

Advanced Analysis

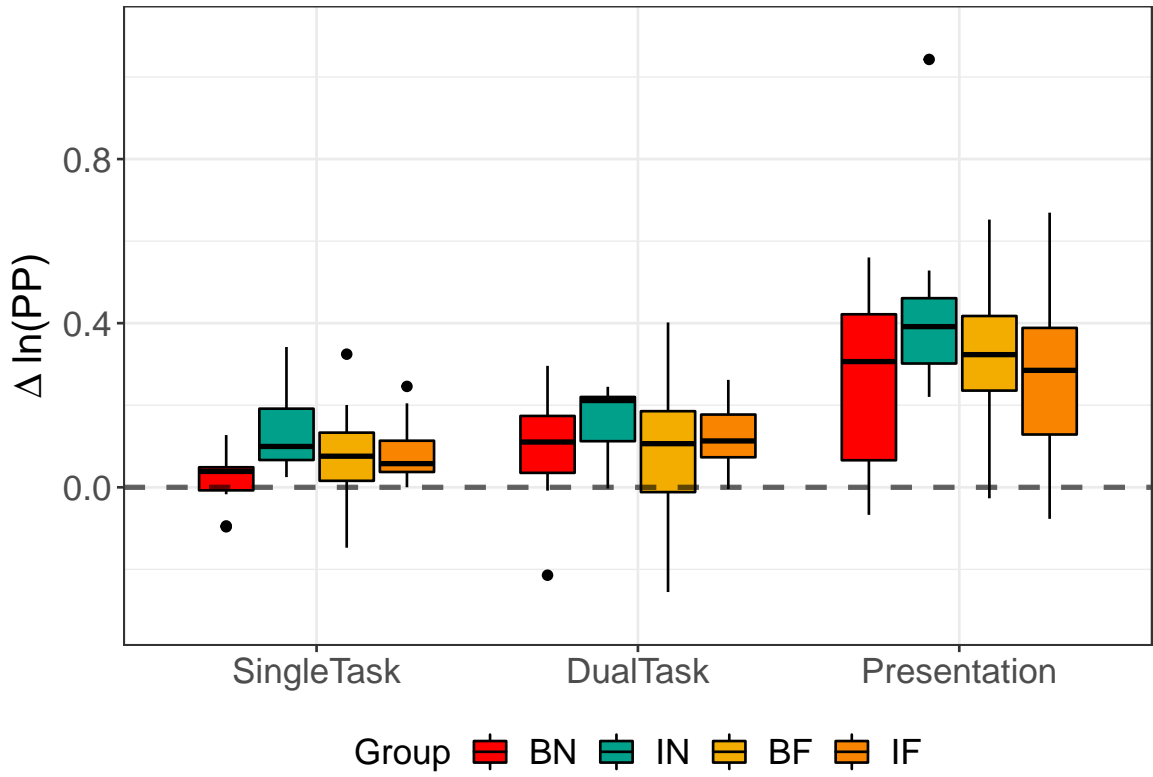
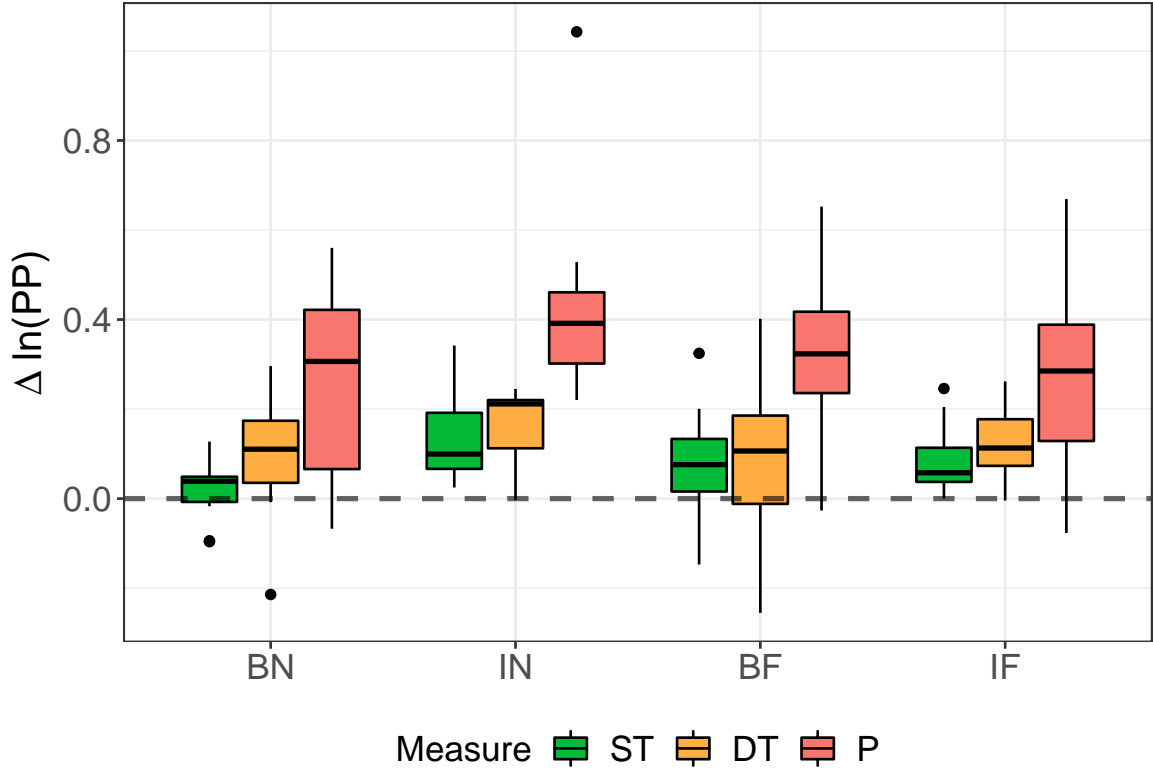
PP, 4 Groups:

