

Advanced Analysis

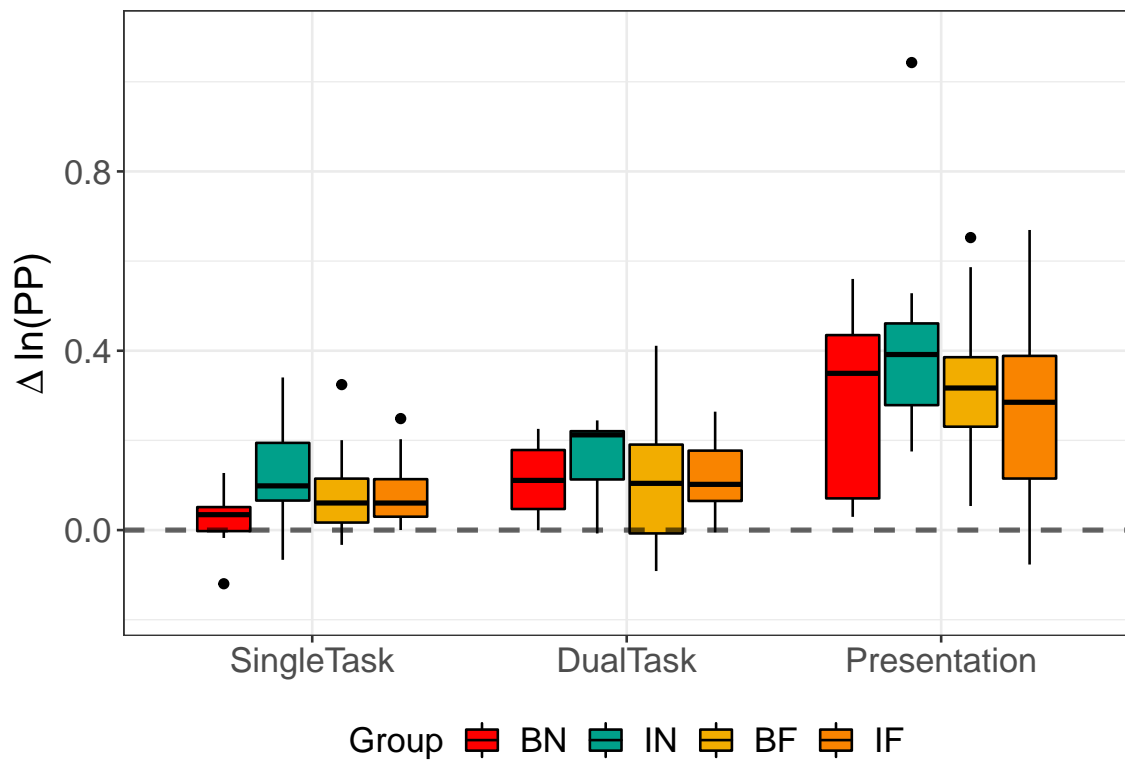
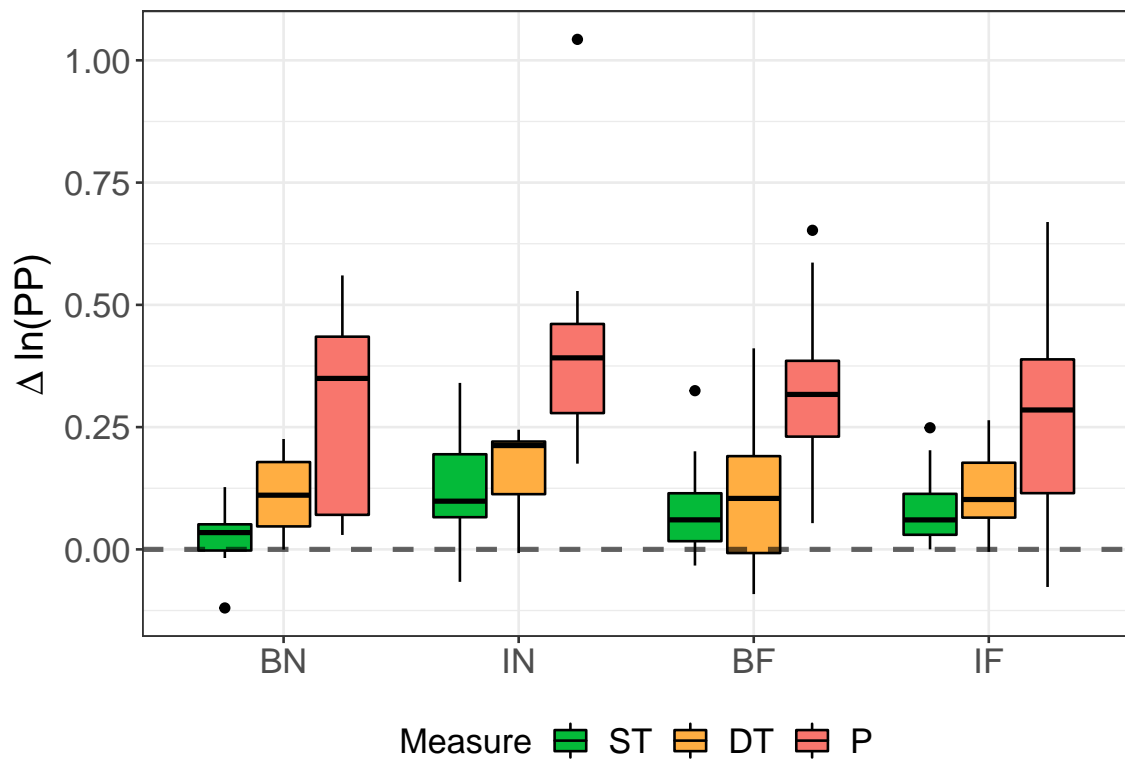
PP, 4 Groups:

