Exp 4 - Control-Response Analysis

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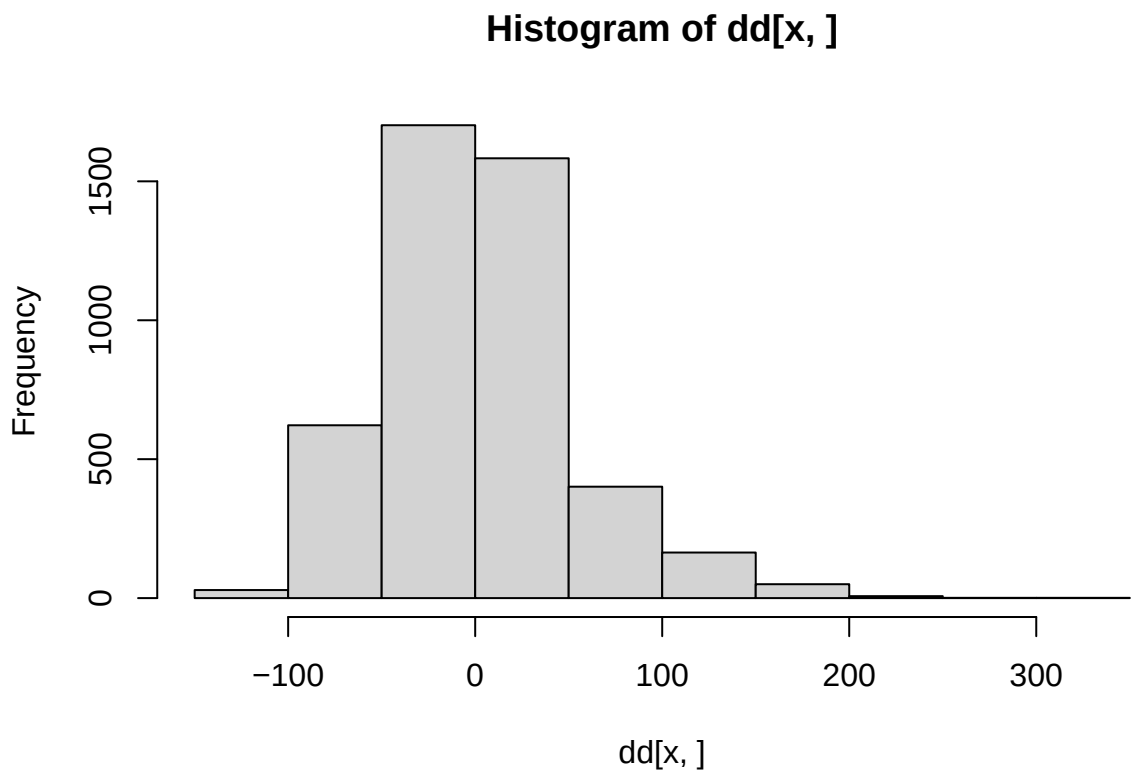
```
## Data: cc4Target
## Models:
## e4.ControlvTarget1: RespRate ~ Phase + ResponseType + (1 | ID)
## e4.ControlvTarget2: RespRate ~ Phase * ResponseType + (1 | ID)
##                    npar   AIC   BIC logLik deviance  Chisq Df Pr(>Chisq)
## e4.ControlvTarget1    6 72042 72083 -36015    72030
## e4.ControlvTarget2    8 71429 71483 -35706    71413 616.81  2  < 2.2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

