Practice for the practice Quiz

Using Problem 12.2.1 Exercise 2 as a guide, use the ideas from Chapter 13 to answer the questions for *table2*.

1. Compute the rate and include it in a final dataframe with the years as columns.

Answer:

The first answer approaches the problem by splitting the dataset into two and then joining the two dataset.

```
library(tidyverse)

table2
```

```
## # A tibble: 12 x 4
##    country      year type            count
##    <chr>       <int> <chr>           <int>
##  1 Afghanistan  1999 cases             745
##  2 Afghanistan  1999 population   19987071
##  3 Afghanistan  2000 cases            2666
##  4 Afghanistan  2000 population   20595360
##  5 Brazil       1999 cases           37737
##  6 Brazil       1999 population  172006362
##  7 Brazil       2000 cases           80488
##  8 Brazil       2000 population  174504898
##  9 China        1999 cases          212258
## 10 China        1999 population 1272915272
## 11 China        2000 cases          213766
## 12 China        2000 population 1280428583
```

```
table2 %>% arrange(type)
```

```
## # A tibble: 12 x 4
##    country      year type            count
##    <chr>       <int> <chr>           <int>
##  1 Afghanistan  1999 cases             745
##  2 Afghanistan  2000 cases            2666
##  3 Brazil       1999 cases           37737
##  4 Brazil       2000 cases           80488
##  5 China        1999 cases          212258
##  6 China        2000 cases          213766
##  7 Afghanistan  1999 population   19987071
##  8 Afghanistan  2000 population   20595360
##  9 Brazil       1999 population  172006362
## 10 Brazil       2000 population  174504898
## 11 China        1999 population 1272915272
## 12 China        2000 population 1280428583
```

```
table2_cases <- table2 %>% filter(type == "cases") %>%
  select(country, year, count) %>%
  rename(cases = count)
table2_cases
```

```
## # A tibble: 6 x 3
##   country      year  cases
##   <chr>       <int>  <int>
```

```
## 1 Afghanistan  1999    745
## 2 Afghanistan  2000   2666
## 3 Brazil       1999  37737
## 4 Brazil       2000  80488
## 5 China        1999 212258
## 6 China        2000 213766
```

```r
library(stringr)


table2_pop <- table2 %>% filter(type == "population") %>%
  select(country, year, count) %>%
  rename(population = count)
table2_pop
```

```
## # A tibble: 6 x 3
##   country      year population
##   <chr>       <int>      <int>
## 1 Afghanistan  1999   19987071
## 2 Afghanistan  2000   20595360
## 3 Brazil       1999  172006362
## 4 Brazil       2000  174504898
## 5 China        1999 1272915272
## 6 China        2000 1280428583
```

Now join the two datasets using two variables as the unique key.

```r
table2_join <- table2_cases %>% inner_join(table2_pop, by=c("country", "year"))

table2_join
```

```
## # A tibble: 6 x 4
##   country      year  cases population
##   <chr>       <int>  <int>      <int>
## 1 Afghanistan  1999    745   19987071
## 2 Afghanistan  2000   2666   20595360
## 3 Brazil       1999  37737  172006362
## 4 Brazil       2000  80488  174504898
## 5 China        1999 212258 1272915272
## 6 China        2000 213766 1280428583
```

Create the new column.

```r
table2_new <- table2_join %>% mutate(rate = cases / population * 10000)

table2_new
```

```
## # A tibble: 6 x 5
##   country      year  cases population  rate
##   <chr>       <int>  <int>      <int> <dbl>
## 1 Afghanistan  1999    745   19987071 0.373
## 2 Afghanistan  2000   2666   20595360 1.29
## 3 Brazil       1999  37737  172006362 2.19
## 4 Brazil       2000  80488  174504898 4.61
## 5 China        1999 212258 1272915272 1.67
## 6 China        2000 213766 1280428583 1.67
```

Now spread the data out into two columns.

```r
table2_new_spread <- table2_new %>% select(country, year, rate) %>%
  spread(year, rate)

table2_new_spread
```

```
## # A tibble: 3 x 3
##   country     `1999` `2000`
##   <chr>        <dbl>  <dbl>
## 1 Afghanistan  0.373   1.29
## 2 Brazil       2.19    4.61
## 3 China        1.67    1.67
```

Now try the new function *pivot_wider()*. Note new this function is from the *tidyr* 1.0 package.

```r
table2_new_spread2 <- table2_new %>% select(country, year, rate) %>%
  pivot_wider(country, names_from = year, values_from = rate)

table2_new_spread2
```

```
## # A tibble: 3 x 3
##   country     `1999` `2000`
##   <chr>        <dbl>  <dbl>
## 1 Afghanistan  0.373   1.29
## 2 Brazil       2.19    4.61
## 3 China        1.67    1.67
```