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
## -213.5853 -184.2211 115.7927
##
## Random effects:
## Formula: ~1 | Subject
##      (Intercept) Residual
## StdDev:  0.06091274 0.1132371
##
## Fixed effects: PP ~ 1 + Group + Activity
##              Value Std.Error DF   t-value p-value
## (Intercept)  0.05156410 0.03095955 146   1.665531  0.0980
## GroupIN      0.07925830 0.03622203  47   2.188124  0.0337
## GroupBF      0.03363399 0.03559917  47   0.944797  0.3496
## GroupIF      0.02112532 0.03512462  47   0.601439  0.5504
## ActivityB    -0.02876631 0.02268813 146  -1.267901  0.2069
## ActivityDT    0.03645022 0.02242428 146   1.625480  0.1062
## ActivityP     0.23776070 0.02269128 146  10.478065  0.0000
## Correlation:
##      (Intr) GropIN GropBF GropIF ActvtB ActvDT
## GroupIN    -0.688
## GroupBF    -0.698  0.596
## GroupIF    -0.708  0.604  0.615
## ActivityB  -0.362  0.000  0.007  0.006
## ActivityDT -0.362  0.000  0.000  0.000  0.494
## ActivityP  -0.362  0.014  0.000  0.000  0.488  0.494
##
## Standardized Within-Group Residuals:
##      Min      Q1      Med      Q3      Max
## -2.81179604 -0.45901472 -0.06617092  0.41949537  5.18908197
##
## Number of Observations: 200
## Number of Groups: 51
```

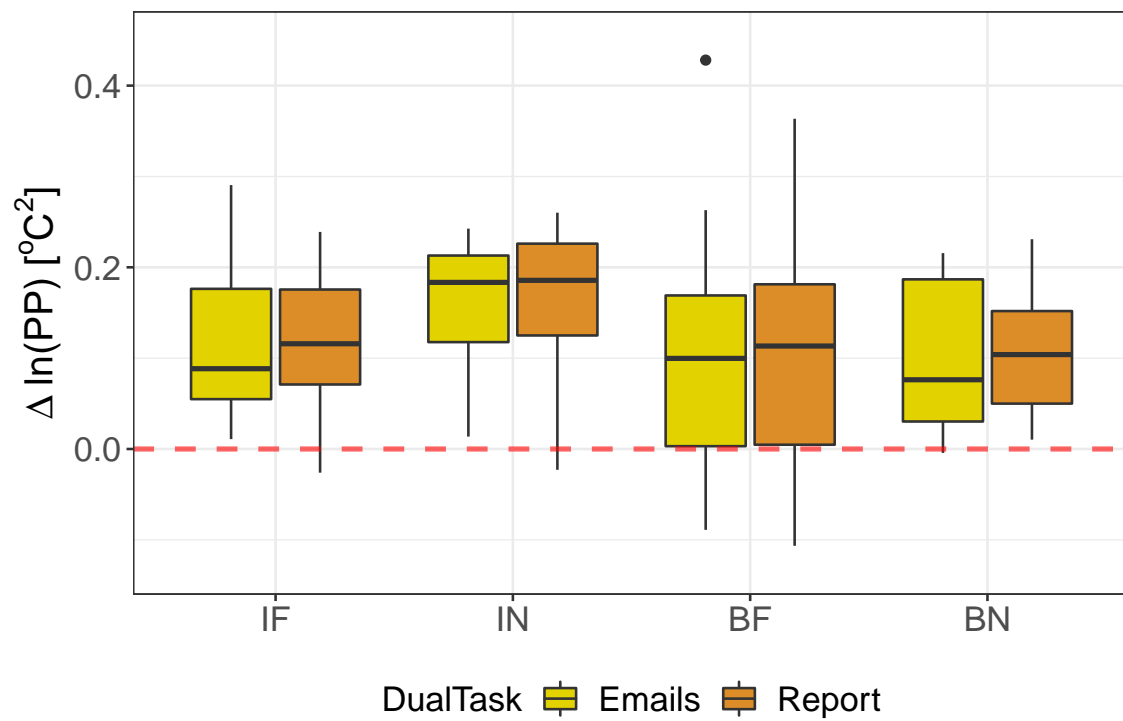


Stress Levels for Dual Task

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
##   -242.319 -224.4419 128.1595
##
## Random effects:
## Formula: ~1 | Subject
##      (Intercept)  Residual
## StdDev:  0.09434278 0.02582581
##
## Fixed effects: PP ~ 1 + Group + DualTask
##              Value Std.Error DF   t-value p-value
## (Intercept)  0.09955053 0.03213526 49  3.0978596  0.0032
## GroupIN      0.05905911 0.04166913 46  1.4173347  0.1631
## GroupBF      0.00871294 0.04166913 46  0.2090983  0.8353
## GroupIF      0.01385414 0.04051677 46  0.3419359  0.7340
## DualTaskReport 0.00574647 0.00516516 49  1.1125435  0.2713
## Correlation:
##      (Intr) GropIN GropBF GropIF
## GroupIN      -0.766
## GroupBF      -0.766  0.591
## GroupIF      -0.788  0.608  0.608
## DualTaskReport -0.080  0.000  0.000  0.000
##
## Standardized Within-Group Residuals:
##      Min      Q1      Med      Q3      Max
## -1.93774892 -0.38963744  0.00213078  0.40140242  1.92401086
##
## Number of Observations: 100
## Number of Groups: 50
```



```
## Paired t-test
## For IF, p = 0.5208 > 0.05

## Paired t-test
## For IN, p = 0.4597 > 0.05

## Paired t-test
## For BF, p = 0.751 > 0.05

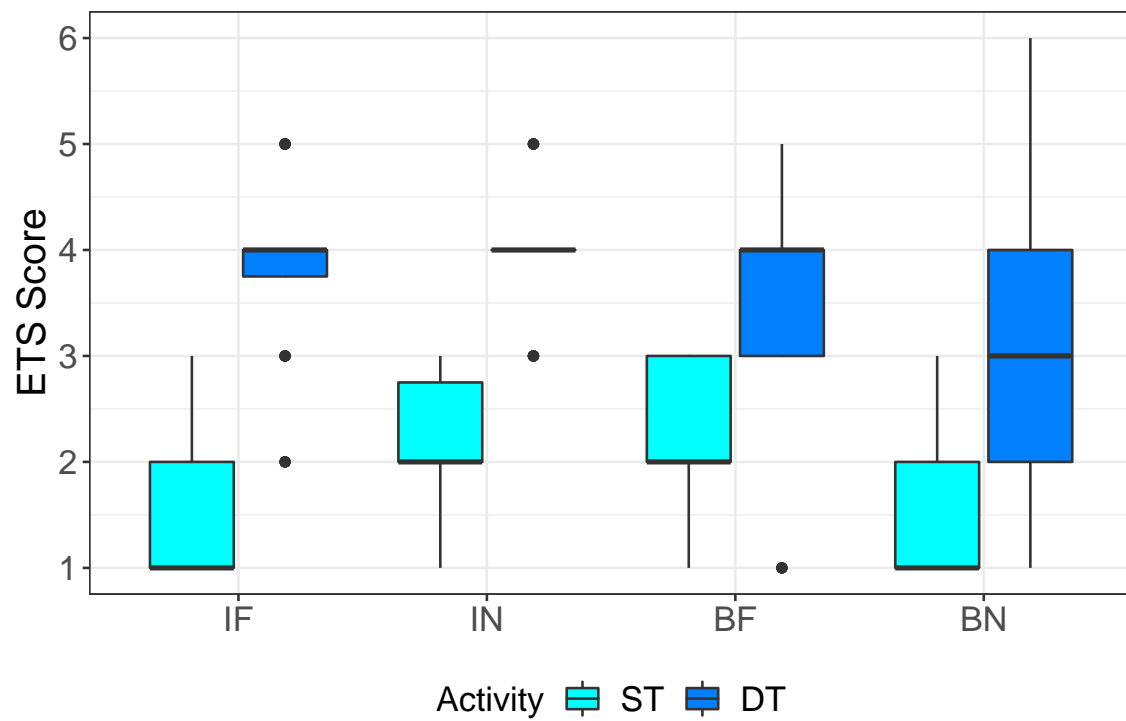
## Paired t-test
## For BN, p = 0.4167 > 0.05
```

