Analyses

TODO discussion 2021-09-20

- why negative: because inverted u and a in 2 places, see chunk calc-space
- why different dfs: I wasn't doing the same analysis, now I am
- why different Fs: because the vss data was different (due to formula switch)
- explain about 2 rows that are excluded, & possible mismatch
- do we have pitch.txt & formant.txt outputted by script?
  - no, but we have output by mom! Alex to integrate
- we can also leave that be, since by now we are aligned in terms of means for point vowels?
  - no, because duration & pitch are incorrectly attributed
- not sure what to do about the fact that our vowel triangles don't look the same – how were those generated? perhaps they are not over the same tokens?
  - mystery solved! i and u based on all moms in both figures
  - what shall we do, single figure for all moms?
- "REAL" decisions:
  - removing outliers? – yes
  - removing items from f1/2 when no f0 – keeping them because they are not outliers
  - doing ANOVA first, then mixed model- agreed
  - (I don't think software matters!) - ANOVA in spss, lmer in r

interim done:

- switched input file, results are stable
- add confidence intervals to vowel space, incorporate results to paper

Replication

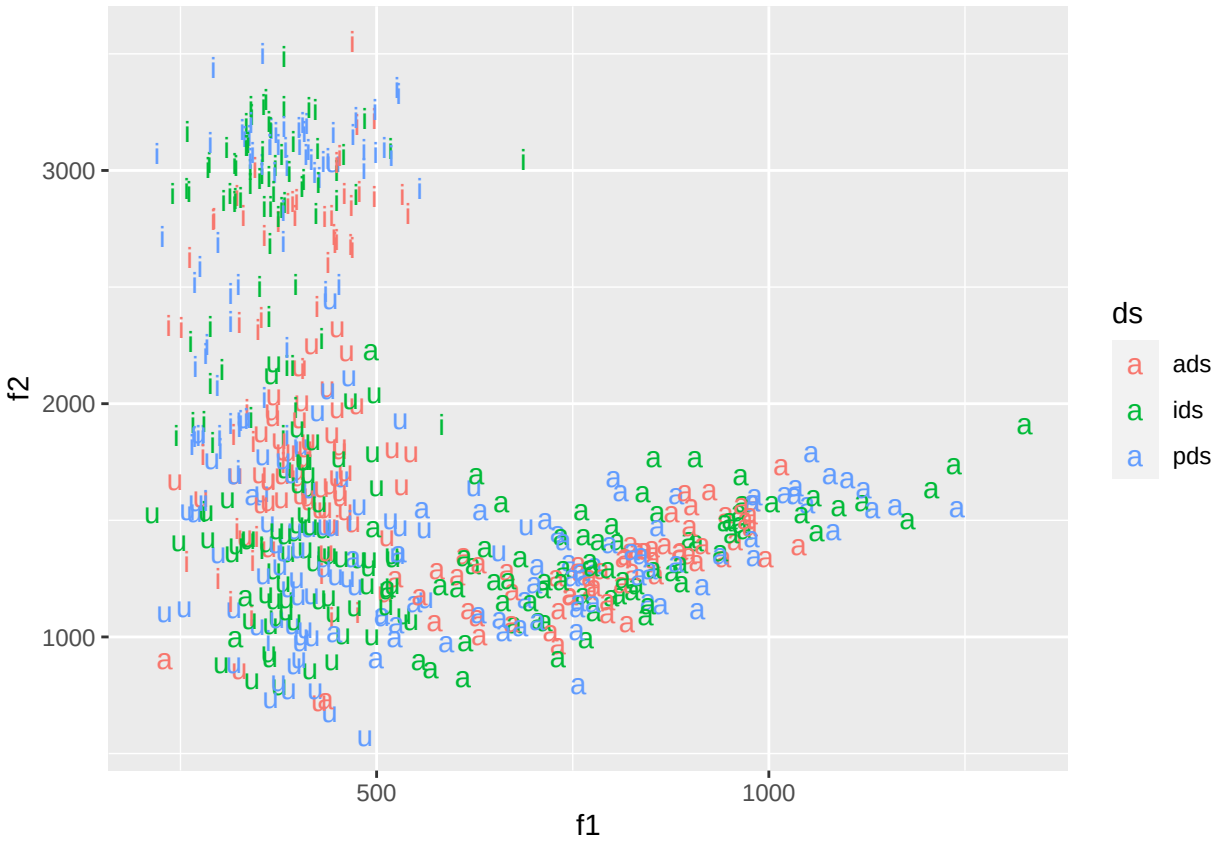
In this section, I'm just doing again the analyses that are already in the manuscript. Those were done with SPSS, so this is more replication than reproduction.

```
## [1] 614  10
```

Checking that we are getting the same means against the means in the xls file – we are.

Checking that we are getting the same means against the means in the sav file – we are.

