Code to reproduce statistics and graphs in Poppels & Kehler (2018, Glossa)

Till Poppels

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Contents

```
require("tidyverse")
require("forcats")
require("ggrepel")
require("lme4")
source("expt-01-pre-processing.R")
source("expt-02-pre-processing.R")
source("expt-03-pre-processing.R")
source("expt-04-pre-processing.R")
d1 <- read_rds("../data/expt-01-clean-data.rds")
d2 <- read_rds("../data/expt-02-clean-data.rds")
d3 <- read_rds("../data/expt-03-clean-data.rds")
d4 <- read_rds("../data/expt-04-clean-data.rds")
```

```
|Experiment | Participants recruited| excluded| remaining|
|:----------|----------------------:|--------:|---------:|
|Expt 1     |                     30|        1|        29|
|Expt 2     |                     60|        0|        60|
|Expt 3     |                     30|        2|        28|
|Expt 4     |                     31|        5|        26|
```

```
Linear mixed model fit by maximum likelihood  ['lmerMod']
Formula: response ~ mismatch + voice.ellipsis + mismatch:voice.ellipsis +
    (1 + mismatch * voice.ellipsis | sid) + (1 + mismatch * voice.ellipsis |
    itemNo)
   Data: tmp

     AIC      BIC   logLik deviance df.resid
```
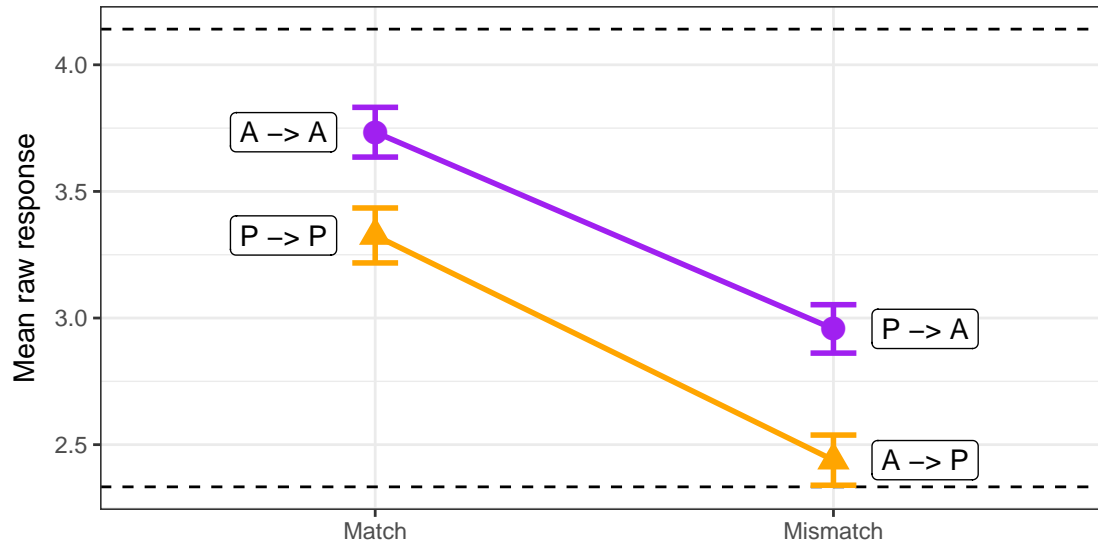
Figure 1: Results from Expt 1.

```
   1679.0    1787.0    -814.5    1629.0       531


Scaled residuals:
    Min       1Q    Median       3Q      Max
-2.95231 -0.56201  0.01544  0.62020  3.04203


Random effects:
 Groups   Name                       Variance Std.Dev. Corr
 sid      (Intercept)                0.259349 0.50926
          mismatch                   0.079187 0.28140   0.25
          voice.ellipsis             0.041940 0.20479  -0.43  0.48
          mismatch:voice.ellipsis    0.013549 0.11640   0.69  0.56 -0.45
 itemNo   (Intercept)                0.076148 0.27595
          mismatch                   0.029970 0.17312  -0.98
          voice.ellipsis             0.020334 0.14260   0.70 -0.54
          mismatch:voice.ellipsis    0.007858 0.08865  -0.90  0.97 -0.32
 Residual                            0.851430 0.92273
Number of obs: 556, groups:  sid, 29; itemNo, 24


Fixed effects:
                         Estimate Std. Error t value
(Intercept)               3.11560    0.11689  26.655
mismatch                 -0.40806    0.07437  -5.487
voice.ellipsis           -0.23905    0.06196  -3.858
mismatch:voice.ellipsis  -0.02933    0.04840  -0.606


Correlation of Fixed Effects:
           (Intr) msmtch vc.llp
mismatch   -0.083
```

```
voice.llpss -0.055  0.086
msmtch:vc.l  0.087  0.352 -0.184


Data: tmp
Models:
m.mismatch: response ~ 1 + voice.ellipsis + mismatch:voice.ellipsis + (1 +
m.mismatch:     mismatch * voice.ellipsis | sid) + (1 + mismatch * voice.ellipsis |