Are the two files the same. Lets give the *comparedf()* function a try. It is from the *arsenal* R package.

```r
library(arsenal)

comparedf(table2_new_spread, table2_new_spread2)
```

```
## Compare Object
##
## Function Call:
## comparedf(x = table2_new_spread, y = table2_new_spread2)
##
## Shared: 3 non-by variables and 3 observations.
## Not shared: 0 variables and 0 observations.
##
## Differences found in 0/3 variables compared.
## 0 variables compared have non-identical attributes.
```

Anternative Solution:

Can we use spread from the beginning? Yes.

```r
table2 %>% spread(key = type, value = count) %>%
  mutate(rate = cases/population) %>%
  select(-cases, -population) %>%
  spread(key = year, value = rate)
```

```
## # A tibble: 3 x 3
##   country        `1999`   `2000`
##   <chr>           <dbl>    <dbl>
## 1 Afghanistan 0.0000373 0.000129
## 2 Brazil      0.000219  0.000461
## 3 China       0.000167  0.000167
```

Or

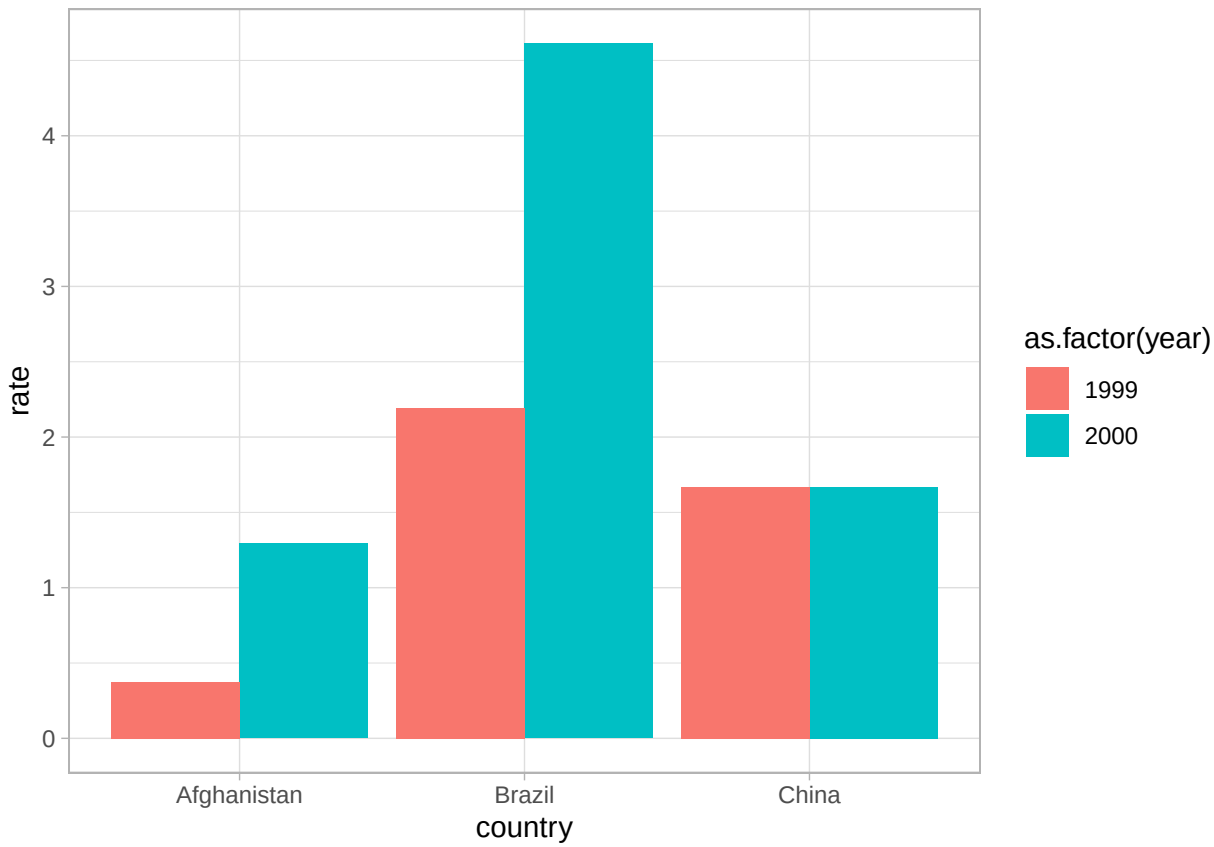
```
table2 %>% pivot_wider(names_from = type, values_from = count) %>%
  mutate(rate = cases/population) %>%
  select(-cases, -population) %>%
  pivot_wider(names_from = year, values_from = rate)
```

```
## # A tibble: 3 x 3
##   country        `1999`   `2000`
##   <chr>           <dbl>    <dbl>
## 1 Afghanistan 0.0000373 0.000129
## 2 Brazil      0.000219  0.000461
## 3 China       0.000167  0.000167
```

