

analysis_chunks

2025-11-18

R Markdown

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When you click the **Knit** button a document will be generated that includes both content as well as the output of any embedded R code chunks within the document. You can embed an R code chunk like this:

Note that the `echo = FALSE` parameter was added to the code chunk to prevent printing of the R code that generated the plot.

```
library(plyr)
```

```
## Warning: package 'plyr' was built under R version 4.3.3
```

```
library(rstatix)
```

```
##  
## Attaching package: 'rstatix'
```

```
## The following objects are masked from 'package:plyr':  
##  
##   desc, mutate
```

```
## The following object is masked from 'package:stats':  
##  
##   filter
```

```
library(effectsize)
```

```
##  
## Attaching package: 'effectsize'
```

```
## The following objects are masked from 'package:rstatix':  
##  
##   cohens_d, eta_squared
```

```
library(ggpubr)
```

```
## Loading required package: ggplot2
```

```
##
## Attaching package: 'ggpubr'
```

```
## The following object is masked from 'package:plyr':
##
##      mutate
```

```
library(tidyverse)
```

```
## Warning: package 'stringr' was built under R version 4.3.3
```

```
## — Attaching core tidyverse packages ————— tidyverse 2.0.0 —
## ✓ dplyr      1.1.4      ✓ readr      2.1.5
## ✓ forcats    1.0.0      ✓ stringr    1.5.1
## ✓ lubridate  1.9.3      ✓ tibble     3.2.1
## ✓ purrr      1.0.2      ✓ tidyr      1.3.1
```

```
## — Conflicts ————— tidyverse_conflicts() —
## ✗ dplyr::arrange() masks plyr::arrange()
## ✗ purrr::compact() masks plyr::compact()
## ✗ dplyr::count()   masks plyr::count()
## ✗ dplyr::desc()    masks rstatix::desc(), plyr::desc()
## ✗ dplyr::failwith() masks plyr::failwith()
## ✗ dplyr::filter()  masks rstatix::filter(), stats::filter()
## ✗ dplyr::id()       masks plyr::id()
## ✗ dplyr::lag()      masks stats::lag()
## ✗ dplyr::mutate()   masks ggpubr::mutate(), rstatix::mutate(), plyr::mutate()
## ✗ dplyr::rename()   masks plyr::rename()
## ✗ dplyr::summarise() masks plyr::summarise()
## ✗ dplyr::summarize() masks plyr::summarize()
## ⓘ Use the conflicted package (<http://conflicted.r-lib.org/>) to force all conflicts to become errors
```

```
library(ez)
```

```
## Warning: package 'ez' was built under R version 4.3.3
```

```
## Warning in check_dep_version(): ABI version mismatch:
## lme4 was built with Matrix ABI version 1
## Current Matrix ABI version is 0
## Please re-install lme4 from source or restore original 'Matrix' package
```

```
library(reshape2)
```

```
## Warning: package 'reshape2' was built under R version 4.3.3
```

```
##
## Attaching package: 'reshape2'
##
## The following object is masked from 'package:tidyr':
##
##      smiths
```

```
library(ggplot2)
```

```
##### Data Preparation #####
userPerformanceData <- read.csv("UserPerformance.csv", header=TRUE, sep = ",")
summary(userPerformanceData)
```

```
##      PID      CoachingStyle      Viewpoint      Pose
## Min.   : 1.0   Length:432      Length:432      Min.   :1.0
## 1st Qu.: 5.0   Class :character  Class :character 1st Qu.:2.0
## Median : 9.5   Mode  :character  Mode  :character Median :3.5
## Mean   : 9.5                                     Mean   :3.5
## 3rd Qu.:14.0                                     3rd Qu.:5.0
## Max.   :18.0                                     Max.   :6.0
##      FootHeight      Foot      LeftHandY      Right.Hand.Y
## Min.   :0.0000   Length:432      Min.   : -0.74378   Min.   : -0.69790
## 1st Qu.:0.2227   Class :character 1st Qu.: -0.34396   1st Qu.: -0.35246
## Median :0.3086   Mode  :character Median : -0.07250   Median : -0.06817
## Mean   :0.3132                                     Mean   : 0.01172
## 3rd Qu.:0.3930                                     3rd Qu.: 0.39355
## Max.   :0.8889                                     Max.   : 0.84767
##      Steadiness      Mistake
## Min.   :0.00000   Min.   :0.0000
## 1st Qu.:0.03886   1st Qu.:0.0000
## Median :0.08577   Median :1.0000
## Mean   :0.11251   Mean   :0.8449
## 3rd Qu.:0.15573   3rd Qu.:1.0000
## Max.   :0.52124   Max.   :5.0000
```

```
##### Remove P2 and P12
userPerformanceData <- userPerformanceData[userPerformanceData$PID!=2,]
userPerformanceData <- userPerformanceData[userPerformanceData$PID!=12,]

### SUS
SUS_Data <- read.csv("SUS.csv", header=TRUE, sep = ",")
##### Remove P2 and P12
SUS_Data <- SUS_Data[SUS_Data$UserId!=2,]
SUS_Data <- SUS_Data[SUS_Data$UserId!=12,]
summary(SUS_Data)
```

```
##      UserId      SUS
## Min.   : 1.000  Min.   : 57.50
## 1st Qu.: 5.750  1st Qu.: 69.38
## Median : 9.500  Median : 82.50
## Mean   : 9.812  Mean    : 80.00
## 3rd Qu.:14.250  3rd Qu.: 92.50
## Max.   :18.000  Max.    :100.00
```

```
### TLX
```

```
TLX_Data <- read.csv("TLX.csv", header=TRUE, sep = ",")
```

```
##### Remove P2 and P12
```

```
TLX_Data <- TLX_Data[TLX_Data$UserId!=2,]
```

```
TLX_Data <- TLX_Data[TLX_Data$UserId!=12,]
```

```
summary(TLX_Data)
```

```
##      UserId      Type      Score
## Min.   : 1.000  Length:96  Min.   : 3.00
## 1st Qu.: 5.750  Class :character 1st Qu.: 23.50
## Median : 9.500  Mode  :character  Median : 50.00
## Mean   : 9.812                      Mean   : 49.66
## 3rd Qu.:14.250                      3rd Qu.: 70.75
## Max.   :18.000                      Max.   :100.00
```

```
### TLX
```

```
MidQuestion_Data <- read.csv("Mid_Questionnaire.csv", header=TRUE, sep = ",")
```

```
##### Remove P2 and P12
```

```
MidQuestion_Data <- MidQuestion_Data[MidQuestion_Data$PID!="Me336",] #P2
```

```
MidQuestion_Data <- MidQuestion_Data[MidQuestion_Data$PID!="Ka513",] #12
```

```
summary(MidQuestion_Data)
```

```
##      PID      Viewpoint      Coaching.Style      Embodiment
## Length:64      Length:64      Length:64      Min.      :1.350
## Class :character Class :character Class :character 1st Qu.:3.470
## Mode  :character Mode  :character Mode  :character Median :4.090
##                                         Mean  :4.203
##                                         3rd Qu.:4.790
##                                         Max.   :6.910
## Social_Presence Social_Presence_Scale3      Enjoyment      Difficulty
## Min.      :2.200 Min.      :-1.8000      Min.      :1.000 Min.      :1.000
## 1st Qu.:4.000 1st Qu.: 0.0000      1st Qu.:4.000 1st Qu.:1.000
## Median :4.300 Median : 0.3000      Median :4.000 Median :2.000
## Mean   :4.286 Mean   : 0.2859      Mean   :4.219 Mean   :1.781
## 3rd Qu.:4.900 3rd Qu.: 0.9000      3rd Qu.:5.000 3rd Qu.:2.000
## Max.   :6.400 Max.   : 2.4000      Max.   :5.000 Max.   :5.000
## PerceptionCoach Recommendation
## Min.      :1.00 Min.      : 4.000
## 1st Qu.:2.00 1st Qu.: 8.000
## Median :3.00 Median :10.000
## Mean   :3.18 Mean   : 9.375
## 3rd Qu.:4.00 3rd Qu.:11.000
## Max.   :5.00 Max.   :11.000
```

Descriptive analysis

Get summary stats

```
userPerformance_Descriptive <- userPerformanceData %>%
  group_by(CoachingStyle) %>%
  get_summary_stats(FootHeight, Steadiness, Mistake, type = "common")
```

userPerformance_Descriptive

A tibble: 6 × 11

```
## CoachingStyle variable      n  min  max median  iqr mean  sd  se  ci
## <chr>          <fct>    <dbl> <dbl> <dbl> <dbl> <dbl> <dbl> <dbl> <dbl>
## 1 Autonomous St... FootHei... 192 0    0.795 0.306 0.178 0.307 0.144 0.01 0.021
## 2 Autonomous St... Steadin... 192 0    0.521 0.104 0.142 0.13 0.107 0.008 0.015
## 3 Autonomous St... Mistake    192 0    5      1      1    0.88 1.07 0.077 0.152
## 4 Controlling S... FootHei... 192 0.007 0.889 0.299 0.173 0.308 0.135 0.01 0.019
## 5 Controlling S... Steadin... 192 0.003 0.445 0.077 0.103 0.099 0.09 0.007 0.013
## 6 Controlling S... Mistake    192 0    5      0.5 1    0.833 1.04 0.075 0.149
```

```
userPerformance_Descriptive <- userPerformanceData %>%
  group_by(CoachingStyle, Viewpoint) %>%
  get_summary_stats(FootHeight, Steadiness, Mistake, type = "common")
```

userPerformance_Descriptive

```
## # A tibble: 12 × 12
##   CoachingStyle Viewpoint variable      n  min  max median  iqr  mean  sd
##   <chr>         <chr>    <fct>   <dbl> <dbl> <dbl> <dbl> <dbl> <dbl> <dbl>
## 1 Autonomous Sty... First Pe... FootHei...   96 0.025 0.795  0.299 0.158 0.298 0.134
## 2 Autonomous Sty... First Pe... Steadin...   96 0.001 0.307  0.062 0.09  0.081 0.07
## 3 Autonomous Sty... First Pe... Mistake     96 0      5      1      1    0.938 1.10
## 4 Autonomous Sty... Third Pe... FootHei...   96 0      0.726 0.318 0.187 0.317 0.154
## 5 Autonomous Sty... Third Pe... Steadin...   96 0      0.521 0.166 0.156 0.178 0.117
## 6 Autonomous Sty... Third Pe... Mistake     96 0      4      0.5  1      0.823 1.04
## 7 Controlling St... First Pe... FootHei...   96 0.007 0.889  0.294 0.155 0.296 0.141
## 8 Controlling St... First Pe... Steadin...   96 0.003 0.445  0.059 0.09  0.094 0.093
## 9 Controlling St... First Pe... Mistake     96 0      4      1      1    0.823 0.973
## 10 Controlling St... Third Pe... FootHei...   96 0.021 0.656  0.321 0.179 0.32  0.129
## 11 Controlling St... Third Pe... Steadin...   96 0.004 0.434  0.086 0.103 0.104 0.088
## 12 Controlling St... Third Pe... Mistake     96 0      5      0      1    0.844 1.12
## # i 2 more variables: se <dbl>, ci <dbl>
```

```
### SUS
SUS_Descriptive <- SUS_Data %>%
  get_summary_stats(SUS, type = "common")

SUS_Descriptive
```

```
## # A tibble: 1 × 10
##   variable      n  min  max median  iqr  mean  sd  se  ci
##   <fct>    <dbl> <dbl> <dbl> <dbl> <dbl> <dbl> <dbl> <dbl> <dbl>
## 1 SUS        16 57.5  100  82.5 23.1   80  14.3 3.56 7.60
```

```
### TLX
TLX_Descriptive <- TLX_Data %>%
  group_by(Type) %>%
  get_summary_stats(Score, type = "common")

TLX_Descriptive
```

```
## # A tibble: 6 × 11
##   Type      variable      n  min  max median  iqr  mean  sd  se  ci
##   <chr>    <fct>   <dbl> <dbl> <dbl> <dbl> <dbl> <dbl> <dbl> <dbl>
## 1 Effort    Score     16   20  100   60  26.5 60.2 23.3 5.83 12.4
## 2 Frustration Score     16    5   70   39  36.8 34.9 21.2 5.29 11.3
## 3 Mental Demand Score     16    5   96  36.5 48.2 40.3 30.9 7.72 16.5
## 4 Performance Score     16   22  100   70  29.8 65.6 22.5 5.63 12.0
## 5 Physical Dema... Score     16   14  100   61  42.8 61.6 31.0 7.76 16.5
## 6 Temporal Dema... Score     16    3  100  29.5 39   35.2 30.4 7.61 16.2
```

```
### MidQuestion_Data
MidQuestion_Descriptive <- MidQuestion_Data %>%
  group_by(Coaching.Style, Viewpoint) %>%
  get_summary_stats(Embodiment, Social_Presence, Enjoyment, Difficulty, PerceptionCoach, Recommendation, type = "common")

MidQuestion_Descriptive
```

```
## # A tibble: 24 × 12
##   Viewpoint Coaching.Style variable      n   min   max median   iqr   mean   sd
##   <chr>      <chr>      <fct>   <dbl> <dbl> <dbl> <dbl> <dbl> <dbl> <dbl>
## 1 First Per... Autonomous-SS. Embodim...   16  2.06  6.56   3.82  1.03   4.05  1.23
## 2 First Per... Autonomous-SS. Social_...   16  2.8   6.4    4     0.45   4.21  0.874
## 3 First Per... Autonomous-SS. Enjoyme...   16  1     5     4     1.25   3.94  1.29
## 4 First Per... Autonomous-SS. Difficu...   16  1     5     2     1.25   2.06  1.29
## 5 First Per... Autonomous-SS. Percept...   16  1     5     2     1.62   2.44  1.18
## 6 First Per... Autonomous-SS. Recomme...   16  6    11    10    3.25   9.25  1.73
## 7 Third Per... Autonomous-SS. Embodim...   16  2.85  6.47   4.30  0.99   4.35  0.898
## 8 Third Per... Autonomous-SS. Social_...   16  3.1   5.8    4     0.975   4.24  0.753
## 9 Third Per... Autonomous-SS. Enjoyme...   16  2     5     4     1     4.12  0.806
## 10 Third Per... Autonomous-SS. Difficu...   16  1     4     2     1     1.88  0.806
## # i 14 more rows
## # i 2 more variables: se <dbl>, ci <dbl>
```

```
#####
#### Statistical analysis
```

```
### ANOVA
```

```
##### Assign User ID as a factor for analysis
```

```
userPerformanceData$PID <- as.factor(userPerformanceData$PID)
userPerformanceData$CoachingStyle <- as.factor(userPerformanceData$CoachingStyle)
userPerformanceData$Viewpoint <- as.factor(userPerformanceData$Viewpoint)
```

```
#Foot Height
```

```
analysisData_Foot.aov <- ezANOVA(data = userPerformanceData, dv= FootHeight, wid = PID, within = .
(Viewpoint, CoachingStyle), detailed =TRUE) #between = Foot, #Pose
```

```
## Warning: Collapsing data to cell means. *IF* the requested effects are a subset
## of the full design, you must use the "within_full" argument, else results may
## be inaccurate.
```

```
analysisData_Foot.aov
```

```
## $ANOVA
##           Effect DFn DFd           SSn           SSd           F
## 1      (Intercept)    1  15 6.054114e+00 0.506732923 179.21020576
## 2      Viewpoint      1  15 7.060254e-03 0.031372013   3.37574181
## 3      CoachingStyle  1  15 1.376684e-05 0.006882933   0.03000212
## 4 Viewpoint:CoachingStyle 1  15 6.793097e-05 0.019150306   0.05320879
##           p p<.05           ges
## 1 9.564110e-10 * 9.147602e-01
## 2 8.605396e-02   1.236042e-02
## 3 8.648011e-01   2.440272e-05
## 4 8.206875e-01   1.204010e-04
```

