

Advanced Analysis

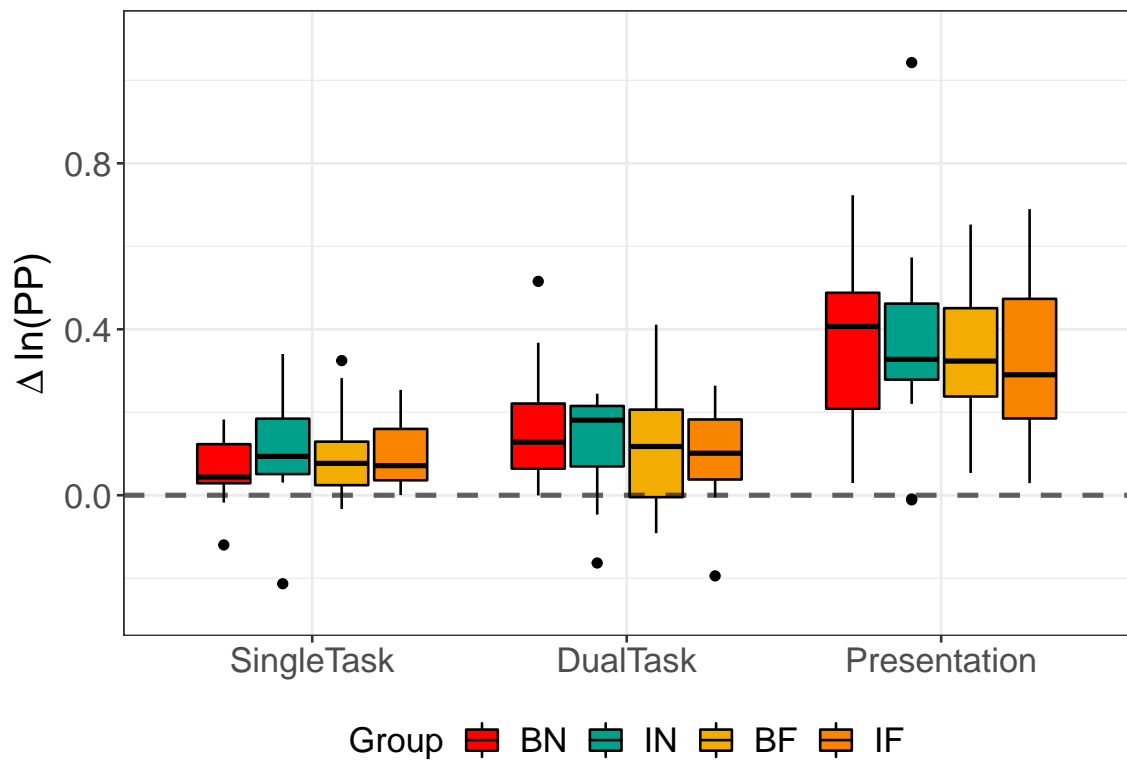
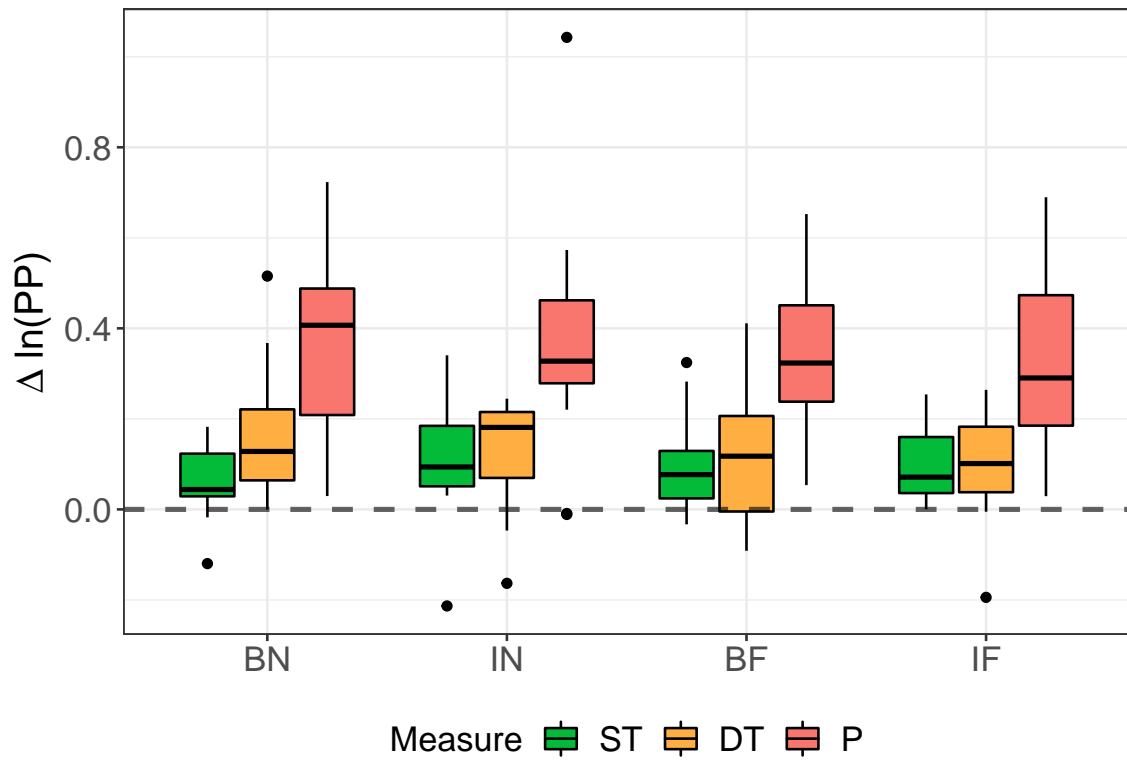
PP, 4 Groups:

Stress Levels Across Activities

Our Linear Model:

$$\Delta \ln(\bar{P}P) = 1 + \text{Group} + \text{Activity} + 1|\text{Subject}$$

```
## Linear mixed-effects model fit by REML
## Data: diff_df
##      AIC      BIC    logLik
## -247.2001 -215.7997 132.6001
##
## Random effects:
## Formula: ~1 | Subject
##      (Intercept) Residual
## StdDev:  0.09175105 0.1130596
##
## Fixed effects: PP ~ 1 + Group + Activity
##              Value Std.Error DF   t-value p-value
## (Intercept)  0.10354849 0.03139011 183   3.298762  0.0012
## GroupIN      0.00245546 0.03905029   59   0.062880  0.9501
## GroupBF     -0.00954642 0.04011114   59  -0.237999  0.8127
## GroupIF     -0.01904097 0.03895914   59  -0.488742  0.6268
## ActivityB   -0.02835372 0.02024374  183  -1.400617  0.1630
## ActivityDT   0.03339114 0.02014430  183   1.657597  0.0991
## ActivityP    0.25894718 0.02034647  183  12.726884  0.0000
## Correlation:
##      (Intr) GropIN GropBF GropIF ActvtB ActvDT
## GroupIN   -0.682
## GroupBF   -0.662  0.533
## GroupIF   -0.682  0.549  0.534
## ActivityB -0.314 -0.006 -0.006 -0.006
## ActivityDT -0.321  0.000  0.000  0.000  0.498
## ActivityP -0.321  0.010  0.000  0.000  0.493  0.495
##
## Standardized Within-Group Residuals:
##      Min      Q1      Med      Q3      Max
## -2.63268141 -0.45991934 -0.05550614  0.43023638  4.83077285
##
## Number of Observations: 249
## Number of Groups: 63
```

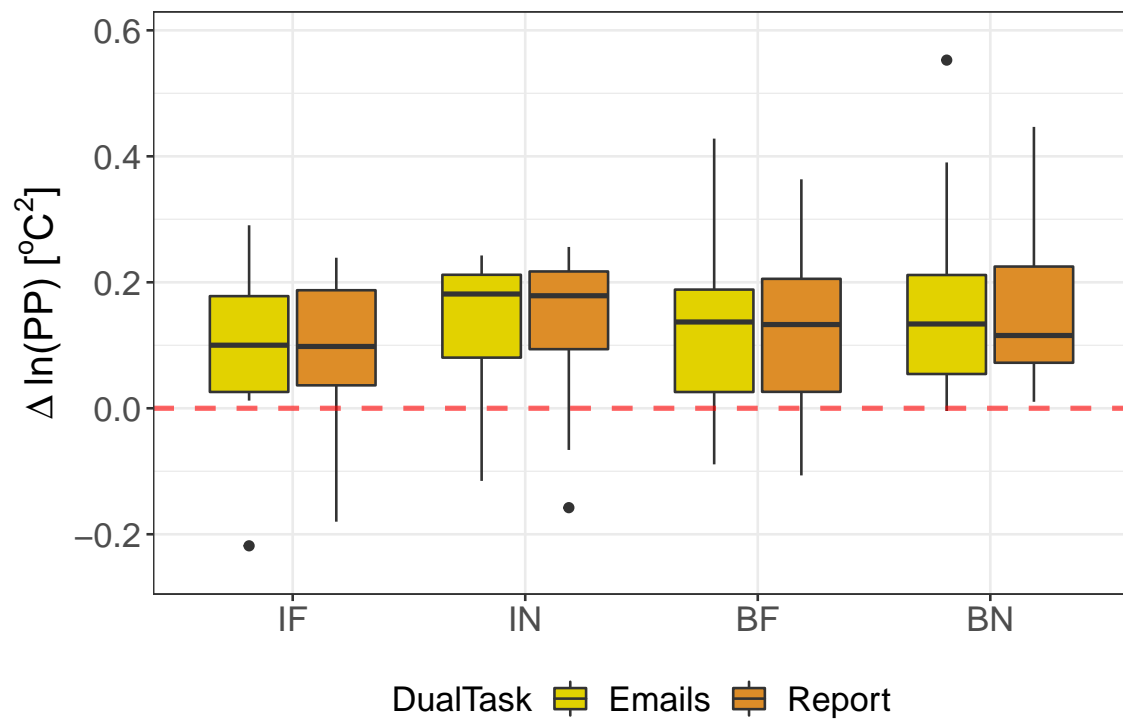


Stress Levels for Dual Task

Our Linear Model:

$$\Delta \ln(\bar{P}\bar{P}) = 1 + \text{Group} + \text{DualTask} + 1|\text{Subject}$$

```
## Linear mixed-effects model fit by REML
## Data: total_df
##      AIC      BIC    logLik
## -281.2856 -261.8318 147.6428
##
## Random effects:
## Formula: ~1 | Subject
##      (Intercept)  Residual
## StdDev:    0.1231059 0.02530318
##
## Fixed effects: PP ~ 1 + Group + DualTask
##              Value Std.Error DF   t-value p-value
## (Intercept)   0.16800013 0.03332468 61   5.041313  0.0000
## GroupIN       -0.03095961 0.04489629 58  -0.689581  0.4932
## GroupBF       -0.03949743 0.04701853 58  -0.840040  0.4043
## GroupIF       -0.06672436 0.04489629 58  -1.486189  0.1426
## DualTaskReport -0.00424620 0.00454459 61  -0.934342  0.3538
## Correlation:
##      (Intr) GropIN GropBF GropIF
## GroupIN      -0.739
## GroupBF      -0.705  0.524
## GroupIF      -0.739  0.548  0.524
## DualTaskReport -0.068  0.000  0.000  0.000
##
## Standardized Within-Group Residuals:
##      Min      Q1      Med      Q3      Max
## -1.738429401 -0.506006920  0.005805051  0.394417770  2.284256657
##
## Number of Observations: 124
## Number of Groups: 62
```



```
## Paired t-test
## For IF, p = 0.674 > 0.05

## Paired t-test
## For IN, p = 0.6229 > 0.05

## Paired t-test
## For BF, p = 0.4738 > 0.05

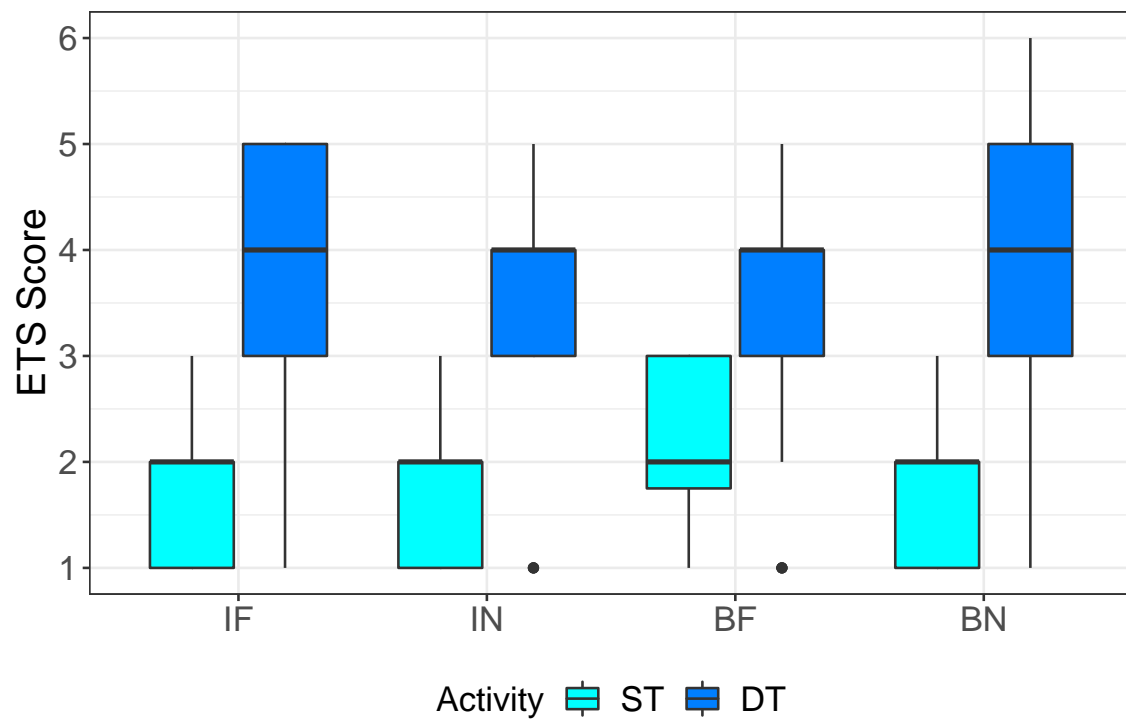
## Paired t-test
## For BN, p = 0.4811 > 0.05
```

Linear Modelling for Writing Quality

Our Linear Model:

$$WritingQuality = 1 + Group + Activity + 1|Subject$$

```
## Linear mixed-effects model fit by REML
## Data: full_df
##      AIC      BIC    logLik
##  793.3721 820.2769 -389.686
##
## Random effects:
## Formula: ~1 | Subject
##      (Intercept) Residual
## StdDev:    0.8120606 0.5913165
##
## Fixed effects: Score ~ 1 + Group + Activity
##              Value Std.Error DF   t-value p-value
## (Intercept)  1.9094325 0.2289277 287   8.340768  0.0000
## GroupIN      0.0971725 0.3071231  58   0.316396  0.7528
## GroupBF      0.0459900 0.3212338  58   0.143167  0.8867
## GroupIF      0.1037474 0.3072053  58   0.337713  0.7368
## ActivityDT   1.7485714 0.0632144 287  27.660972  0.0000
## Correlation:
##      (Intr) GropIN GropBF GropIF
## GroupIN    -0.731
## GroupBF    -0.699  0.521
## GroupIF    -0.731  0.545  0.521
## ActivityDT -0.138  0.000  0.000  0.000
##
## Standardized Within-Group Residuals:
##      Min      Q1      Med      Q3      Max
## -2.5146305 -0.5409298 -0.0189896  0.4566978  2.1478396
##
## Number of Observations: 350
## Number of Groups: 62
```



Activity	Group	n
ST	BN	41
ST	IN	49
ST	BF	40
ST	IF	45
DT	BN	41
DT	IN	49
DT	BF	40
DT	IF	45

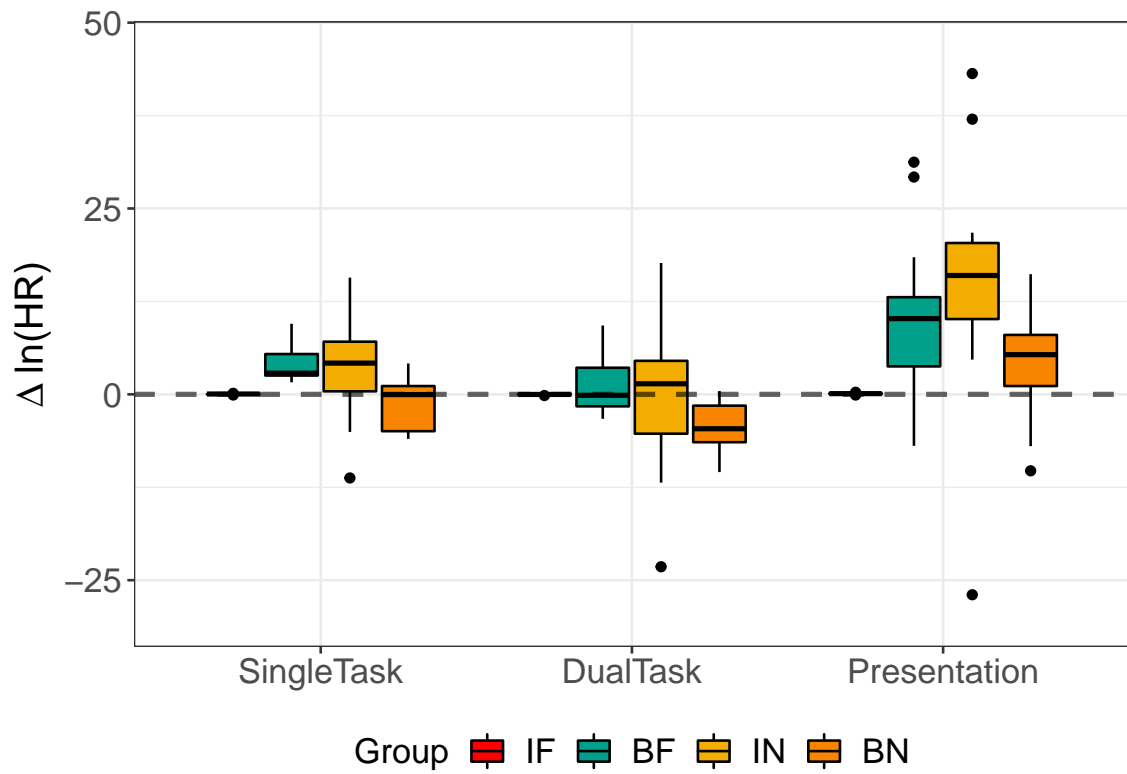
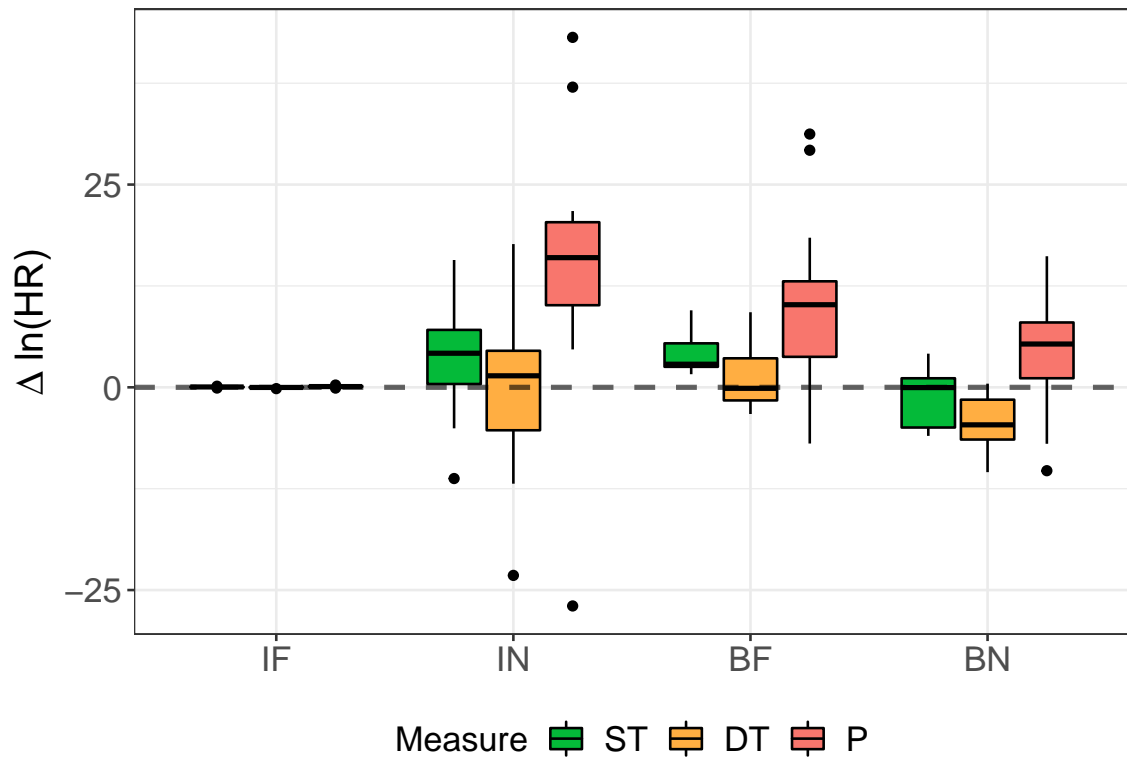
HR, 4 Groups:

Stress Levels Across Activities

Our Linear Model:

$$\Delta \bar{H}R = 1 + \text{Group} + \text{Activity} + 1|\text{Subject}$$

```
## Linear mixed-effects model fit by REML
## Data: diff_df
##      AIC      BIC    logLik
## 1352.988 1382.628 -667.4939
##
## Random effects:
## Formula: ~1 | Subject
##      (Intercept) Residual
## StdDev:      4.819416 5.465658
##
## Fixed effects: HR ~ 1 + Group + Activity
##              Value Std.Error DF   t-value p-value
## (Intercept) -0.707562  1.674257 150 -0.422612  0.6732
## GroupIN      4.155954  2.148792  49  1.934088  0.0589
## GroupBF      5.180946  2.140633  49  2.420287  0.0193
## GroupIF      0.715265  2.227774  49  0.321067  0.7495
## ActivityB    -2.360654  1.068046 150 -2.210255  0.0286
## ActivityDT   -2.737329  1.061743 150 -2.578146  0.0109
## ActivityP     5.760775  1.095428 150  5.258925  0.0000
## Correlation:
##      (Intr) GropIN GropBF GropIF ActvtB ActvDT
## GroupIN    -0.665
## GroupBF    -0.665  0.519
## GroupIF    -0.640  0.499  0.501
## ActivityB  -0.317  0.006  0.000  0.000
## ActivityDT -0.317  0.000  0.000  0.000  0.497
## ActivityP  -0.301 -0.001 -0.013 -0.006  0.482  0.485
##
## Standardized Within-Group Residuals:
##      Min      Q1      Med      Q3      Max
## -3.47928223 -0.45606328  0.06482033  0.44920873  4.94379854
##
## Number of Observations: 206
## Number of Groups: 53
```