m.mismatch:     itemNo)
m: response ~ mismatch + voice.ellipsis + mismatch:voice.ellipsis +
m:     (1 + mismatch * voice.ellipsis | sid) + (1 + mismatch * voice.ellipsis |
m:     itemNo)
            Df    AIC    BIC  logLik deviance  Chisq Chi Df Pr(>Chisq)
m.mismatch 24 1698.9 1802.6 -825.43   1650.9
m          25 1679.0 1787.0 -814.50   1629.0 21.863      1  2.928e-06 ***
---
codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1


Data: tmp
Models:
m.voice: response ~ mismatch + 1 + mismatch:voice.ellipsis + (1 + mismatch *
m.voice:     voice.ellipsis | sid) + (1 + mismatch * voice.ellipsis |
m.voice:     itemNo)
m: response ~ mismatch + voice.ellipsis + mismatch:voice.ellipsis +
m:     (1 + mismatch * voice.ellipsis | sid) + (1 + mismatch * voice.ellipsis |
m:     itemNo)
        Df  AIC    BIC  logLik deviance  Chisq Chi Df Pr(>Chisq)
m.voice 24 1689 1792.6 -820.47     1641
m       25 1679 1787.0 -814.50     1629 11.947      1  0.0005473 ***
---
codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1


Data: tmp
Models:
m.interaction: response ~ mismatch + voice.ellipsis + 1 + (1 + mismatch * voice.ellipsis |
m.interaction:     sid) + (1 + mismatch * voice.ellipsis | itemNo)
m: response ~ mismatch + voice.ellipsis + mismatch:voice.ellipsis +
m:     (1 + mismatch * voice.ellipsis | sid) + (1 + mismatch * voice.ellipsis |
m:     itemNo)
               Df    AIC    BIC  logLik deviance  Chisq Chi Df Pr(>Chisq)
m.interaction 24 1677.4 1781.1 -814.68   1629.4
m             25 1679.0 1787.0 -814.50   1629.0 0.3645      1      0.546




Linear mixed model fit by maximum likelihood  ['lmerMod']
Formula: response ~ mismatch + voice.ellipsis + mismatch:voice.ellipsis +
    (1 + mismatch * voice.ellipsis | sid) + (1 + mismatch * voice.ellipsis |
    itemNo)
```
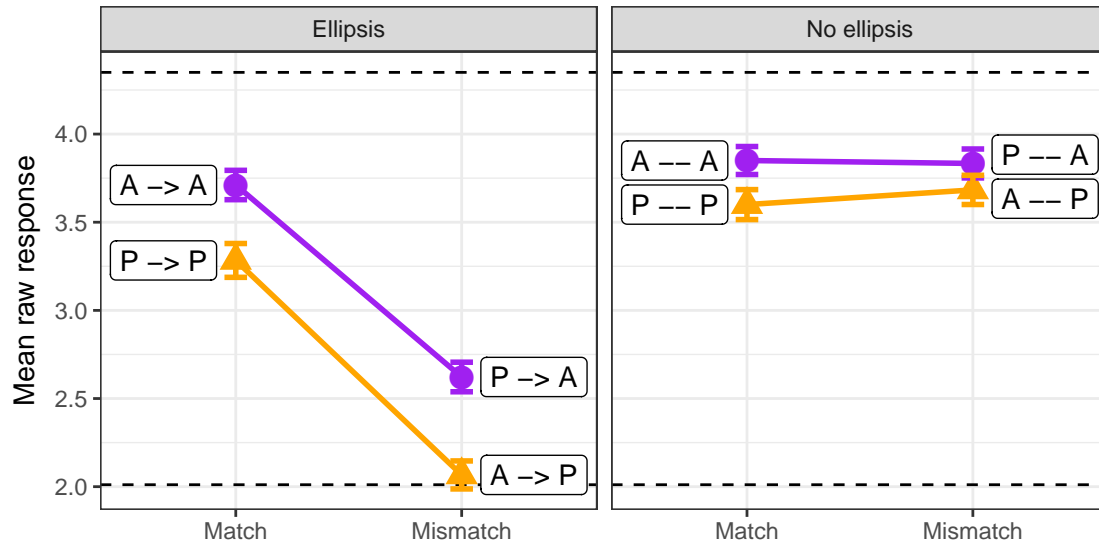
Figure 2: Results from Expt 2.

```
   Data: tmp

      AIC       BIC    logLik deviance df.resid
   2078.3    2192.7   -1014.1   2028.3      695

Scaled residuals:
    Min      1Q  Median      3Q     Max
-2.3648 -0.6002  0.0096  0.6058  3.2750

Random effects:
 Groups   Name                     Variance Std.Dev. Corr
 sid      (Intercept)              0.230502 0.48011
          mismatch                 0.052075 0.22820   0.38
          voice.ellipsis           0.008361 0.09144   0.68  0.07
          mismatch:voice.ellipsis  0.022332 0.14944  -0.32  0.07 -0.91
 itemNo   (Intercept)              0.153439 0.39171
          mismatch                 0.088899 0.29816  -0.82
          voice.ellipsis           0.065489 0.25591   0.00 -0.44
          mismatch:voice.ellipsis  0.013957 0.11814  -0.14  0.06  0.17
 Residual                          0.687476 0.82914
Number of obs: 720, groups:  sid, 60; itemNo, 24

