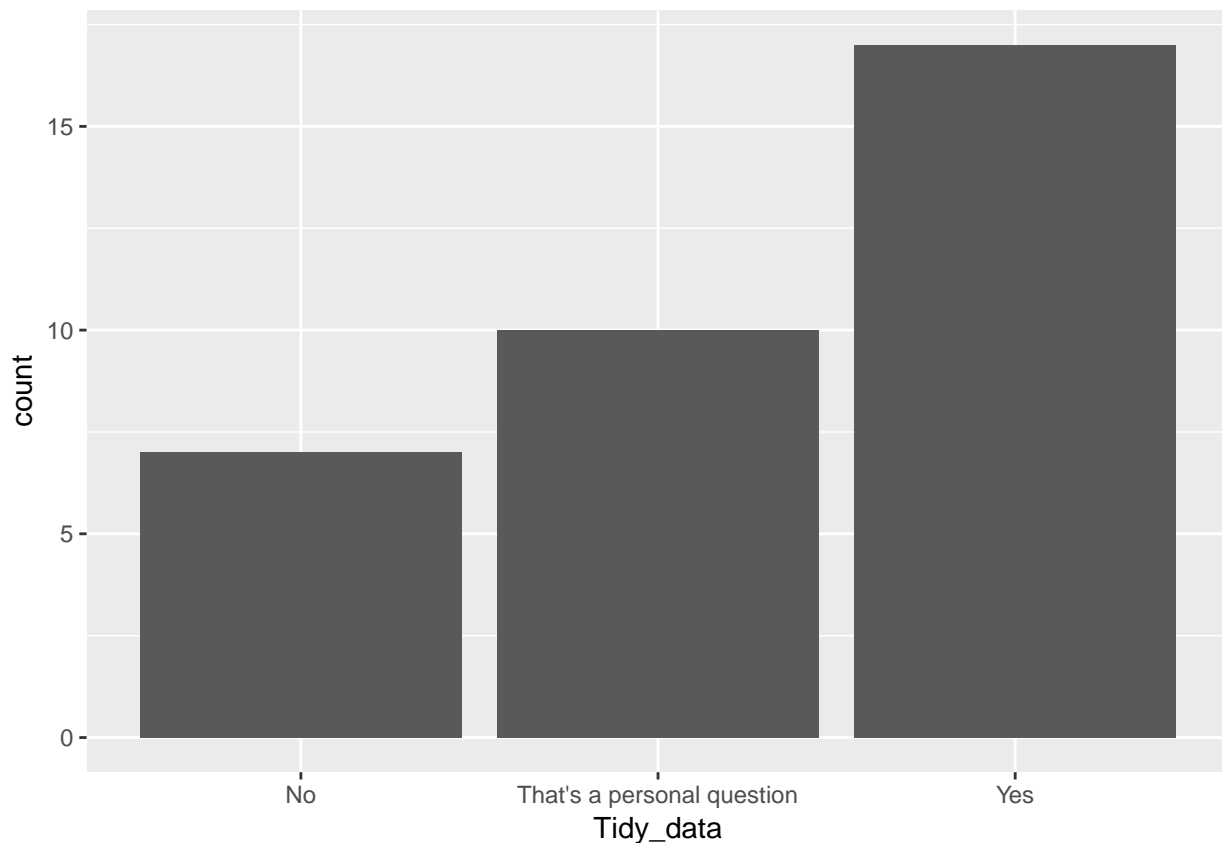
```
GoT_vs_r_exp <- survey %>%
  ggplot() +
  aes(x=GoT, y=Age_yrs) +
  facet_grid(. ~ R_exp) +
  geom_point()
GoT_vs_r_exp
```



```
tidy_hist <- survey %>%
  ggplot() +
  aes(x=Tidy_data) +
  geom_histogram(stat = "count")
```

Warning: Ignoring unknown parameters: binwidth, bins, pad

```
tidy_hist
```



Analysis

I could use a document like this to plan out my analysis plan **before** I conduct it. If I used simulated data, I could make sure that my workflow will run when I get real (cleaned) data. I could even preregister my analysis plan before I conduct it. That doesn't preclude later exploratory analyses, but it does hold me and my collaborators accountable for what I predicted in advance.

Notes

Notice that I sometimes put a label like `got-vs-r-exp` in the brackets for a given 'chunk' of R code. The main reasons to do this are:

- It sometimes makes it easier to debug your code.
- In some cases, you can have this 'chunk' name serve as the file name for a figure you generate within a chunk.
- In a bit, we'll see how these chunk names are useful for making tables, figures, and equations that generate their own numbers.