EmilyANOVA2

TGoodge

2023-08-23

```
library(readxl)
```

```
## Warning: package 'readxl' was built under R version 4.0.5
```

```
library(ggplot2)
```

```
## Warning: package 'ggplot2' was built under R version 4.0.5
```

```
library(tidyverse)
```

```
## Warning: package 'tidyverse' was built under R version 4.0.5
```

```
## -- Attaching packages --------------------------------------- tidyverse 1.3.1 --
```

```
## v tibble  3.1.4     v dplyr   1.0.8
## v tidyr   1.2.0     v stringr 1.4.0
## v readr   2.1.2     v forcats 0.5.1
## v purrr   0.3.4
```

```
## Warning: package 'tibble' was built under R version 4.0.5
```

```
## Warning: package 'tidyr' was built under R version 4.0.5
```

```
## Warning: package 'readr' was built under R version 4.0.5
```

```
## Warning: package 'purrr' was built under R version 4.0.5
```

```
## Warning: package 'dplyr' was built under R version 4.0.5
```

```
## Warning: package 'stringr' was built under R version 4.0.5
```

```
## Warning: package 'forcats' was built under R version 4.0.5
```

```
## -- Conflicts ------------------------------------------ tidyverse_conflicts() --
## x dplyr::filter() masks stats::filter()
## x dplyr::lag()    masks stats::lag()
```

```r
library(dplyr)
library(rstatix)
```

```