Note there are no outliers:




```
##
## ball bead boot  box
##  105  208  200   99
```

```
## [1] 612  15
```

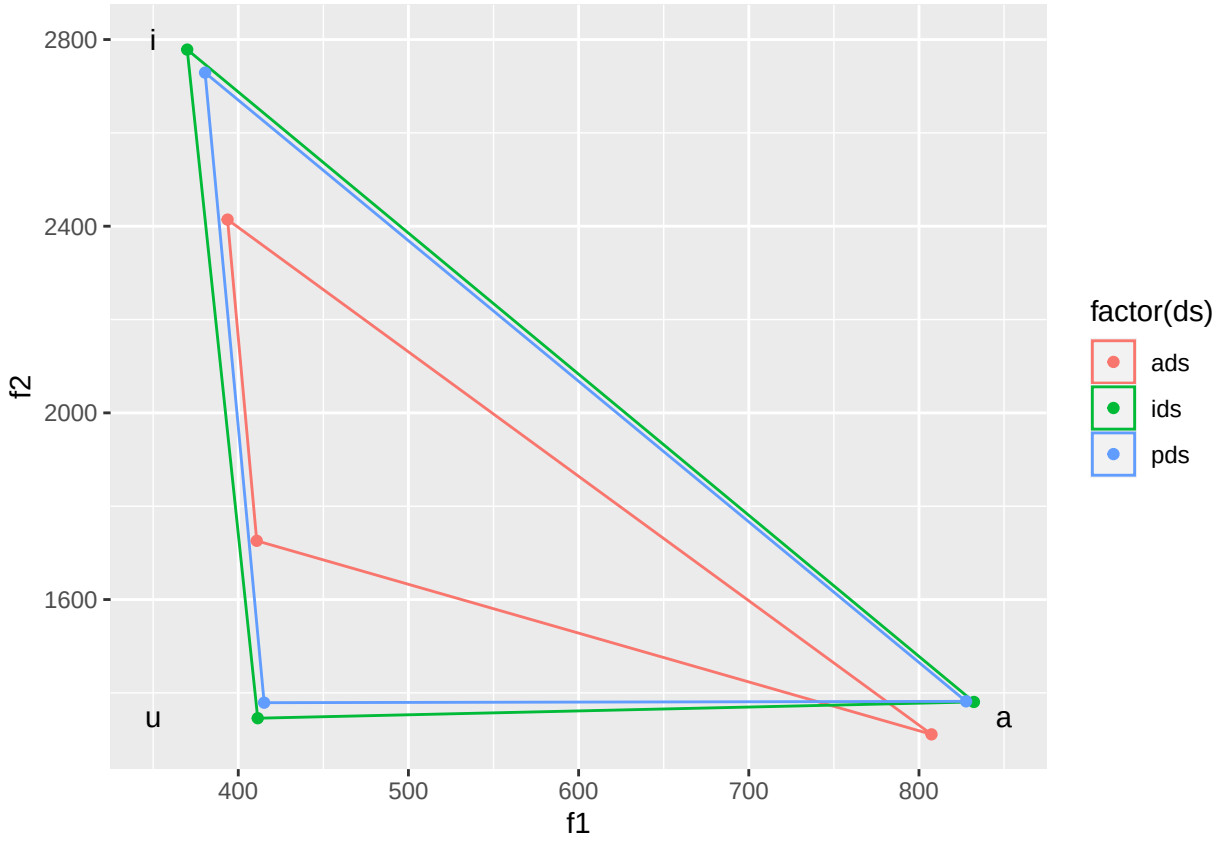
```
## `summarise()` has grouped output by 'motID', 'ds', 'v', 'stim_group'. You can override using the `.g
```

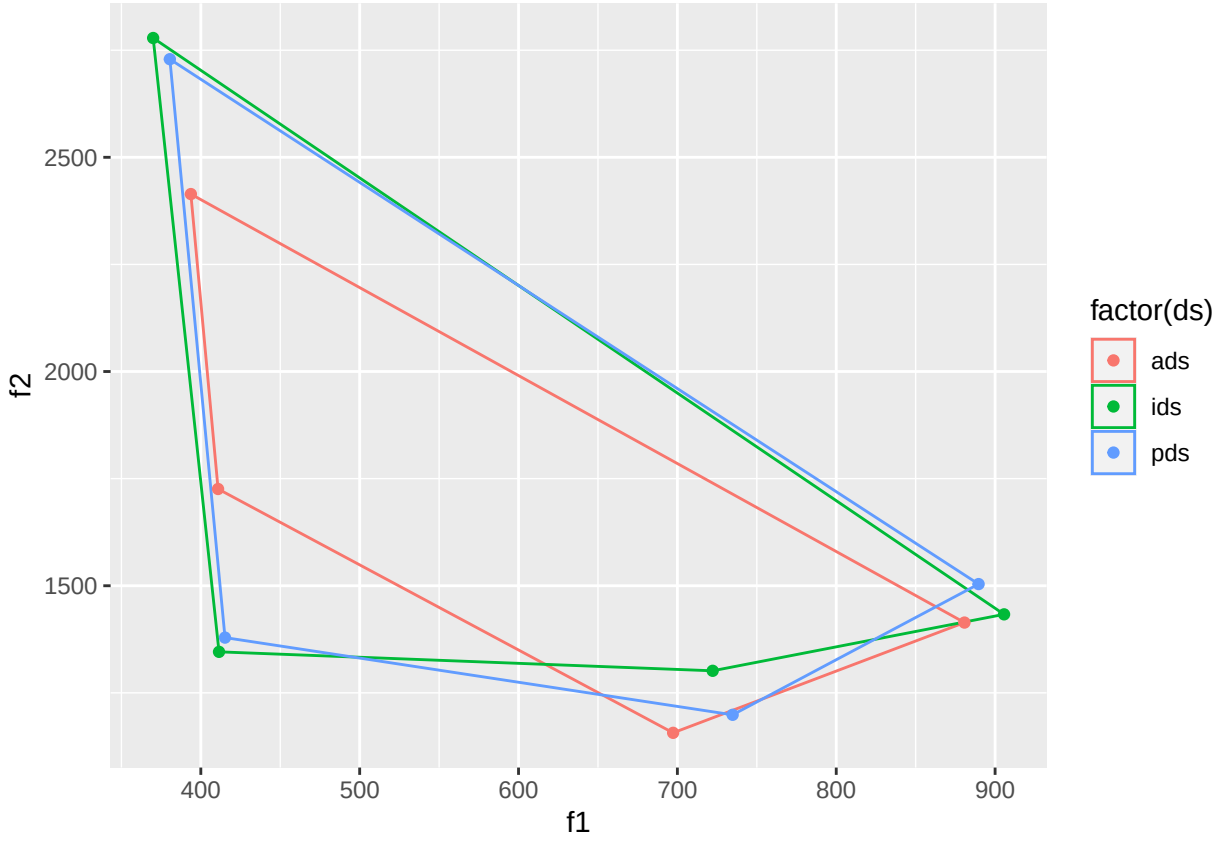
```
## `summarise()` has grouped output by 'ds', 'v'. You can override using the `.groups` argument.
```

```
## `summarise()` has grouped output by 'motID', 'ds'. You can override using the `.groups` argument.
```