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
## -213.1378 -183.1 115.5689
##
## Random effects:
## Formula: ~1 | Subject
##      (Intercept) Residual
## StdDev:  0.08185626 0.1137611
##
## Fixed effects: PP ~ 1 + Group + Activity
##              Value Std.Error DF   t-value p-value
## (Intercept)  0.00420384 0.03178011 157   0.132279  0.8949
## GroupIN      0.13807844 0.04013566  51   3.440293  0.0012
## GroupBF      0.06987864 0.03875306  51   1.803177  0.0773
## GroupIF      0.07221835 0.03875306  51   1.863552  0.0681
## ActivityB    -0.03145762 0.02193896 157  -1.433870  0.1536
## ActivityDT   0.03452862 0.02169339 157   1.591666  0.1135
## ActivityP    0.24204820 0.02206952 157  10.967535  0.0000
## Correlation:
##      (Intr) GropIN GropBF GropIF ActvtB ActvDT
## GroupIN    -0.655
## GroupBF    -0.678  0.537
## GroupIF    -0.678  0.537  0.556
## ActivityB  -0.341  0.000  0.006  0.006
## ActivityDT -0.341  0.000  0.000  0.000  0.494
## ActivityP  -0.332  0.006 -0.007 -0.007  0.486  0.491
##
## Standardized Within-Group Residuals:
##      Min      Q1      Med      Q3      Max
## -2.69198825 -0.43939686 -0.06366974  0.46668288  4.89837325
##
## Number of Observations: 215
## Number of Groups: 55
```

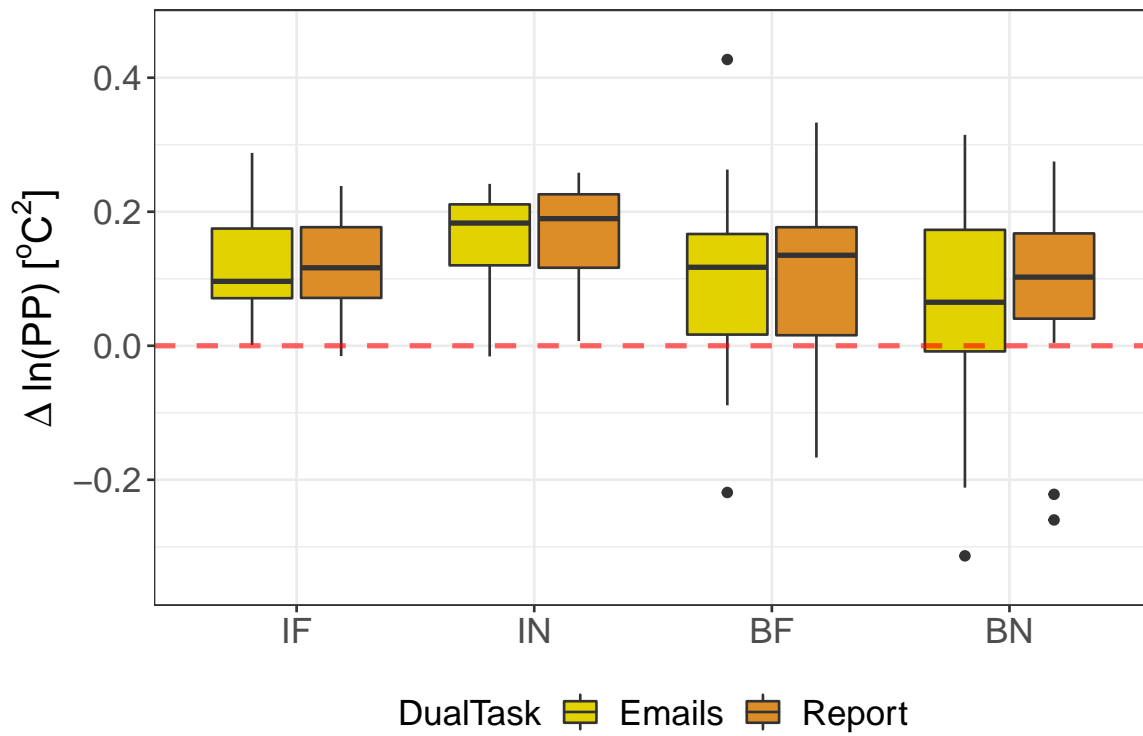


Stress Levels for Dual Task

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
##    -222.1799 -203.7368 118.09
##
## Random effects:
## Formula: ~1 | Subject
##           (Intercept)   Residual
## StdDev:    0.1202122 0.03066947
##
## Fixed effects: PP ~ 1 + Group + DualTask
##               Value Std.Error DF   t-value p-value
## (Intercept)   0.05597855 0.03538573 53 1.5819527 0.1196
## GroupIN       0.10154287 0.04890022 50 2.0765319 0.0430
## GroupBF       0.03914822 0.04805462 50 0.8146609 0.4191
## GroupIF       0.05875801 0.04730954 50 1.2419906 0.2200
## DualTaskReport 0.01016980 0.00590234 53 1.7230112 0.0907
## Correlation:
##           (Intr) GropIN GropBF GropIF
## GroupIN      -0.719
## GroupBF      -0.731 0.529
## GroupIF      -0.743 0.537 0.547
## DualTaskReport -0.083 0.000 0.000 0.000
##
## Standardized Within-Group Residuals:
##           Min           Q1           Med           Q3           Max
## -2.5866795 -0.3712687 0.0181972 0.3073645 2.6038551
##
## Number of Observations: 108
## Number of Groups: 54
```



```
## Paired t-test
## For IF, p = 0.3643 > 0.05
```

```
## Paired t-test
## For IN, p = 0.0825 > 0.05
```

```
## Paired t-test
## For BF, p = 0.7465 > 0.05
```

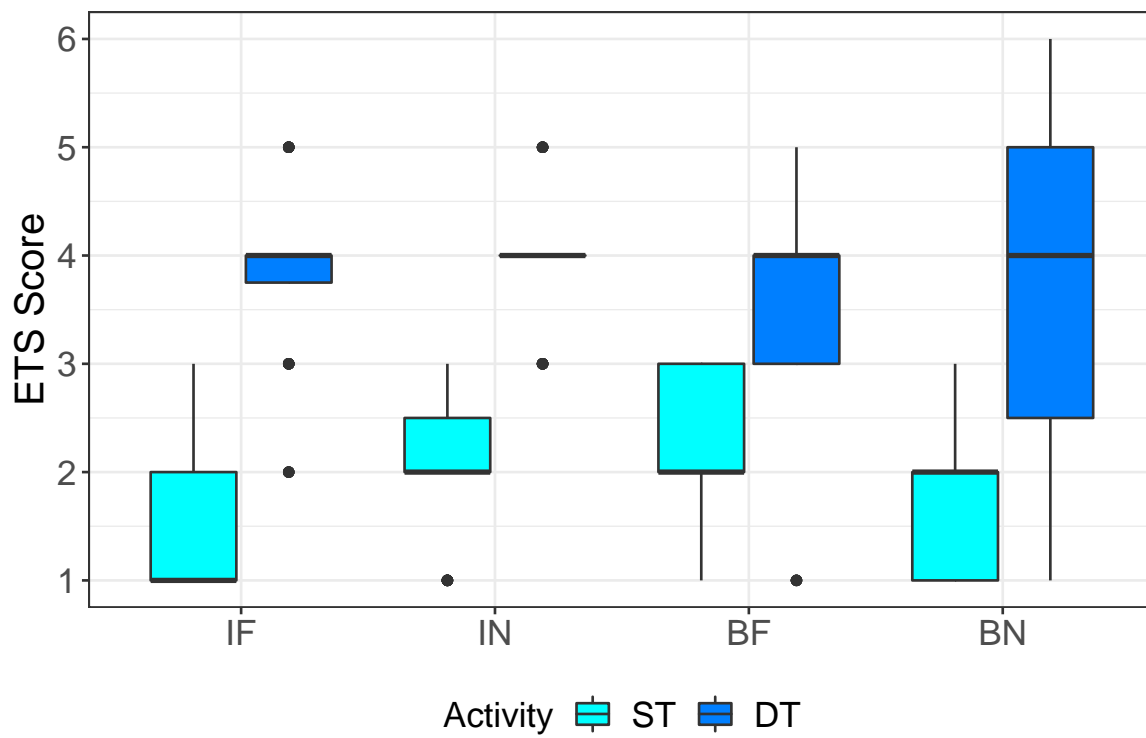
```
## Paired t-test
## For BN, p = 0.3306 > 0.05
```

