Experiment 3: Ratings Analysis

2022-08-12

Contents

Setup

Variable names:

- Experiment: exp3
- Type
  - d = data
  - m = model
  - p = plot
  - est = log odds estimate from model
  - OR = odds ratio converted from est

- Analysis
  - Lik = likability ratings
  - Acc = accomplishment ratings
  - Imp = importance ratings

Load data and select columns used in model. See data/exp3_data_about.txt for more details.

```r
exp3_d <- read.csv("../data/exp3_data.csv", stringsAsFactors=TRUE) %>%
  rename("Participant"="SubjID", "Item"="Name") %>%
  select(Participant, Condition, GenderRating, Item,
         He, She, Other,
         Likeable, Accomplished, Important)
str(exp3_d)
```

```
## 'data.frame':    8904 obs. of  10 variables:
##  $ Participant : Factor w/ 1272 levels "Exp3_P1","Exp3_P10",..: 974 974 974 974 974 974 974 330 330 :
##  $ Condition   : Factor w/ 3 levels "first","full",..: 1 1 1 1 1 1 1 1 1 1 ...
```

```
##  $ GenderRating: num  5.22 1.24 5.86 3.75 6.78 4.34 2.41 6.24 2.61 6.82 ...
##  $ Item       : Factor w/ 63 levels "Ashley Cook",..: 6 9 13 43 47 52 62 2 16 20 ...
##  $ He         : int  0 1 0 0 0 0 1 0 1 0 ...
##  $ She        : int  0 0 1 0 1 1 0 0 0 1 ...
##  $ Other      : int  1 0 0 1 0 0 0 1 0 0 ...
##  $ Likeable   : int  2 2 2 2 2 1 2 2 1 2 ...
##  $ Accomplished: int  2 1 1 2 1 1 2 3 1 1 ...
##  $ Important  : int  2 1 2 2 1 1 2 2 1 1 ...
```

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.

```
exp3_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(exp3_d$Condition) <- centerfactor(
  exp3_d$Condition, c("last","first"))
contrasts(exp3_d$Condition)
```

```
##               [,1]        [,2]
## first   0.4009434 -0.48113208
## full    0.4009434  0.51886792
## last   -0.5990566  0.01886792
```

Flip ratings from 1=most likeable/accomplished/important to 7=most L/A/I, to make interpreting models easier, then mean-center.

```
exp3_d %<>% mutate(
  LikeableFlip = recode(Likeable,
      '1'=7, '2'=6, '3'=5, '4'=4, '5'=3, '6'=2, '7'=1),
  AccomplishedFlip = recode(Accomplished,
      '1'=7, '2'=6, '3'=5, '4'=4, '5'=3, '6'=2, '7'=1),
  ImportantFlip = recode(Important,
      '1'=7, '2'=6, '3'=5, '4'=4, '5'=3, '6'=2, '7'=1),
  LikeableCentered =
      scale(LikeableFlip, scale=FALSE),
  AccomplishedCentered =
      scale(AccomplishedFlip, scale=FALSE),
  ImportantCentered =
    scale(ImportantFlip, scale=FALSE))
str(exp3_d)
```

```
## 'data.frame':    8904 obs. of  17 variables:
##  $ Participant        : Factor w/ 1272 levels "Exp3_P1","Exp3_P10",..: 974 974 974 974 974 974 974 9
##  $ Condition          : Factor w/ 3 levels "first","full",..: 1 1 1 1 1 1 1 1 1 1 1 ...
##   ..- attr(*, "contrasts")= num [1:3, 1:2] 0.401 0.401 -0.599 -0.481 0.519 ...
##   .. ..- attr(*, "dimnames")=List of 2
```

```
##   .. .. ..$ : chr [1:3] "first" "full" "last"
##   .. .. ..$ : NULL
## $ GenderRating      : num  5.22 1.24 5.86 3.75 6.78 4.34 2.41 6.24 2.61 6.82 ...
## $ Item              : Factor w/ 63 levels "Ashley Cook",..: 6 9 13 43 47 52 62 2 16 20 ...
## $ He                : int  0 1 0 0 0 0 1 0 1 0 ...
## $ She               : int  0 0 1 0 1 1 0 0 0 1 ...
## $ Other             : int  1 0 0 1 0 0 0 1 0 0 ...
## $ Likeable          : int  2 2 2 2 2 1 2 2 2 1 2 ...
## $ Accomplished      : int  2 1 1 2 1 1 2 3 1 1 ...
## $ Important         : int  2 1 2 2 1 1 2 2 1 1 ...
## $ GenderRatingCentered: num [1:8904, 1] 1.014 -2.966 1.654 -0.456 2.574 ...
##   ..- attr(*, "scaled:center")= num 4.21
## $ LikeableFlip      : num  6 6 6 6 6 7 6 6 7 6 ...
## $ AccomplishedFlip  : num  6 7 7 6 7 7 6 5 7 7 ...
## $ ImportantFlip     : num  6 7 6 6 7 7 6 6 7 7 ...
## $ LikeableCentered  : num [1:8904, 1] 0.271 0.271 0.271 0.271 0.271 ...
##   ..- attr(*, "scaled:center")= num 5.73
## $ AccomplishedCentered: num [1:8904, 1] 0.147 1.147 1.147 0.147 1.147 ...
##   ..- attr(*, "scaled:center")= num 5.85
## $ ImportantCentered : num [1:8904, 1] 0.585 1.585 0.585 0.585 1.585 ...
##   ..- attr(*, "scaled:center")= num 5.42
```