#Steadiness

```
analysisData_Steadiness.aov <- ezANOVA(data = userPerformanceData, dv= Steadiness, wid = PID, with
in = CoachingStyle * Viewpoint, detailed = TRUE)
```

```
## Warning: Collapsing data to cell means. *IF* the requested effects are a subset
## of the full design, you must use the "within_full" argument, else results may
## be inaccurate.
```

```
analysisData_Steadiness.aov
```

```
## $ANOVA
##           Effect DFn DFd           SSn           SSd           F           p
## 1      (Intercept)    1  15 0.83259194 0.06434981 194.077942 5.485866e-10
## 2      CoachingStyle  1  15 0.01534485 0.02410878   9.547259 7.470289e-03
## 3      Viewpoint      1  15 0.04589008 0.04144832  16.607459 9.950213e-04
## 4 CoachingStyle:Viewpoint 1  15 0.03042098 0.01700706  26.830899 1.119899e-04
##           p<.05           ges
## 1 * 0.85001217
## 2 * 0.09457021
## 3 * 0.23801409
## 4 * 0.17154533
```

#Mistake

```
analysisData_Mistake.aov <- ezANOVA(data = userPerformanceData, dv= Mistake, wid = PID, within = C
oachingStyle * Viewpoint, detailed = TRUE)
```

```
## Warning: Collapsing data to cell means. *IF* the requested effects are a subset
## of the full design, you must use the "within_full" argument, else results may
## be inaccurate.
```

```
analysisData_Mistake.aov
```



```
## $ANOVA
##           Effect DFn DFd           SSn           SSd           F
## 1      (Intercept)    1  15 46.97960069 28.6523438 24.5946376
## 2      CoachingStyle    1  15  0.03515625  0.4301215  1.2260343
## 3      Viewpoint       1  15  0.03515625  2.8745660  0.1834516
## 4 CoachingStyle:Viewpoint 1  15  0.07335069  2.7252604  0.4037267
##           p p<.05      ges
## 1 0.0001713826 * 0.575294049
## 2 0.2856204677    0.001012639
## 3 0.6745101952    0.001012639
## 4 0.5347447384    0.002110469
```

```
##### Interpret effectsize
interpret_cohens_d(0.0166139261, rules = "cohen1988")
```

```
## [1] "very small"
## (Rules: cohen1988)
```

```
##### Pairwise t tests
```

```
#Steadiness
userPerformanceData %>%
  pairwise_t_test(Steadiness ~ Viewpoint, paired = TRUE, p.adjust.method = "bonf")
```

```
## # A tibble: 1 × 10
##   .y.      group1 group2    n1    n2 statistic    df      p    p.adj p.adj.signif
## * <chr>   <chr> <chr> <int> <int>    <dbl> <dbl> <dbl>   <dbl> <chr>
## 1 Steadi... First... Third...   192   192    -6.41   191 1.13e-9 1.13e-9 ****
```

```
userPerformanceData %>%
  pairwise_t_test(Steadiness ~ CoachingStyle, paired = TRUE, p.adjust.method = "bonf")
```

```
## # A tibble: 1 × 10
##   .y.      group1 group2    n1    n2 statistic    df      p    p.adj p.adj.signif
## * <chr>   <chr> <chr> <int> <int>    <dbl> <dbl> <dbl>   <dbl> <chr>
## 1 Steadi... Auton... Contr...   192   192     3.91   191 1.26e-4 1.26e-4 ***
```

```
userPerformanceData %>%
  group_by(Viewpoint) %>%
  pairwise_t_test(Steadiness ~ CoachingStyle, paired = TRUE, p.adjust.method = "bonf")
```

```
## # A tibble: 2 × 11
##   Viewpoint .y.      group1 group2    n1    n2 statistic    df      p    p.adj
## * <fct>    <chr>   <chr> <chr> <int> <int>    <dbl> <dbl> <dbl> <dbl>
## 1 First Person Steadi... Auton... Contr...   96   96    -1.59   95 1.16e-1 1.16e-1
## 2 Third Person Steadi... Auton... Contr...   96   96     6.12   95 2.06e-8 2.06e-8
## # i 1 more variable: p.adj.signif <chr>
```

```
userPerformanceData %>%
  group_by(CoachingStyle) %>%
  pairwise_t_test(Steadiness ~ Viewpoint, paired = TRUE, p.adjust.method = "bonf")
```

```
## # A tibble: 2 × 11
##   CoachingStyle .y.      group1 group2    n1    n2 statistic    df      p
## * <fct>      <chr>    <chr> <chr> <int> <int>    <dbl> <dbl>  <dbl>
## 1 Autonomous Style Steadin... First... Third...    96    96    -8.24    95 9.5 e-13
## 2 Controlling Style Steadin... First... Third...    96    96    -0.965    95 3.37e- 1
## # i 2 more variables: p.adj <dbl>, p.adj.signif <chr>
```

```
userPerformanceData %>%
  group_by(Pose, Viewpoint) %>%
  pairwise_t_test(Steadiness ~ CoachingStyle, paired = TRUE, p.adjust.method = "bonf")
```

```
## # A tibble: 12 × 12
##   Viewpoint      Pose .y.      group1 group2    n1    n2 statistic    df      p
## * <fct>      <int> <chr>    <chr> <chr> <int> <int>    <dbl> <dbl>  <dbl>
## 1 First Person    1 Steadin... Auton... Contr...    16    16   -1.49    15 1.57e-1
## 2 Third Person    1 Steadin... Auton... Contr...    16    16    0.964    15 3.5 e-1
## 3 First Person    2 Steadin... Auton... Contr...    16    16   -0.0828    15 9.35e-1
## 4 Third Person    2 Steadin... Auton... Contr...    16    16    5.31    15 8.81e-5
## 5 First Person    3 Steadin... Auton... Contr...    16    16   -1.43    15 1.72e-1
## 6 Third Person    3 Steadin... Auton... Contr...    16    16    0.905    15 3.8 e-1
## 7 First Person    4 Steadin... Auton... Contr...    16    16    0.528    15 6.05e-1
## 8 Third Person    4 Steadin... Auton... Contr...    16    16    6.04    15 2.27e-5
## 9 First Person    5 Steadin... Auton... Contr...    16    16   -0.803    15 4.35e-1
## 10 Third Person   5 Steadin... Auton... Contr...    16    16    0.449    15 6.6 e-1
## 11 First Person   6 Steadin... Auton... Contr...    16    16  -0.000566    15 1 e+0
## 12 Third Person   6 Steadin... Auton... Contr...    16    16    4.88    15 2 e-4
## # i 2 more variables: p.adj <dbl>, p.adj.signif <chr>
```

```
userPerformanceData %>%
  group_by(Pose, CoachingStyle) %>%
  pairwise_t_test(Steadiness ~ Viewpoint, paired = TRUE, p.adjust.method = "bonf")
```

```
## # A tibble: 12 × 12
##   CoachingStyle   Pose .y. group1 group2   n1   n2 statistic    df      p
## * <fct>         <int> <chr> <chr> <chr> <int> <int>     <dbl> <dbl> <dbl>
## 1 Autonomous Sty...   1 Stea... First... Third...   16   16    -3.43    15 4    e-3
## 2 Controlling St...   1 Stea... First... Third...   16   16    -1.40    15 1.81e-1
## 3 Autonomous Sty...   2 Stea... First... Third...   16   16    -7.58    15 1.68e-6
## 4 Controlling St...   2 Stea... First... Third...   16   16    -1.63    15 1.24e-1
## 5 Autonomous Sty...   3 Stea... First... Third...   16   16    -1.83    15 8.8 e-2
## 6 Controlling St...   3 Stea... First... Third...   16   16     0.603    15 5.56e-1
## 7 Autonomous Sty...   4 Stea... First... Third...   16   16    -4.84    15 2.17e-4
## 8 Controlling St...   4 Stea... First... Third...   16   16    -0.613    15 5.49e-1
## 9 Autonomous Sty...   5 Stea... First... Third...   16   16    -0.917    15 3.74e-1
## 10 Controlling St...   5 Stea... First... Third...   16   16     0.105    15 9.18e-1
## 11 Autonomous Sty...   6 Stea... First... Third...   16   16    -4.86    15 2.07e-4
## 12 Controlling St...   6 Stea... First... Third...   16   16    -0.630    15 5.38e-1
## # i 2 more variables: p.adj <dbl>, p.adj.signif <chr>
```

#Foot Height

```
userPerformanceData %>%
  group_by(CoachingStyle) %>%
  pairwise_t_test(FootHeight ~ Viewpoint, paired = TRUE, p.adjust.method = "bonf")
```

```
## # A tibble: 2 × 11
##   CoachingStyle   .y. group1 group2   n1   n2 statistic    df      p p.adj
## * <fct>         <chr> <chr> <chr> <int> <int>     <dbl> <dbl> <dbl> <dbl>
## 1 Autonomous Style FootH... First... Third...   96   96    -1.41    95 0.16  0.16
## 2 Controlling Style FootH... First... Third...   96   96    -2.17    95 0.032 0.032
## # i 1 more variable: p.adj.signif <chr>
```

```
userPerformanceData %>%
  group_by(CoachingStyle, Pose) %>%
  pairwise_t_test(FootHeight ~ Viewpoint, paired = TRUE, p.adjust.method = "bonf")
```

```
## # A tibble: 12 × 12
##   CoachingStyle   Pose .y. group1 group2   n1   n2 statistic    df      p
## * <fct>         <int> <chr> <chr> <chr> <int> <int>     <dbl> <dbl> <dbl>
## 1 Autonomous Style     1 Foot... First... Third...   16   16    -2.96    15 0.01
## 2 Autonomous Style     2 Foot... First... Third...   16   16    -1.68    15 0.113
## 3 Autonomous Style     3 Foot... First... Third...   16   16     0.548    15 0.592
## 4 Autonomous Style     4 Foot... First... Third...   16   16     1.30    15 0.212
## 5 Autonomous Style     5 Foot... First... Third...   16   16    -1.19    15 0.254
## 6 Autonomous Style     6 Foot... First... Third...   16   16     0.434    15 0.671
## 7 Controlling Style     1 Foot... First... Third...   16   16    -2.69    15 0.017
## 8 Controlling Style     2 Foot... First... Third...   16   16    -0.751    15 0.464
## 9 Controlling Style     3 Foot... First... Third...   16   16    -1.07    15 0.302
## 10 Controlling Style     4 Foot... First... Third...   16   16    -1.69    15 0.113
## 11 Controlling Style     5 Foot... First... Third...   16   16    -0.705    15 0.492
## 12 Controlling Style     6 Foot... First... Third...   16   16     0.361    15 0.723
## # i 2 more variables: p.adj <dbl>, p.adj.signif <chr>
```

```
userPerformanceData %>%
  group_by(Viewpoint, Pose) %>%
  pairwise_t_test(FootHeight ~ CoachingStyle, paired = TRUE, p.adjust.method = "bonf")
```

```
## # A tibble: 12 × 12
##   Viewpoint   Pose .y. group1 group2  n1  n2 statistic    df    p p.adj
## * <fct>      <int> <chr> <chr> <chr> <int> <int>      <dbl> <dbl> <dbl> <dbl>
## 1 First Pers...   1 Foot... Auton... Contr...   16   16    0.709    15 0.489 0.489
## 2 First Pers...   2 Foot... Auton... Contr...   16   16   -0.752    15 0.464 0.464
## 3 First Pers...   3 Foot... Auton... Contr...   16   16    0.0684   15 0.946 0.946
## 4 First Pers...   4 Foot... Auton... Contr...   16   16    2.69     15 0.017 0.017
## 5 First Pers...   5 Foot... Auton... Contr...   16   16   -0.983    15 0.341 0.341
## 6 First Pers...   6 Foot... Auton... Contr...   16   16   -0.336    15 0.741 0.741
## 7 Third Pers...   1 Foot... Auton... Contr...   16   16    0.735    15 0.474 0.474
## 8 Third Pers...   2 Foot... Auton... Contr...   16   16    1.10     15 0.289 0.289
## 9 Third Pers...   3 Foot... Auton... Contr...   16   16   -1.52     15 0.15  0.15
## 10 Third Pers...  4 Foot... Auton... Contr...   16   16   -0.678    15 0.508 0.508
## 11 Third Pers...  5 Foot... Auton... Contr...   16   16    0.216    15 0.832 0.832
## 12 Third Pers...  6 Foot... Auton... Contr...   16   16   -0.261    15 0.798 0.798
## # i 1 more variable: p.adj.signif <chr>
```

#Number of Mistakes

```
userPerformanceData %>%
  group_by(CoachingStyle, Pose) %>%
  pairwise_t_test(Mistake ~ Viewpoint, paired = TRUE, p.adjust.method = "bonf")
```

```
## # A tibble: 12 × 12
##   CoachingStyle   Pose .y. group1 group2  n1  n2 statistic    df    p
## * <fct>      <int> <chr> <chr> <chr> <int> <int>      <dbl> <dbl> <dbl>
## 1 Autonomous Style   1 Mist... First... Third...   16   16    0.939    15 0.362
## 2 Autonomous Style   2 Mist... First... Third...   16   16    1.70     15 0.11
## 3 Autonomous Style   3 Mist... First... Third...   16   16   -0.126    15 0.901
## 4 Autonomous Style   4 Mist... First... Third...   16   16   -1.32     15 0.206
## 5 Autonomous Style   5 Mist... First... Third...   16   16    0.460    15 0.652
## 6 Autonomous Style   6 Mist... First... Third...   16   16    0.808    15 0.432
## 7 Controlling Style   1 Mist... First... Third...   16   16    2.24     15 0.041
## 8 Controlling Style   2 Mist... First... Third...   16   16   -3.16     15 0.006
## 9 Controlling Style   3 Mist... First... Third...   16   16   -0.355    15 0.728
## 10 Controlling Style  4 Mist... First... Third...   16   16   -1.26     15 0.228
## 11 Controlling Style  5 Mist... First... Third...   16   16    0.899    15 0.383
## 12 Controlling Style  6 Mist... First... Third...   16   16    1.10     15 0.289
## # i 2 more variables: p.adj <dbl>, p.adj.signif <chr>
```

```
userPerformanceData %>%
  group_by(Viewpoint, Pose) %>%
  pairwise_t_test(Mistake ~ CoachingStyle, paired = TRUE, p.adjust.method = "bonf")
```

```
## # A tibble: 12 × 12
##   Viewpoint   Pose .y.  group1 group2  n1  n2 statistic  df    p p.adj
## * <fct>      <int> <chr> <chr>  <chr> <int> <int>    <dbl> <dbl> <dbl> <dbl>
## 1 First Pers...   1 Mist... Auton... Contr...  16  16   -0.187   15 0.855 0.855
## 2 First Pers...   2 Mist... Auton... Contr...  16  16    1.38   15 0.188 0.188
## 3 First Pers...   3 Mist... Auton... Contr...  16  16    1.07   15 0.3   0.3
## 4 First Pers...   4 Mist... Auton... Contr...  16  16    0.764   15 0.456 0.456
## 5 First Pers...   5 Mist... Auton... Contr...  16  16    0.324   15 0.751 0.751
## 6 First Pers...   6 Mist... Auton... Contr...  16  16   -0.522   15 0.609 0.609
## 7 Third Pers...   1 Mist... Auton... Contr...  16  16    1.14   15 0.27  0.27
## 8 Third Pers...   2 Mist... Auton... Contr...  16  16   -3.58   15 0.003 0.003
## 9 Third Pers...   3 Mist... Auton... Contr...  16  16    0.545   15 0.594 0.594
## 10 Third Pers...  4 Mist... Auton... Contr...  16  16    0      15 1      1
## 11 Third Pers...  5 Mist... Auton... Contr...  16  16    0.565   15 0.58  0.58
## 12 Third Pers...  6 Mist... Auton... Contr...  16  16   -0.212   15 0.835 0.835
## # i 1 more variable: p.adj.signif <chr>
```