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
##  814.222 842.1447 -400.111
##
## Random effects:
## Formula: ~1 | Subject
##      (Intercept) Residual
## StdDev:   0.7368648 0.5461497
##
## Fixed effects: Score ~ 1 + Group + Activity
##              Value Std.Error DF  t-value p-value
## (Intercept) 1.6667483 0.2329475 351  7.15504  0.0000
## GroupIN      0.4034307 0.3040668  48  1.32678  0.1909
## GroupBF      0.3972397 0.3194899  48  1.24336  0.2198
## GroupIF      0.1122665 0.3097909  48  0.36239  0.7186
## ActivityDT   1.8663366 0.0543439 351 34.34306  0.0000
## Correlation:
##      (Intr) GropIN GropBF GropIF
## GroupIN   -0.756
## GroupBF   -0.719  0.551
## GroupIF   -0.742  0.568  0.541
## ActivityDT -0.117  0.000  0.000  0.000
##
## Standardized Within-Group Residuals:
##      Min      Q1      Med      Q3      Max
## -2.72900544 -0.72894866 -0.02674991  0.76816710  2.51925629
##
## Number of Observations: 404
## Number of Groups: 52
```



| Activity | Group | n |
|----------|-------|----|
| ST | BN | 43 |
| ST | IN | 59 |
| ST | BF | 48 |
| ST | IF | 52 |
| DT | BN | 43 |
| DT | IN | 59 |
| DT | BF | 48 |
| DT | IF | 52 |

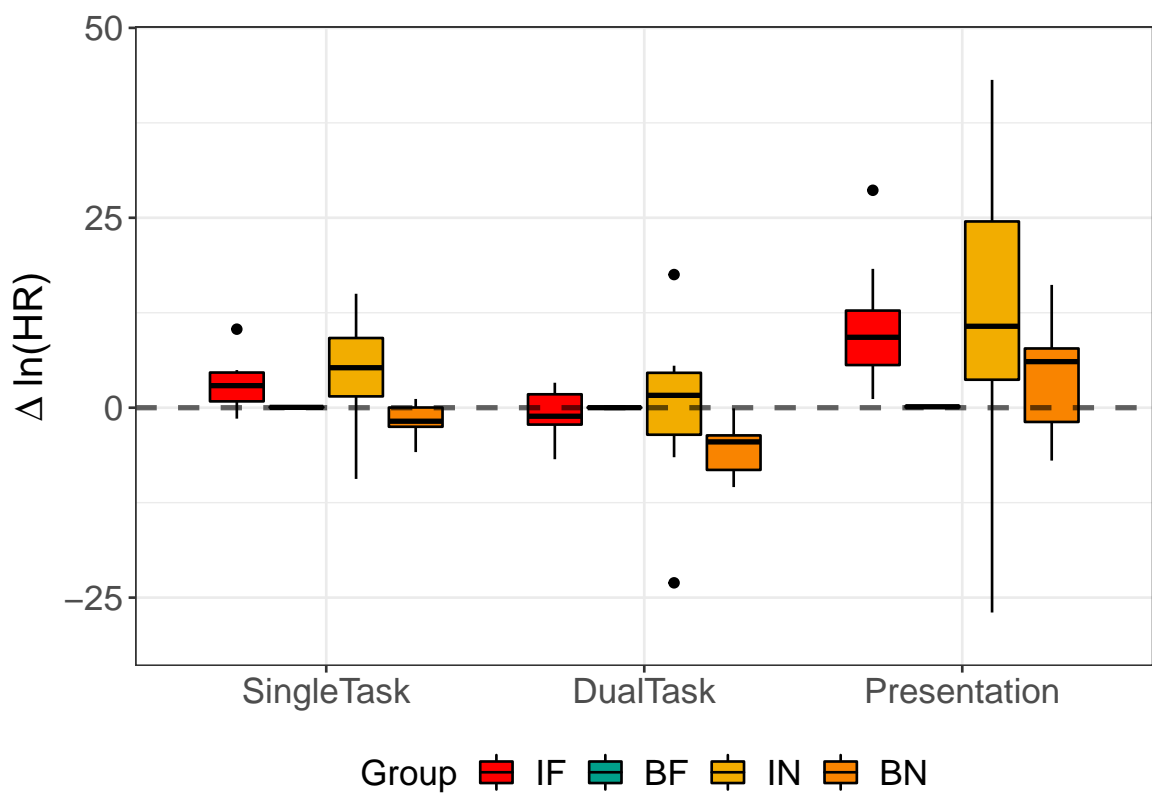
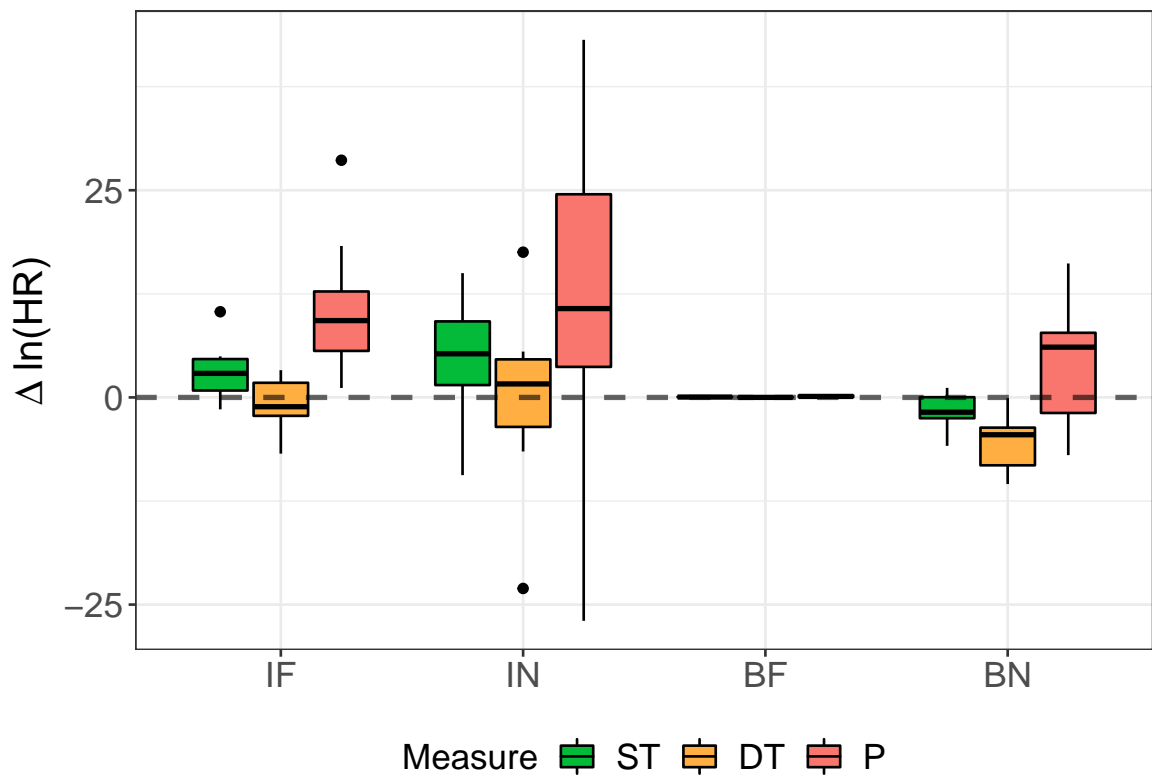
HR, 4 Groups:

Stress Levels Across Activities

Our Linear Model:

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

