### Analysis: Combined Sex

```
library(readr)
Habituation_Data_Long_Trials <- read_csv("Habituation Data Long Trials.csv")

## Rows: 320 Columns: 5
## ── Column specification
──────────────────────────────────────────────────────
## Delimiter: ","
## chr (2): Sex, Time
## dbl (3): Subject, Temp, Trial
##
## 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.

View(Habituation_Data_Long_Trials)

library(plyr)
library(dplyr)

##
## Attaching package: 'dplyr'
##
## The following objects are masked from 'package:plyr':
##
##     arrange, count, desc, failwith, id, mutate, rename, summarise,
##     summarize
##
## The following objects are masked from 'package:stats':
##
##     filter, lag
##
## The following objects are masked from 'package:base':
##
##     intersect, setdiff, setequal, union

library(tidyr)
library(gt)
library(ggplot2)
library(rstatix)

##
## Attaching package: 'rstatix'
##
## The following objects are masked from 'package:plyr':
##
##     desc, mutate
##
## The following object is masked from 'package:stats':
##
##     filter
```

### Analysis: Combined Sex

```
library(ggpubr)
```

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

```
#averages by trial
by_trial <- Habituation_Data_Long_Trials %>%
  group_by(Trial, Time)

by_trial_averages<-ddply(by_trial, c("Trial", "Time"), summarize,
                avgTempTrial=mean(Temp, na.rm=TRUE),
                sd=sd(Temp, na.rm=TRUE),
                N=length(Temp),
                se=sd/sqrt(N))
by_trial_averages
```

```
##    Trial     Time avgTempTrial        sd  N        se
## 1      1    After        36.65 0.7153088 10 0.2262005
## 2      1 Baseline        35.72 1.0053192 10 0.3179098
## 3      1   Before        35.54 0.3238655 10 0.1024153
## 4      1  Fifteen        35.94 0.7604092 10 0.2404625
## 5      1     Five        35.85 0.9442810 10 0.2986079
## 6      1    Sixty        35.03 1.5173442 10 0.4798264
## 7      1      Ten        36.00 0.8205689 10 0.2594867
## 8      1   Thirty        35.65 0.6737128 10 0.2130467
## 9      2    After        36.45 0.6883959 10 0.2176899
## 10     2 Baseline        35.75 0.9419247 10 0.2978628
## 11     2   Before        35.65 0.6346478 10 0.2006932
## 12     2  Fifteen        35.90 0.8353309 10 0.2641548
## 13     2     Five        35.91 0.8047774 10 0.2544930
## 14     2    Sixty        34.99 0.5646041 10 0.1785435
## 15     2      Ten        35.88 0.7004760 10 0.2215100
## 16     2   Thirty        35.70 0.7483315 10 0.2366432
## 17     3    After        36.50 1.0862780 10 0.3435113
## 18     3 Baseline        34.77 1.1035800 10 0.3489826
## 19     3   Before        35.51 1.0082438 10 0.3188347
## 20     3  Fifteen        35.67 0.7587270 10 0.2399305
## 21     3     Five        35.52 0.7612855 10 0.2407396
## 22     3    Sixty        35.06 0.7011102 10 0.2217105
## 23     3      Ten        35.63 0.7616503 10 0.2408550
## 24     3   Thirty        35.50 0.7468452 10 0.2361732
## 25     4    After        35.93 1.2745805 10 0.4030578
## 26     4 Baseline        35.24 0.8140434 10 0.2574231
## 27     4   Before        35.16 0.6113737 10 0.1933333
## 28     4  Fifteen        35.00 0.7102425 10 0.2245984
## 29     4     Five        35.12 0.7927449 10 0.2506879
```