Likeability

Summary statistics:

```
summary(exp3_d$Likeable)
```

```
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##   1.000   1.000   2.000   2.271   3.000   7.000
```

```
summary(exp3_d$LikeableFlip)
```

```
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##   1.000   5.000   6.000   5.729   7.000   7.000
```

```
sd(exp3_d$Likeable)
```

```
## [1] 1.316101
```

Does the Likeability rating of the character predict the likelihood of *she* as opposed to *he* and *other* responses? The maximal model includes all interactions, then random intercepts by item but not by participant.

```
exp3_m_lik <- buildmer(
  formula=(She ~ Condition * GenderRatingCentered *
        LikeableCentered + (1|Participant) + (1|Item)),
  data=exp3_d, family=binomial,
  direction=c("order"), quiet=TRUE)

summary(exp3_m_lik)
```

```
## Generalized linear mixed model fit by maximum likelihood (Laplace
##   Approximation) (p-values based on Wald z-scores) [glmerMod]
##  Family: binomial  ( logit )
## Formula: She ~ 1 + GenderRatingCentered + LikeableCentered + Condition +
##     GenderRatingCentered:Condition + GenderRatingCentered:LikeableCentered +
##     LikeableCentered:Condition + GenderRatingCentered:LikeableCentered:Condition +
##     (1 | Item)
##    Data: exp3_d
##
##      AIC      BIC   logLik deviance df.resid
##   7977.9   8070.1  -3975.9   7951.9     8891
##
## Scaled residuals:
##     Min      1Q  Median      3Q     Max
## -2.6061 -0.5430 -0.1465  0.6311 10.0731
##
## Random effects:
##  Groups Name        Variance Std.Dev.
##  Item   (Intercept) 0.3524   0.5936
## Number of obs: 8904, groups:  Item, 63
##
## Fixed effects:
##                                                        Estimate Std. Error   z value
## (Intercept)                                            -1.37455    0.08926 -15.39993
## GenderRatingCentered                                    1.03162    0.05487  18.80280
## LikeableCentered                                        0.08004    0.02805   2.85360
## Condition1                                              0.13853    0.07103   1.95033
## Condition2                                              0.06855    0.08957   0.76529
## GenderRatingCentered:Condition1                         0.08800    0.04529   1.94320
## GenderRatingCentered:Condition2                        -0.06416    0.05848  -1.09716
## GenderRatingCentered:LikeableCentered                   0.02698    0.01736   1.55389
## LikeableCentered:Condition1                            -0.06365    0.05656  -1.12521
## LikeableCentered:Condition2                             0.06998    0.06931   1.00959
## GenderRatingCentered:LikeableCentered:Condition1        0.06193    0.03485   1.77726
## GenderRatingCentered:LikeableCentered:Condition2       -0.03563    0.04395  -0.81076
##                                                        Pr(>|z|) Pr(>|t|)
## (Intercept)                                               0.000  < 2e-16 ***
## GenderRatingCentered                                      0.000  < 2e-16 ***
## LikeableCentered                                          0.004  0.00432 **
## Condition1                                                0.051  0.05114 .
## Condition2                                                0.444  0.44410
## GenderRatingCentered:Condition1                           0.052  0.05199 .
## GenderRatingCentered:Condition2                           0.273  0.27257
## GenderRatingCentered:LikeableCentered                     0.120  0.12021
## LikeableCentered:Condition1                               0.260  0.26050
## LikeableCentered:Condition2                               0.313  0.31269
## GenderRatingCentered:LikeableCentered:Condition1          0.076  0.07552 .
## GenderRatingCentered:LikeableCentered:Condition2          0.418  0.41751
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
##             (Intr) GndrRC LkblCn Cndtn1 Cndtn2 GRC:C1 GRC:C2 GnRC:LC LkC:C1
## GndrRtngCnt -0.287
```

```
## LikeblCntrd -0.005 -0.003
## Condition1   0.000 -0.005  0.051
## Condition2  -0.017  0.018 -0.072  0.017
## GndrRtnC:C1  0.001  0.016 -0.044 -0.601  0.000
## GndrRtnC:C2  0.016 -0.023  0.048  0.001 -0.586  0.008
## GndrRtnC:LC  0.002  0.005 -0.623 -0.044  0.050  0.044 -0.090
## LkblCntr:C1  0.029 -0.030 -0.054 -0.073 -0.055  0.052  0.037  0.044
## LkblCntr:C2 -0.034  0.028  0.077 -0.056 -0.013  0.038  0.000 -0.042   0.094
## GndRC:LC:C1 -0.029  0.032  0.044  0.053  0.039 -0.047 -0.071 -0.006  -0.626
## GndRC:LC:C2  0.023 -0.042 -0.041  0.038  0.001 -0.073  0.003  0.093  -0.051
##             LkC:C2 GRC:LC:C1
## GndrRtngCnt
## LikeblCntrd
## Condition1
## Condition2
## GndrRtnC:C1
## GndrRtnC:C2
## GndrRtnC:LC
## LkblCntr:C1
## LkblCntr:C2
## GndRC:LC:C1 -0.052
## GndRC:LC:C2 -0.594  0.108
```