```
## Linear mixed-effects model fit by REML
## Data: diff_df
##      AIC      BIC    logLik
## 1167.934 1196.314 -574.9671
##
## Random effects:
## Formula: ~1 | Subject
##      (Intercept) Residual
## StdDev:    4.611047  5.27251
##
## Fixed effects: HR ~ 1 + Group + Activity
##              Value Std.Error DF   t-value p-value
## (Intercept) -0.460108  2.006015 130 -0.229364  0.8189
## GroupIN      4.116425  2.375528  43  1.732846  0.0903
## GroupBF      0.731044  2.371155  43  0.308307  0.7593
## GroupIF      3.855041  2.491648  43  1.547185  0.1291
## ActivityB    -2.385293  1.095374 130 -2.177606  0.0312
## ActivityDT   -2.921984  1.087636 130 -2.686547  0.0082
## ActivityP     4.902909  1.145331 130  4.280781  0.0000
## Correlation:
##      (Intr) GropIN GropBF GropIF ActvtB ActvDT
## GroupIN    -0.754
## GroupBF    -0.754  0.638
## GroupIF    -0.719  0.607  0.609
## ActivityB  -0.272  0.000  0.000  0.008
## ActivityDT -0.271  0.000  0.000  0.000  0.496
## ActivityP  -0.248 -0.003 -0.014 -0.010  0.474  0.475
##
## Standardized Within-Group Residuals:
##      Min      Q1      Med      Q3      Max
## -3.58925639 -0.50460601 -0.01629113  0.42226149  5.18860807
##
## Number of Observations: 180
## Number of Groups: 47
```

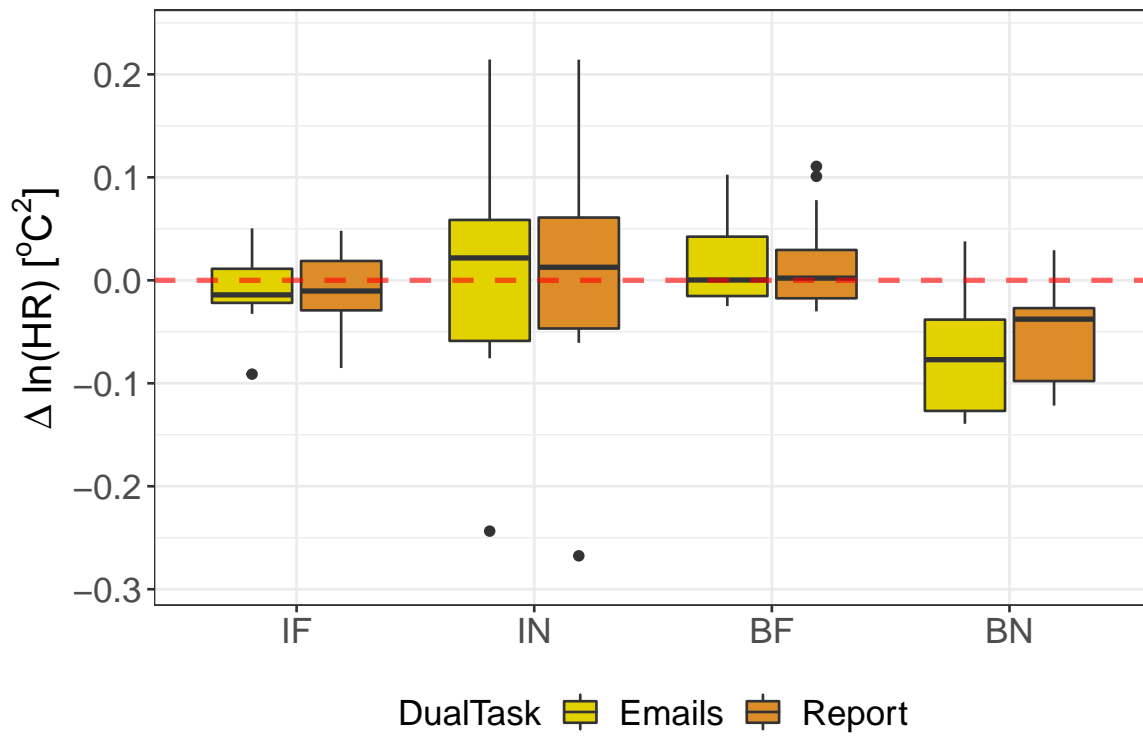


Stress Levels for Dual Task

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
## -297.1249 -279.8636 155.5625
##
## Random effects:
## Formula: ~1 | Subject
##      (Intercept)  Residual
## StdDev:  0.06866781 0.01487866
##
## Fixed effects: HR ~ 1 + Group + DualTask
##              Value Std.Error DF   t-value p-value
## (Intercept) -0.06303756 0.02460997 45 -2.561464  0.0138
## GroupIN      0.06463792 0.03078889 42  2.099391  0.0418
## GroupBF      0.07909728 0.03121653 42  2.533827  0.0151
## GroupIF      0.05271283 0.03227952 42  1.633012  0.1099
## DualTaskReport 0.00378468 0.00310241 45  1.219914  0.2289
## Correlation:
##      (Intr) GropIN GropBF GropIF
## GroupIN      -0.796
## GroupBF      -0.785  0.628
## GroupIF      -0.759  0.607  0.599
## DualTaskReport -0.063  0.000  0.000  0.000
##
## Standardized Within-Group Residuals:
##      Min      Q1      Med      Q3      Max
## -1.57573720 -0.44301705 -0.03874386  0.49969482  1.76241874
##
## Number of Observations: 92
## Number of Groups: 46
```



```
## Paired t-test
## For IF, p = 0.7175 > 0.05
```

```
## Paired t-test
## For IN, p = 0.8392 > 0.05
```

```
## Paired t-test
## For BF, p = 0.8956 > 0.05
```

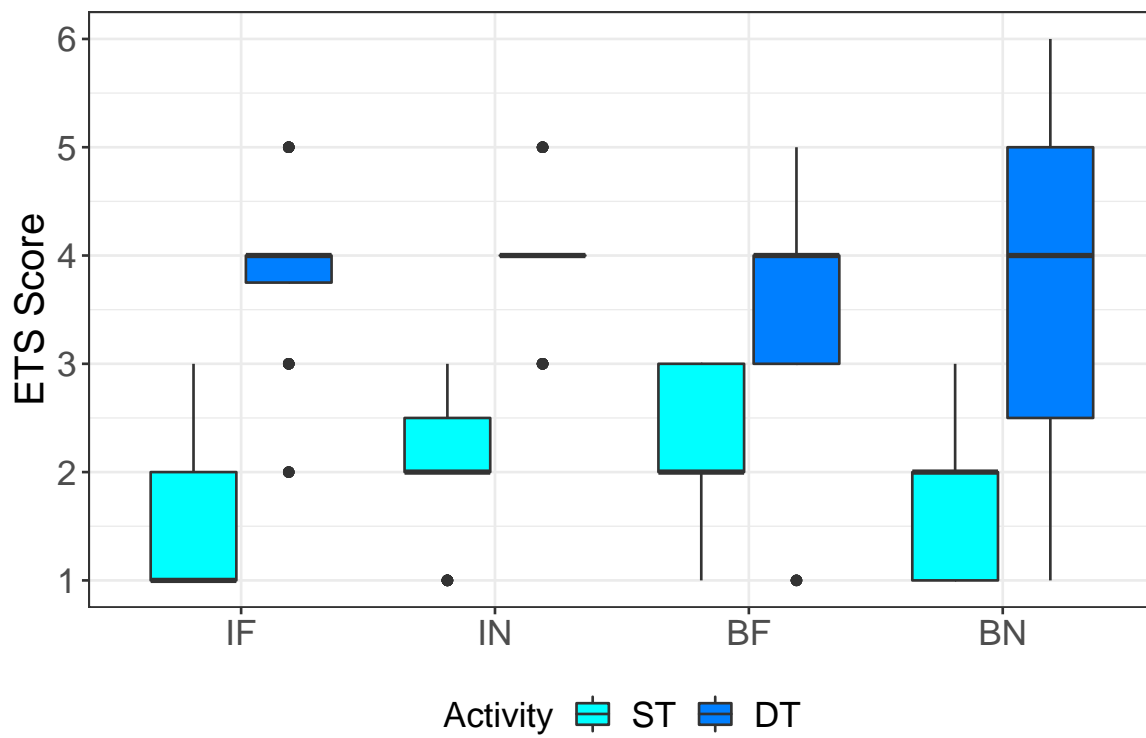
```
## Paired t-test
## For BN, p = 0.1669 > 0.05
```