## Linear mixed model fit by maximum likelihood  ['lmerMod']
## Formula: RespRate ~ Phase * ResponseType + (1 | ID)
##    Data: cc4Target
##
##      AIC      BIC   logLik deviance df.resid
##  71429.0  71483.4 -35706.5  71413.0     6680
##
## Scaled residuals:
##     Min      1Q  Median      3Q     Max
## -2.8503 -0.6998 -0.0090  0.4313  6.5543
##
## Random effects:
##  Groups   Name        Variance Std.Dev.
##  ID       (Intercept)  866.3   29.43
##  Residual             2381.5   48.80
## Number of obs: 6688, groups:  ID, 152
##
## Fixed effects:
##                            Estimate Std. Error t value
## (Intercept)                 19.4715     2.5969   7.498
## Phase2                       0.1535     2.0441   0.075
## Phase3                       0.7752     2.9797   0.260
## ResponseTypeTarget          77.9496     1.4454  53.931
## Phase2:ResponseTypeTarget -67.6798     2.8907 -23.413
## Phase3:ResponseTypeTarget -58.1634     4.2139 -13.803
##
## Correlation of Fixed Effects:
##             (Intr) Phase2 Phase3 RspnTT P2:RTT
## Phase2      -0.197
## Phase3      -0.135  0.171
## RspnsTypTrg -0.278  0.354  0.243
## Phs2:RspnTT  0.139 -0.707 -0.121 -0.500
## Phs3:RspnTT  0.095 -0.121 -0.707 -0.343  0.171
```

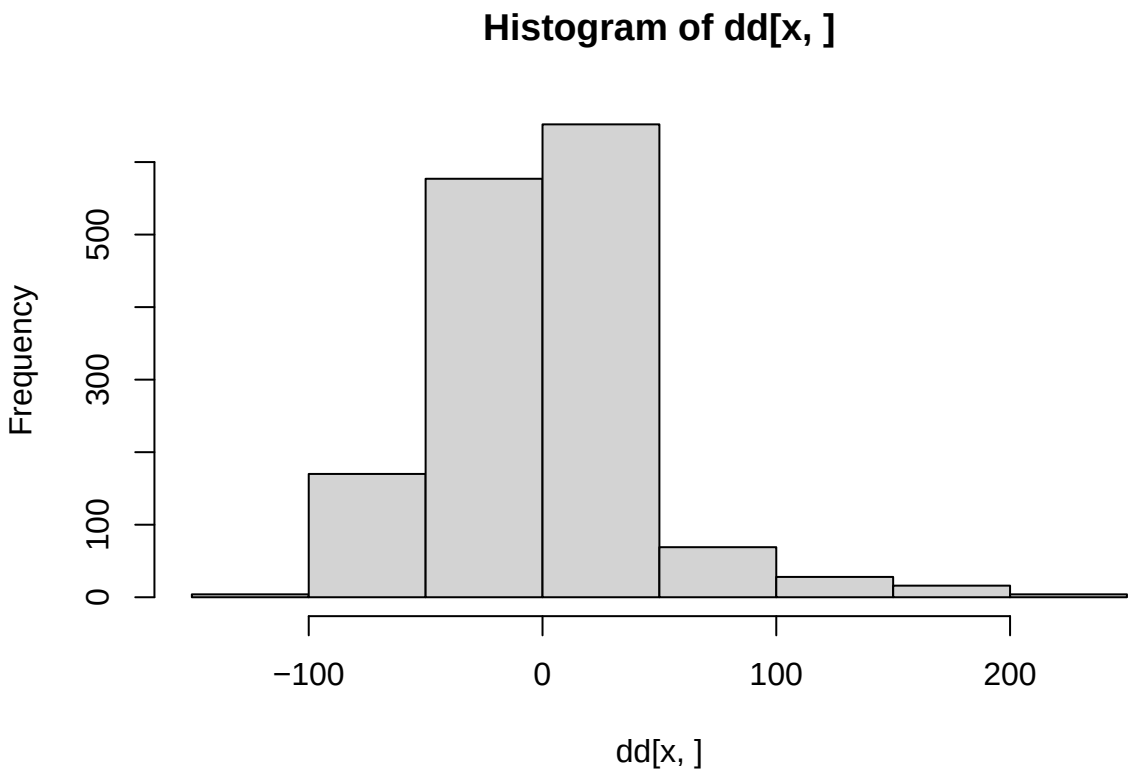
Fixed effects

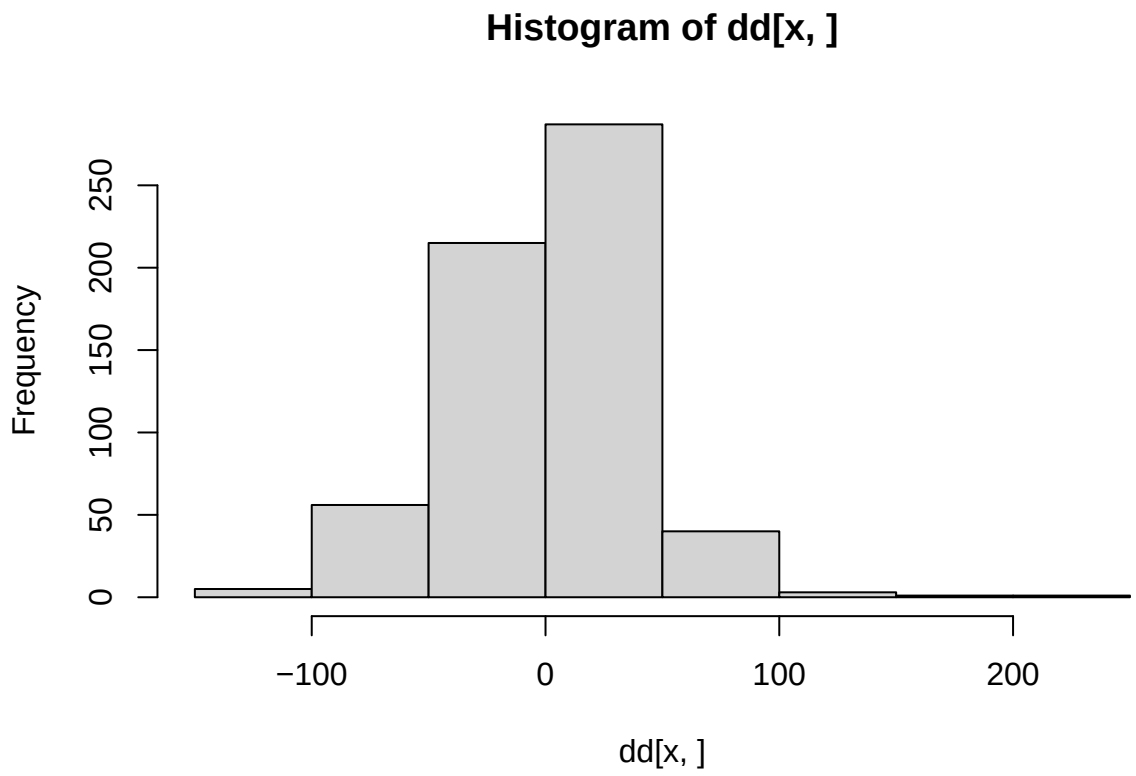
```
## Registered S3 methods overwritten by 'car':
##   method                          from
##   influence.merMod                lme4
##   cooks.distance.influence.merMod lme4
##   dfbeta.influence.merMod         lme4
##   dfbetas.influence.merMod        lme4
```

```
## Analysis of Deviance Table (Type II Wald chisquare tests)
##
## Response: RespRate
##                      Chisq Df Pr(>Chisq)
## Phase               634.96  2  < 2.2e-16 ***
## ResponseType       2303.49  1  < 2.2e-16 ***
## Phase:ResponseType  646.85  2  < 2.2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```



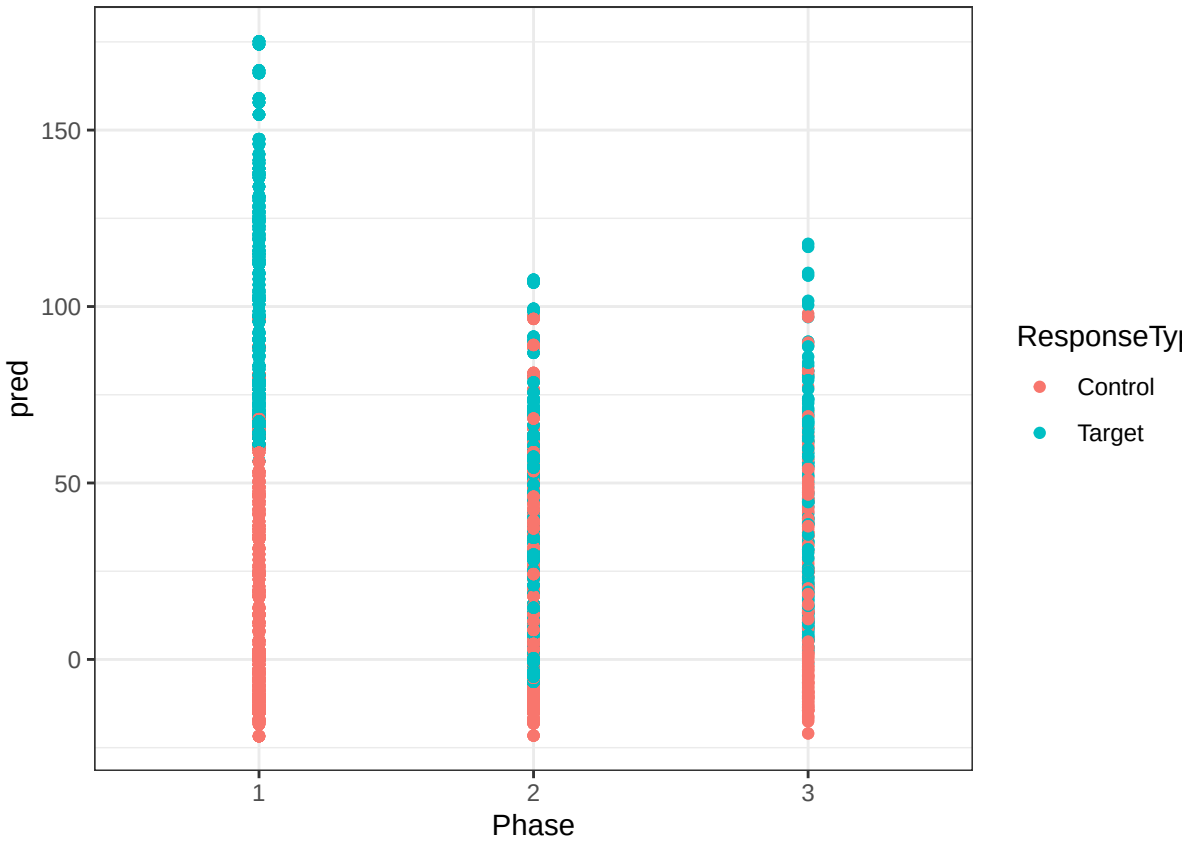