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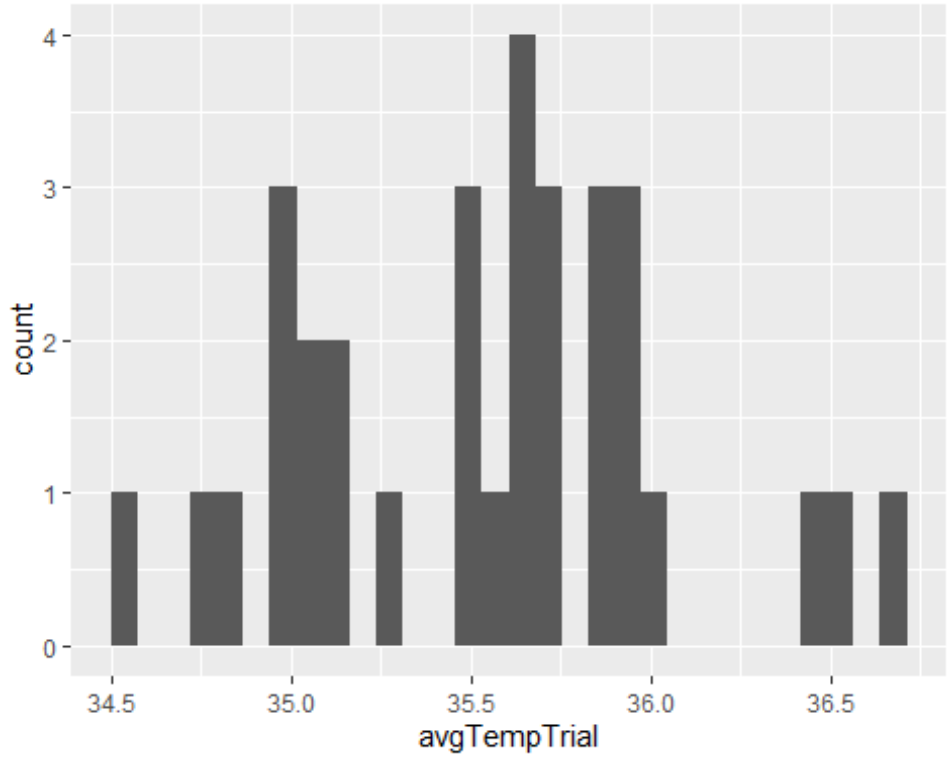
```
## 30     4    Sixty         34.51 0.7894442 10 0.2496442
## 31     4      Ten         35.00 0.7164728 10 0.2265686
## 32     4   Thirty         34.82 0.8456424 10 0.2674156
```

```
avgTrial <- by_trial_averages %>% arrange(Trial)
```

```
#histogram
ggplot(data = avgTrial, mapping = aes(x = avgTempTrial))+
  geom_histogram()
```

```
## `stat_bin()` using `bins = 30`. Pick better value with `binwidth`.
```



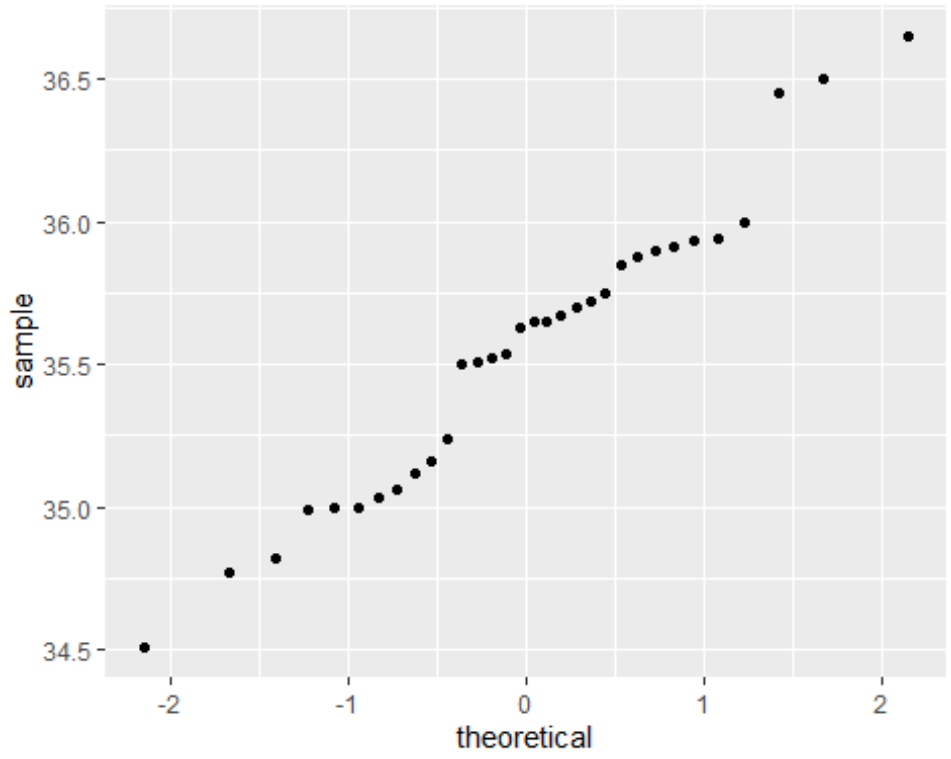

```
#shapiro Test
avgTrial %>%
  group_by(Time) %>%
  shapiro_test(avgTempTrial)
```

```
## # A tibble: 8 × 4
##   Time     variable     statistic      p
##   <chr>    <chr>            <dbl>  <dbl>
## 1 After    avgTempTrial     0.859 0.257
## 2 Baseline avgTempTrial     0.882 0.345
## 3 Before   avgTempTrial     0.866 0.281
## 4 Fifteen  avgTempTrial     0.825 0.155
## 5 Five     avgTempTrial     0.904 0.451
```