## Warning: package 'rstatix' was built under R version 4.0.5
```

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

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

```r
library(afex)
```

```
## Loading required package: lme4
```

```
## Warning: package 'lme4' was built under R version 4.0.5
```

```
## Loading required package: Matrix
```

```
## Warning: package 'Matrix' was built under R version 4.0.5
```

```
##
## Attaching package: 'Matrix'
```

```
## The following objects are masked from 'package:tidyr':
##
##     expand, pack, unpack
```

```
## ************
## Welcome to afex. For support visit: http://afex.singmann.science/
```

```
## - Functions for ANOVAs: aov_car(), aov_ez(), and aov_4()
## - Methods for calculating p-values with mixed(): 'S', 'KR', 'LRT', and 'PB'
## - 'afex_aov' and 'mixed' objects can be passed to emmeans() for follow-up tests
## - NEWS: emmeans() for ANOVA models now uses model = 'multivariate' as default.
## - Get and set global package options with: afex_options()
## - Set orthogonal sum-to-zero contrasts globally: set_sum_contrasts()
## - For example analyses see: browseVignettes("afex")
## ************
```

```
##
## Attaching package: 'afex'
```

```
## The following object is masked from 'package:lme4':
##
##     lmer
```

```r
library(lme4)
library(lmerTest)
```

```
## Warning: package 'lmerTest' was built under R version 4.0.5
```

```
##
## Attaching package: 'lmerTest'
##
## The following object is masked from 'package:lme4':
##
##     lmer
```

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

```r
library(emmeans)
```

```
## Warning: package 'emmeans' was built under R version 4.0.5
```

```r
library(ggpubr)
```

```
## Warning: package 'ggpubr' was built under R version 4.0.5
```

```r
rawData <- read.csv("C:/Users/thoma/Downloads/final_df_ppt.csv")
```

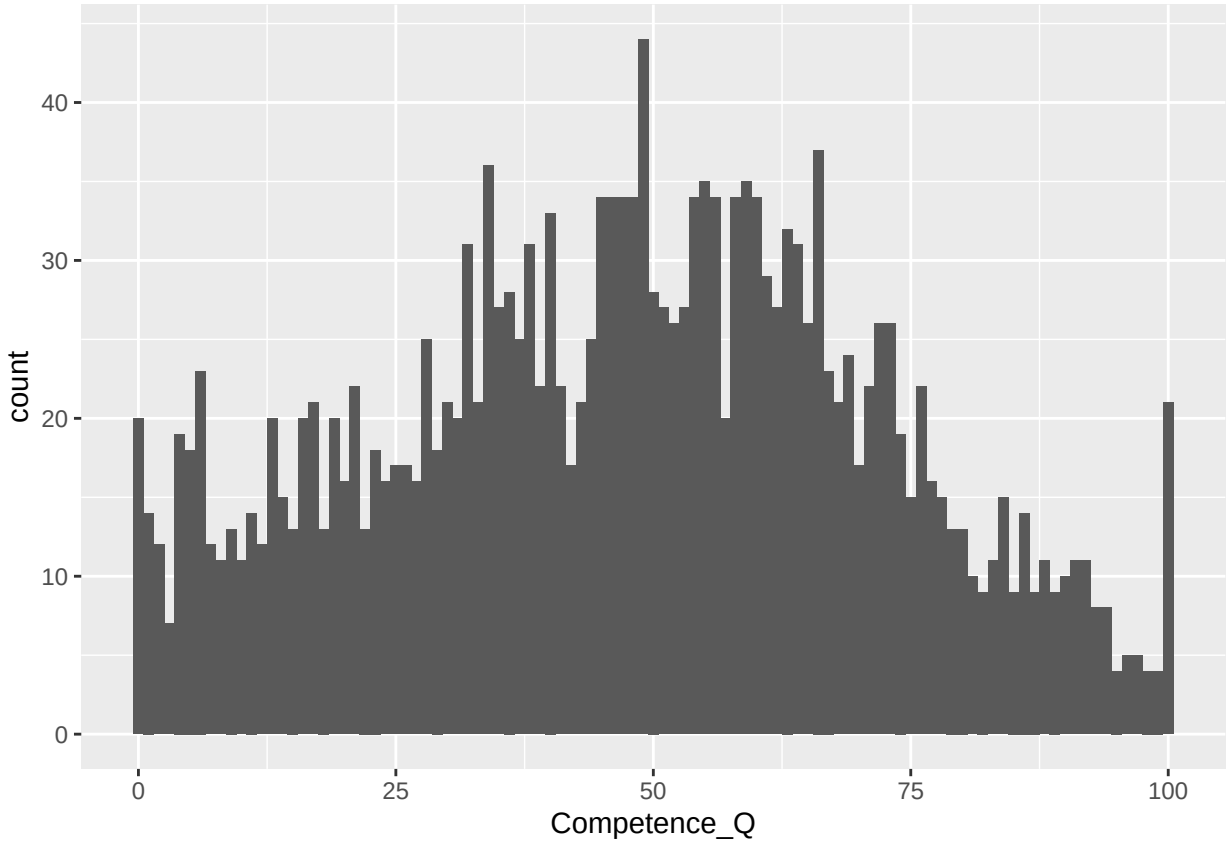
```r
rawData$Extraversion <- rawData$Extraversion_Condition

NoFiller <- rawData %>%
  subset(Filler == "no filler")

Extraversion <- rawData %>%
  subset(Extraversion != "no filler: male") %>%
  subset(Extraversion != "no filler: female")

Extraversion$Extraversion<- substr(Extraversion$Extraversion, 1, 4)
```

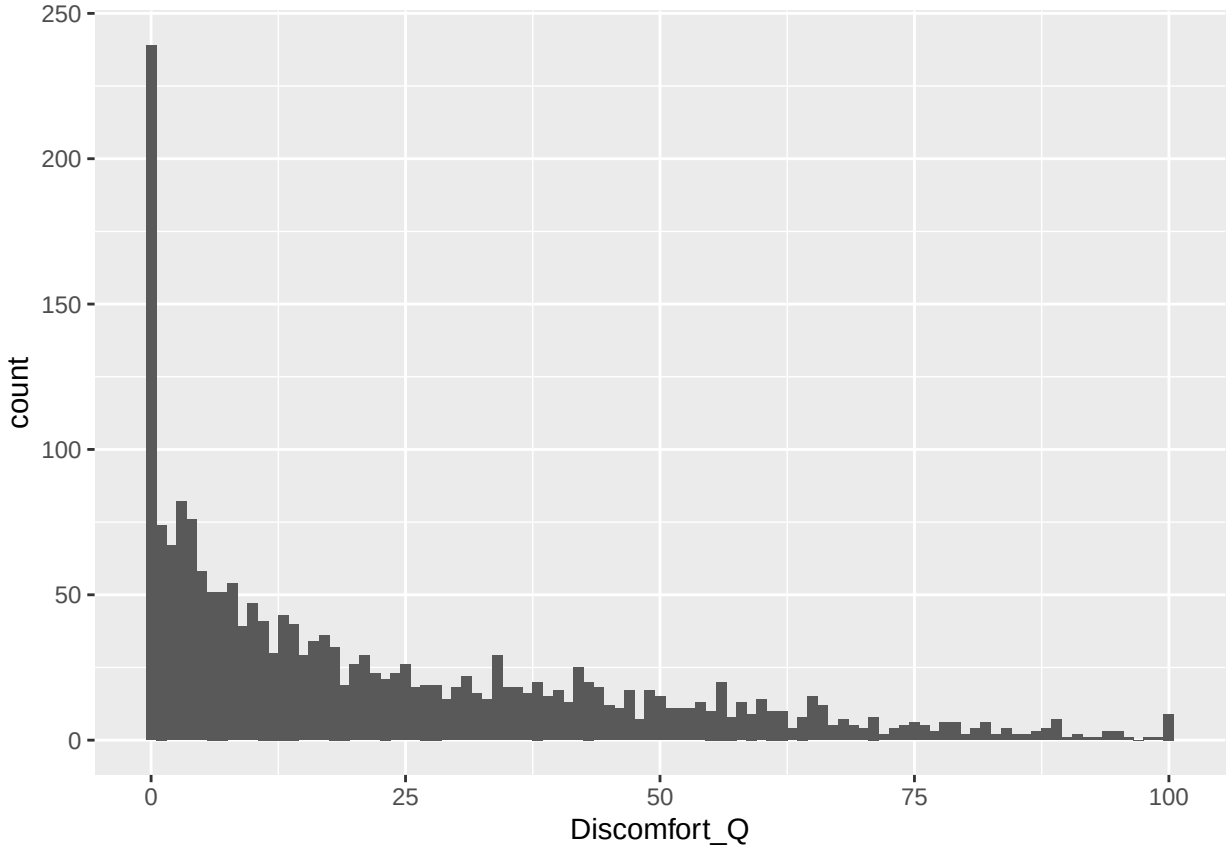
```r
#Plot a very basic histogram of all the data
ggplot(rawData, aes(x = Competence_Q ))+
 geom_histogram(binwidth = 1)
```



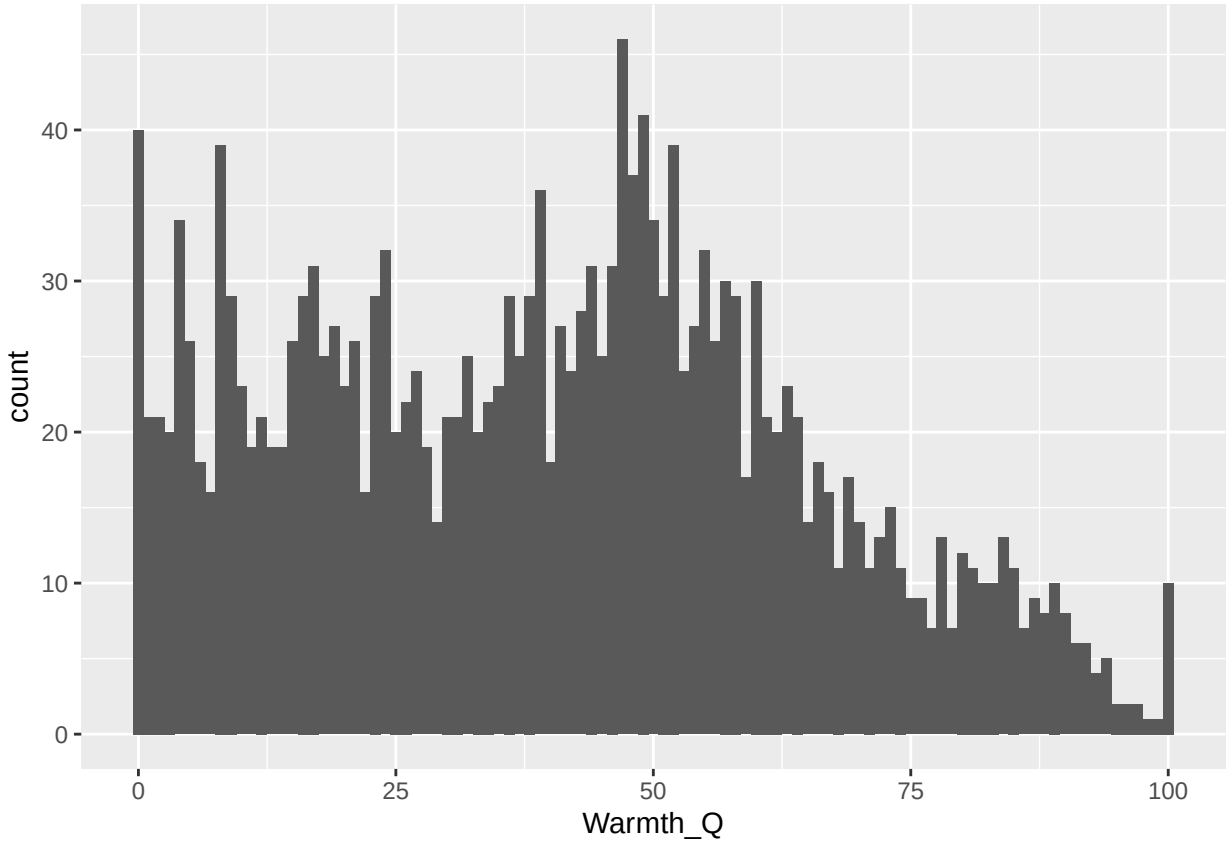

```
#check for outliers in the main dataset
outlier<-Extraversion %>%
group_by(Extraversion) %>%
identify_outliers(Competence_Q)
data.frame(outlier)
```

