

Experiment 4: Ratings Analyses

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Setup

- Variable names:
 - Experiment: exp4
 - Type
 - * d = data
 - * m = model
 - * est = log odds estimate from model
 - * OR = odds ratio converted from est
 - Analysis
 - * Lik = likability ratings
 - * Acc = accomplishment ratings
 - * Imp = importance ratings

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

```
## 'data.frame':   8771 obs. of  10 variables:  
## $ Participant : Factor w/ 1253 levels "R_00dmdQaotbTidXz",...: 1001 1001 1001 1001 1001 1001 1001 23  
## $ Condition   : Factor w/ 3 levels "first","full",...: 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 ...
## $ Likeable    : int 2 1 3 2 4 3 3 3 2 4 ...
## $ Accomplished: int 1 2 1 4 2 2 2 5 3 3 ...
## $ Important   : int 2 1 5 5 1 4 3 3 2 2 ...
```

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
```

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

```
exp4_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(exp4_d)
```

```
## 'data.frame': 8771 obs. of 17 variables:
## $ Participant : Factor w/ 1253 levels "R_00dmdQaotbTidXz",...: 1001 1001 1001 1001 1001 1001 ...
## $ Condition   : Factor w/ 3 levels "first","full",...: 1 1 1 1 1 1 1 1 1 1 ...
## ..- attr(*, "contrasts")= num [1:3, 1:2] 0.331 0.331 -0.669 -0.498 0.502 ...
```

```
## ..- attr(*, "dimnames")=List of 2
## .. ..$ : chr [1:3] "first" "full" "last"
## .. ..$ : NULL
## $ 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 ...
## $ Likeable : int 2 1 3 2 4 3 3 3 2 4 ...
## $ Accomplished : int 1 2 1 4 2 2 2 5 3 3 ...
## $ Important : int 2 1 5 5 1 4 3 3 2 2 ...
## $ GenderRatingCentered: num [1:8771, 1] 2.03 -1.6 2.61 1.13 -2.93 ...
## ..- attr(*, "scaled:center")= num 4.21
## $ LikeableFlip : num 6 7 5 6 4 5 5 5 6 4 ...
## $ AccomplishedFlip : num 7 6 7 4 6 6 6 3 5 5 ...
## $ ImportantFlip : num 6 7 3 3 7 4 5 5 6 6 ...
## $ LikeableCentered : num [1:8771, 1] 0.561 1.561 -0.439 0.561 -1.439 ...
## ..- attr(*, "scaled:center")= num 5.44
## $ AccomplishedCentered: num [1:8771, 1] 1.446 0.446 1.446 -1.554 0.446 ...
## ..- attr(*, "scaled:center")= num 5.55
## $ ImportantCentered : num [1:8771, 1] 0.849 1.849 -2.151 -2.151 1.849 ...
## ..- attr(*, "scaled:center")= num 5.15
```

Likeability

Summary statistics:

```
summary(exp4_d$Likeable)
```

```
##      Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##      1.000   1.000   2.000   2.561   3.000   7.000
```

```
summary(exp4_d$LikeableFlip)
```

```
##      Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##      1.000   5.000   6.000   5.439   7.000   7.000
```

```
sd(exp4_d$Likeable)
```

```
## [1] 1.392179
```

Does the Likeability rating of the character predict how likely the character is to be recalled as female, as opposed to male or other? The maximal model includes random intercepts by item, but not by participant.

```
exp4_m_lik <- buildmer(
  formula=(Female ~ Condition * GenderRatingCentered *
    LikeableCentered + (1|Participant) + (1|Item)),
  data=exp4_d, family=binomial,
  direction=c("order"), quiet=TRUE)

