

Homework 1

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05 April, 2022

Intro Example

Background: The data set used here comes from an experiment design to measure the “stroop” effect, in other words, to measure the effect of incongruent visual information on response times. In the control condition participants looked at a colored square on a screen and had to repeat the color out loud. On the incongruent condition participants would look at a color’s name on the screen printed on a different color. For example, they would see the word “green” printed on a blue font, participants had to repeat the word regardless of the font color (say “green”). We recorded the total number of second that it took for participants to complete 20 trials.

```
link <- "https://raw.githubusercontent.com/ManuelVU/psych-10c-data/main/stroop.csv"
library(tidyverse)
```

```
## -- Attaching packages ----- tidyverse 1.3.1 --
## v ggplot2 3.3.5      v purrr 0.3.4
## v tibble 3.1.6       v dplyr 1.0.8
## v tidyr 1.2.0        v stringr 1.4.0
## v readr 2.1.2        v forcats 0.5.1

## -- Conflicts ----- tidyverse_conflicts() --
## x dplyr::filter() masks stats::filter()
## x dplyr::lag()     masks stats::lag()

stroop <- read_csv(file = link)
```

```
## Rows: 20 Columns: 3

## -- Column specification -----
## Delimiter: ","
## chr (1): condition
## dbl (2): id, response_time
##
## i Use `spec()` to retrieve the full column specification for this data.
## i Specify the column types or set `show_col_types = FALSE` to quiet this message.
```

1. What is the average response time for participants in the **control** condition?

```
mean_resp <- stroop %>%
  group_by(condition) %>%
  summarise("av" = mean(response_time))
```

ANS: the mean response time in the control condition was 19.6044686

2. What is the average response time for participants on the **incongruent** condition?

```
# In this code chunk you can write the function (or functions) that you need to
# calculate the mean of the INCONGRUENT condition, remember to save the result
```

```
# in a new variable so that you can easily insert it in text. Remember to delete  
# the comments inside the code chunks.
```

ANS: the mean response time was 34.332667

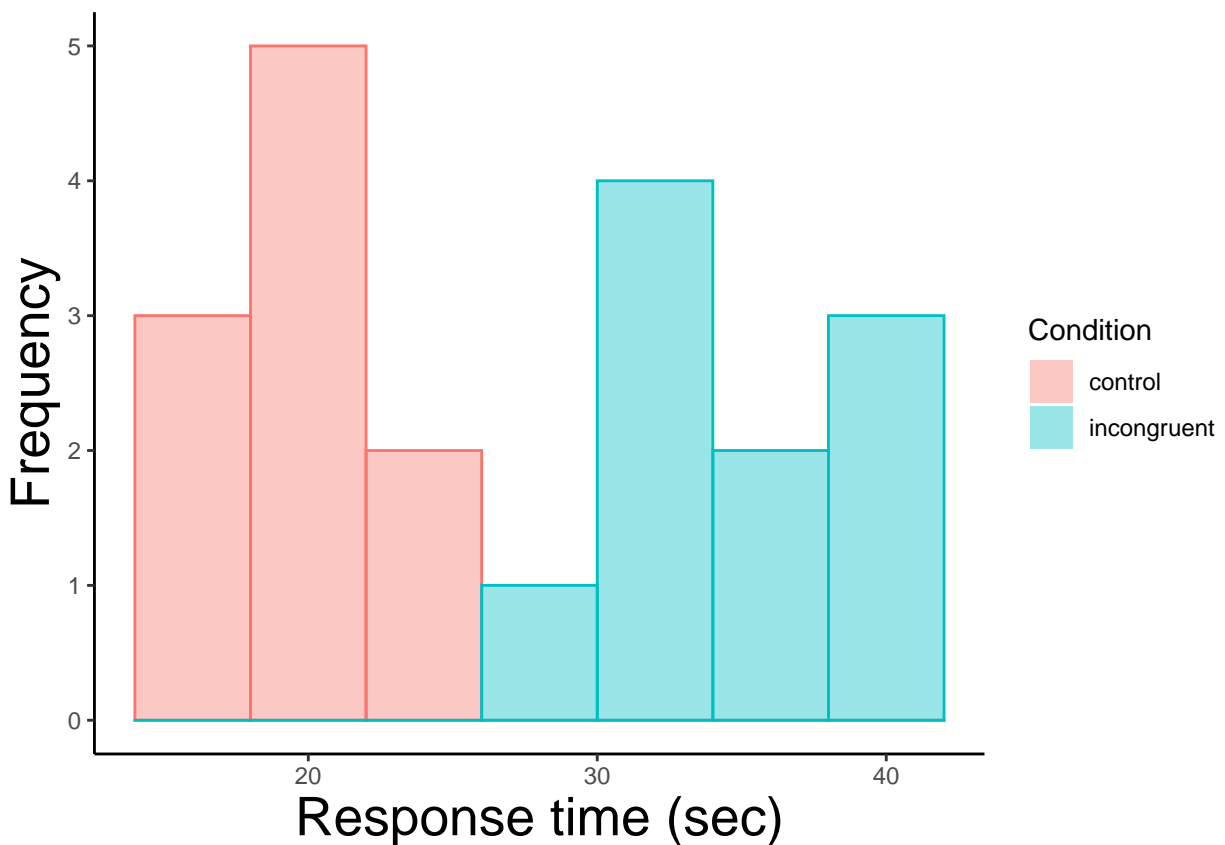
3. Which condition has more variation on response times, the control or the incongruent condition?

```
var_resp <- stroop %>%  
  group_by(condition) %>%  
  summarise("variance" = var(response_time))
```