Mid-Questionnaire Data

#Enjoyment

```
MidQuestion_Data %>%
```

```
  pairwise_t_test(Enjoyment ~ Coaching.Style, paired = TRUE, p.adjust.method = "bonf")
```

```
## # A tibble: 1 × 10
```

```
##   .y.      group1 group2  n1  n2 statistic  df    p p.adj p.adj.signif
## * <chr>    <chr>  <chr> <int> <int>    <dbl> <dbl> <dbl> <dbl> <chr>
## 1 Enjoyment Autonom... Contr...  32  32   -2.17   31 0.037 0.037 *
```

#Difficulty

```
MidQuestion_Data %>%
```

```
  pairwise_t_test(Difficulty ~ Coaching.Style, paired = TRUE, p.adjust.method = "bonf")
```

```
## # A tibble: 1 × 10
```

```
##   .y.      group1 group2  n1  n2 statistic  df    p p.adj p.adj.signif
## * <chr>    <chr>  <chr> <int> <int>    <dbl> <dbl> <dbl> <dbl> <chr>
## 1 Difficulty Autono... Contr...  32  32    2.17   31 0.037 0.037 *
```

#Embodiment

```
MidQuestion_Data %>%
```

```
  pairwise_t_test(Embodiment ~ Viewpoint, paired = TRUE, p.adjust.method = "bonf")
```

```
## # A tibble: 1 × 10
```

```
##   .y.      group1 group2  n1  n2 statistic  df    p p.adj p.adj.signif
## * <chr>    <chr>  <chr> <int> <int>    <dbl> <dbl> <dbl> <dbl> <chr>
## 1 Embodiment First ... Third...  32  32   -2.78   31 0.009 0.009 **
```

```
#Social Presence
MidQuestion_Data %>%
  group_by(Viewpoint) %>%
  pairwise_t_test(Social_Presence ~ Coaching.Style, paired = TRUE, p.adjust.method = "bonf")
```

```
## # A tibble: 2 × 11
##   Viewpoint   .y.      group1 group2    n1    n2 statistic    df      p p.adj
## * <chr>      <chr>      <chr> <chr>  <int> <int>    <dbl> <dbl> <dbl> <dbl>
## 1 First Person Social_Pre... Auton... Contr...    16    16   -0.190    15 0.852 0.852
## 2 Third Person Social_Pre... Auton... Contr...    16    16   -1.06    15 0.307 0.307
## # i 1 more variable: p.adj.signif <chr>
```

```
#Perception
MidQuestion_Data %>%
  pairwise_t_test(PerceptionCoach ~ Coaching.Style, paired = TRUE, p.adjust.method = "bonf")
```

```
## # A tibble: 1 × 10
##   .y.      group1 group2    n1    n2 statistic    df      p  p.adj p.adj.signif
## * <chr>      <chr> <chr>  <int> <int>    <dbl> <dbl>  <dbl>  <dbl> <chr>
## 1 Percep... Auton... Contr...    32    32   -6.87    31 1.08e-7 1.08e-7 ****
```

```
MidQuestion_Data %>%
  group_by(Viewpoint) %>%
  pairwise_t_test(PerceptionCoach ~ Coaching.Style, paired = TRUE, p.adjust.method = "bonf")
```

```
## # A tibble: 2 × 11
##   Viewpoint   .y.      group1 group2    n1    n2 statistic    df      p  p.adj
## * <chr>      <chr>      <chr> <chr>  <int> <int>    <dbl> <dbl>  <dbl>  <dbl>
## 1 First Person Percep... Auton... Contr...    16    16   -4.42    15 4.99e-4 4.99e-4
## 2 Third Person Percep... Auton... Contr...    16    16   -5.19    15 1.1 e-4 1.1 e-4
## # i 1 more variable: p.adj.signif <chr>
```

```
#Recommendation
MidQuestion_Data %>%
  pairwise_t_test(Recommendation ~ Coaching.Style, paired = TRUE, p.adjust.method = "bonf")
```

```
## # A tibble: 1 × 10
##   .y.      group1 group2    n1    n2 statistic    df      p  p.adj p.adj.signif
## * <chr>      <chr> <chr>  <int> <int>    <dbl> <dbl>  <dbl>  <dbl> <chr>
## 1 Recommenda... Auton... Contr...    32    32   -3.52    31 0.001 0.001 **
```

```
MidQuestion_Data %>%
  group_by(Viewpoint) %>%
  pairwise_t_test(Recommendation ~ Coaching.Style, paired = TRUE, p.adjust.method = "bonf")
```

```
## # A tibble: 2 × 11
##   Viewpoint   .y.      group1 group2   n1    n2 statistic    df    p p.adj
## * <chr>      <chr>      <chr>  <chr>  <int> <int>    <dbl> <dbl> <dbl> <dbl>
## 1 First Person Recommenda... Auton... Contr...    16    16    -3.16    15 0.006 0.006
## 2 Third Person Recommenda... Auton... Contr...    16    16    -2.07    15 0.056 0.056
## # i 1 more variable: p.adj.signif <chr>
```

```
##### Visualization #####
#####
```

```
### Rename columns
```

```
userPerformanceData$CoachingStyle <- mapvalues(userPerformanceData$CoachingStyle, from = c("Autonomous Style", "Controlling Style"), to = c("Autonomous-Supportive Style", "Controlled Style"))
```

```
### Rename
```

```
userPerformanceData$CoachingStyleName <- mapvalues(userPerformanceData$CoachingStyle, from = c("Autonomous-Supportive Style", "Controlled Style"), to = c("Autonomous-SS.", "Controlled S."))
```

```
stat_Score.test <- userPerformanceData %>%
  group_by(CoachingStyle) %>%
  pairwise_t_test(Steadiness ~ Viewpoint, paired = TRUE, p.adjust.method = "bonf")
```

```
stat_Score.test <- stat_Score.test %>%
  filter(p < 0.05) %>%
  arrange(desc(CoachingStyle)) %>%
  add_xy_position(x = "CoachingStyle")
```

```
stat_Score.test1 <- userPerformanceData %>%
  group_by(Viewpoint) %>%
  pairwise_t_test(Steadiness ~ CoachingStyle, paired = TRUE, p.adjust.method = "bonf")
```

```
stat_Score.test1 <- stat_Score.test1 %>%
  filter(p < 0.05) %>%
  add_xy_position(x = "CoachingStyle", group = "Viewpoint")
```

```
stat_Score.test2 <- userPerformanceData %>%
  pairwise_t_test(Steadiness ~ CoachingStyle, paired = TRUE, p.adjust.method = "bonf")
```

```
stat_Score.test2 <- stat_Score.test2 %>%
  filter(p < 0.05) %>%
  add_xy_position(x = "CoachingStyle")
```

```
##### User Performance
```

```
# Steadiness
```

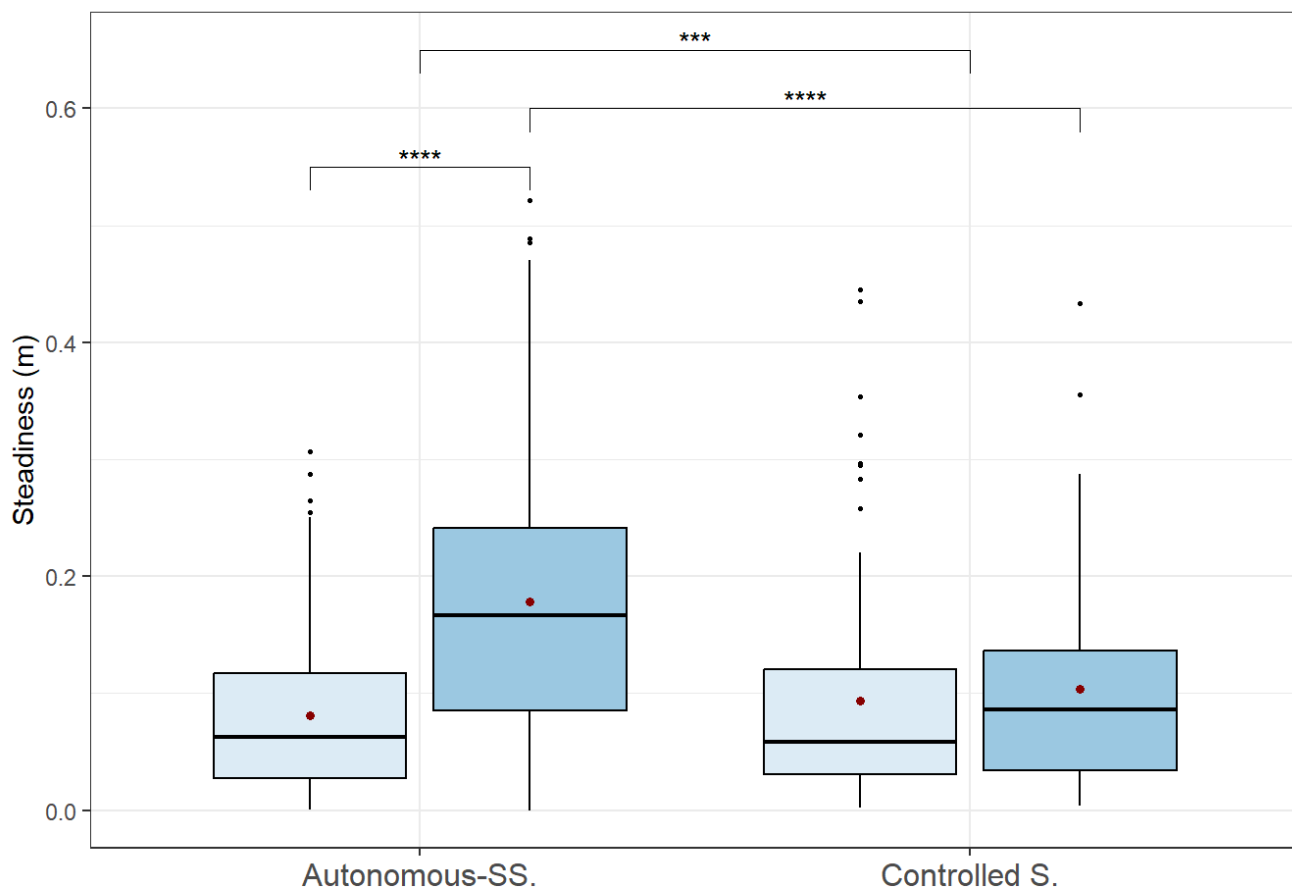
```
newplot1 <- ggboxplot(
  userPerformanceData, x = "CoachingStyleName", y = "Steadiness",
  fill = "Viewpoint", palette = "Blues", #order = c("Controlled Style", "Autonomous-Supportive Sty
le"),
  #ylim = c(1200, 1230),
  size = .4, bxp.errorbar.width = 0.1, outlier.size = 0.5,
) +
  labs(x="", y = "Steadiness (m)") +
  stat_summary(aes(fill= Viewpoint), position = position_dodge(width=.8), fun=mean, geom="point",
shape=20, size=2, color="darkred",) +
  theme_bw()+
  theme(axis.text.x = element_text(size = 12), legend.title = element_blank(), legend.position= "n
one")
```

```
newplot1 <- newplot1 + stat_pvalue_manual(stat_Score.test, label = "p.adj.signif", position = posi
tion_dodge(0.8), y.position = 0.55)
```

```
newplot1 <- newplot1 + stat_pvalue_manual(stat_Score.test1, label = "p.adj.signif", position = pos
ition_dodge(0.8), y.position = 0.60)
```

```
newplot1 <- newplot1 + stat_pvalue_manual(stat_Score.test2, label = "p.adj.signif", position = pos
ition_dodge(0.8), y.position = 0.65)
```

```
newplot1
```