summary(exp4_m_lik)
```

```

## Generalized linear mixed model fit by maximum likelihood (Laplace
## Approximation) (p-values based on Wald z-scores) [glmerMod]
## Family: binomial ( logit )
## Formula:
## Female ~ 1 + GenderRatingCentered + LikeableCentered + GenderRatingCentered:LikeableCentered +
## Condition + GenderRatingCentered:Condition + LikeableCentered:Condition +
## GenderRatingCentered:LikeableCentered:Condition + (1 | Item)
## Data: exp4_d
##
##      AIC      BIC    logLik deviance df.resid
##  9066.8   9158.8  -4520.4   9040.8     8758
##
## Scaled residuals:
##      Min       1Q   Median       3Q      Max
## -4.4522 -0.5946 -0.2609  0.5931  5.5758
##
## Random effects:
## Groups Name             Variance Std.Dev.
## Item (Intercept) 0.3372  0.5807
## Number of obs: 8771, groups: Item, 63
##
## Fixed effects:
##
##              Estimate Std. Error  z value
## (Intercept)    -0.244453   0.078424 -3.117059
## GenderRatingCentered    0.751745   0.044492 16.896062
## LikeableCentered    0.086624   0.019205  4.510472
## Condition1    0.119371   0.055402  2.154647
## Condition2    0.066950   0.065302  1.025240
## GenderRatingCentered:LikeableCentered    0.103182   0.011834  8.719053
## GenderRatingCentered:Condition1    0.124923   0.035196  3.549338
## GenderRatingCentered:Condition2   -0.099175   0.042892 -2.312214
## LikeableCentered:Condition1    0.044613   0.038171  1.168758
## LikeableCentered:Condition2    0.091444   0.046297  1.975159
## GenderRatingCentered:LikeableCentered:Condition1    0.019182   0.023407  0.819486
## GenderRatingCentered:LikeableCentered:Condition2    0.001836   0.029003  0.063300
##
##              Pr(>|z|) Pr(>|t|)
## (Intercept)    0.002 0.001827 **
## GenderRatingCentered    0.000 < 2e-16 ***
## LikeableCentered    0.000 6.47e-06 ***
## Condition1    0.031 0.031189 *
## Condition2    0.305 0.305250
## GenderRatingCentered:LikeableCentered    0.000 < 2e-16 ***
## GenderRatingCentered:Condition1    0.000 0.000386 ***
## GenderRatingCentered:Condition2    0.021 0.020766 *
## LikeableCentered:Condition1    0.243 0.242501
## LikeableCentered:Condition2    0.048 0.048250 *
## GenderRatingCentered:LikeableCentered:Condition1    0.413 0.412509
## GenderRatingCentered:LikeableCentered:Condition2    0.950 0.949528
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
##              (Intr) GndrRC LkblCn Cndtn1 Cndtn2 GnRC:LC GRC:C1 GRC:C2 LkC:C1
## GndrRtngCnt -0.028

```

```
## LikeblCntrd 0.035 -0.010
## Condition1 0.014 0.002 -0.026
## Condition2 -0.013 0.012 -0.027 -0.019
## GndrRtnC:LC -0.004 0.079 -0.149 0.020 0.024
## GndrRtnC:C1 0.004 0.034 0.019 -0.132 0.020 0.004
## GndrRtnC:C2 0.012 -0.029 0.024 0.020 -0.115 -0.030 -0.046
## LkblCntr:C1 -0.008 0.006 0.078 0.091 -0.017 -0.011 -0.012 0.015
## LkblCntr:C2 -0.009 0.010 -0.029 -0.015 0.046 0.004 0.015 0.013 -0.020
## GndRC:LC:C1 0.008 0.002 -0.010 -0.013 0.016 0.109 0.176 -0.021 -0.125
## GndRC:LC:C2 0.011 -0.014 0.006 0.016 0.012 -0.058 -0.019 0.155 0.005
## LkC:C2 GRC:LC:C1
## GndrRtnGnt
## LikeblCntrd
## Condition1
## Condition2
## GndrRtnC:LC
## GndrRtnC:C1
## GndrRtnC:C2
## LkblCntr:C1
## LkblCntr:C2
## GndRC:LC:C1 0.005
## GndRC:LC:C2 -0.127 -0.044
```

- Characters who are rated more Likeable are more likely to be recalled as female across conditions
- Interaction with Name Gender Rating: stronger effect of Likeability rating for more feminine names
- Interaction with Condition (F vs F): n.s. after multiple comparisons
- No other interactions significant

Accomplishment

Summary statistics:

```
summary(exp4_d$Accomplished)
```

```
##      Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##      1.000   1.000   2.000   2.446   3.000   7.000
```

```
summary(exp4_d$AccomplishedFlip)
```

```
##      Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##      1.000   5.000   6.000   5.554   7.000   7.000
```

```
sd(exp4_d$Accomplished)
```

```
## [1] 1.371271
```

Does the Accomplishment rating of the character predict how likely the character is to be recalled as female, as opposed to male or other? The maximal model includes random intercepts by item, but not by participant.

```
exp4_m_acc <- buildmer(
  formula=(Female ~ Condition * GenderRatingCentered *
    AccomplishedCentered + (1|Participant) + (1|Item)),
  data=exp4_d, family=binomial,
  direction=c("order"), quiet=TRUE)