```
##  [1] Extraversion           X                    Audiofile
##  [4] Job_zone_Q             RIASEC_Q             Competence_Q
##  [7] Discomfort_Q           Warmth_Q             Ppt.
## [10] Extraversion_Condition File                 MeanF0
## [13] Duration               Median_f0            Extraverted
## [16] Speaker                Full.File            Sex
## [19] Speaker_mean_f0        Pitch_Category       Speaker_sentence
## [22] Filler                 is.outlier           is.extreme
## <0 rows> (or 0-length row.names)
```

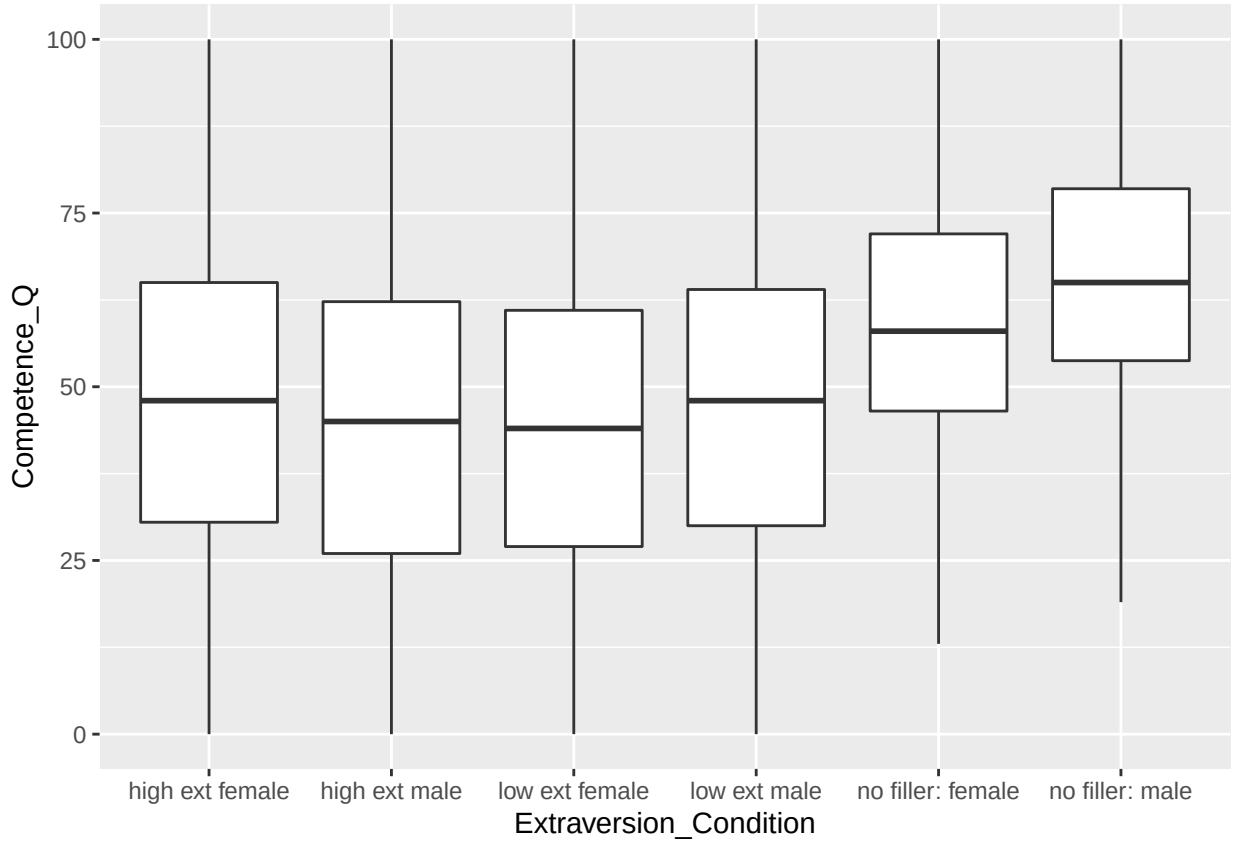
```
#Plot a very basic histogram of all the data
ggplot(rawData, aes(x = Discomfort_Q ))+
 geom_histogram(binwidth = 1)
```




```
#Plot a very basic histogram of all the data
ggplot(rawData, aes(x = Warmth_Q ))+
 geom_histogram(binwidth = 1)
```




```
ggplot(rawData, aes(x=Extraversion_Condition, y=Competence_Q)) +
  geom_boxplot(outlier.shape = NA)
```




```
SexSum <- Extraversion %>%
  group_by(Sex) %>%
  summarise(n = n(),
            mean = mean(Warmth_Q),
            sd = sd(Warmth_Q))
```

```
bartlett.test(Competence_Q ~ Sex, data = Extraversion)
```

```
##
##  Bartlett test of homogeneity of variances
##
## data:  Competence_Q by Sex
## Bartlett's K-squared = 0.041338, df = 1, p-value = 0.8389
```

```
#
 summary(aov(Competence_Q ~ Sex, data = Extraversion))
```

```
##               Df  Sum Sq Mean Sq F value Pr(>F)
## Sex            1     198   198.3   0.342  0.559
## Residuals   1780 1032415   580.0
```

```
#
#
# summary(aov(Discomfort_Q ~ Sex, data = Extraversion))
```

```r
#
#
# summary(aov(Warmth_Q ~ Sex, data = Extraversion))

oneway.test(Competence_Q ~ Sex, data = Extraversion, var.equal = FALSE)
```

```
##
##  One-way analysis of means (not assuming equal variances)
##
## data:  Competence_Q and Sex
## F = 0.34201, num df = 1.0, denom df = 1775.7, p-value = 0.5587
```

```r
summary(aov(Competence_Q ~ Pitch_Category, data = Extraversion))
```

```
##                  Df  Sum Sq Mean Sq F value  Pr(>F)
## Pitch_Category    1    4394    4394   7.607 0.00587 **
## Residuals      1780 1028219     578
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```r
summary(aov(Discomfort_Q ~ Pitch_Category, data = Extraversion))
```

```
##                  Df  Sum Sq Mean Sq F value Pr(>F)
## Pitch_Category    1     156   156.3   0.273  0.601
## Residuals      1780 1019442   572.7
```

```r
summary(aov(Warmth_Q ~  Pitch_Category,data = Extraversion))
```

```
##                  Df  Sum Sq Mean Sq F value Pr(>F)
## Pitch_Category    1    3173    3173    5.53 0.0188 *
## Residuals      1780 1021504     574
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```r
PitchComp <- Extraversion %>%
  group_by(Pitch_Category) %>%
  summarise(n = n(),
            mean = mean(Competence_Q),
            sd = sd(Competence_Q))

PitchWarm <- Extraversion %>%
  group_by(Pitch_Category) %>%
  summarise(n = n(),
            mean = mean(Warmth_Q),
            sd = sd(Warmth_Q))
