Experiment 4: Supplementary Analyses

2023-02-24

Contents

Setup

Variable names:

- Experiment: exp4_

- Data (_d_)

  - d = main df
  - noOther = just *male* and *female* responses

- Models (_m_)

  - noOther = effect of Conditions (Last vs First+Full) and Name Gender Rating, only on *male* and *female* responses
  - FF = dummy coded with First + Full Name conditions as 0, Last Name condition as 1
  - L = dummy coded with Last Name condition as 0, First + Full Name conditions as 1
  - quad = quadratic effect of Name Gender
  - subjGender = participant gender
  - recenter= center name gender rating by scale (at 4)

Load data and select columns used in model. See data/exp4_data_about.txt for more details.

```
exp4_d <- read.csv("../data/exp4_data.csv",
                   stringsAsFactors = TRUE) %>%
  rename("Participant" = "SubjID", "Item" = "Name") %>%
  select(Participant, Condition, SubjGenderMale,
         GenderRating, Item, Male, Female, Other)
str(exp4_d)
```

```
## 'data.frame':    8771 obs. of  8 variables:
##  $ Participant  : Factor w/ 1253 levels "Exp4_P1","Exp4_P10",..: 520 520 520 520 520 520 520 1143 1
##  $ Condition    : Factor w/ 3 levels "first","full",..: 1 1 1 1 1 1 1 1 1 1 1 ...
##  $ SubjGenderMale: int  1 1 1 1 1 1 1 1 1 1 ...
##  $ GenderRating : num  6.24 2.61 6.82 5.34 1.28 4.39 3.87 5.22 1.24 5.86 ...
##  $ Item         : Factor w/ 63 levels "Ashley Cook",..: 1 18 21 22 25 28 50 5 7 15 ...
##  $ Male         : int  0 1 0 0 1 1 1 1 1 0 ...
##  $ Female       : int  1 0 1 1 0 0 0 0 0 1 ...
##  $ Other        : int  0 0 0 0 0 0 0 0 0 0 ...
```

Center gender rating for names: Original scale from 1 to 7, with 1 as most masculine and 7 as most feminine.
Mean-centered with higher still as more feminine.

```
exp4_d %<>% mutate(GenderRatingCentered = scale(GenderRating, scale = FALSE))
```

Set contrasts for name conditions, now weighted to account for uneven sample sizes. This uses Scott Fraundorf's function for weighted contrasts. (The psycholing package version doesn't support doing 2v1 comparisons, only 1v1.) Condition1 is Last vs First+Full. Condition2 is First vs Full.

```
source("centerfactor.R")
contrasts(exp4_d$Condition) <- centerfactor(exp4_d$Condition, c("last","first"))
contrasts(exp4_d$Condition)
```

```
##             [,1]         [,2]
## first  0.3312051 -0.497605746
## full   0.3312051  0.502394254
## last  -0.6687949  0.002394254
```

Without *Other* Responses

The first supplementary analysis tests if excluding *other* responses (2.99% of total responses) affects the pattern of results.

```
sum(exp4_d$Other)
```

```
## [1] 262
```

```
sum(exp4_d$Other)/length(exp4_d$Other)
```

```
## [1] 0.02987117
```

Exclude *other* responses.

```
exp4_d_noOther <- exp4_d %>% filter(Other == 0)
```

Effect of Name Condition (first name, last name, full name) and first name Gender Rating on likelihood of a *female* response, as opposed to a *male* response, with *other* responses excluded. Participant and Item are again included as random intercepts, with items defined as the unique first, last and first + last name combinations.

```
exp4_m_noOther <- glmer(
  Female ~ Condition * GenderRatingCentered + (1|Participant) + (1|Item),
  data = exp4_d_noOther, family = binomial)
summary(exp4_m_noOther)
```

```
## Generalized linear mixed model fit by maximum likelihood (Laplace
##   Approximation) [glmerMod]
##  Family: binomial  ( logit )
## Formula: Female ~ Condition * GenderRatingCentered + (1 | Participant) +
##     (1 | Item)
##    Data: exp4_d_noOther
##
##      AIC      BIC   logLik deviance df.resid
##   8737.3   8793.7  -4360.6   8721.3     8501
##
## Scaled residuals:
##     Min      1Q  Median      3Q     Max
## -3.4146 -0.5648 -0.2574  0.5646  4.7423
##
## Random effects:
##  Groups      Name        Variance Std.Dev.
##  Participant (Intercept) 0.05031  0.2243
##  Item        (Intercept) 0.36891  0.6074
## Number of obs: 8509, groups:  Participant, 1232; Item, 63
##
## Fixed effects:
##                                Estimate Std. Error z value Pr(>|z|)
## (Intercept)                    -0.16411    0.08196  -2.002   0.0452 *
## Condition1                      0.13514    0.05783   2.337   0.0194 *
## Condition2                      0.11302    0.06837   1.653   0.0983 .
## GenderRatingCentered            0.76972    0.04650  16.554   <2e-16 ***
## Condition1:GenderRatingCentered 0.13701    0.03522   3.890   0.0001 ***
## Condition2:GenderRatingCentered -0.09189   0.04315  -2.129   0.0332 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
##             (Intr) Cndtn1 Cndtn2 GndrRC C1:GRC
## Condition1   0.016
## Condition2  -0.010 -0.012
## GndrRtngCnt -0.022  0.005  0.013
## Cndtn1:GnRC  0.004 -0.101  0.020  0.038
## Cndtn2:GnRC  0.012  0.020 -0.085 -0.025 -0.038
```