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
##  814.222 842.1447 -400.111
##
## Random effects:
## Formula: ~1 | Subject
##      (Intercept) Residual
## StdDev:    0.7368648 0.5461497
##
## Fixed effects: Score ~ 1 + Group + Activity
##              Value Std.Error DF   t-value p-value
## (Intercept) 1.6667483 0.2329475 351   7.15504  0.0000
## GroupIN      0.4034307 0.3040668  48   1.32678  0.1909
## GroupBF      0.3972397 0.3194899  48   1.24336  0.2198
## GroupIF      0.1122665 0.3097909  48   0.36239  0.7186
## ActivityDT   1.8663366 0.0543439 351  34.34306  0.0000
## Correlation:
##      (Intr) GropIN GropBF GropIF
## GroupIN   -0.756
## GroupBF   -0.719  0.551
## GroupIF   -0.742  0.568  0.541
## ActivityDT -0.117  0.000  0.000  0.000
##
## Standardized Within-Group Residuals:
##      Min      Q1      Med      Q3      Max
## -2.72900544 -0.72894866 -0.02674991  0.76816710  2.51925629
##
## Number of Observations: 404
## Number of Groups: 52
```



| Activity | Group | n |
|----------|-------|----|
| ST | BN | 43 |
| ST | IN | 59 |
| ST | BF | 48 |
| ST | IF | 52 |
| DT | BN | 43 |
| DT | IN | 59 |
| DT | BF | 48 |
| DT | IF | 52 |

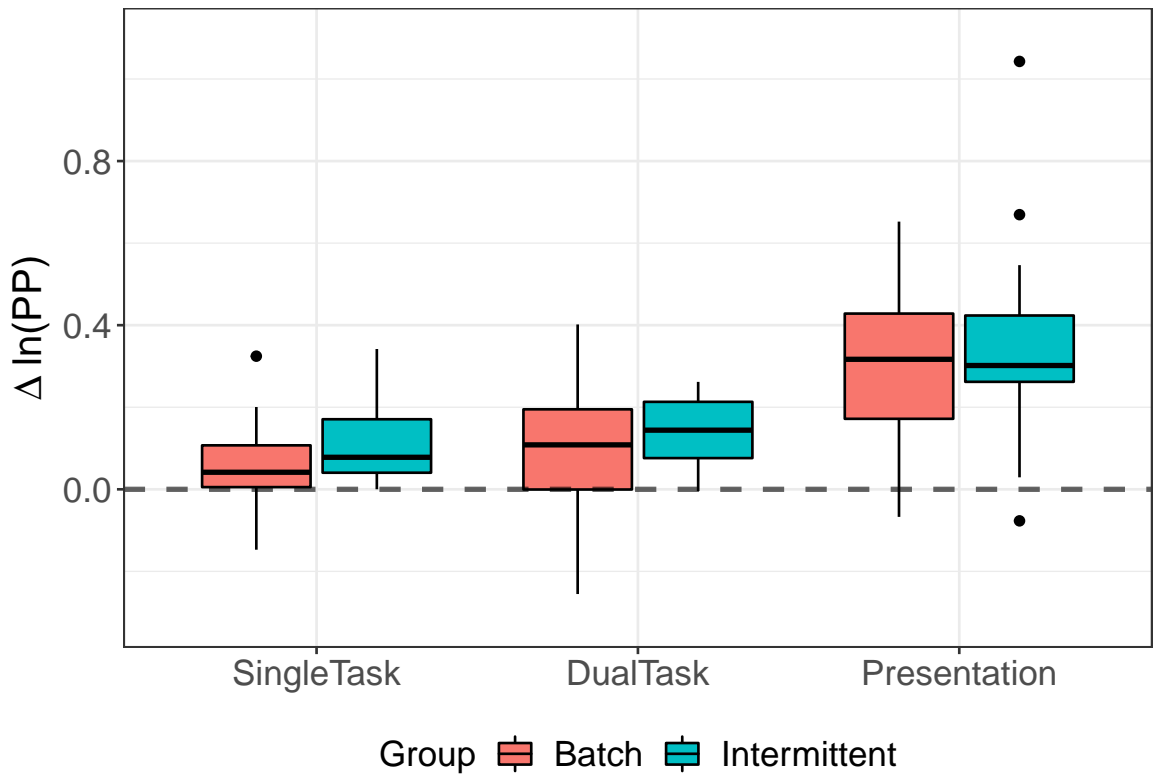
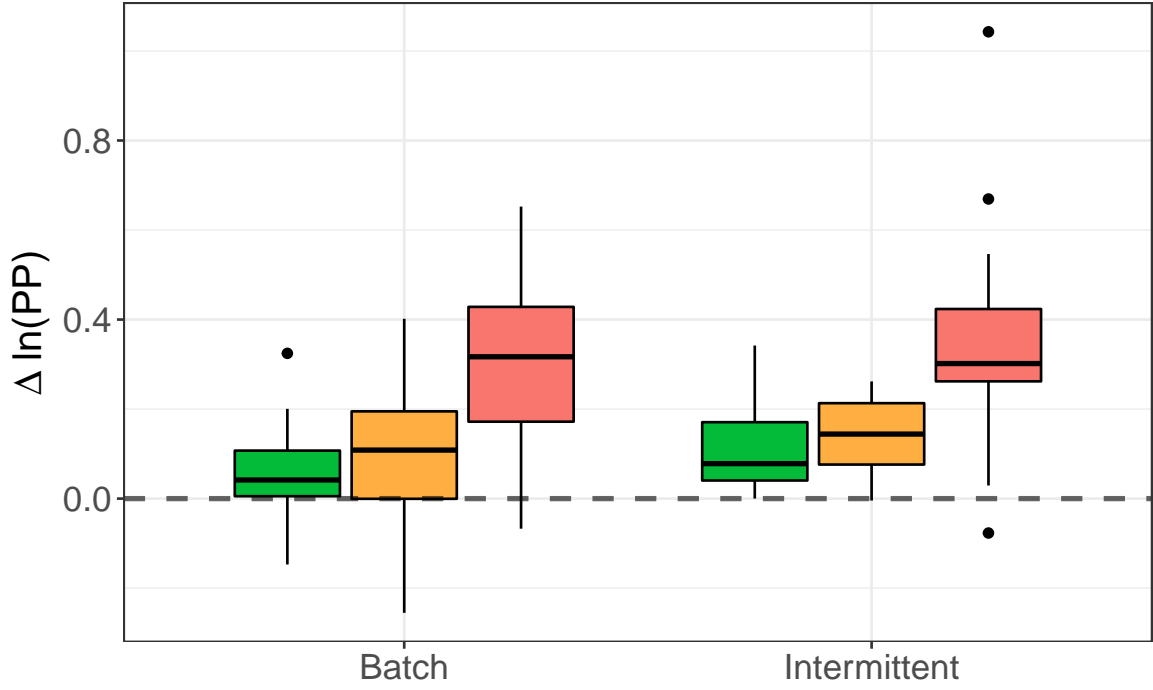
PP, 2 Groups:

Stress Levels Across Activities

Our Linear Model:

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