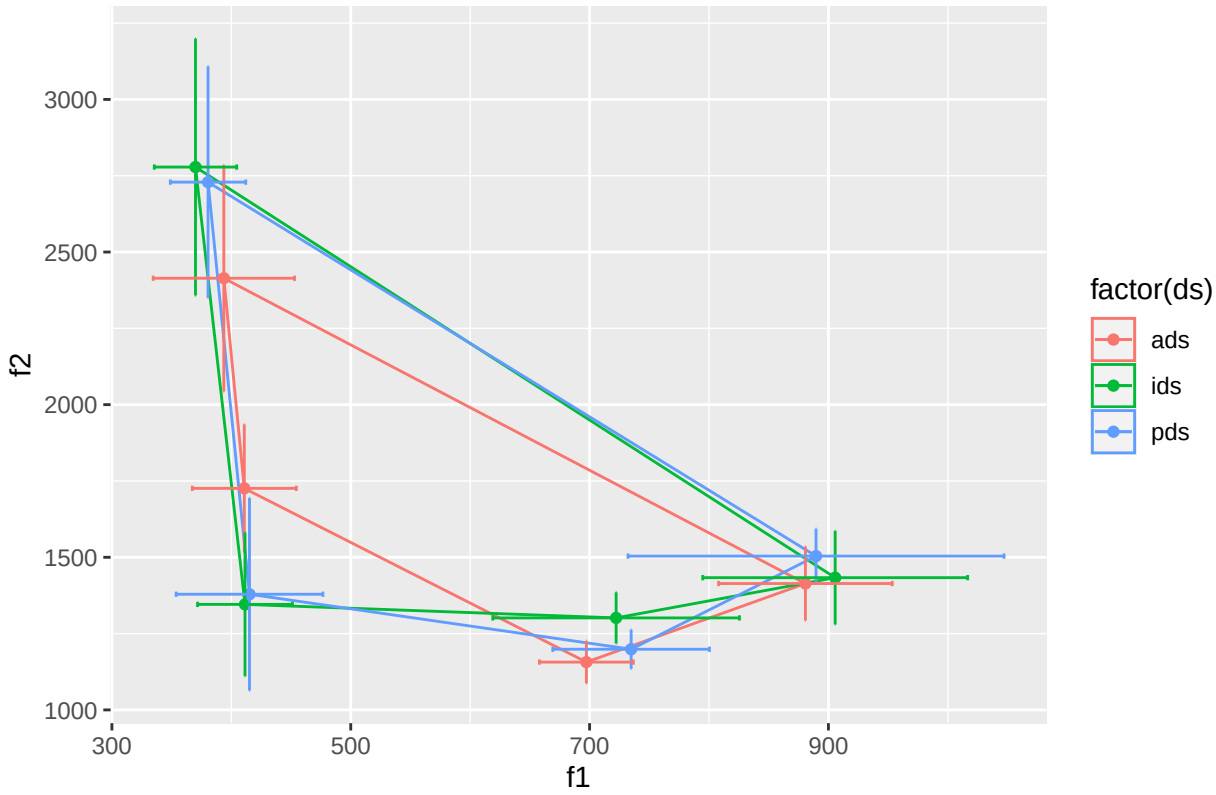
```
## `summarise()` has grouped output by 'ds'. You can override using the `.groups` argument.
## `summarise()` has grouped output by 'ds'. You can override using the `.groups` argument.
## `summarise()` has grouped output by 'ds'. You can override using the `.groups` argument.
```

