

# PV2003 Replication - Study 2

```
#Easy standardisation function
z <- function(x,remove.outliers = FALSE,winsorise = FALSE){
  out <- (x - mean(x,na.rm = TRUE))/sd(x,na.rm = TRUE)
  if (remove.outliers == TRUE){
    out <- ifelse(out >3,NA,ifelse(out < -3,NA,out))
  }
  if (winsorise == TRUE){
    out <- ifelse(out > 3,3,ifelse(out < -3,-3,out))
  }
  return(out)
}

#Easy descriptive statistics function
descriptives <- function(data,variables){
  output <- data.frame("variable"=variables,"N"=NA,"min"=NA,"max"=NA,"mean"=NA,"sd"=NA)
  d <- as.data.frame(data[variables])
  for (v in 1:NROW(variables)){
    output[v,"N"] <- sum(!is.na(d[v]))
    output[v,"min"] <- min(d[,v],na.rm=TRUE)
    output[v,"max"] <- max(d[,v],na.rm=TRUE)
    output[v,"mean"] <- mean(d[,v],na.rm=TRUE)
    output[v,"sd"] <- sd(d[,v],na.rm=TRUE)
  }
  print(output)
  return(data)
}
```

## Data processing

```
# load original data
dat_orig <- read_csv(
  "Women's SRA and fem_pref Ciaran MSc.csv",
  col_types = cols() # can override default guess of column types here
)
```

Face preference scores (DV) recoded from 0 to 7 to -3.5 to 3.5:

- 0.5 to 3.5: masculinised face rated
  - ‘slightly more attractive’ (4 = 0.5),
  - ‘somewhat more attractive’ (3 = 1.5),
  - ‘more attractive’ (6 = 2.5) or
  - ‘much more attractive’ (7 = 3.5) than masculinized face.
- -0.5 to -3.5: feminised face rated
  - ‘slightly more attractive’ (3 = -0.5), ‘*somewhat more attractive*’ (2 = -1.5), ‘more attractive’ (1 = -2.5) or
  - ‘much more attractive’ (0 = -3.5) than feminized face.

Predictors:

- Women’s SRA (centred on mean for sample)
- Sex of face (effect coded as male=0.5 and female=-0.5)

```

dat <- dat_orig %>%
  mutate(
    sub_id = row_number(), # create subject IDs
    sra.c = z(sra) # grand-mean center sra
  ) %>%
  gather(face_id, score, female1:male40) %>% # make data long
  mutate(
    # effect-code face sex
    face_sex = gsub("\\d", "", face_id),
    face_sex.e = recode(face_sex, "female" = -0.5, "male" = 0.5),
    # center femininity preference score
    score.c = (score - 3.5) * -1
  )