```
## Linear mixed-effects model fit by REML
## Data: diff_df
##      AIC      BIC    logLik
## -220.4086 -196.9788 117.2043
##
## Random effects:
## Formula: ~1 | Subject
##      (Intercept) Residual
## StdDev:  0.08673069 0.113735
##
## Fixed effects: PP ~ 1 + Group + Activity
##              Value Std.Error DF   t-value p-value
## (Intercept)  0.04303503 0.02400955 157   1.792413  0.0750
## GroupIntermittent 0.06395569 0.02808979  53   2.276831  0.0269
## ActivityB      -0.03142660 0.02193501 157  -1.432714  0.1539
## ActivityDT      0.03452862 0.02168842 157   1.592030  0.1134
## ActivityP       0.24162380 0.02206449 157  10.950799  0.0000
## Correlation:
##              (Intr) GrpInt ActvtB ActvDT
## GroupIntermittent -0.596
## ActivityB          -0.446  0.000
## ActivityDT          -0.452  0.000  0.494
## ActivityP          -0.446  0.004  0.486  0.491
##
## Standardized Within-Group Residuals:
##      Min      Q1      Med      Q3      Max
## -2.78573559 -0.40485178 -0.03457846  0.46168033  4.96293923
##
## Number of Observations: 215
## Number of Groups: 55
```

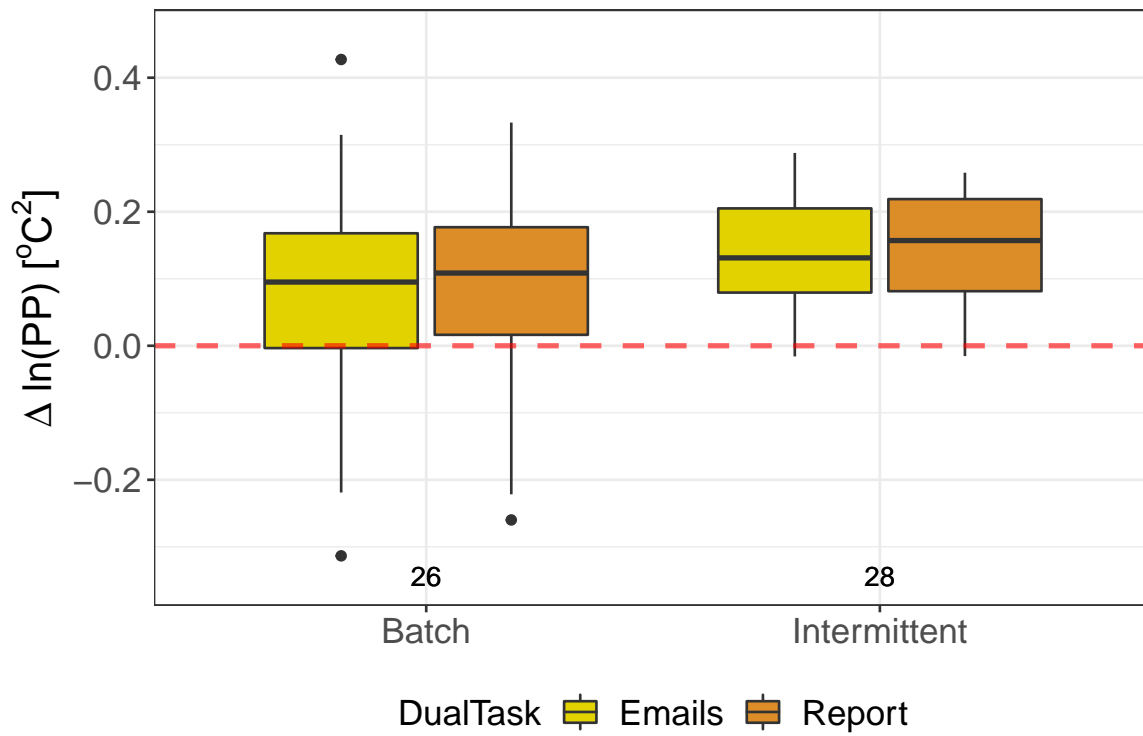


Stress Levels for Dual Task

Our Linear Model:

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

```
## Linear mixed-effects model fit by REML
## Data: total_df
##      AIC      BIC    logLik
##   -233.205 -219.9352 121.6025
##
## Random effects:
## Formula: ~1 | Subject
##      (Intercept)  Residual
## StdDev:    0.1196356 0.03066947
##
## Fixed effects: PP ~ 1 + Group + DualTask
##              Value Std.Error DF   t-value p-value
## (Intercept)    0.07705836 0.02402678 53  3.207186  0.0023
## GroupIntermittent 0.05754260 0.03311406 52  1.737709  0.0882
## DualTaskReport    0.01016980 0.00590234 53  1.723011  0.0907
## Correlation:
##              (Intr) GrpInt
## GroupIntermittent -0.715
## DualTaskReport    -0.123  0.000
##
## Standardized Within-Group Residuals:
##      Min      Q1      Med      Q3      Max
## -2.60846594 -0.34915701  0.01252142  0.28596138  2.58206907
##
## Number of Observations: 108
## Number of Groups: 54
```



```
## Paired t-test
## For Batch, p = 0.3528 > 0.05

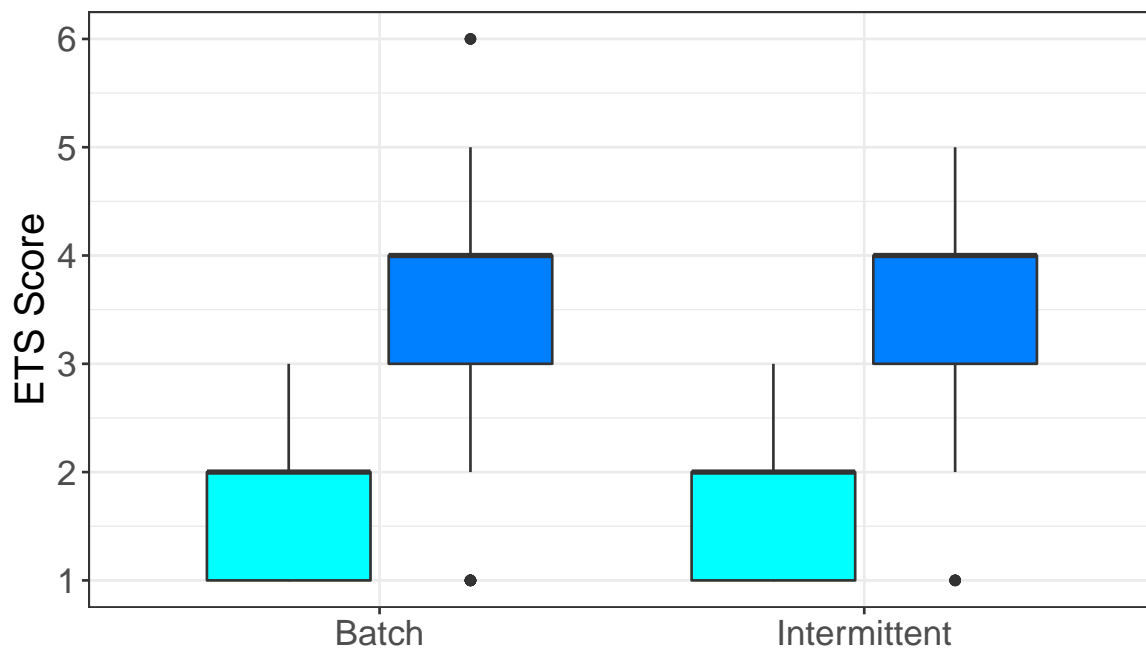
## Paired t-test
## For Intermittent, p = 0.0525 > 0.05
```

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
##  811.7688 831.7386 -400.8844
##
## Random effects:
## Formula: ~1 | Subject
##      (Intercept) Residual
## StdDev:   0.7417761 0.5461764
##
## Fixed effects: Score ~ 1 + Group + Activity
##              Value Std.Error DF  t-value p-value
## (Intercept)   1.9002441 0.15348066 351 12.38100  0.0000
## GroupIntermittent 0.0117149 0.21387747  50  0.05477  0.9565
## ActivityDT       1.8663366 0.05434659 351 34.34138  0.0000
## Correlation:
##              (Intr) GrpInt
## GroupIntermittent -0.695
## ActivityDT        -0.177  0.000
##
## Standardized Within-Group Residuals:
##      Min      Q1      Med      Q3      Max
## -2.749554137 -0.731430647 -0.008304264  0.752987193  2.498450738
##
## Number of Observations: 404
## Number of Groups: 52
```



Activity ■ ST ■ DT

| Activity | Group | n |
|----------|--------------|-----|
| ST | Batch | 102 |
| ST | Intermittent | 100 |
| DT | Batch | 102 |
| DT | Intermittent | 100 |