```

```r
summary(aov(Competence_Q ~ Extraversion, data = Extraversion))
```

```
##                 Df  Sum Sq Mean Sq F value Pr(>F)
## Extraversion     1     124   123.8   0.213  0.644
## Residuals     1780 1032490   580.1
```

```r
summary(aov(Discomfort_Q ~ Extraversion, data = Extraversion))
```

```
##                Df  Sum Sq Mean Sq F value Pr(>F)
## Extraversion    1     274   273.6   0.478   0.49
## Residuals    1780 1019325   572.7
```

```r
summary(aov(Warmth_Q ~ Extraversion, data = Extraversion))
```

```
##                Df  Sum Sq Mean Sq F value Pr(>F)
## Extraversion    1     274   274.0   0.476   0.49
## Residuals    1780 1024403   575.5
```

```r
# Full 2x2x2 within subjects ANOVA
summary(aov(Competence_Q ~ Pitch_Category * Sex * Extraversion, data = Extraversion))
```

```
##                                  Df  Sum Sq Mean Sq F value Pr(>F)
## Pitch_Category                    1    4394    4394   7.660 0.0057 **
## Sex                               1       2       2   0.004 0.9511
## Extraversion                      1    1487    1487   2.593 0.1075
## Pitch_Category:Sex                1    3003    3003   5.234 0.0223 *
## Pitch_Category:Extraversion       1      42      42   0.073 0.7866
## Sex:Extraversion                  1    2276    2276   3.968 0.0465 *
## Pitch_Category:Sex:Extraversion   1    3748    3748   6.533 0.0107 *
## Residuals                      1774 1017661     574
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```r
summary(aov(Discomfort_Q ~ Pitch_Category * Sex * Extraversion, data = Extraversion))
```

```
##                                  Df  Sum Sq Mean Sq F value Pr(>F)
## Pitch_Category                    1     156   156.3   0.273  0.602
## Sex                               1     874   874.2   1.525  0.217
## Extraversion                      1     128   128.2   0.224  0.636
## Pitch_Category:Sex                1     332   332.1   0.579  0.447
## Pitch_Category:Extraversion       1     211   210.6   0.368  0.544
## Sex:Extraversion                  1     130   130.0   0.227  0.634
## Pitch_Category:Sex:Extraversion   1    1031  1031.3   1.799  0.180
## Residuals                      1774 1016736   573.1
```

```r
summary(aov(Warmth_Q ~ Pitch_Category * Sex * Extraversion, data = Extraversion))
```

```
##                                  Df  Sum Sq Mean Sq F value  Pr(>F)
## Pitch_Category                    1    3173    3173   5.575 0.01832 *
## Sex                               1    4713    4713   8.281 0.00405 **
## Extraversion                      1    1370    1370   2.407 0.12101
## Pitch_Category:Sex                1    4025    4025   7.073 0.00790 **
## Pitch_Category:Extraversion       1     290     290   0.509 0.47557
## Sex:Extraversion                  1      11      11   0.020 0.88811
## Pitch_Category:Sex:Extraversion   1    1420    1420   2.495 0.11440
## Residuals                      1774 1009675     569
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```r