```

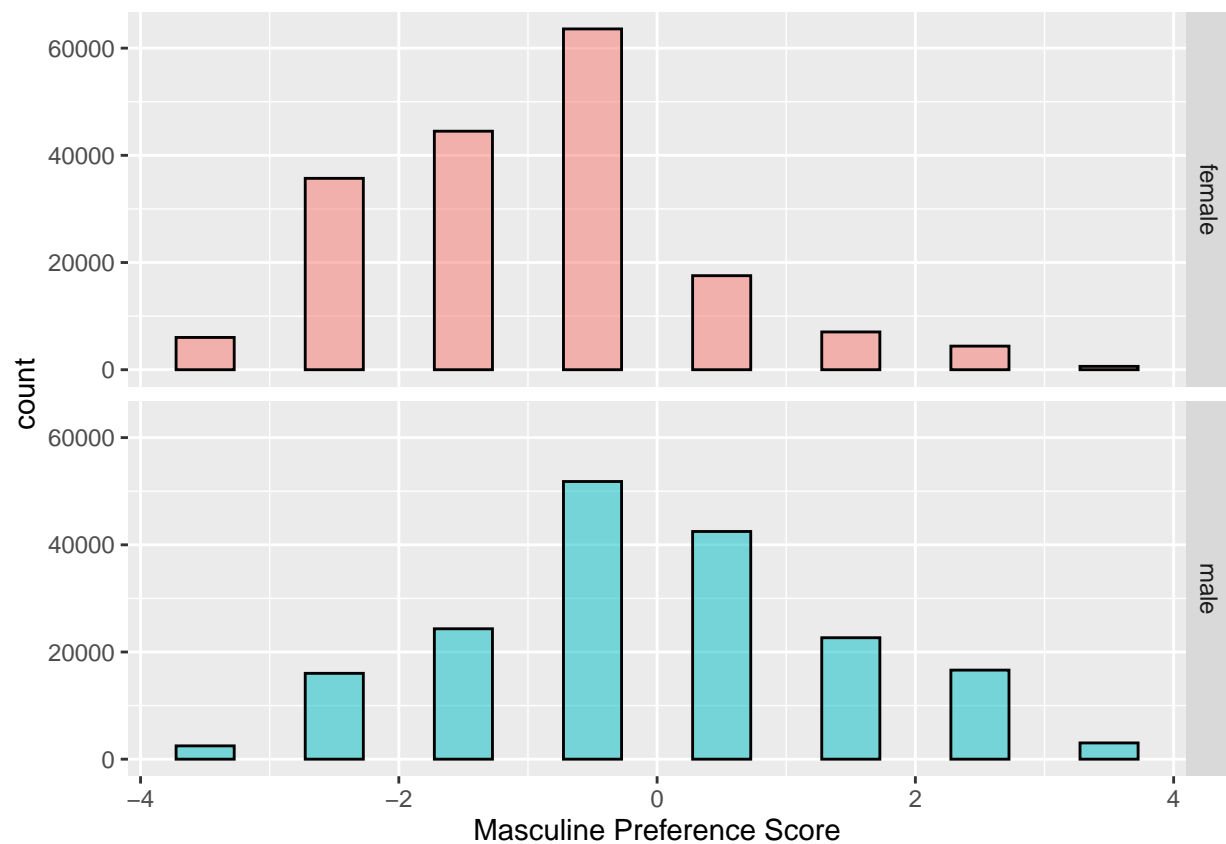
## Descriptive plots

Sense check for the recoding.

```

ggplot(dat, aes(score.c, fill = face_sex)) +
  geom_bar(color = "black", alpha = 0.5, show.legend = FALSE) +
