Beer Preferences for Thursday Night Football: A Blanced Incomplete Block Design Experiment

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Abstract

Introduction

Methods

Everything was randomized before starting the experiment. With simple R code and using a `set.seed(530)` we were able to get a correct BIBD set up.

```
x <- data.frame(p= c("1","2","3","4"),
                a = c("C", "B", "D", "D"),
                b = c("B", "C", "A", "B"),
                c = c("D", "A", "C", "A"))
kable(x,
      col.names = c("Participants","I", "II", "III"),
      align = "c")
```

Participants	I	II	III
1	C	B	D
2	B	C	A
3	D	A	C
4	D	B	A

We then randomized the assignments of beer types to the letters and the order of participants, using the same `set.seed(530)`.The table below is are treatment assignments and order assignments

```
y <- data.frame(trts = c("A", "B", "C", "D"),
                beers = c("Siera", "Coors", "Guinnes", "Pliny"),
                rank = 1:4,
                participants = c("Zach", "Jon", "Nolan", "Benni"))
kable(y) %>%
  column_spec(3, border_left = TRUE)
```

trts	beers	rank	participants
A	Siera	1	Zach
B	Coors	2	Jon
C	Guinnes	3	Nolan
D	Pliny	4	Benni

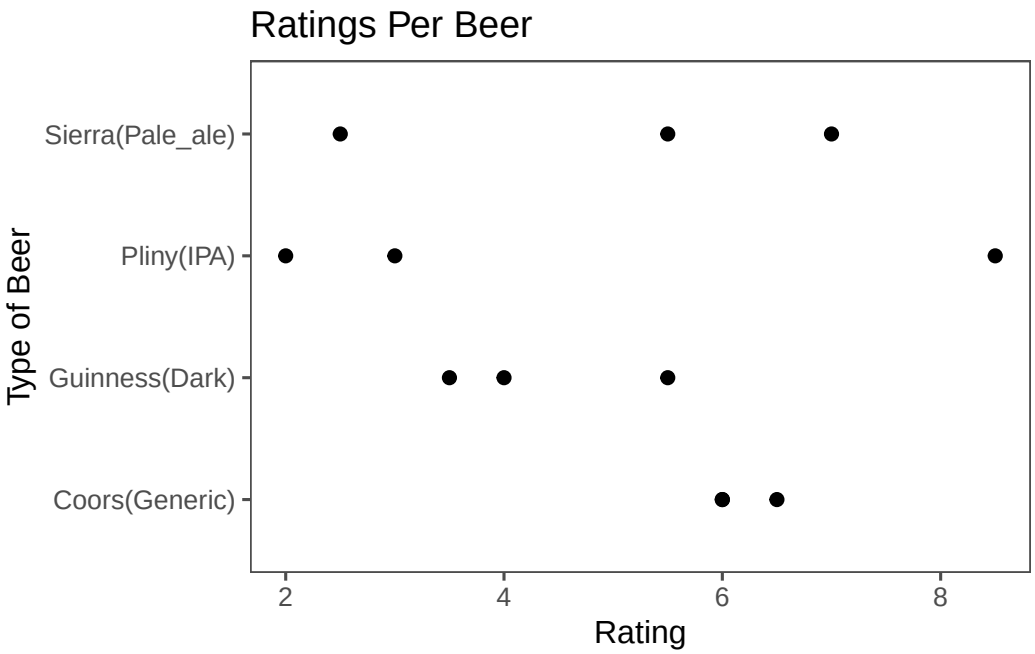
The experiment was conducted inside of Matthew's room. Participants were blind folded before entry into the room, they were seated down and told the following:

You will be offered three beers during the experiment. You will drink a glass of water, then taste the beer. After tasting you will rate the beer on a scale from 1 to 10. 1 meaning ”I never want to drink this again”, 5 meaning ”this is an okay beer, and 10 meaning ”I want a whole glass of this beer right now”. Half points are allowed.