Fixed effects:
                        Estimate Std. Error t value
(Intercept)              2.91866    0.10583  27.578
mismatch                -0.57437    0.07440  -7.720
voice.ellipsis          -0.24987    0.06187  -4.039
mismatch:voice.ellipsis -0.03182    0.04377  -0.727
```

```
Correlation of Fixed Effects:
           (Intr) msmtch vc.llp
mismatch    -0.419
voice.llpss  0.077 -0.303
msmtch:vc.l -0.144  0.041  0.001


Data: tmp
Models:
m.mismatch: response ~ 1 + voice.ellipsis + mismatch:voice.ellipsis + (1 +
m.mismatch:     mismatch * voice.ellipsis | sid) + (1 + mismatch * voice.ellipsis |
m.mismatch:     itemNo)
m: response ~ mismatch + voice.ellipsis + mismatch:voice.ellipsis +
m:     (1 + mismatch * voice.ellipsis | sid) + (1 + mismatch * voice.ellipsis |
m:     itemNo)
             Df    AIC    BIC  logLik deviance  Chisq Chi Df Pr(>Chisq)
m.mismatch   24 2107.9 2217.8 -1030.0   2059.9
m            25 2078.3 2192.8 -1014.1   2028.3 31.646      1    1.85e-08 ***
---
codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1


Data: tmp
Models:
m.voice: response ~ mismatch + 1 + mismatch:voice.ellipsis + (1 + mismatch *
m.voice:     voice.ellipsis | sid) + (1 + mismatch * voice.ellipsis |
m.voice:     itemNo)
m: response ~ mismatch + voice.ellipsis + mismatch:voice.ellipsis +
m:     (1 + mismatch * voice.ellipsis | sid) + (1 + mismatch * voice.ellipsis |
m:     itemNo)
         Df    AIC    BIC  logLik deviance  Chisq Chi Df Pr(>Chisq)
m.voice  24 2088.7 2198.6 -1020.4   2040.7
m        25 2078.3 2192.8 -1014.1   2028.3 12.459      1    0.000416 ***
---
codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1


Data: tmp
Models:
m.interaction: response ~ mismatch + voice.ellipsis + 1 + (1 + mismatch * voice.ellipsis |
m.interaction:     sid) + (1 + mismatch * voice.ellipsis | itemNo)
m: response ~ mismatch + voice.ellipsis + mismatch:voice.ellipsis +
m:     (1 + mismatch * voice.ellipsis | sid) + (1 + mismatch * voice.ellipsis |
m:     itemNo)
               Df    AIC    BIC  logLik deviance  Chisq Chi Df Pr(>Chisq)
m.interaction  24 2076.8 2186.7 -1014.4   2028.8
m              25 2078.3 2192.8 -1014.1   2028.3 0.5236      1     0.4693


Linear mixed model fit by maximum likelihood  ['lmerMod']
Formula: response ~ mismatch + voice.ellipsis + mismatch:voice.ellipsis +
```

```
    (1 + mismatch * voice.ellipsis | sid) + (1 + mismatch * voice.ellipsis |
    itemNo)
  Data: tmp

    AIC      BIC   logLik deviance df.resid
  2055.1   2169.5  -1002.5   2005.1      695


Scaled residuals:
    Min      1Q  Median      3Q     Max
-3.3345 -0.6042  0.0939  0.5989  2.3103


Random effects:
 Groups   Name                        Variance  Std.Dev. Corr
