Hypothesis Testing for NSF Office Stress Project - Full Sensor Set

Below are the test results for each of the Conditions that had n >= 7 subjects. Statistical testing can have three different possible outcomes: the data is already normal (t-test), the logarithm of the data is normal (t-test with log data), or the data is NOT normal (Wilcoxon test).

For notation, let:

WB-RB = Writing Baseline - Resting Baseline
SC-RB = Stress Condition - Resting Baseline
SC-WB = Stress Condition - Writing Baseline
DT-RB = Dual Task - Resting Baseline
DT-WB = Dual Task - Writing Baseline
DT-SC = Dual Task - Stress Condition
P-RB = Presentation - Resting Baseline
P-WB = Presentation - Writing Baseline
P-SC = Presentation - Stress Condition
P-DT = Presentation - Dual Task
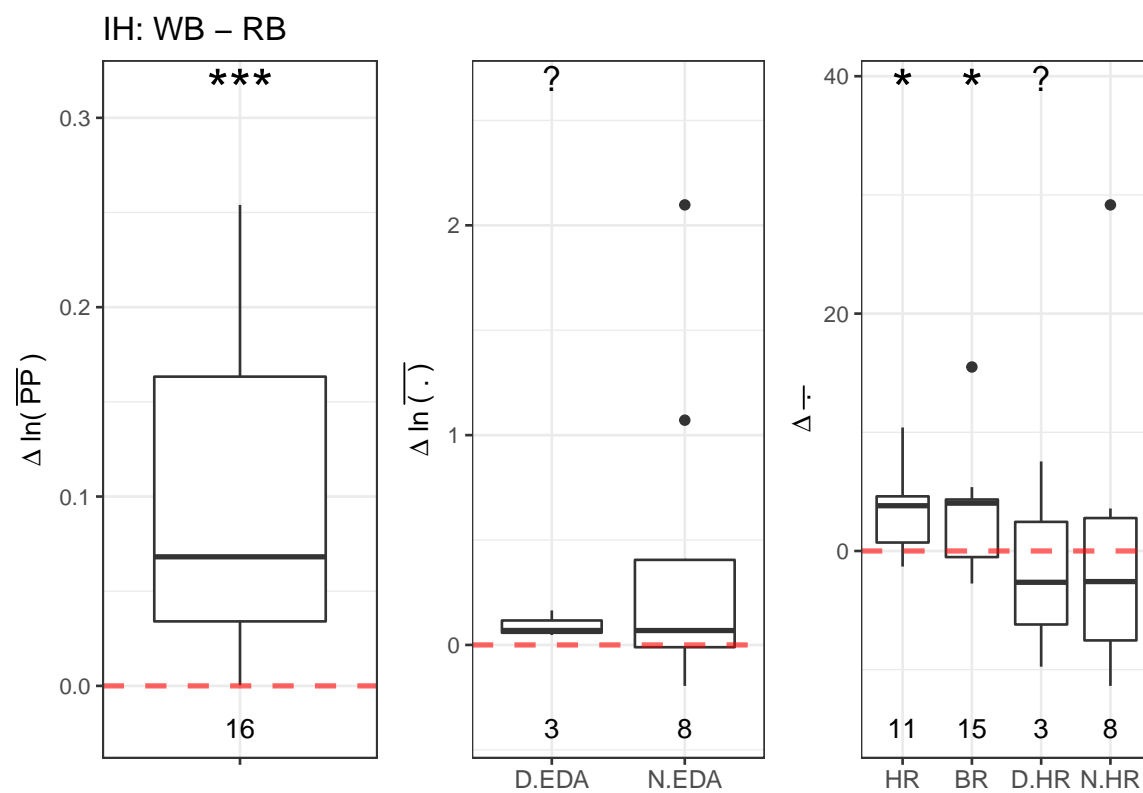
For each of the graphs, let:

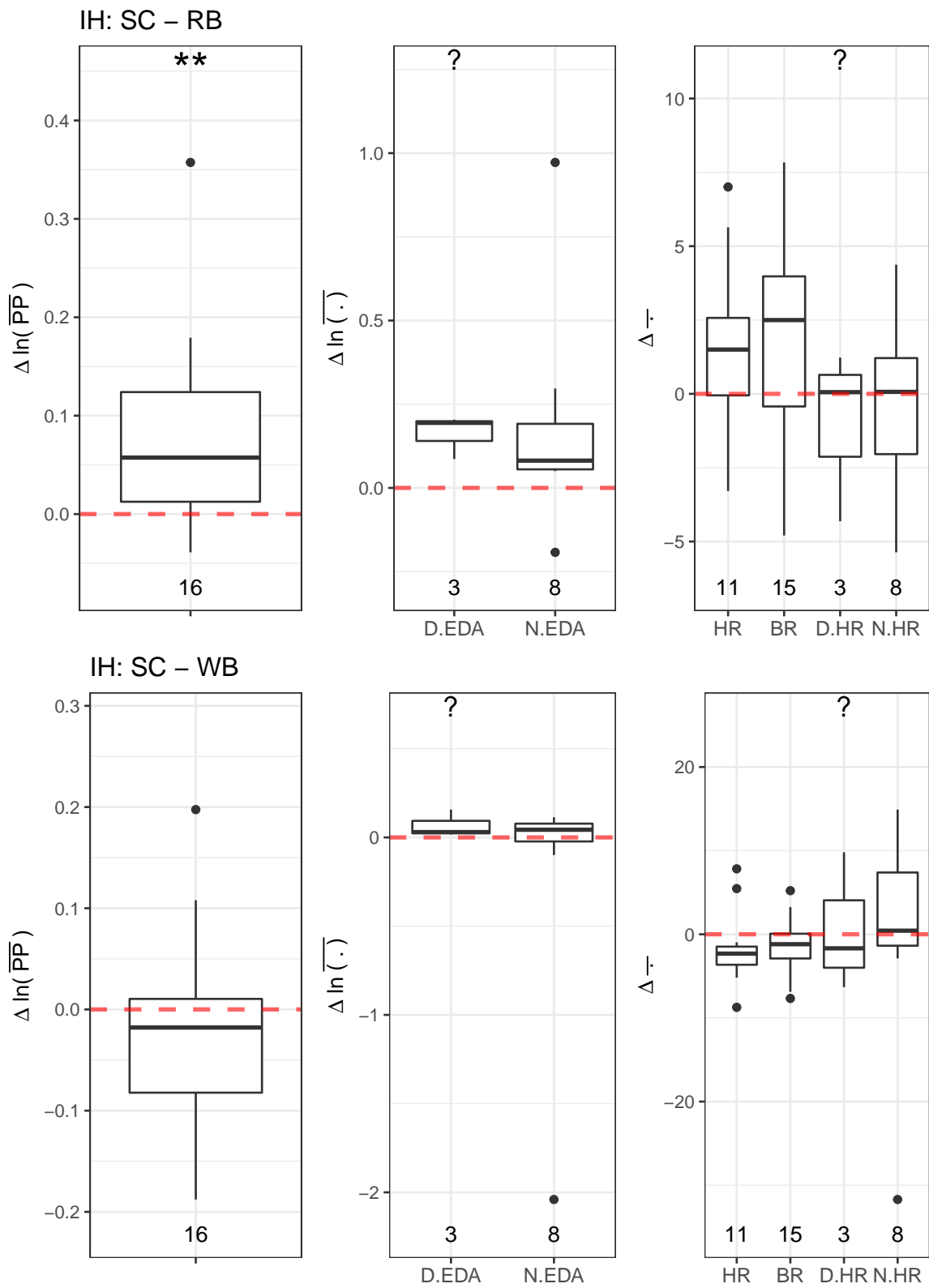***** = 0.01 < p <= 0.05
** = 0.001 < p <= 0.01
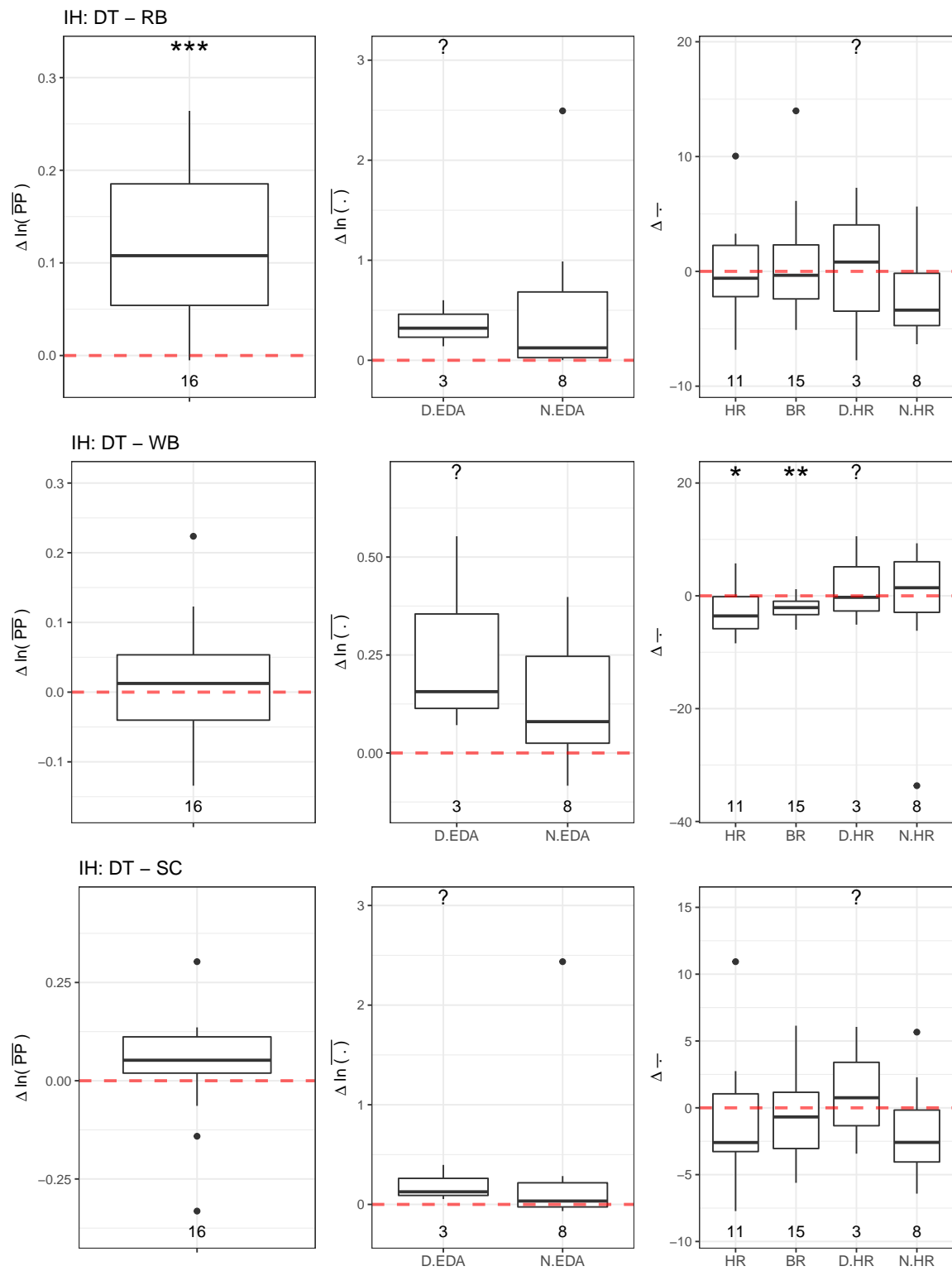******* = p <= 0.001
? = Did not run statistical test $(n < 7)$

Intermittent-High (IH)

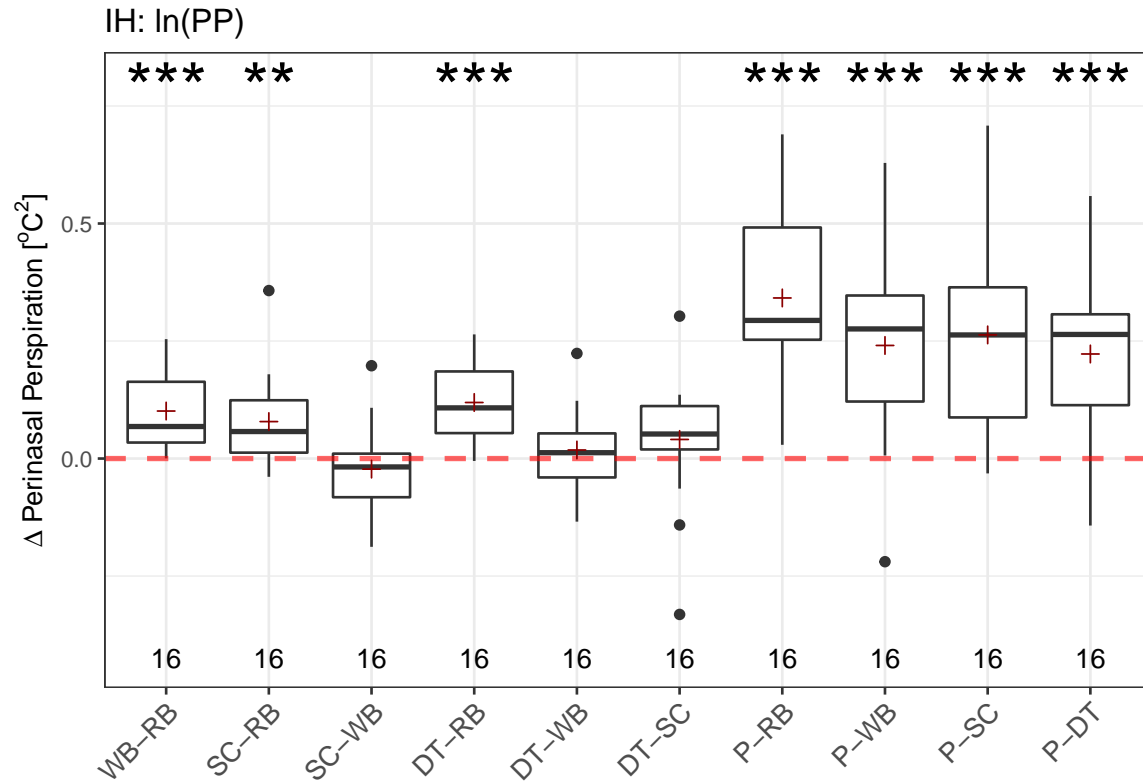# Sensor Channels per Activity

IH: WB − RB

Sensor Channel across Activities

IH: ln(PP)
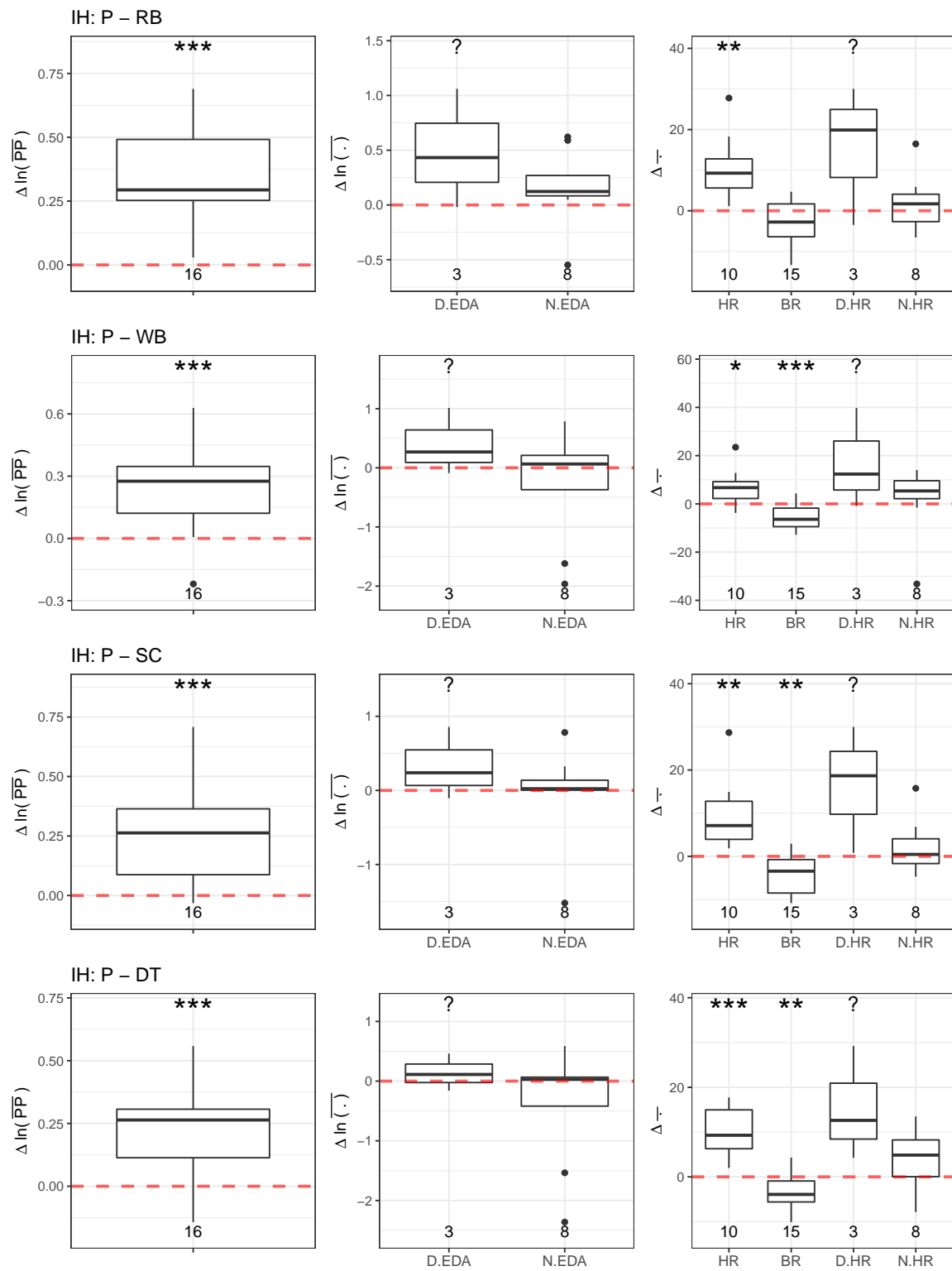

```
## In the following tests, we applied ln(PP).
##
## Writing Baseline - Resting Baseline
## Transformed t-test p = 2e-04 < 0.001   ***
##
## Stress Condition - Resting Baseline
## Transformed t-test p = 0.0072 < 0.01   **
##
## StressCondition - Writing Baseline
## Transformed t-test p = 0.3534 > 0.05
##
## Dual Task - Resting Baseline
## Transformed t-test p = 0 < 0.001   ***
##
## Dual Task - Writing Baseline
## Transformed t-test p = 0.4225 > 0.05
##
## Dual Task - Stress Condition
## Transformed t-test p = 0.257 > 0.05
##
## Presentation - Resting Baseline
## Transformed t-test p = 0 < 0.001   ***
##
```
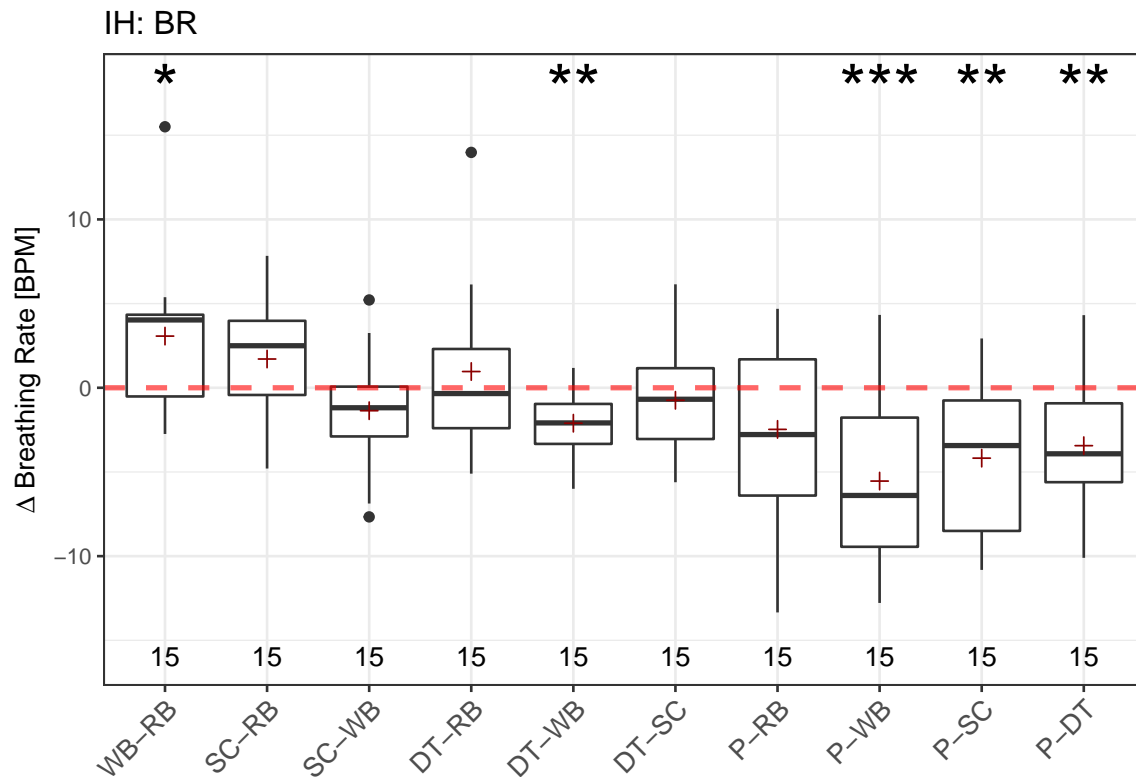
```
## Presentation - Writing Baseline
## Transformed t-test p = 3e-04 < 0.001  ***
##
## Presentation - Stress Condition
## Transformed t-test p = 1e-04 < 0.001  ***
##
## Presentation - Dual Task
## Transformed t-test p = 4e-04 < 0.001  ***
```

IH: ln(HR)
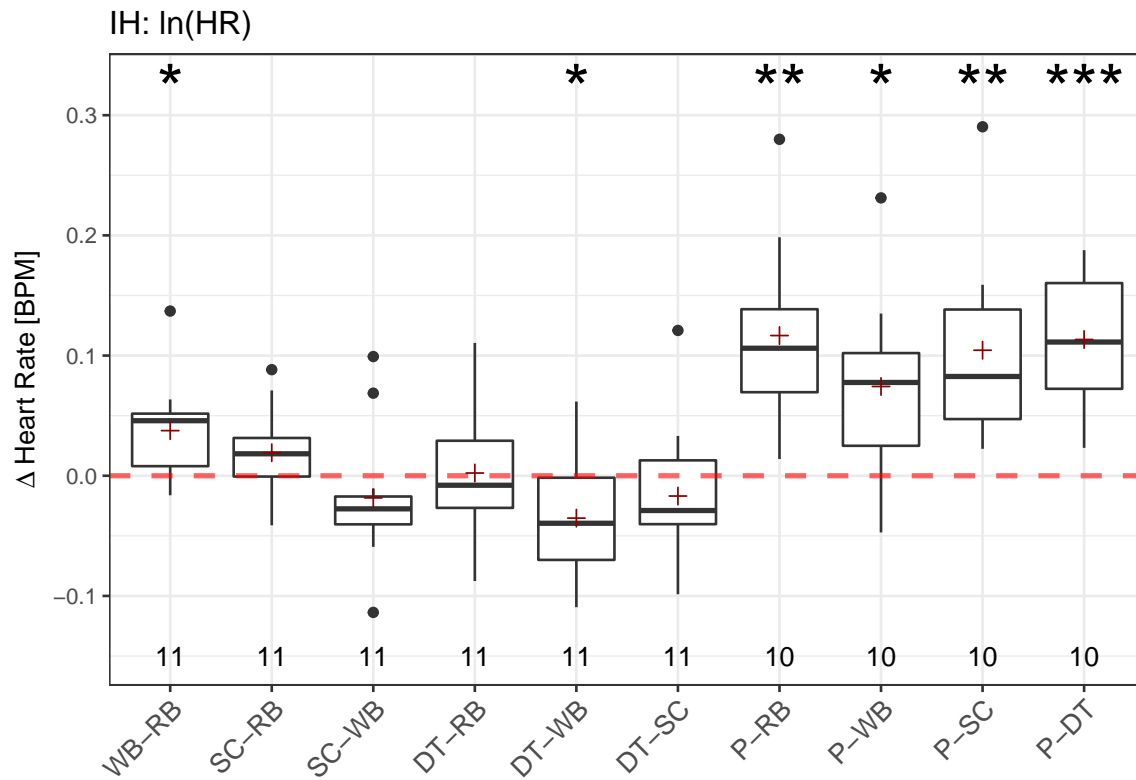
```
## Writing Baseline - Resting Baseline
## Transformed t-test p = 0.0156 < 0.05  *
##
## Stress Condition - Resting Baseline
## Transformed t-test p = 0.1143 > 0.05
##
## StressCondition - Writing Baseline
## Transformed t-test p = 0.317 > 0.05
##
## Dual Task - Resting Baseline
## Transformed t-test p = 0.885 > 0.05
##
## Dual Task - Writing Baseline
## Transformed t-test p = 0.0361 < 0.05  *
##
## Dual Task - Stress Condition
## Transformed t-test p = 0.3857 > 0.05
##
## Presentation - Resting Baseline
## Transformed t-test p = 0.0011 < 0.01  **
##
## Presentation - Writing Baseline
## Transformed t-test p = 0.0133 < 0.05  *
##
## Presentation - Stress Condition
```

```
## Transformed t-test p = 0.0027 < 0.01   **
##
## Presentation - Dual Task
## Transformed t-test p = 1e-04 < 0.001   ***
```