  facet_grid(face_sex~.) +
  xlab("Masculine Preference Score")

```

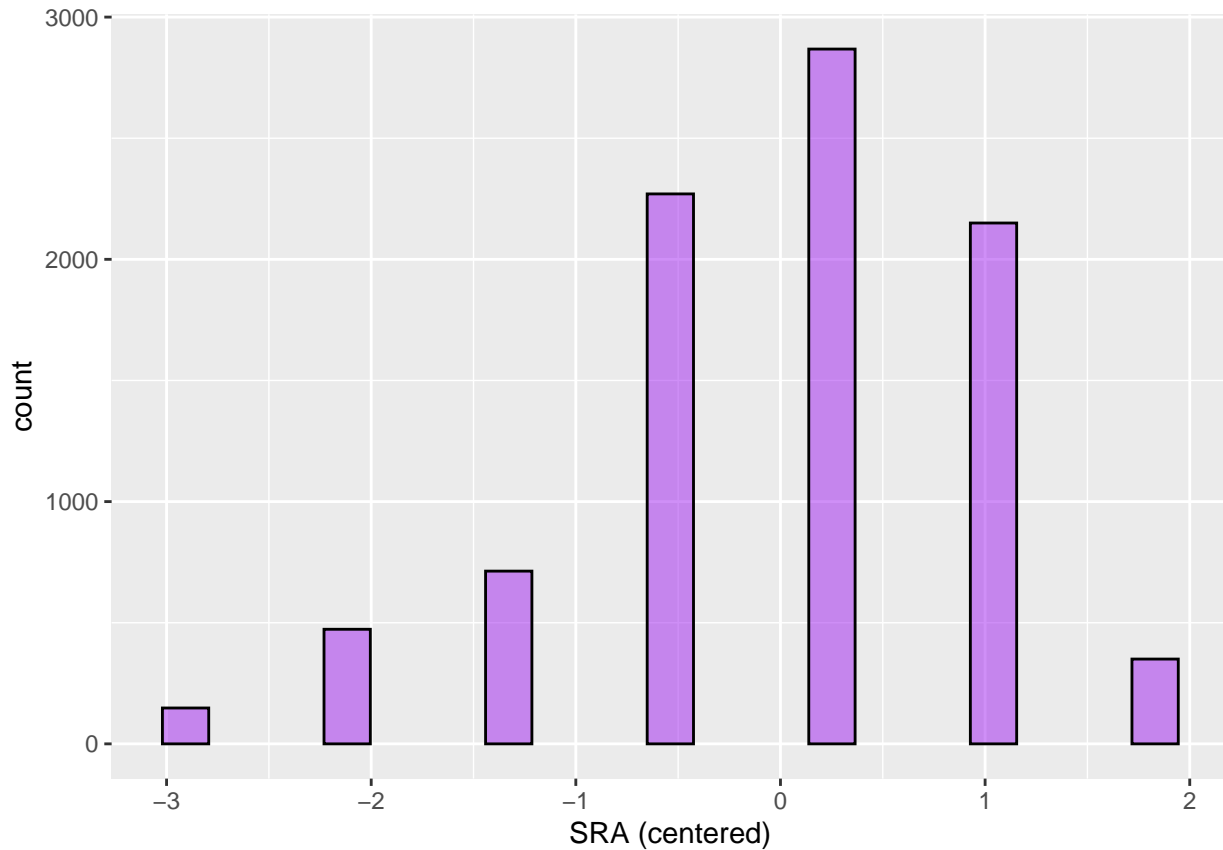


```

group_by(dat, sub_id, sra.c) %>%
  summarise() %>%
  ggplot(aes(sra.c)) +