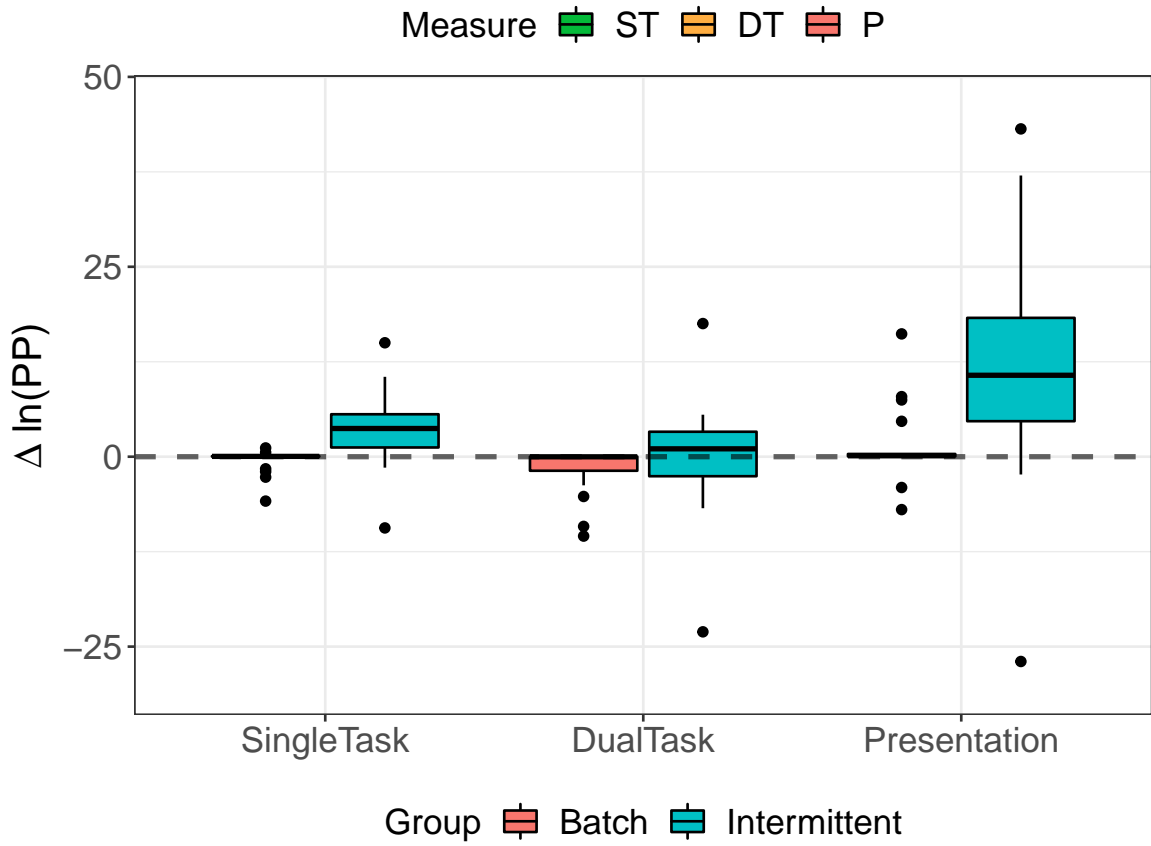
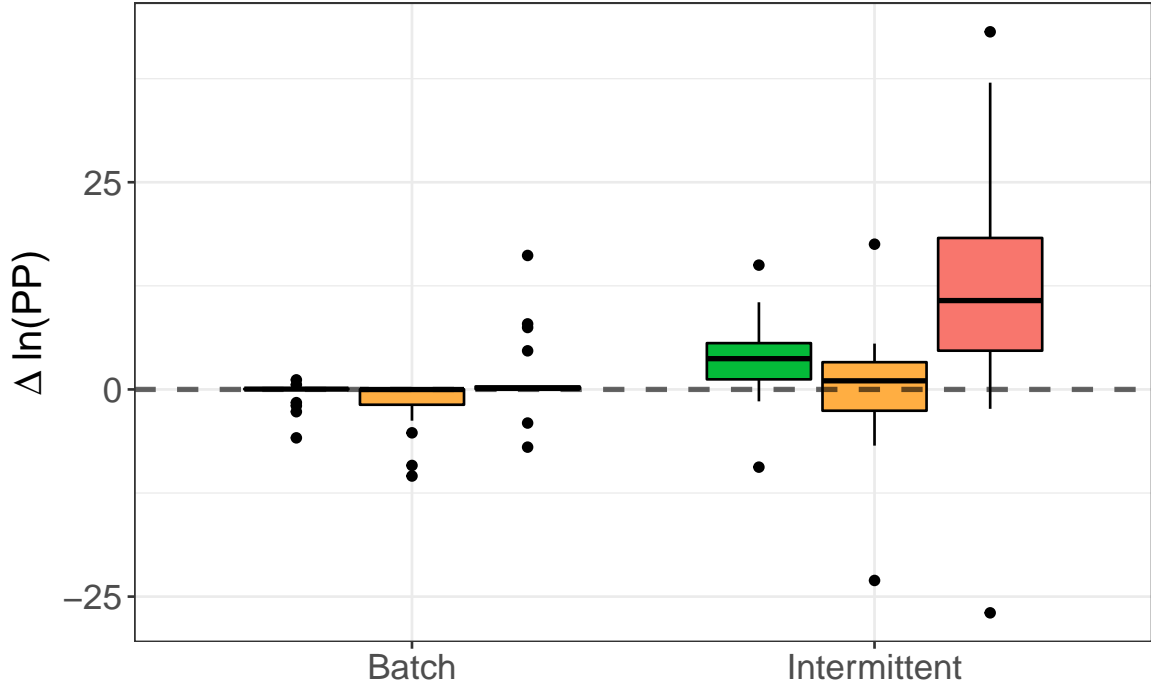
HR, 2 Groups:

Stress Levels Across Activities

Our Linear Model:

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

```
## Linear mixed-effects model fit by REML
## Data: diff_df
##      AIC      BIC    logLik
## 1170.946 1193.099 -578.473
##
## Random effects:
## Formula: ~1 | Subject
##      (Intercept) Residual
## StdDev:      4.481114 5.271894
##
## Fixed effects: HR ~ 1 + Group + Activity
##              Value Std.Error DF   t-value p-value
## (Intercept)  0.004958  1.296684 130   0.003824  0.9970
## GroupIntermittent 3.536476  1.530566  45   2.310567  0.0255
## ActivityB      -2.383440  1.095157 130  -2.176345  0.0313
## ActivityDT     -2.921984  1.087509 130  -2.686861  0.0082
## ActivityP       4.908475  1.144838 130   4.287485  0.0000
## Correlation:
##              (Intr) GrpInt ActvtB ActvDT
## GroupIntermittent -0.628
## ActivityB         -0.420  0.006
## ActivityDT        -0.419  0.000  0.497
## ActivityP         -0.401  0.004  0.475  0.475
##
## Standardized Within-Group Residuals:
##      Min      Q1      Med      Q3      Max
## -3.62964871 -0.49214954 -0.01180449  0.43107110  5.21355141
##
## Number of Observations: 180
## Number of Groups: 47
```