IH: BR

```
## Writing Baseline - Resting Baseline
## t-test p = 0.0184 < 0.05  *
##
## Stress Condition - Resting Baseline
## t-test p = 0.0865 > 0.05
##
## StressCondition - Writing Baseline
## t-test p = 0.1405 > 0.05
##
## Dual Task - Resting Baseline
## t-test p = 0.4484 > 0.05
##
## Dual Task - Writing Baseline
## t-test p = 0.0012 < 0.01  **
##
## Dual Task - Stress Condition
## t-test p = 0.3441 > 0.05
##
## Presentation - Resting Baseline
## t-test p = 0.0908 > 0.05
##
## Presentation - Writing Baseline
## t-test p = 7e-04 < 0.001  ***
##
## Presentation - Stress Condition
```
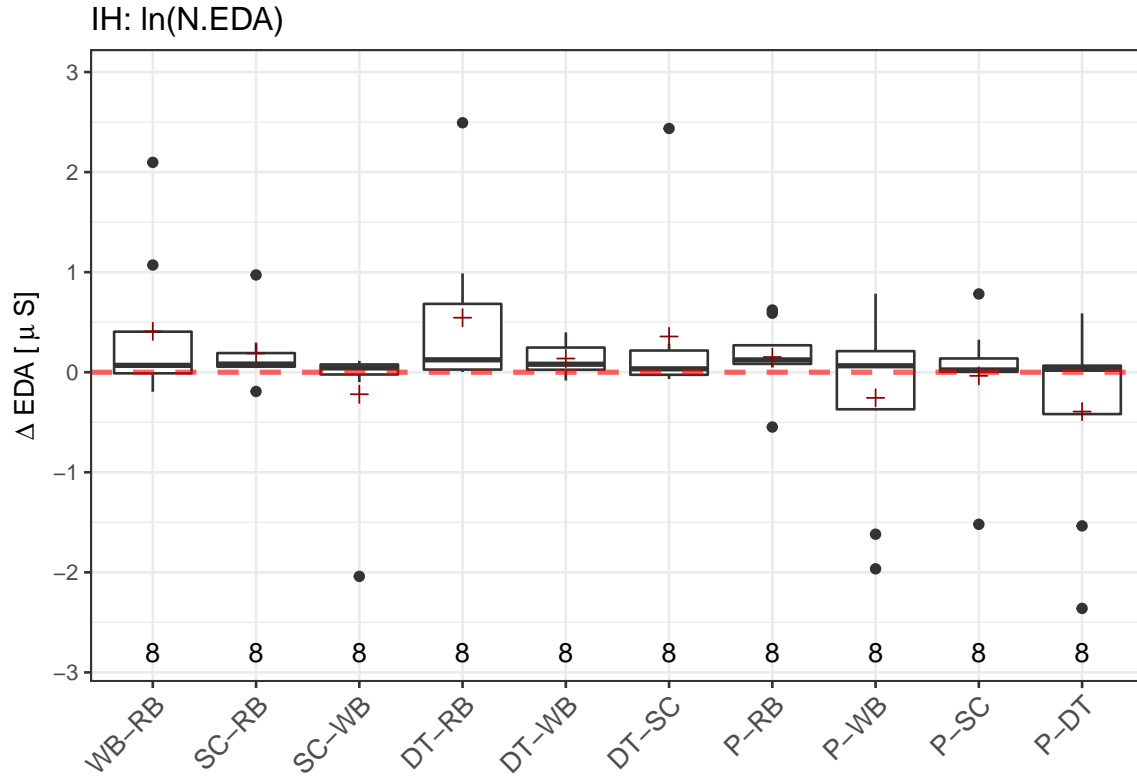
```
## t-test p = 0.0029 < 0.01  **
##
## Presentation - Dual Task
## t-test p = 0.0056 < 0.01  **
```

```
## IH has LESS than 7 subjects for D.EDA. Cannot continue with test.
## -----
```

IH: ln(N.EDA)

```
## In the following tests, we applied ln(N.EDA).
##
## Writing Baseline - Resting Baseline
## Transformed t-test p = 0.1841 > 0.05
##
## Stress Condition - Resting Baseline
## Transformed t-test p = 0.167 > 0.05
##
## StressCondition - Writing Baseline
## Transformed t-test p = 0.4268 > 0.05
##
## Dual Task - Resting Baseline
## Transformed t-test p = 0.1169 > 0.05
##
## Dual Task - Writing Baseline
## Transformed t-test p = 0.0696 > 0.05
##
## Dual Task - Stress Condition
## Transformed t-test p = 0.2729 > 0.05
##
## Presentation - Resting Baseline
## Transformed t-test p = 0.2745 > 0.05
##
## Presentation - Writing Baseline
## Transformed t-test p = 0.4856 > 0.05
```
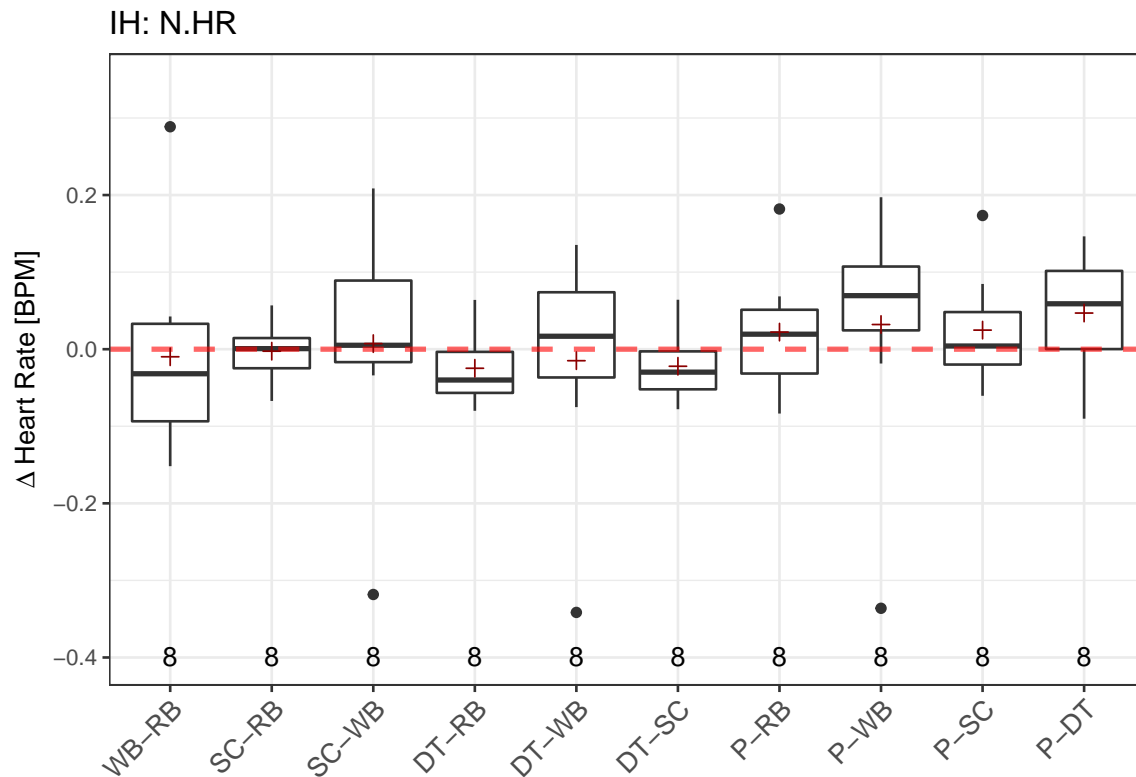
```
## 
## Presentation - Stress Condition
## Transformed t-test p = 0.8809 > 0.05
## 
## Presentation - Dual Task
## Transformed t-test p = 0.3046 > 0.05
```

```
## IH has LESS than 7 subjects for D.HR. Cannot continue with test.
## -----
```

IH: N.HR


```
## In the following tests, we applied ln(N.HR).
##
## Writing Baseline - Resting Baseline
## Wilcoxon p = 0.5469 > 0.05
##
## Stress Condition - Resting Baseline
## Wilcoxon p = 1 > 0.05
##
## StressCondition - Writing Baseline
## Wilcoxon p = 0.7422 > 0.05
##
## Dual Task - Resting Baseline
## Wilcoxon p = 0.25 > 0.05
##
## Dual Task - Writing Baseline
## Wilcoxon p = 0.8438 > 0.05
##
## Dual Task - Stress Condition
## Wilcoxon p = 0.25 > 0.05
##
## Presentation - Resting Baseline
## Wilcoxon p = 0.7422 > 0.05
##
## Presentation - Writing Baseline
## Wilcoxon p = 0.25 > 0.05
```
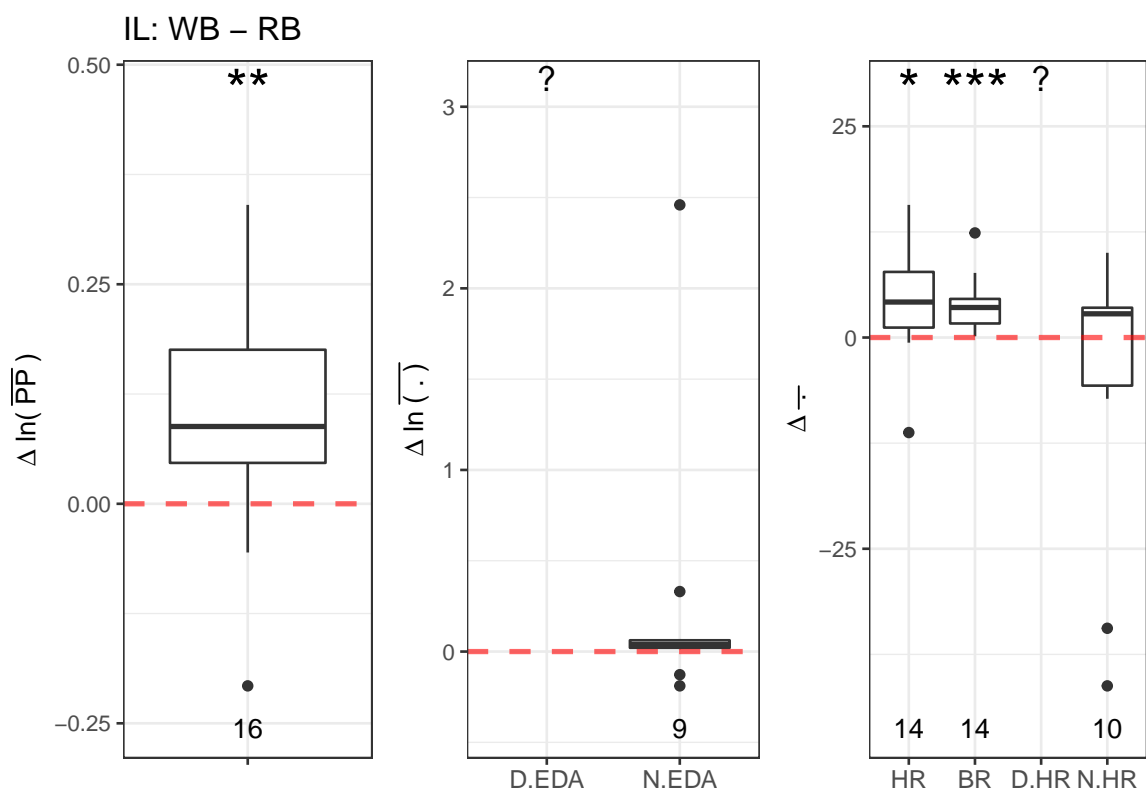
```
## 
## Presentation - Stress Condition
## Wilcoxon p = 0.5469 > 0.05
## 
## Presentation - Dual Task
## Wilcoxon p = 0.1484 > 0.05
```

Intermittent-Low (IL)

Sensor Channels per Activity
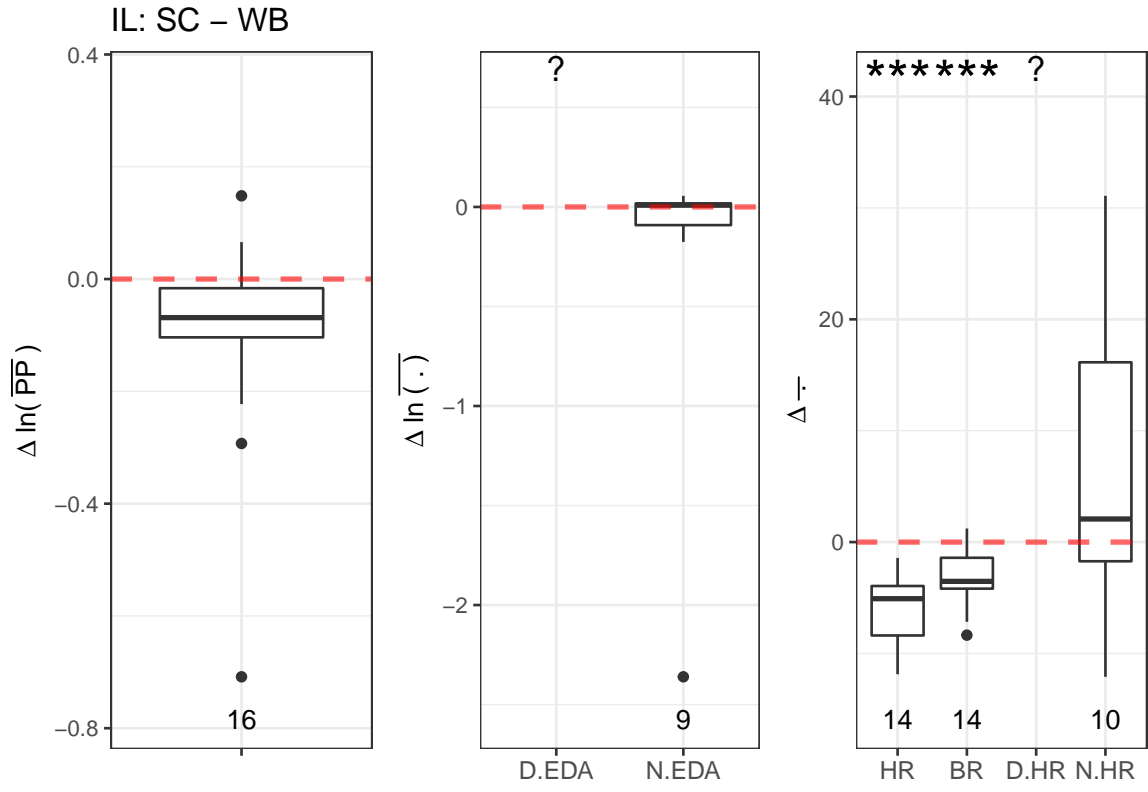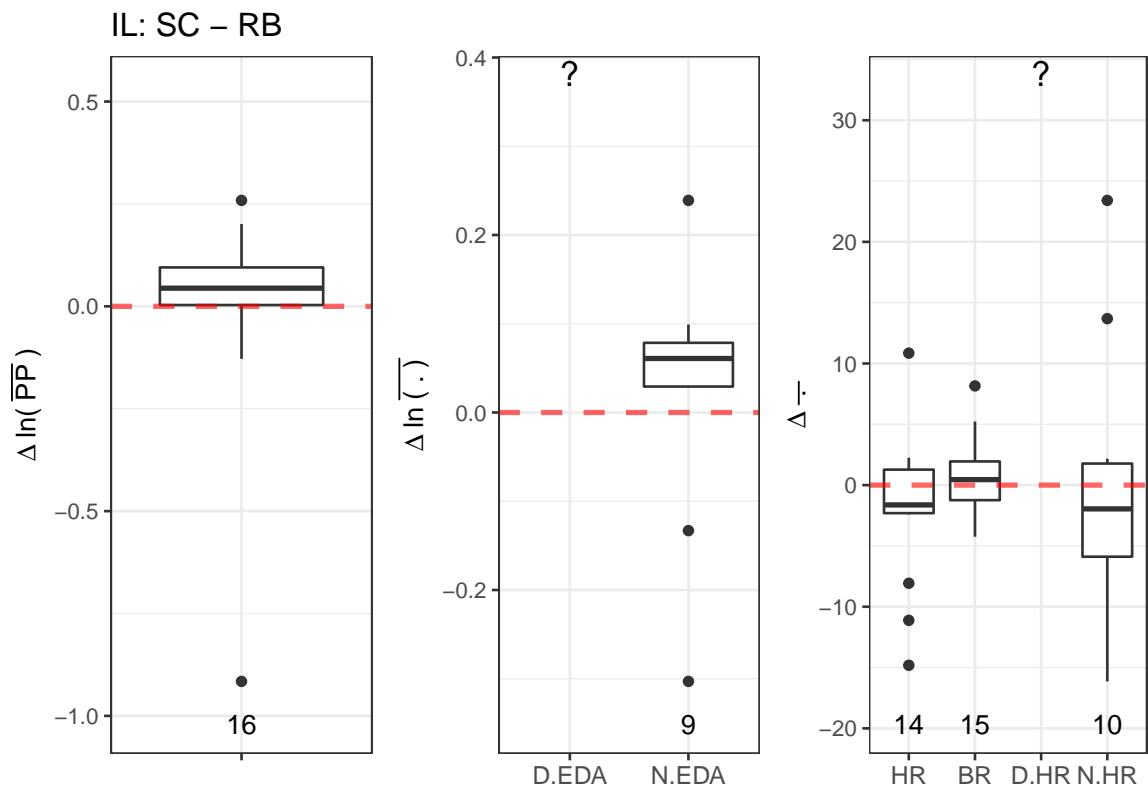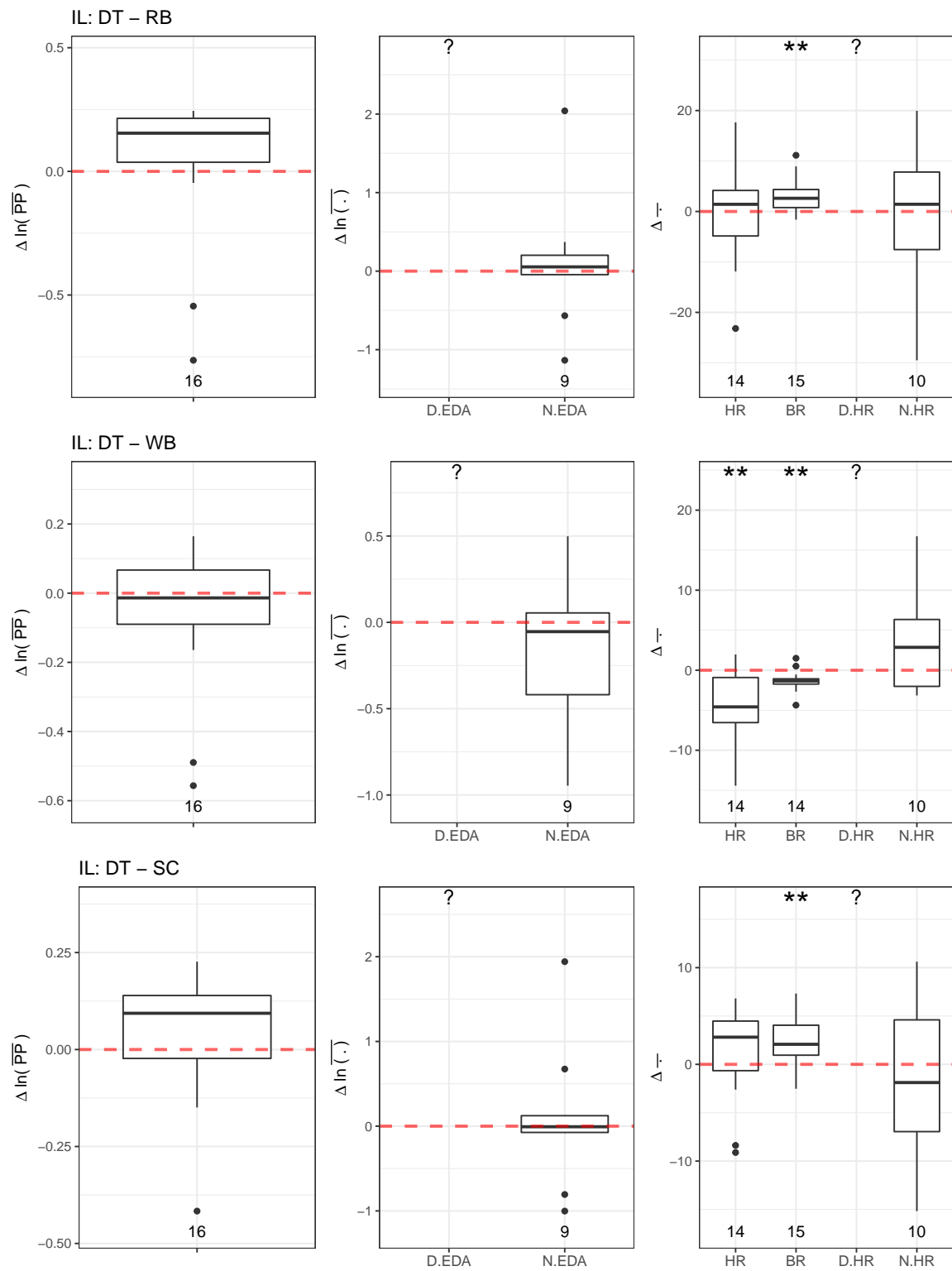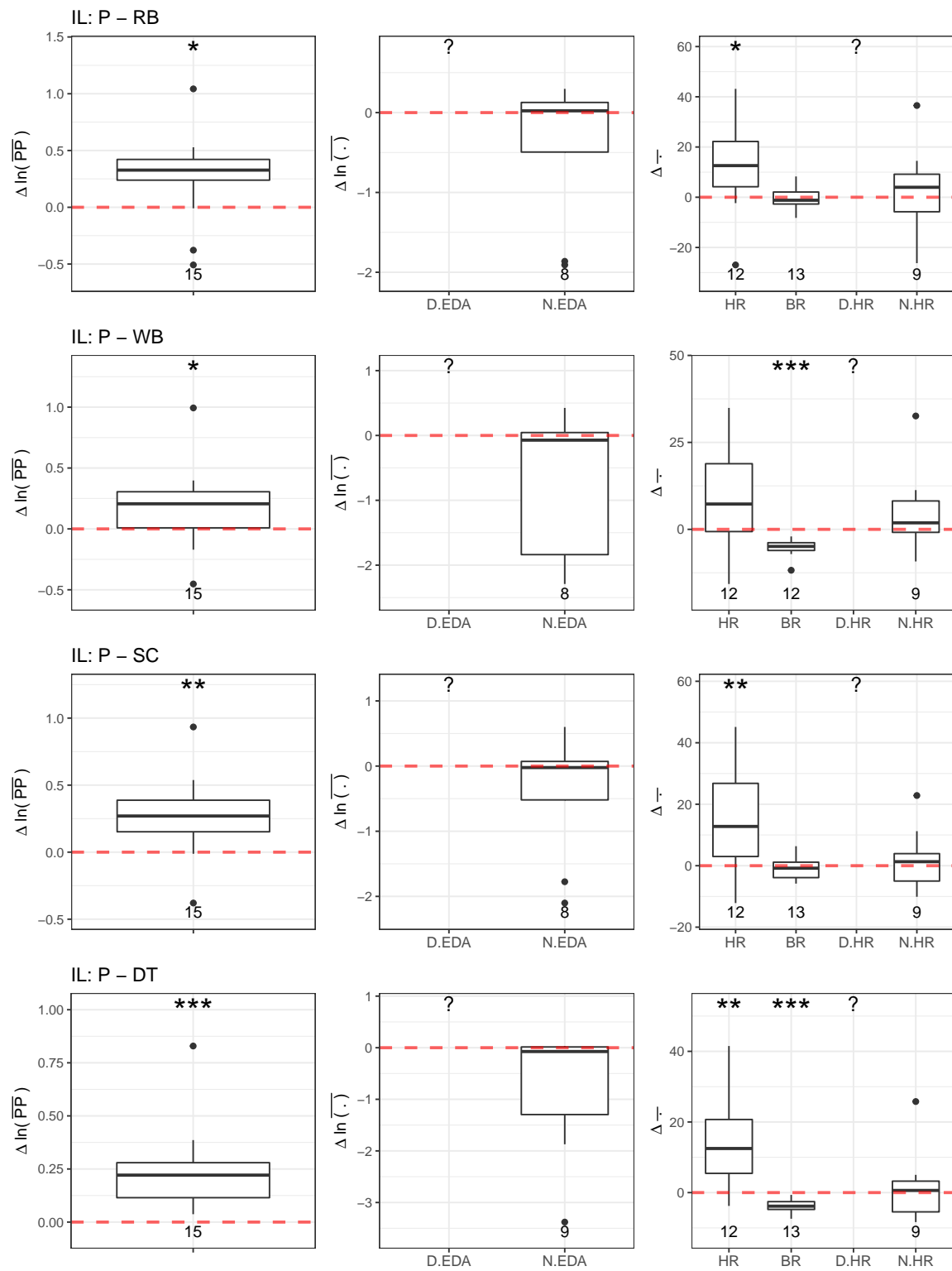
IL: WB − RB

