```
library(rprime)
```

Warning: package 'rprime' was built under R version 3.5.2

```
library(lme4)
```

Loading required package: Matrix

```
library(lmerTest)
```

```
##
## Attaching package: 'lmerTest'
```

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

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

```
library(EMAtools)
```

Warning: package 'EMAtools' was built under R version 3.5.2

```
library(ggplot2)
```

Warning: package 'ggplot2' was built under R version 3.5.1

```
library(cowplot)
```

```
##
## Attaching package: 'cowplot'
```

```
## The following object is masked from 'package:ggplot2':
##
##     ggsave
```

```
library(dplyr)
```

Warning: package 'dplyr' was built under R version 3.5.1

```
##
## Attaching package: 'dplyr'
```

```
## The following objects are masked from 'package:stats':
##
##     filter, lag
```

```
## The following objects are masked from 'package:base':
##
##     intersect, setdiff, setequal, union
```

```
library(readxl)
theme = theme(panel.grid.major = element_blank(),
              panel.grid.minor = element_blank(),
              panel.background = element_blank(),
              axis.line = element_line(colour = "black"),
              legend.key = element_rect(fill = "white"),
              text = element_text(size = 15))
```

```
################################################################################
big_face = read.csv('face_data.csv')
aged = read.csv('face_data_age.csv')
aged$age[aged$age == -999] = NA

big_face2 = big_face[complete.cases(big_face),]
big_face2 = subset(big_face2, partno != 1170)
tdata = distinct(big_face2[,c('partno','sub_sex')])

table(tdata$sub_sex)
```

```
##
##   0   1
## 228 192
```

```
tdata = merge(tdata, aged, by='partno')
with(tdata, tapply(age, list(sub_sex),mean,na.rm=T))
```

```
##         0        1
## 18.78509 19.32804
```

```
with(tdata, tapply(age, list(sub_sex),sd,na.rm=T))
```

```
##          0         1
## 0.9674648 1.5152792
```

```
summary(big_face2$rt)
```

```
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##       5    1310    1754    2366    2633  157366
```

```
big_face2 = subset(big_face2, rt > 500) # response minimum
big_face2 = subset(big_face2, rt < 45001) # task length


######################### Response Times & accuracy overall
big_face2$sub_sex = factor(big_face2$sub_sex)

rtzscore = scale(big_face2$rt)
summary(abs(rtzscore) < 3)
```

```
##       V1
##  Mode :logical
##  FALSE:238
##  TRUE :13245
```

```
rt_noout = subset(big_face2, abs(rtzscore) < 3)

mod1 = lmer(rt ~ sub_sex + (1 | partno), data = rt_noout)
summary(mod1)
```

```
## Linear mixed model fit by REML. t-tests use Satterthwaite's method [
## lmerModLmerTest]
## Formula: rt ~ sub_sex + (1 | partno)
##    Data: rt_noout
##
## REML criterion at convergence: 229516.4
```

```
## 
## Scaled residuals:
##     Min     1Q Median     3Q    Max
## -1.7670 -0.6142 -0.3135  0.2598  4.9386
## 
## Random effects:
##  Groups   Name        Variance Std.Dev.
##  partno   (Intercept)  116052   340.7
##  Residual             1901734  1379.0
## Number of obs: 13245, groups:  partno, 419
## 
## Fixed effects:
##             Estimate Std. Error      df t value Pr(>|t|)
## (Intercept)  2210.70      27.72  409.67  79.740   <2e-16 ***
## sub_sex1       85.62      41.09  422.14   2.084   0.0378 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## 
## Correlation of Fixed Effects:
##         (Intr)
## sub_sex1 -0.670
```

```r
lme.dscore(mod1, data = big_face2, type='lme4')
```

```
##               t       df         d
## sub_sex1 1.95396 433.2287 0.1877531
```

```r
mod2 = lmer(acc ~ sub_sex + (1 | partno), data = big_face2)
summary(mod2)
```

```