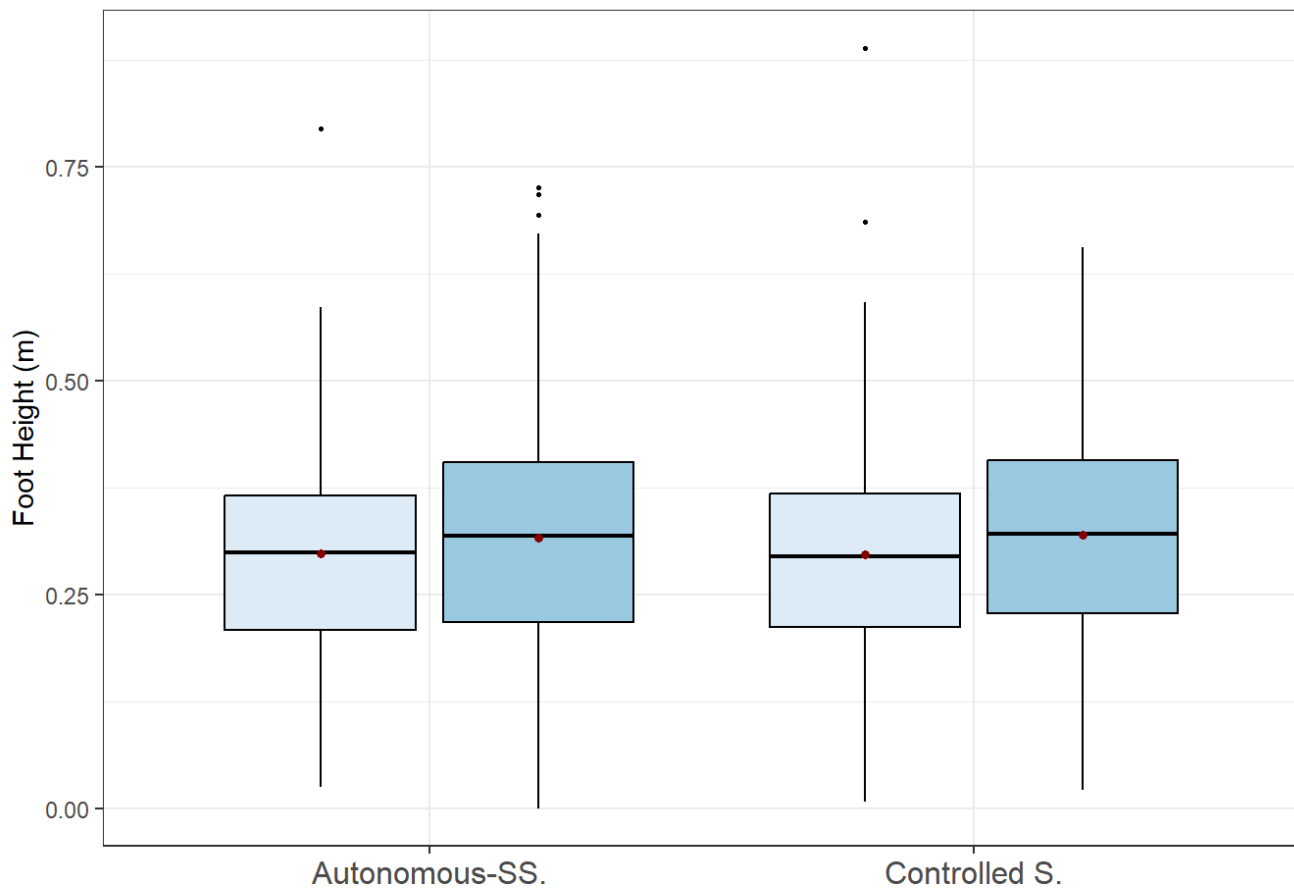



```

#Foot Height
newplot2 <- ggboxplot(
  userPerformanceData, x = "CoachingStyleName", y = "FootHeight",
  fill = "Viewpoint", palette = "Blues", #order = c("Controlled Style", "Autonomous-Supportive Style"),
  #ylim = c(1200, 1230),
  size = .4, bxp.errorbar.width = 0.1, outlier.size = 0.5,
) +
  labs(x="", y = "Foot Height (m)") +
  stat_summary(aes(fill= Viewpoint), position = position_dodge(width=.8), fun=mean, geom="point",
  shape=20, size=2, color="darkred",) +
  theme_bw()+
  theme(axis.text.x = element_text(size = 12), legend.title = element_blank(), legend.position= "none")

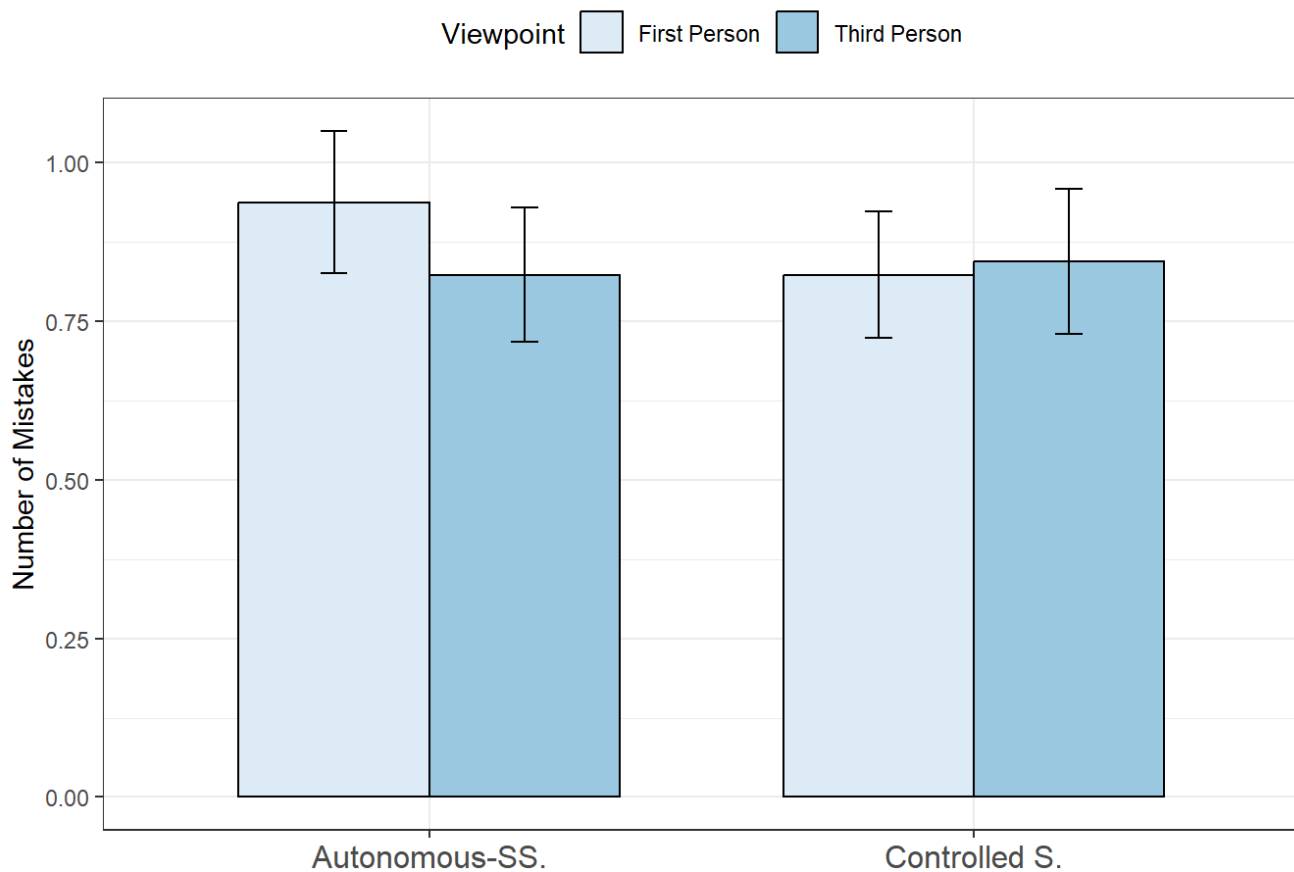
newplot2

```

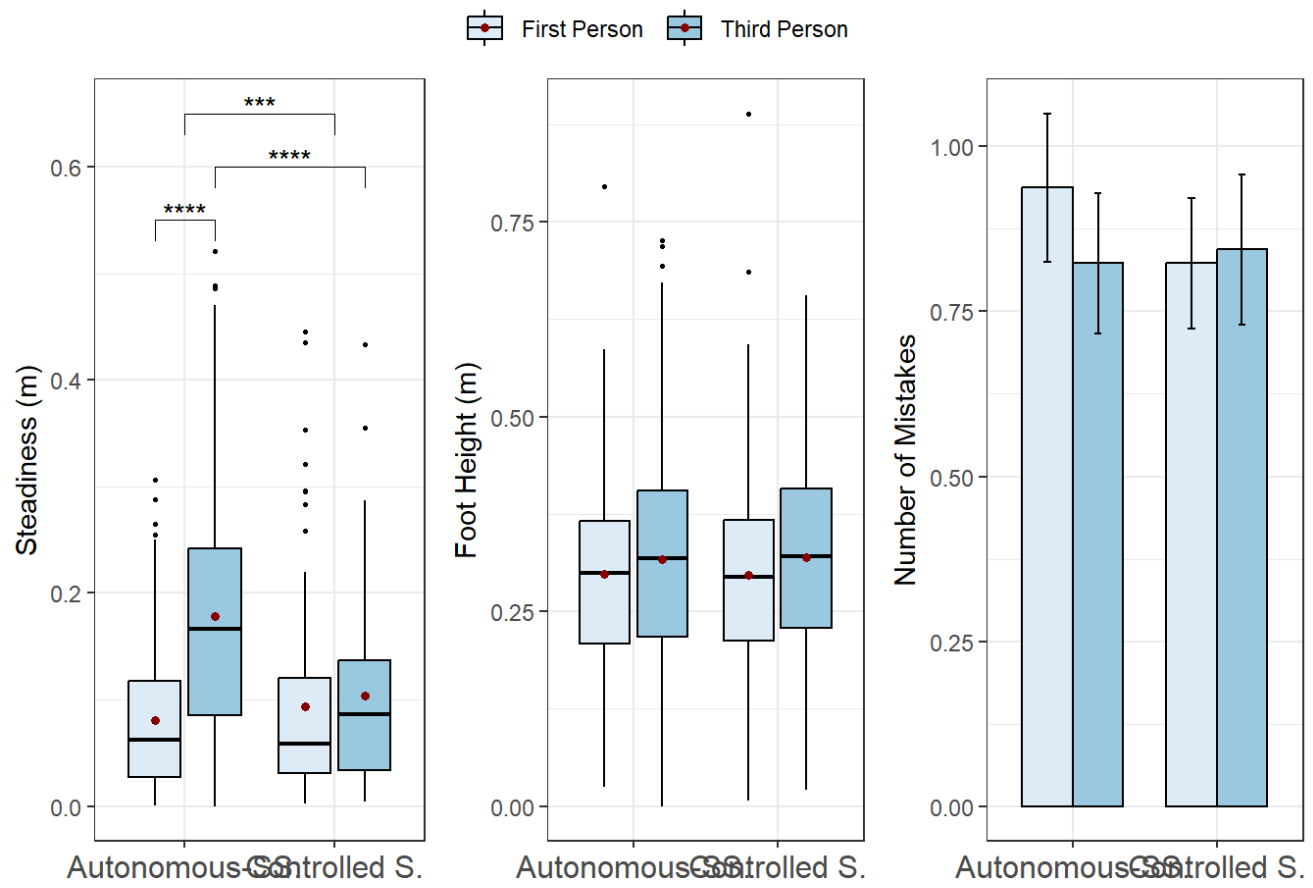


```
#Mistakes
newplot3 <- ggbarplot(
  userPerformanceData, x = "CoachingStyleName", y = "Mistake",
  fill = "Viewpoint", color = "black", palette = "Blues",
  position = position_dodge(0.7), #order = c("Controlled Style", "Autonomous-Supportive Style"),
  add = "mean_se", label = FALSE, lab.nb.digits = 2, lab.vjust = 4.2,
) +
  labs(x="", y = "Number of Mistakes") +
  theme_bw()+
  theme(axis.text.x = element_text(size = 12), legend.background = element_rect(fill = "transparent", color = NA), legend.position = "top") # c(.873, .88)) axis.text.x = element_text(size = 12),

newplot3
```



```
# Combine plots
ggarrange(newplot1, newplot2, newplot3, ncol=3, nrow = 1, common.legend = TRUE)
```



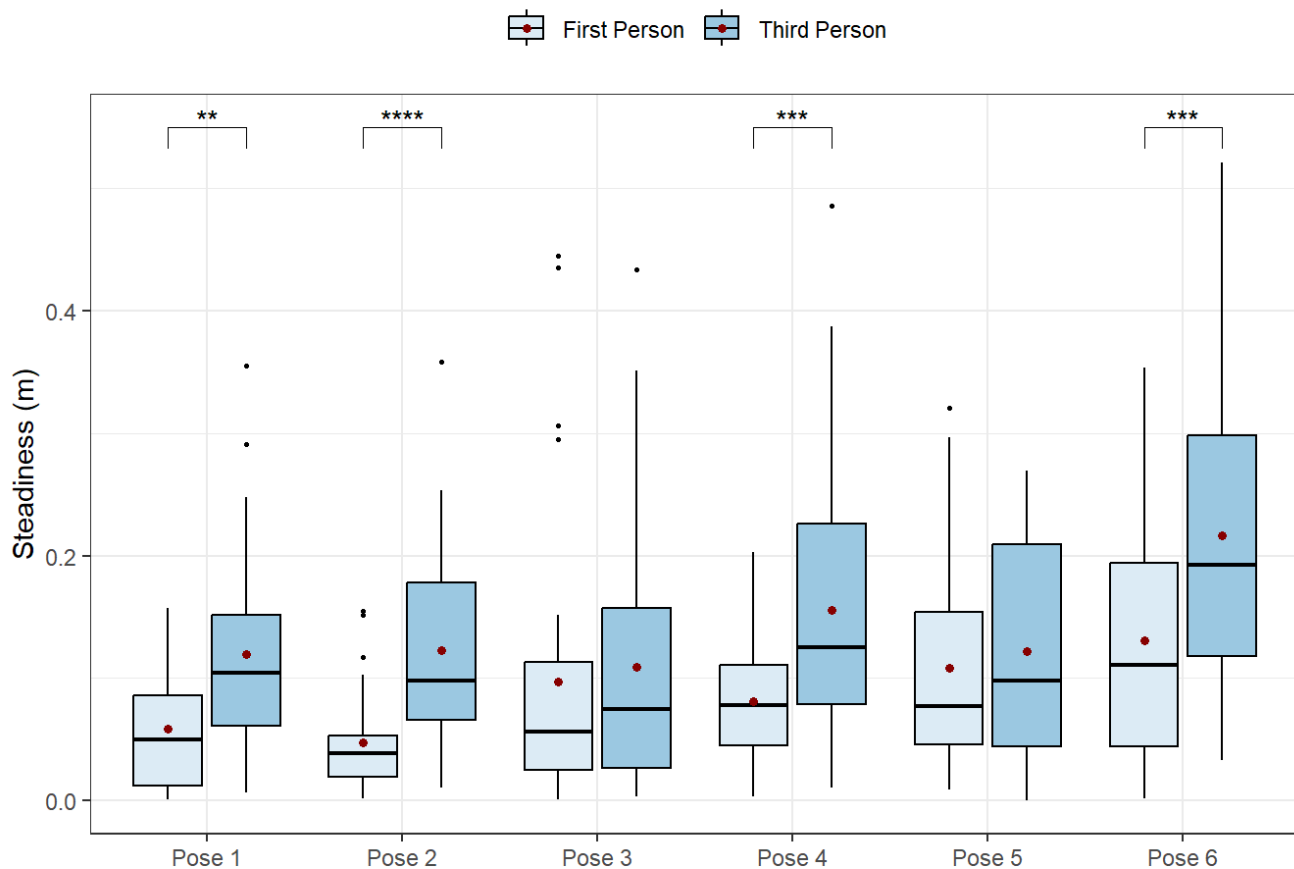
```
##### Pose Visualization -- Steadiness #####
### Rename columns
userPerformanceData$PoseName <- mapvalues(userPerformanceData$Pose, from = c("1", "2", "3", "4",
"5", "6"), to = c("Pose 1", "Pose 2", "Pose 3", "Pose 4", "Pose 5", "Pose 6"))

##### Viewpoint
stat_viewpoint.test <- userPerformanceData %>%
  group_by(Pose) %>%
  pairwise_t_test(Steadiness ~ Viewpoint, paired = TRUE, p.adjust.method = "bonf")

stat_viewpoint.test <- stat_viewpoint.test %>%
  filter(p < 0.05) %>%
  add_xy_position(x = "Pose")

poseViewpointPlot <- ggboxplot(
  userPerformanceData, x = "PoseName", y = "Steadiness",
  fill = "Viewpoint", palette = "Blues", #order = c("Controlled Style", "Autonomous-Supportive Style"),
  #ylim = c(1200, 1230),
  size = .4, bxp.errorbar.width = 0.1, outlier.size = 0.5,
) +
  labs(x="", y = "Steadiness (m)") +
  stat_summary(aes(fill= Viewpoint), position = position_dodge(width=.8), fun=mean, geom="point",
shape=20, size=2, color="darkred",) +
  theme_bw()+
  theme(legend.title = element_blank(), legend.position= "top")

poseViewpointPlot + stat_pvalue_manual(stat_viewpoint.test, label = "p.adj.signif", position = position_dodge(0.8), y.position = 0.55)
```