Sensor Channel across Activities

IL: ln(PP)
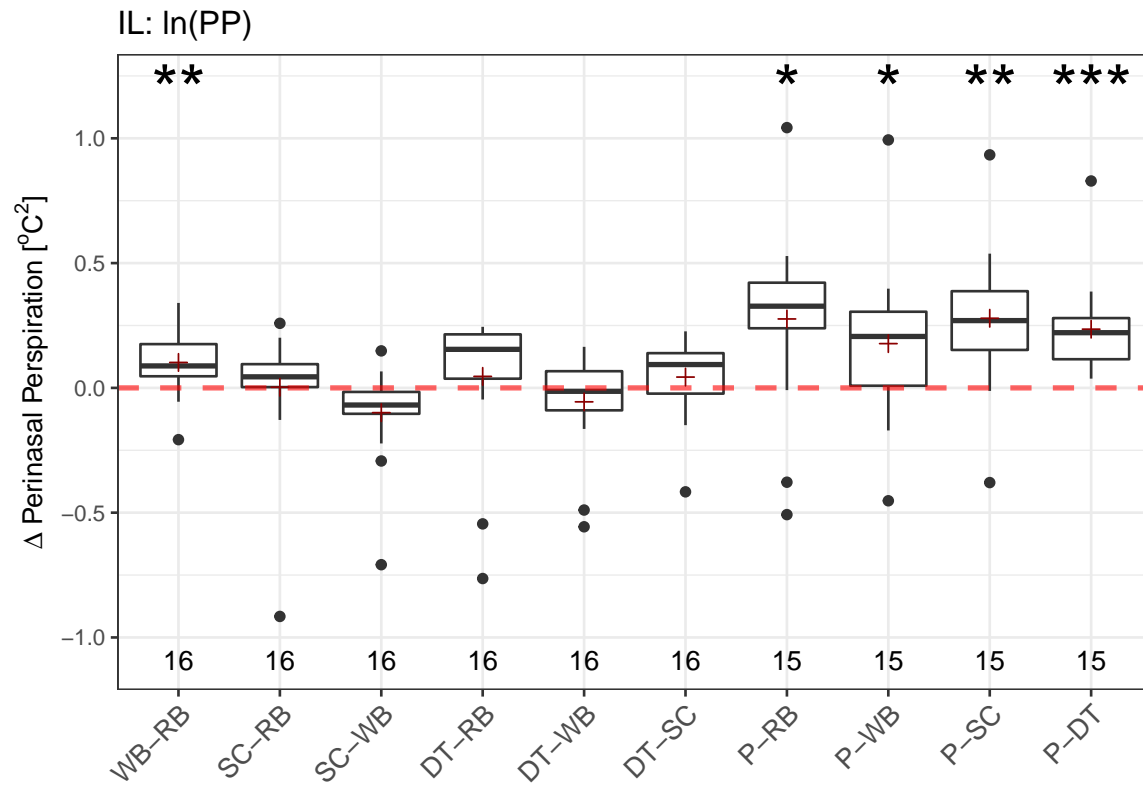

```
## Writing Baseline - Resting Baseline
## Transformed t-test p = 0.0081 < 0.01   **
##
## Stress Condition - Resting Baseline
## Transformed t-test p = 0.9677 > 0.05
##
## StressCondition - Writing Baseline
## Transformed t-test p = 0.0589 > 0.05
##
## Dual Task - Resting Baseline
## Transformed t-test p = 0.5346 > 0.05
##
## Dual Task - Writing Baseline
## Transformed t-test p = 0.2923 > 0.05
##
## Dual Task - Stress Condition
## Transformed t-test p = 0.2891 > 0.05
##
## Presentation - Resting Baseline
## Transformed t-test p = 0.0114 < 0.05   *
##
## Presentation - Writing Baseline
## Transformed t-test p = 0.0499 < 0.05   *
```

```
## 
## Presentation - Stress Condition
## Transformed t-test p = 0.002 < 0.01  **
## 
## Presentation - Dual Task
## Transformed t-test p = 4e-04 < 0.001  ***
```

IL: HR
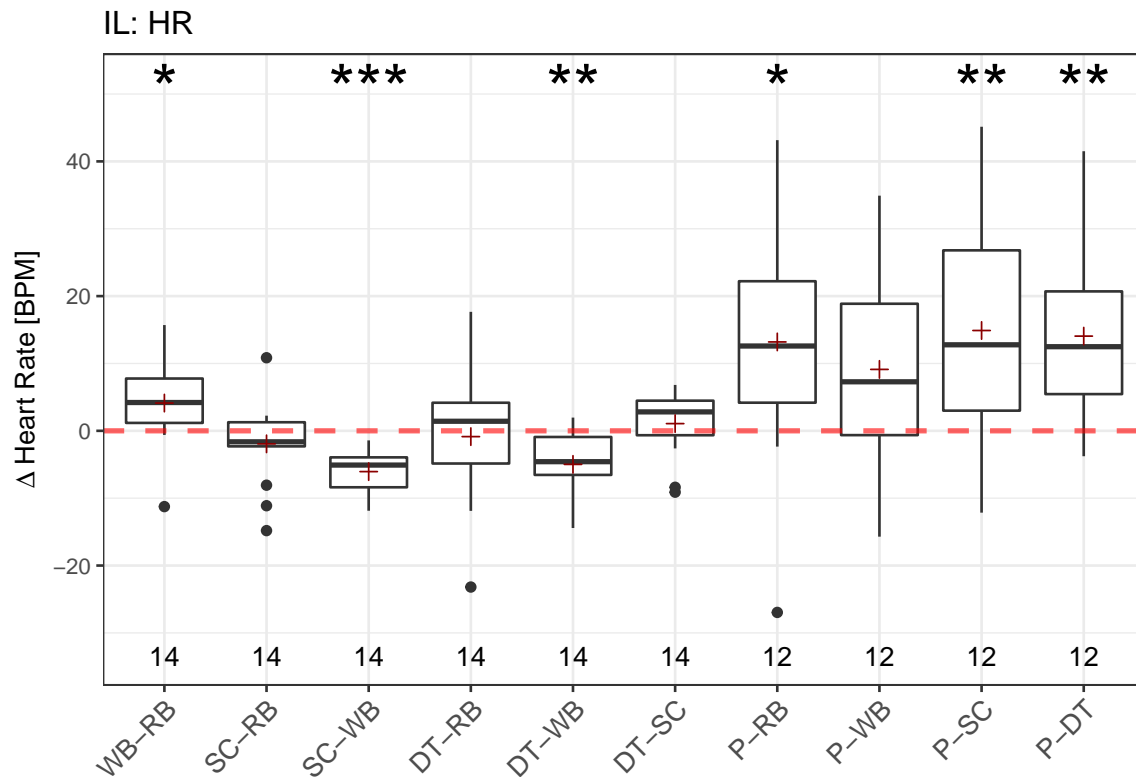
```
## Writing Baseline - Resting Baseline
## t-test p = 0.0296 < 0.05  *
##
## Stress Condition - Resting Baseline
## t-test p = 0.2669 > 0.05
##
## StressCondition - Writing Baseline
## t-test p = 0 < 0.001  ***
##
## Dual Task - Resting Baseline
## t-test p = 0.7416 > 0.05
##
## Dual Task - Writing Baseline
## t-test p = 0.0038 < 0.01  **
##
## Dual Task - Stress Condition
## t-test p = 0.4266 > 0.05
##
## Presentation - Resting Baseline
## t-test p = 0.0326 < 0.05  *
##
## Presentation - Writing Baseline
## t-test p = 0.0531 > 0.05
##
## Presentation - Stress Condition
```

```
## t-test p = 0.0081 < 0.01  **
##
## Presentation - Dual Task
## t-test p = 0.0038 < 0.01  **
```

IL: BR
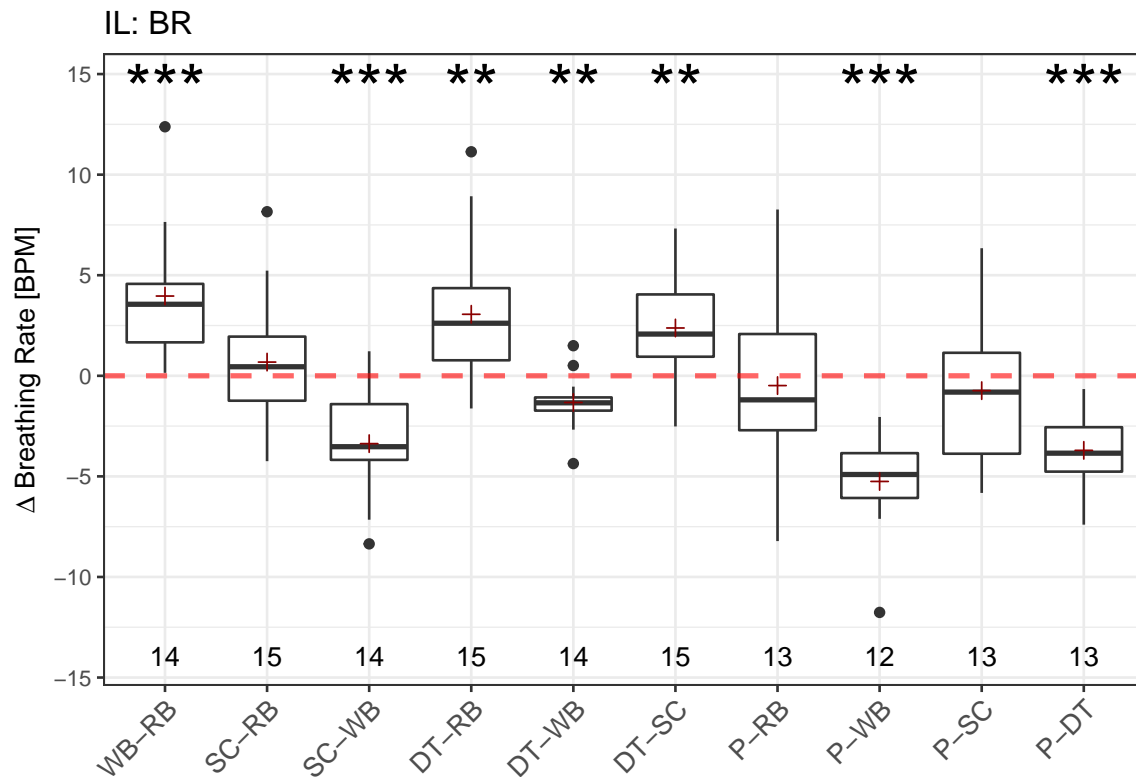
```
## Writing Baseline - Resting Baseline
## t-test p = 5e-04 < 0.001  ***
##
## Stress Condition - Resting Baseline
## t-test p = 0.4283 > 0.05
##
## StressCondition - Writing Baseline
## t-test p = 4e-04 < 0.001  ***
##
## Dual Task - Resting Baseline
## t-test p = 0.0063 < 0.01  **
##
## Dual Task - Writing Baseline
## t-test p = 0.0029 < 0.01  **
##
## Dual Task - Stress Condition
## t-test p = 0.0065 < 0.01  **
##
## Presentation - Resting Baseline
## t-test p = 0.7026 > 0.05
##
## Presentation - Writing Baseline
## t-test p = 0 < 0.001  ***
##
## Presentation - Stress Condition
```

```
## t-test p = 0.4772 > 0.05
##
## Presentation - Dual Task
## t-test p = 0 < 0.001  ***
```

```
## IL has LESS than 7 subjects for D.EDA. Cannot continue with test.
## -----
```

IL: ln(N.EDA)
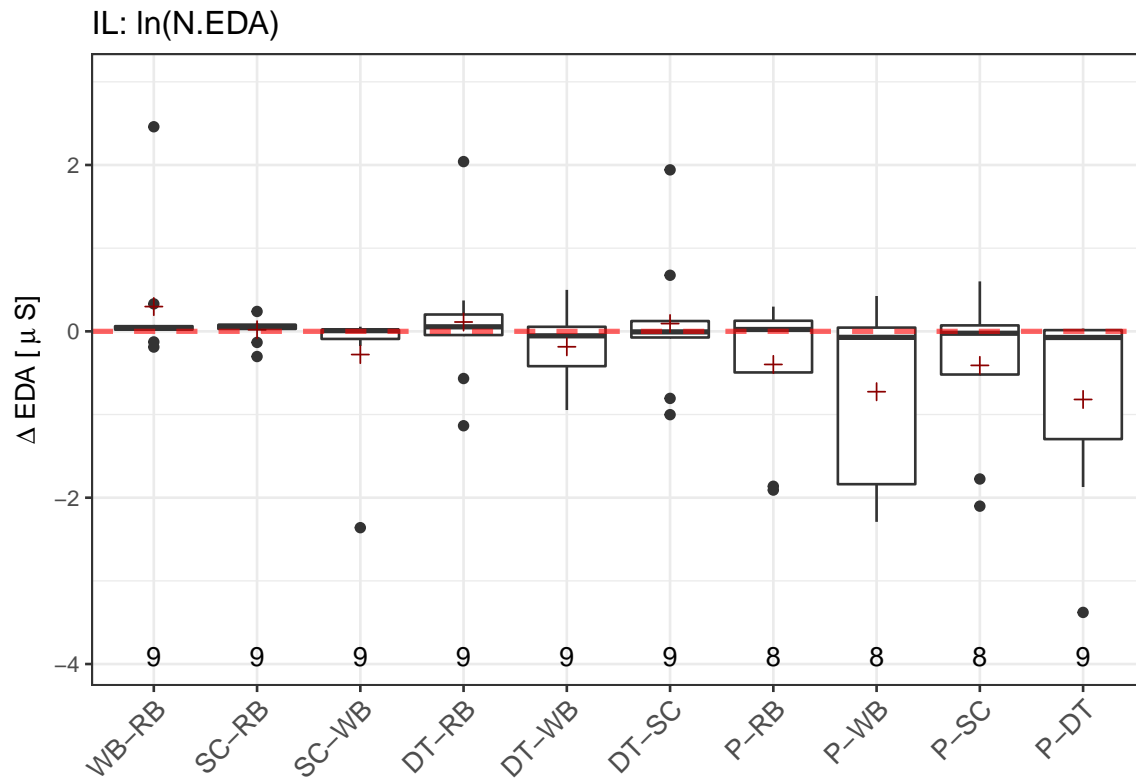

```
## Writing Baseline - Resting Baseline
## Transformed t-test p = 0.3093 > 0.05
##
## Stress Condition - Resting Baseline
## Transformed t-test p = 0.7217 > 0.05
##
## StressCondition - Writing Baseline
## Transformed t-test p = 0.3168 > 0.05
##
## Dual Task - Resting Baseline
## Transformed t-test p = 0.7041 > 0.05
##
## Dual Task - Writing Baseline
## Transformed t-test p = 0.2795 > 0.05
##
## Dual Task - Stress Condition
## Transformed t-test p = 0.7513 > 0.05
##
## Presentation - Resting Baseline
## Transformed t-test p = 0.2626 > 0.05
##
## Presentation - Writing Baseline
## Transformed t-test p = 0.1132 > 0.05
##
## Presentation - Stress Condition
```

```
## Transformed t-test p = 0.2721 > 0.05
##
## Presentation - Dual Task
## Transformed t-test p = 0.0712 > 0.05
```

```
## IL has LESS than 7 subjects for D.HR. Cannot continue with test.
## -----
```
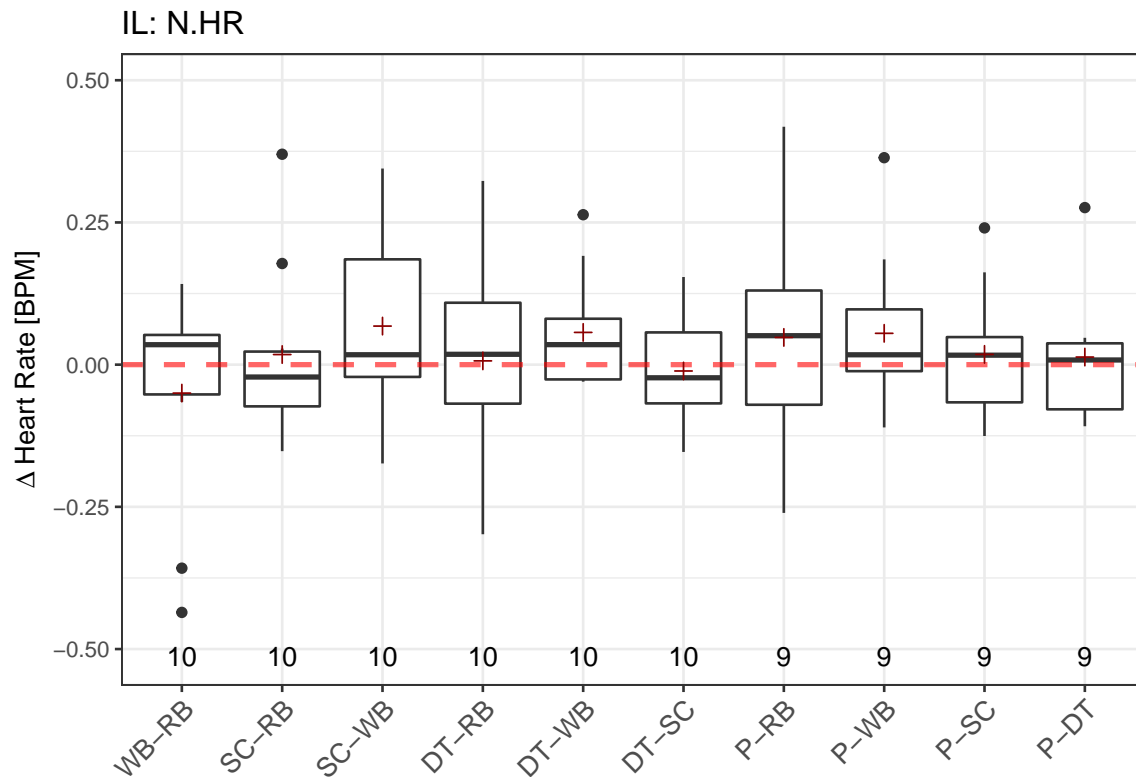
IL: N.HR

```
## Writing Baseline - Resting Baseline
## Wilcoxon p = 1 > 0.05
##
## Stress Condition - Resting Baseline
## Wilcoxon p = 0.7695 > 0.05
##
## StressCondition - Writing Baseline
## Wilcoxon p = 0.4316 > 0.05
##
## Dual Task - Resting Baseline
## Wilcoxon p = 0.625 > 0.05
##
## Dual Task - Writing Baseline
## Wilcoxon p = 0.084 > 0.05
##
## Dual Task - Stress Condition
## Wilcoxon p = 0.8457 > 0.05
##
## Presentation - Resting Baseline
## Wilcoxon p = 0.6523 > 0.05
##
## Presentation - Writing Baseline
## Wilcoxon p = 0.3594 > 0.05
##
## Presentation - Stress Condition
```

```
## Wilcoxon p = 0.9102 > 0.05
##
## Presentation - Dual Task
## Wilcoxon p = 1 > 0.05
```

Batch-High (BH)