```

```
geom_bar(color="black", fill = "purple", alpha = 0.5) +
xlab("SRA (centered)")
```



## Main Analysis

All data and analysis code can be found on the OSF (XXX). Preference scores were analyzed using linear mixed effects models using the lme4 (Bates et al., 2015) and lmerTest (Kuznetsova et al., 2015) packages in R statistical software (R Core Team, 2013). The model included fixed effects for sex of face and self-rated attractiveness, as well as their interaction. Sex of face was effect coded (male = 0.5, female = -0.5) and self-rated attractiveness was centred on the mean for the sample. Random intercepts were specified for both participants and stimuli and random slopes were specified maximally (Barr et al., 2013; Barr, 2013).

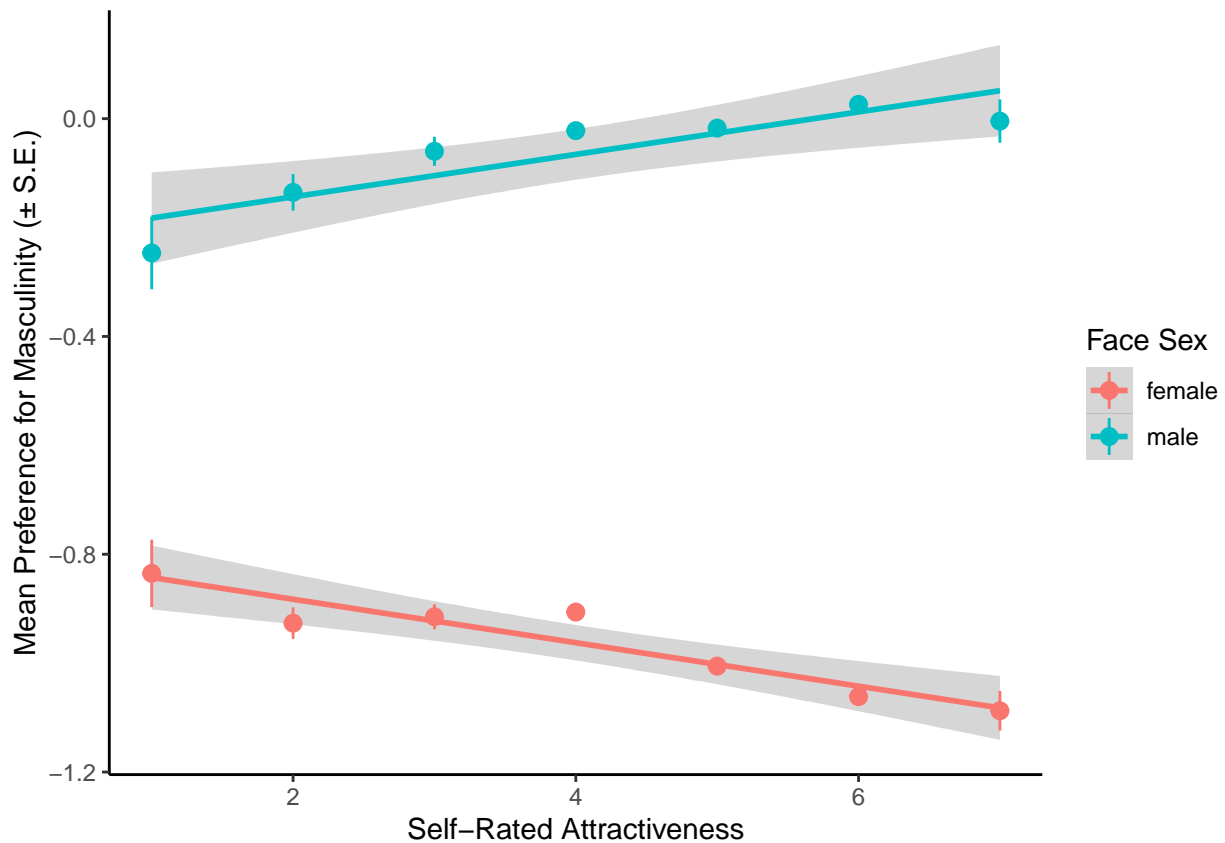
```
a <- lmer(score.c ~ face_sex.e * sra.c +
          (1 + face_sex.e | sub_id) +
          (1 + sra.c | face_id),
          data = dat)
save(a, file = "a.Rdata")
```

```
load("a.Rdata")
summary(a)
```

```
## Linear mixed model fit by REML. t-tests use Satterthwaite's method [
## lmerModLmerTest]
## Formula: score.c ~ face_sex.e * sra.c + (1 + face_sex.e | sub_id) + (1 +
##      sra.c | face_id)
## Data: dat
```

```
##
## REML criterion at convergence: 1168366
##
## Scaled residuals:
##      Min       1Q   Median       3Q      Max
## -4.9007 -0.5937 -0.0135  0.5197  5.0507
##
## Random effects:
##   Groups   Name      Variance Std.Dev. Corr
##   sub_id   (Intercept) 0.2083331 0.45644
##           face_sex.e 0.6228030 0.78918  0.19
##   face_id  (Intercept) 0.1960211 0.44274
##           sra.c       0.0006174 0.02485  0.39
##   Residual                1.3854734 1.17706
## Number of obs: 358880, groups:  sub_id, 8972; face_id, 40
##
## Fixed effects:
##              Estimate Std. Error      df t value Pr(>|t|)
## (Intercept)   -0.501889   0.070197  38.356126  -7.150 1.47e-08 ***
## face_sex.e     0.961826   0.140310  38.266307   6.855 3.73e-08 ***
## sra.c          -0.009412   0.006521 182.942434  -1.443  0.151
## face_sex.e:sra.c 0.100986   0.012108 136.376467   8.340 7.22e-14 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
##              (Intr) fc_sx. sra.c
## face_sex.e   0.001
## sra.c         0.232  0.000
## fc_sx.:sra.c 0.000  0.250  0.095
```

```
dat %>%
  group_by(sub_id, sra, face_sex) %>%
  summarise(mean_score = mean(score.c)) %>%
  ungroup() %>%
  group_by(face_sex, sra) %>%
  summarise(mean = mean(mean_score),
            se = sd(mean_score)/sqrt(n())) %>%
  ggplot(aes(sra, mean, color = face_sex)) +
  geom_smooth(method = lm) +
  geom_pointrange(aes(ymin = mean - se, ymax = mean + se)) +
  xlab("Self-Rated Attractiveness") +
  ylab("Mean Preference for Masculinity (± S.E.)") +
  guides(colour = guide_legend(title = "Face Sex")) +
  theme_classic()
```



```
ggsave("Figure2.png")
```

```
## Saving 6.5 x 4.5 in image
```