- Characters who are rated as more Likeable are more likely to be referred to with *she*

Accomplishment

Summary statistics:

```
summary(exp3_d$Accomplished)
```

```
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##   1.000   1.000   2.000   2.147   3.000   7.000
```

```
summary(exp3_d$AccomplishedFlip)
```

```
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##   1.000   5.000   6.000   5.853   7.000   7.000
```

```
sd(exp3_d$Accomplished)
```

```
## [1] 1.27504
```

Does the Accomplishment rating of the character predict the likelihood of *she* as opposed to *he* and *other* responses? The maximal model includes all interactions, then random intercepts by item but not by participant.

```r
exp3_m_acc <- buildmer(
  formula=(She ~ Condition * GenderRatingCentered *
    AccomplishedCentered + (1|Participant) + (1|Item)),
  data=exp3_d, family=binomial,
  direction=c("order"), quiet=TRUE)

summary(exp3_m_acc)
```

```
## Generalized linear mixed model fit by maximum likelihood (Laplace
##   Approximation) (p-values based on Wald z-scores) [glmerMod]
## Family: binomial  ( logit )
## Formula: She ~ 1 + GenderRatingCentered + AccomplishedCentered + Condition +
##     GenderRatingCentered:Condition + GenderRatingCentered:AccomplishedCentered +
##     AccomplishedCentered:Condition + GenderRatingCentered:AccomplishedCentered:Condition +
##     (1 | Item)
##    Data: exp3_d
##
##      AIC      BIC   logLik deviance df.resid
##   7975.7   8068.0  -3974.9   7949.7     8891
##
## Scaled residuals:
##     Min      1Q  Median      3Q     Max
## -2.6466 -0.5469 -0.1450  0.6222 10.8637
##
## Random effects:
##  Groups Name        Variance Std.Dev.
##  Item   (Intercept) 0.3595   0.5996
## Number of obs: 8904, groups:  Item, 63
##
## Fixed effects:
##                                                            Estimate Std. Error
## (Intercept)                                               -1.372294   0.089919
## GenderRatingCentered                                       1.034110   0.055238
## AccomplishedCentered                                       0.072453   0.028342
## Condition1                                                 0.139473   0.070835
## Condition2                                                 0.073638   0.089326
## GenderRatingCentered:Condition1                            0.090036   0.045170
## GenderRatingCentered:Condition2                           -0.057030   0.058311
## GenderRatingCentered:AccomplishedCentered                  0.029731   0.017426
## AccomplishedCentered:Condition1                           -0.083766   0.058528
## AccomplishedCentered:Condition2                           -0.069941   0.069994
## GenderRatingCentered:AccomplishedCentered:Condition1       0.084687   0.035961
## GenderRatingCentered:AccomplishedCentered:Condition2       0.002789   0.043500
##                                                            z value Pr(>|z|)
## (Intercept)                                               -15.261381   0.000
## GenderRatingCentered                                       18.720891   0.000
## AccomplishedCentered                                        2.556329   0.011
## Condition1                                                  1.968970   0.049
## Condition2                                                  0.824375   0.410
## GenderRatingCentered:Condition1                             1.993281   0.046
## GenderRatingCentered:Condition2                            -0.978038   0.328
## GenderRatingCentered:AccomplishedCentered                   1.706129   0.088
## AccomplishedCentered:Condition1                            -1.431211   0.152
```