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
##  814.8919 842.8146 -400.4459
##
## Random effects:
## Formula: ~1 | Subject
##      (Intercept) Residual
## StdDev:    0.7374618 0.5464401
##
## Fixed effects: Score ~ 1 + Group + Activity
##              Value Std.Error DF   t-value p-value
## (Intercept) 1.6564731 0.2319287 351   7.14217  0.0000
## GroupIN      0.4285587 0.3034433  48   1.41232  0.1643
## GroupBF      0.4207053 0.3191191  48   1.31833  0.1936
## GroupIF      0.1373943 0.3091324  48   0.44445  0.6587
## ActivityDT   1.8366337 0.0543728 351  33.77853  0.0000
## Correlation:
##      (Intr) GropIN GropBF GropIF
## GroupIN    -0.754
## GroupBF    -0.717  0.548
## GroupIF    -0.740  0.566  0.538
## ActivityDT -0.117  0.000  0.000  0.000
##
## Standardized Within-Group Residuals:
##      Min      Q1      Med      Q3      Max
## -2.69792826 -0.70715999 -0.02912959  0.74059321  2.49318766
##
## Number of Observations: 404
## Number of Groups: 52
```



Activity	Group	n
ST	BN	45
ST	IN	58
ST	BF	47
ST	IF	52
DT	BN	45
DT	IN	58
DT	BF	47
DT	IF	52

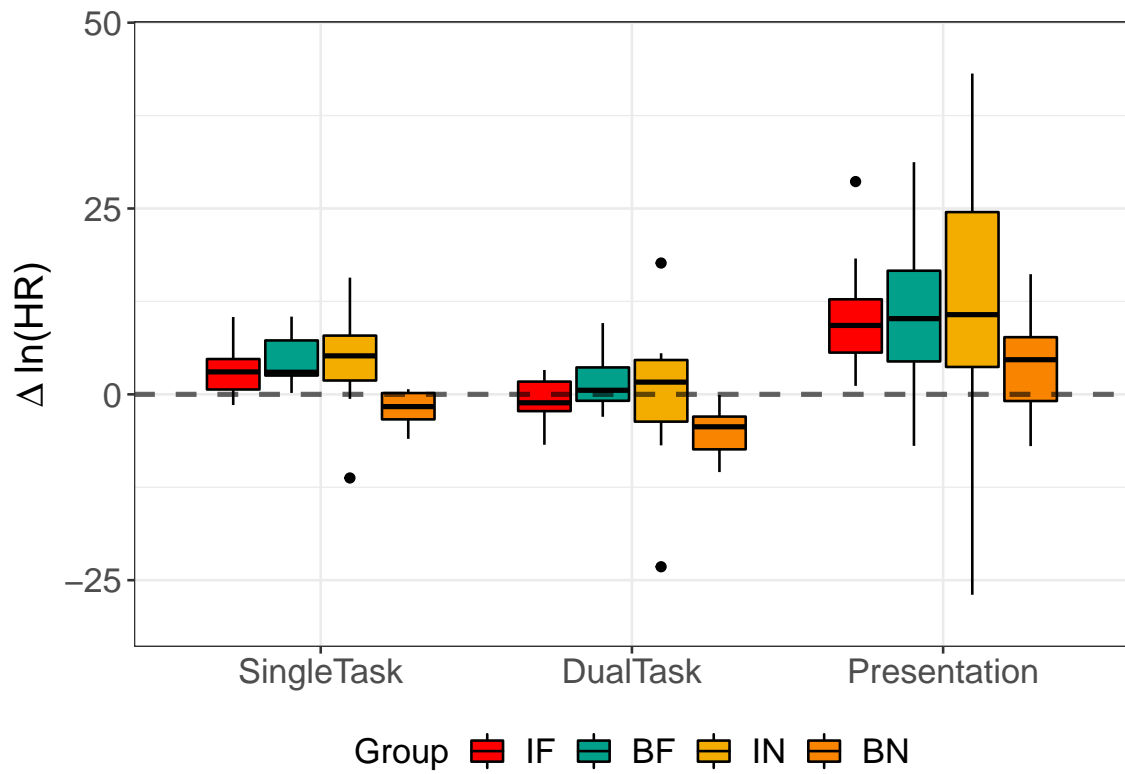
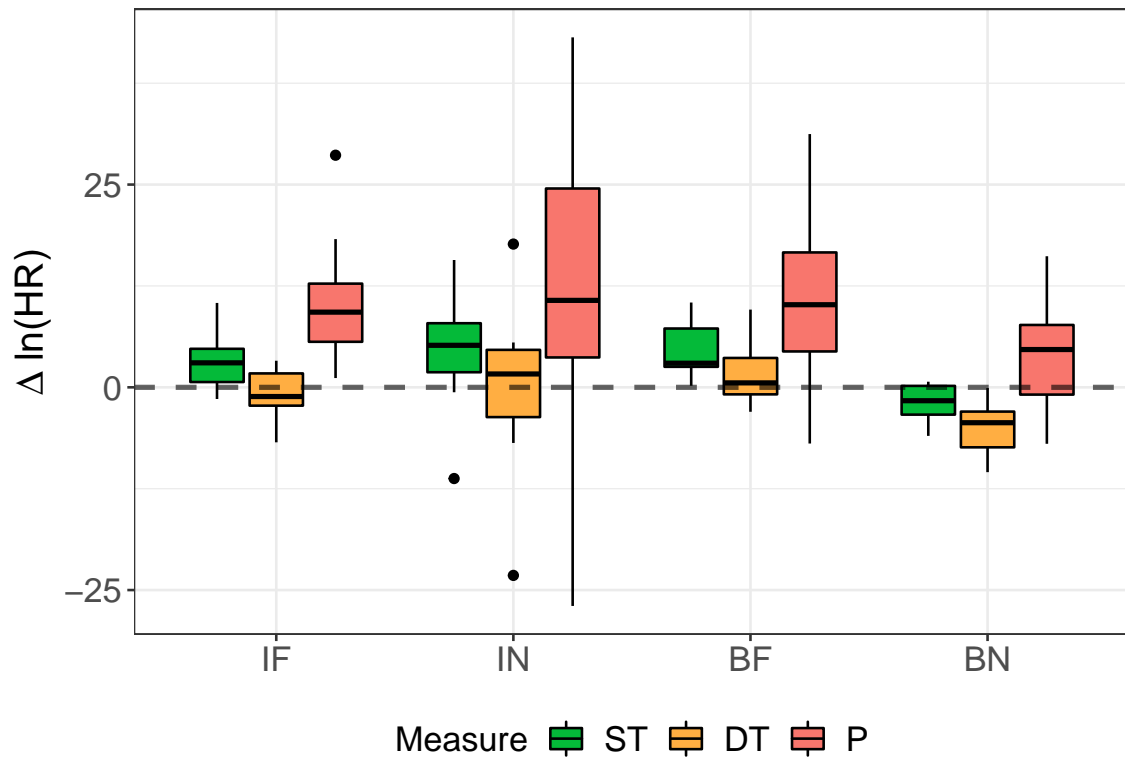
HR, 4 Groups:

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
## 1254.437 1283.273 -618.2186
##
## Random effects:
## Formula: ~1 | Subject
##      (Intercept) Residual
## StdDev:      4.97023 5.689257
##
## Fixed effects: HR ~ 1 + Group + Activity
##              Value Std.Error DF   t-value p-value
## (Intercept) -0.885644  2.046130 137 -0.432838  0.6658
## GroupIN      4.278192  2.467344  45  1.733926  0.0898
## GroupBF      6.069422  2.430091  45  2.497611  0.0162
## GroupIF      4.094181  2.590288  45  1.580589  0.1210
## ActivityB    -2.462404  1.149404 137 -2.142332  0.0339
## ActivityDT   -3.730290  1.149404 137 -3.245413  0.0015
## ActivityP     7.202201  1.207142 137  5.966327  0.0000
## Correlation:
##      (Intr) GropIN GropBF GropIF ActvtB ActvDT
## GroupIN    -0.734
## GroupBF    -0.744  0.618
## GroupIF    -0.698  0.580  0.589
## ActivityB  -0.281  0.000  0.000  0.000
## ActivityDT -0.281  0.000  0.000  0.000  0.500
## ActivityP  -0.260 -0.001 -0.013 -0.010  0.476  0.476
##
## Standardized Within-Group Residuals:
##      Min      Q1      Med      Q3      Max
## -3.59568167 -0.40905907  0.02708004  0.35913603  4.51555818
##
## Number of Observations: 189
## Number of Groups: 49
```