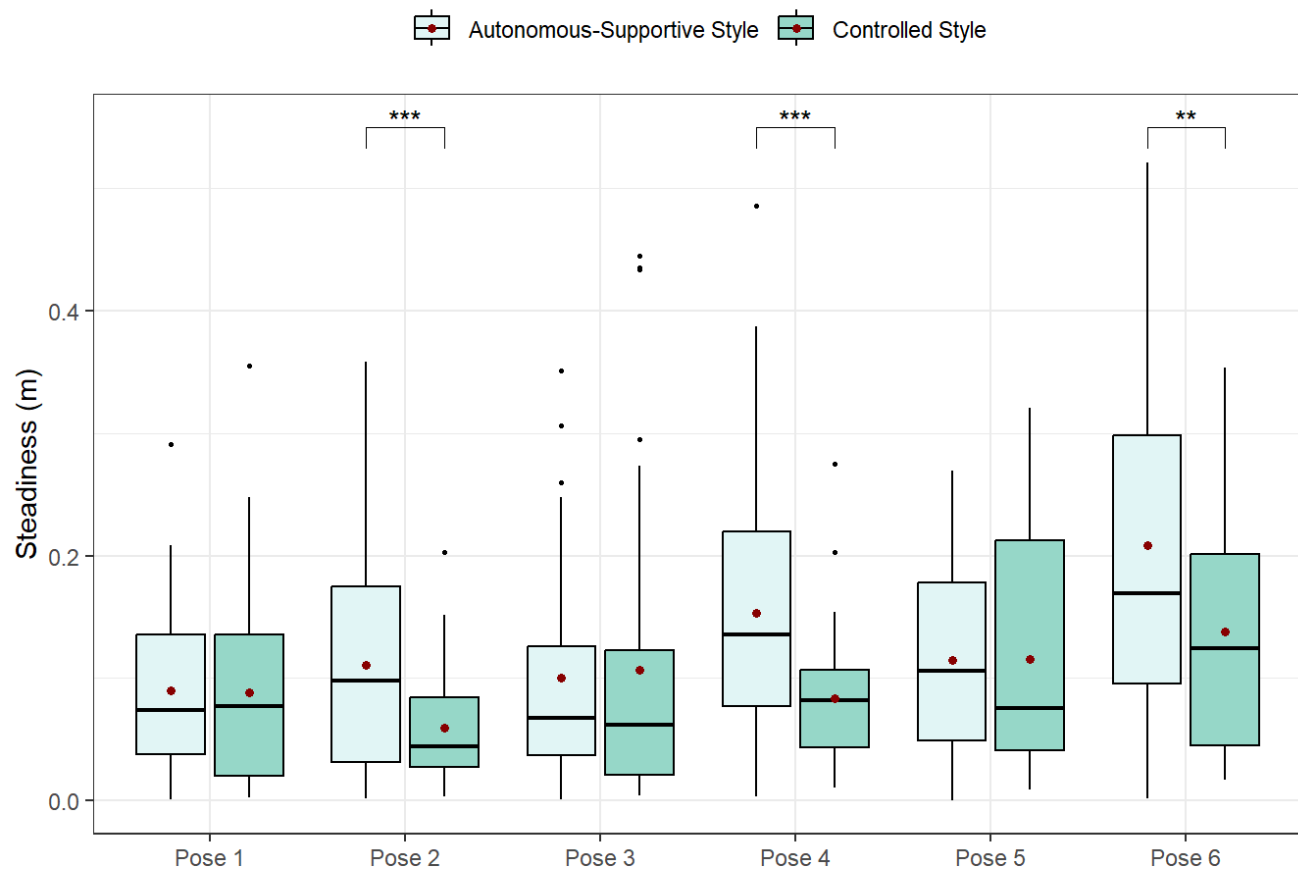


Coaching Style

```
stat_style.test <- userPerformanceData %>%
  group_by(Pose) %>%
  pairwise_t_test(Steadiness ~ CoachingStyle, paired = TRUE, p.adjust.method = "bonf")

stat_style.test <- stat_style.test %>%
  filter(p < 0.05) %>%
  add_xy_position(x = "Pose")

poseStylePlot <- ggboxplot(
  userPerformanceData, x = "PoseName", y = "Steadiness",
  fill = "CoachingStyle", palette = "BuGn", #order = c("Controlled Style", "Autonomous-Supportive
Style"),
  #ylim = c(1200, 1230),
  size = .4, bxp.errorbar.width = 0.1, outlier.size = 0.5,
) +
  labs(x="", y = "Steadiness (m)") +
  stat_summary(aes(fill= CoachingStyle), position = position_dodge(width=.8), fun=mean, geom="point",
  shape=20, size=2, color="darkred",) +
  theme_bw()+
  theme(legend.title = element_blank(), legend.position= "top")
poseStylePlot + stat_pvalue_manual(stat_style.test, label = "p.adj.signif", position = position_dodge(0.8), y.position = 0.55)
```



Combine

```

stat_combine.test <- userPerformanceData %>%
  group_by(CoachingStyleName, PoseName) %>%
  pairwise_t_test(Steadiness ~ Viewpoint, paired = TRUE, p.adjust.method = "bonf")

stat_combine.test <- stat_combine.test %>%
  filter(p < 0.05) %>%
  add_xy_position(x = "CoachingStyleName")

stat_combine1.test <- userPerformanceData %>%
  group_by(Viewpoint, PoseName) %>%
  pairwise_t_test(Steadiness ~ CoachingStyleName, paired = TRUE, p.adjust.method = "bonf")

stat_combine1.test <- stat_combine1.test %>%
  filter(p < 0.05) %>%
  add_xy_position("CoachingStyleName", group = "Viewpoint")

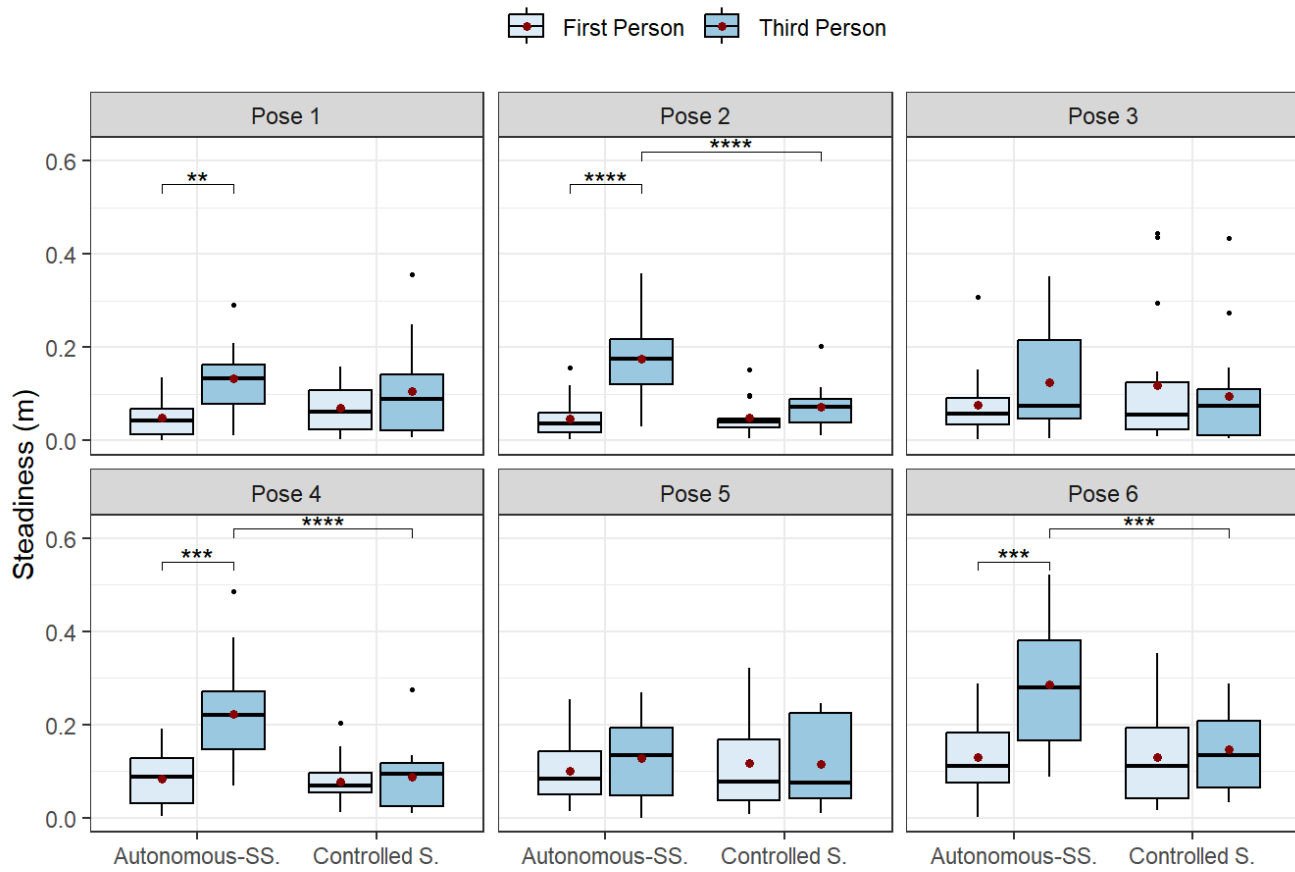
poseCombinedPlot <- ggboxplot(
  userPerformanceData, x = "CoachingStyleName", y = "Steadiness", fill = "Viewpoint",
  facet.by = "PoseName", palette = "Blues", #order = c("Controlled Style", "Autonomous-Supportive
Style"),
  #ylim = c(1200, 1230),
  size = .4, bxp.errorbar.width = 0.1, outlier.size = 0.5,
) +
  labs(x="", y = "Steadiness (m)") +
  stat_summary(aes(fill= Viewpoint), position = position_dodge(width=.8), fun=mean, geom="point",
shape=20, size=2, color="darkred",) +
  theme_bw()+
  theme( legend.title = element_blank(), legend.position= "top") #axis.text.x = element_text(size
= 12),

poseCombinedPlot <- poseCombinedPlot + stat_pvalue_manual(stat_combine.test, label = "p.adj.signi
f", y.position = 0.55)

poseSteadinessPlot <- poseCombinedPlot + stat_pvalue_manual(stat_combine1.test, label = "p.adj.sig
nif", y.position = 0.62)

poseSteadinessPlot

```



Pose Visualization -- Foot Height

```

stat_footpose.test <- userPerformanceData %>%
  group_by(CoachingStyleName, PoseName) %>%
  pairwise_t_test(FootHeight ~ Viewpoint, paired = TRUE, p.adjust.method = "bonf")

stat_footpose.test <- stat_footpose.test %>%
  filter(p < 0.05) %>%
  add_xy_position(x = "CoachingStyleName")

stat_footpose1.test <- userPerformanceData %>%
  group_by(Viewpoint, PoseName) %>%
  pairwise_t_test(FootHeight ~ CoachingStyleName, paired = TRUE, p.adjust.method = "bonf")

stat_footpose1.test <- stat_footpose1.test %>%
  filter(p < 0.05) %>%
  add_xy_position(x = "CoachingStyleName", group = "Viewpoint")

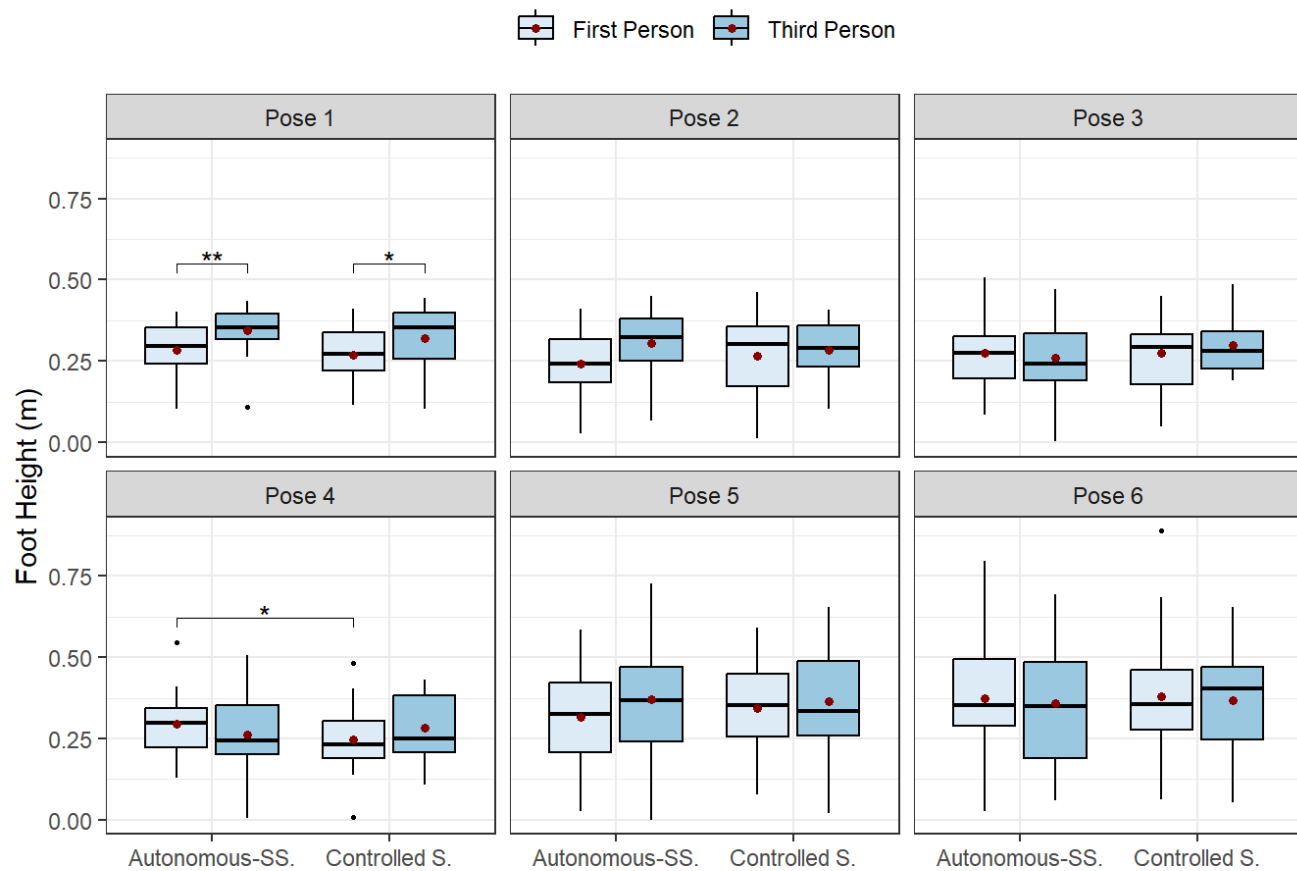
poseFootPlot <- ggboxplot(
  userPerformanceData, x = "CoachingStyleName", y = "FootHeight", fill = "Viewpoint",
  facet.by = "PoseName",
  palette = "Blues", #order = c("Controlled Style", "Autonomous-Supportive Style"),
  #ylim = c(1200, 1230),
  size = .4, bxp.errorbar.width = 0.1, outlier.size = 0.5,
) +
  labs(x="", y = "Foot Height (m)") +
  stat_summary(aes(fill= Viewpoint), position = position_dodge(width=.8), fun=mean, geom="point",
shape=20, size=2, color="darkred",) +
  theme_bw()+
  theme( legend.title = element_blank(), legend.position= "top") #axis.text.x = element_text(size
= 12),

poseFootPlot <- poseFootPlot + stat_pvalue_manual(stat_footpose.test, label = "p.adj.signif", y.po
sition = 0.55)

poseFootHeightPlot <- poseFootPlot + stat_pvalue_manual(stat_footpose1.test, label = "p.adj.signi
f", y.position = 0.62, )

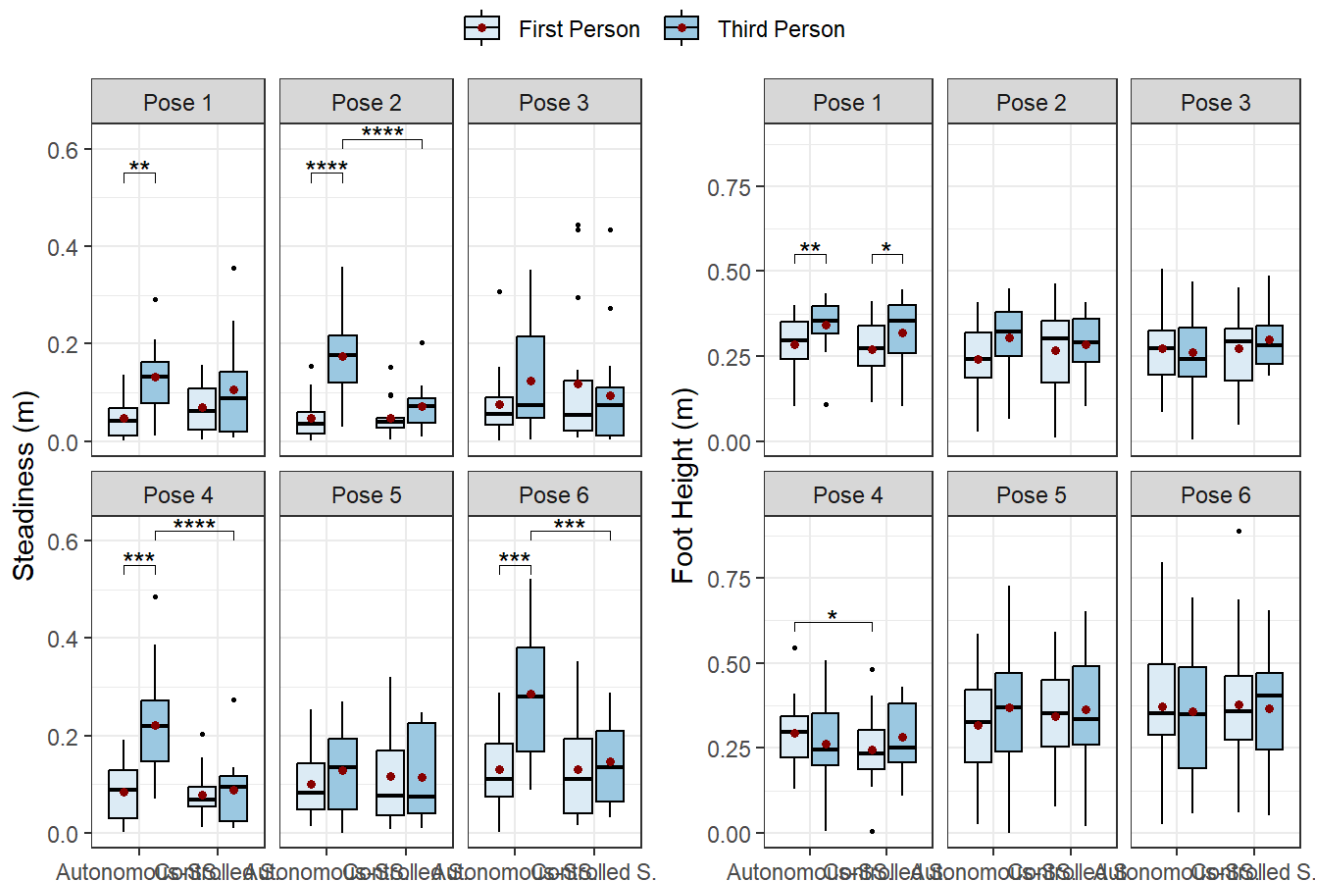
poseFootHeightPlot

