lme_result

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Result LM and ANOVA E299

Subjects' averages analysis

```
datFrameAvg = ddply(datFrameOK,.(subjIndxF,LegCF,HandCF,cLxLF),summarize,trial_RTms=mean(trial_RTms))
mixmodel1 = lmer(trial_RTms ~ LegCF*HandCF*cLxLF + (1|subjIndxF), data=datFrameAvg, REML=F)
summary(mixmodel1)
```

```
## Linear mixed model fit by maximum likelihood  ['lmerMod']
## Formula: trial_RTms ~ LegCF * HandCF * cLxLF + (1 | subjIndxF)
##    Data: datFrameAvg
##
##      AIC      BIC   logLik deviance df.resid
##   2313.3   2346.6  -1146.6   2293.3      198
##
## Scaled residuals:
##      Min       1Q   Median       3Q      Max
## -2.73115 -0.64204  0.06266  0.53721  2.94599
##
## Random effects:
##  Groups    Name        Variance Std.Dev.
##  subjIndxF (Intercept) 5230     72.32
##  Residual              2511     50.11
## Number of obs: 208, groups:  subjIndxF, 26
##
## Fixed effects:
##                       Estimate Std. Error t value
## (Intercept)            570.437     14.603   39.06
## LegCF1                 -67.778      3.475  -19.51
## HandCF1                -20.125      3.475   -5.79
## cLxLF1                 -32.240      3.475   -9.28
## LegCF1:HandCF1          -8.539      3.475   -2.46
## LegCF1:cLxLF1           26.366      3.475    7.59
## HandCF1:cLxLF1         -22.581      3.475   -6.50
## LegCF1:HandCF1:cLxLF1  -24.569      3.475   -7.07
##
## Correlation of Fixed Effects:
##             (Intr) LegCF1 HndCF1 cLxLF1 LgCF1:HCF1 LCF1:L HCF1:L
## LegCF1      0.000
## HandCF1     0.000  0.000
## cLxLF1      0.000  0.000  0.000
## LgCF1:HnCF1 0.000  0.000  0.000  0.000
## LgCF1:cLLF1 0.000  0.000  0.000  0.000  0.000
## HndCF1:LLF1 0.000  0.000  0.000  0.000  0.000      0.000
## LCF1:HCF1:L 0.000  0.000  0.000  0.000  0.000      0.000  0.000
```

```
anova(mixmodel1)
```

```
## Analysis of Variance Table
##                     Df Sum Sq Mean Sq  F value
## LegCF                1 955518  955518 380.5027
## HandCF               1  84247   84247  33.5487
## cLxLF                1 216196  216196  86.0926
## LegCF:HandCF         1  15167   15167   6.0398
## LegCF:cLxLF          1 144598  144598  57.5811
## HandCF:cLxLF         1 106057  106057  42.2338
## LegCF:HandCF:cLxLF   1 125558  125558  49.9992
```

this are equivalent

```
mixmodel1 = lme(trial_RTms ~ LegCF*HandCF*cLxLF , random= ~1|subjIndxF, data=datFrameAvg)
summary(mixmodel1)
```

```
## Linear mixed-effects model fit by REML
##  Data: datFrameAvg
##        AIC      BIC    logLik
##   2275.608 2308.591 -1127.804
##
## Random effects:
##  Formula: ~1 | subjIndxF
##         (Intercept) Residual
## StdDev:    73.75217 51.10428
##
## Fixed effects: trial_RTms ~ LegCF * HandCF * cLxLF
##                            Value Std.Error  DF   t-value p-value
## (Intercept)            570.4366 14.891710 175  38.30565   0.000
## LegCF1                 -67.7779  3.543444 175 -19.12768   0.000
## HandCF1                -20.1255  3.543444 175  -5.67964   0.000
## cLxLF1                 -32.2398  3.543444 175  -9.09843   0.000
## LegCF1:HandCF1          -8.5393  3.543444 175  -2.40988   0.017
## LegCF1:cLxLF1           26.3663  3.543444 175   7.44086   0.000
## HandCF1:cLxLF1         -22.5808  3.543444 175  -6.37255   0.000
## LegCF1:HandCF1:cLxLF1 -24.5692  3.543444 175  -6.93369   0.000
##  Correlation:
##                       (Intr) LegCF1 HndCF1 cLxLF1 LgCF1:HCF1 LCF1:L HCF1:L
## LegCF1                0
## HandCF1               0      0
## cLxLF1                0      0      0
## LegCF1:HandCF1        0      0      0      0
## LegCF1:cLxLF1         0      0      0      0      0
## HandCF1:cLxLF1        0      0      0      0      0          0
## LegCF1:HandCF1:cLxLF1 0      0      0      0      0          0      0
##
## Standardized Within-Group Residuals:
##         Min          Q1         Med          Q3         Max
## -2.67811384 -0.62957074  0.06144569  0.52678092  2.88877631
##
## Number of Observations: 208
## Number of Groups: 26
```

```
anova(mixmodel1)
```

```
##                   numDF denDF   F-value p-value
## (Intercept)           1   175 1467.3225  <.0001
```

```
## LegCF                   1   175  365.8680  <.0001
## HandCF                  1   175   32.2583  <.0001
## cLxLF                   1   175   82.7814  <.0001
## LegCF:HandCF            1   175    5.8075   0.017
## LegCF:cLxLF             1   175   55.3664  <.0001
## HandCF:cLxLF            1   175   40.6094  <.0001
## LegCF:HandCF:cLxLF      1   175   48.0761  <.0001
```

```
anovamodel1 = aov(trial_RTms ~ LegCF*HandCF*cLxLF + Error(subjIndxF) , data=datFrameAvg)
summary(anovamodel1)
```

```
##
## Error: subjIndxF
##           Df  Sum Sq Mean Sq F value Pr(>F)
## Residuals 25 1153168   46127
##
## Error: Within
##                      Df Sum Sq Mean Sq F value   Pr(>F)
## LegCF                 1 955518  955518 365.868  < 2e-16 ***
## HandCF                1  84247   84247  32.258 5.53e-08 ***
## cLxLF                 1 216196  216196  82.781  < 2e-16 ***
## LegCF:HandCF          1  15167   15167   5.808    0.017 *
## LegCF:cLxLF           1 144598  144598  55.366 4.33e-12 ***
## HandCF:cLxLF          1 106057  106057  40.609 1.59e-09 ***
## LegCF:HandCF:cLxLF    1 125558  125558  48.076 7.60e-11 ***
## Residuals           175 457038    2612
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

adding the factor response mode (external or anatomical) explains a bit more