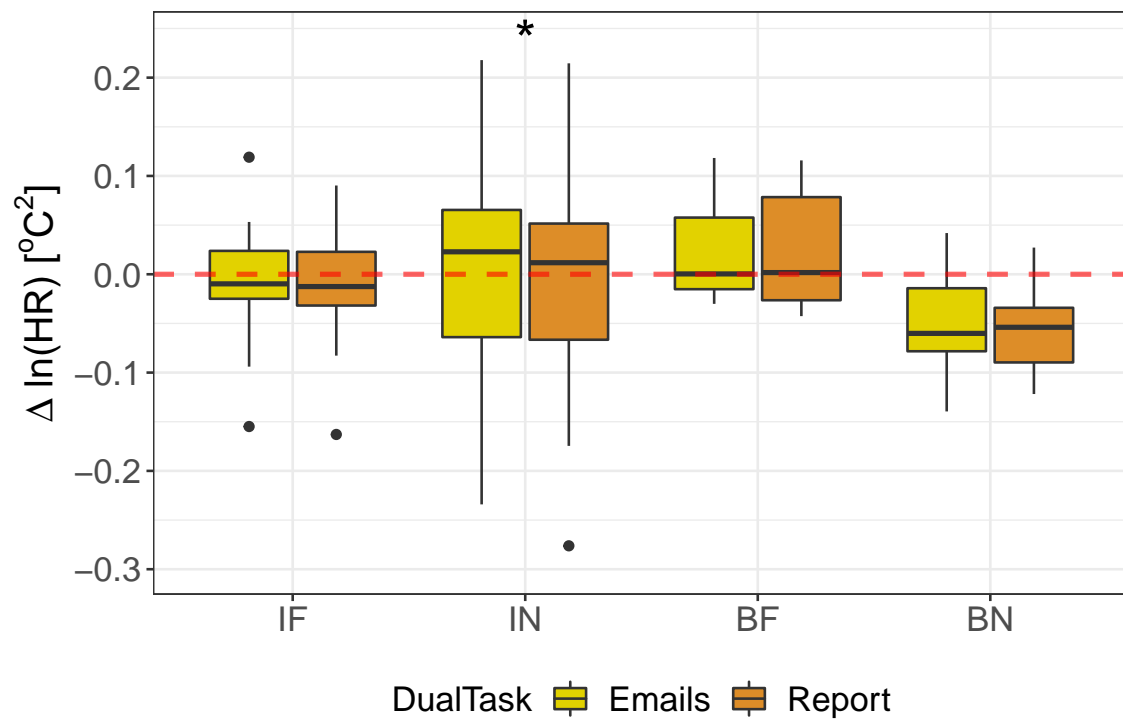


Stress Levels for Dual Task

Our Linear Model:

$$\Delta \bar{HR} = 1 + Group + DualTask + 1|Subject$$

```
## Linear mixed-effects model fit by REML
## Data: total_df
##      AIC      BIC    logLik
## -327.6932 -309.5274 170.8466
##
## Random effects:
## Formula: ~1 | Subject
##      (Intercept)  Residual
## StdDev:  0.07541611 0.01549374
##
## Fixed effects: HR ~ 1 + Group + DualTask
##              Value Std.Error DF   t-value p-value
## (Intercept) -0.04737276 0.021190754 51 -2.235539  0.0298
## GroupIN      0.04518851 0.029352507 48  1.539511  0.1302
## GroupBF      0.07322944 0.029891130 48  2.449872  0.0180
## GroupIF      0.03915708 0.030507507 48  1.283523  0.2055
## DualTaskReport -0.00599943 0.003038572 51 -1.974425  0.0538
## Correlation:
##      (Intr) GropIN GropBF GropIF
## GroupIN      -0.718
## GroupBF      -0.705  0.509
## GroupIF      -0.691  0.499  0.490
## DualTaskReport -0.072  0.000  0.000  0.000
##
## Standardized Within-Group Residuals:
##      Min      Q1      Med      Q3      Max
## -1.8939801 -0.3744487  0.0397759  0.3875371  2.0610869
##
## Number of Observations: 104
## Number of Groups: 52
```



```
## Paired t-test
## For IF, p = 0.4269 > 0.05

## Paired t-test
## For IN, p = 0.025 < 0.05  *

## Paired t-test
## For BF, p = 0.8595 > 0.05

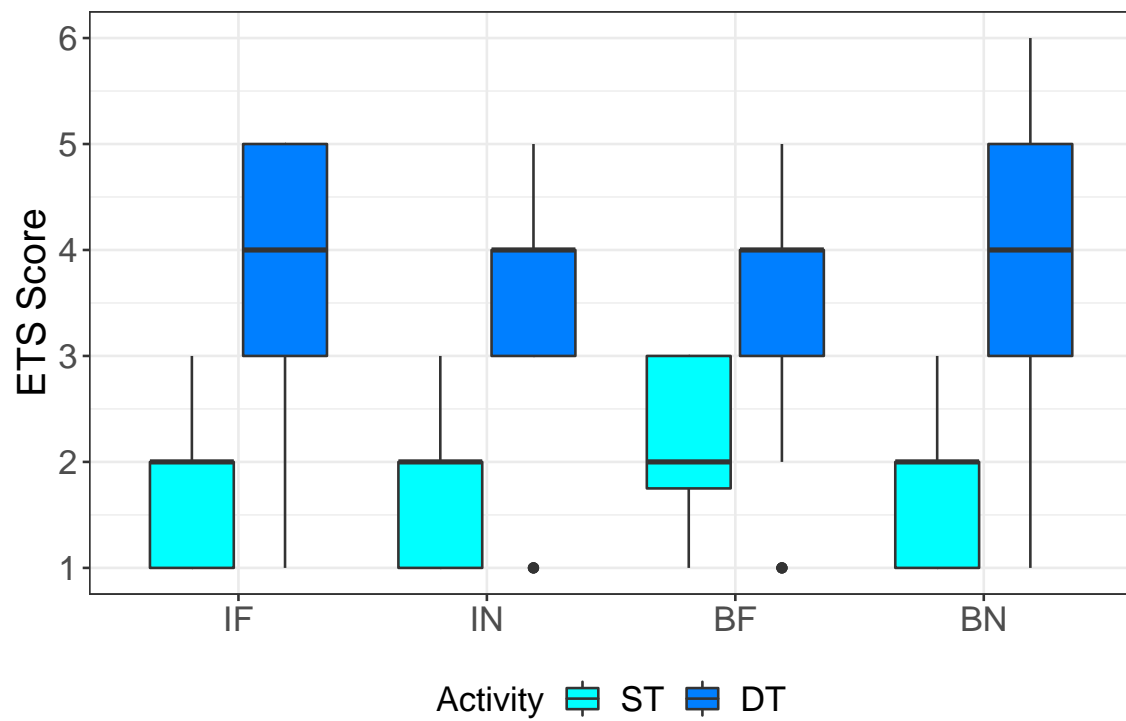
## Paired t-test
## For BN, p = 0.573 > 0.05
```

Linear Modelling for Writing Quality

Our Linear Model:

$$WritingQuality = 1 + Group + Activity + 1|Subject$$

```
## Linear mixed-effects model fit by REML
## Data: full_df
##      AIC      BIC    logLik
##  793.3721 820.2769 -389.686
##
## Random effects:
## Formula: ~1 | Subject
##      (Intercept) Residual
## StdDev:    0.8120606 0.5913165
##
## Fixed effects: Score ~ 1 + Group + Activity
##              Value Std.Error DF   t-value p-value
## (Intercept)  1.9094325 0.2289277 287   8.340768  0.0000
## GroupIN      0.0971725 0.3071231  58   0.316396  0.7528
## GroupBF      0.0459900 0.3212338  58   0.143167  0.8867
## GroupIF      0.1037474 0.3072053  58   0.337713  0.7368
## ActivityDT   1.7485714 0.0632144 287  27.660972  0.0000
## Correlation:
##      (Intr) GropIN GropBF GropIF
## GroupIN    -0.731
## GroupBF    -0.699  0.521
## GroupIF    -0.731  0.545  0.521
## ActivityDT -0.138  0.000  0.000  0.000
##
## Standardized Within-Group Residuals:
##      Min      Q1      Med      Q3      Max
## -2.5146305 -0.5409298 -0.0189896  0.4566978  2.1478396
##
## Number of Observations: 350
## Number of Groups: 62
```



Activity	Group	n
ST	BN	41
ST	IN	49
ST	BF	40
ST	IF	45
DT	BN	41
DT	IN	49
DT	BF	40
DT	IF	45

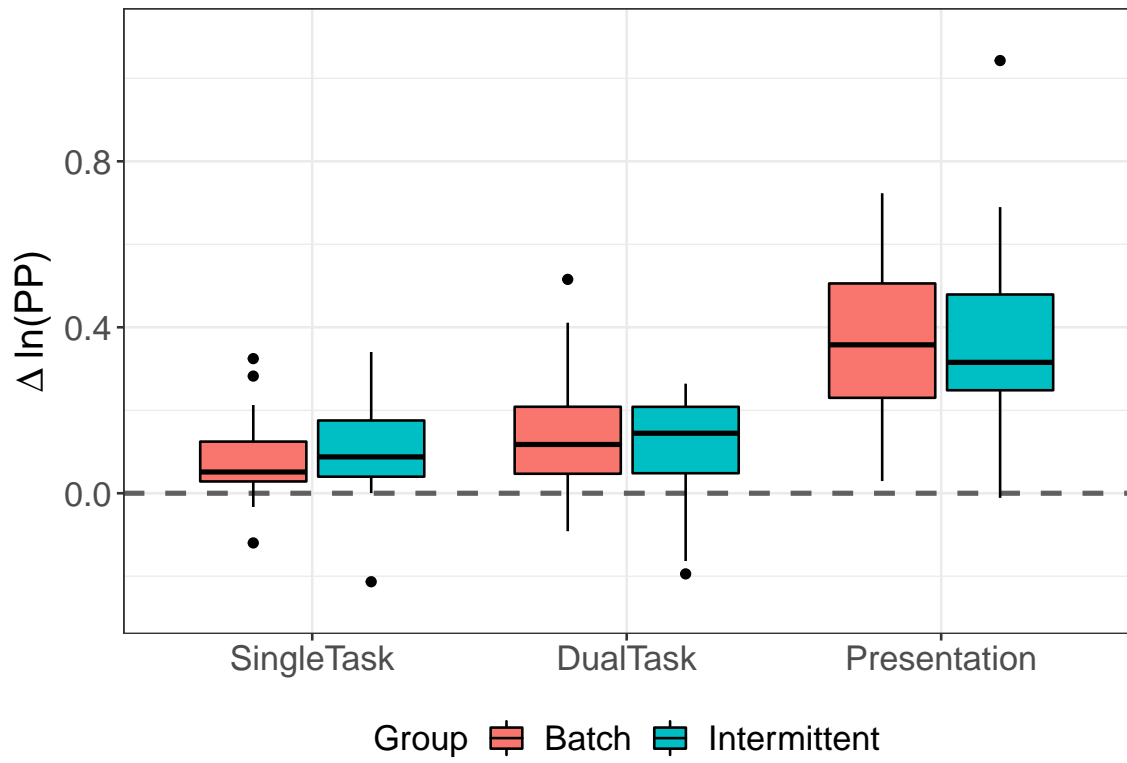
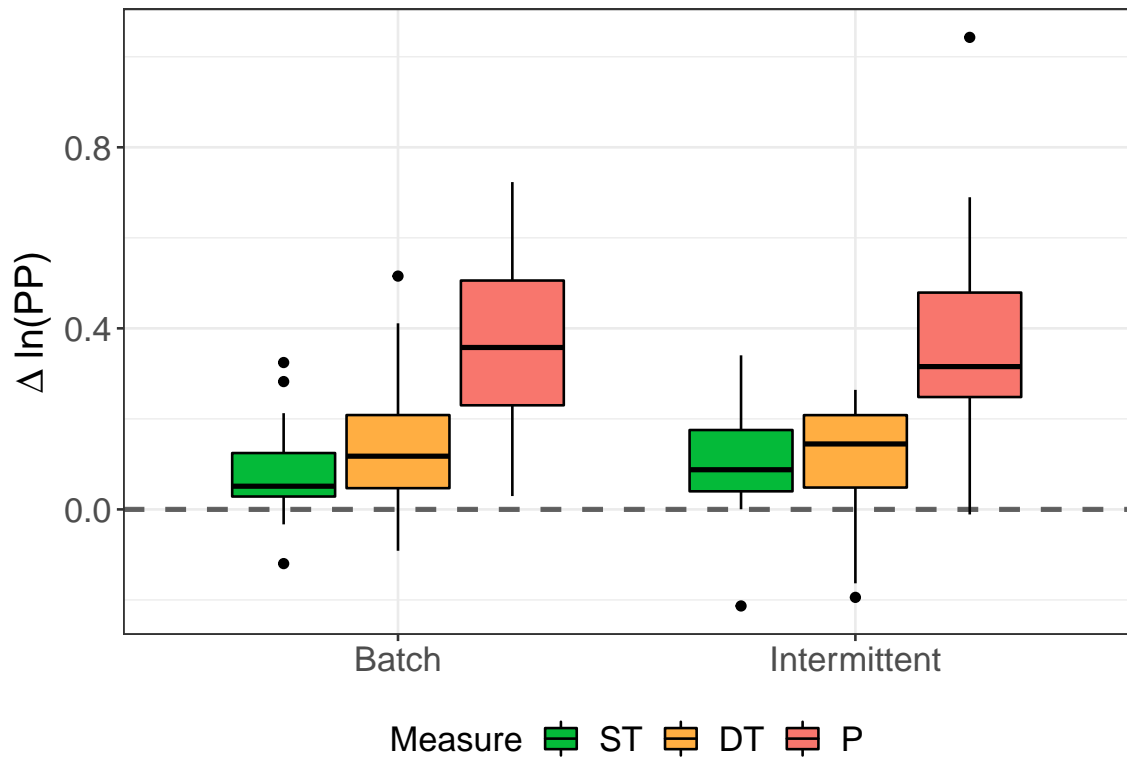
PP, 2 Groups:

Stress Levels Across Activities

Our Linear Model:

$$\Delta \ln(\bar{P}P) = 1 + \text{Group} + \text{Activity} + 1|\text{Subject}$$

```
## Linear mixed-effects model fit by REML
## Data: diff_df
##      AIC      BIC    logLik
## -260.1758 -235.6956 137.0879
##
## Random effects:
## Formula: ~1 | Subject
##      (Intercept) Residual
## StdDev:  0.09005326 0.1130618
##
## Fixed effects: PP ~ 1 + Group + Activity
##              Value Std.Error DF   t-value p-value
## (Intercept)  0.09863006 0.02329966 183   4.233112  0.0000
## GroupIntermittent -0.00339085 0.02693122  61  -0.125908  0.9002
## ActivityB        -0.02839596 0.02024359 183  -1.402714  0.1624
## ActivityDT        0.03339114 0.02014468 183   1.657566  0.0991
## ActivityP        0.25882016 0.02034538 183  12.721321  0.0000
## Correlation:
##              (Intr) GrpInt ActvtB ActvDT
## GroupIntermittent -0.624
## ActivityB          -0.428 -0.004
## ActivityDT         -0.432  0.000  0.498
## ActivityP          -0.432  0.007  0.493  0.495
##
## Standardized Within-Group Residuals:
##      Min      Q1      Med      Q3      Max
## -2.66012776 -0.46851210 -0.05833488  0.43604269  4.87053890
##
## Number of Observations: 249
## Number of Groups: 63
```

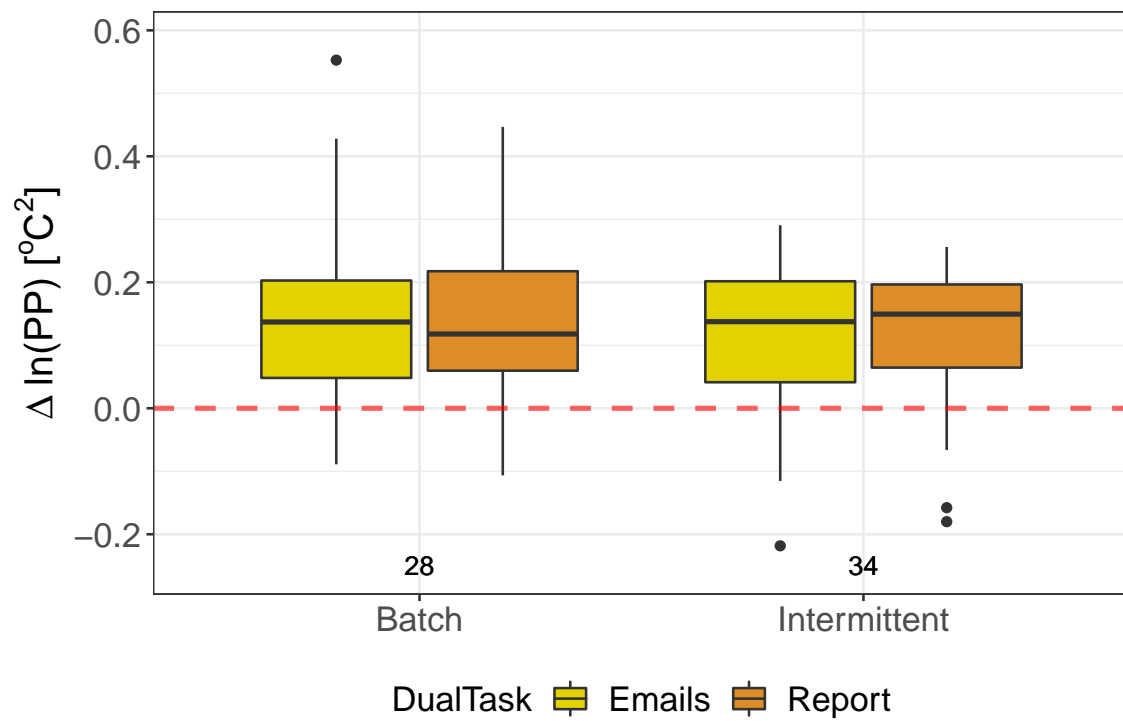


Stress Levels for Dual Task

Our Linear Model:

$$\Delta \ln(\bar{P}P) = 1 + \text{Group} + \text{DualTask} + 1|\text{Subject}$$

```
## Linear mixed-effects model fit by REML
## Data: total_df
##      AIC      BIC    logLik
## -292.6276 -278.6486 151.3138
##
## Random effects:
## Formula: ~1 | Subject
##      (Intercept)  Residual
## StdDev:    0.1224845 0.02530318
##
## Fixed effects: PP ~ 1 + Group + DualTask
##              Value Std.Error DF   t-value p-value
## (Intercept)    0.14825142 0.023503147 61  6.307726  0.0000
## GroupIntermittent -0.02909326 0.031589531 60 -0.920978  0.3608
## DualTaskReport    -0.00424620 0.004544585 61 -0.934342  0.3538
## Correlation:
##              (Intr) GrpInt
## GroupIntermittent -0.737
## DualTaskReport    -0.097  0.000
##
## Standardized Within-Group Residuals:
##      Min      Q1      Med      Q3      Max
## -1.719404974 -0.511923117  0.009651265  0.392218695  2.303281383
##
## Number of Observations: 124
## Number of Groups: 62
```



```
## Paired t-test
## For Batch, p = 0.3019 > 0.05

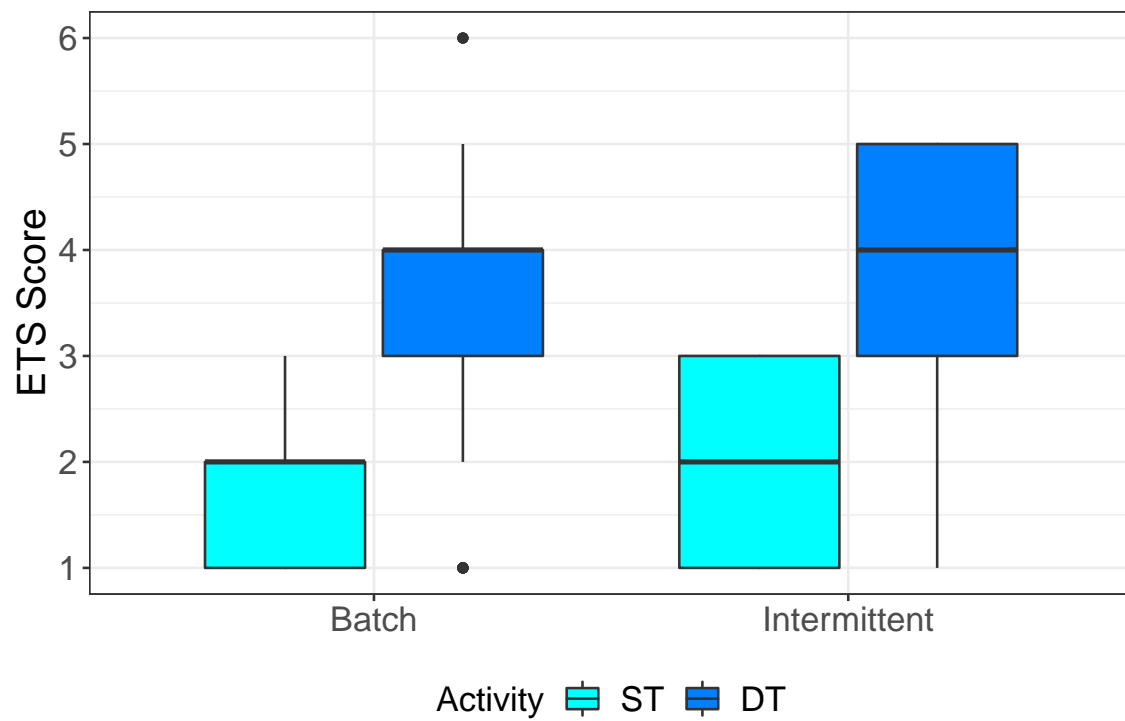
## Paired t-test
## For Intermittent, p = 0.9568 > 0.05
```

Linear Modelling for Writing Quality

Our Linear Model:

$$WritingQuality = 1 + Group + Activity + 1|Subject$$

```
## Linear mixed-effects model fit by REML
## Data: full_df
##      AIC      BIC    logLik
##  788.4361 807.6827 -389.2181
##
## Random effects:
## Formula: ~1 | Subject
##      (Intercept)  Residual
## StdDev:    0.7981448 0.5913018
##
## Fixed effects: Score ~ 1 + Group + Activity
##              Value Std.Error DF   t-value p-value
## (Intercept)   1.9623244 0.15383437 287 12.756085  0.0000
## GroupIntermittent 0.0248393 0.21312959  60  0.116546  0.9076
## ActivityDT      1.7485714 0.06321282 287 27.661659  0.0000
## Correlation:
##              (Intr) GrpInt
## GroupIntermittent -0.691
## ActivityDT        -0.205  0.000
##
## Standardized Within-Group Residuals:
##      Min      Q1      Med      Q3      Max
## -2.51713640 -0.54248023 -0.01399613  0.44458339  2.13472376
##
## Number of Observations: 350
## Number of Groups: 62
```