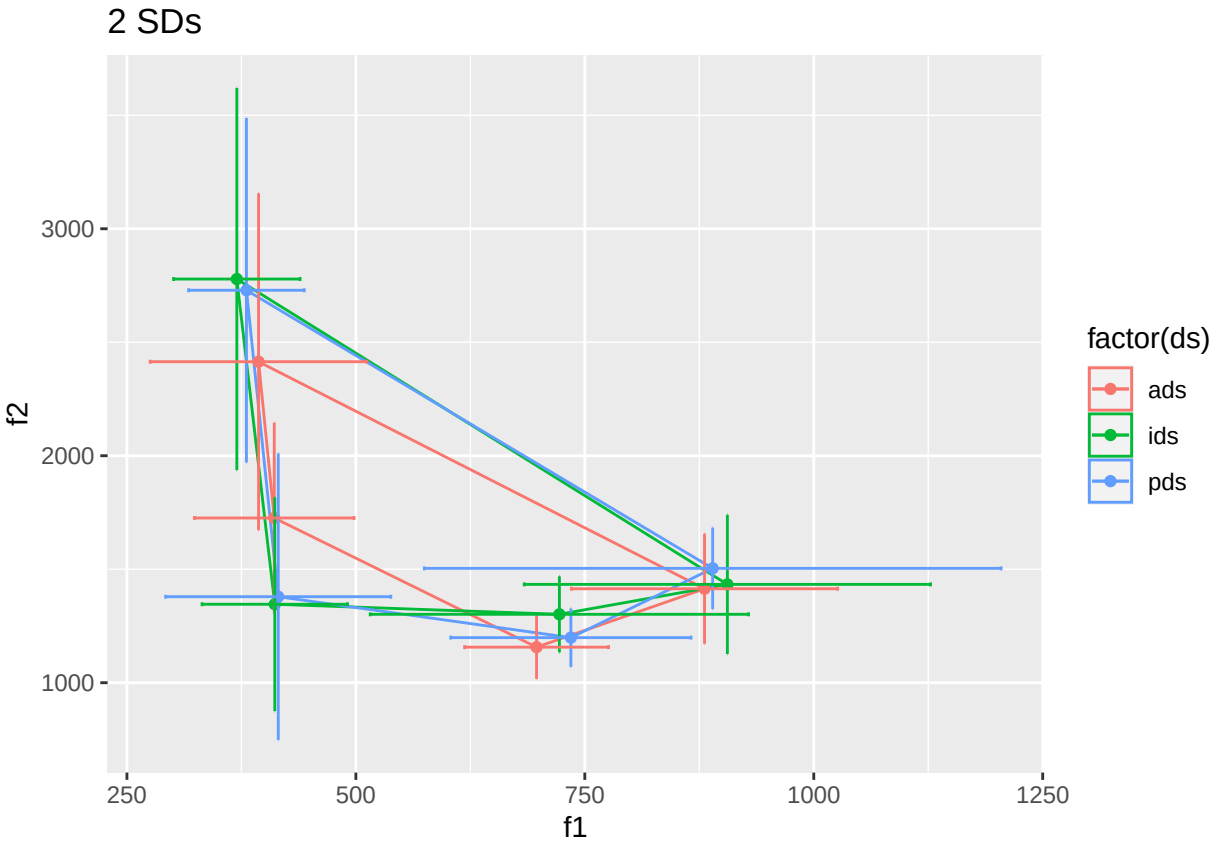
Fig vowel space




2500
2000
1500
f2
400
500
600
700
800
900
f1
factor(ds)
ads
ids
pds

1 SDs


3000
2500
2000
1500
1000
f2
300
500
700
900
f1
factor(ds)
ads
ids
pds



Vowel space calculations

Next we calculate vowel space for each mom and register.

ANOVA

A within-subject analysis of variance (ANOVA) on average vowel space across listener conditions (3=IDS, PDS, ADS) revealed a significant main effect ($F(2,18) = 6.04$, $p < .02$), with paired contrasts indicating that the average vowel spaces for IDS and PDS were not significantly different, $t(9) = .98$, $p > .05$, but were both greater than the vowel space of ADS (IDS v. ADS, $t(9) = 3.79$, $p < .005$) and (PDS v. ADS, $t(9) = 2.24$, $p = .05$; see Figure 1a and b).

ANOVA: not the same F or dfs

explanations from Robin: "To conduct a repeated-measures ANOVA in SPSS, we do not specify the repeated-measures factor and the dependent variable in the SPSS data file. Instead, the SPSS data file contains several quantitative variables. The number of quantitative variables is equal to the number of levels of the within-subjects factor. The scores on any one of these quantitative variables are the scores on the dependent variable for a single level of the within-subjects factor. Although we do not define the within-subjects factor in the SPSS data file, we specify it in the dialog box for the General Linear Model Repeated-Measures procedure. To define the factor, we give a name to the within-subjects factor, specify the number of levels of this factor, and indicate the quantitative variables in the data set associated with the levels of the within-subjects factor." and "the error term in the SPSS repeated measures model is (n-1) for sample (10-1=9) x (k-1) for the number of measures per sample (3-1=2); so 9 x 2 = 18 (for the denominator)."

```
## Anova Table (Type III tests)
```

```
##
## Response: vss
##                 Sum Sq Df F value    Pr(>F)
## (Intercept) 3.4849e+12  1 49.8950 1.356e-07 ***
## ds          5.1724e+11  2  3.7028   0.03792 *
## Residuals   1.8858e+12 27
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
## Warning: Converting "mom" to factor for ANOVA.
```

```
## Warning: Converting "ds" to factor for ANOVA.
```

```
##                               Length Class      Mode
## ANOVA                         9      data.frame list
## Mauchly's Test for Sphericity 4      data.frame list
## Sphericity Corrections        7      data.frame list
## aov                           3      aovlist    list
```

```
## Tables of means
## Grand mean
##
## 774124.3
##
##  ds
## ds
##    ads    ids    pds
## 590331 888984 843058
```