Post-hoc analyses (male)

```
a_male <- lmer(score.c ~ sra.c +
  (1 | sub_id) +
  (1 + sra.c | face_id),
  data = filter(dat, face_sex == "male"))
```

```
## Warning in checkConv(attr(opt, "derivs"), opt$par, ctrl =
## control$checkConv, : Model failed to converge with max|grad| = 0.197863
## (tol = 0.002, component 1)
```

```
summary(a_male)
```

```
## Linear mixed model fit by REML. t-tests use Satterthwaite's method [
## lmerModLmerTest]
## Formula: score.c ~ sra.c + (1 | sub_id) + (1 + sra.c | face_id)
## Data: filter(dat, face_sex == "male")
##
## REML criterion at convergence: 607012
##
## Scaled residuals:
##    Min      1Q  Median      3Q      Max
## -4.5827 -0.5759  0.0000  0.5686  4.4082
```

```
##
## Random effects:
##   Groups   Name                Variance Std.Dev. Corr
##   sub_id   (Intercept) 0.4222298 0.64979
##   face_id  (Intercept) 0.2405541 0.49046
##           sra.c         0.0009326 0.03054 0.52
##   Residual                1.5703303 1.25313
## Number of obs: 179440, groups: sub_id, 8972; face_id, 20
##
## Fixed effects:
##               Estimate Std. Error      df t value Pr(>|t|)
## (Intercept) -0.02098    0.10993 20.37818  -0.191 0.850552
## sra.c         0.04108    0.01012 66.05245   4.059 0.000133 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
##      (Intr)
## sra.c 0.351
## convergence code: 0
## Model failed to converge with max|grad| = 0.197863 (tol = 0.002, component 1)
```

### Post-hoc analyses (female)

```
a_female <- lmer(score.c ~ sra.c +
  (1 | sub_id) +
  (1 + sra.c | face_id),
  data = filter(dat, face_sex == "female"))
```

```
## Warning in checkConv(attr(opt, "derivs"), opt$par, ctrl =
## control$checkConv, : Model failed to converge with max|grad| = 0.00776614
## (tol = 0.002, component 1)
```

```
summary(a_female)
```

```
## Linear mixed model fit by REML. t-tests use Satterthwaite's method [
## lmerModLmerTest]
## Formula: score.c ~ sra.c + (1 | sub_id) + (1 + sra.c | face_id)
##   Data: filter(dat, face_sex == "female")
##
## REML criterion at convergence: 558422.6
##
## Scaled residuals:
##      Min       1Q   Median       3Q      Max
## -4.3078 -0.6176 -0.0290  0.4829  5.4389
##
## Random effects:
##   Groups   Name                Variance Std.Dev. Corr
##   sub_id   (Intercept) 0.3059034 0.55309
##   face_id  (Intercept) 0.1414035 0.37604
##           sra.c         0.0002913 0.01707 0.05
##   Residual                1.2006129 1.09572
## Number of obs: 179440, groups: sub_id, 8972; face_id, 20
##
```

```

## Fixed effects:
##           Estimate Std. Error      df t value Pr(>|t|)
## (Intercept) -0.98280    0.08433  19.13356 -11.655 3.89e-10 ***
## sra.c        -0.05990    0.00744 127.99161  -8.051 4.88e-13 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
##      (Intr)
## sra.c 0.026
## convergence code: 0
## Model failed to converge with max|grad| = 0.00776614 (tol = 0.002, component 1)

```

The negative main effect of face sex (estimate = 0.96, s.e. = 0.14, 95% CI = [0.69, 1.24],  $t(38.3) = 6.85$ ,  $p < .001$ ) meant that femininity preferences were weaker for male faces than for female faces. There was no significant main effect of SRA (estimate = -0.01, s.e. = 0.01, 95% CI = [-0.02, 0.00],  $t(182.9) = -1.44$ ,  $p = 0.151$ ). The interaction between SRA and face sex (estimate = 0.10, s.e. = 0.01, 95% CI = [0.08, 0.12],  $t(136.4) = 8.34$ ,  $p < .001$ ) meant that femininity preferences increased with increasing SRA for female faces (estimate = -0.06, s.e. = 0.01, 95% CI = [-0.07, -0.05],  $t(128.0) = -8.05$ ,  $p < .001$ ), but decreased with increasing SRA for male faces (estimate = 0.04, s.e. = 0.01, 95% CI = [0.02, 0.06],  $t(66.1) = 4.06$ ,  $p < .001$ ).