 sid      (Intercept)                 0.1974582 0.44436
          mismatch                    0.0081874 0.09048   0.10
          voice.ellipsis              0.0006514 0.02552  -0.52 -0.91
          mismatch:voice.ellipsis     0.0077367 0.08796  -0.39  0.87 -0.59
 itemNo   (Intercept)                 0.2017072 0.44912
          mismatch                    0.0111075 0.10539   0.30
          voice.ellipsis              0.0422154 0.20546  -0.18 -0.59
          mismatch:voice.ellipsis     0.0217571 0.14750   0.20  0.97 -0.39
 Residual                             0.7276855 0.85304
Number of obs: 720, groups:  sid, 60; itemNo, 24


Fixed effects:
                        Estimate Std. Error t value
(Intercept)              3.74366    0.11275  33.202
mismatch                 0.01723    0.04021   0.428
voice.ellipsis          -0.10011    0.05277  -1.897
mismatch:voice.ellipsis  0.03061    0.04531   0.676


Correlation of Fixed Effects:
           (Intr) msmtch vc.llp
mismatch    0.145
voice.llpss -0.134 -0.269
msmtch:vc.l  0.060  0.409 -0.216


Data: tmp
Models:
m.mismatch: response ~ 1 + voice.ellipsis + mismatch:voice.ellipsis + (1 +
m.mismatch:     mismatch * voice.ellipsis | sid) + (1 + mismatch * voice.ellipsis |
m.mismatch:     itemNo)
m: response ~ mismatch + voice.ellipsis + mismatch:voice.ellipsis +
m:     (1 + mismatch * voice.ellipsis | sid) + (1 + mismatch * voice.ellipsis |
m:     itemNo)
           Df    AIC    BIC  logLik deviance  Chisq Chi Df Pr(>Chisq)
m.mismatch 24 2053.2 2163.2 -1002.6   2005.2
m          25 2055.1 2169.6 -1002.5   2005.1 0.1831      1     0.6688
```

```
Data: tmp
Models:
m.voice: response ~ mismatch + 1 + mismatch:voice.ellipsis + (1 + mismatch *
m.voice:     voice.ellipsis | sid) + (1 + mismatch * voice.ellipsis |
m.voice:     itemNo)
m: response ~ mismatch + voice.ellipsis + mismatch:voice.ellipsis +
m:     (1 + mismatch * voice.ellipsis | sid) + (1 + mismatch * voice.ellipsis |
m:     itemNo)
        Df   AIC    BIC  logLik deviance  Chisq Chi Df Pr(>Chisq)
m.voice 24 2056.4 2166.3 -1004.2   2008.4
m       25 2055.1 2169.6 -1002.5   2005.1 3.3338      1    0.06787 .
---
codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Data: tmp
Models:
m.interaction: response ~ mismatch + voice.ellipsis + 1 + (1 + mismatch * voice.ellipsis |
m.interaction:     sid) + (1 + mismatch * voice.ellipsis | itemNo)
m: response ~ mismatch + voice.ellipsis + mismatch:voice.ellipsis +
m:     (1 + mismatch * voice.ellipsis | sid) + (1 + mismatch * voice.ellipsis |
m:     itemNo)
              Df   AIC    BIC  logLik deviance  Chisq Chi Df Pr(>Chisq)
m.interaction 24 2053.5 2163.4 -1002.8   2005.5
m             25 2055.1 2169.6 -1002.5   2005.1 0.4532      1    0.5008
```
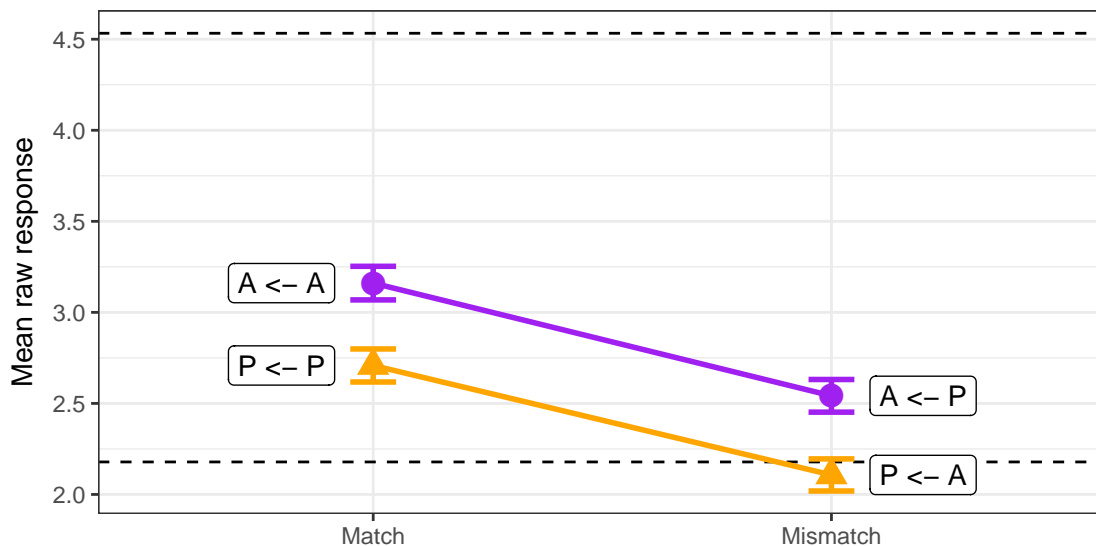