```



```
# Combine plots
```

```
ggarrange(poseSteadinessPlot, poseFootHeightPlot, ncol=2, nrow = 1, common.legend = TRUE)
```



```
##### Pose Visualization -- Number of Mistake #####

stat_mistake.test <- userPerformanceData %>%
  group_by(CoachingStyleName, PoseName) %>%
  pairwise_t_test(Mistake ~ Viewpoint, paired = TRUE, p.adjust.method = "bonf")

stat_mistake.test <- stat_mistake.test %>%
  filter(p < 0.05) %>%
  add_xy_position(x = "CoachingStyleName")

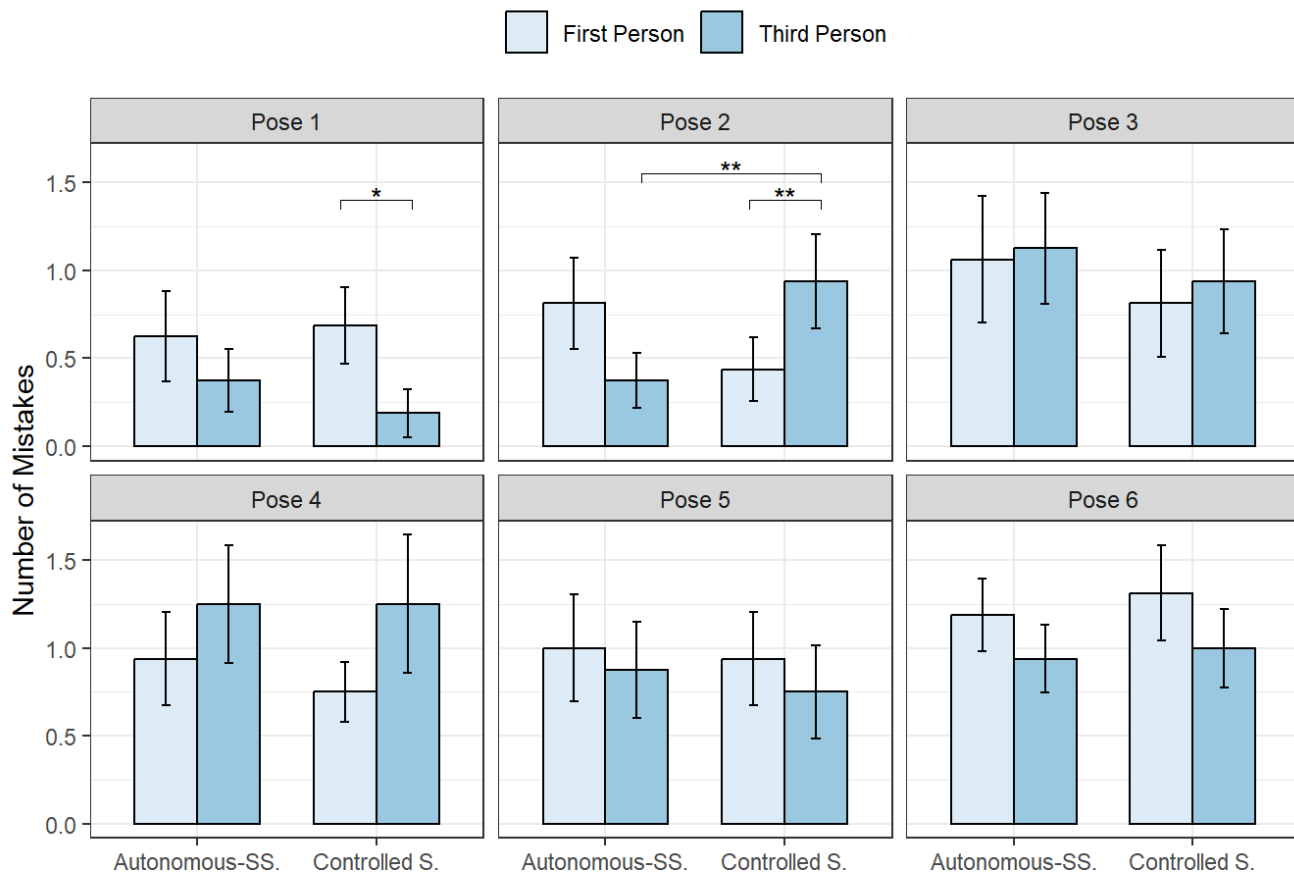
stat_mistake1.test <- userPerformanceData %>%
  group_by(Viewpoint, PoseName) %>%
  pairwise_t_test(Mistake ~ CoachingStyleName, paired = TRUE, p.adjust.method = "bonf")

stat_mistake1.test <- stat_mistake1.test %>%
  filter(p < 0.05) %>%
  add_xy_position(x = "CoachingStyleName", group = "Viewpoint")

poseMistakePlot <- ggbarplot(
  userPerformanceData, x = "CoachingStyleName", y = "Mistake",
  fill = "Viewpoint", color = "black", palette = "Blues", facet.by = "PoseName",
  position = position_dodge(0.7), #order = c("Controlled Style", "Autonomous-Supportive Style"),
  add = "mean_se", label = FALSE, lab.nb.digits = 2, lab.vjust = 4.2,
) +
  labs(x="", y = "Number of Mistakes") +
  theme_bw()+
  theme(legend.title = element_blank(), legend.background = element_rect(fill = "transparent", col
or = NA), legend.position = "top") # c(.873, .88)) axis.text.x = element_text(size = 12),

poseMistakePlot <- poseMistakePlot + stat_pvalue_manual(stat_mistake.test, label = "p.adj.signif",
y.position = 1.4, tip.length = .01)

poseMistakePlot + stat_pvalue_manual(stat_mistake1.test, label = "p.adj.signif", y.position = 1.5
5, tip.length = .01)
```

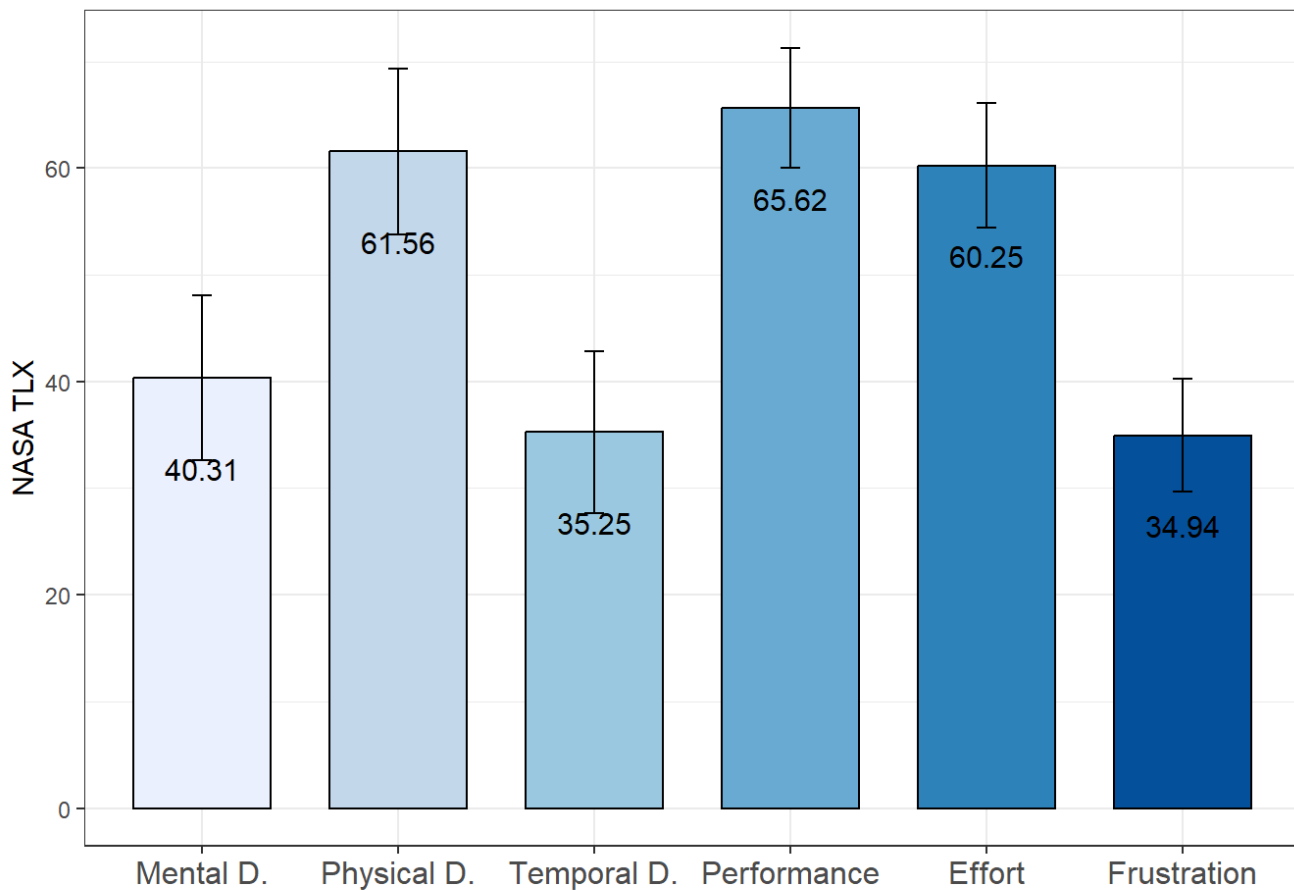


TLX Questionnaire Data Visualization

```
TLX_Data$TypeName <- mapvalues(TLX_Data$Type, from = c("Mental Demand", "Physical Demand", "Temporal Demand", "Performance", "Effort", "Frustration"), to = c("Mental D.", "Physical D.", "Temporal D.", "Performance", "Effort", "Frustration"))
```

```
#TLX
```

```
ggbarplot(
  TLX_Data, x = "TypeName", y = "Score",
  fill = "TypeName", palette = "Blues",
  position = position_dodge(.75),
  add = "mean_se", label = TRUE, lab.nb.digits = 2, lab.vjust = 4.5, #lab.size = 3,
) +
  labs(x="", y = "NASA TLX") +
  theme_bw()+
  theme(axis.text.x = element_text(size = 12), legend.title = element_blank(), legend.background =
element_rect(fill = "transparent", color = NA), legend.position = "none") # c(.890, .88))
```