## Linear mixed model fit by REML. t-tests use Satterthwaite's method [
## lmerModLmerTest]
## Formula: acc ~ sub_sex + (1 | partno)
##    Data: big_face2
## 
## REML criterion at convergence: 17626.1
## 
## Scaled residuals:
##     Min     1Q Median     3Q    Max
## -1.8078 -1.3125  0.5790  0.7192  1.3582
## 
## Random effects:
##  Groups   Name        Variance Std.Dev.
##  partno   (Intercept) 0.00753  0.08677
##  Residual             0.21114  0.45950
## Number of obs: 13483, groups:  partno, 419
## 
## Fixed effects:
##              Estimate Std. Error        df t value Pr(>|t|)
## (Intercept)  0.696745   0.007845 389.574395  88.815  < 2e-16 ***
## sub_sex1    -0.047885   0.011645 399.411539  -4.112 4.77e-05 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## 
## Correlation of Fixed Effects:
```

```
##          (Intr)
## sub_sex1 -0.671
```

```r
lme.dscore(mod2, data = big_face2, type='lme4')
```

```
##                 t        df          d
## sub_sex1 -4.111934 399.4115 -0.4114962
```

```r
####################### RT & Acc for male faces
Mfacert = subset(rt_noout, stim_sex == 'Male')
Mfaceac = subset(big_face2, stim_sex == 'Male')

mod3 = lmer(rt ~ sub_sex + (1 | partno), data = Mfacert)
summary(mod3)
```

```
## Linear mixed model fit by REML. t-tests use Satterthwaite's method [
## lmerModLmerTest]
## Formula: rt ~ sub_sex + (1 | partno)
##    Data: Mfacert
##
## REML criterion at convergence: 116569.2
##
## Scaled residuals:
##     Min      1Q  Median      3Q     Max
## -1.6637 -0.6142 -0.3160  0.2632  4.6861
##
## Random effects:
##  Groups   Name        Variance Std.Dev.
##  partno   (Intercept)  106413   326.2
##  Residual             1888006  1374.0
## Number of obs: 6728, groups:  partno, 419
##
## Fixed effects:
##             Estimate Std. Error      df t value Pr(>|t|)
## (Intercept)  2205.82      31.34  409.29  70.373   <2e-16 ***
## sub_sex1      107.47      46.42  415.02   2.315   0.0211 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
##          (Intr)
## sub_sex1 -0.673
```

```r
lme.dscore(mod3, data = Mfacert, type='lme4')
```

```
##                 t        df        d
## sub_sex1 2.314977 415.02 0.22727
```

```r
mod4 = lmer(acc ~ sub_sex + (1 | partno), data = Mfaceac)
summary(mod4)
```

```
## Linear mixed model fit by REML. t-tests use Satterthwaite's method [
## lmerModLmerTest]
## Formula: acc ~ sub_sex + (1 | partno)
##    Data: Mfaceac
##
## REML criterion at convergence: 8500
```

```
## 
## Scaled residuals:
##     Min      1Q  Median      3Q     Max
## -1.8445 -1.3819  0.5339  0.6766  1.2002
## 
## Random effects:
##  Groups   Name        Variance Std.Dev.
##  partno   (Intercept) 0.007733 0.08794
##  Residual             0.196592 0.44339
## Number of obs: 6836, groups:  partno, 419
## 
## Fixed effects:
##               Estimate Std. Error         df t value Pr(>|t|)
## (Intercept)   0.735374   0.009321 402.929659  78.896  < 2e-16 ***
## sub_sex1     -0.051741   0.013802 406.237165  -3.749 0.000203 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## 
## Correlation of Fixed Effects:
##         (Intr)
## sub_sex1 -0.674
```

```r
lme.dscore(mod4, data = Mfaceac, type='lme4')
```

```
##                  t       df          d
## sub_sex1 -3.748836 406.2372 -0.3719946
```

```r
###################### RT & Acc for female faces
Ffacert = subset(rt_noout, stim_sex == 'Female')
Ffaceac = subset(big_face2, stim_sex == 'Female')

mod5 = lmer(rt ~ sub_sex + (1 | partno), data = Ffacert)
summary(mod5)
```

```
## Linear mixed model fit by REML. t-tests use Satterthwaite's method [
## lmerModLmerTest]
## Formula: rt ~ sub_sex + (1 | partno)
##    Data: Ffacert
## 
## REML criterion at convergence: 112628.4
## 
## Scaled residuals:
##     Min      1Q  Median      3Q     Max
## -1.6917 -0.6075 -0.3125  0.2576  4.8478
## 
## Random effects:
##  Groups   Name        Variance Std.Dev.
##  partno   (Intercept)  113811   337.4
##  Residual             1928734  1388.8
## Number of obs: 6492, groups:  partno, 418
## 
## Fixed effects:
##             Estimate Std. Error     df t value Pr(>|t|)
## (Intercept)  2213.86      32.16 403.81  68.838   <2e-16 ***
## sub_sex1       71.93      48.11 420.54   1.495    0.136
```