```
## AccomplishedCentered:Condition2                              -0.999249    0.318
## GenderRatingCentered:AccomplishedCentered:Condition1          2.354960    0.019
## GenderRatingCentered:AccomplishedCentered:Condition2          0.064123    0.949
##                                                              Pr(>|t|)
## (Intercept)                                                   <2e-16 ***
## GenderRatingCentered                                          <2e-16 ***
## AccomplishedCentered                                          0.0106 *
## Condition1                                                    0.0490 *
## Condition2                                                    0.4097
## GenderRatingCentered:Condition1                               0.0462 *
## GenderRatingCentered:Condition2                               0.3281
## GenderRatingCentered:AccomplishedCentered                     0.0880 .
## AccomplishedCentered:Condition1                               0.1524
## AccomplishedCentered:Condition2                               0.3177
## GenderRatingCentered:AccomplishedCentered:Condition1          0.0185 *
## GenderRatingCentered:AccomplishedCentered:Condition2          0.9489
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
##            (Intr) GndrRC AccmpC Cndtn1 Cndtn2 GRC:C1 GRC:C2 GnRC:AC AcC:C1
## GndrRtngCnt -0.284
## AccmplshdCn -0.006  0.003
## Condition1   0.001 -0.006  0.060
## Condition2  -0.017  0.018 -0.013  0.015
## GndrRtnC:C1 -0.001  0.018 -0.054 -0.601  0.001
## GndrRtnC:C2  0.016 -0.023  0.002  0.001 -0.586  0.005
## GndrRtnC:AC  0.006  0.006 -0.623 -0.055  0.002  0.060 -0.022
## AccmplsC:C1  0.041 -0.045 -0.088 -0.045 -0.008  0.031  0.001  0.080
## AccmplsC:C2 -0.001 -0.003  0.021 -0.006  0.026 -0.001 -0.033  0.012   0.055
## GndRC:AC:C1 -0.040  0.048  0.079  0.032  0.001 -0.009 -0.016 -0.069  -0.633
## GndRC:AC:C2 -0.005 -0.002  0.011 -0.001 -0.033 -0.015  0.062  0.023  -0.013
##            AcC:C2 GRC:AC:C1
## GndrRtngCnt
## AccmplshdCn
## Condition1
## Condition2
## GndrRtnC:C1
## GndrRtnC:C2
## GndrRtnC:AC
## AccmplsC:C1
## AccmplsC:C2
## GndRC:AC:C1 -0.013
## GndRC:AC:C2 -0.592  0.056
```

- Characters who are rated as more Accomplished are more likely to be referred to with *she*, but this is n.s. after correction for multiple comparisons.

- Interaction between Accomplishment, Name Gender Rating, and Condition (L vs F+F), but this is n.s. after correction for multiple comparisons, so I'm not going to dig into it.

Importance

Summary statistics:

```
summary(exp3_d$Important)
```

```
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##   1.000   1.000   2.000   2.585   3.000   7.000
```

```
summary(exp3_d$ImportantFlip)
```

```
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##   1.000   5.000   6.000   5.415   7.000   7.000
```

```
sd(exp3_d$Important)
```

```
## [1] 1.366153
```