Compared to the main model:

- Intercept and Condition2:GenderRatingCentered (difference between Last Name and First+Full name conditions) potentially smaller differences

- Condition2 now trending

Odds Ratios: Intercept

```
exp(get_intercept(exp4_m_noOther))
```

```
## [1] 0.8486503
```

```
exp(-get_intercept(exp4_m_noOther))
```

```
## [1] 1.178342
```

0.84x less likely to recall as female overall (or: 1.18x more likely to recall as male overall), p<.05

Odds Ratios: Last vs First+Full

```
exp4_m_noOther %>% tidy() %>%
  filter(term=="Condition1") %>% pull(estimate) %>% exp()
```

```
## [1] 1.144697
```

1.14x more likely to recall as female in First + Full compared to Last, p<.05

Odds Ratios: Last Only

Dummy code with Last Name as 0, so that intercept is the Last Name condition only.

```
exp4_d_noOther %<>% mutate(Condition_Last = case_when(
  Condition == "first" ~ 1,
  Condition == "full"  ~ 1,
  Condition == "last"  ~ 0))
exp4_d_noOther$Condition_Last %<>% as.factor()
```

```
exp4_m_noOther_L <- glmer(
  Female ~ Condition_Last + (1|Participant) + (1|Item),
  data = exp4_d_noOther, family = binomial)
summary(exp4_m_noOther_L)
```

```
## Generalized linear mixed model fit by maximum likelihood (Laplace
##   Approximation) [glmerMod]
##  Family: binomial  ( logit )
## Formula: Female ~ Condition_Last + (1 | Participant) + (1 | Item)
##    Data: exp4_d_noOther
```

```
## 
##      AIC      BIC   logLik deviance df.resid
##   8858.6   8886.8  -4425.3   8850.6     8505
## 
## Scaled residuals:
##     Min      1Q  Median      3Q     Max
## -3.0926 -0.5697 -0.2723  0.5620  4.0294
## 
## Random effects:
##  Groups      Name        Variance Std.Dev.
##  Participant (Intercept) 0.0476   0.2182
##  Item        (Intercept) 2.2803   1.5101
## Number of obs: 8509, groups:  Participant, 1232; Item, 63
## 
## Fixed effects:
##                 Estimate Std. Error z value Pr(>|z|)
## (Intercept)     -0.27235    0.19639  -1.387  0.16553
## Condition_Last1  0.16052    0.05804   2.766  0.00568 **
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## 
## Correlation of Fixed Effects:
##             (Intr)
## Condtn_Lst1 -0.198
```

```
exp(get_intercept(exp4_m_noOther_L))
```

```
## [1] 0.7615914
```

```
exp(-get_intercept(exp4_m_noOther_L))
```

```
## [1] 1.31304
```

0.76x times less likely to recall as female in the Last Name condition (or: 1.31x more likely to recall as male in the Last Name condition), p=.17