Paired contrasts – same pattern of results but different t values.

```
##
##  Paired t-test
##
## data:  vs$vss[vs$ds == "pds"] and vs$vss[vs$ds == "ids"]
## t = -0.51421, df = 9, p-value = 0.6195
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -247965.2  156114.8
## sample estimates:
## mean of the differences
##               -45925.22
```

```
##
## Cohen's d
##
## d estimate: 0.1634661 (negligible)
## 95 percent confidence interval:
##      lower      upper
## -0.7776627  1.1045948
```

```
##
##  Paired t-test
##
## data:  vs$vss[vs$ds == "ids"] and vs$vss[vs$ds == "ads"]
## t = 2.4812, df = 9, p-value = 0.03493
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
```

```
##   26360.03 570944.75
## sample estimates:
## mean of the differences
##                298652.4
```

```
##
## Cohen's d
##
## d estimate: -1.145361 (large)
## 95 percent confidence interval:
##      lower      upper
## -2.1590346 -0.1316881
```

```
##
##  Paired t-test
##
## data:  vs$vss[vs$ds == "pds"] and vs$vss[vs$ds == "ads"]
## t = 2.0114, df = 9, p-value = 0.07516
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -31509.44 536963.78
## sample estimates:
## mean of the differences
##                252727.2
```

```
##
## Cohen's d
##
## d estimate: -1.009995 (large)
## 95 percent confidence interval:
##       lower       upper
## -2.00766139 -0.01232847
```