Figure 3: Results from Expt 3.

```
Linear mixed model fit by maximum likelihood  ['lmerMod']
```

```
Formula: response ~ mismatch + voice.ellipsis + mismatch:voice.ellipsis +
    (1 + mismatch * voice.ellipsis | sid) + (1 + mismatch * voice.ellipsis |
    itemNo)
   Data: tmp

     AIC      BIC   logLik deviance df.resid
  1943.6   2056.3   -946.8   1893.6      647

Scaled residuals:
     Min       1Q   Median       3Q      Max
-3.13753 -0.63007 -0.06087  0.58549  2.72387

Random effects:
 Groups   Name                    Variance Std.Dev. Corr
 sid      (Intercept)             0.413559 0.64309
          mismatch                0.010954 0.10466   0.21
          voice.ellipsis          0.009322 0.09655   0.29  0.42
          mismatch:voice.ellipsis 0.012091 0.10996  -0.11 -0.16  0.58
 itemNo   (Intercept)             0.081690 0.28581
          mismatch                0.024887 0.15776  -0.69
          voice.ellipsis          0.024614 0.15689  -0.41  0.11
          mismatch:voice.ellipsis 0.005777 0.07600   0.25  0.49 -0.59
 Residual                         0.780822 0.88364
Number of obs: 672, groups:  sid, 28; itemNo, 24

Fixed effects:
                         Estimate Std. Error t value
(Intercept)              2.632243   0.139100  18.923
mismatch                -0.302273   0.051093  -5.916
voice.ellipsis          -0.229022   0.050325  -4.551
mismatch:voice.ellipsis  0.006914   0.043065   0.161

Correlation of Fixed Effects:
            (Intr) msmtch vc.llp
mismatch    -0.111
voice.llpss -0.016  0.102
msmtch:vc.l -0.007  0.080 -0.036

Data: tmp
Models:
m.mismatch: response ~ 1 + voice.ellipsis + mismatch:voice.ellipsis + (1 +
m.mismatch:      mismatch * voice.ellipsis | sid) + (1 + mismatch * voice.ellipsis |
m.mismatch:      itemNo)
m: response ~ mismatch + voice.ellipsis + mismatch:voice.ellipsis +
m:      (1 + mismatch * voice.ellipsis | sid) + (1 + mismatch * voice.ellipsis |
m:      itemNo)
           Df    AIC    BIC  logLik deviance  Chisq Chi Df Pr(>Chisq)
m.mismatch 24 1964.1 2072.3 -958.04   1916.1
```

```
m              25 1943.6 2056.3 -946.78    1893.6 22.527        1  2.073e-06 ***
---
codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1


Data: tmp
Models:
m.voice: response ~ mismatch + 1 + mismatch:voice.ellipsis + (1 + mismatch *
m.voice:    voice.ellipsis | sid) + (1 + mismatch * voice.ellipsis |
m.voice:    itemNo)
m: response ~ mismatch + voice.ellipsis + mismatch:voice.ellipsis +
m:    (1 + mismatch * voice.ellipsis | sid) + (1 + mismatch * voice.ellipsis |
m:    itemNo)
        Df    AIC    BIC  logLik deviance  Chisq Chi Df Pr(>Chisq)
m.voice 24 1956.4 2064.7 -954.22    1908.4
m       25 1943.6 2056.3 -946.78    1893.6 14.876      1  0.0001148 ***
---
codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1


Data: tmp
Models:
m.interaction: response ~ mismatch + voice.ellipsis + 1 + (1 + mismatch * voice.ellipsis |
m.interaction:    sid) + (1 + mismatch * voice.ellipsis | itemNo)
m: response ~ mismatch + voice.ellipsis + mismatch:voice.ellipsis +
m:    (1 + mismatch * voice.ellipsis | sid) + (1 + mismatch * voice.ellipsis |
m:    itemNo)
              Df    AIC    BIC  logLik deviance  Chisq Chi Df Pr(>Chisq)
m.interaction 24 1941.6 2049.8 -946.79    1893.6
m             25 1943.6 2056.3 -946.78    1893.6 0.0257      1     0.8727
```
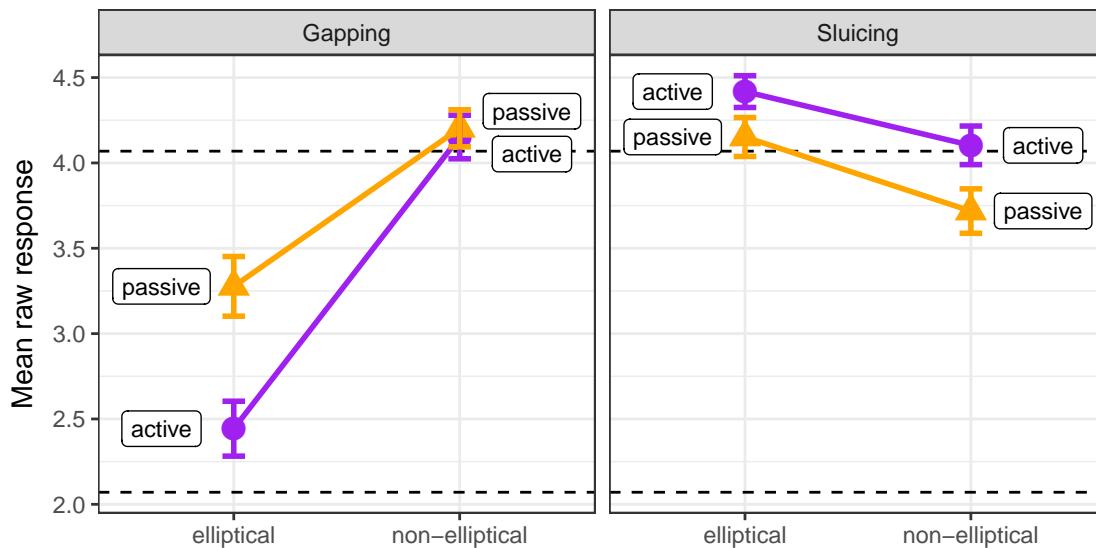

