STOR 665 HW 7

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4/23/2021

Problem 7

(a)

Explain the data briefly.

```
#load data
ergoStool <- ergoStool

#examine the data structure
str(ergoStool)
```

```
## 'data.frame':    36 obs. of  3 variables:
##  $ effort : num  12 15 12 10 10 14 13 12 7 14 ...
##  $ Type   : Factor w/ 4 levels "T1","T2","T3",..: 1 2 3 4 1 2 3 4 1 2 ...
##  $ Subject: Factor w/ 9 levels "A","B","C","D",..: 1 1 1 1 2 2 2 2 3 3 ...
```

```
#data summary
summary(ergoStool)
```

```
##      effort      Type      Subject
##  Min.   : 7.00   T1:9   A      : 4
##  1st Qu.: 8.00   T2:9   B      : 4
##  Median :10.00   T3:9   C      : 4
##  Mean   :10.25   T4:9   D      : 4
##  3rd Qu.:12.00          E      : 4
##  Max.   :15.00          F      : 4
##                         (Other):12
```

Inspection of the contingency table below reveals that the factors 'Type' and 'Subject' are completely crossed (i.e. there is at least one observation for each combination of factor levels). Further, this is an unreplicated design.

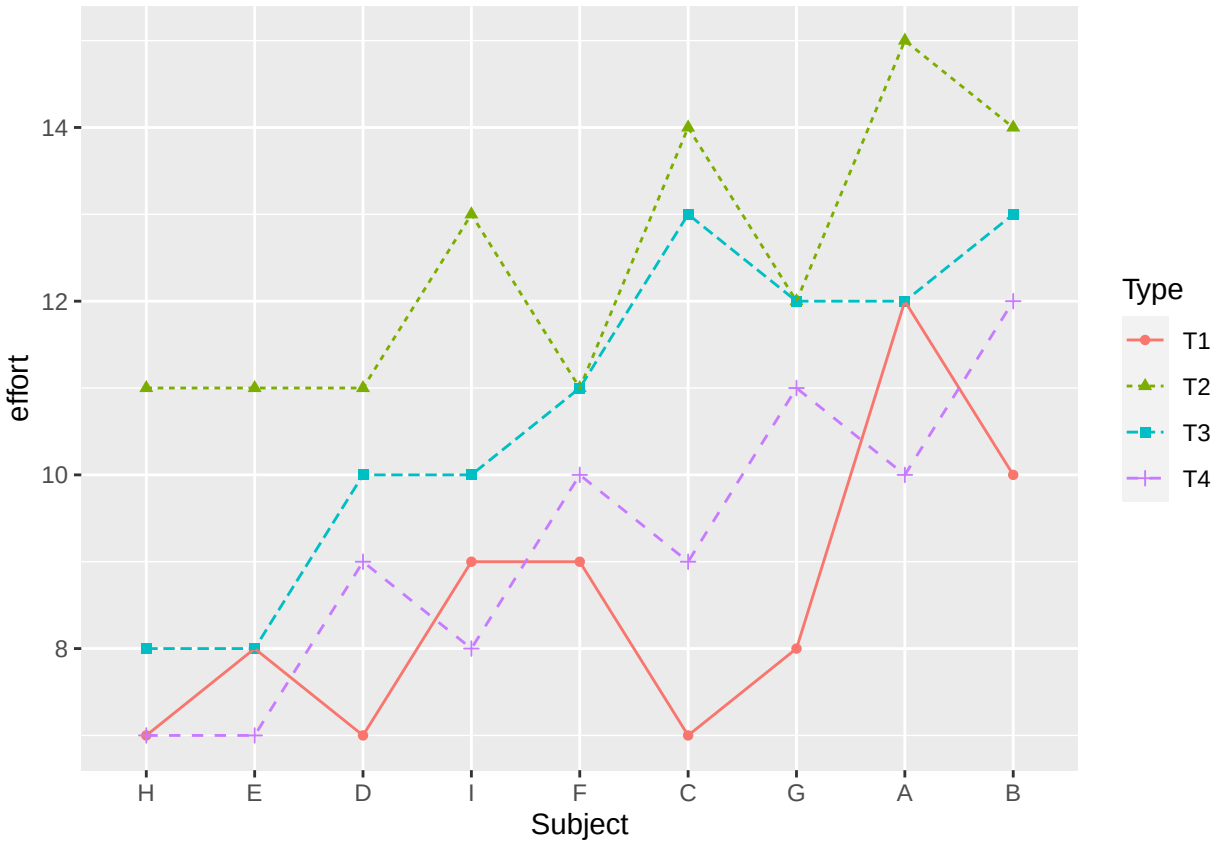
```
xtabs(~Type + Subject, ergoStool)
```

```
##     Subject
## Type A B C D E F G H I
##   T1 1 1 1 1 1 1 1 1 1
##   T2 1 1 1 1 1 1 1 1 1
##   T3 1 1 1 1 1 1 1 1 1
##   T4 1 1 1 1 1 1 1 1 1
```

(b)

```
#determine the average effort for each level of the factor Subject
ergoStool %>%
  group_by(Subject) %>%
  summarize(avg_effort=mean(effort)) -> avg_effort_df

ergoStool %>%
  mutate(avg_effort=rep(avg_effort_df$avg_effort, each=4, times=1)) %>%
  mutate(Subject=fct_reorder(Subject, avg_effort)) %>%
  ggplot(aes(x=Subject, y=effort, shape=Type, color=Type)) +
  geom_point() +
  geom_line(aes(x=Subject, y=effort, group=Type, color=Type, linetype=Type))
```



(c)