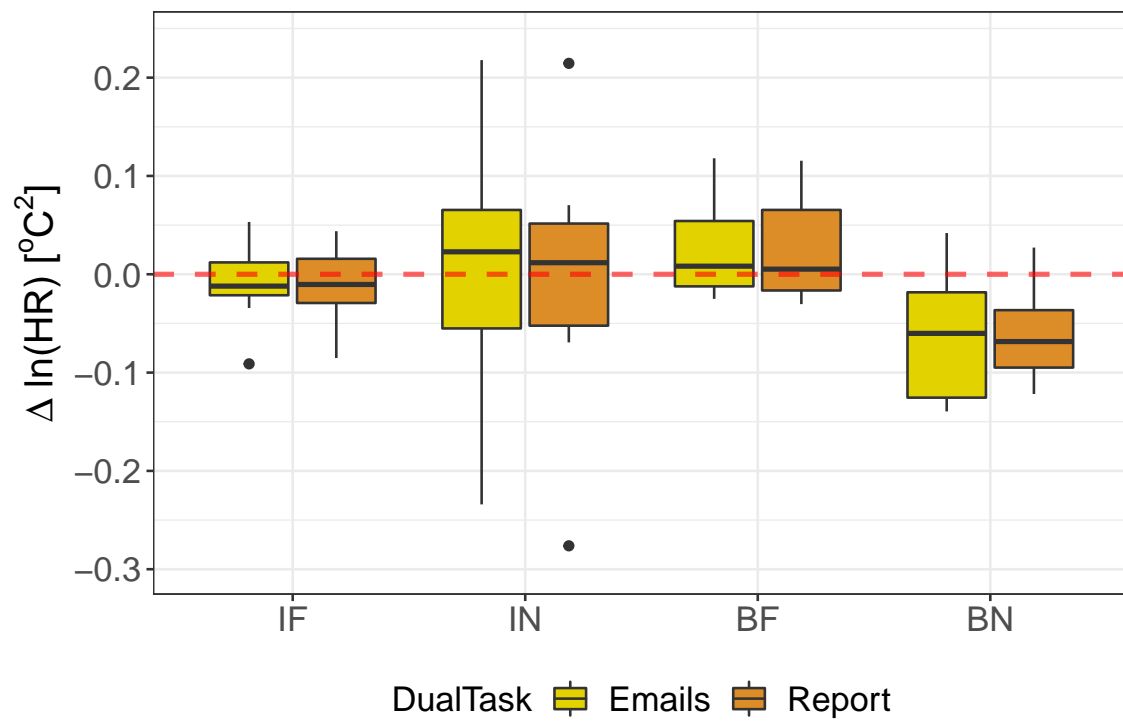


Stress Levels for Dual Task

Our Linear Model:

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

```
## Linear mixed-effects model fit by REML
## Data: total_df
##      AIC      BIC    logLik
## -312.3311 -294.7551 163.1655
##
## Random effects:
## Formula: ~1 | Subject
##      (Intercept)  Residual
## StdDev:  0.06913645 0.01468389
##
## Fixed effects: HR ~ 1 + Group + DualTask
##              Value Std.Error DF   t-value p-value
## (Intercept) -0.06062827 0.023352067 47 -2.5962698 0.0125
## GroupIN      0.06472257 0.029869574 44  2.1668393 0.0357
## GroupBF      0.08704844 0.029869574 44  2.9142846 0.0056
## GroupIF      0.05357653 0.031423010 44  1.7050094 0.0952
## DualTaskReport -0.00287140 0.002997337 47 -0.9579828 0.3430
## Correlation:
##      (Intr) GropIN GropBF GropIF
## GroupIN      -0.779
## GroupBF      -0.779  0.609
## GroupIF      -0.740  0.579  0.579
## DualTaskReport -0.064  0.000  0.000  0.000
##
## Standardized Within-Group Residuals:
##      Min      Q1      Med      Q3      Max
## -1.889191063 -0.417144413 -0.001957543  0.361793415  2.070980710
##
## Number of Observations: 96
## Number of Groups: 48
```



```
## Paired t-test
## For IF, p = 0.8626 > 0.05

## Paired t-test
## For IN, p = 0.1416 > 0.05

## Paired t-test
## For BF, p = 0.9277 > 0.05

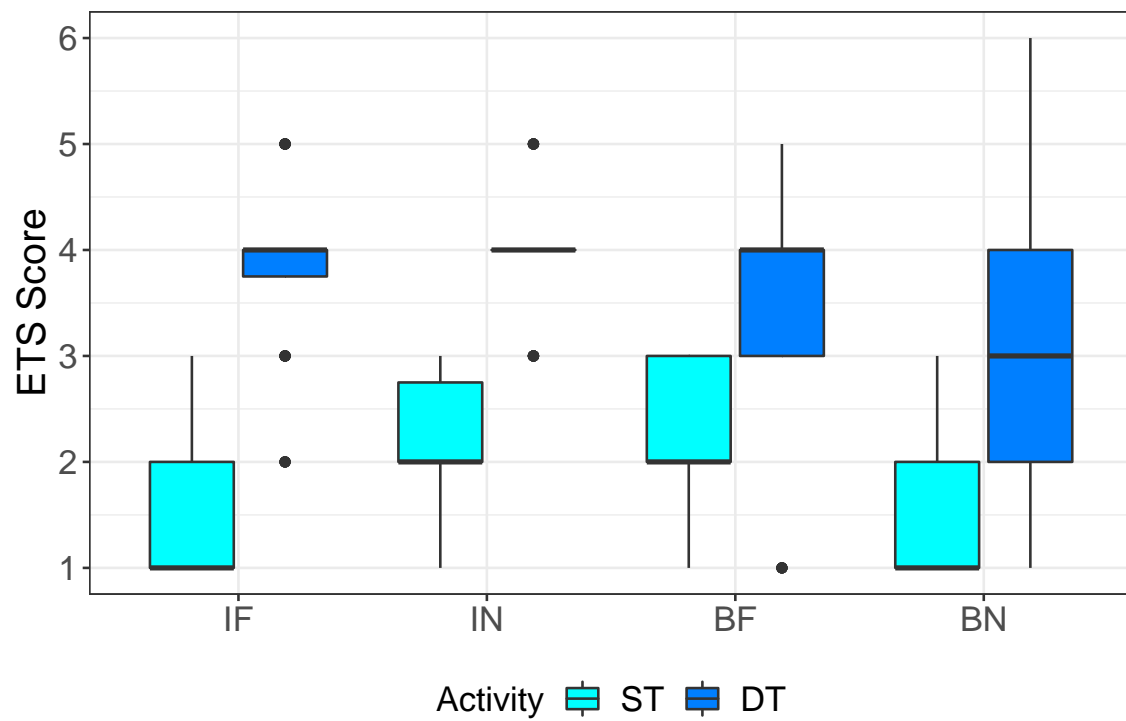
## Paired t-test
## For BN, p = 0.7531 > 0.05
```