2. Now make a clustered bar graph. Question, which table is the one to use, table2_new or table2_new_spread?

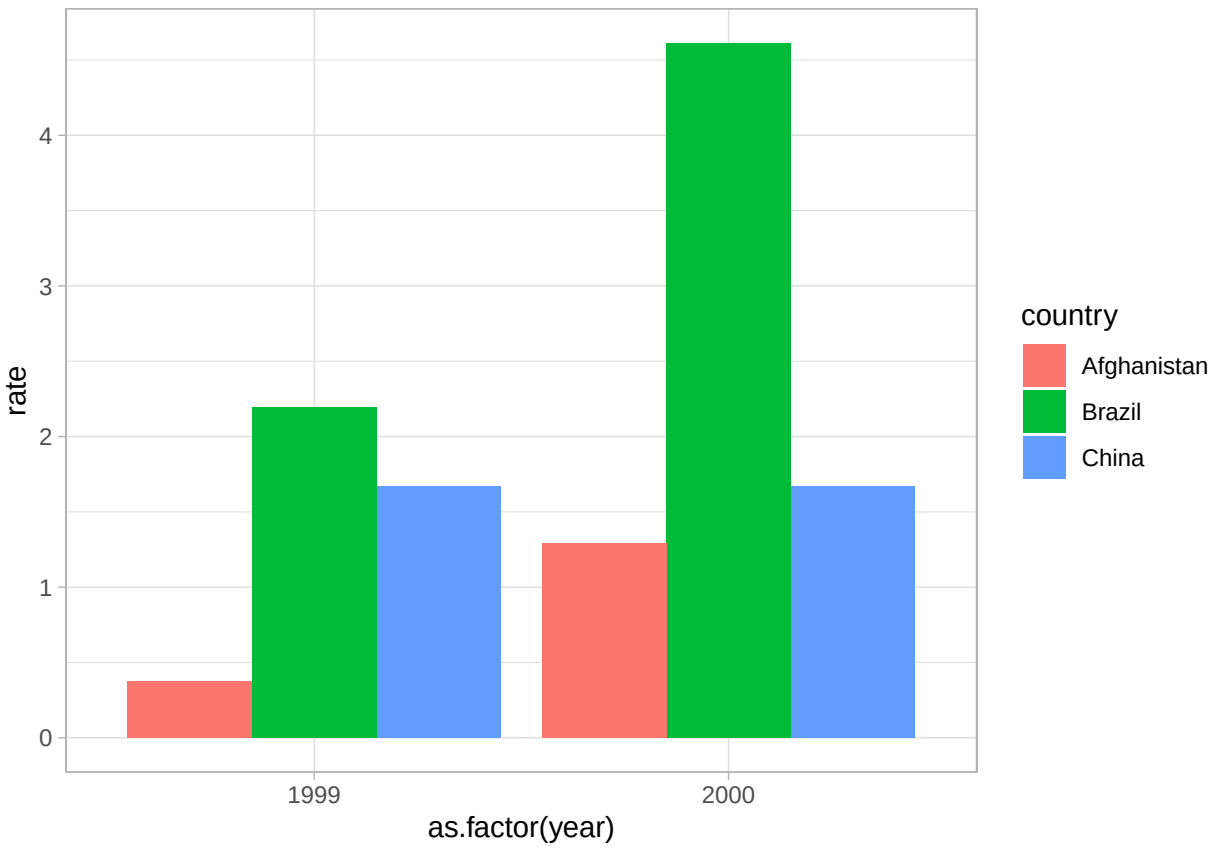
Answer: The one to use is in tidy format. So table2_new. Note the use of as.factor() function. This is our next topic of discussion.

```
table2_new %>% ggplot(aes(x = country, y = rate, fill = as.factor(year))) +
  geom_bar(stat = "identity", position = "dodge") +
  theme_light()
```



Or you can make the plot using year to group the bars.

```
table2_new %>% ggplot(aes(x = as.factor(year), y = rate, fill = country)) +
  geom_bar(stat = "identity", position = "dodge") +
  theme_light()
```


rate
4
3
2
1
0
1999
2000
as.factor(year)
country
Afghanistan
Brazil
China

“‘