Sensor Channels per Activity
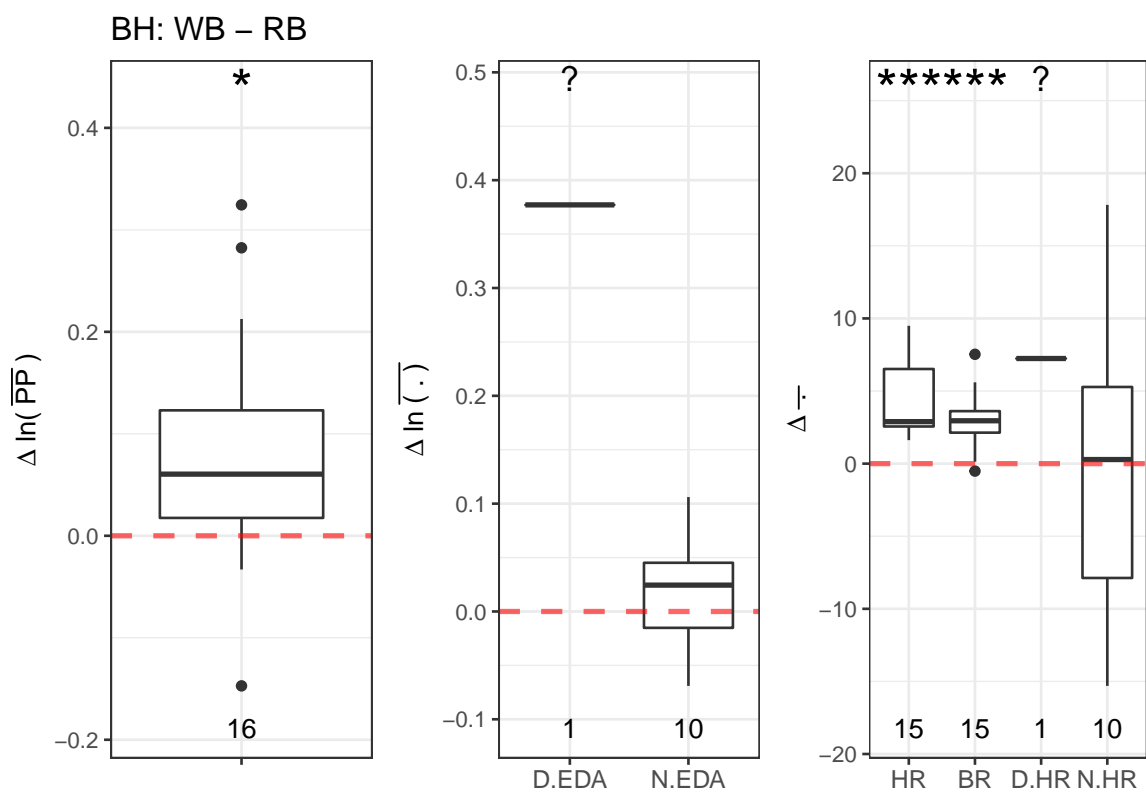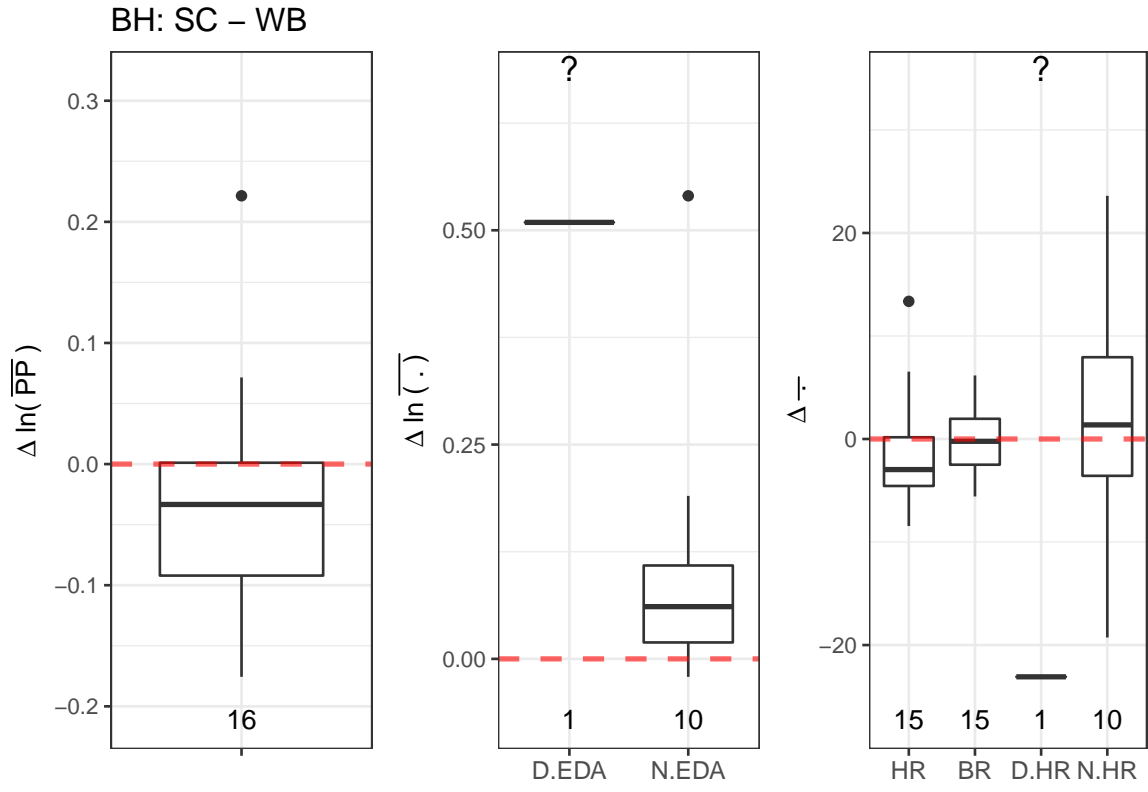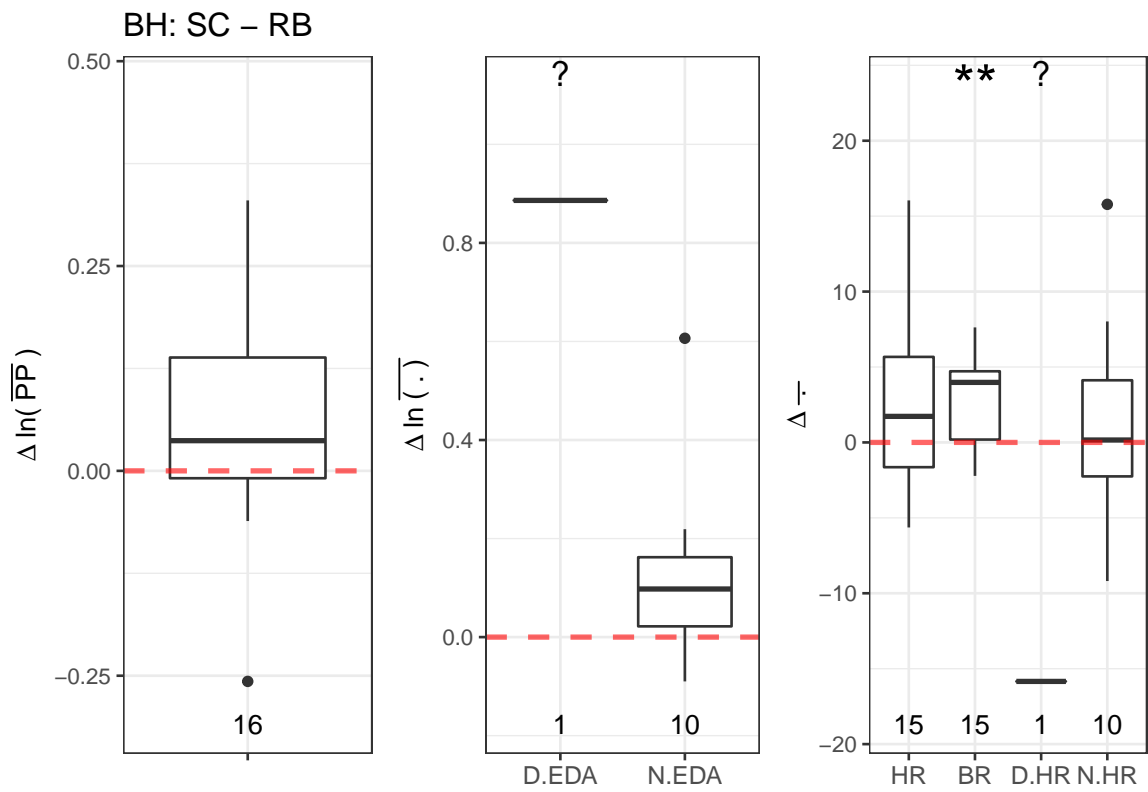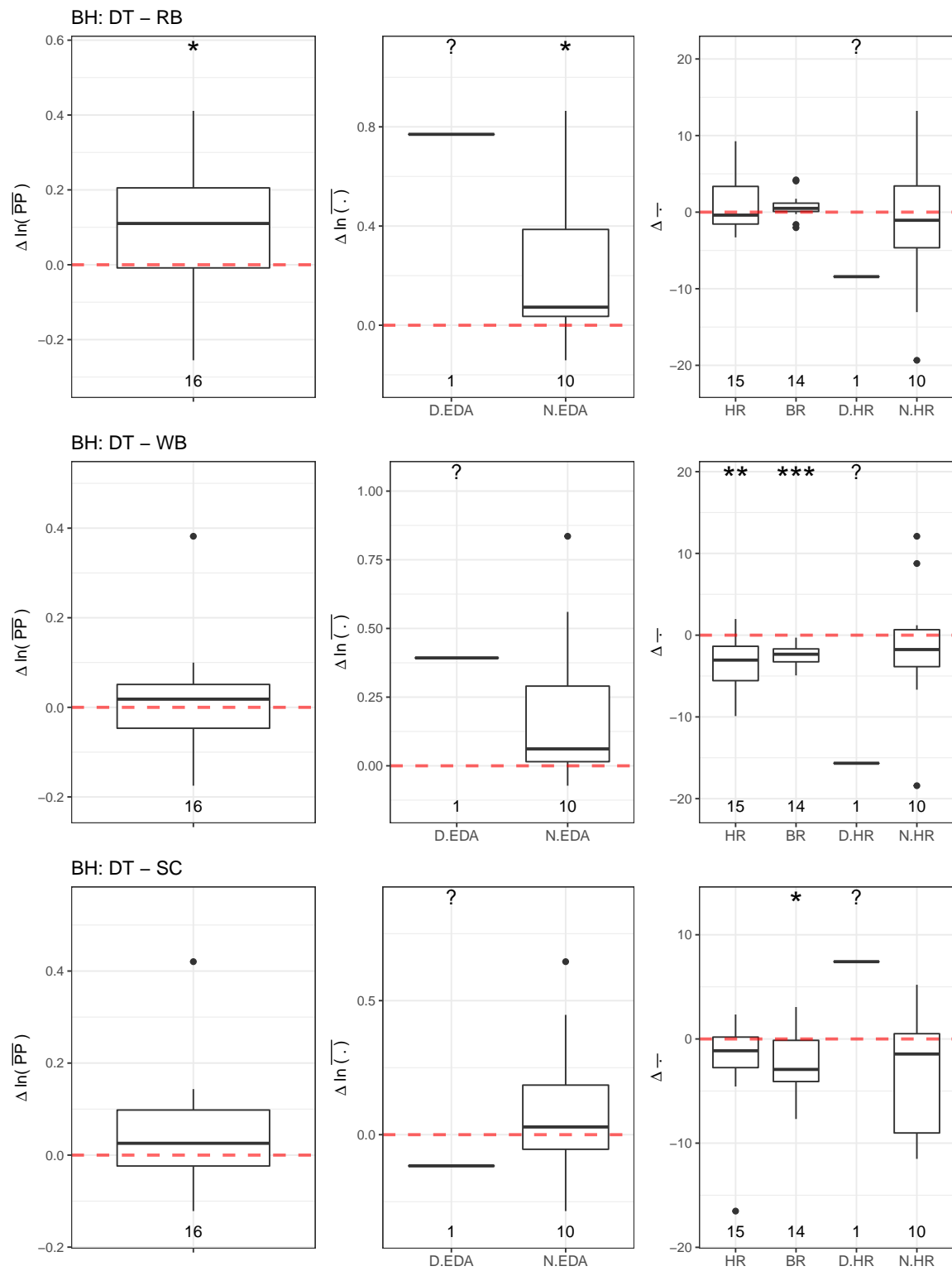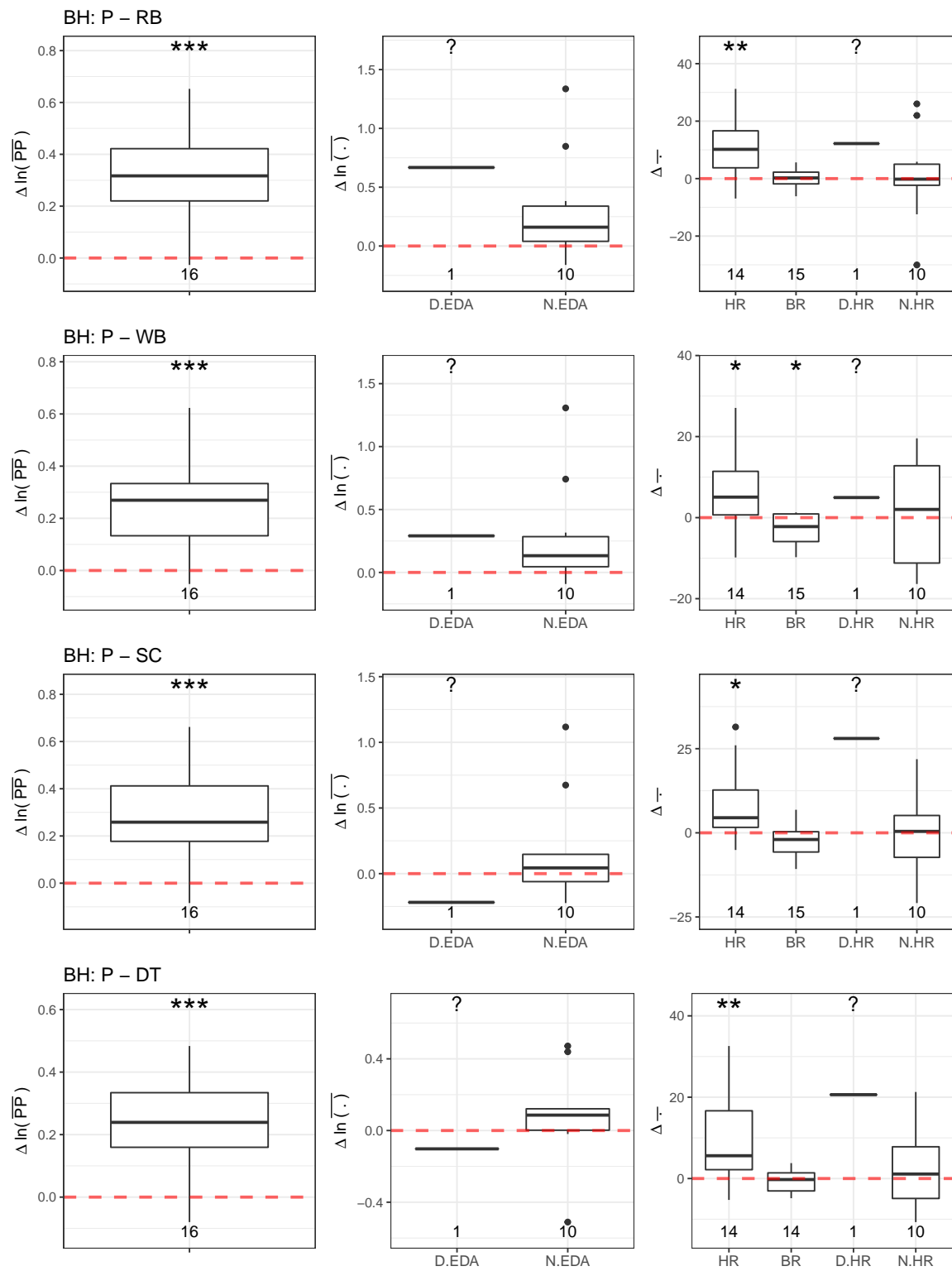
BH: WB – RB

Sensor Channel across Activities

BH: ln(PP)
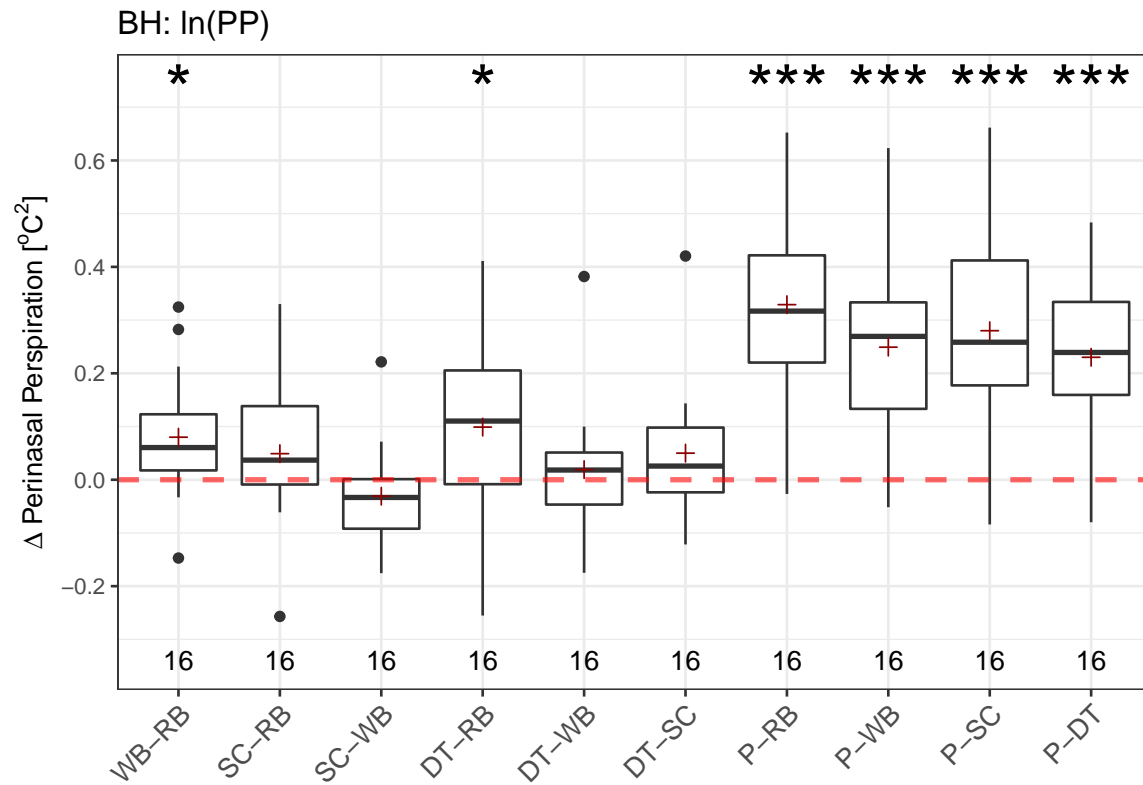
```
## Writing Baseline - Resting Baseline
## Transformed t-test p = 0.0173 < 0.05  *
##
## Stress Condition - Resting Baseline
## Transformed t-test p = 0.1505 > 0.05
##
## StressCondition - Writing Baseline
## Transformed t-test p = 0.1982 > 0.05
##
## Dual Task - Resting Baseline
## Transformed t-test p = 0.0257 < 0.05  *
##
## Dual Task - Writing Baseline
## Transformed t-test p = 0.5396 > 0.05
##
## Dual Task - Stress Condition
## Transformed t-test p = 0.1253 > 0.05
##
## Presentation - Resting Baseline
## Transformed t-test p = 0 < 0.001  ***
##
## Presentation - Writing Baseline
## Transformed t-test p = 1e-04 < 0.001  ***
```

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```
## 
## Presentation - Stress Condition
## Transformed t-test p = 0 < 0.001   ***
## 
## Presentation - Dual Task
## Transformed t-test p = 0 < 0.001   ***
```

BH: HR
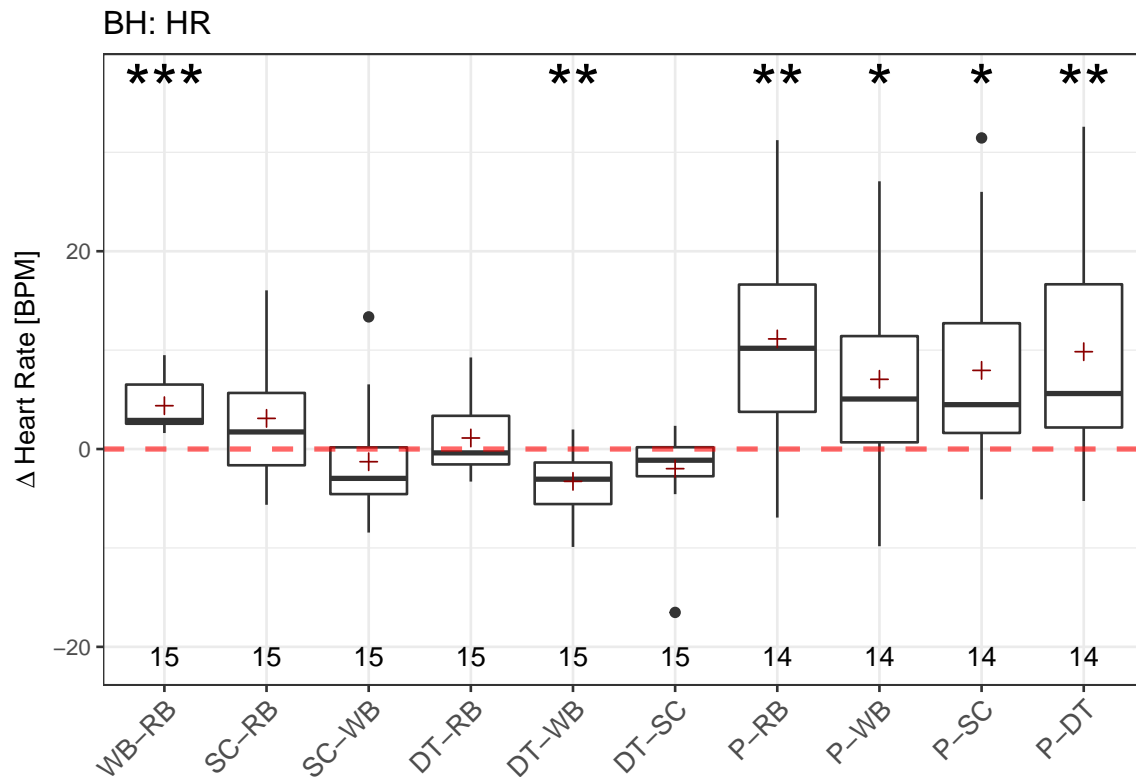

```
## Writing Baseline - Resting Baseline
## t-test p = 0 < 0.001   ***
##
## Stress Condition - Resting Baseline
## t-test p = 0.0677 > 0.05
##
## StressCondition - Writing Baseline
## t-test p = 0.3915 > 0.05
##
## Dual Task - Resting Baseline
## t-test p = 0.2819 > 0.05
##
## Dual Task - Writing Baseline
## t-test p = 0.0013 < 0.01   **
##
## Dual Task - Stress Condition
## t-test p = 0.1068 > 0.05
##
## Presentation - Resting Baseline
## t-test p = 0.0048 < 0.01   **
##
## Presentation - Writing Baseline
## t-test p = 0.0414 < 0.05   *
##
## Presentation - Stress Condition
```

```
## t-test p = 0.0174 < 0.05  *
##
## Presentation - Dual Task
## t-test p = 0.0088 < 0.01  **
```
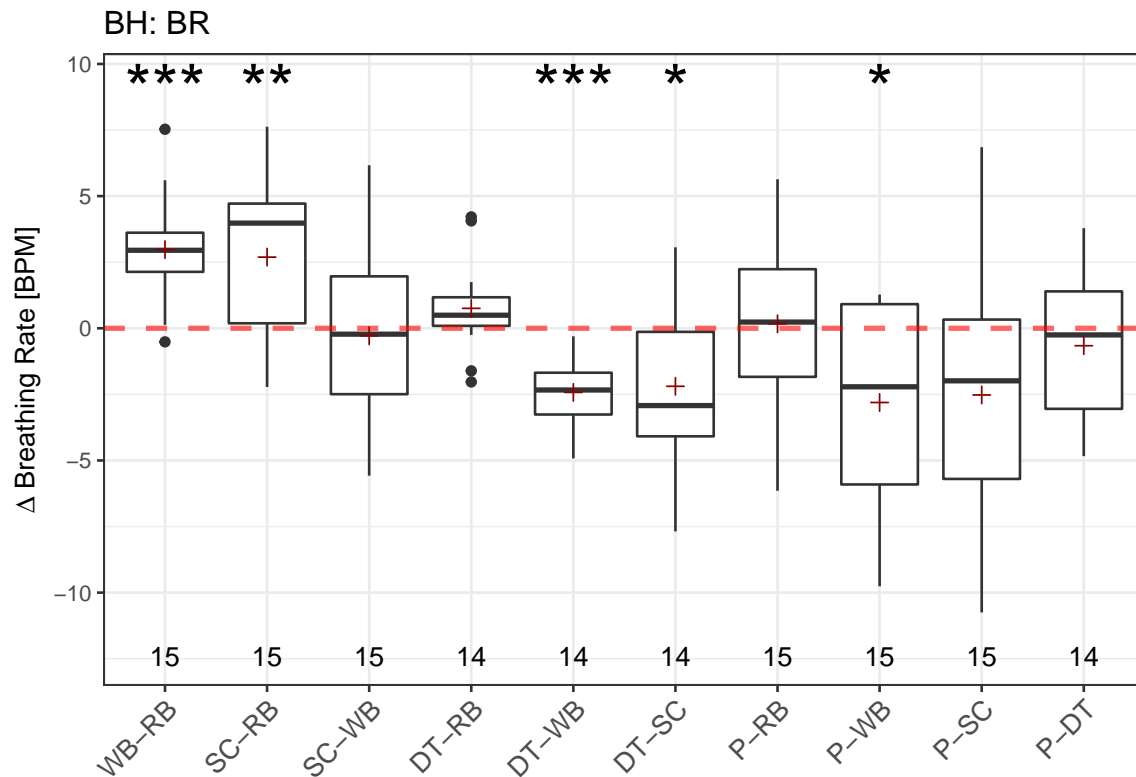
BH: BR

```
## Writing Baseline - Resting Baseline
## t-test p = 0 < 0.001   ***
##
## Stress Condition - Resting Baseline
## t-test p = 0.0061 < 0.01   **
##
## StressCondition - Writing Baseline
## t-test p = 0.7466 > 0.05
##
## Dual Task - Resting Baseline
## t-test p = 0.1299 > 0.05
##
## Dual Task - Writing Baseline
## t-test p = 0 < 0.001   ***
##
## Dual Task - Stress Condition
## t-test p = 0.0223 < 0.05   *
##
## Presentation - Resting Baseline
## t-test p = 0.8464 > 0.05
##
## Presentation - Writing Baseline
## t-test p = 0.0134 < 0.05   *
##
## Presentation - Stress Condition
```

```
## t-test p = 0.0513 > 0.05
##
## Presentation - Dual Task
## t-test p = 0.4077 > 0.05
```

```
## BH has LESS than 7 subjects for D.EDA. Cannot continue with test.
## -----
```

BH: ln(N.EDA)

```
## Writing Baseline - Resting Baseline
## Transformed t-test p = 0.2534 > 0.05
##
## Stress Condition - Resting Baseline
## Transformed t-test p = 0.0609 > 0.05
##
## StressCondition - Writing Baseline
## Transformed t-test p = 0.0622 > 0.05
##
## Dual Task - Resting Baseline
## Transformed t-test p = 0.0463 < 0.05  *
##
## Dual Task - Writing Baseline
## Transformed t-test p = 0.0542 > 0.05
##
## Dual Task - Stress Condition
## Transformed t-test p = 0.3059 > 0.05
##
## Presentation - Resting Baseline
## Transformed t-test p = 0.062 > 0.05
##
## Presentation - Writing Baseline
## Transformed t-test p = 0.0625 > 0.05
##
## Presentation - Stress Condition
```

```
## Transformed t-test p = 0.2062 > 0.05
##
## Presentation - Dual Task
## Transformed t-test p = 0.3639 > 0.05
```

```
## BH has LESS than 7 subjects for D.HR. Cannot continue with test.
## -----
```

BH: N.HR


```
## Writing Baseline - Resting Baseline
## t-test p = 0.8962 > 0.05
##
## Stress Condition - Resting Baseline
## t-test p = 0.5287 > 0.05
##
## StressCondition - Writing Baseline
## t-test p = 0.6089 > 0.05
##
## Dual Task - Resting Baseline
## t-test p = 0.5231 > 0.05
##
## Dual Task - Writing Baseline
## t-test p = 0.5861 > 0.05
##
## Dual Task - Stress Condition
## t-test p = 0.0955 > 0.05
##
## Presentation - Resting Baseline
## t-test p = 0.8627 > 0.05
##
## Presentation - Writing Baseline
## t-test p = 0.7565 > 0.05
##
## Presentation - Stress Condition
```