dur, f0, f1, f2

Duration and pitch can be done at the item level

```
## Linear mixed model fit by REML. t-tests use Satterthwaite's method [
## lmerModLmerTest]
## Formula: Vowel.Duration ~ ds * target + (1 + ds | motID)
##    Data: dat
##
## REML criterion at convergence: -1196.9
##
## Scaled residuals:
##     Min      1Q  Median      3Q     Max
## -3.5075 -0.5243 -0.0812  0.3429  5.3475
##
## Random effects:
##  Groups   Name        Variance  Std.Dev. Corr
##  motID    (Intercept) 0.0007844 0.02801
##           dsids       0.0049885 0.07063  0.70
##           dspds       0.0016989 0.04122  0.40 0.43
##  Residual             0.0067937 0.08242
## Number of obs: 612, groups:  motID, 10
```

```
##
## Fixed effects:
##                     Estimate Std. Error         df t value Pr(>|t|)
## (Intercept)         0.195594   0.018239  32.025482  10.724 3.95e-12 ***
## dsids               0.071813   0.031079  23.296971   2.311    0.030 *
## dspds               0.028688   0.025691  43.025541   1.117    0.270
## targetbead          0.015715   0.019451 258.823341   0.808    0.420
## targetboot         -0.025027   0.019208 259.178447  -1.303    0.194
## targetbox          -0.007414   0.022431  83.669854  -0.331    0.742
## dsids:targetbead    0.017544   0.025607 376.840946   0.685    0.494
## dspds:targetbead    0.007505   0.026095 388.124947   0.288    0.774
## dsids:targetboot   -0.038539   0.025541 379.230020  -1.509    0.132
## dspds:targetboot   -0.012970   0.026379 371.011771  -0.492    0.623
## dsids:targetbox    -0.014198   0.031273 159.359764  -0.454    0.650
## dspds:targetbox     0.008293   0.032348 166.157477   0.256    0.798
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
##              (Intr) dsids  dspds  trgtbd trgtbt trgtbx dsds:trgtbd dspds:trgtbd
## dsids        -0.187
## dspds        -0.429  0.460
## targetbead   -0.713  0.404  0.492
## targetboot   -0.722  0.409  0.498  0.673
## targetbox    -0.660  0.366  0.448  0.614  0.622
## dsds:trgtbd   0.527 -0.566 -0.370 -0.747 -0.499 -0.448
## dspds:trgtbd  0.521 -0.299 -0.709 -0.736 -0.492 -0.444  0.553
## dsds:trgtbt   0.528 -0.569 -0.370 -0.493 -0.739 -0.448  0.673       0.364
## dspds:trgtbt  0.512 -0.295 -0.715 -0.478 -0.716 -0.434  0.359       0.684
## dsds:trgtbx   0.447 -0.525 -0.313 -0.417 -0.422 -0.682  0.604       0.308
## dspds:trgtbx  0.438 -0.250 -0.640 -0.408 -0.413 -0.667  0.304       0.602
##              dsds:trgtbt dspds:trgtbt dsds:trgtbx
## dsids
## dspds
## targetbead
## targetboot
## targetbox
## dsds:trgtbd
## dspds:trgtbd
## dsds:trgtbt
## dspds:trgtbt  0.534
## dsds:trgtbx   0.608       0.303
## dspds:trgtbx  0.305       0.613        0.468

## Warning: NAs introduced by coercion

## Linear mixed model fit by REML. t-tests use Satterthwaite's method [
## lmerModLmerTest]
## Formula: Pitch ~ ds * target + (1 + ds | motID)
##    Data: dat
##
## REML criterion at convergence: 6725.7
##
## Scaled residuals:
##     Min      1Q  Median      3Q     Max
```

```
## -2.3511 -0.5609 -0.1344  0.4840  8.8002
##
## Random effects:
##  Groups   Name        Variance Std.Dev. Corr
##  motID    (Intercept)  314.5   17.73
##           dsids       3671.3   60.59    -0.62
##           dspds       1984.1   44.54    -0.47  0.98
##  Residual             4385.8   66.23
## Number of obs: 604, groups:  motID, 10
##
## Fixed effects:
##                  Estimate Std. Error       df t value Pr(>|t|)
## (Intercept)      200.9206    14.5842  45.8273  13.777   <2e-16 ***
## dsids             26.3386    26.7180  24.0931   0.986   0.3340
## dspds             46.0629    22.5968  34.1186   2.038   0.0493 *
## targetbead        -2.2826    16.1489 330.3489  -0.141   0.8877
## targetboot        11.7234    15.9680 325.5135   0.734   0.4634
## targetbox         -4.5147    18.7515 132.7122  -0.241   0.8101
## dsids:targetbead  16.7363    21.4775 493.1876   0.779   0.4362
## dspds:targetbead   0.3199    21.1068 479.6936   0.015   0.9879
## dsids:targetboot  25.0670    21.4922 494.3137   1.166   0.2440
## dspds:targetboot  11.0419    21.1774 482.9255   0.521   0.6023
## dsids:targetbox   12.1603    26.8806 322.8957   0.452   0.6513
## dspds:targetbox  -12.5868    25.4269 334.3660  -0.495   0.6209
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
##              (Intr) dsids  dspds  trgtbd trgtbt trgtbx dsds:trgtbd dspds:trgtbd
## dsids        -0.663
## dspds        -0.633  0.768
## targetbead   -0.764  0.439  0.469
## targetboot   -0.774  0.445  0.474  0.694
## targetbox    -0.713  0.421  0.424  0.638  0.645
## dsds:trgtbd   0.596 -0.579 -0.391 -0.771 -0.541 -0.507
## dspds:trgtbd  0.563 -0.345 -0.647 -0.747 -0.512 -0.461  0.595
## dsds:trgtbt   0.599 -0.583 -0.393 -0.536 -0.764 -0.509  0.700       0.415
## dspds:trgtbt  0.555 -0.347 -0.649 -0.500 -0.729 -0.451  0.414       0.687
## dsds:trgtbx   0.537 -0.542 -0.367 -0.480 -0.485 -0.748  0.638       0.382
## dspds:trgtbx  0.485 -0.328 -0.570 -0.435 -0.440 -0.686  0.383       0.599
##              dsds:trgtbt dspds:trgtbt dsds:trgtbx
## dsids
## dspds
## targetbead
## targetboot
## targetbox
## dsds:trgtbd
## dspds:trgtbd
## dsds:trgtbt
## dspds:trgtbt  0.582
## dsds:trgtbx   0.642       0.385
## dspds:trgtbx  0.385       0.603        0.583

## Linear mixed model fit by REML. t-tests use Satterthwaite's method [
```