Odds Ratios: First and Full Only

Dummy code with First and Full Name as 0, so that intercept is average for these two conditions.

```
exp4_d_noOther %<>% mutate(Condition_FF = case_when(
  Condition == "first" ~ 0,
  Condition == "full"  ~ 0,
  Condition == "last"  ~ 1))
exp4_d_noOther$Condition_FF %<>% as.factor()
```

```
exp4_m_noOther_FF <- glmer(
  Female ~ Condition_FF + (1|Participant) + (1|Item),
  data = exp4_d_noOther, family = binomial)
summary(exp4_m_noOther_FF)
```

```
## Generalized linear mixed model fit by maximum likelihood (Laplace
##   Approximation) [glmerMod]
##  Family: binomial  ( logit )
## Formula: Female ~ Condition_FF + (1 | Participant) + (1 | Item)
##    Data: exp4_d_noOther
##
##      AIC      BIC   logLik deviance df.resid
##   8858.6   8886.8  -4425.3   8850.6     8505
##
## Scaled residuals:
##     Min      1Q  Median      3Q     Max
## -3.0926 -0.5697 -0.2723  0.5620  4.0294
##
## Random effects:
##  Groups      Name        Variance Std.Dev.
##  Participant (Intercept) 0.04761  0.2182
##  Item        (Intercept) 2.28036  1.5101
## Number of obs: 8509, groups:  Participant, 1232; Item, 63
##
## Fixed effects:
##              Estimate Std. Error z value Pr(>|z|)
## (Intercept)  -0.11182    0.19346  -0.578  0.56327
## Condition_FF1 -0.16052    0.05804  -2.766  0.00568 **
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
##            (Intr)
## Conditn_FF1 -0.099
```

```
exp(get_intercept(exp4_m_noOther_FF))
```

```
## [1] 0.8942089
```

```
exp(-get_intercept(exp4_m_noOther_FF))
```

```
## [1] 1.118307
```

0.89x less likely to recall as female in First and Full Name conditions (or: 1.12x more likely to recall as male in First and Full Name conditions), p=0.56

Quadratic Name Gender Rating

The second supplementary analysis tested the effect of squared name gender rating, such that larger values meant names with stronger gender associations (masc or fem), and smaller values meant names with weaker gender associations.

```
exp4_d %<>% mutate(GenderRatingSquared = GenderRatingCentered^2)
```

```
exp4_m_quad <- glmer(
```

```
  Female ~ Condition*GenderRatingCentered + Condition*GenderRatingSquared +
    (1|Participant) + (1|Item),
  data = exp4_d, family = binomial)
summary(exp4_m_quad)
```

```
## Generalized linear mixed model fit by maximum likelihood (Laplace
##   Approximation) [glmerMod]
##  Family: binomial  ( logit )
## Formula:
## Female ~ Condition * GenderRatingCentered + Condition * GenderRatingSquared +
##     (1 | Participant) + (1 | Item)
##    Data: exp4_d
##
##      AIC      BIC   logLik deviance df.resid
##   9142.9   9220.8  -4560.4   9120.9     8760
##
## Scaled residuals:
##     Min      1Q  Median      3Q     Max
## -3.2147 -0.5741 -0.2557  0.5736  5.9910
##
## Random effects:
##  Groups      Name        Variance Std.Dev.
##  Participant (Intercept) 0.2036   0.4512
##  Item        (Intercept) 0.3482   0.5901
## Number of obs: 8771, groups:  Participant, 1253; Item, 63
##
## Fixed effects:
##                                 Estimate Std. Error z value Pr(>|z|)
## (Intercept)                     -0.36856    0.11558  -3.189 0.001429 **
## Condition1                       0.16075    0.08016   2.005 0.044922 *
## Condition2                      -0.07644    0.09273  -0.824 0.409751
## GenderRatingCentered             0.77986    0.04638  16.814  < 2e-16 ***
## GenderRatingSquared              0.03431    0.02628   1.306 0.191644
## Condition1:GenderRatingCentered  0.13226    0.03480   3.800 0.000145 ***
## Condition2:GenderRatingCentered -0.09190    0.04261  -2.157 0.031020 *
## Condition1:GenderRatingSquared  -0.01425    0.01933  -0.737 0.461071
## Condition2:GenderRatingSquared   0.05969    0.02351   2.539 0.011119 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
##            (Intr) Cndtn1 Cndtn2 GndrRC GndrRS C1:GRC C2:GRC C1:GRS
## Condition1  0.002
## Condition2 -0.003 -0.002
## GndrRtngCnt -0.173  0.003 -0.005
## GndrRtngSqr -0.717 -0.005  0.005  0.212
## Cndtn1:GnRC  0.001 -0.165 -0.009  0.038 -0.003
## Cndtn2:GnRC -0.004 -0.008 -0.154 -0.027  0.029 -0.043
## Cndtn1:GnRS -0.005 -0.636  0.007 -0.003  0.029  0.117  0.056
## Cndtn2:GnRS  0.005  0.006 -0.620  0.034 -0.027  0.058  0.095 -0.045
```

- Condition (F v F) * Quadratic Gender Rating interaction, but n.s. after correction for multiple comparisons, so not making a big deal of it

Participant Gender

Setup/Data Summary

The third supplementary analysis looks at participant gender: if male participants show a larger bias to recall the character as male than non-male participants.