```
## t-test p = 0.8971 > 0.05
##
## Presentation - Dual Task
## t-test p = 0.4014 > 0.05
```

Batch-Low (BL)

Sensor Channels per Activity
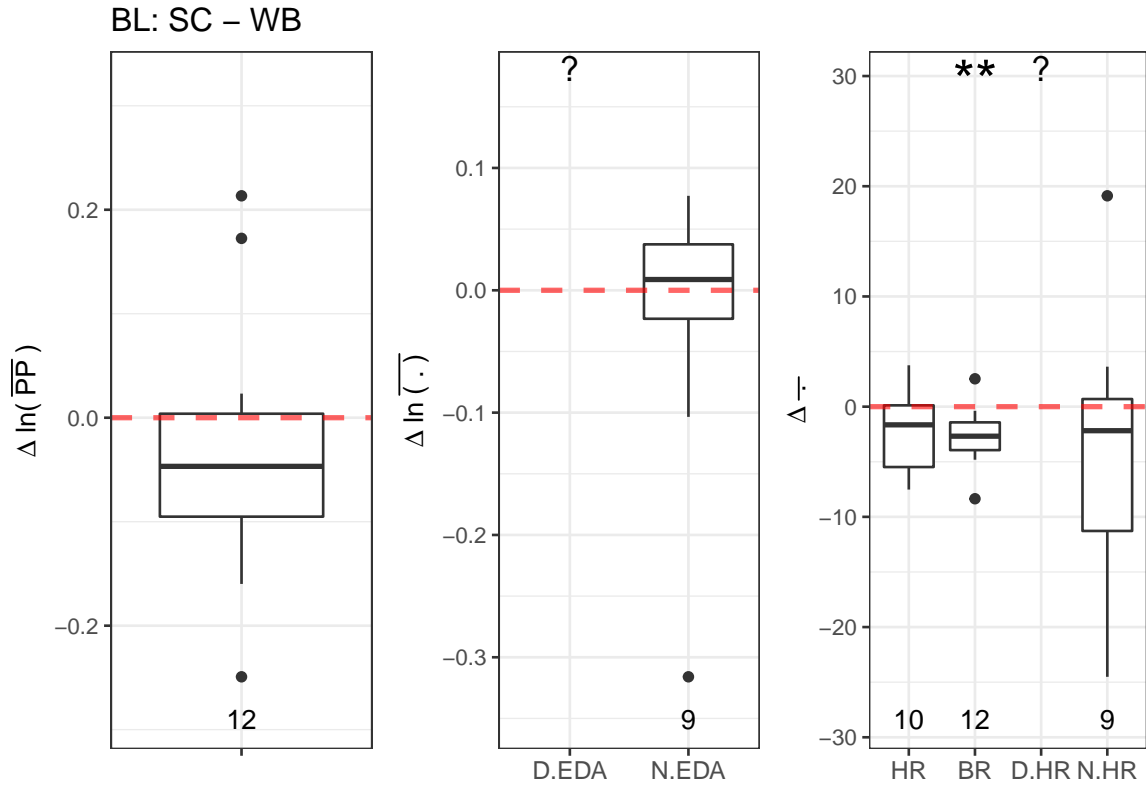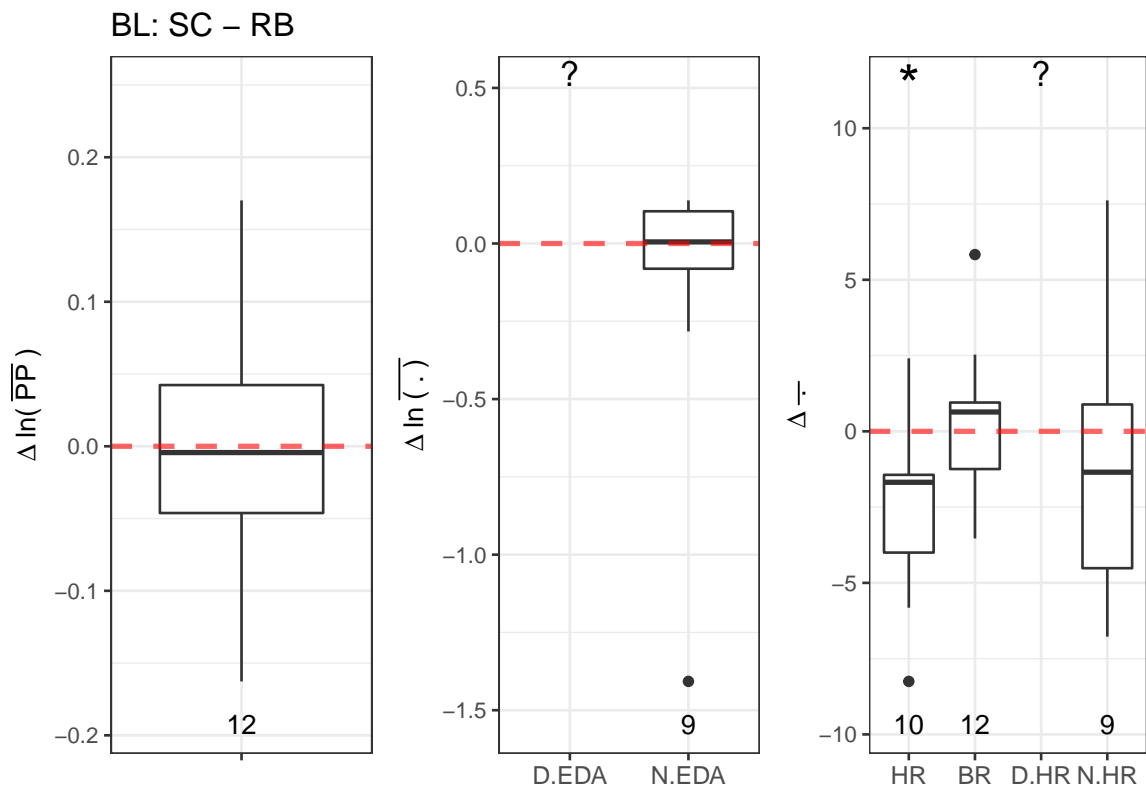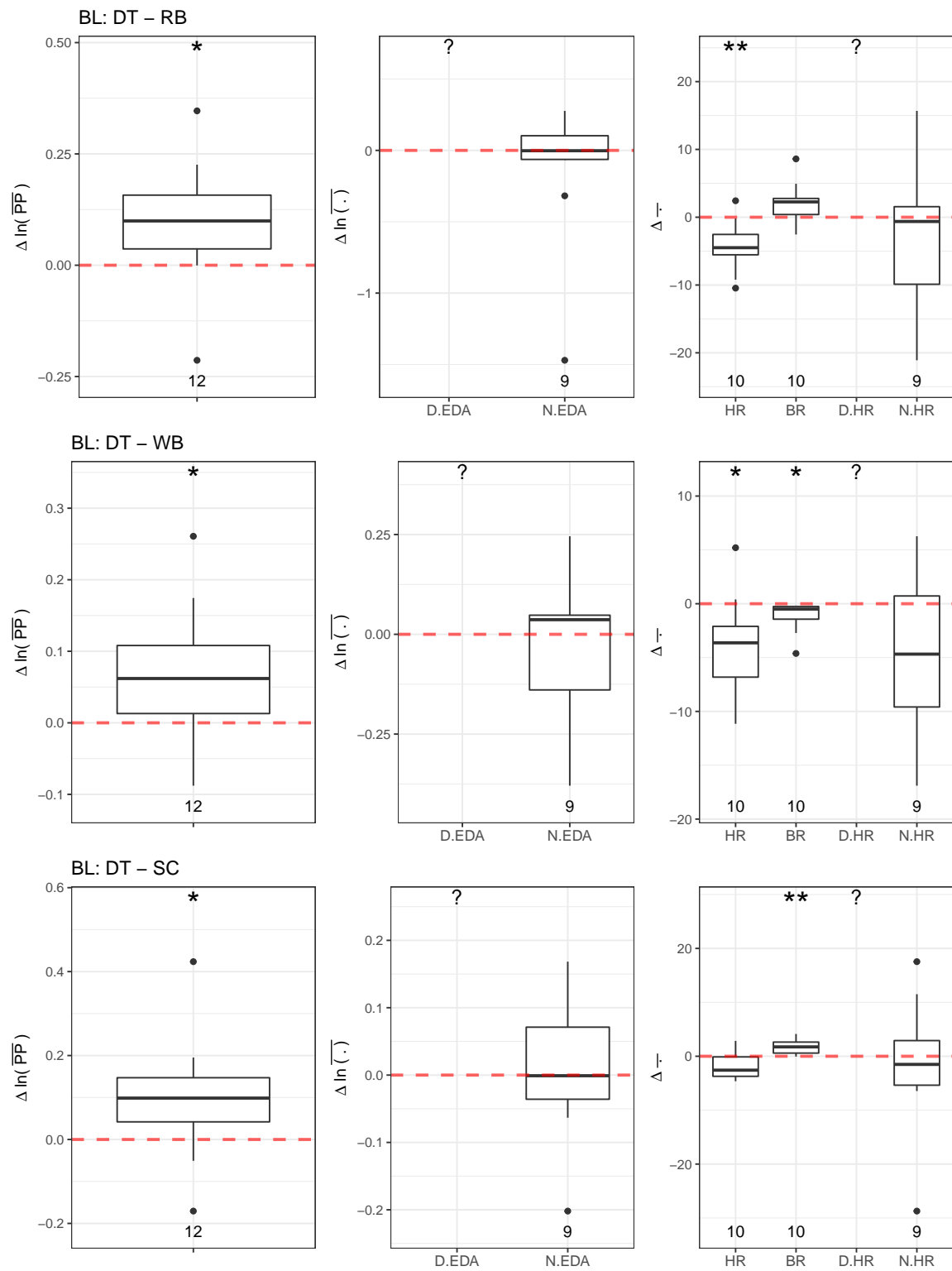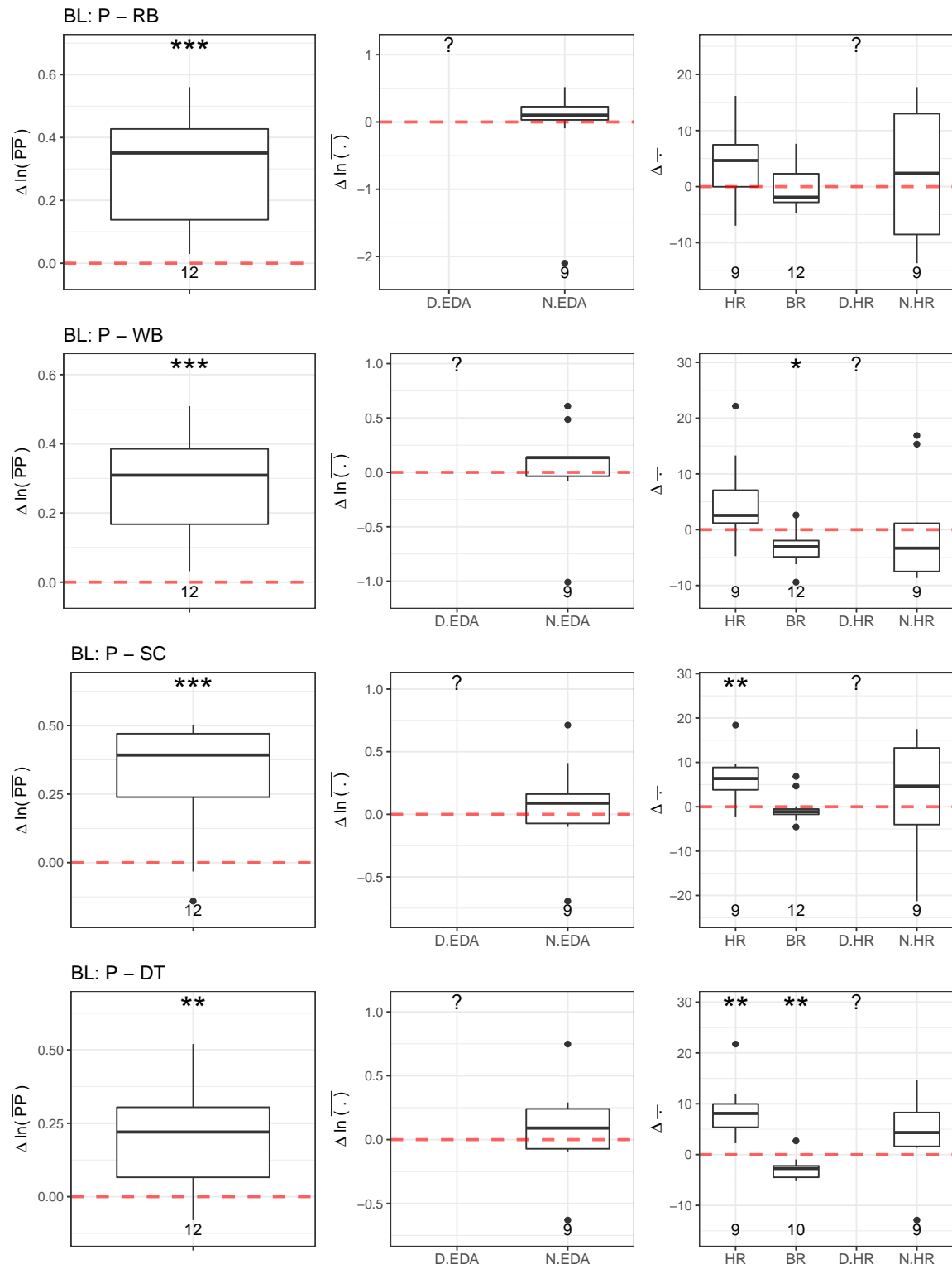
Sensor Channel across Activities

BL: ln(PP)
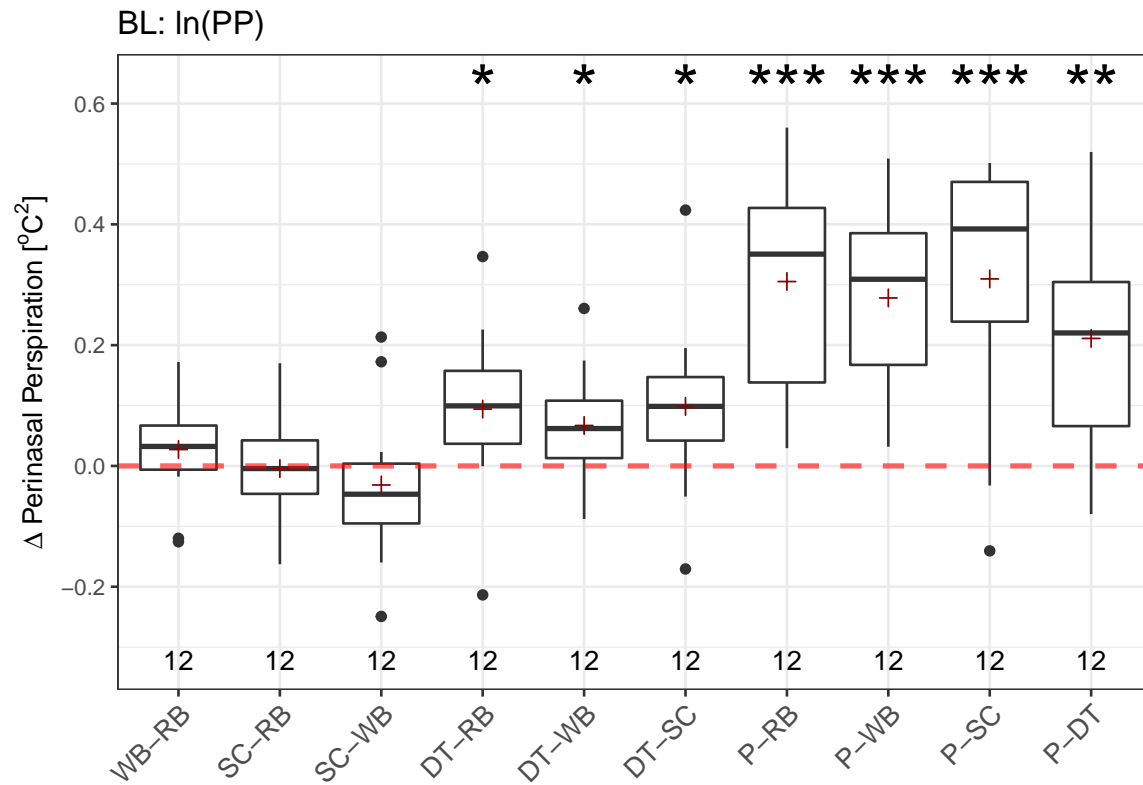

```
## Writing Baseline - Resting Baseline
## Transformed t-test p = 0.3112 > 0.05
##
## Stress Condition - Resting Baseline
## Transformed t-test p = 0.8742 > 0.05
##
## StressCondition - Writing Baseline
## Transformed t-test p = 0.4112 > 0.05
##
## Dual Task - Resting Baseline
## Transformed t-test p = 0.0384 < 0.05   *
##
## Dual Task - Writing Baseline
## Transformed t-test p = 0.031 < 0.05    *
##
## Dual Task - Stress Condition
## Transformed t-test p = 0.0383 < 0.05   *
##
## Presentation - Resting Baseline
## Transformed t-test p = 1e-04 < 0.001   ***
##
## Presentation - Writing Baseline
## Transformed t-test p = 1e-04 < 0.001   ***
```

```
## 
## Presentation - Stress Condition
## Transformed t-test p = 4e-04 < 0.001  ***
## 
## Presentation - Dual Task
## Transformed t-test p = 0.0019 < 0.01  **
```

BL: HR
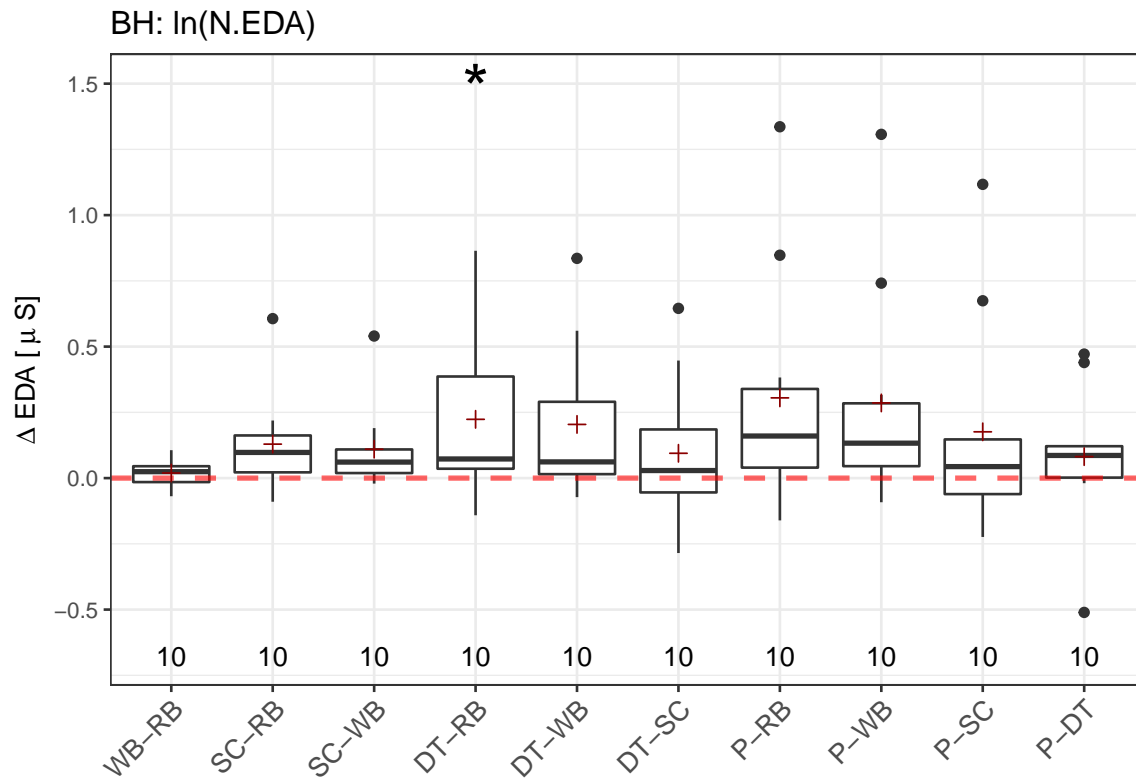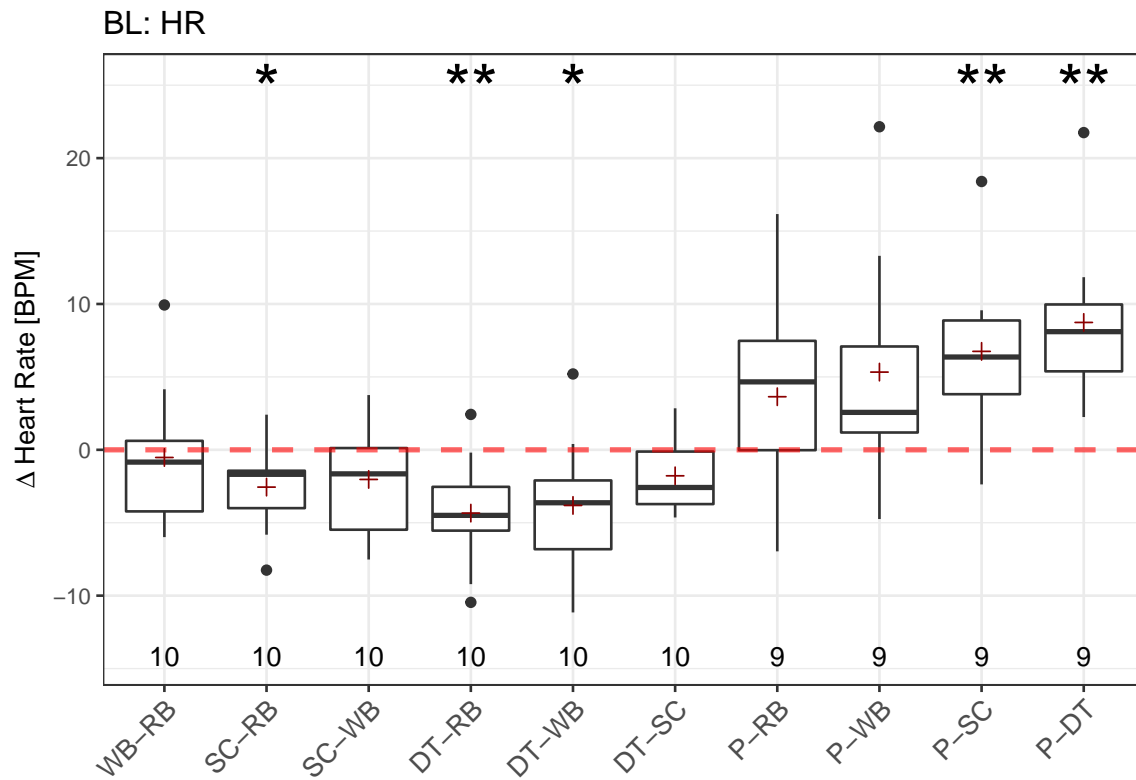
```
## Writing Baseline - Resting Baseline
## t-test p = 0.7388 > 0.05
##
## Stress Condition - Resting Baseline
## t-test p = 0.0232 < 0.05  *
##
## StressCondition - Writing Baseline
## t-test p = 0.1472 > 0.05
##
## Dual Task - Resting Baseline
## t-test p = 0.0059 < 0.01  **
##
## Dual Task - Writing Baseline
## t-test p = 0.0304 < 0.05  *
##
## Dual Task - Stress Condition
## t-test p = 0.059 > 0.05
##
## Presentation - Resting Baseline
## t-test p = 0.152 > 0.05
##
## Presentation - Writing Baseline
## t-test p = 0.0882 > 0.05
##
## Presentation - Stress Condition
```
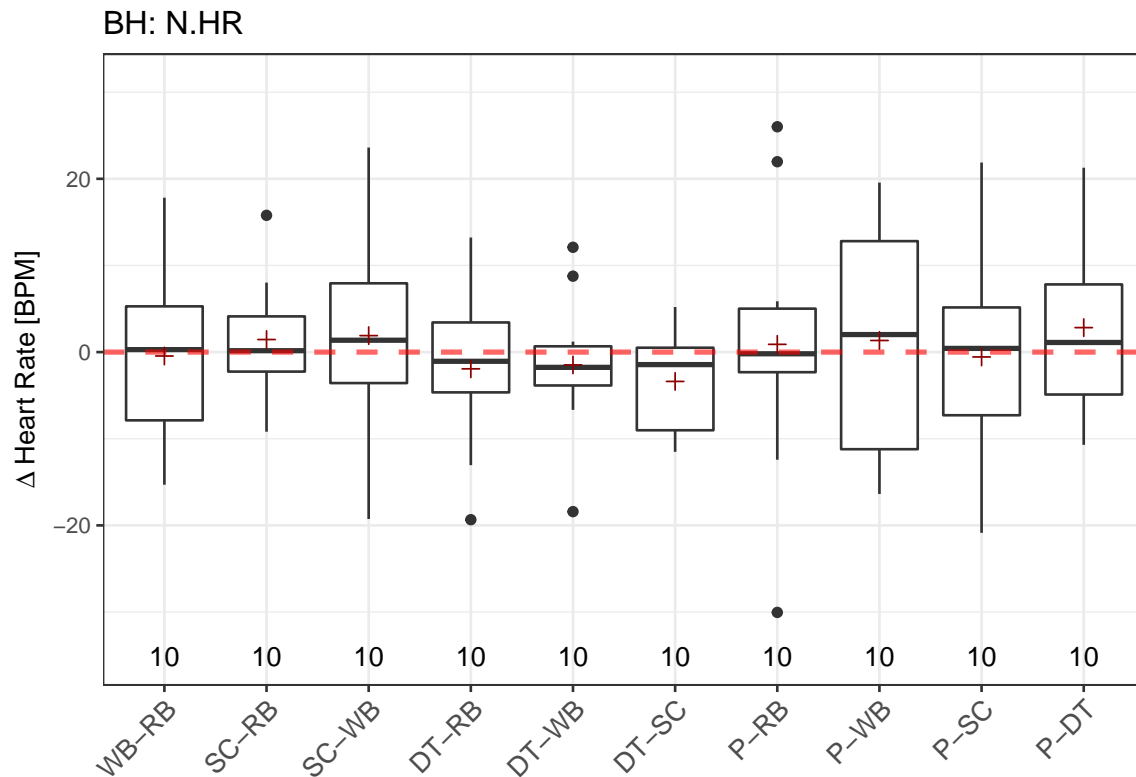
```
## t-test p = 0.0081 < 0.01   **
##
## Presentation - Dual Task
## t-test p = 0.0017 < 0.01   **
```

BL: BR
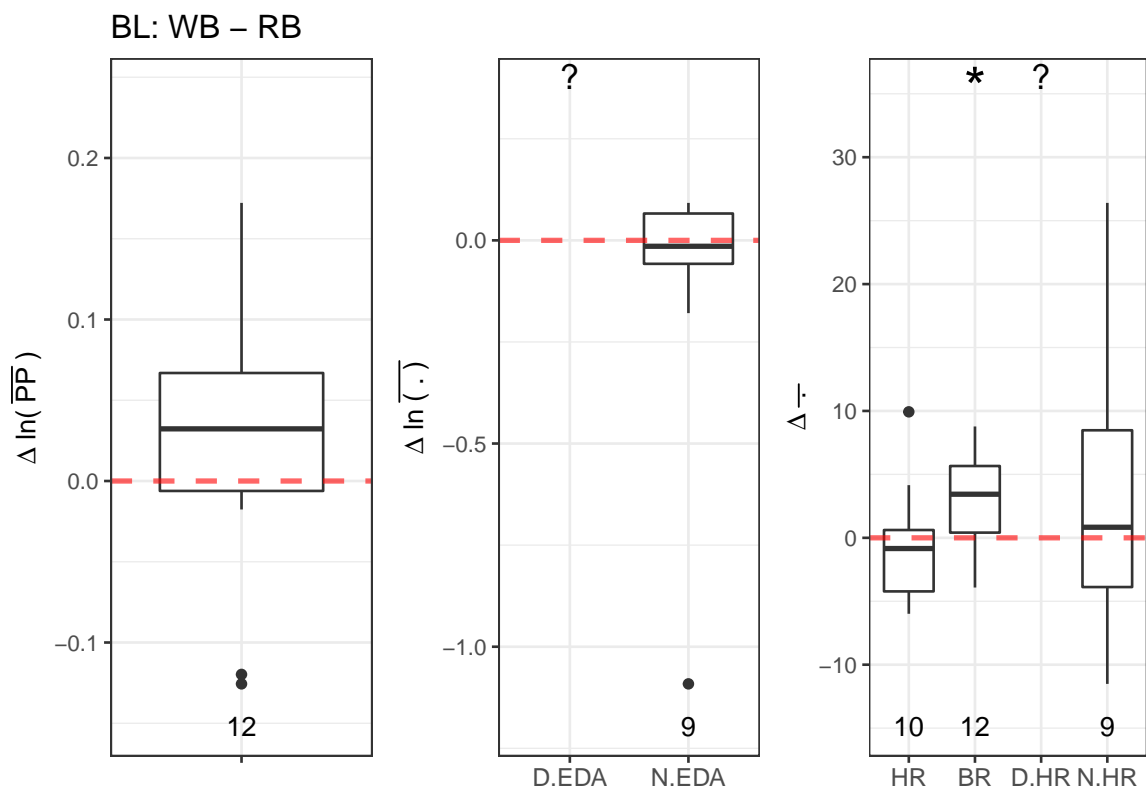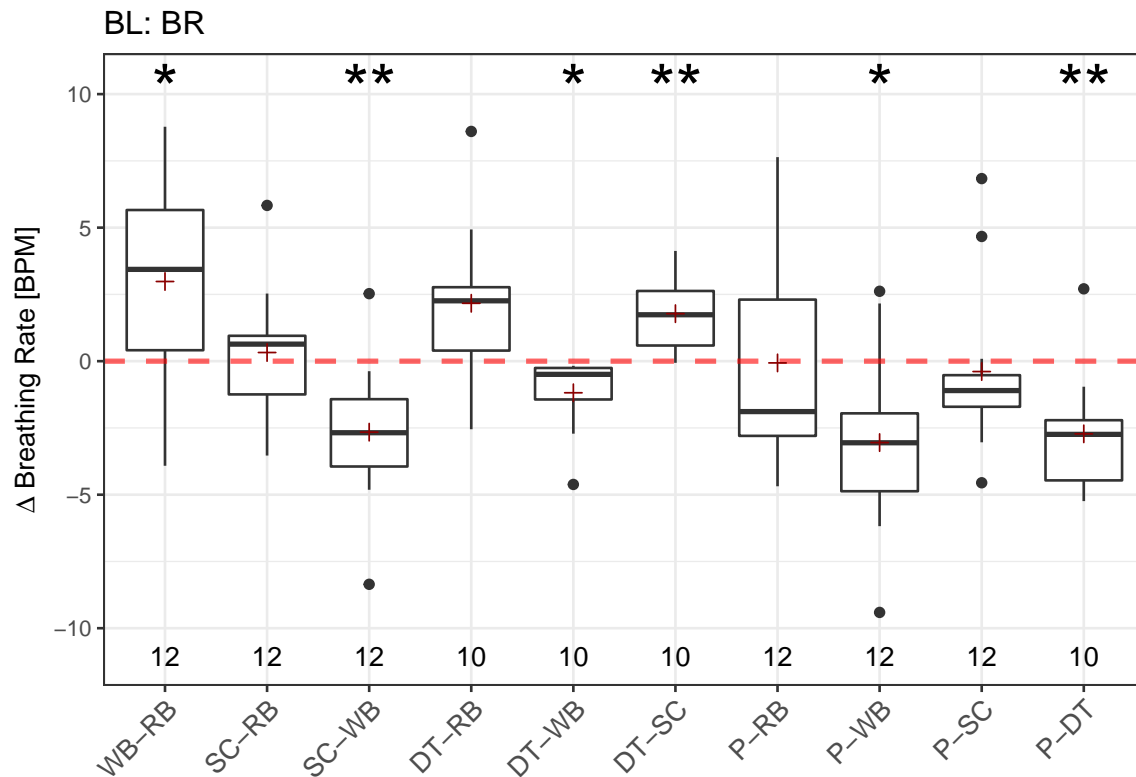
```
## Writing Baseline - Resting Baseline
## t-test p = 0.0144 < 0.05  *
##
## Stress Condition - Resting Baseline
## t-test p = 0.6486 > 0.05
##
## StressCondition - Writing Baseline
## t-test p = 0.0059 < 0.01  **
##
## Dual Task - Resting Baseline
## t-test p = 0.0517 > 0.05
##
## Dual Task - Writing Baseline
## t-test p = 0.0295 < 0.05  *
##
## Dual Task - Stress Condition
## t-test p = 0.0039 < 0.01  **
##
## Presentation - Resting Baseline
## t-test p = 0.9565 > 0.05
##
## Presentation - Writing Baseline
## t-test p = 0.0101 < 0.05  *
##
## Presentation - Stress Condition
```