Activity	Group	n
ST	Batch	90
ST	Intermittent	85
DT	Batch	90
DT	Intermittent	85

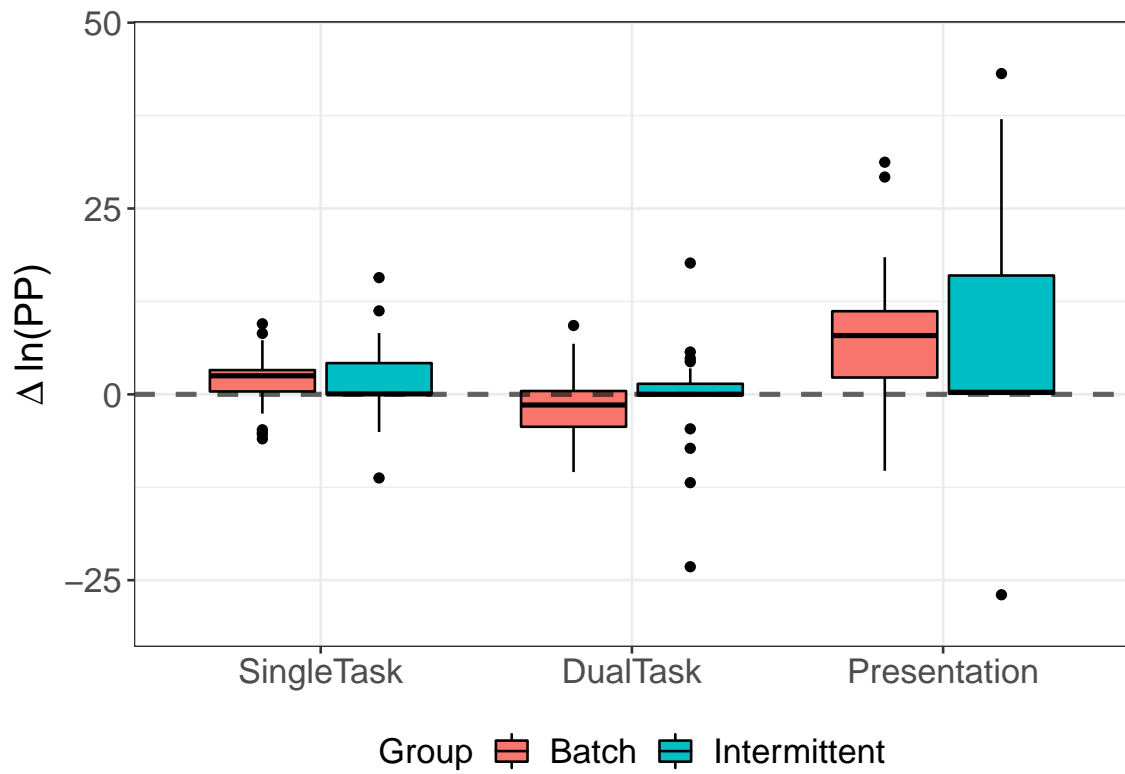
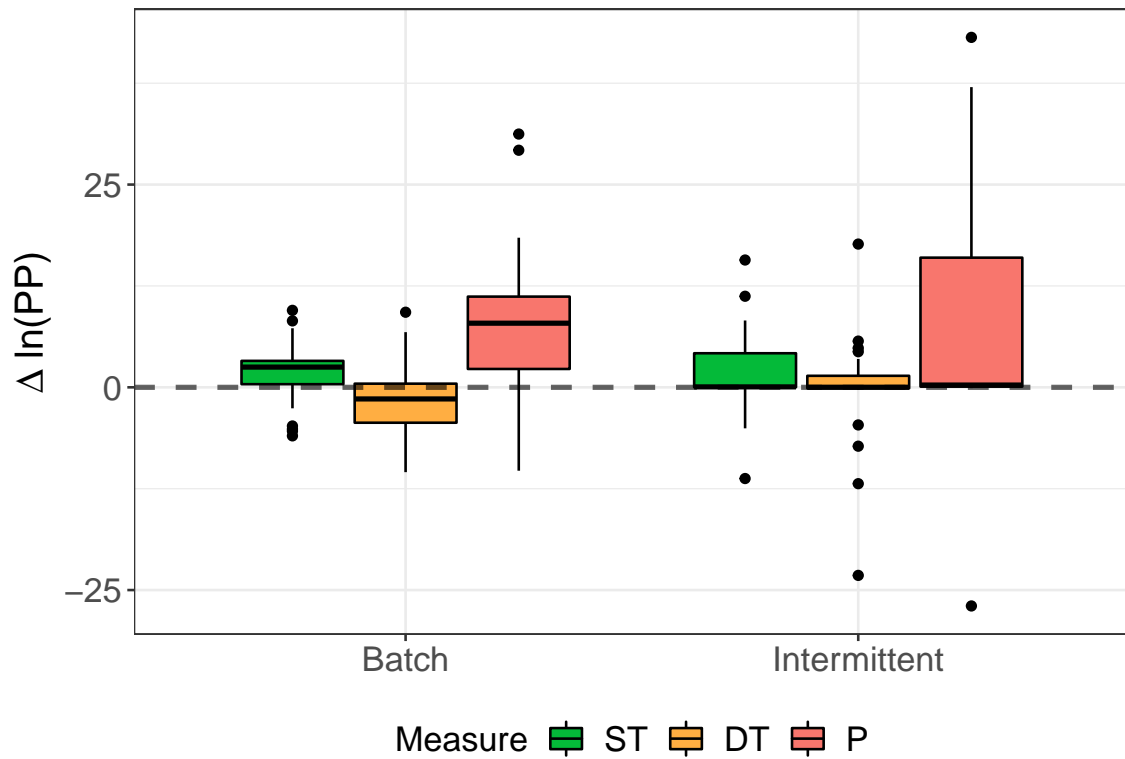
HR, 2 Groups:

Stress Levels Across Activities

Our Linear Model:

$$\Delta \bar{H}R = 1 + \text{Group} + \text{Activity} + 1|\text{Subject}$$

```
## Linear mixed-effects model fit by REML
## Data: diff_df
##      AIC      BIC    logLik
## 1363.706 1386.829 -674.8532
##
## Random effects:
## Formula: ~1 | Subject
##      (Intercept) Residual
## StdDev:      5.205745 5.464657
##
## Fixed effects: HR ~ 1 + Group + Activity
##              Value Std.Error DF   t-value p-value
## (Intercept)   1.989900  1.306784 150   1.522746  0.1299
## GroupIntermittent -0.140989  1.621731  51  -0.086937  0.9311
## ActivityB        -2.367044  1.067887 150  -2.216568  0.0282
## ActivityDT       -2.737329  1.061549 150  -2.578619  0.0109
## ActivityP         5.787255  1.095408 150   5.283196  0.0000
## Correlation:
##              (Intr) GrpInt ActvtB ActvDT
## GroupIntermittent -0.609
## ActivityB          -0.406  0.004
## ActivityDT         -0.406  0.000  0.497
## ActivityP          -0.396  0.004  0.481  0.485
##
## Standardized Within-Group Residuals:
##      Min      Q1      Med      Q3      Max
## -3.307498315 -0.453060131 -0.005386522  0.384032266  4.958054192
##
## Number of Observations: 206
## Number of Groups: 53
```

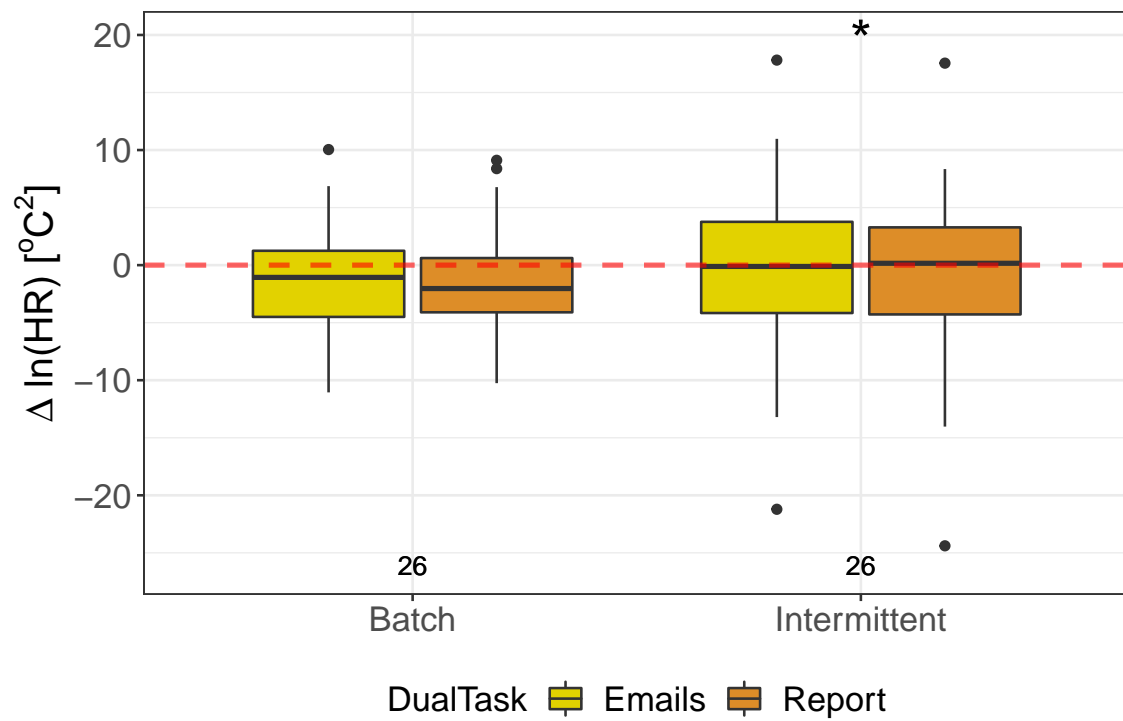



Stress Levels for Dual Task

Our Linear Model:

$$\Delta \bar{HR} = 1 + Group + DualTask + 1|Subject$$

```
## Linear mixed-effects model fit by REML
## Data: total_df
##      AIC      BIC    logLik
##  546.2402 559.3158 -268.1201
##
## Random effects:
## Formula: ~1 | Subject
##      (Intercept) Residual
## StdDev:      6.407062 1.183799
##
## Fixed effects: HR ~ 1 + Group + DualTask
##              Value Std.Error DF   t-value p-value
## (Intercept)  -0.9455883 1.2725124 51 -0.7430877  0.4608
## GroupIntermittent  0.3843059 1.7921010 50  0.2144444  0.8311
## DualTaskReport   -0.4267526 0.2321621 51 -1.8381668  0.0719
## Correlation:
##              (Intr) GrpInt
## GroupIntermittent -0.704
## DualTaskReport   -0.091  0.000
##
## Standardized Within-Group Residuals:
##      Min      Q1      Med      Q3      Max
## -2.07237240 -0.39077742  0.06396253  0.38343943  2.29625197
##
## Number of Observations: 104
## Number of Groups: 52
```



```
## Paired t-test
## For Batch, p = 0.6287 > 0.05

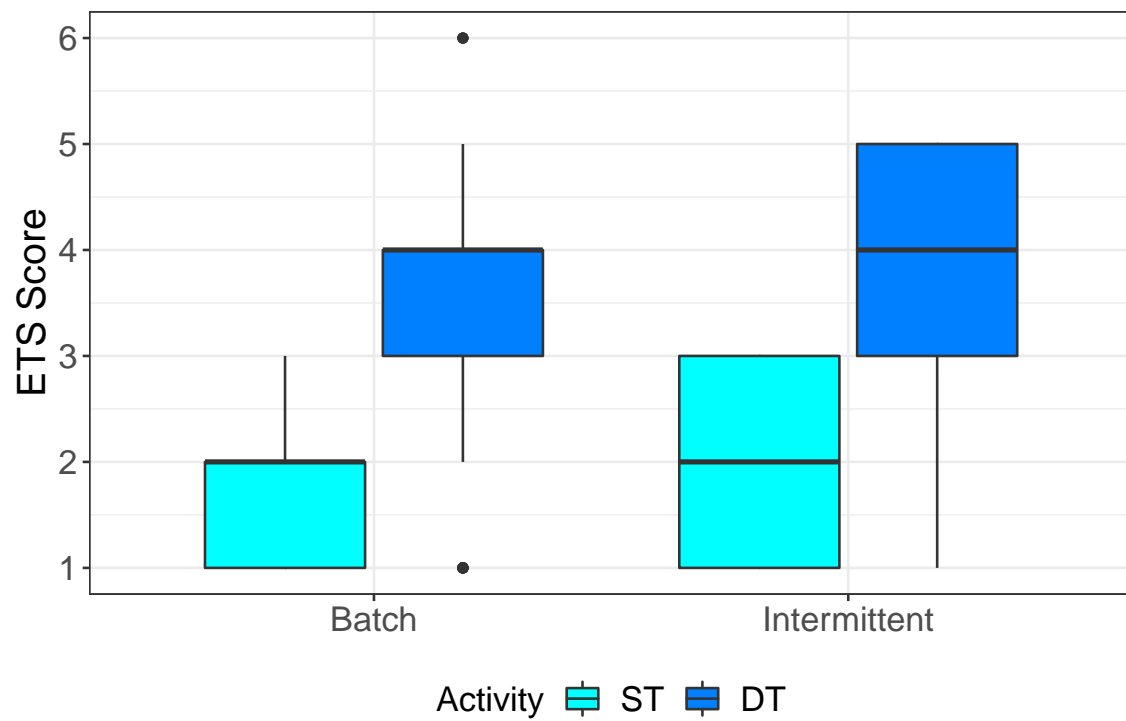
## Paired t-test
## For Intermittent, p = 0.026 < 0.05  *
```

Linear Modelling for Writing Quality

Our Linear Model:

$$WritingQuality = 1 + Group + Activity + 1|Subject$$

```
## Linear mixed-effects model fit by REML
## Data: full_df
##      AIC      BIC    logLik
##  788.4361 807.6827 -389.2181
##
## Random effects:
## Formula: ~1 | Subject
##      (Intercept)  Residual
## StdDev:    0.7981448 0.5913018
##
## Fixed effects: Score ~ 1 + Group + Activity
##              Value Std.Error DF   t-value p-value
## (Intercept)   1.9623244 0.15383437 287 12.756085 0.0000
## GroupIntermittent 0.0248393 0.21312959 60  0.116546 0.9076
## ActivityDT       1.7485714 0.06321282 287 27.661659 0.0000
## Correlation:
##              (Intr) GrpInt
## GroupIntermittent -0.691
## ActivityDT        -0.205  0.000
##
## Standardized Within-Group Residuals:
##      Min      Q1      Med      Q3      Max
## -2.51713640 -0.54248023 -0.01399613  0.44458339  2.13472376
##
## Number of Observations: 350
## Number of Groups: 62
```



Activity	Group	n
ST	Batch	90
ST	Intermittent	85
DT	Batch	90
DT	Intermittent	85

Let's Get to 10 ★ with Four Groups

Our Linear Model:

$$\Delta \ln(\bar{PP}) = 1 + ETSScore + Group + Activity + 1|Subject$$

```
## Linear mixed-effects model fit by REML
## Data: full_df
##      AIC      BIC    logLik
##   -160.5083 -138.2084  88.25415
##
## Random effects:
## Formula: ~1 | Subject
##      (Intercept)  Residual
## StdDev:  0.08084134 0.08136686
##
## Fixed effects: PP ~ 1 + ETSScore + Group + Activity
##              Value Std.Error DF   t-value p-value
## (Intercept)  0.09158205 0.03360038 62   2.7256259  0.0083
## ETSScore      0.00450738 0.01022715 62   0.4407265  0.6609
## GroupIN       0.01119762 0.03572654 58   0.3134259  0.7551
## GroupBF      -0.01982268 0.03750531 58  -0.5285299  0.5991
## GroupIF      -0.01637761 0.03582440 58  -0.4571636  0.6493
## ActivityDT    0.02498409 0.02338112 62   1.0685579  0.2894
## Correlation:
##      (Intr) ETSScr GropIN GropBF GropIF
## ETSScore   -0.575
## GroupIN    -0.572 -0.025
## GroupBF    -0.552 -0.010  0.525
## GroupIF    -0.568 -0.028  0.550  0.524
## ActivityDT  0.317 -0.785  0.019  0.008  0.022
##
## Standardized Within-Group Residuals:
##      Min      Q1      Med      Q3      Max
## -2.62029064 -0.43326554 -0.04658972  0.38532837  2.94518516
##
## Number of Observations: 126
## Number of Groups: 62
```

Hey! Let's ANOVA!

Our ANOVA Model:

$$\Delta \ln(\bar{P}P) = 1 + \textit{StressFactor} + \textit{IntermittentFactor}$$

```
##              Df Sum Sq Mean Sq F value Pr(>F)
## StressFactor    1  0.0240  0.02402    1.519   0.223
## IntermittentFactor 1  0.0124  0.01237    0.782   0.380
## Residuals      60  0.9490  0.01582

##   Tukey multiple comparisons of means
##     95% family-wise confidence level
##
## Fit: aov(formula = PP ~ 1 + StressFactor + IntermittentFactor, data = diff_df, na.action = na.omit)
##
## $StressFactor
##           diff           lwr           upr          p adj
## High-Low -0.0390584 -0.102456  0.02433915  0.222623
##
## $IntermittentFactor
##           diff           lwr           upr          p adj
## Intermittent-Non-Intermittent -0.02811007 -0.09170022  0.03548009  0.3801001
```

Now a Linear Model Very Close to the ANOVA One Above:

Our Linear Model:

$$\Delta \ln(\bar{PP}) = 1 + \text{StressIndicator} + \text{IntermittencyIndicator} + 1|\text{Subjects}$$

```
## Linear mixed-effects model fit by REML
## Data: diff_df
##      AIC      BIC    logLik
##   -58.87726 -48.40553 34.43863
##
## Random effects:
## Formula: ~1 | Subject
##      (Intercept)  Residual
## StdDev:    0.1177584 0.04415941
##
## Fixed effects: PP ~ 1 + StressFactor + IntermittentFactor
##                                     Value Std.Error DF   t-value p-value
## (Intercept)                   0.16545016 0.02853494 60   5.798161  0.0000
## StressFactorHigh                -0.03954027 0.03169874 60  -1.247377  0.2171
## IntermittentFactorIntermittent -0.02811837 0.03179504 60  -0.884364  0.3800
## Correlation:
##                                     (Intr) StrsFH
## StressFactorHigh                  -0.575
## IntermittentFactorIntermittent -0.611  0.017
##
## Standardized Within-Group Residuals:
##      Min      Q1      Med      Q3      Max
## -0.839323292 -0.208574255  0.003066103  0.220158084  0.977145059
##
## Number of Observations: 63
## Number of Groups: 63
```


Hey! Let's ANOVA 2: With Interaction Effects

Our ANOVA Model:

$$\Delta \ln(\bar{P}P) = 1 + \text{StressFactor} + \text{IntermittentFactor} + \text{StressFactor} * \text{IntermittentFactor}$$

```
##              Df Sum Sq Mean Sq F value Pr(>F)
## StressFactor      1 0.0240  0.024021   1.494   0.226
## IntermittentFactor 1 0.0124  0.012371   0.770   0.384
## StressFactor:IntermittentFactor 1 0.0007  0.000661   0.041   0.840
## Residuals        59 0.9484  0.016074

## Tukey multiple comparisons of means
## 95% family-wise confidence level
##
## Fit: aov(formula = PP ~ 1 + StressFactor * IntermittentFactor, data = diff_df, na.action = na.omit)
##
## $StressFactor
##           diff           lwr           upr           p adj
## High-Low -0.0390584 -0.102991 0.02487418 0.226391
##
## $IntermittentFactor
##           diff           lwr           upr           p adj
## Intermittent-Non-Intermittent -0.02811007 -0.09223688 0.03601675 0.383969
##
## $`StressFactor:IntermittentFactor`
##           diff           lwr
## High:Non-Intermittent-Low:Non-Intermittent -0.04655998 -0.1711200
## Low:Intermittent-Low:Non-Intermittent -0.03473940 -0.1557105
## High:Intermittent-Low:Non-Intermittent -0.06829939 -0.1892705
## Low:Intermittent-High:Non-Intermittent 0.01182058 -0.1069186
## High:Intermittent-High:Non-Intermittent -0.02173941 -0.1404786
## High:Intermittent-Low:Intermittent -0.03355999 -0.1485287
##           upr           p adj
## High:Non-Intermittent-Low:Non-Intermittent 0.07800001 0.7566681
## Low:Intermittent-Low:Non-Intermittent 0.08623169 0.8723476
## High:Intermittent-Low:Non-Intermittent 0.05267170 0.4483409
## Low:Intermittent-High:Non-Intermittent 0.13055978 0.9935469
## High:Intermittent-High:Non-Intermittent 0.09699979 0.9623489
## High:Intermittent-Low:Intermittent 0.08140874 0.8668803
```