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
##  814.8919 842.8146 -400.4459
##
## Random effects:
## Formula: ~1 | Subject
##      (Intercept)  Residual
## StdDev:    0.7374618 0.5464401
##
## Fixed effects: Score ~ 1 + Group + Activity
##              Value Std.Error DF  t-value p-value
## (Intercept) 1.6564731 0.2319287 351   7.14217  0.0000
## GroupIN      0.4285587 0.3034433  48   1.41232  0.1643
## GroupBF      0.4207053 0.3191191  48   1.31833  0.1936
## GroupIF      0.1373943 0.3091324  48   0.44445  0.6587
## ActivityDT   1.8366337 0.0543728 351  33.77853  0.0000
## Correlation:
##      (Intr) GropIN GropBF GropIF
## GroupIN    -0.754
## GroupBF    -0.717  0.548
## GroupIF    -0.740  0.566  0.538
## ActivityDT -0.117  0.000  0.000  0.000
##
## Standardized Within-Group Residuals:
##      Min      Q1      Med      Q3      Max
## -2.69792826 -0.70715999 -0.02912959  0.74059321  2.49318766
##
## Number of Observations: 404
## Number of Groups: 52
```



Activity	Group	n
ST	BN	45
ST	IN	58
ST	BF	47
ST	IF	52
DT	BN	45
DT	IN	58
DT	BF	47
DT	IF	52

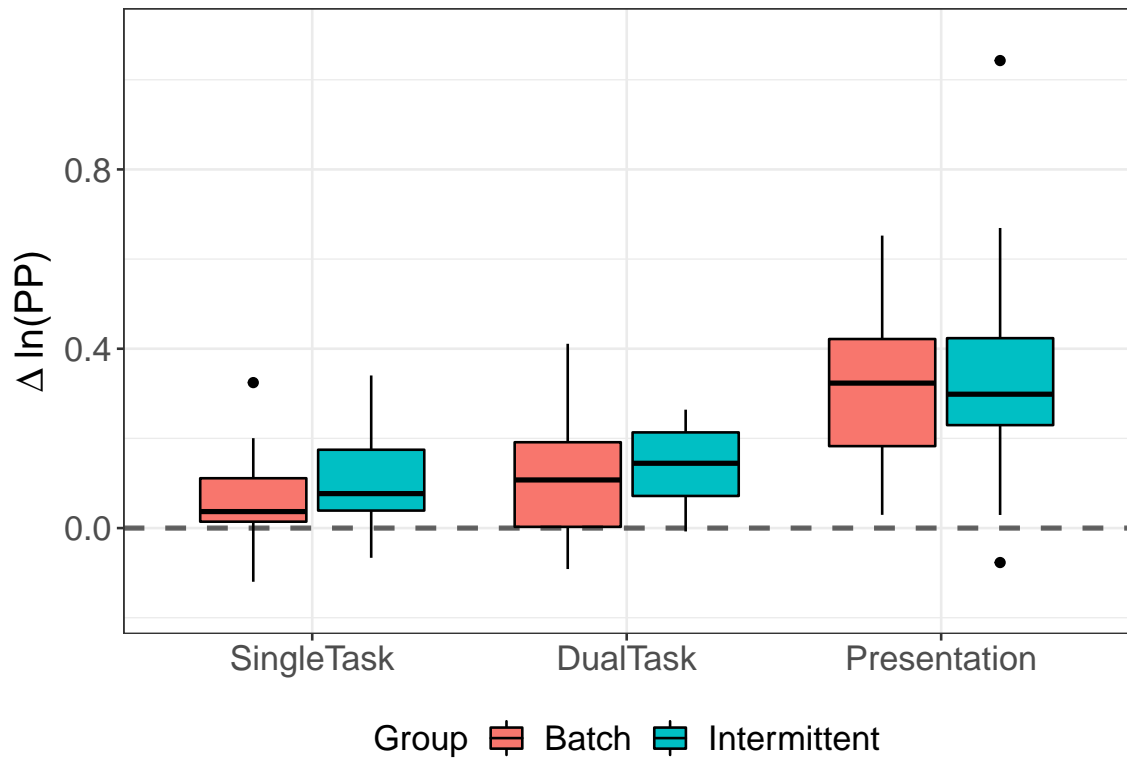
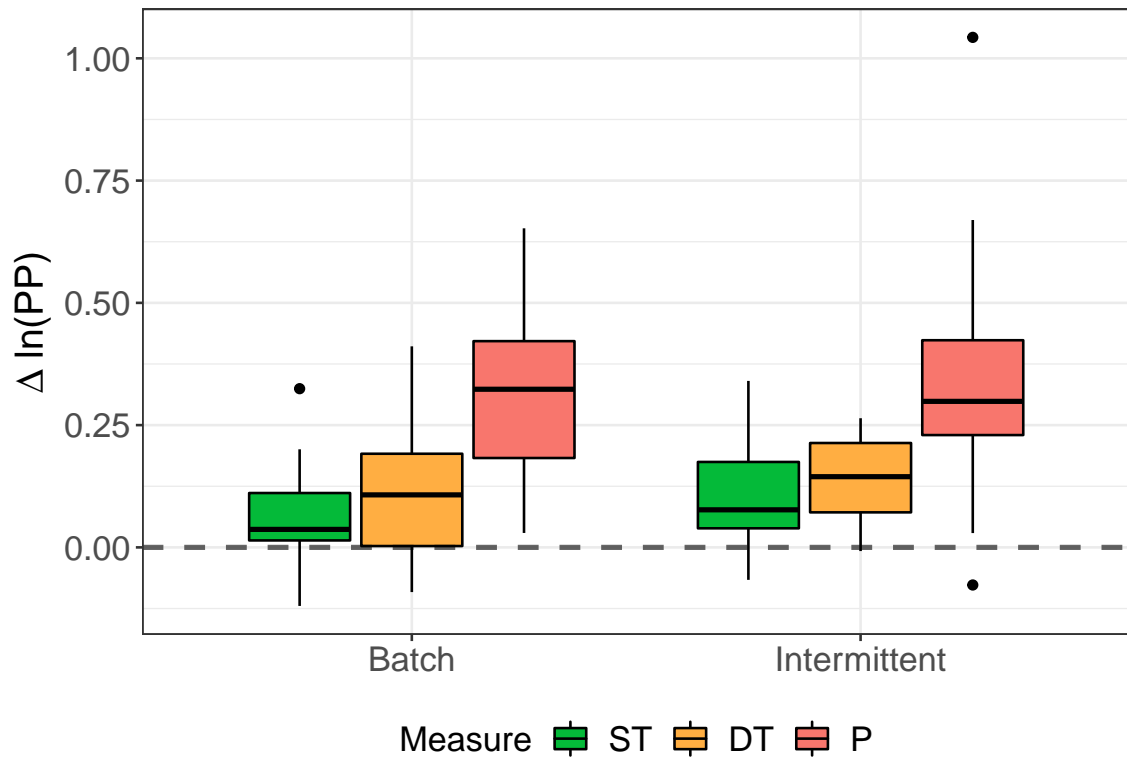
PP, 2 Groups:

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
## -223.2959 -200.3849 118.648
##
## Random effects:
## Formula: ~1 | Subject
##      (Intercept) Residual
## StdDev:  0.06373975 0.1131608
##
## Fixed effects: PP ~ 1 + Group + Activity
##              Value Std.Error DF   t-value p-value
## (Intercept)  0.07205950 0.02248987 146   3.204088  0.0017
## GroupIntermittent 0.02760173 0.02409844  49   1.145374  0.2576
## ActivityB      -0.02859734 0.02267348 146  -1.261268  0.2092
## ActivityDT      0.03645022 0.02240918 146   1.626576  0.1060
## ActivityP       0.23710316 0.02267461 146  10.456771  0.0000
## Correlation:
##              (Intr) GrpInt ActvtB ActvDT
## GroupIntermittent -0.588
## ActivityB          -0.492 -0.001
## ActivityDT         -0.498  0.000  0.494
## ActivityP          -0.498  0.010  0.488  0.494
##
## Standardized Within-Group Residuals:
##      Min      Q1      Med      Q3      Max
## -2.88763666 -0.44455680 -0.09344074  0.43010634  5.28658361
##
## Number of Observations: 200
## Number of Groups: 51
```

