Creating more complex figures

Complete the following assignment and then save your R script and figures into the associated google drive folder. The R script should be titled HW_DV2_[YOUR INITIALS].

We will be working with different data from those used in the walkthrough and group work. Load in ProductivePacifists_Data.RData, which is located in the “Training Data” folder, as well as the relevant packages.

**Exercise 1:** Create a barplot that compares the proportion of democracies and autocracies that are land oriented in 1900 and in 2000 (i.e., two pairs of two bars). Use the land_oriented_medium_binary and autocracy_BX. Add an appropriate title and axis labels.

```r
library(tidyverse)
library(ggplot2)
load("ProductivePacifists_Data.RData")

# Preprocessing using the tidyverse

# Small dataset of the number of countries for 1900 and 2000
countries <- dat %>%
  filter(year %in% c(1900, 2000)) %>%
  group_by(year) %>%
  summarise(country_count = n())

# Create a small dataset that counts the number of
# autocracies and democracies that are land oriented
# to merge with country-count object and ultimately generate
# the proportions for each
regime_prop <- dat %>%
  group_by(year, autocracy_BX, land_oriented_medium_binary) %>%
  summarise(count = n()) %>%
  filter(year %in% c(1900, 2000)) %>%
  left_join(countries, by = "year") %>%
  mutate(prop = count/country_count) %>%
  # get the proportion of countries for each combination using
  # the merged country count variable
```
Exercise 2: Create four map plots, one with data from 1850, one from 1900, one from 1950, one from 2000. In each plot, show a heatmap of how land-oriented each country is. Use the variable `land_oriented_medium_continuous_trim`. Make sure to load in the necessary packages, and add the necessary information for each plot (title and labels, legend).

library(maps)
library(ggplot2)
library(dplyr)
library(countrycode)
# Extract map data
dat_map <- map_data("world")

# Pre-processing (adding country variables to merge on to map data)
dat_map$gwno <- countryCode(dat_map$region,
    origin = "country.name",
    destination = "gwn")  # using the Gleditsch & Ward
    # countrycode

# Note: we already have the country code (gwno) in the productive pacifists data

# Merge map data and productive pacifists data
merged <- full_join(dat_map, dat, by = "gwno")

# 1850
p1850 <- ggplot(subset(merged, year == 1850),
    aes(x = long, y = lat, group = group, fill = land_oriented_medium_continuous_trim)) +
    geom_polygon() +
    scale_fill_gradient(low = "#4575b4", high = "#d73027") +
    labs(title = "Country Land Orientation (continuous) in 1850",
        x = "", y = "",
        fill = "Land-orientation (cont.)") +

# BONUS: in maps, you can also remove the whole background using "element_blank()"
# as we don't technically need the grid lines
theme(panel.grid.major = element_blank(), panel.grid.minor = element_blank(),
    panel.background = element_blank(), axis.line = element_blank(),
    axis.ticks.x = element_blank(), axis.ticks.y = element_blank(),
    axis.text.x = element_blank(), axis.text.y = element_blank(),
    legend.position = "bottom")

p1850
Country Land Orientation (continuous) in 1850

# 1900

p1900 <- ggplot(subset(merged, year == 1900),
aes(x = long, y = lat, group = group, fill = land_oriented_medium_continuous_trim)) +
geom_polygon() +
scale_fill_gradient(low = "#4575b4", high = "#d73027") +
labs(title = "Country Land Orientation (continuous) in 1900",
     x = "",
     y = "",
     fill = "Land-orientation (cont.)") +

# BONUS: in maps, you can also remove the whole background using "element_blank()"
# as we don't technically need the grid lines
theme(panel.grid.major = element_blank(), panel.grid.minor = element_blank(),
      panel.background = element_blank(), axis.line = element_blank(),
      axis.ticks.x = element_blank(), axis.ticks.y = element_blank(),
      axis.text.x = element_blank(), axis.text.y = element_blank(),
      legend.position = "bottom")
p1900
Country Land Orientation (continuous) in 1900

# 1950

p1950 <- ggplot(subset(merged, year == 1950),
  aes(x = long, y = lat, group = group, fill = land_oriented_medium_continuous_trim)) +
  geom_polygon() +
  scale_fill_gradient(low = "#4575b4", high = "#d73027") +
  labs(title = "Country Land Orientation (continuous) in 1950",
       x = "",
       y = "",
       fill = "Land-orientation (cont.)") +