Participants entered their gender in a free-response box.

```
exp4_d %>% group_by(SubjGenderMale) %>%
  summarise(total = n_distinct(Participant)) %>% kable()
```

SubjGenderMale	total
0	558
1	604
NA	91

For this analysis, we exclude participants who did not respond (N=91). Because there are not enough participants to create 3 groups, we compare male to non-male participants. Male (N=602) and transgender male (N=1) are coded as 1, and female (N=555), nonbinary (N=3), and transgender female (N=1) are coded as 0.

Summary of responses by condition and participant gender:

```
exp4_d_subjGender <- exp4_d %>%
  filter(!is.na(SubjGenderMale)) %>%
  mutate(ResponseAll = case_when(
    Male   == 1 ~ "Male",
    Female == 1 ~ "Female",
    Other  == 1 ~ "Other"))

exp4_d_subjGender %>% group_by(SubjGenderMale) %>%
  summarise(total = n_distinct(Participant)) %>%
  kable()
```

SubjGenderMale	total
0	558
1	604

Participant gender is mean centered effects coded, comparing non-male participants to male participants.

```
exp4_d_subjGender$SubjGenderMale %<>% as.factor()
contrasts(exp4_d_subjGender$SubjGenderMale) = cbind("NM_M"=c(-.5, .5))
contrasts(exp4_d_subjGender$SubjGenderMale)
```

```
##   NM_M
## 0 -0.5
## 1  0.5
```

Model: Condition * Name Gender * Participant Gender

Effects of Name Condition (first name, full name), the first name's Gender Rating (centered, positive=more feminine), and Participant Gender (non-male vs. male) on the likelihood of a *female* response as opposed to *male* or *other* responses.

```r
exp4_m_subjGender <- glmer(
  Female ~ Condition * GenderRatingCentered * SubjGenderMale +
          (1|Participant) + (1|Item),
  data = exp4_d_subjGender, family = binomial)
summary(exp4_m_subjGender)
```

```
## Generalized linear mixed model fit by maximum likelihood (Laplace
##   Approximation) [glmerMod]
## Family: binomial  ( logit )
## Formula: Female ~ Condition * GenderRatingCentered * SubjGenderMale +
##     (1 | Participant) + (1 | Item)
##    Data: exp4_d_subjGender
##
##      AIC      BIC   logLik deviance df.resid
##   8483.2   8581.2  -4227.6   8455.2     8120
##
## Scaled residuals:
##     Min      1Q  Median      3Q     Max
## -3.4045 -0.5729 -0.2630  0.5804  4.8534
##
## Random effects:
##  Groups      Name        Variance Std.Dev.
##  Participant (Intercept) 0.1822   0.4269
##  Item        (Intercept) 0.3674   0.6061
## Number of obs: 8134, groups:  Participant, 1162; Item, 63
##
## Fixed effects:
##                                                    Estimate Std. Error z value
## (Intercept)                                        -0.24986    0.08273  -3.020
## Condition1                                          0.14936    0.06380   2.341
## Condition2                                          0.07757    0.07463   1.039
## GenderRatingCentered                                0.76492    0.04662  16.407
## SubjGenderMaleNM_M                                 -0.20190    0.06077  -3.322
## Condition1:GenderRatingCentered                     0.09614    0.03622   2.654
## Condition2:GenderRatingCentered                    -0.09863    0.04345  -2.270
## Condition1:SubjGenderMaleNM_M                      -0.01404    0.12799  -0.110
## Condition2:SubjGenderMaleNM_M                      -0.14467    0.14936  -0.969
## GenderRatingCentered:SubjGenderMaleNM_M            -0.02008    0.03494  -0.575
## Condition1:GenderRatingCentered:SubjGenderMaleNM_M  0.04140    0.07267   0.570
## Condition2:GenderRatingCentered:SubjGenderMaleNM_M -0.05277    0.08694  -0.607
##                                                    Pr(>|z|)
## (Intercept)                                        0.002526 **
## Condition1                                         0.019232 *
## Condition2                                         0.298617
## GenderRatingCentered                                < 2e-16 ***
## SubjGenderMaleNM_M                                 0.000892 ***
## Condition1:GenderRatingCentered                    0.007950 **
## Condition2:GenderRatingCentered                    0.023221 *
## Condition1:SubjGenderMaleNM_M                      0.912633
## Condition2:SubjGenderMaleNM_M                      0.332749
## GenderRatingCentered:SubjGenderMaleNM_M            0.565577
## Condition1:GenderRatingCentered:SubjGenderMaleNM_M 0.568875
## Condition2:GenderRatingCentered:SubjGenderMaleNM_M 0.543834
```

```
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
##              (Intr) Cndtn1 Cndtn2 GndrRC SGMNM_ Cn1:GRC Cn2:GRC C1:SGM C2:SGM
## Condition1   0.009
## Condition2  -0.007 -0.007
## GndrRtngCnt -0.029  0.007  0.012
## SbjGndMNM_M -0.012  0.041 -0.042 -0.018
## Cndtn1:GnRC  0.005 -0.122  0.017  0.025 -0.017
## Cndtn2:GnRC  0.012  0.017 -0.104 -0.024  0.000 -0.035
## Cn1:SGMNM_M  0.014 -0.066 -0.028 -0.002  0.019 -0.019   0.000
## Cn2:SGMNM_M -0.014 -0.031 -0.005 -0.002 -0.011  0.000  -0.041  -0.007
## GRC:SGMNM_M -0.015 -0.018  0.001 -0.013 -0.112  0.060  -0.052   0.009  0.024
## C1:GRC:SGMN -0.004 -0.020  0.000  0.016  0.010 -0.086  -0.036  -0.123  0.018
## C2:GRC:SGMN -0.001  0.000 -0.041 -0.018  0.024 -0.038   0.002   0.017 -0.103
##              GRC:SG C1:GRC:
## Condition1
## Condition2
## GndrRtngCnt
## SbjGndMNM_M
## Cndtn1:GnRC
## Cndtn2:GnRC
## Cn1:SGMNM_M
## Cn2:SGMNM_M
## GRC:SGMNM_M
## C1:GRC:SGMN  0.056
## C2:GRC:SGMN -0.050 -0.034
```