summary(aov(Competence_Q ~ Sex, data = NoFiller))
```

```
##              Df Sum Sq Mean Sq F value   Pr(>F)
## Sex           1   5501    5501   13.33 0.000321 ***
## Residuals   238  98201     413
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```r
summary(aov(Discomfort_Q ~ Sex, data = NoFiller))
```

```
##              Df Sum Sq Mean Sq F value Pr(>F)
## Sex           1    179   178.5   0.641  0.424
## Residuals   238  66255   278.4
```

```r
summary(aov(Warmth_Q ~ Sex, data = NoFiller))
```

```
##              Df Sum Sq Mean Sq F value Pr(>F)
## Sex           1   3557    3557   5.461 0.0203 *
## Residuals   238 155027     651
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```r
summary(aov(Competence_Q ~ Pitch_Category  , data = NoFiller))
```

```
##                 Df Sum Sq Mean Sq F value Pr(>F)
## Pitch_Category   1     29    28.7   0.066  0.798
## Residuals      238 103674   435.6
```

```r
summary(aov(Discomfort_Q ~ Pitch_Category  , data = NoFiller))
```

```
##                 Df Sum Sq Mean Sq F value Pr(>F)
## Pitch_Category   1     74    73.7   0.264  0.608
## Residuals      238  66360   278.8
```

```r
summary(aov(Warmth_Q ~ Pitch_Category , data = NoFiller))
```

```
##                 Df Sum Sq Mean Sq F value Pr(>F)
## Pitch_Category   1    785   784.8   1.184  0.278
## Residuals      238 157799   663.0
```

```r
summary(aov(Competence_Q ~ Pitch_Category * Sex , data = NoFiller))
```

```
##                     Df Sum Sq Mean Sq F value   Pr(>F)
## Pitch_Category       1     29      29   0.069 0.792337
## Sex                  1   5501    5501  13.314 0.000324 ***
## Pitch_Category:Sex   1    663     663   1.605 0.206380
## Residuals          236  97509     413
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```r
summary(aov(Discomfort_Q ~ Pitch_Category * Sex , data = NoFiller))
```

```
##                     Df Sum Sq Mean Sq F value Pr(>F)
## Pitch_Category       1     74    73.7   0.264  0.608
## Sex                  1    179   178.5   0.638  0.425
## Pitch_Category:Sex   1    182   182.0   0.651  0.421
## Residuals          236  66000   279.7
```

```r
summary(aov(Warmth_Q ~ Pitch_Category * Sex , data = NoFiller))
```

```
##                     Df Sum Sq Mean Sq F value Pr(>F)
## Pitch_Category       1    785     785   1.203 0.2739
## Sex                  1   3557    3557   5.452 0.0204 *
## Pitch_Category:Sex   1    240     240   0.368 0.5448
## Residuals          236 154002     653
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```r
CompModelSex <- lmer(data = Extraversion, formula = Competence_Q ~ Sex + (1 |Ppt.) + (1|Audiofile), REM

CompModelPitch <- lmer(data = Extraversion, formula = Competence_Q ~ Pitch_Category + (1 |Ppt.) + (1|Au

CompModelExtr <- lmer(data = Extraversion, formula = Competence_Q ~ Extraversion + (1 |Ppt.) + (1|Audio



########################

CompModelSexPitch <- lmer(data = Extraversion, formula = Competence_Q ~ Sex * Pitch_Category + (1 |Ppt.