Figure 4: Results from Expt 4 (pilot on gapping/sluicing).

```
Linear mixed model fit by maximum likelihood  ['lmerMod']
Formula: response ~ ellipsis + voice + ellipsis:voice + (1 + ellipsis |
    sid) + (1 + ellipsis | itemNo)
   Data: tmp

     AIC      BIC   logLik deviance df.resid
   865.4    905.8   -421.7    843.4      281

Scaled residuals:
    Min      1Q  Median      3Q     Max
-3.7657 -0.5276  0.1071  0.5037  3.6453

Random effects:
 Groups   Name        Variance Std.Dev. Corr
 sid      (Intercept) 0.46613  0.6827
          ellipsis    0.19907  0.4462   0.47
 itemNo   (Intercept) 0.05694  0.2386
          ellipsis    0.01967  0.1403   1.00
 Residual             0.75372  0.8682
Number of obs: 292, groups:  sid, 26; itemNo, 12

Fixed effects:
               Estimate Std. Error t value
(Intercept)      3.5161     0.1602  21.943
ellipsis        -0.6515     0.1105  -5.893
voice            0.2029     0.1446   1.403
ellipsis:voice   0.1945     0.1025   1.898

Correlation of Fixed Effects:
           (Intr) ellpss voice
ellipsis   0.479
voice      0.071  0.037
ellipsis:vc 0.036  0.075  0.381

Data: tmp
Models:
m.ellipsis: response ~ 1 + voice + ellipsis:voice + (1 + ellipsis | sid) +
m.ellipsis:      (1 + ellipsis | itemNo)
m: response ~ ellipsis + voice + ellipsis:voice + (1 + ellipsis |
m:      sid) + (1 + ellipsis | itemNo)
           Df    AIC    BIC  logLik deviance  Chisq Chi Df Pr(>Chisq)
m.ellipsis 10 885.59 922.36 -432.79   865.59
m          11 865.38 905.82 -421.69   843.38 22.209      1  2.446e-06 ***
---
codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
Linear mixed model fit by maximum likelihood  ['lmerMod']
Formula: response ~ ellipsis + voice + ellipsis:voice + (1 | sid) + (1 |
    itemNo)
   Data: tmp

     AIC      BIC   logLik deviance df.resid
   895.1    920.9   -440.6    881.1      285

Scaled residuals:
    Min      1Q  Median      3Q     Max
-3.2743 -0.6396  0.0240  0.6495  2.9683

Random effects:
 Groups   Name        Variance Std.Dev.
 sid      (Intercept) 0.46710  0.6835
 itemNo   (Intercept) 0.06801  0.2608
 Residual             0.97944  0.9897
Number of obs: 292, groups:  sid, 26; itemNo, 12

Fixed effects:
               Estimate Std. Error t value
(Intercept)     3.51405    0.16552  21.230
ellipsis       -0.68132    0.05868 -11.610
voice           0.19603    0.14739   1.330
ellipsis:voice  0.19847    0.05833   3.403

Correlation of Fixed Effects:
            (Intr) ellpss voice
ellipsis    0.007
voice       0.068  0.012
ellipsis:vc 0.012  0.079  0.009

Data: tmp
Models:
m.voice: response ~ ellipsis + 1 + ellipsis:voice + (1 | sid) + (1 | itemNo)
m: response ~ ellipsis + voice + ellipsis:voice + (1 | sid) + (1 |
m:      itemNo)
        Df    AIC    BIC  logLik deviance  Chisq Chi Df Pr(>Chisq)
m.voice  6 894.84 916.90 -441.42   882.84
m        7 895.14 920.88 -440.57   881.14 1.6971      1     0.1927


Linear mixed model fit by maximum likelihood  ['lmerMod']
Formula: response ~ ellipsis + voice + ellipsis:voice + (1 + ellipsis:voice |
    sid) + (1 + ellipsis:voice | itemNo)
   Data: tmp

     AIC      BIC   logLik deviance df.resid
```

```
   873.1    913.6    -425.6    851.1        281


Scaled residuals:
    Min      1Q  Median      3Q     Max
-3.6788 -0.5154  0.0076  0.5025  3.4711


Random effects:
 Groups   Name           Variance  Std.Dev. Corr
 sid      (Intercept)    0.4722091 0.68717
          ellipsis:voice 0.2047110 0.45245   0.17
 itemNo   (Intercept)    0.0589566 0.24281
          ellipsis:voice 0.0008724 0.02954  -1.00
 Residual                0.7693439 0.87712
Number of obs: 292, groups:  sid, 26; itemNo, 12


Fixed effects:
               Estimate Std. Error t value
(Intercept)      3.5192     0.1617  21.769
ellipsis        -0.6441     0.1043  -6.176
voice            0.2078     0.1457   1.427
ellipsis:voice   0.1955     0.1043   1.875


Correlation of Fixed Effects:
           (Intr) ellpss voice
ellipsis    0.015
voice       0.070  0.149
ellipsis:vc 0.100  0.078  0.017


Data: tmp
Models:
m.interaction: response ~ ellipsis + voice + 1 + (1 + ellipsis:voice | sid) +
m.interaction:     (1 + ellipsis:voice | itemNo)
m: response ~ ellipsis + voice + ellipsis:voice + (1 + ellipsis:voice |
m:     sid) + (1 + ellipsis:voice | itemNo)
              Df    AIC    BIC  logLik deviance  Chisq Chi Df Pr(>Chisq)
m.interaction 10 874.38 911.15 -427.19   854.38
m             11 873.11 913.55 -425.55   851.11 3.2733      1    0.07042 .
---
codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1



Linear mixed model fit by maximum likelihood  ['lmerMod']
Formula: response ~ ellipsis + voice + ellipsis:voice + (1 + ellipsis |
    sid) + (1 + ellipsis | itemNo)
   Data: tmp


    AIC      BIC   logLik deviance df.resid
  771.0    811.4   -374.5    749.0      281
```