## Analysis: Combined Sex

```
## 6 Sixty    avgTempTrial     0.730 0.0246
## 7 Ten      avgTempTrial     0.891 0.387
## 8 Thirty   avgTempTrial     0.797 0.0967

#make a qqplot
ggplot(avgTrial, aes(sample=avgTempTrial))+stat_qq()
```




```
#identify outliers
Outliers_temptrial <- avgTrial %>%
  group_by(Time) %>%
  identify_outliers(avgTempTrial)

Outliers_temptrial

## # A tibble: 4 × 8
##   Time   Trial avgTempTrial    sd     N    se is.outlier is.extreme
##   <chr>  <dbl>        <dbl> <dbl> <int> <dbl> <lgl>      <lgl>
## 1 After      4         35.9 1.27     10 0.403 TRUE       FALSE
## 2 Before     4         35.2 0.611    10 0.193 TRUE       FALSE
## 3 Sixty      4         34.5 0.789    10 0.250 TRUE       FALSE
## 4 Thirty     4         34.8 0.846    10 0.267 TRUE       FALSE

#ANOVA
res.aovTrial <- anova_test(data = avgTrial, dv = avgTempTrial, wid = Trial,
within = Time)
get_anova_table(res.aovTrial)
```

### Analysis: Combined Sex

```
## ANOVA Table (type III tests)
##
##   Effect DFn DFd      F        p p<.05   ges
## 1   Time   7  21 18.338 1.26e-07     * 0.588
```

```
pwcTrial<-avgTrial %>%
  pairwise_t_test( avgTempTrial~Trial,paired=TRUE, p.adjust.method =
"bonferroni" )
pwcTrial
```

```
## # A tibble: 6 × 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 avgTem… 1      2          8     8     0.516     7 6.22e-1 1   e+0 ns
## 2 avgTem… 1      3          8     8     2.57      7 3.7 e-2 2.21e-1 ns
## 3 avgTem… 1      4          8     8     8.87      7 4.7 e-5 2.82e-4 ***
## 4 avgTem… 2      3          8     8     2.22      7 6.2 e-2 3.7 e-1 ns
## 5 avgTem… 2      4          8     8     9.79      7 2.46e-5 1.48e-4 ***
## 6 avgTem… 3      4          8     8     3.14      7 1.6 e-2 9.8 e-2 ns
```

### Analysis: Male Subjects

```
library(readr)
Hab_Data_Long_Trials_Male <- read_csv("Hab Data Long Trials Male.csv")

## Rows: 160 Columns: 5
## ── Column specification ────────────────────────────────────────────────────
## Delimiter: ","
## chr (2): Sex, Time
## dbl (3): Subject, Temp, Trial
##
## 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.

View(Hab_Data_Long_Trials_Male)


library(plyr)
library(dplyr)

##
## Attaching package: 'dplyr'
##
## The following objects are masked from 'package:plyr':
##
##     arrange, count, desc, failwith, id, mutate, rename, summarise,
##     summarize
##
## The following objects are masked from 'package:stats':
##
##     filter, lag
##
## The following objects are masked from 'package:base':
##
##     intersect, setdiff, setequal, union

library(tidyr)
library(gt)
library(ggplot2)
library(rstatix)

##
## Attaching package: 'rstatix'
##
## The following objects are masked from 'package:plyr':
##
##     desc, mutate
##
## The following object is masked from 'package:stats':
##
##     filter
```