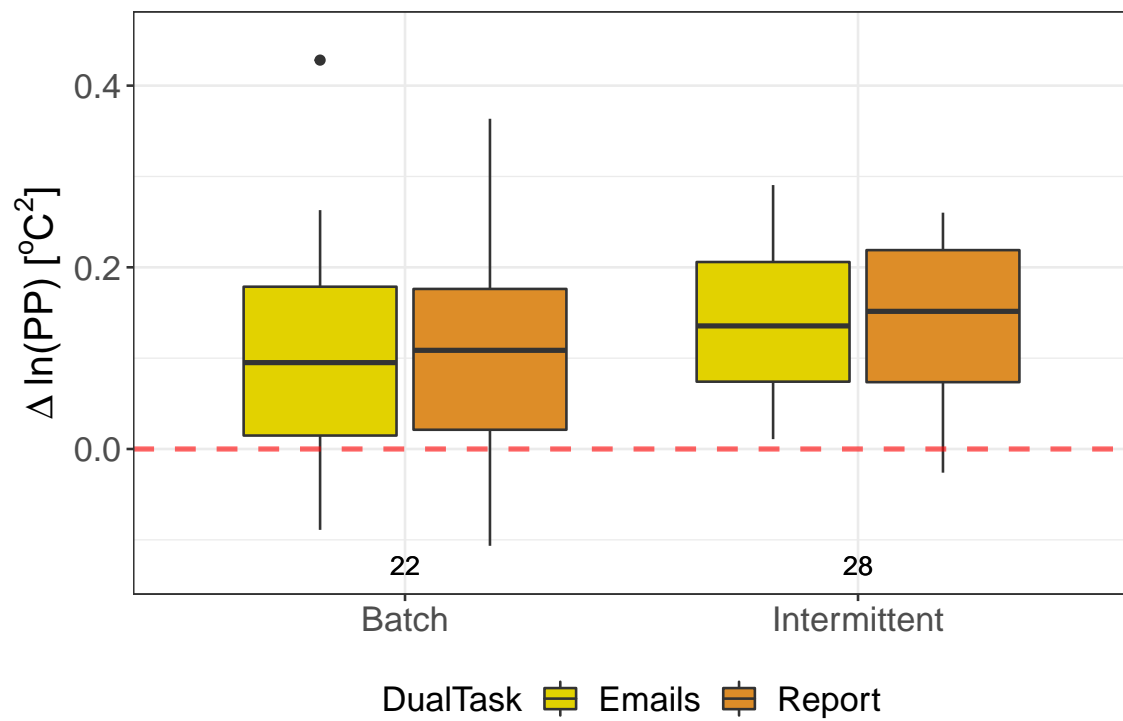


Stress Levels for Dual Task

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
## -254.0418 -241.1683 132.0209
##
## Random effects:
## Formula: ~1 | Subject
##      (Intercept)  Residual
## StdDev:  0.09391864 0.02582581
##
## Fixed effects: PP ~ 1 + Group + DualTask
##              Value Std.Error DF  t-value p-value
## (Intercept)   0.10469908 0.020561361 49 5.092031  0.0000
## GroupIntermittent 0.02969360 0.027258676 48 1.089327  0.2814
## DualTaskReport   0.00574647 0.005165162 49 1.112544  0.2713
## Correlation:
##              (Intr) GrpInt
## GroupIntermittent -0.742
## DualTaskReport   -0.126  0.000
##
## Standardized Within-Group Residuals:
##      Min      Q1      Med      Q3      Max
## -1.932781106 -0.365497754  0.008058312  0.375388557  1.928979053
##
## Number of Observations: 100
## Number of Groups: 50
```



```
## Paired t-test
## For Batch, p = 0.5544 > 0.05

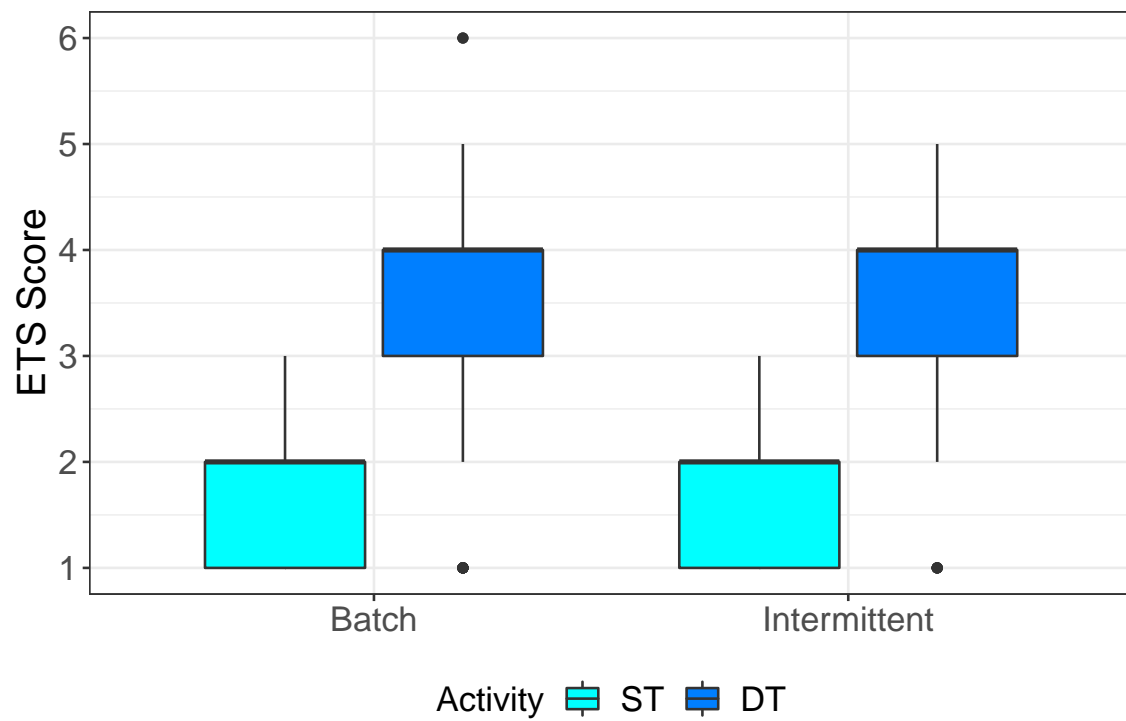
## Paired t-test
## For Intermittent, p = 0.3135 > 0.05
```

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
##  812.652 832.6218 -401.326
##
## Random effects:
## Formula: ~1 | Subject
##      (Intercept)  Residual
## StdDev:    0.7456625 0.5463159
##
## Fixed effects: Score ~ 1 + Group + Activity
##              Value Std.Error DF  t-value p-value
## (Intercept)   1.9034998 0.15392016 351 12.36680 0.0000
## GroupIntermittent 0.0223334 0.21479505 50  0.10398 0.9176
## ActivityDT       1.8366337 0.05436047 351 33.78620 0.0000
## Correlation:
##              (Intr) GrpInt
## GroupIntermittent -0.694
## ActivityDT        -0.177  0.000
##
## Standardized Within-Group Residuals:
##      Min      Q1      Med      Q3      Max
## -2.719407670 -0.704546662 -0.001241215  0.726094288  2.472887653
##
## Number of Observations: 404
## Number of Groups: 52
```