- Male participants less likely to recall character as female than non-male participants overall.

- No other interactions with participant gender significant.

Gender Rating Centering

The first name gender ratings aren't perfectly centered, partially because mostly-feminine/somewhat-masculine names are much less common than mostly-masculine/somewhat-feminine names.

```
mean(exp4_d$GenderRating, na.rm = TRUE)
```

```
## [1] 4.206052
```

Does it make a difference if we center it on 4, the mean of the scale, instead of 4.21, the mean of the items?

```
exp4_d %<>% mutate(GenderRating4 = GenderRating - 4)
```

```
exp4_m_recenter <- glmer(
  Female ~ Condition * GenderRating4 + (1|Participant) + (1|Item),
  data = exp4_d, family = binomial)
summary(exp4_m_recenter)
```

```
## Generalized linear mixed model fit by maximum likelihood (Laplace
##   Approximation) [glmerMod]
##  Family: binomial  ( logit )
## Formula: Female ~ Condition * GenderRating4 + (1 | Participant) + (1 |
##      Item)
##    Data: exp4_d
##
##      AIC      BIC   logLik deviance df.resid
##   9145.4   9202.1  -4564.7   9129.4     8763
##
## Scaled residuals:
##     Min      1Q  Median      3Q     Max
## -3.4531 -0.5754 -0.2627  0.5724  5.4530
##
## Random effects:
##  Groups      Name        Variance Std.Dev.
##  Participant (Intercept) 0.2014   0.4488
##  Item        (Intercept) 0.3599   0.5999
## Number of obs: 8771, groups:  Participant, 1253; Item, 63
##
## Fixed effects:
##                         Estimate Std. Error z value Pr(>|z|)
## (Intercept)             -0.41350    0.08242  -5.017 5.25e-07 ***
## Condition1               0.09925    0.06296   1.576 0.114920
## Condition2               0.08956    0.07392   1.212 0.225681
## GenderRating4            0.76408    0.04590  16.647  < 2e-16 ***
## Condition1:GenderRating4  0.13147    0.03451   3.809 0.000139 ***
## Condition2:GenderRating4 -0.10289    0.04204  -2.447 0.014394 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
##            (Intr) Cndtn1 Cndtn2 GndrR4 C1:GR4
## Condition1   0.012
## Condition2  -0.015 -0.020
## GenderRtng4 -0.143 -0.002  0.015
## Cndtn1:GnR4 -0.003 -0.232  0.021  0.035
## Cndtn2:GnR4  0.014  0.021 -0.227 -0.030 -0.046
```

Here, the beta estimate for the intercept has a larger absolute value (-0.41 vs -0.26), and the beta estimates for the condition effects is slightly different (0.10 vs 0.13; 0.09 vs 0.07).