ANS: the variance of the control condition was 6.8782827 and the variance for the incongruent condition was 14.1838852.

4. Create a histogram for the response times of each condition (1 per group). Describe what you see in the histograms in as few words as possible.

```
ggplot(data = stroop) +  
  aes(x = response_time) +  
  aes(fill = condition, color = condition) +  
  geom_histogram(position="identity",  
                 binwidth = 4,  
                 alpha = 0.4) +  
  theme_classic() +  
  xlab("Response time (sec)") +  
  ylab("Frequency") +  
  guides(fill = guide_legend("Condition"), color = "none") +  
  theme(axis.title.x = element_text(size = 20),  
        axis.title.y = element_text(size = 20))
```



ANS: [WRITE YOUR ANSWER HERE]

5. On average how much more time did it take participants on the incongruent condition to read the color names printed on the screen? (Note that we will always give you the data on a format that is easier to use)

```
# In this chunk you should write (a.k.a. copy from the slides) the code needed
# to load the data for the second part of the example.
link_wide <- "https://raw.githubusercontent.com/ManuelVU/psych-10c-data/main/stroop-wide.csv"
stroop_wide <- read_csv(file = link_wide)
```

```
## Rows: 10 Columns: 3
## -- Column specification -----
## Delimiter: ","
## dbl (3): id, control, incongruent
##
## i Use `spec()` to retrieve the full column specification for this data.
## i Specify the column types or set `show_col_types = FALSE` to quiet this message.
```

Notice that now we have a new data file called `stroop_wide`, this will make it easy for us to calculate variables like the difference between conditions.

First we will add our new “difference” variable to the data `stroop_wide`

```
# First we get our new variable
stroop_wide <- stroop_wide %>%
  mutate(difference = control - incongruent)

# Now we can calculate the average improvement between conditions
mean_improve <- stroop_wide %>%
  summarise(average = mean(difference)) %>%
  pull(average)
```

ANS: The average difference between response times in the control and incongruent condition was -14.7281984.

6. How much variation is there on the difference in response times between conditions?

Now that we have the difference between conditions by participant we can just calculate the variance of those observations.

```
# To calculate the variance we use the following code
var_improve <- stroop_wide %>%
  summarise(variation = var(difference)) %>%
  pull(variation)
```

ANS: The variance of the difference in response time of participants in the control condition in comparison to the incongruent condition was 13.1822464

7. Create a boxplot of the difference between the two conditions.

To create a boxplot we just need to copy the code on the slides and make a couple of changes because in this case we only have one variable, the difference!

```
ggplot(data = stroop_wide) +
  aes(y = difference) +
  geom_boxplot() +
  theme_classic() +
  xlab("") +
  ylab("Difference in RT between conditions") +
  theme(axis.title.y = element_text(size = 15))
```

