HW1

Kenny Mai

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Load packages

```r
library(readr)
library(dplyr)
```

```
##
## Attaching package: 'dplyr'

## The following objects are masked from 'package:stats':
##
##     filter, lag

## The following objects are masked from 'package:base':
##
##     intersect, setdiff, setequal, union
```

```r
library(moments)
library(ggplot2)
library(lsmeans)
```

```
## Loading required package: emmeans

## The 'lsmeans' package is now basically a front end for 'emmeans'.
## Users are encouraged to switch the rest of the way.
## See help('transition') for more information, including how to
## convert old 'lsmeans' objects and scripts to work with 'emmeans'.
```

Import data

```r
emotion_new <- read_csv("emotion_new.csv")
```

```
##
## -- Column specification --------------------------------------------------------
## cols(
##   emotion = col_character(),
##   cooperation = col_double()
## )
```

2

Summary stats

```r
# Use dplyr to group by emotion and produce mean, sd, and skewness
summary <-
  emotion_new %>%
  group_by(emotion) %>%
```

```
  summarise(
    mean = mean(cooperation),
    sd = sd(cooperation),
    skew = skewness(cooperation))
```

`summarise()` ungrouping output (override with `.groups` argument)
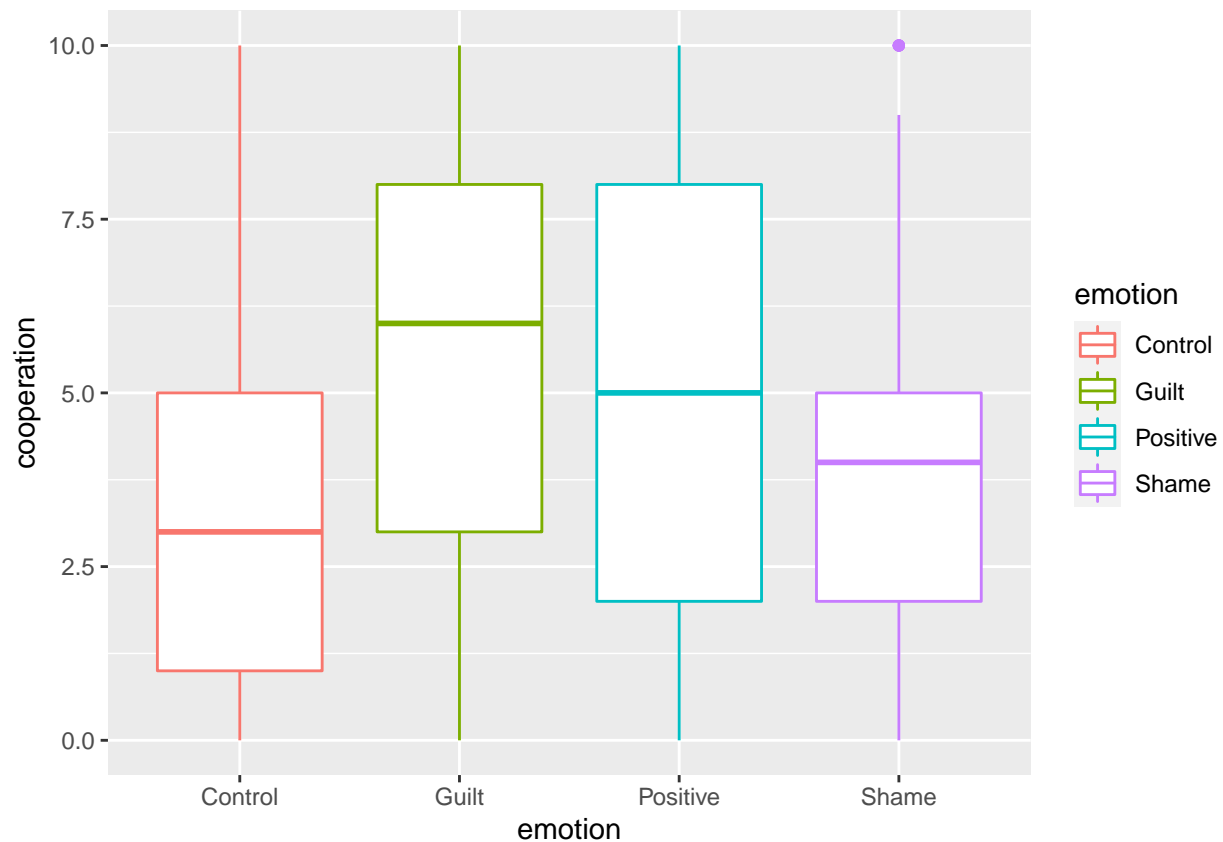
```
summary
```

```
## # A tibble: 4 x 4
##   emotion   mean    sd    skew
##   <chr>    <dbl> <dbl>   <dbl>
## 1 Control   3.49  3.11  0.552
## 2 Guilt     5.38  3.25 -0.186
## 3 Positive  4.86  3.25 -0.0221
## 4 Shame     3.78  2.95  0.684
```

3

Box plots

```
# Make box plot
ggplot(data=emotion_new,aes(x=emotion, y=cooperation, color=emotion)) +
  geom_boxplot()
```

5

```
# Compute the analysis of variance
res.aov <- aov(cooperation ~ emotion, data = emotion_new)
# Summary of the analysis
summary(res.aov)
```

```
##               Df Sum Sq Mean Sq F value Pr(>F)
## emotion        3  111.2   37.07   3.683 0.0127 *
## Residuals    242 2436.0   10.07
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

Between group SS is 111.2 Within group SS is 2436 Total SS is 2547.2 F ratio is 3.683 1st degrees of freedom is 3 2nd degrees of freedom is 242

#8

```
res.means <- lsmeans(res.aov, "emotion")
shame.control <- c(1,0,0,-1)
guilt.control <- c(1,-1,0,0)
positive.control <- c(1,0,-1,0)
shame.guilt <- c(0,1,0,-1)
shame.positive <- c(0,0,1,-1)
guilt.positive <- c(0,-1,0,1)
emotion.contrasts <- list(shame.control,guilt.control,positive.control,shame.guilt,shame.positive,guilt
contrast(res.means,emotion.contrasts)
```

```
##  contrast         estimate    SE  df t.ratio p.value
##  c(1, 0, 0, -1)    -0.291 0.694 242 -0.419  0.6758
##  c(1, -1, 0, 0)    -1.894 0.706 242 -2.684  0.0078
##  c(1, 0, -1, 0)    -1.371 0.585 242 -2.345  0.0199
##  c(0, 1, 0, -1)     1.603 0.681 242  2.355  0.0193
##  c(0, 0, 1, -1)     1.081 0.555 242  1.948  0.0525
##  c(0, -1, 0, 1)    -1.603 0.681 242 -2.355  0.0193
```

#11

```
1-0.95^6
```

```
## [1] 0.2649081
```