### Analysis: Male Subjects

```
library(ggpubr)

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

by_trialM <- Hab_Data_Long_Trials_Male %>%
  group_by(Trial, Time)

by_trial_M_averages<-ddply(by_trialM, c("Trial", "Time"), summarize,
                           MavgTempTrial=mean(Temp, na.rm=TRUE),
                           sd=sd(Temp, na.rm=TRUE),
                           N=length(Temp),
                           se=sd/sqrt(N))
by_trial_M_averages

##    Trial     Time MavgTempTrial        sd N         se
## 1      1    After         36.72 0.8613942 5 0.38522721
## 2      1 Baseline         35.76 1.3575714 5 0.60712437
## 3      1   Before         35.42 0.1643168 5 0.07348469
## 4      1  Fifteen         35.94 1.0358571 5 0.46324939
## 5      1     Five         35.70 1.1937336 5 0.53385391
## 6      1    Sixty         35.56 0.7829432 5 0.35014283
## 7      1      Ten         35.90 1.1423660 5 0.51088159
## 8      1   Thirty         35.82 0.8927486 5 0.39924930
## 9      2    After         36.60 0.7314369 5 0.32710854
## 10     2 Baseline         36.02 1.2755391 5 0.57043843
## 11     2   Before         35.64 0.8792042 5 0.39319207
## 12     2  Fifteen         36.14 1.0406729 5 0.46540305
## 13     2     Five         36.12 1.0425929 5 0.46626173
## 14     2    Sixty         34.88 0.7661593 5 0.34263683
## 15     2      Ten         36.06 0.9208692 5 0.41182521
## 16     2   Thirty         35.86 1.0406729 5 0.46540305
## 17     3    After         36.84 1.1326959 5 0.50655701
## 18     3 Baseline         34.58 1.3255188 5 0.59279001
## 19     3   Before         35.94 1.3352902 5 0.59715995
## 20     3  Fifteen         36.08 0.6534524 5 0.29223278
## 21     3     Five         35.54 0.8848729 5 0.39572718
## 22     3    Sixty         34.96 0.8354639 5 0.37363083
## 23     3      Ten         35.98 0.7463243 5 0.33376639
## 24     3   Thirty         35.72 0.8584870 5 0.38392708
## 25     4    After         36.62 1.0963576 5 0.49030603
## 26     4 Baseline         35.38 0.7854935 5 0.35128336
## 27     4   Before         34.88 0.4604346 5 0.20591260
## 28     4  Fifteen         35.12 0.4266146 5 0.19078784
## 29     4     Five         35.28 0.7496666 5 0.33526109
## 30     4    Sixty         34.54 0.4615192 5 0.20639767
```

## Analysis: Male Subjects

```
## 31     4      Ten         35.20 0.6324555 5 0.28284271
## 32     4   Thirty         35.00 0.5338539 5 0.23874673
```

```
res.aovM <- anova_test(data = by_trial_M_averages, dv = MavgTempTrial, wid =
Trial, within = Time)
get_anova_table(res.aovM)
```

```
## ANOVA Table (type III tests)
##
##   Effect DFn DFd     F        p p<.05   ges
## 1   Time   7  21 8.953 4.09e-05     * 0.603
```

```
pwcTrialM<-by_trial_M_averages %>%
  pairwise_t_test( MavgTempTrial~Trial,paired=TRUE, p.adjust.method =
"bonferroni" )
pwcTrialM
```

```
## # A tibble: 6 × 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 MavgTemp… 1      2          8     8    -0.521     7 6.18e-1 1     ns
## 2 MavgTemp… 1      3          8     8     0.796     7 4.52e-1 1     ns
## 3 MavgTemp… 1      4          8     8     5.71      7 7.25e-4 0.004 **
## 4 MavgTemp… 2      3          8     8     1.05      7 3.29e-1 1     ns
## 5 MavgTemp… 2      4          8     8     5.48      7 9.22e-4 0.006 **
## 6 MavgTemp… 3      4          8     8     2.16      7 6.8 e-2 0.408 ns
```

### Analysis: Female Subjects

```
library(readr)
Hab_Data_Long_Trials_Female <- read_csv("Hab Data Long Trials Female.csv")
```

```
## Rows: 160 Columns: 5
## ── Column specification ────────────────────────────────────────────────────────
## Delimiter: ","
## chr (1): Time
## dbl (3): Subject, Temp, Trial
## lgl (1): Sex
##
## 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.
```

```
library(plyr)
library(dplyr)
```

```
##
## Attaching package: 'dplyr'
##
## The following objects are masked from 'package:plyr':
##
##     arrange, count, desc, failwith, id, mutate, rename, summarise,
##     summarize
##
## The following objects are masked from 'package:stats':
##
##     filter, lag
##
## The following objects are masked from 'package:base':
##
##     intersect, setdiff, setequal, union
```

```
library(tidyr)
library(gt)
library(ggplot2)
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(ggpubr)
```