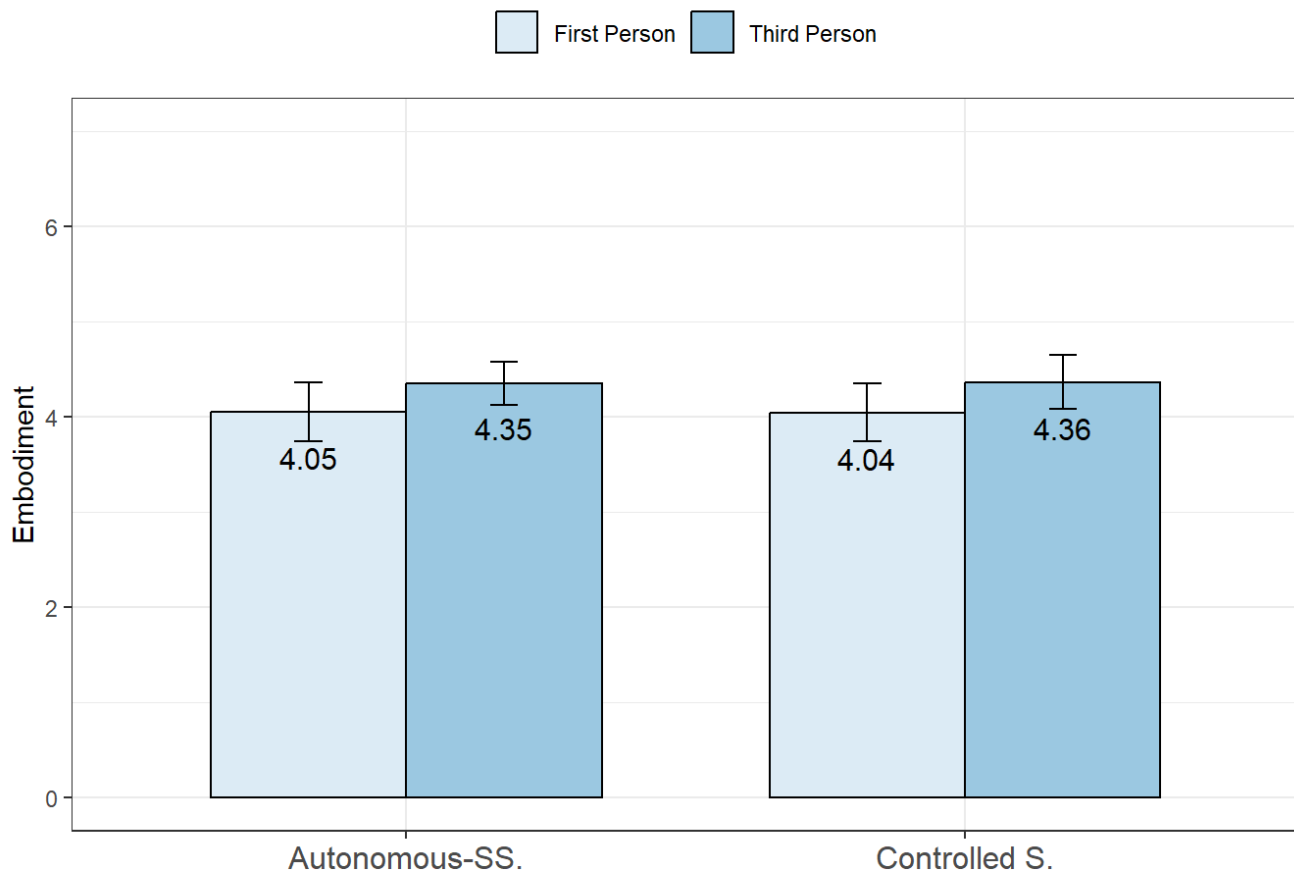


Mid Questionnaire Data Visualization

#Embodiment

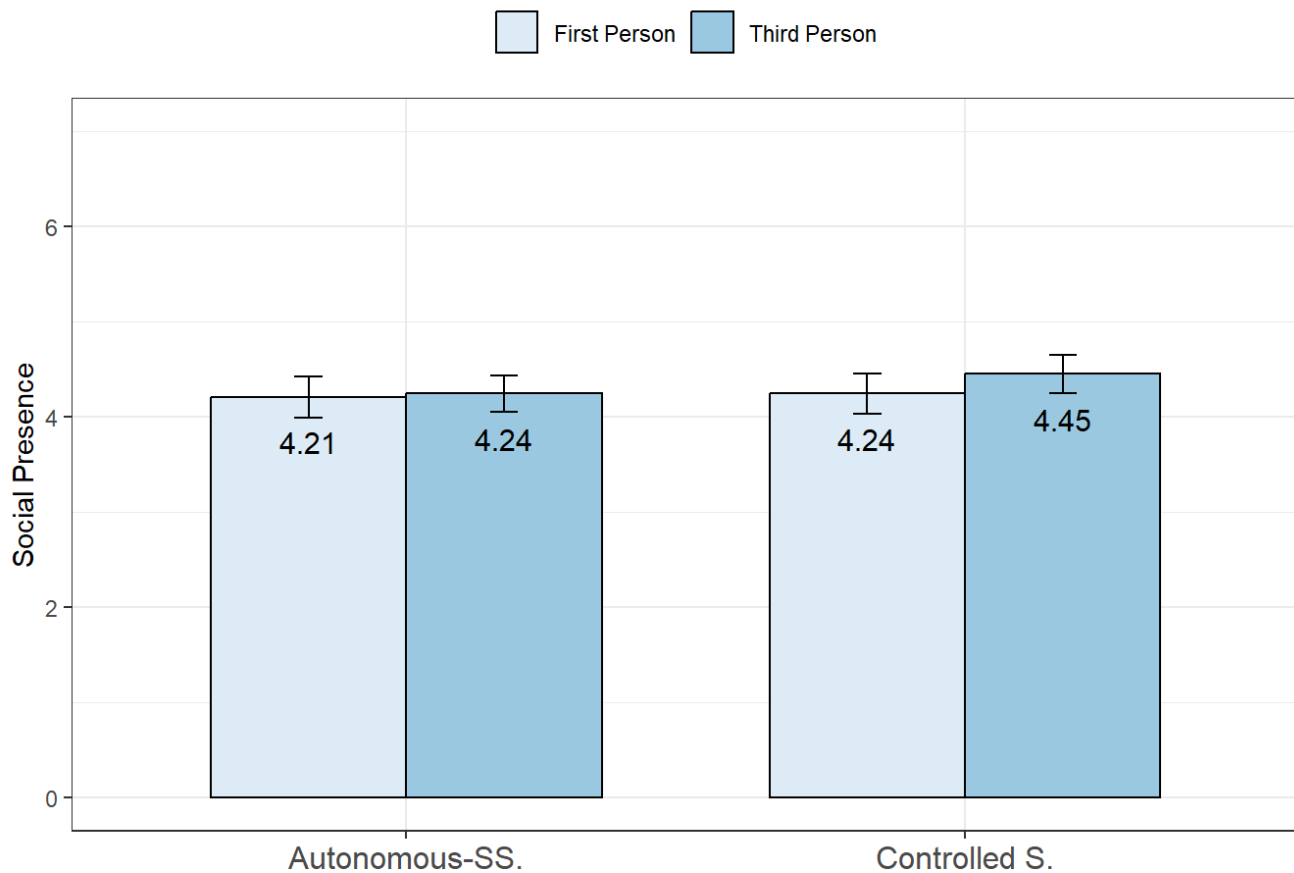
```
Mid_plot1 <- ggbarplot(
  MidQuestion_Data, x = "Coaching.Style", y = "Embodiment",
  fill = "Viewpoint", palette = "Blues", order = c("Autonomous-SS.", "Controlled S."),
  position = position_dodge(.7),
  ylim = c(0, 7),
  add = "mean_se", label = TRUE, lab.nb.digits = 2, lab.vjust = 2.5, #lab.size = 3,
) +
  labs(x="", y = "Embodiment") +
  theme_bw()+
  theme(axis.text.x = element_text(size = 12), legend.title = element_blank(), legend.background
= element_rect(fill = "transparent", color = NA), legend.position = "top") # c(.890, .88))
```

Mid_plot1



```
Mid_plot2 <- ggbarplot(
  MidQuestion_Data, x = "Coaching.Style", y = "Social_Presence",
  fill = "Viewpoint", palette = "Blues", order = c("Autonomous-SS.", "Controlled S."),
  position = position_dodge(.7),
  ylim = c(0, 7),
  #ylim = c(-3, 3),
  add = "mean_se", label = TRUE, lab.nb.digits = 2, lab.vjust = 2.5, #lab.size = 3,
) +
  labs(x="", y = "Social Presence") +
  theme_bw()+
  theme(axis.text.x = element_text(size = 12), legend.title = element_blank(), legend.background =
element_rect(fill = "transparent", color = NA), legend.position = "top") # c(.890, .88))
```

Mid_plot2



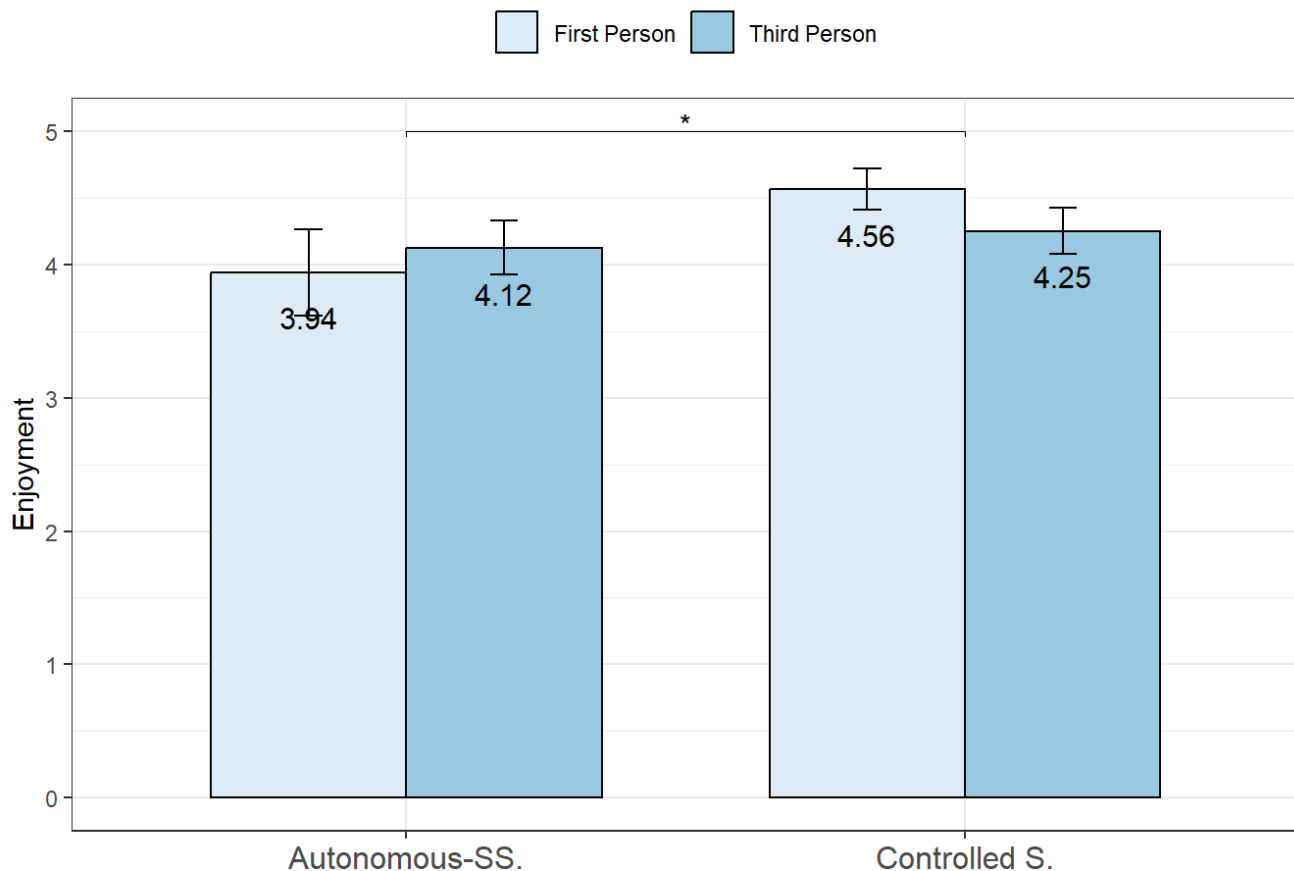
```
#### Enjoyment
stat_enjoyment.test <- MidQuestion_Data %>%
  pairwise_t_test(Enjoyment ~ Coaching.Style, paired = TRUE, p.adjust.method = "bonf")

stat_enjoyment.test <- stat_enjoyment.test %>%
  filter(p < 0.05) %>%
  add_xy_position(x = "Coaching.Style")

Mid_plot3 <- ggbarplot(
  MidQuestion_Data, x = "Coaching.Style", y = "Enjoyment",
  fill = "Viewpoint", palette = "Blues", order = c("Autonomous-SS.", "Controlled S."),
  position = position_dodge(.7),
  ylim = c(0, 5),
  add = "mean_se", label = TRUE, lab.nb.digits = 2, lab.vjust = 2.5, #lab.size = 3,
) +
  labs(x="", y = "Enjoyment") +
  theme_bw()+
  theme(axis.text.x = element_text(size = 12), legend.title = element_blank(), legend.background =
element_rect(fill = "transparent", color = NA), legend.position = "top") # c(.890, .88))

Mid_plot3 <- Mid_plot3 + stat_pvalue_manual(stat_enjoyment.test, label = "p.adj.signif", y.position
n = 5, tip.length = .01)

Mid_plot3
```

#Difficulty

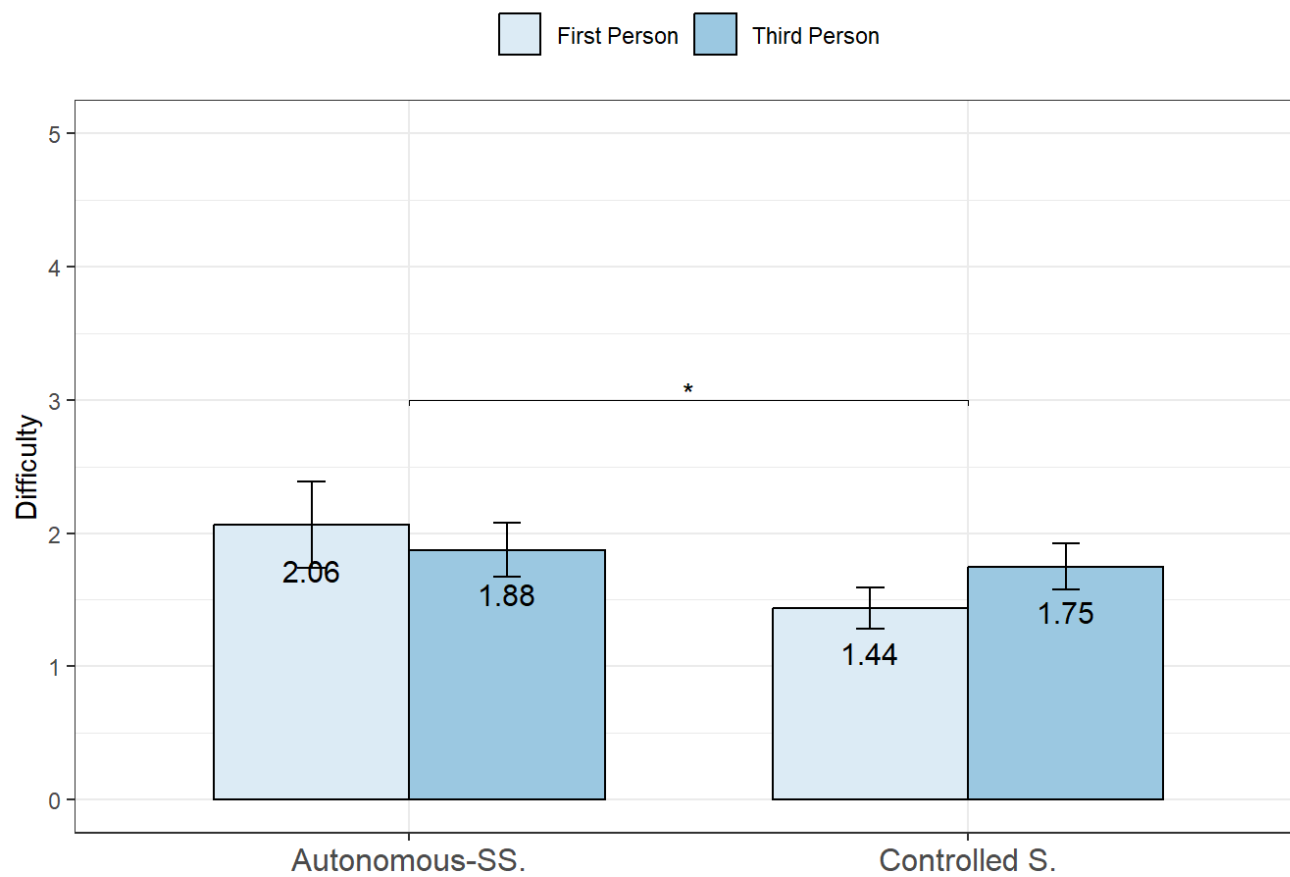
```
stat_difficulty.test <- MidQuestion_Data %>%
  pairwise_t_test(Difficulty ~ Coaching.Style, paired = TRUE, p.adjust.method = "bonf")

stat_difficulty.test <- stat_difficulty.test %>%
  filter(p < 0.05) %>%
  add_xy_position(x = "Coaching.Style")

Mid_plot4 <- ggbarplot(
  MidQuestion_Data, x = "Coaching.Style", y = "Difficulty",
  fill = "Viewpoint", palette = "Blues", order = c("Autonomus-SS.", "Controlled S."),
  position = position_dodge(.7),
  ylim = c(0, 5),
  add = "mean_se", label = TRUE, lab.nb.digits = 2, lab.vjust = 2.5, #lab.size = 3,
) +
  labs(x="", y = "Difficulty") +
  theme_bw() +
  theme(axis.text.x = element_text(size = 12), legend.title = element_blank(), legend.background =
element_rect(fill = "transparent", color = NA), legend.position = "top") # c(.890, .88))

Mid_plot4 <- Mid_plot4 + stat_pvalue_manual(stat_difficulty.test, label = "p.adj.signif", y.positi
on = 3, tip.length = .01)

Mid_plot4
```