```
## lmerModLmerTest]
## Formula: f1 ~ ds * target + (1 + ds | motID)
##    Data: dat
##
## REML criterion at convergence: 7380.8
##
## Scaled residuals:
##     Min      1Q  Median      3Q     Max
## -4.8850 -0.5066 -0.0105  0.4939  3.6794
##
## Random effects:
##  Groups   Name        Variance Std.Dev. Corr
##  motID    (Intercept)  1767     42.04
##           dsids        1368     36.98   -0.59
##           dspds        1910     43.70   -0.74  0.73
##  Residual             11384    106.70
## Number of obs: 612, groups:  motID, 10
##
## Fixed effects:
##                   Estimate Std. Error        df t value Pr(>|t|)
## (Intercept)       716.4984    25.6245   40.3652  27.961  < 2e-16 ***
## dsids              18.9470    30.4303   45.8502   0.623   0.5366
## dspds              40.3167    32.3719   48.4858   1.245   0.2190
## targetbead       -322.1054    26.1567  449.5181 -12.314  < 2e-16 ***
## targetboot       -305.3773    25.8294  449.1069 -11.823  < 2e-16 ***
## targetbox         146.9823    31.3532  243.3127   4.688  4.6e-06 ***
## dsids:targetbead  -40.3431    33.5104  427.3748  -1.204   0.2293
## dspds:targetbead  -57.0131    34.4055  480.3026  -1.657   0.0982 .
## dsids:targetboot  -14.6346    33.4001  421.1287  -0.438   0.6615
## dspds:targetboot  -37.6148    34.6422  430.7730  -1.086   0.2782
## dsids:targetbox     0.9004    40.5772  149.5862   0.022   0.9823
## dspds:targetbox   -38.9954    42.9047  215.9709  -0.909   0.3644
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
##              (Intr) dsids  dspds  trgtbd trgtbt trgtbx dsds:trgtbd dspds:trgtbd
## dsids        -0.710
## dspds        -0.739  0.602
## targetbead   -0.708  0.574  0.556
## targetboot   -0.717  0.581  0.563  0.696
## targetbox    -0.669  0.532  0.523  0.647  0.654
## dsds:trgtbd   0.537 -0.756 -0.433 -0.766 -0.529 -0.484
## dspds:trgtbd  0.535 -0.446 -0.751 -0.757 -0.526 -0.488  0.588
## dsds:trgtbt   0.539 -0.761 -0.435 -0.523 -0.758 -0.485  0.680       0.403
## dspds:trgtbt  0.531 -0.445 -0.755 -0.515 -0.742 -0.482  0.401       0.694
## dsds:trgtbx   0.488 -0.699 -0.403 -0.472 -0.478 -0.733  0.614       0.371
## dspds:trgtbx  0.483 -0.406 -0.681 -0.467 -0.473 -0.723  0.364       0.619
##              dsds:trgtbt dspds:trgtbt dsds:trgtbx
## dsids
## dspds
## targetbead
## targetboot
## targetbox
```

```
## dsds:trgtbd
## dspds:trgtbd
## dsds:trgtbt
## dspds:trgtbt  0.572
## dsds:trgtbx   0.618       0.371
## dspds:trgtbx  0.365       0.626        0.558
```

```
## Linear mixed model fit by REML. t-tests use Satterthwaite's method [
## lmerModLmerTest]
## Formula: f2 ~ ds * target + (1 | motID)
##    Data: dat
##
## REML criterion at convergence: 8905.8
##
## Scaled residuals:
##     Min      1Q  Median      3Q     Max
## -4.3857 -0.4709  0.0855  0.6152  3.5881
##
## Random effects:
##  Groups   Name        Variance Std.Dev.
##  motID    (Intercept)  20894   144.5
##  Residual             146513   382.8
## Number of obs: 612, groups:  motID, 10
##
## Fixed effects:
##                  Estimate Std. Error       df t value Pr(>|t|)
## (Intercept)      1214.780     86.430   78.119  14.055  < 2e-16 ***
## dsids             121.725     92.492  590.933   1.316  0.18866
## dspds               9.972     95.412  591.214   0.105  0.91680
## targetbead       1158.997     89.789  598.411  12.908  < 2e-16 ***
## targetboot        501.410     88.664  598.370   5.655 2.41e-08 ***
## targetbox         191.689    103.098  599.180   1.859  0.06348 .
## dsids:targetbead  286.107    114.979  591.491   2.488  0.01311 *
## dspds:targetbead  331.067    117.437  591.848   2.819  0.00498 **
## dsids:targetboot -454.546    114.504  591.232  -3.970 8.08e-05 ***
## dspds:targetboot -335.557    117.238  591.065  -2.862  0.00436 **
## dsids:targetbox  -138.777    130.369  591.274  -1.064  0.28754
## dspds:targetbox    59.829    136.587  591.529   0.438  0.66153
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
##              (Intr) dsids  dspds  trgtbd trgtbt trgtbx dsds:trgtbd dspds:trgtbd
## dsids        -0.613
## dspds        -0.596  0.555
## targetbead   -0.690  0.590  0.574
## targetboot   -0.699  0.597  0.580  0.670
## targetbox    -0.637  0.514  0.500  0.609  0.616
## dsds:trgtbd   0.505 -0.805 -0.447 -0.750 -0.493 -0.430
## dspds:trgtbd  0.495 -0.452 -0.814 -0.736 -0.482 -0.422  0.567
## dsds:trgtbt   0.505 -0.808 -0.448 -0.486 -0.741 -0.429  0.652       0.366
## dspds:trgtbt  0.486 -0.451 -0.813 -0.469 -0.717 -0.408  0.364       0.662
## dsds:trgtbx   0.435 -0.709 -0.394 -0.418 -0.424 -0.696  0.570       0.320
## dspds:trgtbx  0.416 -0.388 -0.699 -0.401 -0.405 -0.666  0.312       0.568
```

```
##              dsds:trgtbt dspds:trgtbt dsds:trgtbx
## dsids
## dspds
## targetbead
## targetboot
## targetbox
## dsds:trgtbd
## dspds:trgtbd
## dsds:trgtbt
## dspds:trgtbt  0.553
## dsds:trgtbx   0.573       0.320
## dspds:trgtbx  0.313       0.567        0.527
```