### Analysis: Female Subjects

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

```
by_trialF <- Hab_Data_Long_Trials_Female %>%
  group_by(Trial, Time)

by_trial_F_averages<-ddply(by_trialF, c("Trial", "Time"), summarize,
                           FavgTempTrial=mean(Temp, na.rm=TRUE),
                           sd=sd(Temp, na.rm=TRUE),
                           N=length(Temp),
                           se=sd/sqrt(N))
by_trial_F_averages
```

```
##    Trial     Time FavgTempTrial        sd N         se
## 1      1    After         36.58 0.6300794 5 0.28178006
## 2      1 Baseline         35.68 0.6534524 5 0.29223278
## 3      1   Before         35.66 0.4159327 5 0.18601075
## 4      1  Fifteen         35.94 0.4774935 5 0.21354157
## 5      1     Five         36.00 0.7245688 5 0.32403703
## 6      1    Sixty         34.50 1.9659603 5 0.87920419
## 7      1      Ten         36.10 0.4301163 5 0.19235384
## 8      1   Thirty         35.48 0.3898718 5 0.17435596
## 9      2    After         36.30 0.6892024 5 0.30822070
## 10     2 Baseline         35.48 0.4324350 5 0.19339080
## 11     2   Before         35.66 0.3646917 5 0.16309506
## 12     2  Fifteen         35.66 0.5856620 5 0.26191602
## 13     2     Five         35.70 0.5099020 5 0.22803509
## 14     2    Sixty         35.10 0.3162278 5 0.14142136
## 15     2      Ten         35.70 0.4183300 5 0.18708287
## 16     2   Thirty         35.54 0.3361547 5 0.15033296
## 17     3    After         36.16 1.0406729 5 0.46540305
## 18     3 Baseline         34.96 0.9449868 5 0.42261093
## 19     3   Before         35.08 0.2049390 5 0.09165151
## 20     3  Fifteen         35.26 0.6693280 5 0.29933259
## 21     3     Five         35.50 0.7211103 5 0.32249031
## 22     3    Sixty         35.16 0.6188699 5 0.27676705
## 23     3      Ten         35.28 0.6648308 5 0.29732137
## 24     3   Thirty         35.28 0.6300794 5 0.28178006
## 25     4    After         35.24 1.1238327 5 0.50259327
## 26     4 Baseline         35.10 0.9082951 5 0.40620192
## 27     4   Before         35.44 0.6580274 5 0.29427878
## 28     4  Fifteen         34.88 0.9576012 5 0.42825226
## 29     4     Five         34.96 0.8876936 5 0.39698866
## 30     4    Sixty         34.48 1.0894953 5 0.48723711
## 31     4      Ten         34.80 0.8093207 5 0.36193922
## 32     4   Thirty         34.64 1.1148991 5 0.49859803
```

### Analysis: Female Subjects

```
res.aovF <- anova_test(data = by_trial_F_averages, dv = FavgTempTrial, wid =
Trial, within = Time)
get_anova_table(res.aovF)
```

```
## ANOVA Table (type III tests)
##
##   Effect DFn DFd     F        p p<.05   ges
## 1   Time   7  21 6.738 0.000295     * 0.426
```

```
pwcTrialF<-by_trial_F_averages %>%
  pairwise_t_test( FavgTempTrial~Trial,paired=TRUE, p.adjust.method =
"bonferroni" )
pwcTrialF
```

```
## # A tibble: 6 × 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 FavgTemp… 1      2          8     8     0.876     7 4.1 e-1 1     ns
## 2 FavgTemp… 1      3          8     8     2.44      7 4.5 e-2 0.269 ns
## 3 FavgTemp… 1      4          8     8     4.64      7 2   e-3 0.014 *
## 4 FavgTemp… 2      3          8     8     4.08      7 5   e-3 0.028 *
## 5 FavgTemp… 2      4          8     8     7.02      7 2.08e-4 0.001 **
## 6 FavgTemp… 3      4          8     8     2.57      7 3.7 e-2 0.221 ns
```