```
## t-test p = 0.6759 > 0.05
##
## Presentation - Dual Task
## t-test p = 0.0052 < 0.01  **
```

```
## BL has LESS than 7 subjects for D.EDA. Cannot continue with test.
## -----
```

BL: ln(N.EDA)
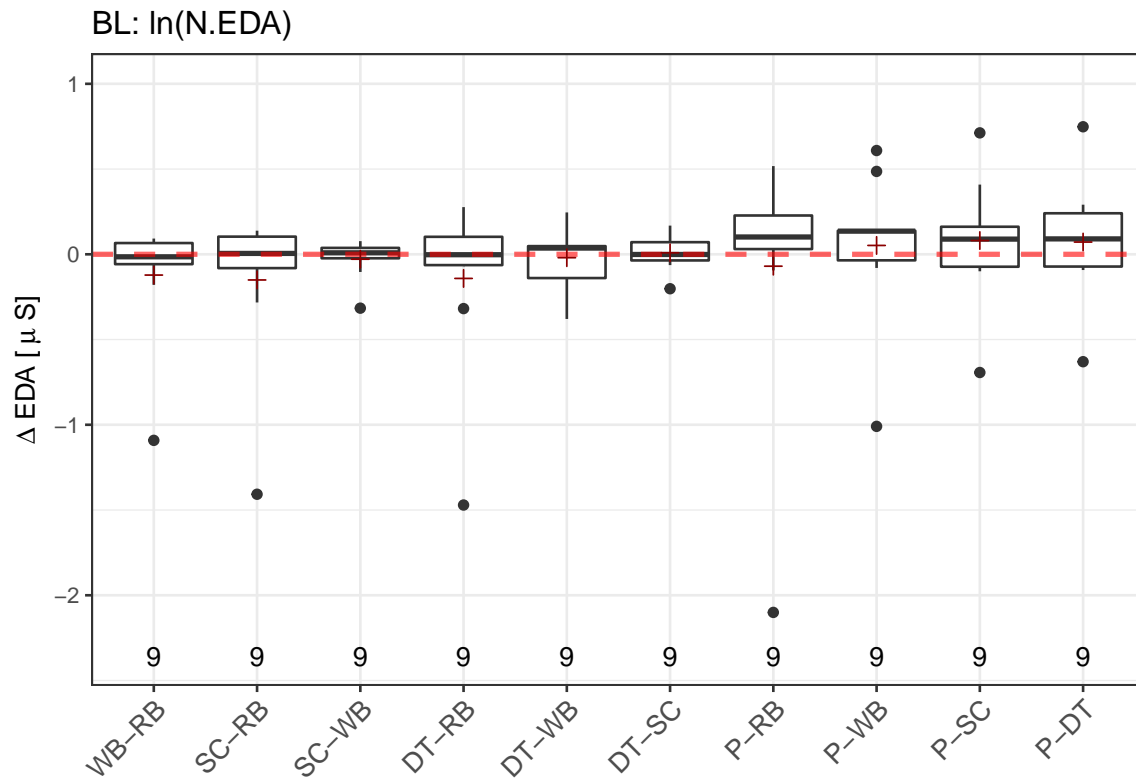

```
## Writing Baseline - Resting Baseline
## Transformed t-test p = 0.3569 > 0.05
##
## Stress Condition - Resting Baseline
## Transformed t-test p = 0.3834 > 0.05
##
## StressCondition - Writing Baseline
## Transformed t-test p = 0.4905 > 0.05
##
## Dual Task - Resting Baseline
## Transformed t-test p = 0.443 > 0.05
##
## Dual Task - Writing Baseline
## Transformed t-test p = 0.7508 > 0.05
##
## Dual Task - Stress Condition
## Transformed t-test p = 0.8093 > 0.05
##
## Presentation - Resting Baseline
## Transformed t-test p = 0.7966 > 0.05
##
## Presentation - Writing Baseline
## Transformed t-test p = 0.7417 > 0.05
##
## Presentation - Stress Condition
```

```
## Transformed t-test p = 0.5446 > 0.05
##
## Presentation - Dual Task
## Transformed t-test p = 0.5744 > 0.05
```

```
## BL has LESS than 7 subjects for D.HR. Cannot continue with test.
## -----
```

BL: ln(N.HR)
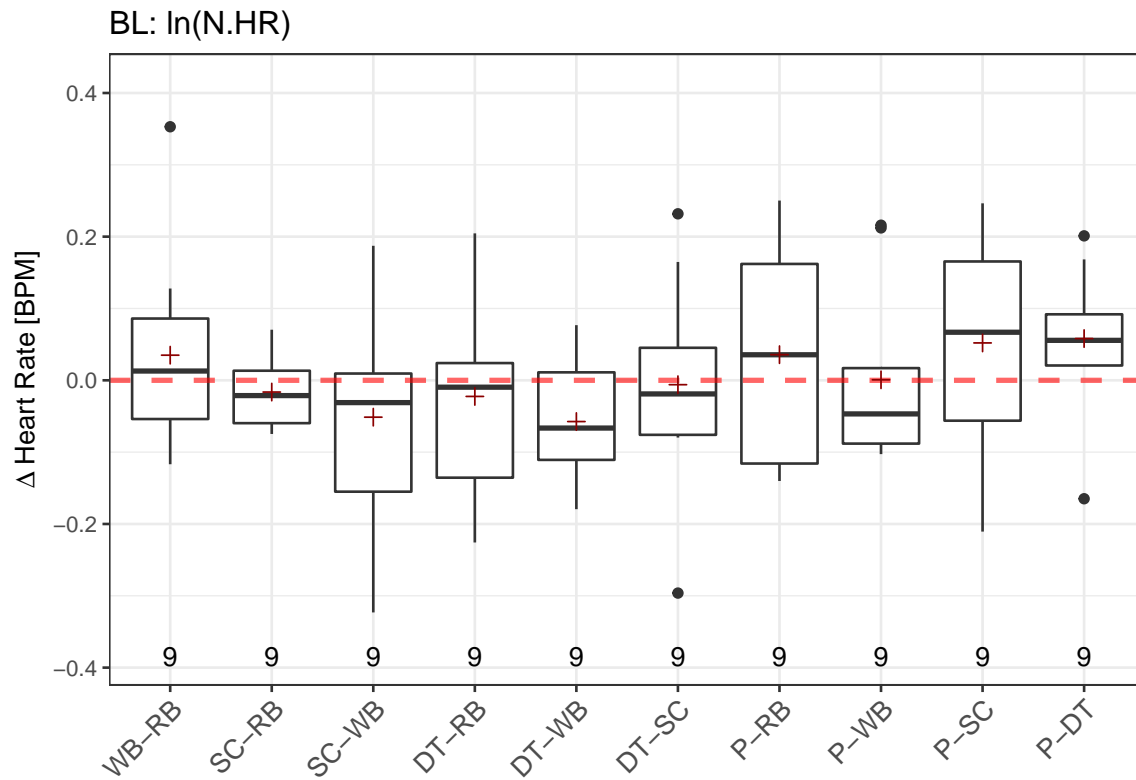
```
## Writing Baseline - Resting Baseline
## Transformed t-test p = 0.4807 > 0.05
##
## Stress Condition - Resting Baseline
## Transformed t-test p = 0.3497 > 0.05
##
## StressCondition - Writing Baseline
## Transformed t-test p = 0.3222 > 0.05
##
## Dual Task - Resting Baseline
## Transformed t-test p = 0.6637 > 0.05
##
## Dual Task - Writing Baseline
## Transformed t-test p = 0.0929 > 0.05
##
## Dual Task - Stress Condition
## Transformed t-test p = 0.907 > 0.05
##
## Presentation - Resting Baseline
## Transformed t-test p = 0.4979 > 0.05
##
## Presentation - Writing Baseline
## Transformed t-test p = 0.9871 > 0.05
##
## Presentation - Stress Condition
```

```
## Transformed t-test p = 0.3202 > 0.05
##
## Presentation - Dual Task
## Transformed t-test p = 0.1336 > 0.05
```

Across Activities

WB – RB for ln(PP)
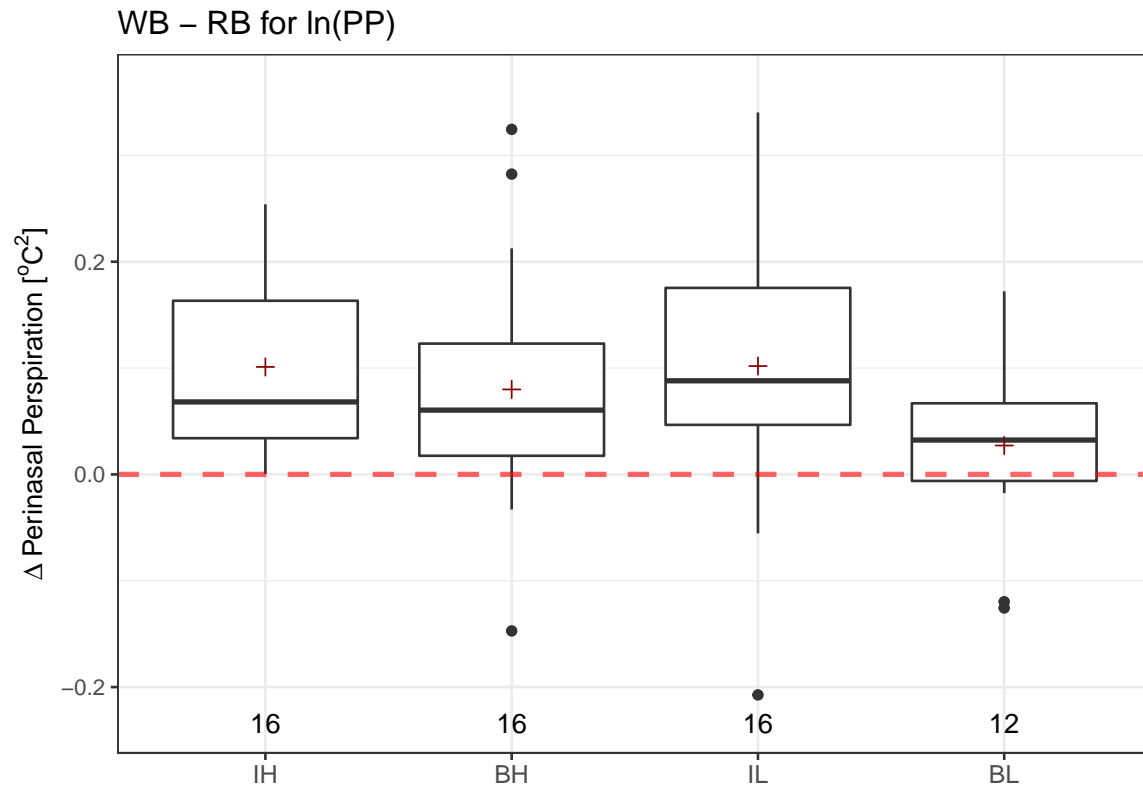

```
## ANOVA:
##           Df Sum Sq Mean Sq F value Pr(>F)
## Condition  3 0.0482 0.01607   1.337  0.272
## Residuals 56 0.6731 0.01202
##
## ---
##
##     Tukey multiple comparisons of means
##     95% family-wise confidence level
##
## Fit: aov(formula = formula(paste(diff, "~ Condition")), data = anova_df)
##
## $Condition
##                diff         lwr        upr      p adj
## BL-BH -0.052727431 -0.16359022 0.05813536 0.5922702
## IH-BH  0.021163957 -0.08147504 0.12380296 0.9472502
## IL-BH  0.021971674 -0.08066732 0.12461067 0.9414989
## IH-BL  0.073891388 -0.03697140 0.18475418 0.3009194
## IL-BL  0.074699105 -0.03616368 0.18556189 0.2916494
## IL-IH  0.000807717 -0.10183128 0.10344672 0.9999967
```

WB – RB for HR
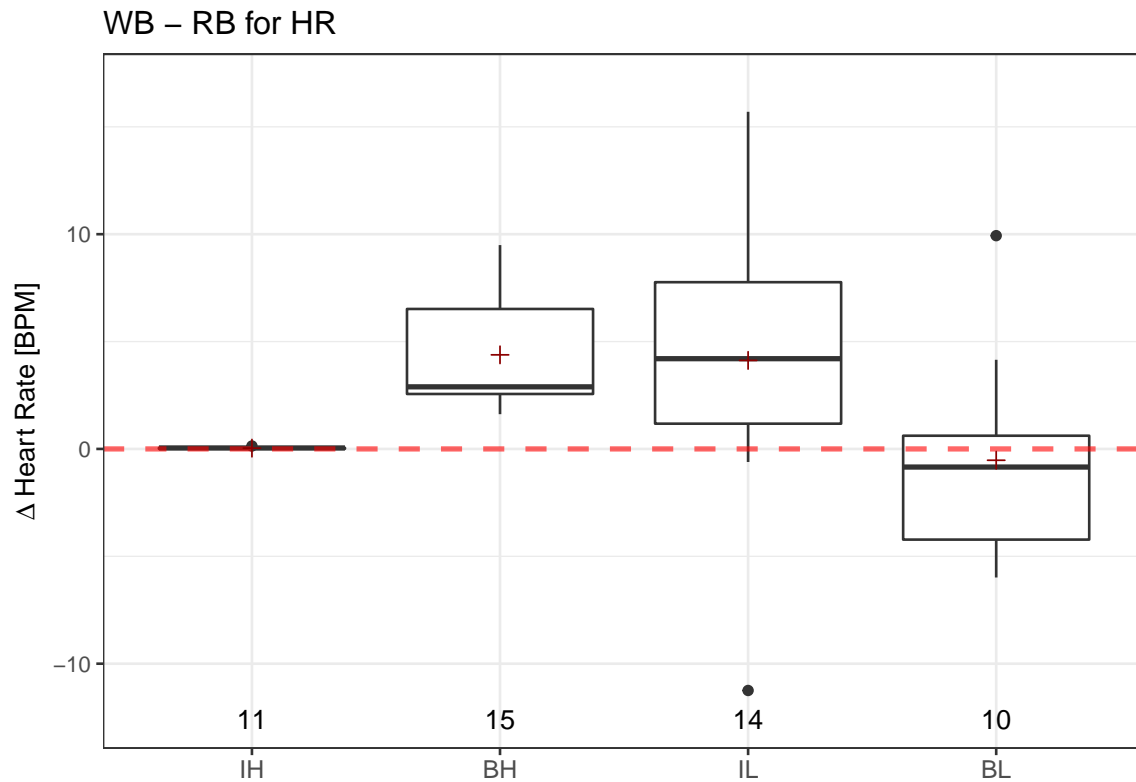
```
## ANOVA:
##             Df Sum Sq Mean Sq F value Pr(>F)
## Condition    3  247.4   82.48   4.553 0.0071 **
## Residuals   46  833.4   18.12
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## ---
##
##     Tukey multiple comparisons of means
##     95% family-wise confidence level
##
## Fit: aov(formula = formula(paste(diff, "~ Condition")), data = anova_df)
##
## $Condition
##               diff          lwr         upr       p adj
## BL-BH -4.9080202 -9.53971251 -0.2763279 0.0340209
## IH-BH -4.3440965 -8.84769879  0.1595057 0.0623114
## IL-BH -0.2590350 -4.47507453  3.9570046 0.9984139
## IH-BL  0.5639237 -4.39318717  5.5210345 0.9901888
## IL-BL  4.6489852 -0.04840811  9.3463786 0.0533428
## IL-IH  4.0850616 -0.48608313  8.6562063 0.0948905
```

WB – RB for BR
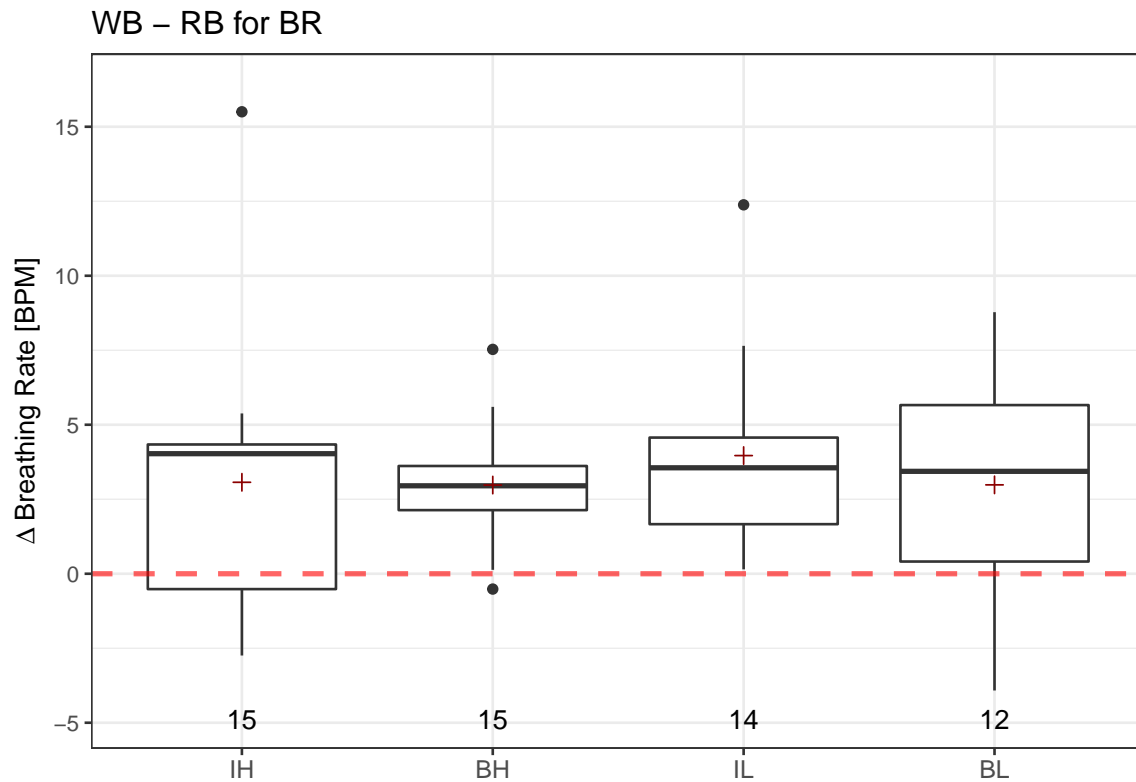
```
## ANOVA:
##             Df Sum Sq Mean Sq F value Pr(>F)
## Condition    3    9.6   3.213   0.274  0.844
## Residuals   52  609.5  11.721
##
## ---
##
##     Tukey multiple comparisons of means
##     95% family-wise confidence level
##
## Fit: aov(formula = formula(paste(diff, "~ Condition")), data = anova_df)
##
## $Condition
##              diff        lwr      upr       p adj
## BL-BH 0.006473186 -3.512700 3.525647 1.0000000
## IH-BH 0.092879124 -3.225029 3.410788 0.9998509
## IL-BH 0.989198128 -2.387439 4.365835 0.8642672
## IH-BL 0.086405938 -3.432767 3.605579 0.9998993
## IL-BL 0.982724942 -2.591872 4.557322 0.8847556
## IL-IH 0.896319004 -2.480318 4.272956 0.8948454
```
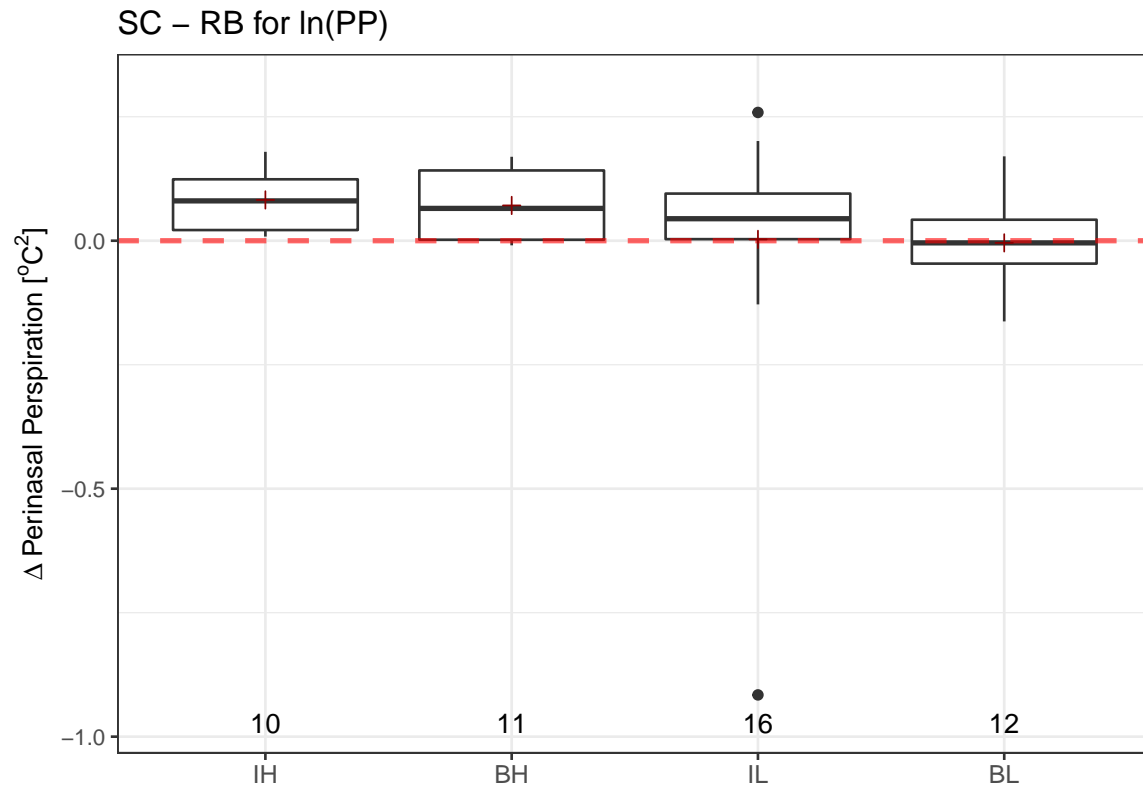
SC – RB for ln(PP)