```
datFrameAvg = ddply(datFrameOK,.(subjIndxF,LegCF,HandCF,cLxLF,RespMF),summarize,trial_RTms=mean(trial_R

anovamodel1 = aov(trial_RTms ~ LegCF*HandCF*cLxLF + Error(subjIndxF) , data=datFrameAvg)
summary(anovamodel1)
```

```
##
## Error: subjIndxF
##           Df  Sum Sq Mean Sq F value Pr(>F)
## Residuals 25 2295429   91817
##
## Error: Within
##                      Df  Sum Sq Mean Sq F value   Pr(>F)
## LegCF                 1 1929126 1929126 535.667  < 2e-16 ***
## HandCF                1  168153  168153  46.692 3.28e-11 ***
## cLxLF                 1  427142  427142 118.606  < 2e-16 ***
## LegCF:HandCF          1   33508   33508   9.304  0.00245 **
## LegCF:cLxLF           1  287914  287914  79.946  < 2e-16 ***
## HandCF:cLxLF          1  221389  221389  61.474 4.50e-14 ***
## LegCF:HandCF:cLxLF    1  258644  258644  71.818 5.15e-16 ***
## Residuals           383 1379318    3601
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
anovamodel2 = aov(trial_RTms ~ LegCF*HandCF*cLxLF*RespMF + Error(subjIndxF) , data=datFrameAvg)
summary(anovamodel2)
```

```
##
## Error: subjIndxF
##           Df  Sum Sq Mean Sq F value Pr(>F)
## Residuals 25 2295429   91817
##
## Error: Within
##                             Df  Sum Sq Mean Sq F value   Pr(>F)
## LegCF                        1 1929126 1929126 537.800  < 2e-16 ***
## HandCF                       1  168153  168153  46.878 3.10e-11 ***
## cLxLF                        1  427142  427142 119.078  < 2e-16 ***
## RespMF                       1    8250    8250   2.300   0.1302
## LegCF:HandCF                 1   33508   33508   9.341   0.0024 **
## LegCF:cLxLF                  1  287914  287914  80.264  < 2e-16 ***
## HandCF:cLxLF                 1  221389  221389  61.719 4.23e-14 ***
## LegCF:RespMF                 1     793     793   0.221   0.6385
## HandCF:RespMF                1    1829    1829   0.510   0.4756
## cLxLF:RespMF                 1     497     497   0.139   0.7098
## LegCF:HandCF:cLxLF           1  258644  258644  72.104 4.83e-16 ***
## LegCF:HandCF:RespMF          1    1021    1021   0.285   0.5939
## LegCF:cLxLF:RespMF           1    3091    3091   0.862   0.3538
## HandCF:cLxLF:RespMF          1     241     241   0.067   0.7957
## LegCF:HandCF:cLxLF:RespMF    1   18445   18445   5.142   0.0239 *
## Residuals                  375 1345150    3587
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
noRespM = lmer(trial_RTms ~ LegCF*HandCF*cLxLF + (1|subjIndxF), data=datFrameAvg,REML=F)
summary(noRespM)
```