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```
Scaled residuals:
    Min      1Q  Median      3Q     Max
-4.5137 -0.3243  0.1175  0.5674  2.6977


Random effects:
 Groups   Name        Variance Std.Dev. Corr
 sid      (Intercept) 0.278385 0.52762
          ellipsis    0.006674 0.08169  -1.00
 itemNo   (Intercept) 0.031676 0.17798
          ellipsis    0.004898 0.06999  -1.00
 Residual             0.628695 0.79290
Number of obs: 292, groups:  sid, 26; itemNo, 12


Fixed effects:
               Estimate Std. Error t value
(Intercept)     4.08698    0.12598  32.441
ellipsis        0.18637    0.05341   3.489
voice          -0.15851    0.11508  -1.377
ellipsis:voice  0.03392    0.04978   0.681


Correlation of Fixed Effects:
           (Intr) ellpss voice
ellipsis    -0.411
voice       -0.055  0.008
ellipsis:vc  0.008 -0.059 -0.305


Data: tmp
Models:
m.ellipsis: response ~ 1 + voice + ellipsis:voice + (1 + ellipsis | sid) +
m.ellipsis:     (1 + ellipsis | itemNo)
m: response ~ ellipsis + voice + ellipsis:voice + (1 + ellipsis |
m:     sid) + (1 + ellipsis | itemNo)
           Df    AIC    BIC  logLik deviance  Chisq Chi Df Pr(>Chisq)
m.ellipsis 10 778.17 814.94 -379.09   758.17
m          11 770.98 811.43 -374.49   748.98 9.1862      1   0.002438 **
---
codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1


Linear mixed model fit by maximum likelihood  ['lmerMod']
Formula: response ~ ellipsis + voice + ellipsis:voice + (1 | sid) + (1 |
    itemNo)
   Data: tmp

     AIC      BIC   logLik deviance df.resid
   895.1    920.9   -440.6    881.1      285
```

```
Scaled residuals:
    Min      1Q  Median      3Q     Max
-3.2743 -0.6396  0.0240  0.6495  2.9683


Random effects:
 Groups   Name        Variance Std.Dev.
 sid      (Intercept) 0.46710  0.6835
 itemNo   (Intercept) 0.06801  0.2608
 Residual             0.97944  0.9897
Number of obs: 292, groups:  sid, 26; itemNo, 12


Fixed effects:
               Estimate Std. Error t value
(Intercept)     3.51405    0.16552  21.230
ellipsis       -0.68132    0.05868 -11.610
voice           0.19603    0.14739   1.330
ellipsis:voice  0.19847    0.05833   3.403


Correlation of Fixed Effects:
           (Intr) ellpss voice
ellipsis   0.007
voice      0.068  0.012
ellipsis:vc 0.012  0.079  0.009


Data: tmp
Models:
m.voice: response ~ ellipsis + 1 + ellipsis:voice + (1 | sid) + (1 | itemNo)
m: response ~ ellipsis + voice + ellipsis:voice + (1 | sid) + (1 |
m:      itemNo)
        Df    AIC    BIC  logLik deviance  Chisq Chi Df Pr(>Chisq)
m.voice  6 894.84 916.90 -441.42   882.84
m        7 895.14 920.88 -440.57   881.14 1.6971      1     0.1927