```
## [1] "Removed 12 subjects who had Stroop scores less than 30."
##
## ---
##   ANOVA:
##             Df Sum Sq Mean Sq F value Pr(>F)
## Condition    3 0.0717 0.02390     0.9  0.448
## Residuals   45 1.1944 0.02654
##
## ---
##
##     Tukey multiple comparisons of means
##     95% family-wise confidence level
##
## Fit: aov(formula = formula(paste(diff, "~ Condition")), data = anova_df)
##
## $Condition
##              diff         lwr         upr      p adj
## BL-BH -0.075478820 -0.25689518 0.10593754 0.6853738
## IH-BH  0.011116132 -0.17877855 0.20101081 0.9986230
## IL-BH -0.068455385 -0.23868105 0.10177028 0.7076679
## IH-BL  0.086594952 -0.09949383 0.27268374 0.6042769
## IL-BL  0.007023435 -0.15894591 0.17299278 0.9994774
## IL-IH -0.079571517 -0.25476832 0.09562528 0.6228117
```
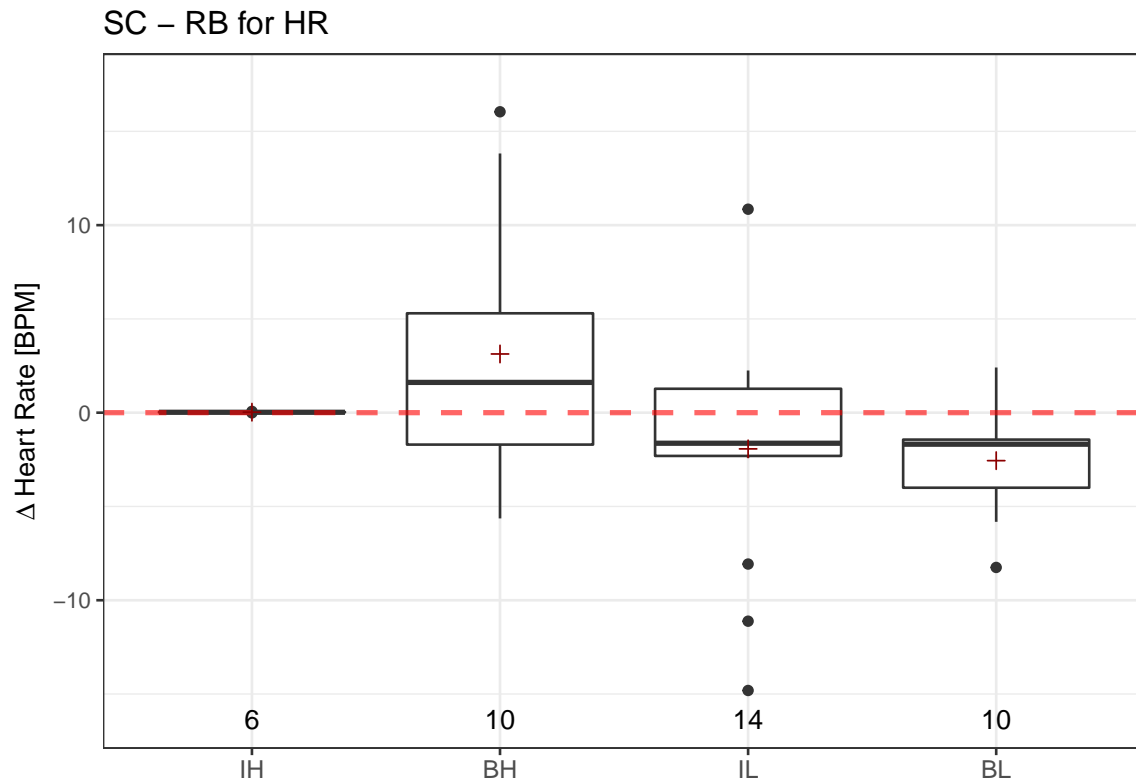
SC – RB for HR


```
## [1] "Removed 12 subjects who had Stroop scores less than 30."
##
## ---
##    ANOVA:
##              Df Sum Sq Mean Sq F value Pr(>F)
## Condition     3  204.4   68.12   2.393 0.0845 .
## Residuals    36 1024.6   28.46
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## ---
##
##     Tukey multiple comparisons of means
##     95% family-wise confidence level
##
## Fit: aov(formula = formula(paste(diff, "~ Condition")), data = anova_df)
##
## $Condition
##              diff        lwr        upr      p adj
## BL-BH -5.6876203 -12.113373  0.7381320 0.0984656
## IH-BH -3.1030319 -10.522852  4.3167878 0.6759273
## IL-BH -5.0598501 -11.008941  0.8892406 0.1191814
## IH-BL  2.5845884  -4.835231 10.0044081 0.7846339
## IL-BL  0.6277702  -5.321320  6.5768609 0.9918553
## IL-IH -1.9568182  -8.967889  5.0542524 0.8753411
```
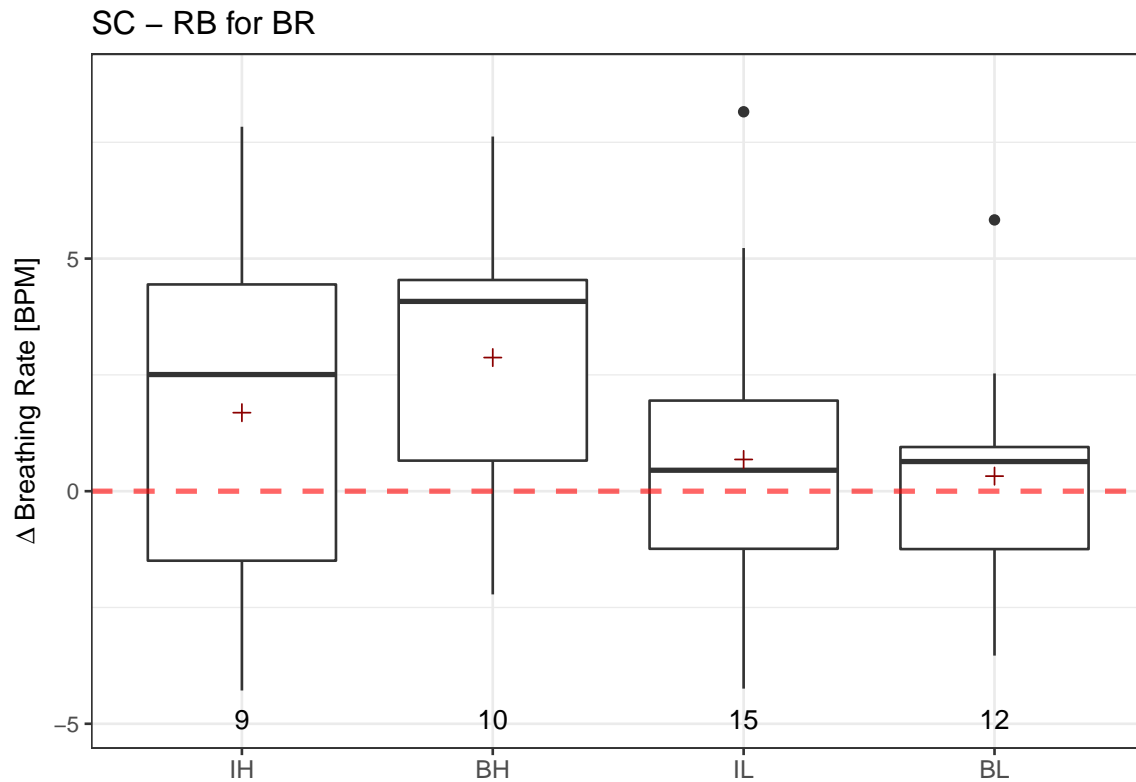
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SC − RB for BR


```
## [1] "Removed 12 subjects who had Stroop scores less than 30."
##
## ---
##    ANOVA:
##              Df Sum Sq Mean Sq F value Pr(>F)
## Condition     3   43.2   14.39   1.435  0.246
## Residuals    42  421.2   10.03
##
## ---
##
##      Tukey multiple comparisons of means
##      95% family-wise confidence level
##
## Fit: aov(formula = formula(paste(diff, "~ Condition")), data = anova_df)
##
## $Condition
##              diff       lwr       upr       p adj
## BL-BH -2.5486249 -6.175665  1.078415 0.2521544
## IH-BH -1.1846675 -5.076796  2.707461 0.8474184
## IL-BH -2.1906250 -5.648872  1.267622 0.3393232
## IH-BL  1.3639574 -2.371376  5.099291 0.7633237
## IL-BL  0.3579999 -2.922781  3.638781 0.9912137
## IL-IH -1.0059575 -4.577619  2.565704 0.8746984
```

DT – RB for ln(PP)
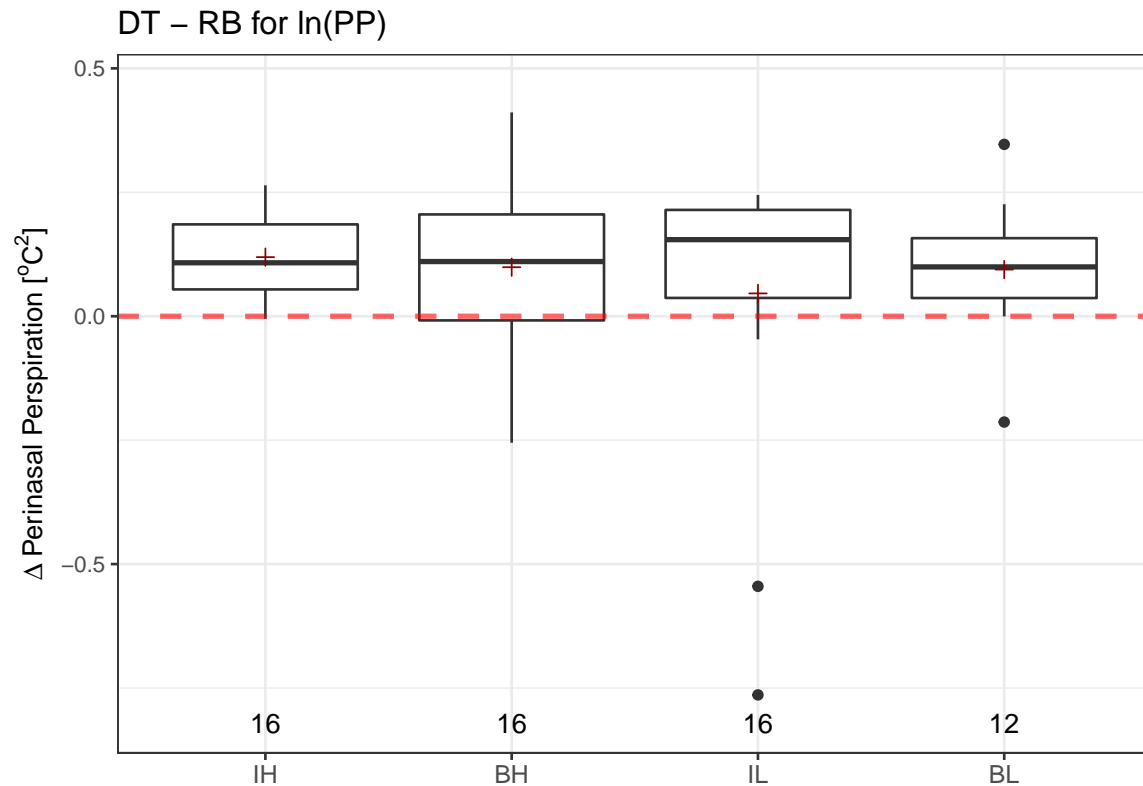
```
## ANOVA:
##             Df Sum Sq Mean Sq F value Pr(>F)
## Condition    3  0.046 0.01535    0.44  0.725
## Residuals   56  1.954 0.03490
##
## ---
##
##     Tukey multiple comparisons of means
##     95% family-wise confidence level
##
## Fit: aov(formula = formula(paste(diff, "~ Condition")), data = anova_df)
##
## $Condition
##                 diff        lwr       upr      p adj
## BL-BH -0.004751779 -0.1936516 0.1841480 0.9998926
## IH-BH  0.020311813 -0.1545754 0.1951990 0.9898006
## IL-BH -0.052877931 -0.2277651 0.1220093 0.8538386
## IH-BL  0.025063592 -0.1638362 0.2139634 0.9849637
## IL-BL -0.048126152 -0.2370259 0.1407736 0.9062671
## IL-IH -0.073189744 -0.2480770 0.1016975 0.6860706
```

DT – RB for HR
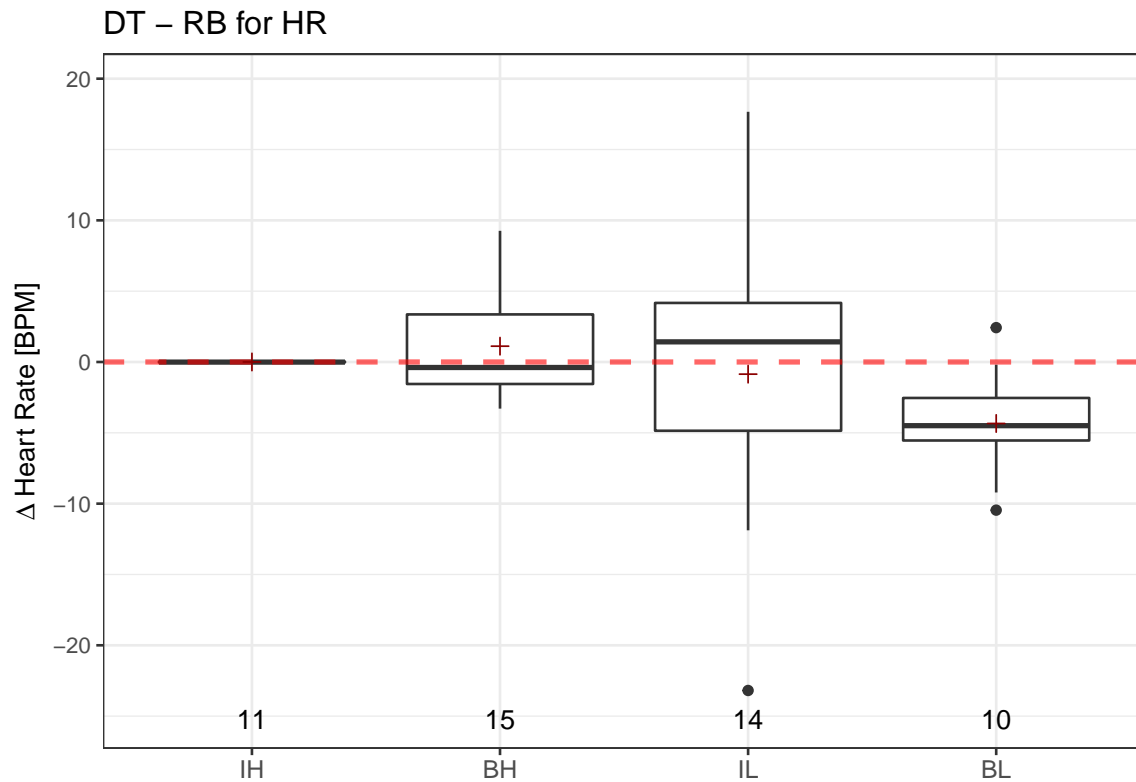