Variability analyses

Get standard deviation of f1 and f2, separating by mom and register.

```
## `summarise()` has grouped output by 'motID', 'ds'. You can override using the `.groups` argument.
```

```
## Linear mixed model fit by REML. t-tests use Satterthwaite's method [
## lmerModLmerTest]
## Formula: f1.sd ~ ds * target + (1 | motID)
##    Data: sds
##
## REML criterion at convergence: 803.4
##
## Scaled residuals:
##     Min      1Q  Median      3Q     Max
## -2.7877 -0.5022  0.0003  0.4267  3.2233
##
## Random effects:
##  Groups   Name        Variance Std.Dev.
##  motID    (Intercept)  106.8   10.34
##  Residual             1209.3   34.77
## Number of obs: 90, groups:  motID, 10
##
## Fixed effects:
##                  Estimate Std. Error      df t value Pr(>|t|)
## (Intercept)       111.961     17.985  77.926   6.225 2.26e-08 ***
## dsids             -10.492     24.589  69.221  -0.427  0.67092
## dspds              34.795     24.589  69.221   1.415  0.16154
## targetbead        -61.288     20.826  73.637  -2.943  0.00435 **
## targetboot        -70.667     20.826  73.637  -3.393  0.00111 **
## targetbox         -50.105     23.086  77.207  -2.170  0.03305 *
## dsids:targetbead   20.047     29.095  69.221   0.689  0.49311
## dspds:targetbead  -14.025     29.095  69.221  -0.482  0.63130
## dsids:targetboot   20.299     29.095  69.221   0.698  0.48772
## dspds:targetboot   -7.713     29.095  69.221  -0.265  0.79173
## dsids:targetbox   118.860     31.745  69.221   3.744  0.00037 ***
## dspds:targetbox    73.487     31.745  69.221   2.315  0.02359 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
```

```
##              (Intr) dsids  dspds  trgtbd trgtbt trgtbx dsds:trgtbd dspds:trgtbd
## dsids        -0.684
## dspds        -0.684  0.500
## targetbead   -0.835  0.590  0.590
## targetboot   -0.835  0.590  0.590  0.721
## targetbox    -0.770  0.533  0.533  0.665  0.665
## dsds:trgtbd   0.578 -0.845 -0.423 -0.699 -0.499 -0.450
## dspds:trgtbd  0.578 -0.423 -0.845 -0.699 -0.499 -0.450  0.500
## dsds:trgtbt   0.578 -0.845 -0.423 -0.499 -0.699 -0.450  0.714       0.357
## dspds:trgtbt  0.578 -0.423 -0.845 -0.499 -0.699 -0.450  0.357       0.714
## dsds:trgtbx   0.530 -0.775 -0.387 -0.457 -0.457 -0.688  0.655       0.327
## dspds:trgtbx  0.530 -0.387 -0.775 -0.457 -0.457 -0.688  0.327       0.655
##              dsds:trgtbt dspds:trgtbt dsds:trgtbx
## dsids
## dspds
## targetbead
## targetboot
## targetbox
## dsds:trgtbd
## dspds:trgtbd
## dsds:trgtbt
## dspds:trgtbt  0.500
## dsds:trgtbx   0.655       0.327
## dspds:trgtbx  0.327       0.655        0.500
```

```
## boundary (singular) fit: see ?isSingular
```

```
## Linear mixed model fit by REML. t-tests use Satterthwaite's method [
## lmerModLmerTest]
## Formula: f2.sd ~ ds * target + (1 | motID)
##    Data: sds
##
## REML criterion at convergence: 1020.7
##
## Scaled residuals:
##     Min      1Q  Median      3Q     Max
## -2.6935 -0.5737 -0.1042  0.4766  3.2933
##
## Random effects:
##  Groups   Name        Variance  Std.Dev.
##  motID    (Intercept) 1.042e-15 3.228e-08
##  Residual             2.092e+04 1.447e+02
## Number of obs: 90, groups:  motID, 10
##
## Fixed effects:
##                   Estimate Std. Error      df t value Pr(>|t|)
## (Intercept)         121.25      72.33   78.00   1.676  0.09766 .
## dsids                80.26     102.29   78.00   0.785  0.43504
## dspds                40.28     102.29   78.00   0.394  0.69479
## targetbead          494.57      85.58   78.00   5.779 1.47e-07 ***
## targetboot           64.16      85.58   78.00   0.750  0.45570
## targetbox           -45.07      93.37   78.00  -0.483  0.63067
## dsids:targetbead   -402.58     121.03   78.00  -3.326  0.00134 **
## dspds:targetbead   -216.14     121.03   78.00  -1.786  0.07801 .
## dsids:targetboot    -28.35     121.03   78.00  -0.234  0.81538
```

```
## dspds:targetboot    54.29     121.03   78.00   0.449  0.65495
## dsids:targetbox     44.74     132.05   78.00   0.339  0.73566
## dspds:targetbox     24.41     132.05   78.00   0.185  0.85383
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
##              (Intr) dsids  dspds  trgtbd trgtbt trgtbx dsds:trgtbd dspds:trgtbd
## dsids        -0.707
## dspds        -0.707  0.500
## targetbead   -0.845  0.598  0.598
## targetboot   -0.845  0.598  0.598  0.714
## targetbox    -0.775  0.548  0.548  0.655  0.655
## dsds:trgtbd   0.598 -0.845 -0.423 -0.707 -0.505 -0.463
## dspds:trgtbd  0.598 -0.423 -0.845 -0.707 -0.505 -0.463  0.500
## dsds:trgtbt   0.598 -0.845 -0.423 -0.505 -0.707 -0.463  0.714       0.357
## dspds:trgtbt  0.598 -0.423 -0.845 -0.505 -0.707 -0.463  0.357       0.714
## dsds:trgtbx   0.548 -0.775 -0.387 -0.463 -0.463 -0.707  0.655       0.327
## dspds:trgtbx  0.548 -0.387 -0.775 -0.463 -0.463 -0.707  0.327       0.655
##              dsds:trgtbt dspds:trgtbt dsds:trgtbx
## dsids
## dspds
## targetbead
## targetboot
## targetbox
## dsds:trgtbd
## dspds:trgtbd
## dsds:trgtbt
## dspds:trgtbt  0.500
## dsds:trgtbx   0.655       0.327
## dspds:trgtbx  0.327       0.655        0.500
## optimizer (nloptwrap) convergence code: 0 (OK)
## boundary (singular) fit: see ?isSingular
```