summary(exp4_m_acc)
```

```
## Generalized linear mixed model fit by maximum likelihood (Laplace
## Approximation) (p-values based on Wald z-scores) [glmerMod]
## Family: binomial ( logit )
## Formula:
## Female ~ 1 + GenderRatingCentered + AccomplishedCentered + GenderRatingCentered:AccomplishedCentered
## Condition + GenderRatingCentered:Condition + AccomplishedCentered:Condition +
## GenderRatingCentered:AccomplishedCentered:Condition + (1 | Item)
## Data: exp4_d
##
##      AIC      BIC   logLik deviance df.resid
##  9082.2   9174.2  -4528.1   9056.2     8758
##
## Scaled residuals:
##      Min       1Q   Median       3Q      Max
## -4.1200 -0.5912 -0.2519  0.5987  5.7663
##
## Random effects:
## Groups Name      Variance Std.Dev.
## Item (Intercept) 0.3385   0.5818
## Number of obs: 8771, groups: Item, 63
##
## Fixed effects:
##
##              Estimate Std. Error
## (Intercept)    -0.243204   0.078552
## GenderRatingCentered    0.749198   0.044554
## AccomplishedCentered    0.047072   0.019043
## Condition1          0.113323   0.055390
## Condition2          0.071078   0.065376
## GenderRatingCentered:AccomplishedCentered    0.108068   0.011716
## GenderRatingCentered:Condition1    0.126130   0.035188
## GenderRatingCentered:Condition2   -0.100900   0.043082
## AccomplishedCentered:Condition1    0.012340   0.038401
## AccomplishedCentered:Condition2    0.079506   0.046748
## GenderRatingCentered:AccomplishedCentered:Condition1  0.056186   0.023330
## GenderRatingCentered:AccomplishedCentered:Condition2 -0.009309   0.029285
##
##              z value Pr(>|z|)
## (Intercept)   -3.096102   0.002
## GenderRatingCentered   16.815545   0.000
## AccomplishedCentered    2.471823   0.013
## Condition1          2.045905   0.041
## Condition2          1.087224   0.277
## GenderRatingCentered:AccomplishedCentered    9.224136   0.000
## GenderRatingCentered:Condition1    3.584509   0.000
## GenderRatingCentered:Condition2   -2.342047   0.019
## AccomplishedCentered:Condition1    0.321345   0.748
```

```

## AccomplishedCentered:Condition2          1.700743    0.089
## GenderRatingCentered:AccomplishedCentered:Condition1 2.408265    0.016
## GenderRatingCentered:AccomplishedCentered:Condition2 -0.317879    0.751
##                                          Pr(>|t|)
## (Intercept)                                0.001961 **
## GenderRatingCentered                      < 2e-16 ***
## AccomplishedCentered                     0.013443 *
## Condition1                               0.040766 *
## Condition2                               0.276938
## GenderRatingCentered:AccomplishedCentered < 2e-16 ***
## GenderRatingCentered:Condition1          0.000338 ***
## GenderRatingCentered:Condition2          0.019178 *
## AccomplishedCentered:Condition1          0.747949
## AccomplishedCentered:Condition2          0.088991 .
## GenderRatingCentered:AccomplishedCentered:Condition1 0.016029 *
## GenderRatingCentered:AccomplishedCentered:Condition2 0.750576
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
##      (Intr) GndrRC AccmpC Cndtn1 Cndtn2 GnRC:AC GRC:C1 GRC:C2 AcC:C1
## GndrRtnGnt -0.029
## AccmplshdCn 0.039 -0.008
## Condition1 0.015 -0.001 -0.009
## Condition2 -0.013 0.013 -0.004 -0.020
## GndrRtnC:AC -0.006 0.074 -0.124 -0.010 0.013
## GndrRtnC:C1 0.001 0.037 -0.009 -0.135 0.021 0.019
## GndrRtnC:C2 0.012 -0.029 0.015 0.021 -0.125 -0.027 -0.047
## AccmplsC:C1 -0.001 -0.005 0.084 0.103 -0.002 0.003 -0.012 0.010
## AccmplsC:C2 -0.004 0.009 -0.063 0.000 0.079 0.032 0.010 -0.024 -0.044
## GndRC:AC:C1 -0.005 0.012 0.003 -0.013 0.011 0.128 0.177 -0.019 -0.141
## GndRC:AC:C2 0.008 -0.015 0.032 0.009 -0.025 -0.090 -0.017 0.175 0.024
##      AcC:C2 GRC:AC:C1
## GndrRtnGnt
## AccmplshdCn
## Condition1
## Condition2
## GndrRtnC:AC
## GndrRtnC:C1
## GndrRtnC:C2
## AccmplsC:C1
## AccmplsC:C2
## GndRC:AC:C1 0.025
## GndRC:AC:C2 -0.120 -0.065

```

- Characters who were rated more Accomplished were more likely to be recalled as female, but this is n.s. after correction for multiple comparisons.
- Interaction with Name Gender Rating: stronger effect of Accomplishment rating for more feminine names
- Interaction between Condition (L vs F+F), Name Gender Rating, and Accomplishment: n.s. after correction for multiple comparisons

Importance

Summary statistics:

```
summary(exp4_d$Important)
```

```
##      Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##      1.000   2.000   3.000   2.849   4.000   7.000
```

```
summary(exp4_d$ImportantFlip)
```

```
##      Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##      1.000   4.000   5.000   5.151   6.000   7.000
```

```
sd(exp4_d$Important)
```

```
## [1] 1.461433
```

Does the Importance rating of the character predict how likely the character is to be recalled as female, as opposed to male or other? The maximal model includes random intercepts by item, but not by participant.