Linear mixed model fit by maximum likelihood  ['lmerMod']
Formula: response ~ ellipsis + voice + ellipsis:voice + (1 + ellipsis:voice |
    sid) + (1 + ellipsis:voice | itemNo)
   Data: tmp

     AIC      BIC   logLik deviance df.resid
   773.2    813.7   -375.6    751.2      281


Scaled residuals:
    Min      1Q  Median      3Q     Max
-4.1556 -0.2981  0.1198  0.5876  2.4703


Random effects:
 Groups   Name            Variance Std.Dev. Corr
```

```
 sid      (Intercept)    0.278983 0.52819
          ellipsis:voice 0.001288 0.03589   1.00
 itemNo   (Intercept)    0.034419 0.18552
          ellipsis:voice 0.003862 0.06214  -1.00
 Residual                0.633500 0.79593
Number of obs: 292, groups:  sid, 26; itemNo, 12


Fixed effects:
              Estimate Std. Error t value
(Intercept)    4.08276    0.12692  32.169
ellipsis       0.18572    0.04731   3.926
voice         -0.15559    0.11505  -1.352
ellipsis:voice 0.03521    0.05089   0.692


Correlation of Fixed Effects:
           (Intr) ellpss voice
ellipsis   -0.010
voice      -0.057  0.130
ellipsis:vc -0.041 -0.065 -0.011


Data: tmp
Models:
m.interaction: response ~ ellipsis + voice + 1 + (1 + ellipsis:voice | sid) +
m.interaction:     (1 + ellipsis:voice | itemNo)
m: response ~ ellipsis + voice + ellipsis:voice + (1 + ellipsis:voice |
m:     sid) + (1 + ellipsis:voice | itemNo)
              Df    AIC    BIC  logLik deviance  Chisq Chi Df Pr(>Chisq)
m.interaction 10 771.69 808.45 -375.84   751.69
m             11 773.21 813.66 -375.61   751.21 0.4751      1     0.4907


R version 3.4.4 (2018-03-15)
Platform: x86_64-pc-linux-gnu (64-bit)
Running under: Ubuntu 16.04 LTS

Matrix products: default
BLAS: /usr/lib/libblas/libblas.so.3.6.0
LAPACK: /usr/lib/lapack/liblapack.so.3.6.0

locale:
 [1] LC_CTYPE=en_US.UTF-8       LC_NUMERIC=C
 [3] LC_TIME=en_US.UTF-8        LC_COLLATE=en_US.UTF-8
 [5] LC_MONETARY=en_US.UTF-8    LC_MESSAGES=en_US.UTF-8
 [7] LC_PAPER=en_US.UTF-8       LC_NAME=C
 [9] LC_ADDRESS=C               LC_TELEPHONE=C
[11] LC_MEASUREMENT=en_US.UTF-8 LC_IDENTIFICATION=C


attached base packages:
```

```
[1] stats     graphics  grDevices utils     datasets  methods   base

other attached packages:
 [1] bindrcpp_0.2.2  lme4_1.1-17      Matrix_1.2-3     ggrepel_0.7.0
 [5] forcats_0.3.0   stringr_1.3.1   dplyr_0.7.4       purrr_0.2.4
 [9] readr_1.1.1     tidyr_0.8.0     tibble_1.4.2      ggplot2_2.2.1
[13] tidyverse_1.2.1

loaded via a namespace (and not attached):
 [1] xfun_0.4        tidyselect_0.2.4 reshape2_1.4.2   splines_3.4.4
 [5] haven_1.1.1     lattice_0.20-33 colorspace_1.3-2 rlang_0.2.0
 [9] pillar_1.2.1    nloptr_1.0.4    foreign_0.8-66   glue_1.3.0
[13] modelr_0.1.1    readxl_1.0.0    bindr_0.1.1      plyr_1.8.4
[17] munsell_0.4.3   gtable_0.2.0    cellranger_1.1.0 rvest_0.3.2
[21] psych_1.8.3.3   labeling_0.3    knitr_1.21       parallel_3.4.4
[25] highr_0.6       broom_0.4.4     Rcpp_0.12.16     scales_0.4.1
[29] jsonlite_1.6    mnormt_1.5-5    hms_0.4.2        stringi_1.2.4
[33] grid_3.4.4      cli_1.0.0       tools_3.4.4      magrittr_1.5
[37] lazyeval_0.2.0  crayon_1.3.4    pkgconfig_2.0.1  MASS_7.3-45
[41] xml2_1.2.0      lubridate_1.7.3 assertthat_0.2.0 minqa_1.2.4
[45] httr_1.3.1      rstudioapi_0.7  R6_2.2.2         nlme_3.1-124
[49] compiler_3.4.4
```