CompModelPitchExtr <- lmer(data = Extraversion, formula = Competence_Q ~ Extraversion * Pitch_Category

CompModelSexExtr <- lmer(data = Extraversion, formula = Competence_Q ~ Extraversion * Sex + (1 |Ppt.) +

######################


CompModelSexPitchExtr <- lmer(data = Extraversion, formula = Competence_Q ~ Sex * Extraversion* Pitch_Ca

###################
anova(CompModelSex, CompModelSexPitch,CompModelSexExtr,CompModelSexPitchExtr)
```

```
## Data: Extraversion
## Models:
## CompModelSex: Competence_Q ~ Sex + (1 | Ppt.) + (1 | Audiofile)
## CompModelSexPitch: Competence_Q ~ Sex * Pitch_Category + (1 | Ppt.) + (1 | Audiofile)
## CompModelSexExtr: Competence_Q ~ Extraversion * Sex + (1 | Ppt.) + (1 | Audiofile)
## CompModelSexPitchExtr: Competence_Q ~ Sex * Extraversion * Pitch_Category + (1 | Ppt.) + (1 | Audiof
##                       npar   AIC   BIC  logLik deviance   Chisq Df Pr(>Chisq)
## CompModelSex             5 15691 15718 -7840.4    15681
## CompModelSexPitch        7 15688 15727 -7837.1    15674  6.5004  2    0.03877 *
```

```
## CompModelSexExtr          7 15693 15731 -7839.4    15679  0.0000  0
## CompModelSexPitchExtr    11 15688 15748 -7832.8    15666 13.2246  4    0.01023 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
#summary(CompModelBasic)

library(report)

WHNresults <- report(CompModelSexPitchExtr, CI = 95)

summary(WHNresults)
```