#Perception

```

stat_perception.test <- MidQuestion_Data %>%
  pairwise_t_test(PerceptionCoach ~ Coaching.Style, paired = TRUE, p.adjust.method = "bonf")

stat_perception.test <- stat_perception.test %>%
  filter(p < 0.05) %>%
  add_xy_position(x = "Coaching.Style")

stat_perception.test11 <- MidQuestion_Data %>%
  group_by(Viewpoint) %>%
  pairwise_t_test(PerceptionCoach ~ Coaching.Style, paired = TRUE, p.adjust.method = "bonf")

stat_perception.test1 <- stat_perception.test11 %>%
  filter(p < 0.05, Viewpoint == "First Person") %>%
  add_xy_position(x = "Coaching.Style", group = "Viewpoint")

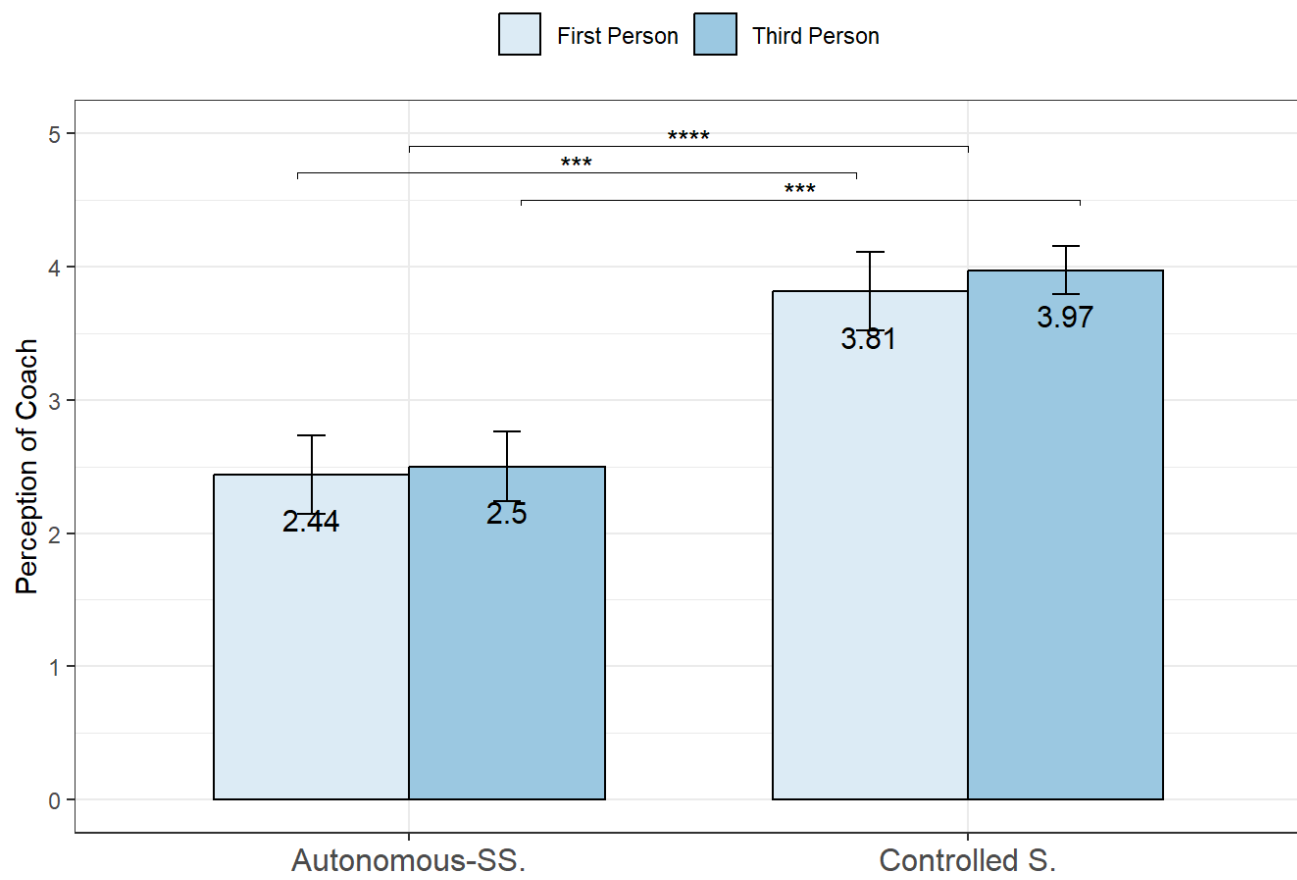
stat_perception.test2 <- stat_perception.test11 %>%
  filter(p < 0.05, Viewpoint == "Third Person") %>%
  add_xy_position(x = "Coaching.Style", group = "Viewpoint")

Mid_plot5 <- ggbarplot(
  MidQuestion_Data, x = "Coaching.Style", y = "PerceptionCoach",
  fill = "Viewpoint", palette = "Blues", order = c("Autonomous-SS.", "Controlled S."),
  position = position_dodge(.7),
  ylim = c(0, 5),
  add = "mean_se", label = TRUE, lab.nb.digits = 2, lab.vjust = 2.5, #lab.size = 3,
) +
  labs(x="", y = "Perception of Coach") +
  theme_bw()+
  theme(axis.text.x = element_text(size = 12), legend.title = element_blank(), legend.background =
element_rect(fill = "transparent", color = NA), legend.position = "top") # c(.890, .88))

Mid_plot5 <- Mid_plot5 + stat_pvalue_manual(stat_perception.test, label = "p.adj.signif", y.positi
on = 4.9, tip.length = .01)
Mid_plot5 <- Mid_plot5 + stat_pvalue_manual(stat_perception.test1, label = "p.adj.signif", y.posit
ion = 4.7, tip.length = .01)
Mid_plot5 <- Mid_plot5 + stat_pvalue_manual(stat_perception.test2, label = "p.adj.signif", y.posit
ion = 4.5, tip.length = .01)

Mid_plot5

```



```
#Recommendation
```

```
stat_recommend.test <- MidQuestion_Data %>%
  pairwise_t_test(Recommendation ~ Coaching.Style, paired = TRUE, p.adjust.method = "bonf")
```

```
stat_recommend.test <- stat_recommend.test %>%
  filter(p < 0.05) %>%
  add_xy_position(x = "Coaching.Style")
```

```
stat_recommend.test1 <- MidQuestion_Data %>%
  group_by(Viewpoint) %>%
  pairwise_t_test(Recommendation ~ Coaching.Style, paired = TRUE, p.adjust.method = "bonf")
```

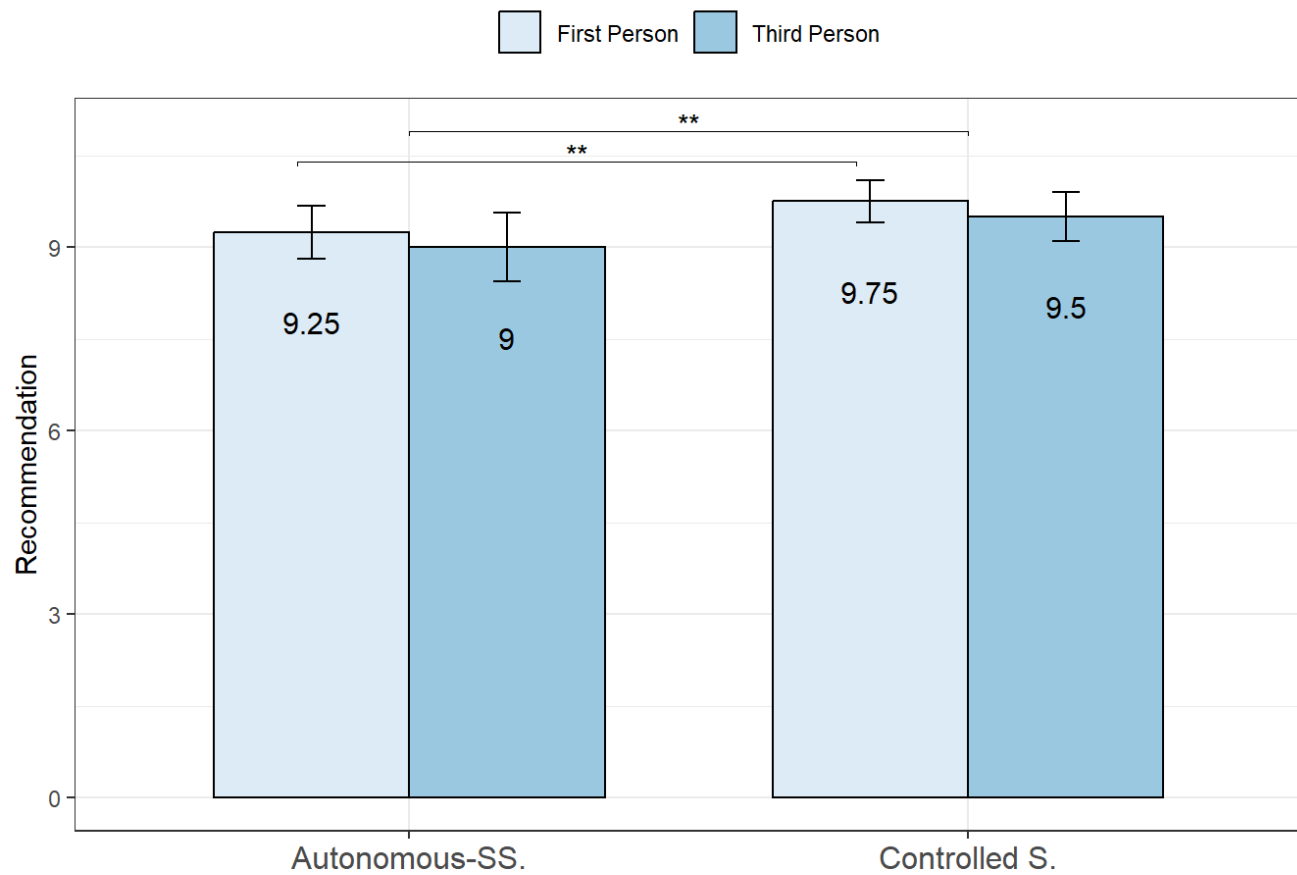
```
stat_recommend.test1 <- stat_recommend.test1 %>%
  filter(p < 0.05) %>%
  add_xy_position(x = "Coaching.Style", group = "Viewpoint")
```

```
Mid_plot6 <- ggbarplot(
  MidQuestion_Data, x = "Coaching.Style", y = "Recommendation",
  fill = "Viewpoint", palette = "Blues", order = c("Autonomous-SS.", "Controlled S."),
  position = position_dodge(.7),
  ylim = c(0, 10.9),
  add = "mean_se", label = TRUE, lab.nb.digits = 2, lab.vjust = 4.5, #lab.size = 3,
) +
  labs(x="", y = "Recommendation") +
  theme_bw()+
  theme(axis.text.x = element_text(size = 12), legend.title = element_blank(), legend.background =
element_rect(fill = "transparent", color = NA), legend.position = "top") # c(.890, .88))
```

```
Mid_plot6 <- Mid_plot6 + stat_pvalue_manual(stat_recommend.test, label = "p.adj.signif", y.position = 10.9, tip.length = .01)
```

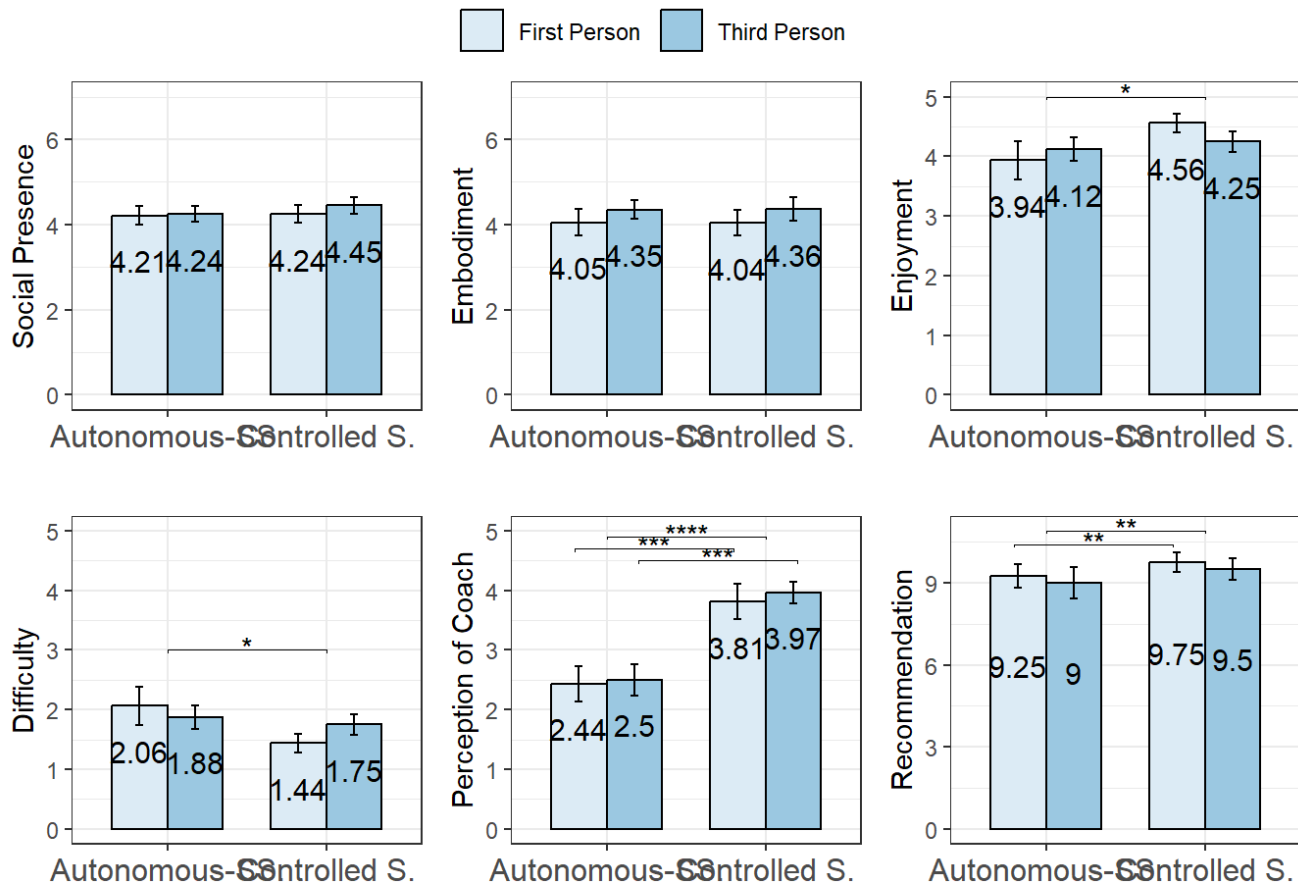
```
Mid_plot6 <- Mid_plot6 + stat_pvalue_manual(stat_recommend.test1, label = "p.adj.signif", y.position = 10.4, tip.length = .01)
```

```
Mid_plot6
```



```
# Combine plots
```

```
ggarrange(Mid_plot2, Mid_plot1, Mid_plot3, Mid_plot4, Mid_plot5, Mid_plot6, ncol=3, nrow = 2, common.legend = TRUE)
```



```
# Combine plots for Mid_plot2 and Mid_plot1
#ggarrange(Mid_plot2, Mid_plot1, ncol=2, nrow = 1, common.legend = TRUE)
```