```
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
##          (Intr)
## sub_sex1 -0.666
```

```
lme.dscore(mod5, data = Ffacert, type='lme4')
```

```
##                 t      df         d
## sub_sex1 1.495206 420.544 0.1458228
```

```
mod6 = lmer(acc ~ sub_sex + (1 | partno), data = Ffaceac)
summary(mod6)
```

```
## Linear mixed model fit by REML. t-tests use Satterthwaite's method [
## lmerModLmerTest]
## Formula: acc ~ sub_sex + (1 | partno)
##    Data: Ffaceac
##
## REML criterion at convergence: 9072.6
##
## Scaled residuals:
##     Min      1Q  Median      3Q     Max
## -1.5020 -1.2760  0.6959  0.7578  0.9946
##
## Random effects:
##  Groups   Name        Variance Std.Dev.
##  partno   (Intercept) 0.003339 0.05778
##  Residual             0.226963 0.47641
## Number of obs: 6622, groups:  partno, 418
##
## Fixed effects:
##              Estimate Std. Error         df t value Pr(>|t|)
## (Intercept)  0.659118   0.008736 390.688171  75.451  < 2e-16 ***
## sub_sex1    -0.046286   0.013108 403.276453  -3.531 0.000461 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
##          (Intr)
## sub_sex1 -0.666
```

```
lme.dscore(mod6, data = Ffaceac, type='lme4')
```

```
##                  t       df          d
## sub_sex1 -3.531223 403.2765 -0.3516849
```

```
##################################################################### PLOTS for overall
dodge = position_dodge(width = 0.8)

r1 = ggplot(rt_noout, aes(sub_sex,y=rt, fill = sub_sex)) +
  geom_violin(aes(fill=sub_sex,color=sub_sex),alpha=.8) +
  geom_point(color="black", size=0.3, position = position_jitter(w=0.05),alpha=.04) +
  geom_boxplot(width=.1, outlier.shape = NA)+
  stat_summary(fun.y = mean,
               geom = "point",
```

```r
                fill = "White",
                color = "Black") +
  stat_summary(fun.data = mean_cl_normal,
                geom = "errorbar",
                position = position_dodge(width = 0.90),
                width = 0.2) +
  theme + theme(legend.position='none')+
  xlab("Sex") +
  ylab("Response Time (ms)") + coord_cartesian(ylim=c(0,9000)) +
  scale_x_discrete(labels = c('Female','Male')) +
  scale_fill_manual(values=c('firebrick3','dodgerblue3')) +
  scale_color_manual(values=c('firebrick3','dodgerblue3'))

mean_acc = data.frame(cbind(as.numeric(names(with(big_face2, tapply(acc, list(partno),mean,na.rm=T)))),
                            unname(with(big_face2, tapply(acc, list(partno),mean,na.rm=T)))))
colnames(mean_acc) = c('partno','accuracy')
tt = distinct(big_face2[,c('partno','sub_sex')])
mean_acc2 = merge(mean_acc,tt,by='partno')


a1 = ggplot(mean_acc2, aes(sub_sex,y=accuracy, fill = sub_sex)) +
  geom_violin(aes(fill=sub_sex,color=sub_sex),alpha=.8) +
  geom_point(color="black", size=0.3, position = position_jitter(w=0.05),alpha=.2) +
  geom_boxplot(width=.1, outlier.shape = NA)+
  stat_summary(fun.y = mean,
                geom = "point",
                fill = "White",
                color = "Black") +
  stat_summary(fun.data = mean_cl_normal,
                geom = "errorbar",
                position = position_dodge(width = 0.90),
                width = 0.2) +
  theme + theme(legend.position='none')+
  xlab("Sex") +
  ylab("Accuracy") + coord_cartesian(ylim=c(0,1)) +
  scale_x_discrete(labels = c('Female','Male')) +
  scale_fill_manual(values=c('firebrick3','dodgerblue3')) +
  scale_color_manual(values=c('firebrick3','dodgerblue3'))

plot_grid(r1,a1, ncol = 1)
```