```
exp4_m_imp <- buildmer(
  formula=(Female ~ Condition * GenderRatingCentered *
    ImportantCentered + (1|Participant) + (1|Item)),
  data=exp4_d, family=binomial,
  direction=c("order"), quiet=TRUE)
```

```
summary(exp4_m_imp)
```

```
## Generalized linear mixed model fit by maximum likelihood (Laplace
## Approximation) (p-values based on Wald z-scores) [glmerMod]
## Family: binomial ( logit )
## Formula:
## Female ~ 1 + GenderRatingCentered + Condition + GenderRatingCentered:Condition +
## ImportantCentered + GenderRatingCentered:ImportantCentered +
## Condition:ImportantCentered + GenderRatingCentered:Condition:ImportantCentered +
## (1 | Item) + (1 | Participant)
## Data: exp4_d
##
##      AIC      BIC   logLik deviance df.resid
##  9110.1   9209.2  -4541.1   9082.1     8757
##
## Scaled residuals:
##      Min       1Q   Median       3Q      Max
## -3.4351 -0.5792 -0.2520  0.5759  5.9605
##
## Random effects:
## Groups      Name                Variance Std.Dev.
## Participant (Intercept) 0.2045     0.4523
## Item          (Intercept) 0.3583     0.5986
## Number of obs: 8771, groups: Participant, 1253; Item, 63
```



```

##
## Fixed effects:
##
##               Estimate Std. Error
## (Intercept)    -0.248812   0.081532
## GenderRatingCentered  0.772472   0.045914
## Condition1         0.125487   0.062102
## Condition2         0.079999   0.072919
## ImportantCentered    0.009610   0.019744
## GenderRatingCentered:Condition1  0.133310   0.034992
## GenderRatingCentered:Condition2 -0.098331   0.042671
## GenderRatingCentered:ImportantCentered  0.077713   0.011593
## Condition1:ImportantCentered  0.009947   0.039429
## Condition2:ImportantCentered  0.076869   0.046678
## GenderRatingCentered:Condition1:ImportantCentered  0.016048   0.023112
## GenderRatingCentered:Condition2:ImportantCentered -0.008267   0.028272
##
##               z value Pr(>|z|) Pr(>|t|)
## (Intercept)    -3.051711   0.002 0.002275
## GenderRatingCentered  16.824211   0.000 < 2e-16
## Condition1         2.020650   0.043 0.043316
## Condition2         1.097092   0.273 0.272601
## ImportantCentered    0.486734   0.626 0.626447
## GenderRatingCentered:Condition1  3.809773   0.000 0.000139
## GenderRatingCentered:Condition2 -2.304378   0.021 0.021201
## GenderRatingCentered:ImportantCentered  6.703149   0.000 2.04e-11
## Condition1:ImportantCentered  0.252264   0.801 0.800837
## Condition2:ImportantCentered  1.646771   0.100 0.099605
## GenderRatingCentered:Condition1:ImportantCentered  0.694352   0.487 0.487462
## GenderRatingCentered:Condition2:ImportantCentered -0.292412   0.770 0.769972
##
## (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
## GndrRtnGnt -0.028
## Condition1  0.012  0.002
## Condition2 -0.011  0.013 -0.014
## ImprtnCntr  0.025 -0.001 -0.006  0.013
## GndrRtnC:C1  0.001  0.036 -0.118  0.019 -0.008
## GndrRtnC:C2  0.012 -0.029  0.019 -0.109  0.023 -0.044
## GndrRtnC:IC  0.002  0.060 -0.005  0.021 -0.103  0.023 -0.007
## Cndtn1:ImpC -0.001 -0.003  0.069  0.010  0.043  0.005  0.015 -0.002

```

```

## Cndtn2:ImpC  0.004  0.007  0.010  0.056 -0.070  0.015  -0.004   0.020 -0.051
## GndRC:C1:IC -0.002  0.010  0.002  0.015 -0.002  0.125  -0.005   0.087 -0.091
## GndRC:C2:IC  0.010 -0.002  0.015 -0.005  0.021 -0.002   0.135  -0.100  0.019
##           Cn2:IC GRC:C1:
## GndrRtnGnt
## Condition1
## Condition2
## ImprntCntr
## GndrRtnC:C1
## GndrRtnC:C2
## GndrRtnC:IC
## Cndtn1:ImpC
## Cndtn2:ImpC
## GndRC:C1:IC  0.019
## GndRC:C2:IC -0.087 -0.074

```

- No main effect of Importance like there was for other ratings
- Interaction with Name Gender Rating: stronger effect of Importance rating for more feminine names