```
## ANOVA:
##            Df Sum Sq Mean Sq F value Pr(>F)
## Condition   3  187.5   62.50   1.887  0.145
## Residuals  46 1523.8   33.13
##
## ---
##
##     Tukey multiple comparisons of means
##     95% family-wise confidence level
##
## Fit: aov(formula = formula(paste(diff, "~ Condition")), data = anova_df)
##
## $Condition
##              diff       lwr       upr     p adj
## BL-BH -5.4561564 -11.719142  0.8068286 0.1077898
## IH-BH -1.1130302  -7.202812  4.9767512 0.9615697
## IL-BH -1.9740785  -7.675017  3.7268599 0.7927127
## IH-BL  4.3431262  -2.359891 11.0461430 0.3216979
## IL-BL  3.4820779  -2.869748  9.8339041 0.4687717
## IL-IH -0.8610483  -7.042161  5.3200641 0.9823088
```

DT – RB for BR
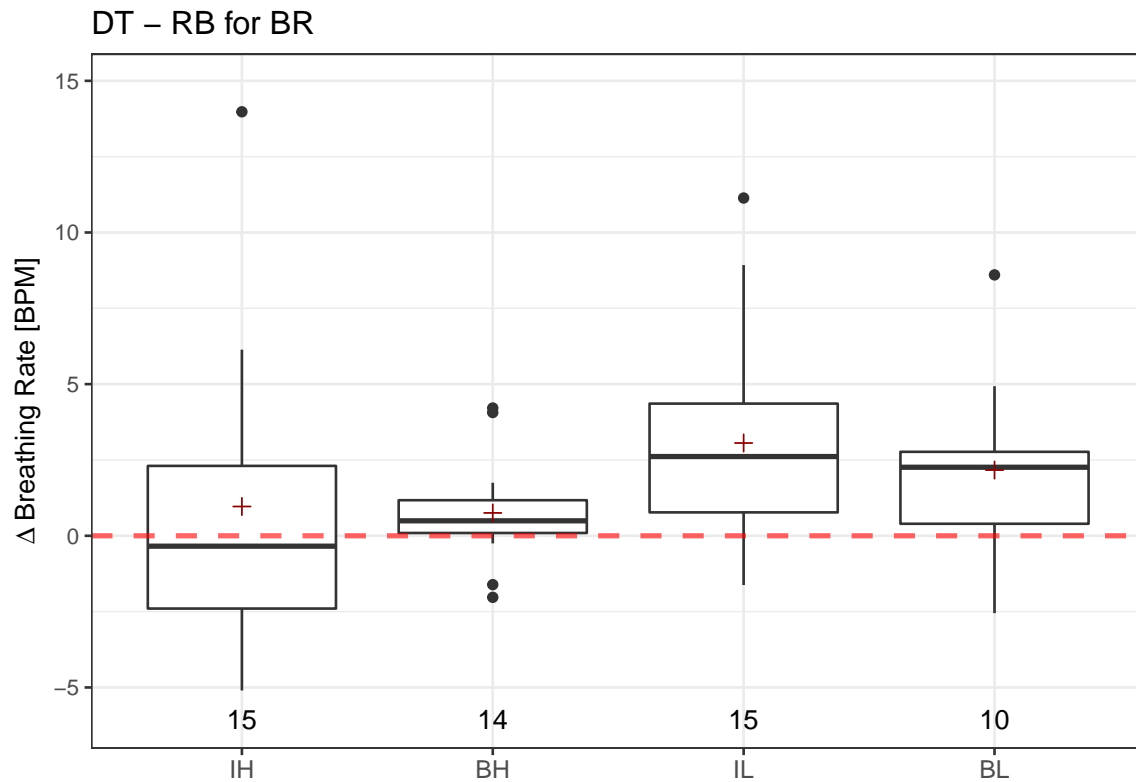
```
## ANOVA:
##             Df Sum Sq Mean Sq F value Pr(>F)
## Condition   3    50.5   16.82    1.321  0.278
## Residuals  50   636.8   12.74
##
## ---
##
##     Tukey multiple comparisons of means
##     95% family-wise confidence level
##
## Fit: aov(formula = formula(paste(diff, "~ Condition")), data = anova_df)
##
## $Condition
##             diff        lwr      upr      p adj
## BL-BH   1.4129937  -2.513885  5.339873  0.7746224
## IH-BH   0.2115210  -3.312961  3.736003  0.9985359
## IL-BH   2.3041802  -1.220302  5.828662  0.3155808
## IH-BL  -1.2014727  -5.073428  2.670482  0.8425252
## IL-BL   0.8911865  -2.980768  4.763141  0.9278959
## IL-IH   2.0926593  -1.370523  5.555841  0.3846728
```

P – RB for ln(PP)
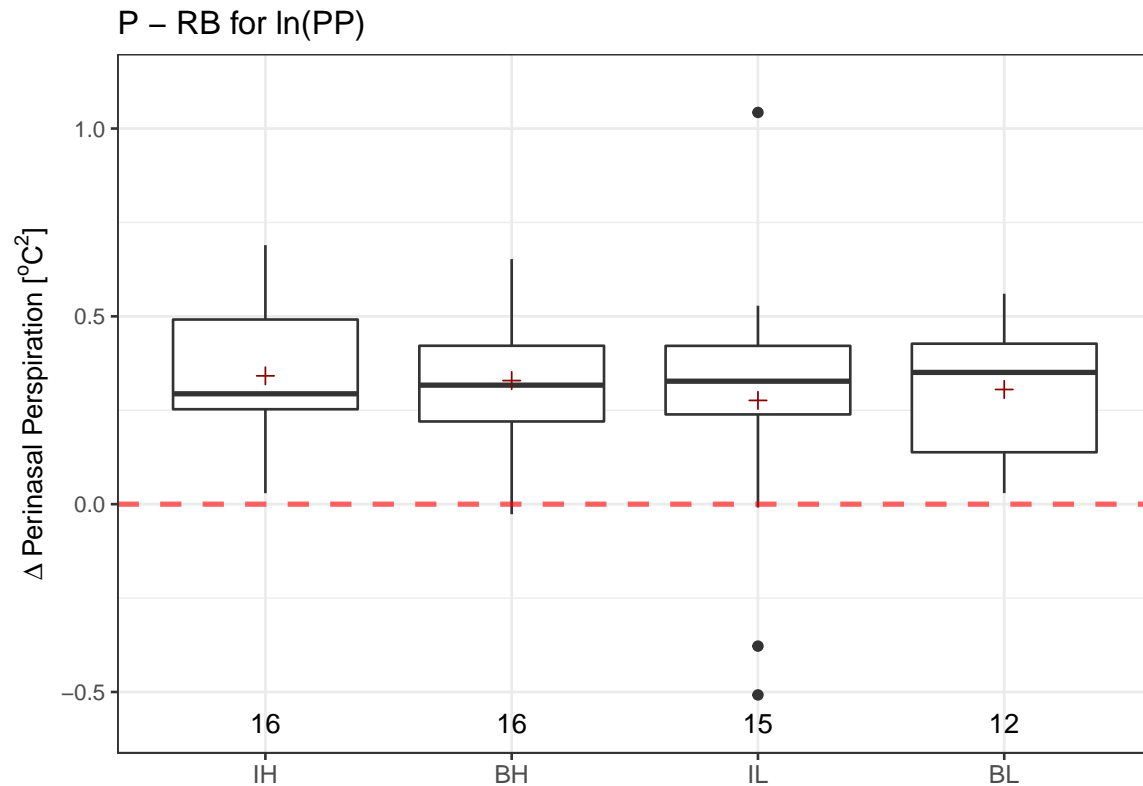
```
## ANOVA:
##             Df Sum Sq Mean Sq F value Pr(>F)
## Condition    3  0.038 0.01271     0.2  0.896
## Residuals   55  3.492 0.06349
##
## ---
##
##     Tukey multiple comparisons of means
##     95% family-wise confidence level
##
## Fit: aov(formula = formula(paste(diff, "~ Condition")), data = anova_df)
##
## $Condition
##             diff         lwr       upr       p adj
## BL-BH -0.02368803 -0.2786230 0.2312469 0.9946973
## IH-BH  0.01262150 -0.2234024 0.2486454 0.9989729
## IL-BH -0.05278427 -0.2927096 0.1871411 0.9368297
## IH-BL  0.03630953 -0.2186254 0.2912445 0.9815042
## IL-BL -0.02909625 -0.2876475 0.2294550 0.9906836
## IL-IH -0.06540578 -0.3053311 0.1745196 0.8878104
```

P – RB for HR
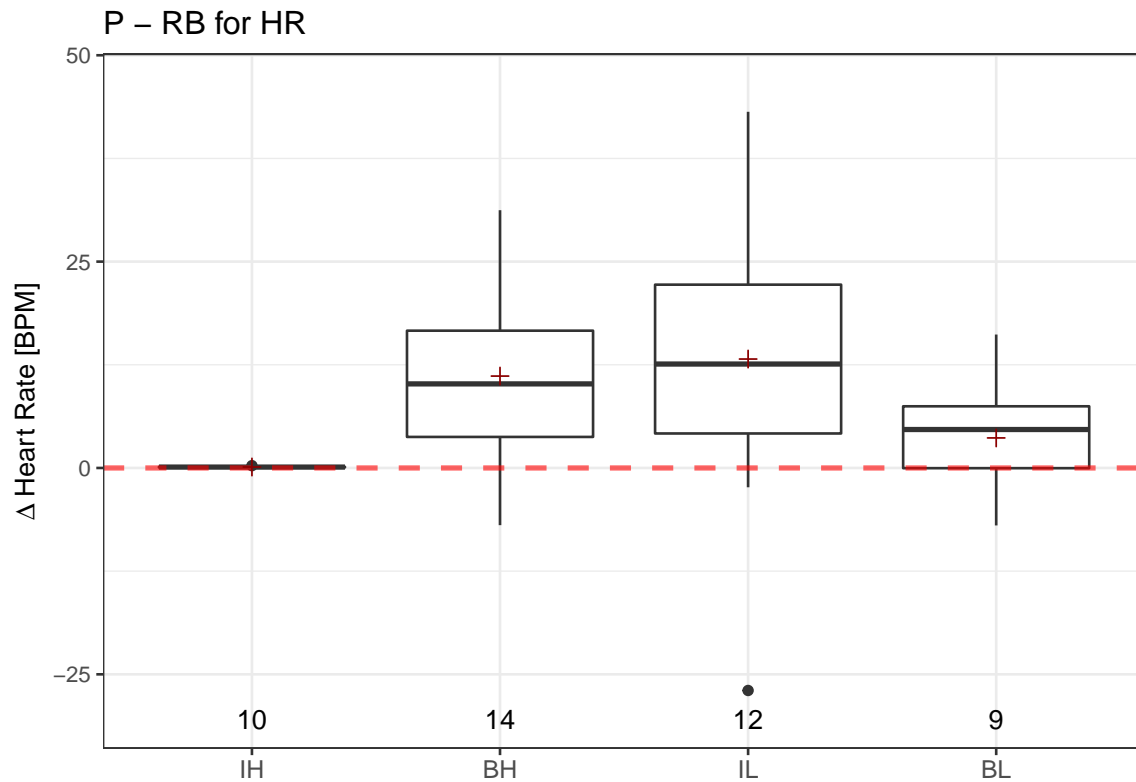

```
## ANOVA:
##             Df Sum Sq Mean Sq F value Pr(>F)
## Condition    3   1251   417.0   2.759 0.0543 .
## Residuals   41   6196   151.1
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## ---
##
##     Tukey multiple comparisons of means
##     95% family-wise confidence level
##
## Fit: aov(formula = formula(paste(diff, "~ Condition")), data = anova_df)
##
## $Condition
##            diff        lwr        upr      p adj
## BL-BH  -7.492688 -21.556292  6.570915 0.4904678
## IH-BH -11.016346 -24.645208  2.612515 0.1504340
## IL-BH   2.063625 -10.885785 15.013036 0.9735758
## IH-BL  -3.523658 -18.647896 11.600581 0.9238389
## IL-BL   9.556314  -4.958643 24.071270 0.3055791
## IL-IH  13.079972  -1.014172 27.174115 0.0773772
```

P – RB for BR
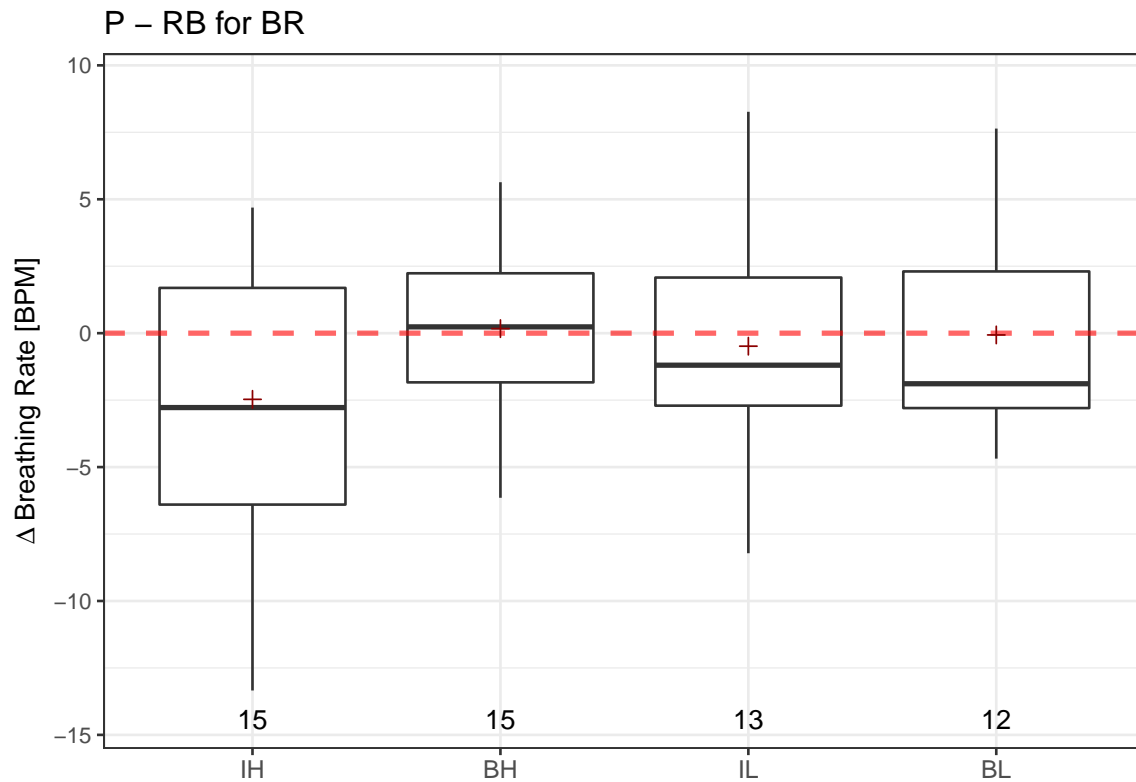

```
## ANOVA:
##            Df Sum Sq Mean Sq F value Pr(>F)
## Condition   3   63.7   21.22   1.119   0.35
## Residuals  51  966.8   18.96
##
## ---
##
##    Tukey multiple comparisons of means
##    95% family-wise confidence level
##
## Fit: aov(formula = formula(paste(diff, "~ Condition")), data = anova_df)
##
## $Condition
##             diff       lwr      upr     p adj
## BL-BH -0.2352217 -4.713756 4.243313 0.9990185
## IH-BH -2.6409437 -6.863346 1.581459 0.3545787
## IL-BH -0.6556059 -5.037400 3.726188 0.9785135
## IH-BL -2.4057221 -6.884256 2.072812 0.4889376
## IL-BL -0.4203843 -5.049499 4.208731 0.9950037
## IL-IH  1.9853378 -2.396456 6.367132 0.6275987
```

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Summary

Condition	Difference	Measure	p	Test	n	Significance
BH	WB - RB	PP	0.0173080	Transformed t-test	16	*
BH	WB - RB	HR	0.0000221	t-test	15	***
BH	WB - RB	BR	0.0000456	t-test	15	***
BH	WB - RB	N.EDA	0.2534179	Transformed t-test	10	
BH	WB - RB	N.HR	0.8962389	t-test	10	
BH	SC - RB	PP	0.1505156	Transformed t-test	16	
BH	SC - RB	HR	0.0676868	t-test	15	
BH	SC - RB	BR	0.0060548	t-test	15	**
BH	SC - RB	N.EDA	0.0609244	Transformed t-test	10	
BH	SC - RB	N.HR	0.5286897	t-test	10	
BH	SC - WB	PP	0.1982421	Transformed t-test	16	
BH	SC - WB	HR	0.3915336	t-test	15	
BH	SC - WB	BR	0.7466036	t-test	15	
BH	SC - WB	N.EDA	0.0621603	Transformed t-test	10	
BH	SC - WB	N.HR	0.6088627	t-test	10	
BH	DT - RB	PP	0.0257406	Transformed t-test	16	*
BH	DT - RB	HR	0.2818579	t-test	15	
BH	DT - RB	BR	0.1299423	t-test	14	
BH	DT - RB	N.EDA	0.0462830	Transformed t-test	10	*
BH	DT - RB	N.HR	0.5231194	t-test	10	
BH	DT - WB	PP	0.5396050	Transformed t-test	16	
BH	DT - WB	HR	0.0012903	t-test	15	**
BH	DT - WB	BR	0.0000039	t-test	14	***
BH	DT - WB	N.EDA	0.0541748	Transformed t-test	10	
BH	DT - WB	N.HR	0.5861420	t-test	10	
BH	DT - SC	PP	0.1253277	Transformed t-test	16	
BH	DT - SC	HR	0.1067941	t-test	15	
BH	DT - SC	BR	0.0223007	t-test	14	*
BH	DT - SC	N.EDA	0.3059258	Transformed t-test	10	
BH	DT - SC	N.HR	0.0955421	t-test	10	
BH	P - RB	PP	0.0000065	Transformed t-test	16	***
BH	P - RB	HR	0.0048470	t-test	14	**
BH	P - RB	BR	0.8463726	t-test	15	
BH	P - RB	N.EDA	0.0619911	Transformed t-test	10	
BH	P - RB	N.HR	0.8626994	t-test	10	
BH	P - WB	PP	0.0000833	Transformed t-test	16	***
BH	P - WB	HR	0.0414463	t-test	14	*
BH	P - WB	BR	0.0134266	t-test	15	*
BH	P - WB	N.EDA	0.0624879	Transformed t-test	10	
BH	P - WB	N.HR	0.7565417	t-test	10	
BH	P - SC	PP	0.0000467	Transformed t-test	16	***
BH	P - SC	HR	0.0173810	t-test	14	*
BH	P - SC	BR	0.0512656	t-test	15	
BH	P - SC	N.EDA	0.2061865	Transformed t-test	10	
BH	P - SC	N.HR	0.8970905	t-test	10	

(continued)

Condition	Difference	Measure	p	Test	n	Significance
BH	P - DT	PP	0.0000138	Transformed t-test	16	***
BH	P - DT	HR	0.0088212	t-test	14	**
BH	P - DT	BR	0.4077358	t-test	14	
BH	P - DT	N.EDA	0.3638723	Transformed t-test	10	
BH	P - DT	N.HR	0.4013641	t-test	10	
BL	WB - RB	PP	0.3111512	Transformed t-test	12	
BL	WB - RB	HR	0.7387962	t-test	10	
BL	WB - RB	BR	0.0144324	t-test	12	*
BL	WB - RB	N.EDA	0.3568742	Transformed t-test	9	
BL	WB - RB	N.HR	0.4807056	Transformed t-test	9	
BL	SC - RB	PP	0.8741675	Transformed t-test	12	
BL	SC - RB	HR	0.0232452	t-test	10	*
BL	SC - RB	BR	0.6485754	t-test	12	
BL	SC - RB	N.EDA	0.3833588	Transformed t-test	9	
BL	SC - RB	N.HR	0.3497321	Transformed t-test	9	
BL	SC - WB	PP	0.4112087	Transformed t-test	12	
BL	SC - WB	HR	0.1472392	t-test	10	
BL	SC - WB	BR	0.0059262	t-test	12	**
BL	SC - WB	N.EDA	0.4904764	Transformed t-test	9	
BL	SC - WB	N.HR	0.3221591	Transformed t-test	9	
BL	DT - RB	PP	0.0384288	Transformed t-test	12	*
BL	DT - RB	HR	0.0059170	t-test	10	**
BL	DT - RB	BR	0.0517248	t-test	10	
BL	DT - RB	N.EDA	0.4430097	Transformed t-test	9	
BL	DT - RB	N.HR	0.6636593	Transformed t-test	9	
BL	DT - WB	PP	0.0310006	Transformed t-test	12	*
BL	DT - WB	HR	0.0304091	t-test	10	*
BL	DT - WB	BR	0.0294794	t-test	10	*
BL	DT - WB	N.EDA	0.7508402	Transformed t-test	9	
BL	DT - WB	N.HR	0.0929248	Transformed t-test	9	
BL	DT - SC	PP	0.0383143	Transformed t-test	12	*
BL	DT - SC	HR	0.0589739	t-test	10	
BL	DT - SC	BR	0.0039438	t-test	10	**
BL	DT - SC	N.EDA	0.8092831	Transformed t-test	9	
BL	DT - SC	N.HR	0.9070167	Transformed t-test	9	
BL	P - RB	PP	0.0001148	Transformed t-test	12	***
BL	P - RB	HR	0.1520301	t-test	9	
BL	P - RB	BR	0.9564644	t-test	12	
BL	P - RB	N.EDA	0.7965883	Transformed t-test	9	
BL	P - RB	N.HR	0.4978772	Transformed t-test	9	
BL	P - WB	PP	0.0000638	Transformed t-test	12	***
BL	P - WB	HR	0.0882318	t-test	9	
BL	P - WB	BR	0.0100505	t-test	12	*
BL	P - WB	N.EDA	0.7417377	Transformed t-test	9	
BL	P - WB	N.HR	0.9870621	Transformed t-test	9	
BL	P - SC	PP	0.0004323	Transformed t-test	12	***
BL	P - SC	HR	0.0080584	t-test	9	**

(continued)

Condition	Difference	Measure	p	Test	n	Significance
BL	P - SC	BR	0.6759070	t-test	12	
BL	P - SC	N.EDA	0.5445969	Transformed t-test	9	
BL	P - SC	N.HR	0.3201872	Transformed t-test	9	
BL	P - DT	PP	0.0019330	Transformed t-test	12	**
BL	P - DT	HR	0.0017449	t-test	9	**
BL	P - DT	BR	0.0051760	t-test	10	**
BL	P - DT	N.EDA	0.5743980	Transformed t-test	9	
BL	P - DT	N.HR	0.1335777	Transformed t-test	9	
IH	WB - RB	PP	0.0002132	Transformed t-test	16	***
IH	WB - RB	HR	0.0156014	Transformed t-test	11	*
IH	WB - RB	BR	0.0184463	t-test	15	*
IH	WB - RB	N.EDA	0.1840917	Transformed t-test	8	
IH	WB - RB	N.HR	0.5468750	Wilcoxon	8	
IH	SC - RB	PP	0.0072317	Transformed t-test	16	**
IH	SC - RB	HR	0.1143439	Transformed t-test	11	
IH	SC - RB	BR	0.0864944	t-test	15	
IH	SC - RB	N.EDA	0.1669862	Transformed t-test	8	
IH	SC - RB	N.HR	1.0000000	Wilcoxon	8	
IH	SC - WB	PP	0.3534362	Transformed t-test	16	
IH	SC - WB	HR	0.3169827	Transformed t-test	11	
IH	SC - WB	BR	0.1404898	t-test	15	
IH	SC - WB	N.EDA	0.4267805	Transformed t-test	8	
IH	SC - WB	N.HR	0.7421875	Wilcoxon	8	
IH	DT - RB	PP	0.0000331	Transformed t-test	16	***
IH	DT - RB	HR	0.8850103	Transformed t-test	11	
IH	DT - RB	BR	0.4484333	t-test	15	
IH	DT - RB	N.EDA	0.1168906	Transformed t-test	8	
IH	DT - RB	N.HR	0.2500000	Wilcoxon	8	
IH	DT - WB	PP	0.4225392	Transformed t-test	16	
IH	DT - WB	HR	0.0361008	Transformed t-test	11	*
IH	DT - WB	BR	0.0012299	t-test	15	**
IH	DT - WB	N.EDA	0.0695965	Transformed t-test	8	
IH	DT - WB	N.HR	0.8437500	Wilcoxon	8	
IH	DT - SC	PP	0.2570218	Transformed t-test	16	
IH	DT - SC	HR	0.3856627	Transformed t-test	11	
IH	DT - SC	BR	0.3441009	t-test	15	
IH	DT - SC	N.EDA	0.2729165	Transformed t-test	8	
IH	DT - SC	N.HR	0.2500000	Wilcoxon	8	
IH	P - RB	PP	0.0000107	Transformed t-test	16	***
IH	P - RB	HR	0.0011076	Transformed t-test	10	**
IH	P - RB	BR	0.0907505	t-test	15	
IH	P - RB	N.EDA	0.2744891	Transformed t-test	8	
IH	P - RB	N.HR	0.7421875	Wilcoxon	8	
IH	P - WB	PP	0.0002569	Transformed t-test	16	***
IH	P - WB	HR	0.0132975	Transformed t-test	10	*
IH	P - WB	BR	0.0007386	t-test	15	***
IH	P - WB	N.EDA	0.4855839	Transformed t-test	8	

(continued)

Condition	Difference	Measure	p	Test	n	Significance
IH	P - WB	N.HR	0.2500000	Wilcoxon	8	
IH	P - SC	PP	0.0001499	Transformed t-test	16	***
IH	P - SC	HR	0.0027481	Transformed t-test	10	**
IH	P - SC	BR	0.0028918	t-test	15	**
IH	P - SC	N.EDA	0.8808683	Transformed t-test	8	
IH	P - SC	N.HR	0.5468750	Wilcoxon	8	
IH	P - DT	PP	0.0003933	Transformed t-test	16	***
IH	P - DT	HR	0.0000932	Transformed t-test	10	***
IH	P - DT	BR	0.0056199	t-test	15	**
IH	P - DT	N.EDA	0.3046314	Transformed t-test	8	
IH	P - DT	N.HR	0.1484375	Wilcoxon	8	
IL	WB - RB	PP	0.0081275	Transformed t-test	16	**
IL	WB - RB	HR	0.0296381	t-test	14	*
IL	WB - RB	BR	0.0005134	t-test	14	***
IL	WB - RB	N.EDA	0.3093006	Transformed t-test	9	
IL	WB - RB	N.HR	1.0000000	Wilcoxon	10	
IL	SC - RB	PP	0.9676786	Transformed t-test	16	
IL	SC - RB	HR	0.2669373	t-test	14	
IL	SC - RB	BR	0.4282762	t-test	15	
IL	SC - RB	N.EDA	0.7216926	Transformed t-test	9	
IL	SC - RB	N.HR	0.7695312	Wilcoxon	10	
IL	SC - WB	PP	0.0588774	Transformed t-test	16	
IL	SC - WB	HR	0.0000048	t-test	14	***
IL	SC - WB	BR	0.0004184	t-test	14	***
IL	SC - WB	N.EDA	0.3167622	Transformed t-test	9	
IL	SC - WB	N.HR	0.4316406	Wilcoxon	10	
IL	DT - RB	PP	0.5346038	Transformed t-test	16	
IL	DT - RB	HR	0.7416151	t-test	14	
IL	DT - RB	BR	0.0063324	t-test	15	**
IL	DT - RB	N.EDA	0.7041266	Transformed t-test	9	
IL	DT - RB	N.HR	0.6250000	Wilcoxon	10	
IL	DT - WB	PP	0.2922834	Transformed t-test	16	
IL	DT - WB	HR	0.0037787	t-test	14	**
IL	DT - WB	BR	0.0028507	t-test	14	**
IL	DT - WB	N.EDA	0.2794954	Transformed t-test	9	
IL	DT - WB	N.HR	0.0839844	Wilcoxon	10	
IL	DT - SC	PP	0.2890821	Transformed t-test	16	
IL	DT - SC	HR	0.4266015	t-test	14	
IL	DT - SC	BR	0.0064712	t-test	15	**
IL	DT - SC	N.EDA	0.7513285	Transformed t-test	9	
IL	DT - SC	N.HR	0.8457031	Wilcoxon	10	
IL	P - RB	PP	0.0113585	Transformed t-test	15	*
IL	P - RB	HR	0.0326350	t-test	12	*
IL	P - RB	BR	0.7026470	t-test	13	
IL	P - RB	N.EDA	0.2625813	Transformed t-test	8	
IL	P - RB	N.HR	0.6523438	Wilcoxon	9	
IL	P - WB	PP	0.0499145	Transformed t-test	15	*

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Condition	Difference	Measure	p	Test	n	Significance
IL	P - WB	HR	0.0531180	t-test	12	
IL	P - WB	BR	0.0000168	t-test	12	***
IL	P - WB	N.EDA	0.1132077	Transformed t-test	8	
IL	P - WB	N.HR	0.3593750	Wilcoxon	9	
IL	P - SC	PP	0.0020385	Transformed t-test	15	**
IL	P - SC	HR	0.0080668	t-test	12	**
IL	P - SC	BR	0.4772220	t-test	13	
IL	P - SC	N.EDA	0.2720706	Transformed t-test	8	
IL	P - SC	N.HR	0.9101562	Wilcoxon	9	
IL	P - DT	PP	0.0003956	Transformed t-test	15	***
IL	P - DT	HR	0.0038321	t-test	12	**
IL	P - DT	BR	0.0000132	t-test	13	***
IL	P - DT	N.EDA	0.0711601	Transformed t-test	9	
IL	P - DT	N.HR	1.0000000	Wilcoxon	9	