Results

Table 3: Beer Ratings by Participant

Beers	Nolan	Jon	Beni	Zach	Row Means
Sierra(Pale_ale)	NA	5.5	7	2.5	5.00
Coors(Generic)	6	6	NA	6.5	6.17
Guinness(Dark)	5.5	3.5	4	NA	4.33
Pliny(IPA)	3	NA	8.5	2	4.50
Column Means	4.83	5	6.5	3.67	NA



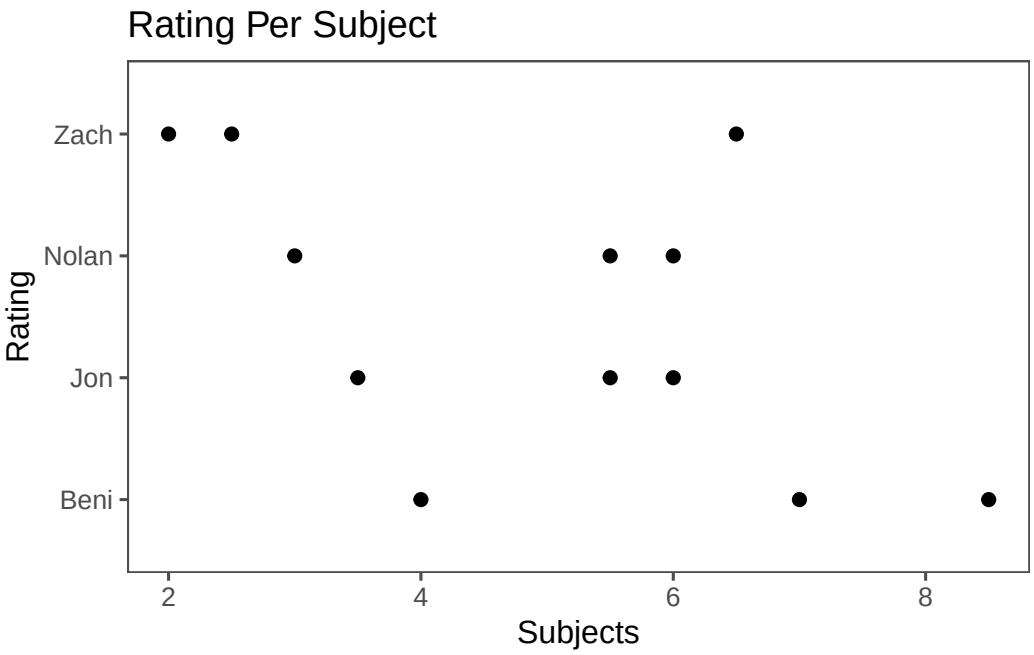


Table 4: ANOVA Table for Linear Model

	Df	Sum Sq	Mean Sq	F value	Pr(>F)
names	3	12.16667	4.055556	1.197212	0.4001761
beers	3	14.39583	4.798611	1.416564	0.3414684
Residuals	5	16.93750	3.387500	NA	NA

Conclusion

Appendix

Code Used

Libraries Used

```
library(tidyverse)
library(ggthemes)
library(tidyr)
library(knitr)
```

Data Code

```
# Data input
beers <- c("Sierra(Pale_ale)", "Coors(Generic)", "Guinness(Dark)", "Pliny(IPA)")
Nolan <- c(NA, 6, 5.5, 3)
Jon <- c(5.5, 6, 3.5, NA)
Benni <- c(7, NA, 4, 8.5)
Zach <- c(2.5, 6.5, NA, 2)

raw_data <- data.frame(beers, Nolan, Jon, Benni, Zach)

# Data Cleaning

pivoted_raw_data <- pivot_longer(raw_data,
                         cols=-beers,
                         names_to = "names",
                         values_to = "rating")

cleaned_data <- pivoted_raw_data %>%
  drop_na(rating)
```

```
#Table
col_means <- round(colMeans(raw_data[, -1], na.rm = TRUE), 2)

raw_data_with_col_means <- rbind(raw_data, c("Mean", col_means))

row_means <- round(apply(raw_data[, -1], 1, mean, na.rm = TRUE), 2)

raw_data_with_means <- cbind(raw_data_with_col_means, Row_Mean = c(row_means, NA))
```

```
raw_data_with_means %>%
  kable(
    caption = "Beer Ratings by Participant",
    col.names = c("Beers", "Nolan", "Jon", "Beni", "Zach", "Row Means"),
    align = "c"
  )
```

Plots

Code for Plot 1 {.anchor #plot1}

```
cleaned_data %>%
  ggplot(aes(x = rating,
             y = beers))+
  geom_point(size = 2)+
  theme_few()+
  ggtitle("Ratings Per Beer")+
  ylab("Type of Beer")+
  xlab("Rating")
```

```
cleaned_data %>%
  ggplot(aes(x = rating,
             y = names))+
  geom_point(size = 2)+
  theme_few()+
  ggtitle("Rating Per Subject")+
  xlab("Subjects")+
  ylab("Rating")
```