```
## We fitted a linear mixed model to predict Competence_Q with Sex. The model
## included Ppt. as random effects. The model's total explanatory power is
## substantial (conditional R2 = 0.44) and the part related to the fixed effects
## alone (marginal R2) is of 0.01. The model's intercept is at 47.33 (95% CI
## [43.15, 51.51]). Within this model:
##
##   - The effect of Sex [Male] is statistically significant and negative (beta =
## -4.56, 95% CI [-8.90, -0.23], t(1771) = -2.06, p = 0.039, Std. beta = -0.19)
##   - The effect of Extraversionlow is statistically significant and negative (beta
## = -5.85, 95% CI [-10.56, -1.13], t(1771) = -2.43, p = 0.015, Std. beta = -0.24)
##   - The effect of Pitch Category [low-pitch] is statistically non-significant and
## negative (beta = -4.68, 95% CI [-15.33, 5.98], t(1771) = -0.86, p = 0.390, Std.
## beta = -0.19)
##   - The interaction effect of Extraversionlow on Sex [Male] is statistically
## significant and positive (beta = 9.29, 95% CI [2.12, 16.45], t(1771) = 2.54, p
## = 0.011, Std. beta = 0.39)
##   - The interaction effect of Pitch Category [low-pitch] on Sex [Male] is
## statistically significant and positive (beta = 13.53, 95% CI [1.44, 25.63],
## t(1771) = 2.19, p = 0.028, Std. beta = 0.56)
##   - The interaction effect of Pitch Category [low-pitch] on Extraversionlow is
## statistically non-significant and positive (beta = 10.33, 95% CI [-1.59,
## 22.26], t(1771) = 1.70, p = 0.089, Std. beta = 0.43)
##   - The interaction effect of Pitch Category [low-pitch] on (Sex [Male] *
## Extraversionlow ) is statistically significant and negative (beta = -17.02, 95%
## CI [-31.31, -2.73], t(1771) = -2.34, p = 0.020, Std. beta = -0.71), We fitted a
## linear mixed model to predict Competence_Q with Extraversion. The model
## included Ppt. as random effects. The model's total explanatory power is
## substantial (conditional R2 = 0.44) and the part related to the fixed effects
## alone (marginal R2) is of 0.01. The model's intercept is at 47.33 (95% CI
## [43.15, 51.51]). Within this model:
##
##   - The effect of Sex [Male] is statistically significant and negative (beta =
## -4.56, 95% CI [-8.90, -0.23], t(1771) = -2.06, p = 0.039, Std. beta = -0.19)
##   - The effect of Extraversionlow is statistically significant and negative (beta
## = -5.85, 95% CI [-10.56, -1.13], t(1771) = -2.43, p = 0.015, Std. beta = -0.24)
##   - The effect of Pitch Category [low-pitch] is statistically non-significant and
## negative (beta = -4.68, 95% CI [-15.33, 5.98], t(1771) = -0.86, p = 0.390, Std.
## beta = -0.19)
##   - The interaction effect of Extraversionlow on Sex [Male] is statistically
## significant and positive (beta = 9.29, 95% CI [2.12, 16.45], t(1771) = 2.54, p
## = 0.011, Std. beta = 0.39)
```

```
##   - The interaction effect of Pitch Category [low-pitch] on Sex [Male] is
## statistically significant and positive (beta = 13.53, 95% CI [1.44, 25.63],
## t(1771) = 2.19, p = 0.028, Std. beta = 0.56)
##   - The interaction effect of Pitch Category [low-pitch] on Extraversionlow is
## statistically non-significant and positive (beta = 10.33, 95% CI [-1.59,
## 22.26], t(1771) = 1.70, p = 0.089, Std. beta = 0.43)
##   - The interaction effect of Pitch Category [low-pitch] on (Sex [Male] *
## Extraversionlow ) is statistically significant and negative (beta = -17.02, 95%
## CI [-31.31, -2.73], t(1771) = -2.34, p = 0.020, Std. beta = -0.71) and We
## fitted a linear mixed model to predict Competence_Q with Pitch_Category. The
## model included Ppt. as random effects. The model's total explanatory power is
## substantial (conditional R2 = 0.44) and the part related to the fixed effects
## alone (marginal R2) is of 0.01. The model's intercept is at 47.33 (95% CI
## [43.15, 51.51]). Within this model:
##
##   - The effect of Sex [Male] is statistically significant and negative (beta =
## -4.56, 95% CI [-8.90, -0.23], t(1771) = -2.06, p = 0.039, Std. beta = -0.19)
##   - The effect of Extraversionlow is statistically significant and negative (beta
## = -5.85, 95% CI [-10.56, -1.13], t(1771) = -2.43, p = 0.015, Std. beta = -0.24)
##   - The effect of Pitch Category [low-pitch] is statistically non-significant and
## negative (beta = -4.68, 95% CI [-15.33, 5.98], t(1771) = -0.86, p = 0.390, Std.
## beta = -0.19)
##   - The interaction effect of Extraversionlow on Sex [Male] is statistically
## significant and positive (beta = 9.29, 95% CI [2.12, 16.45], t(1771) = 2.54, p
## = 0.011, Std. beta = 0.39)
##   - The interaction effect of Pitch Category [low-pitch] on Sex [Male] is
## statistically significant and positive (beta = 13.53, 95% CI [1.44, 25.63],
## t(1771) = 2.19, p = 0.028, Std. beta = 0.56)
##   - The interaction effect of Pitch Category [low-pitch] on Extraversionlow is
## statistically non-significant and positive (beta = 10.33, 95% CI [-1.59,
## 22.26], t(1771) = 1.70, p = 0.089, Std. beta = 0.43)
##   - The interaction effect of Pitch Category [low-pitch] on (Sex [Male] *
## Extraversionlow ) is statistically significant and negative (beta = -17.02, 95%
## CI [-31.31, -2.73], t(1771) = -2.34, p = 0.020, Std. beta = -0.71)
```