Activity	Group	n
ST	Batch	103
ST	Intermittent	99
DT	Batch	103
DT	Intermittent	99

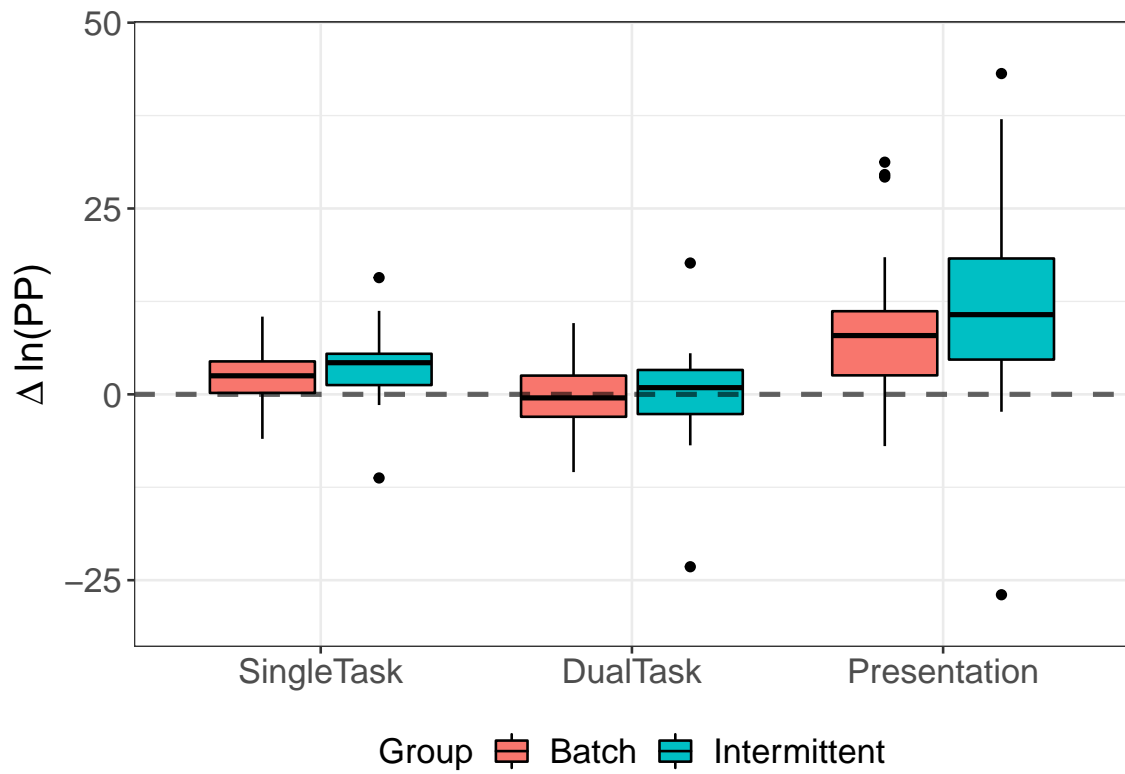
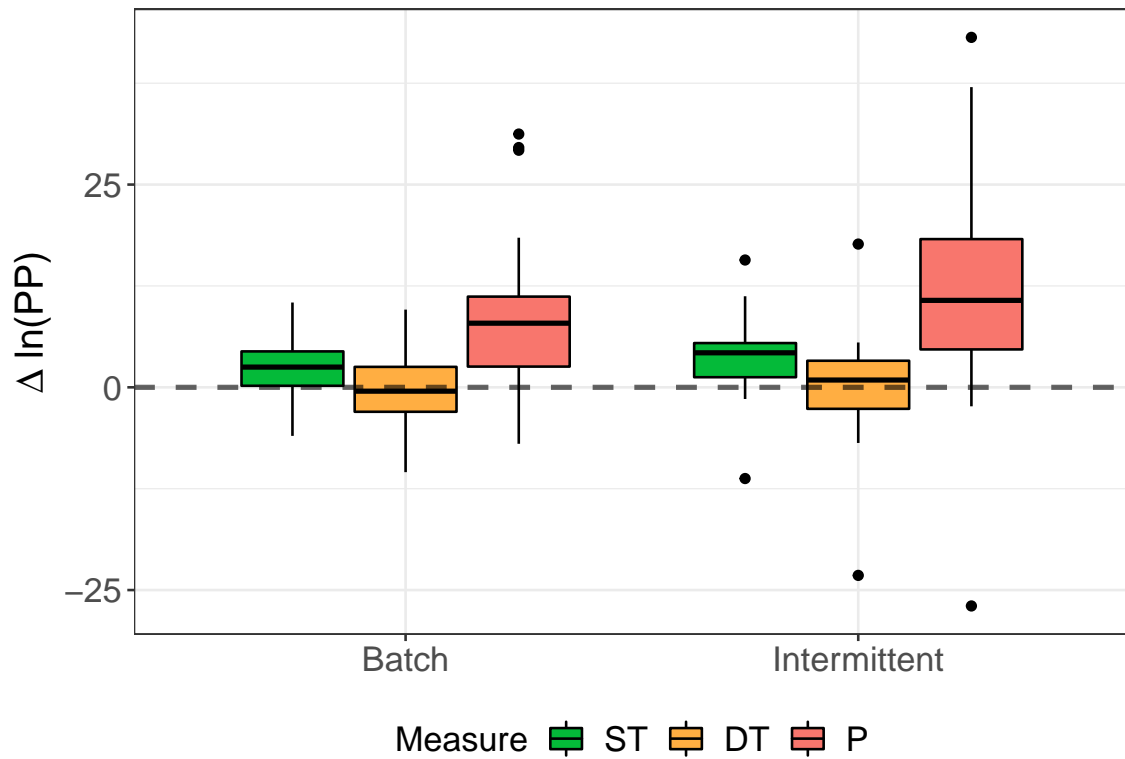
HR, 2 Groups:

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
## 1263.631 1286.135 -624.8154
##
## Random effects:
## Formula: ~1 | Subject
##      (Intercept) Residual
## StdDev:      5.265315 5.688525
##
## Fixed effects: HR ~ 1 + Group + Activity
##              Value Std.Error DF   t-value p-value
## (Intercept)   2.917119  1.412513 137   2.065198  0.0408
## GroupIntermittent 0.385465  1.718789  47   0.224265  0.8235
## ActivityB      -2.462404  1.149255 137  -2.142608  0.0339
## ActivityDT     -3.730290  1.149255 137  -3.245831  0.0015
## ActivityP       7.236803  1.207183 137   5.994786  0.0000
## Correlation:
##              (Intr) GrpInt ActvtB ActvDT
## GroupIntermittent -0.621
## ActivityB          -0.407  0.000
## ActivityDT         -0.407  0.000  0.500
## ActivityP          -0.390  0.004  0.476  0.476
##
## Standardized Within-Group Residuals:
##      Min      Q1      Med      Q3      Max
## -3.51427366 -0.38364517 -0.02197133  0.34038343  4.48138157
##
## Number of Observations: 189
## Number of Groups: 49
```

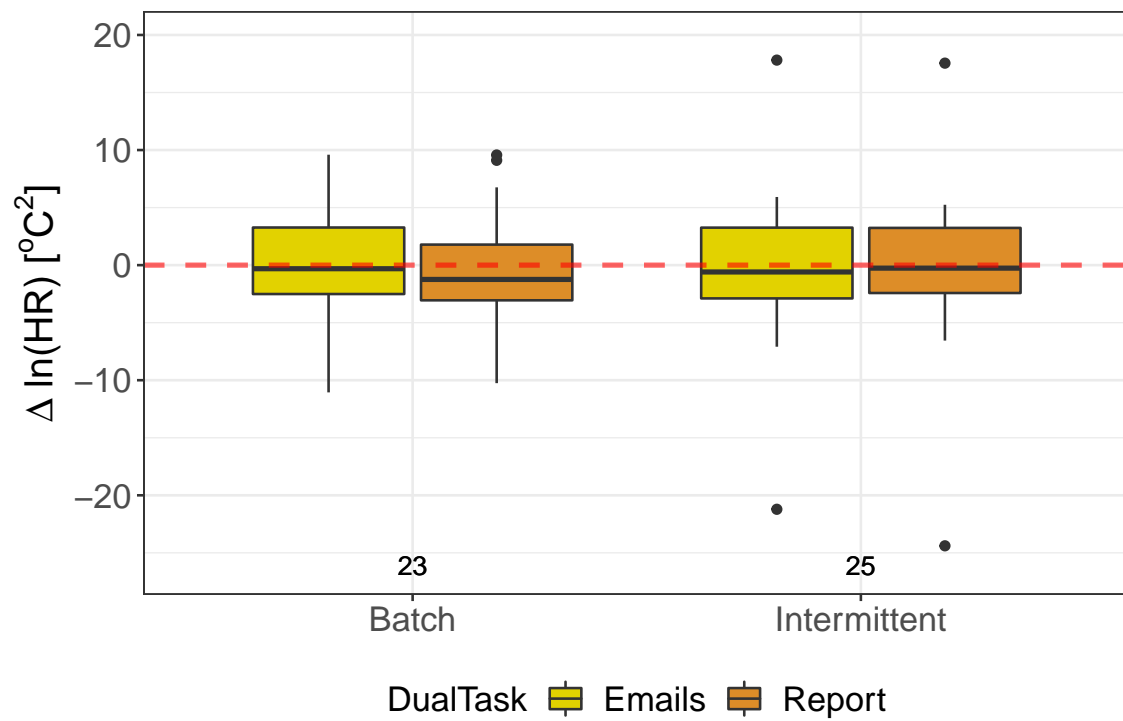



Stress Levels for Dual Task

Our Linear Model:

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