```
## Linear mixed model fit by maximum likelihood  ['lmerMod']
## Formula: trial_RTms ~ LegCF * HandCF * cLxLF + (1 | subjIndxF)
##    Data: datFrameAvg
##
##      AIC      BIC   logLik deviance df.resid
##   4683.3   4723.6  -2331.7   4663.3      406
##
## Scaled residuals:
##      Min       1Q   Median       3Q      Max
## -2.74427 -0.64780 -0.00281  0.64646  3.00565
##
## Random effects:
##  Groups    Name        Variance Std.Dev.
##  subjIndxF (Intercept) 5297     72.78
##  Residual              3537     59.47
## Number of obs: 416, groups:  subjIndxF, 26
##
## Fixed effects:
##                       Estimate Std. Error t value
## (Intercept)            570.925     14.568   39.19
## LegCF1                 -68.098      2.916  -23.36
## HandCF1                -20.105      2.916   -6.90
## cLxLF1                 -32.043      2.916  -10.99
## LegCF1:HandCF1          -8.975      2.916   -3.08
## LegCF1:cLxLF1           26.308      2.916    9.02
## HandCF1:cLxLF1         -23.069      2.916   -7.91
```

```
## LegCF1:HandCF1:cLxLF1  -24.935      2.916   -8.55
##
## Correlation of Fixed Effects:
##             (Intr) LegCF1 HndCF1 cLxLF1 LgCF1:HCF1 LCF1:L HCF1:L
## LegCF1      0.000
## HandCF1     0.000  0.000
## cLxLF1      0.000  0.000  0.000
## LgCF1:HnCF1 0.000  0.000  0.000  0.000
## LgCF1:cLLF1 0.000  0.000  0.000  0.000  0.000
## HndCF1:LLF1 0.000  0.000  0.000  0.000  0.000      0.000
## LCF1:HCF1:L 0.000  0.000  0.000  0.000  0.000      0.000  0.000
```

```
wRespM = lmer(trial_RTms ~ LegCF*HandCF*cLxLF*RespMF + (1|subjIndxF), data=datFrameAvg,REML=F)
summary(wRespM)
```

```
## Linear mixed model fit by maximum likelihood  ['lmerMod']
## Formula: trial_RTms ~ LegCF * HandCF * cLxLF * RespMF + (1 | subjIndxF)
##    Data: datFrameAvg
##
##      AIC      BIC   logLik deviance df.resid
##   4689.5   4762.1  -2326.8   4653.5      398
##
## Scaled residuals:
##      Min       1Q   Median       3Q      Max
## -2.59779 -0.61894 -0.02265  0.63924  2.94743
##
## Random effects:
##  Groups    Name        Variance Std.Dev.
##  subjIndxF (Intercept) 5302     72.82
##  Residual              3449     58.73
## Number of obs: 416, groups:  subjIndxF, 26
##
## Fixed effects:
##                                Estimate Std. Error t value
## (Intercept)                    570.9250    14.5680   39.19
## LegCF1                         -68.0979     2.8794  -23.65
## HandCF1                        -20.1051     2.8794   -6.98
## cLxLF1                         -32.0435     2.8794  -11.13
## RespMF1                          4.4532     2.8794    1.55
## LegCF1:HandCF1                  -8.9748     2.8794   -3.12
## LegCF1:cLxLF1                   26.3078     2.8794    9.14
## HandCF1:cLxLF1                 -23.0691     2.8794   -8.01
## LegCF1:RespMF1                   1.3807     2.8794    0.48
## HandCF1:RespMF1                  2.0968     2.8794    0.73
## cLxLF1:RespMF1                   1.0934     2.8794    0.38
## LegCF1:HandCF1:cLxLF1          -24.9347     2.8794   -8.66
## LegCF1:HandCF1:RespMF1          -1.5670     2.8794   -0.54
## LegCF1:cLxLF1:RespMF1            2.7260     2.8794    0.95
## HandCF1:cLxLF1:RespMF1           0.7608     2.8794    0.26
## LegCF1:HandCF1:cLxLF1:RespMF1  -6.6588     2.8794   -2.31
##
## Correlation matrix not shown by default, as p = 16 > 12.
## Use print(x, correlation=TRUE)  or
##   vcov(x)     if you need it
```

```r
anova(noRespM,wRespM)
```

```
## Data: datFrameAvg
## Models:
## noRespM: trial_RTms ~ LegCF * HandCF * cLxLF + (1 | subjIndxF)
## wRespM: trial_RTms ~ LegCF * HandCF * cLxLF * RespMF + (1 | subjIndxF)
##         Df    AIC    BIC  logLik deviance  Chisq Chi Df Pr(>Chisq)
## noRespM 10 4683.3 4723.6 -2331.7   4663.3
## wRespM  18 4689.5 4762.1 -2326.8   4653.5 9.7825      8     0.2806
```