# BONUS: in maps, you can also remove the whole background using "element_blank()"
# as we don't technically need the grid lines

theme(panel.grid.major = element_blank(), panel.grid.minor = element_blank(),
      panel.background = element_blank(), axis.line = element_blank(),
      axis.ticks.x = element_blank(), axis.ticks.y = element_blank(),
      axis.text.x = element_blank(), axis.text.y = element_blank(),
      legend.position = "bottom")

p1950
Country Land Orientation (continuous) in 1950

```r
# 2000
p2000 <- ggplot(subset(merged, year == 2000),
    aes(x = long, y = lat, group = group, fill = land_oriented_medium_continuous_trim)) +
    geom_polygon() +
    scale_fill_gradient(low = "#4575b4", high = "#d73027") +
    labs(title = "Country Land Orientation (continuous) in 2000",
         x = "",
         y = "",
         fill = "Land-orientation (cont.)") +

# BONUS: in maps, you can also remove the whole background using "element_blank()"
# as we don't technically need the grid lines
theme(panel.grid.major = element_blank(), panel.grid.minor = element_blank(),
      panel.background = element_blank(), axis.line = element_blank(),
      axis.ticks.x = element_blank(), axis.ticks.y = element_blank(),
      axis.text.x = element_blank(), axis.text.y = element_blank(),
      legend.position = "bottom")

p2000
```
Country Land Orientation (continuous) in 2000

**Bonus:** Combine all four plots into a single figure. Label each subplot with the year. Add a legend.

```r
library(ggpubr)
# Resaving plots with an adjusted title (year only)

p1850 <- ggplot(subset(merged, year == 1850),
                 aes(x = long, y = lat, group = group, fill = land_oriented_medium_continuous_trim)) +
           geom_polygon() +
           scale_fill_gradient(low = "#4575b4", high = "#d73027") +
           labs(title = "1850",
                x = "", y = "",
                fill = "Land-orientation (cont.)") +
           theme(panel.grid.major = element_blank(),
                 panel.grid.minor = element_blank(),
                 panel.background = element_blank(),
                 axis.line = element_blank(),
                 axis.ticks.x = element_blank(),
                 axis.ticks.y = element_blank(),
                 axis.text.x = element_blank(),
                 axis.text.y = element_blank())

p1900 <- ggplot(subset(merged, year == 1900),
                 aes(x = long, y = lat, group = group, fill = land_oriented_medium_continuous_trim)) +
           geom_polygon() +
           scale_fill_gradient(low = "#4575b4", high = "#d73027") +
           labs(title = "1900",
                x = "", y = "",
                fill = "Land-orientation (cont.)") +
           theme(panel.grid.major = element_blank(),
                 panel.grid.minor = element_blank(),
                 panel.background = element_blank(),
                 axis.line = element_blank(),
                 axis.ticks.x = element_blank(),
                 axis.ticks.y = element_blank(),
                 axis.text.x = element_blank(),
                 axis.text.y = element_blank())
```
p1950 <- ggplot(subset(merged, year == 1950),
aes(x = long, y = lat, group = group, fill = land_oriented_medium_continuous_trim)) +
geom_polygon() +
scale_fill_gradient(low = "#4575b4", high = "#d73027") +
labs(title = "1950",
    x = "",
    y = "",
    fill = "Land-orientation (cont.)") +
theme(panel.grid.major = element_blank(), panel.grid.minor = element_blank(),
      panel.background = element_blank(), axis.line = element_blank(),
      axis.ticks.x = element_blank(), axis.ticks.y = element_blank(),
      axis.text.x = element_blank(), axis.text.y = element_blank())

p2000 <- ggplot(subset(merged, year == 2000),
aes(x = long, y = lat, group = group, fill = land_oriented_medium_continuous_trim)) +
geom_polygon() +
scale_fill_gradient(low = "#4575b4", high = "#d73027") +
labs(title = "2000",
    x = "",
    y = "",
    fill = "Land-orientation (cont.)") +
theme(panel.grid.major = element_blank(), panel.grid.minor = element_blank(),
      panel.background = element_blank(), axis.line = element_blank(),
      axis.ticks.x = element_blank(), axis.ticks.y = element_blank(),
      axis.text.x = element_blank(), axis.text.y = element_blank())

p_all <- ggarrange(p1850, p1900, p1950, p2000, ncol = 2, nrow = 2,
    common.legend = T, legend = "bottom")

annotate_figure(p_all, top = text_grob("Country Land Orientation (continuous)",
    color = "black", face = "bold", size = 14)) # creates one common title
Country Land Orientation (continuous)

1850

1900

1950

2000

Land-orientation (cont.)

Land-orientation (cont.)

1850 1900

1950 2000

2 3 4 5 6