Appendix

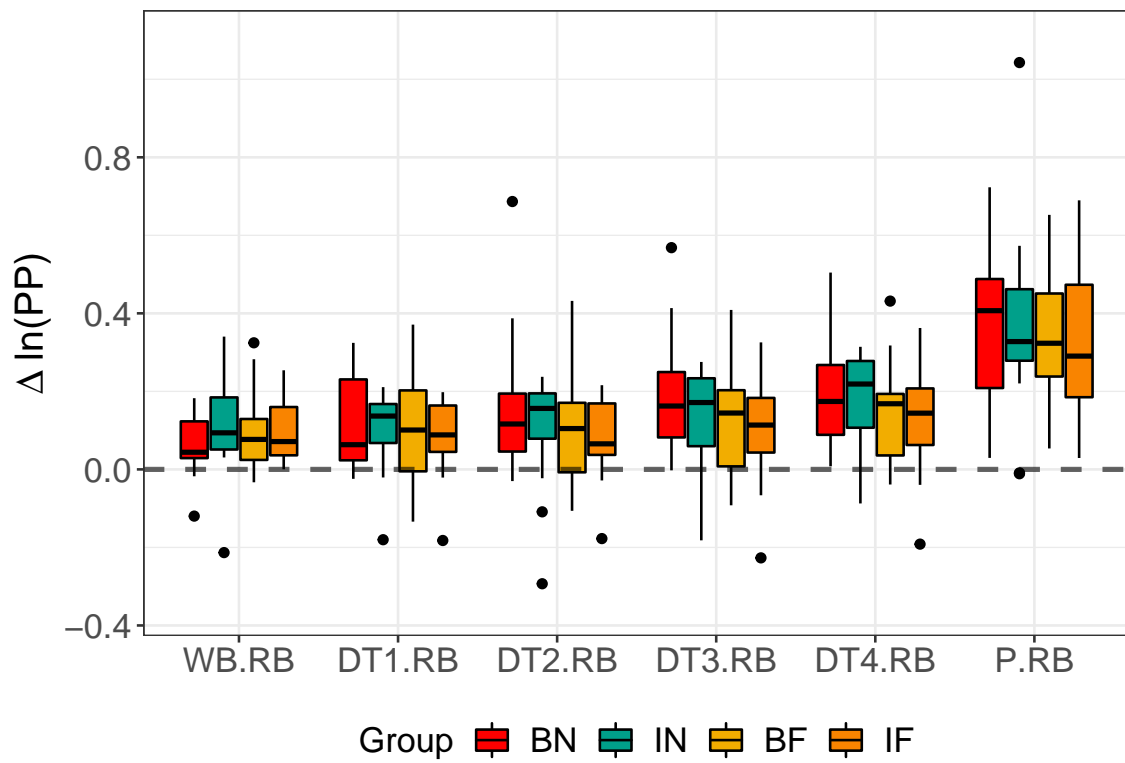
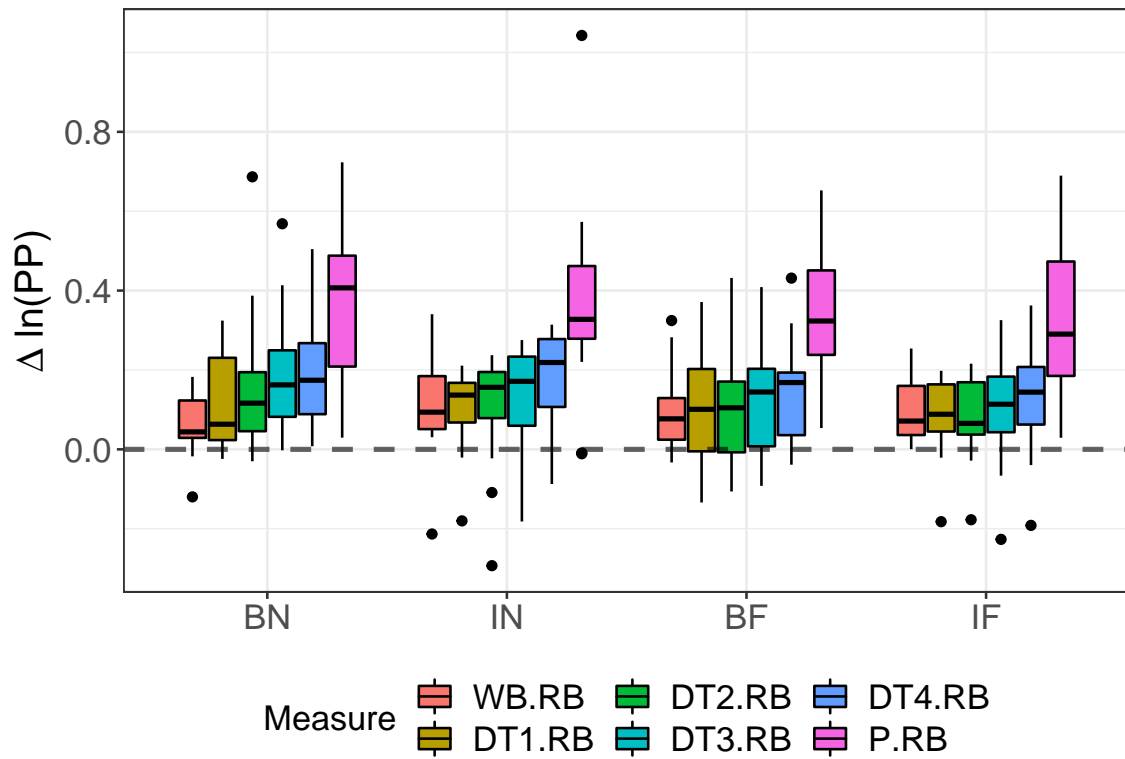
PP, 4 Groups, 4 Dual Task Sessions:

Stress Levels Across Activities

Our Linear Model:

$$\Delta \ln(\bar{P}P) = 1 + \text{Group} + \text{Activity} + 1|\text{Subject}$$

```
## Linear mixed-effects model fit by REML
## Data: diff_df
##      AIC      BIC logLik
## -600.7099 -552.0004 312.355
##
## Random effects:
## Formula: ~1 | Subject
##      (Intercept) Residual
## StdDev:  0.1053673 0.09510609
##
## Fixed effects: PP ~ 1 + Group + Activity
##              Value Std.Error DF   t-value p-value
## (Intercept)  0.11749575 0.03176722 369   3.698647  0.0002
## GroupIN      -0.01399913 0.04021223   59  -0.348131  0.7290
## GroupBF      -0.02535325 0.04138490   59  -0.612621  0.5425
## GroupIF      -0.04032608 0.04019326   59  -1.003304  0.3198
## ActivityB    -0.02724250 0.01702370 369  -1.600269  0.1104
## ActivityDT1   0.00221894 0.01694545 369   0.130946  0.8959
## ActivityDT2   0.02184438 0.01694545 369   1.289100  0.1982
## ActivityDT3   0.04527092 0.01694545 369   2.671568  0.0079
## ActivityDT4   0.05998258 0.01694545 369   3.539746  0.0005
## ActivityP     0.25906246 0.01710423 369  15.146107  0.0000
## Correlation:
##      (Intr) GropIN GropBF GropIF ActvtB ActDT1 ActDT2 ActDT3 ActDT4
## GroupIN    -0.694
## GroupBF    -0.674  0.533
## GroupIF    -0.694  0.548  0.533
## ActivityB  -0.263 -0.003 -0.002 -0.002
## ActivityDT1 -0.267  0.000  0.000  0.000  0.498
## ActivityDT2 -0.267  0.000  0.000  0.000  0.498  0.500
## ActivityDT3 -0.267  0.000  0.000  0.000  0.498  0.500  0.500
## ActivityDT4 -0.267  0.000  0.000  0.000  0.498  0.500  0.500  0.500
## ActivityP   -0.266  0.004  0.000  0.000  0.493  0.495  0.495  0.495  0.495
##
## Standardized Within-Group Residuals:
##      Min      Q1      Med      Q3      Max
## -3.39369886 -0.45179179 -0.02538214  0.43245029  5.85949374
##
## Number of Observations: 438
## Number of Groups: 63
```



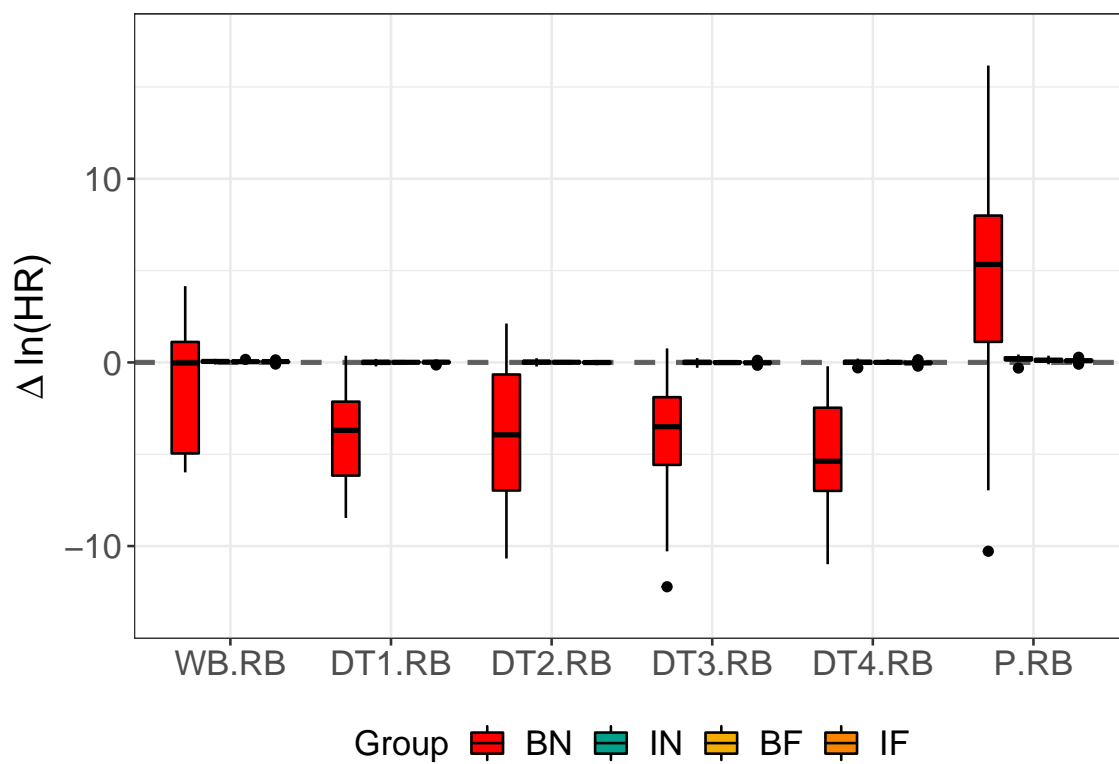
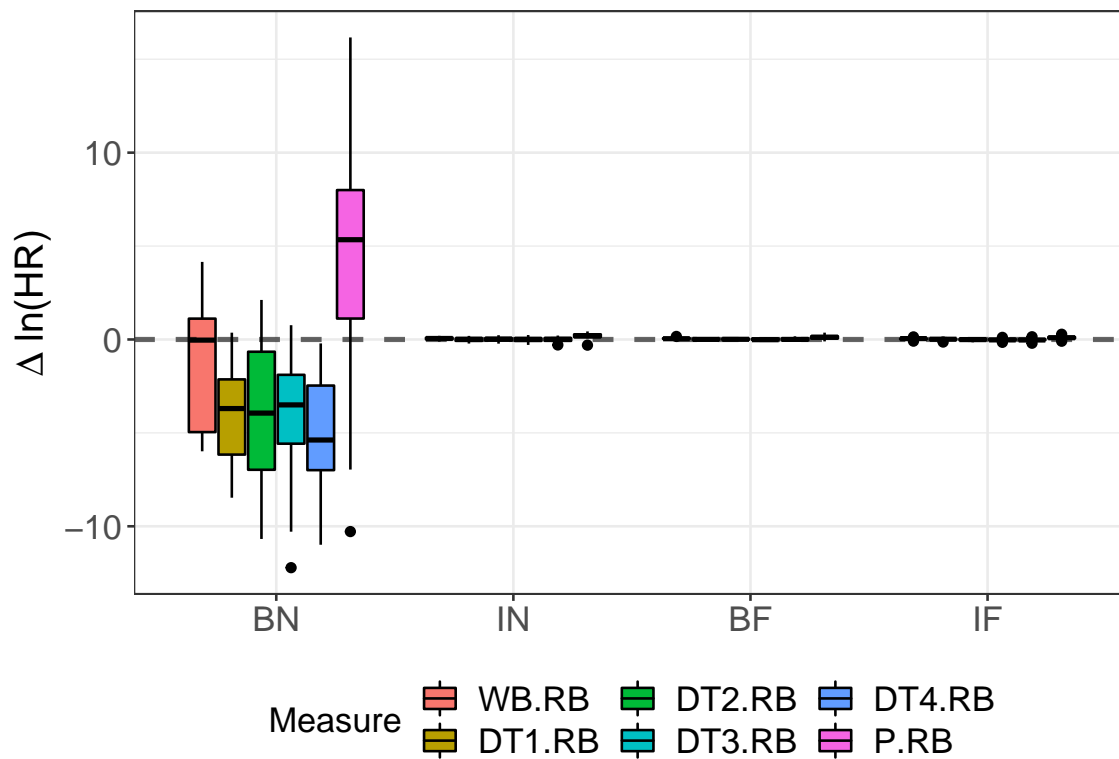
HR, 4 Groups, 4 Dual Task Sessions:

Stress Levels Across Activities

Our Linear Model:

$$\Delta \ln(\bar{H}R) = 1 + \text{Group} + \text{Activity} + 1|\text{Subject}$$

```
## Linear mixed-effects model fit by REML
## Data: diff_df
##      AIC      BIC    logLik
## 1650.196 1696.662 -813.0981
##
## Random effects:
## Formula: ~1 | Subject
##      (Intercept) Residual
## StdDev:      1.473147 2.033896
##
## Fixed effects: HR ~ 1 + Group + Activity
##              Value Std.Error DF   t-value p-value
## (Intercept) -1.7155296 0.5292301 306 -3.241557 0.0013
## GroupIN      2.1907980 0.6420477  49  3.412204 0.0013
## GroupBF      2.1752711 0.6409326  49  3.393916 0.0014
## GroupIF      2.1651078 0.6665519  49  3.248221 0.0021
## ActivityB    -0.5242007 0.3972368 306 -1.319618 0.1879
## ActivityDT1  -0.8090012 0.3950988 306 -2.047592 0.0415
## ActivityDT2  -0.8366730 0.3950988 306 -2.117630 0.0350
## ActivityDT3  -0.8893517 0.3950988 306 -2.250960 0.0251
## ActivityDT4  -1.0359963 0.3950988 306 -2.622119 0.0092
## ActivityP     1.1774331 0.4065419 306  2.896216 0.0040
## Correlation:
##      (Intr) GropIN GropBF GropIF ActvtB ActDT1 ActDT2 ActDT3 ActDT4
## GroupIN    -0.629
## GroupBF    -0.629  0.519
## GroupIF    -0.605  0.499  0.500
## ActivityB   -0.372  0.004  0.000  0.000
## ActivityDT1 -0.373  0.000  0.000  0.000  0.497
## ActivityDT2 -0.373  0.000  0.000  0.000  0.497  0.500
## ActivityDT3 -0.373  0.000  0.000  0.000  0.497  0.500  0.500
## ActivityDT4 -0.373  0.000  0.000  0.000  0.497  0.500  0.500  0.500
## ActivityP   -0.359 -0.001 -0.008 -0.004  0.483  0.486  0.486  0.486  0.486
##
## Standardized Within-Group Residuals:
##      Min      Q1      Med      Q3      Max
## -2.6368679 -0.2104193  0.1643876  0.2161512  8.1833187
##
## Number of Observations: 365
## Number of Groups: 53
```



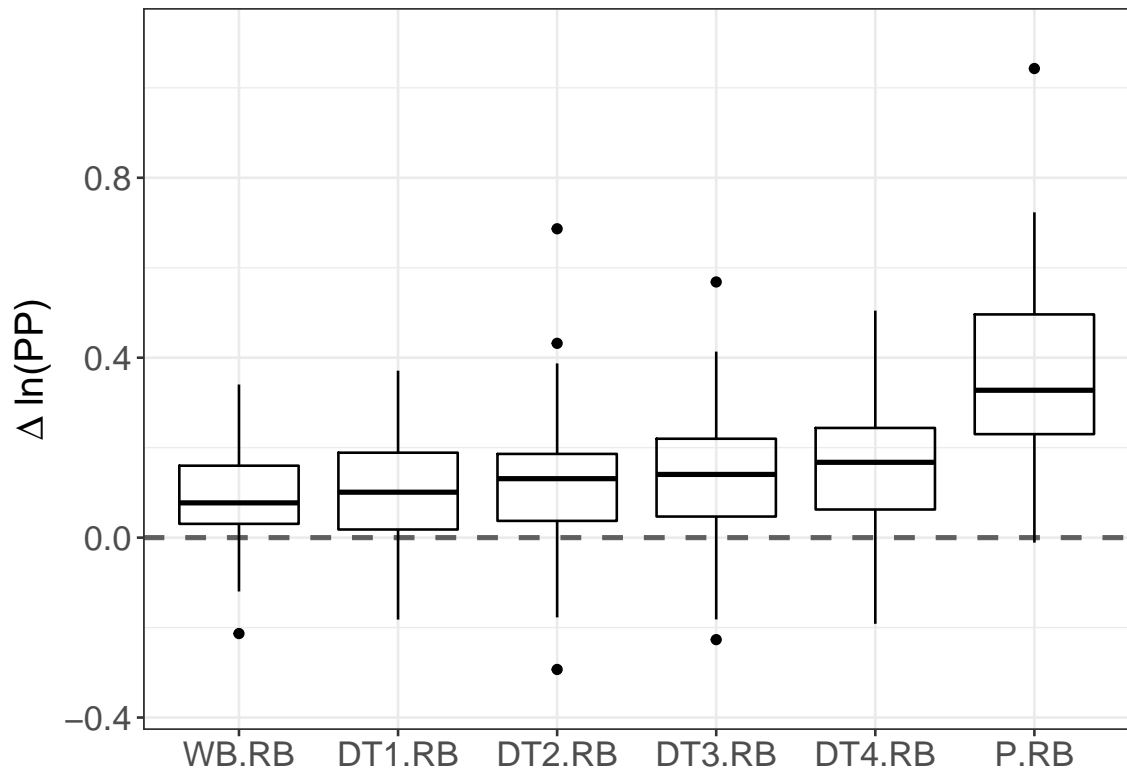
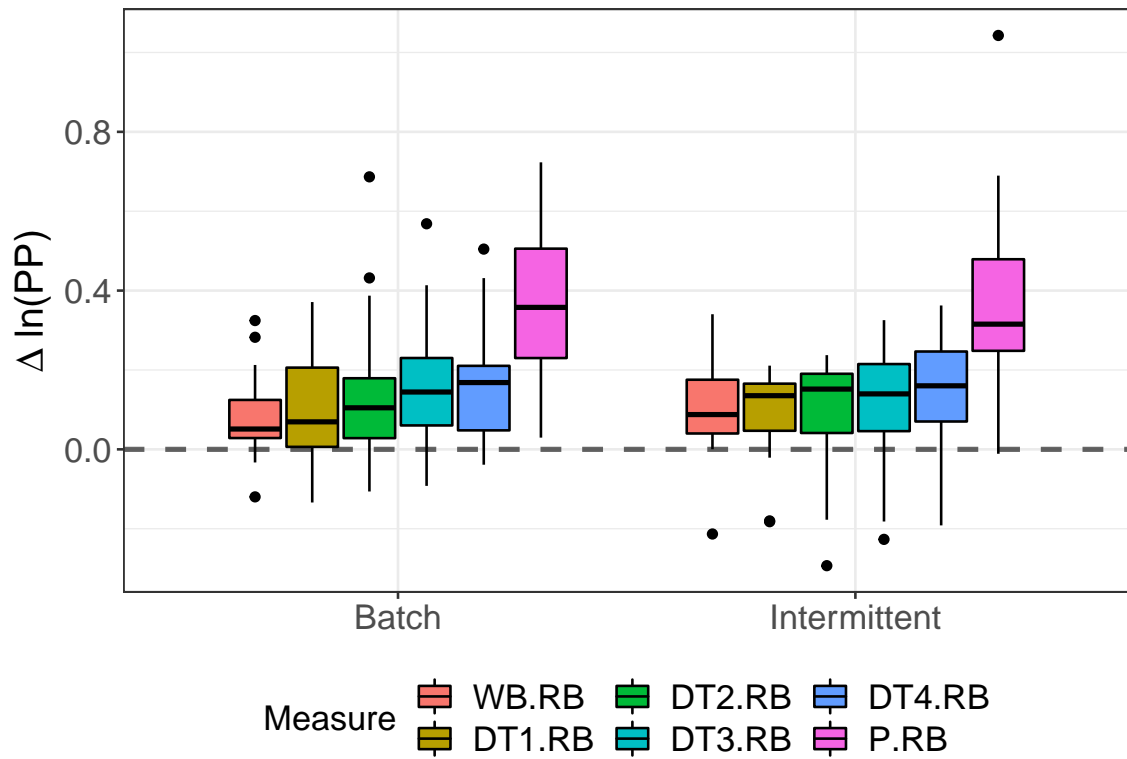
PP, 2 Groups, 4 Dual Task Sessions:

Stress Levels Across Activities

Our Linear Model:

$$\Delta \ln(\bar{P}P) = 1 + \text{Group} + \text{Activity} + 1|\text{Subject}$$

```
## Linear mixed-effects model fit by REML
## Data: diff_df
##      AIC      BIC    logLik
## -613.0943 -572.4565 316.5472
##
## Random effects:
## Formula: ~1 | Subject
##      (Intercept)  Residual
## StdDev:    0.1042452 0.09510695
##
## Fixed effects: PP ~ 1 + Group + Activity
##              Value Std.Error DF   t-value p-value
## (Intercept)   0.10438453 0.02329239 369   4.481487  0.0000
## GroupIntermittent -0.01405354 0.02788450  61  -0.503991  0.6161
## ActivityB       -0.02727357 0.01702378 369  -1.602087  0.1100
## ActivityDT1      0.00221894 0.01694560 369   0.130945  0.8959
## ActivityDT2      0.02184438 0.01694560 369   1.289088  0.1982
## ActivityDT3      0.04527092 0.01694560 369   2.671544  0.0079
## ActivityDT4      0.05998258 0.01694560 369   3.539714  0.0005
## ActivityP        0.25900834 0.01710417 369  15.142996  0.0000
## Correlation:
##              (Intr) GrpInt ActvtB ActDT1 ActDT2 ActDT3 ActDT4
## GroupIntermittent -0.646
## ActivityB          -0.361 -0.002
## ActivityDT1        -0.364  0.000  0.498
## ActivityDT2        -0.364  0.000  0.498  0.500
## ActivityDT3        -0.364  0.000  0.498  0.500  0.500
## ActivityDT4        -0.364  0.000  0.498  0.500  0.500  0.500
## ActivityP          -0.362  0.003  0.493  0.495  0.495  0.495  0.495
##
## Standardized Within-Group Residuals:
##      Min      Q1      Med      Q3      Max
## -3.40754646 -0.44886099 -0.03191748  0.43048613  5.87752175
##
## Number of Observations: 438
## Number of Groups: 63
```



HR, 2 Groups, 4 Dual Task Sessions:

Stress Levels Across Activities

Our Linear Model:

$$\Delta \ln(\bar{H}R) = 1 + \text{Group} + \text{Activity} + 1|\text{Subject}$$

```
## Linear mixed-effects model fit by REML
## Data: diff_df
##      AIC      BIC    logLik
## 1658.837 1697.615 -819.4186
##
## Random effects:
## Formula: ~1 | Subject
##      (Intercept) Residual
## StdDev:      1.642773 2.033251
##
## Fixed effects: HR ~ 1 + Group + Activity
##              Value Std.Error DF   t-value p-value
## (Intercept) -0.5859835 0.4346097 306 -1.348298 0.1786
## GroupIntermittent 1.0477044 0.4991717 51  2.098886 0.0408
## ActivityB      -0.5243055 0.3971202 306 -1.320269 0.1877
## ActivityDT1     -0.8090012 0.3949737 306 -2.048241 0.0414
## ActivityDT2     -0.8366730 0.3949737 306 -2.118301 0.0350
## ActivityDT3     -0.8893517 0.3949737 306 -2.251673 0.0251
## ActivityDT4     -1.0359963 0.3949737 306 -2.622950 0.0092
## ActivityP       1.1916310 0.4064601 306  2.931729 0.0036
## Correlation:
##              (Intr) GrpInt ActvtB ActDT1 ActDT2 ActDT3 ActDT4
## GroupIntermittent -0.563
## ActivityB         -0.453  0.002
## ActivityDT1       -0.454  0.000  0.497
## ActivityDT2       -0.454  0.000  0.497  0.500
## ActivityDT3       -0.454  0.000  0.497  0.500  0.500
## ActivityDT4       -0.454  0.000  0.497  0.500  0.500  0.500
## ActivityP         -0.443  0.003  0.483  0.486  0.486  0.486  0.486
##
## Standardized Within-Group Residuals:
##      Min      Q1      Med      Q3      Max
## -2.7729891 -0.2060674  0.1743266  0.2788476  8.0787211
##
## Number of Observations: 365
## Number of Groups: 53
```