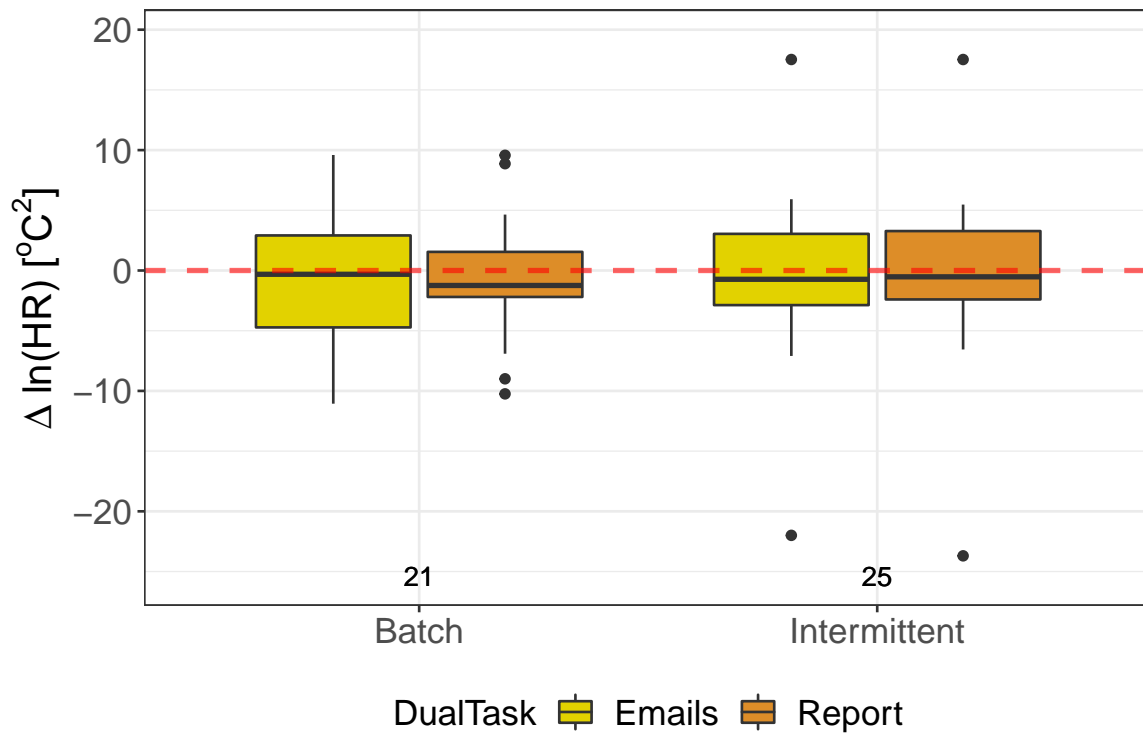



Stress Levels for Dual Task

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
##  472.5203 484.9635 -231.2601
##
## Random effects:
## Formula: ~1 | Subject
##      (Intercept) Residual
## StdDev:      5.977237 1.124413
##
## Fixed effects: HR ~ 1 + Group + DualTask
##              Value Std.Error DF   t-value p-value
## (Intercept)  -1.0340572 1.3210404 45 -0.7827597  0.4379
## GroupIntermittent 0.5268177 1.7848769 44  0.2951563  0.7693
## DualTaskReport   0.3088114 0.2344563 45  1.3171382  0.1945
## Correlation:
##              (Intr) GrpInt
## GroupIntermittent -0.734
## DualTaskReport   -0.089  0.000
##
## Standardized Within-Group Residuals:
##      Min      Q1      Med      Q3      Max
## -1.766605064 -0.436180635 -0.005407971  0.509799583  1.997952625
##
## Number of Observations: 92
## Number of Groups: 46
```



```
## Paired t-test
## For Batch, p = 0.2583 > 0.05
```

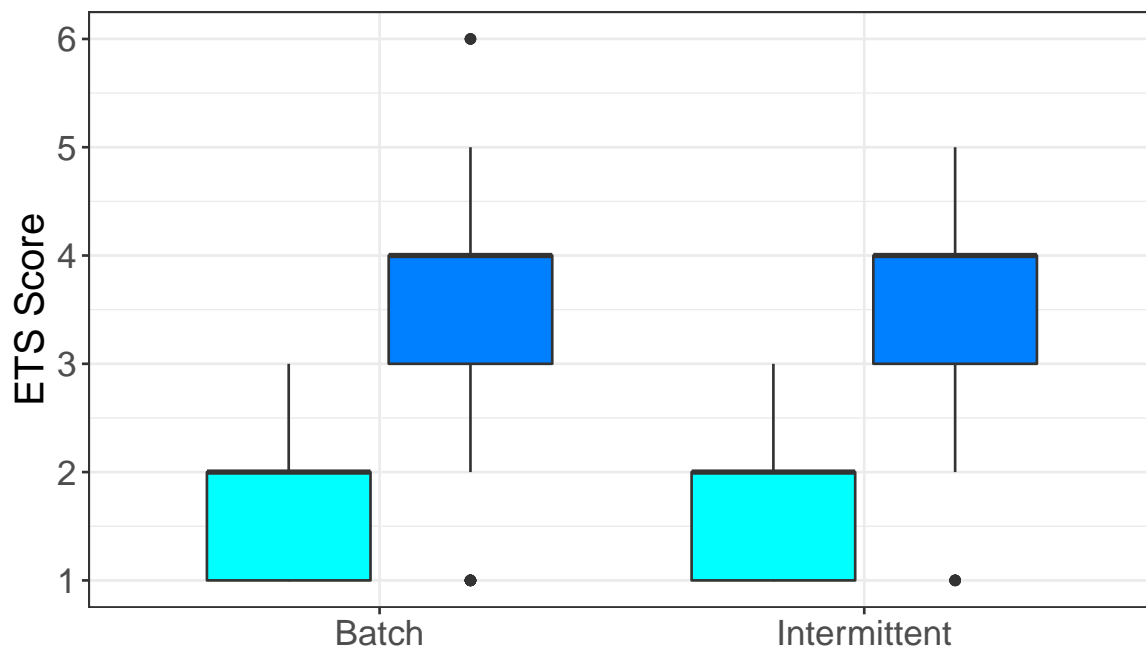
```
## Paired t-test
## For Intermittent, p = 0.5442 > 0.05
```

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
##  811.7688 831.7386 -400.8844
##
## Random effects:
## Formula: ~1 | Subject
##      (Intercept) Residual
## StdDev:   0.7417761 0.5461764
##
## Fixed effects: Score ~ 1 + Group + Activity
##              Value Std.Error DF  t-value p-value
## (Intercept)   1.9002441 0.15348066 351 12.38100  0.0000
## GroupIntermittent 0.0117149 0.21387747  50  0.05477  0.9565
## ActivityDT       1.8663366 0.05434659 351 34.34138  0.0000
## Correlation:
##              (Intr) GrpInt
## GroupIntermittent -0.695
## ActivityDT        -0.177  0.000
##
## Standardized Within-Group Residuals:
##      Min      Q1      Med      Q3      Max
## -2.749554137 -0.731430647 -0.008304264  0.752987193  2.498450738
##
## Number of Observations: 404
## Number of Groups: 52
```



Activity ■ ST ■ DT

| Activity | Group | n |
|----------|--------------|-----|
| ST | Batch | 102 |
| ST | Intermittent | 100 |
| DT | Batch | 102 |
| DT | Intermittent | 100 |

Let's Get to 10 ★ with Four Groups

Our Linear Model:

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

```
## Linear mixed-effects model fit by REML
## Data: full_df
##      AIC      BIC    logLik
## -148.1437 -127.9694 82.07187
##
## Random effects:
## Formula: ~1 | Subject
##      (Intercept)  Residual
## StdDev:  0.08708762 0.05924682
##
## Fixed effects: PP ~ 1 + ETSScore + Group + Activity
##              Value Std.Error DF   t-value p-value
## (Intercept)  0.01825213 0.03409999 47  0.535253  0.5950
## ETSScore    -0.01143289 0.01002932 47 -1.139946  0.2601
## GroupIN      0.14559723 0.03984458 45  3.654129  0.0007
## GroupBF      0.04423412 0.04054805 45  1.090906  0.2811
## GroupIF      0.07491421 0.03959597 45  1.891965  0.0649
## ActivityDT   0.04942296 0.02214038 47  2.232255  0.0304
## Correlation:
##      (Intr) ETSScr GropIN GropBF GropIF
## ETSScore   -0.489
## GroupIN    -0.570 -0.113
## GroupBF    -0.565 -0.101  0.537
## GroupIF    -0.621 -0.016  0.540  0.530
## ActivityDT  0.316 -0.841  0.095  0.085  0.013
##
## Standardized Within-Group Residuals:
##      Min      Q1      Med      Q3      Max
## -1.82718410 -0.50237965  0.04256535  0.41823819  1.95797921
##
## Number of Observations: 98
## Number of Groups: 49
```