```
## Linear mixed-effects model fit by REML
## Data: total_df
##      AIC      BIC    logLik
##  492.5249 505.1879 -241.2625
##
## Random effects:
## Formula: ~1 | Subject
##      (Intercept) Residual
## StdDev:      6.016257 1.111417
##
## Fixed effects: HR ~ 1 + Group + DualTask
##              Value Std.Error DF   t-value p-value
## (Intercept)  -0.6280509 1.2702091 47 -0.4944468  0.6233
## GroupIntermittent  0.3254378 1.7530211 46  0.1856440  0.8535
## DualTaskReport   -0.1808579 0.2268671 47 -0.7971979  0.4293
## Correlation:
##              (Intr) GrpInt
## GroupIntermittent -0.719
## DualTaskReport   -0.089  0.000
##
## Standardized Within-Group Residuals:
##      Min      Q1      Med      Q3      Max
## -2.103401267 -0.397769399  0.007921389  0.384854891  2.328488769
##
## Number of Observations: 96
## Number of Groups: 48
```



```
## Paired t-test
## For Batch, p = 0.8989 > 0.05

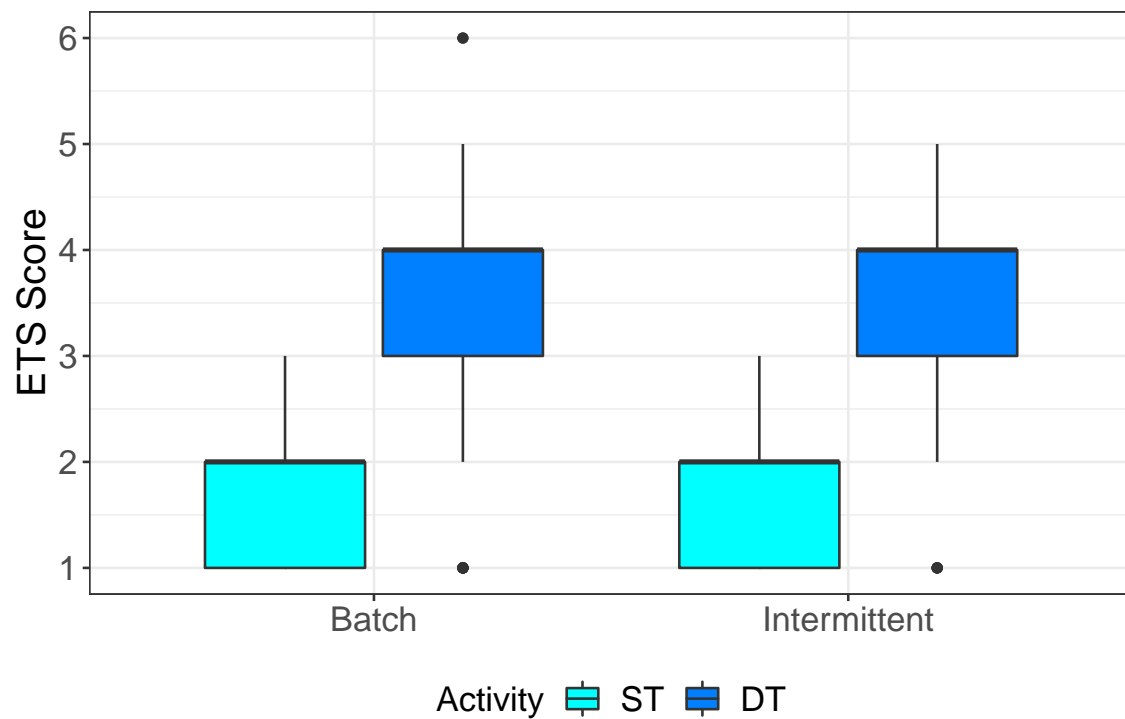
## Paired t-test
## For Intermittent, p = 0.2465 > 0.05
```

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
##  812.652 832.6218 -401.326
##
## Random effects:
## Formula: ~1 | Subject
##      (Intercept)  Residual
## StdDev:    0.7456625 0.5463159
##
## Fixed effects: Score ~ 1 + Group + Activity
##              Value Std.Error DF  t-value p-value
## (Intercept)   1.9034998 0.15392016 351 12.36680 0.0000
## GroupIntermittent 0.0223334 0.21479505 50 0.10398 0.9176
## ActivityDT      1.8366337 0.05436047 351 33.78620 0.0000
## Correlation:
##              (Intr) GrpInt
## GroupIntermittent -0.694
## ActivityDT        -0.177 0.000
##
## Standardized Within-Group Residuals:
##      Min      Q1      Med      Q3      Max
## -2.719407670 -0.704546662 -0.001241215 0.726094288 2.472887653
##
## Number of Observations: 404
## Number of Groups: 52
```



Activity	Group	n
ST	Batch	103
ST	Intermittent	99
DT	Batch	103
DT	Intermittent	99

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
##   -156.0199 -136.5734 86.00995
##
## Random effects:
## Formula: ~1 | Subject
##      (Intercept)   Residual
## StdDev:  0.05562275 0.06105279
##
## Fixed effects: PP ~ 1 + ETSScore + Group + Activity
##              Value Std.Error DF   t-value p-value
## (Intercept) 0.04776135 0.02800533 43  1.7054378  0.0953
## ETSScore    0.00121452 0.00966818 43  0.1256205  0.9006
## GroupIN     0.09854878 0.03179433 41  3.0995710  0.0035
## GroupBF     0.00707537 0.03221195 41  0.2196504  0.8272
## GroupIF     0.01761621 0.03068881 41  0.5740270  0.5691
## ActivityDT  0.03214267 0.02164531 43  1.4849721  0.1448
## Correlation:
##      (Intr) ETSScr GropIN GropBF GropIF
## ETSScore   -0.495
## GroupIN    -0.512 -0.215
## GroupBF    -0.518 -0.186  0.578
## GroupIF    -0.591 -0.101  0.586  0.576
## ActivityDT  0.261 -0.804  0.173  0.150  0.081
##
## Standardized Within-Group Residuals:
##      Min      Q1      Med      Q3      Max
## -2.38826656 -0.60187748 -0.01387275  0.35970150  2.17009514
##
## Number of Observations: 90
## Number of Groups: 45
```