Does the Importance rating of the character predict the likelihood of *she* as opposed to *he* and *other* responses
The maximal model includes all interactions, then random intercepts by item but not by participant.

```
exp3_m_imp <- buildmer(
  formula=(She ~ Condition * GenderRatingCentered *
          ImportantCentered + (1|Participant) + (1|Item)),
  data=exp3_d, family=binomial,
  direction=c("order"), quiet=TRUE)

summary(exp3_m_imp)
```

```
## Generalized linear mixed model fit by maximum likelihood (Laplace
##   Approximation) (p-values based on Wald z-scores) [glmerMod]
##  Family: binomial  ( logit )
## Formula: She ~ 1 + GenderRatingCentered + Condition + ImportantCentered +
##     GenderRatingCentered:Condition + GenderRatingCentered:ImportantCentered +
##     Condition:ImportantCentered + GenderRatingCentered:Condition:ImportantCentered +
##     (1 | Item)
##    Data: exp3_d
##
##      AIC      BIC   logLik deviance df.resid
##   7998.6   8090.8  -3986.3   7972.6     8891
##
## Scaled residuals:
##     Min      1Q  Median      3Q     Max
## -2.4475 -0.5401 -0.1474  0.6287  9.9492
##
## Random effects:
##  Groups Name        Variance Std.Dev.
##  Item   (Intercept) 0.3588   0.599
## Number of obs: 8904, groups:  Item, 63
##
## Fixed effects:
```

```
##                                                                Estimate Std. Error
## (Intercept)                                                   -1.374939   0.089891
## GenderRatingCentered                                           1.033386   0.055223
## Condition1                                                     0.136685   0.070836
## Condition2                                                     0.076287   0.089472
## ImportantCentered                                              0.041717   0.026130
## GenderRatingCentered:Condition1                                0.087121   0.045131
## GenderRatingCentered:Condition2                               -0.054816   0.058223
## GenderRatingCentered:ImportantCentered                         0.003465   0.016691
## Condition1:ImportantCentered                                  -0.059867   0.052359
## Condition2:ImportantCentered                                   0.078475   0.063683
## GenderRatingCentered:Condition1:ImportantCentered              0.065853   0.033480
## GenderRatingCentered:Condition2:ImportantCentered             -0.028648   0.041322
##                                                                 z value Pr(>|z|) Pr(>|t|)
## (Intercept)                                                   -15.295681    0.000   <2e-16
## GenderRatingCentered                                           18.712826    0.000   <2e-16
## Condition1                                                      1.929597    0.054   0.0537
## Condition2                                                      0.852629    0.394   0.3939
## ImportantCentered                                              1.596504    0.110   0.1104
## GenderRatingCentered:Condition1                                1.930384    0.054   0.0536
## GenderRatingCentered:Condition2                               -0.941476    0.346   0.3465
## GenderRatingCentered:ImportantCentered                         0.207585    0.836   0.8356
## Condition1:ImportantCentered                                  -1.143396    0.253   0.2529
## Condition2:ImportantCentered                                   1.232280    0.218   0.2178
## GenderRatingCentered:Condition1:ImportantCentered              1.966937    0.049   0.0492
## GenderRatingCentered:Condition2:ImportantCentered             -0.693288    0.488   0.4881
##
## (Intercept)                                                   ***
## GenderRatingCentered                                          ***
## Condition1                                                    .
## Condition2
## ImportantCentered
## GenderRatingCentered:Condition1                               .
## GenderRatingCentered:Condition2
## GenderRatingCentered:ImportantCentered
## Condition1:ImportantCentered
## Condition2:ImportantCentered
## GenderRatingCentered:Condition1:ImportantCentered *
## GenderRatingCentered:Condition2:ImportantCentered
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
##            (Intr) GndrRC Cndtn1 Cndtn2 ImprtC GnRC:C1 GnRC:C2 GRC:IC Cn1:IC
## GndrRtngCnt -0.285
## Condition1   0.002 -0.006
## Condition2  -0.017  0.018  0.014
## ImprtntCntr -0.022  0.026  0.051 -0.053
## GndrRtnC:C1 -0.001  0.017 -0.601  0.001 -0.052
## GndrRtnC:C2  0.015 -0.021  0.002 -0.588  0.030  0.008
## GndrRtnC:IC  0.026 -0.025 -0.052  0.030 -0.585  0.043  -0.059
## Cndtn1:ImpC  0.033 -0.038 -0.042 -0.039 -0.070  0.046   0.021   0.064
## Cndtn2:ImpC -0.027  0.022 -0.041  0.019  0.041  0.023  -0.017  -0.001  0.065
## GndRC:C1:IC -0.036  0.038  0.046  0.022  0.065 -0.030  -0.046  -0.048 -0.590
```

```
## GndRC:C2:IC  0.019 -0.035  0.023 -0.017 -0.001 -0.048   0.021   0.048 -0.018
##              Cn2:IC GRC:C1:
## GndrRtngCnt
## Condition1
## Condition2
## ImprtntCntr
## GndrRtnC:C1
## GndrRtnC:C2
## GndrRtnC:IC
## Cndtn1:ImpC
## Cndtn2:ImpC
## GndRC:C1:IC -0.018
## GndRC:C2:IC -0.552  0.074
```

- Interaction between Important, Name Gender Rating, and Condition (L vs F+F), but this is way too small to be significant after correction for multiple comparisons