Checking residuals


Histogram of dd[x,]
Frequency
0
100
300
500
−100
0
100
200
dd[x,]



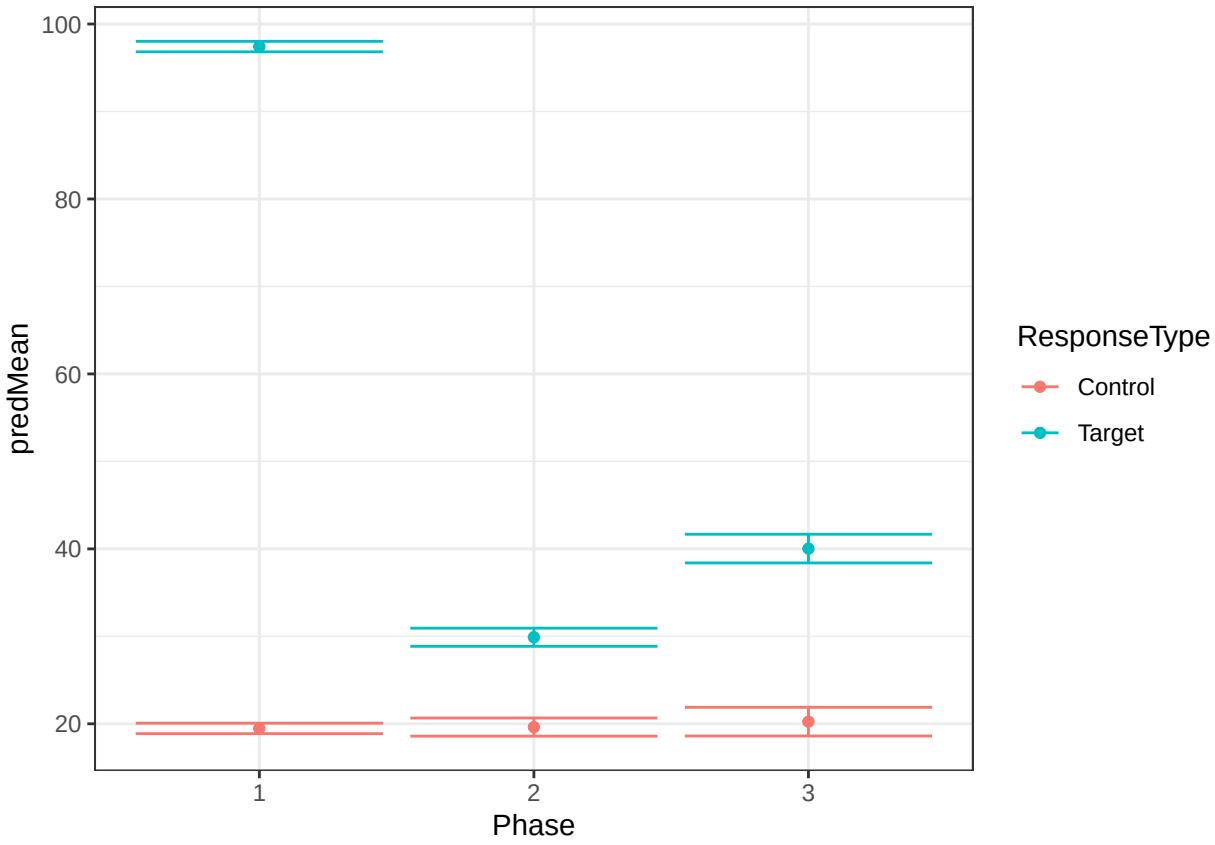

```
## cc4Target$Phase: 1
## $breaks
##  [1] -150 -100  -50    0   50  100  150  200  250  300  350
##
## $counts
##  [1]   29  622 1702 1583  401  164   50    7    1    1
##
## $density
##  [1] 1.271930e-04 2.728070e-03 7.464912e-03 6.942982e-03 1.758772e-03
##  [6] 7.192982e-04 2.192982e-04 3.070175e-05 4.385965e-06 4.385965e-06
##
## $mids
##  [1] -125  -75  -25   25   75  125  175  225  275  325
##
## $xname
## [1] "dd[x, ]"
##
## $equidist
## [1] TRUE
##
## attr(,"class")
## [1] "histogram"
## ------------------------------------------------------------
## cc4Target$Phase: 2
## $breaks
## [1] -150 -100  -50    0   50  100  150  200  250
```

```
##
## $counts
## [1]   4 170 577 652  69  28  16   4
##
## $density
## [1] 5.263158e-05 2.236842e-03 7.592105e-03 8.578947e-03 9.078947e-04
## [6] 3.684211e-04 2.105263e-04 5.263158e-05
##
## $mids
## [1] -125  -75  -25   25   75  125  175  225
##
## $xname
## [1] "dd[x, ]"
##
## $equidist
## [1] TRUE
##
## attr(,"class")
## [1] "histogram"
## ------------------------------------------------------------
## cc4Target$Phase: 3
## $breaks
## [1] -150 -100  -50    0   50  100  150  200  250
##
## $counts
## [1]   5  56 215 287  40   3   1   1
##
## $density
## [1] 1.644737e-04 1.842105e-03 7.072368e-03 9.440789e-03 1.315789e-03
## [6] 9.868421e-05 3.289474e-05 3.289474e-05
##
## $mids
## [1] -125  -75  -25   25   75  125  175  225
##
## $xname
## [1] "dd[x, ]"
##
## $equidist
## [1] TRUE
##
## attr(,"class")
## [1] "histogram"
```



looking @ predictions

```
## `summarise()` has grouped output by 'Phase'. You can override using the `.groups` argument.
```



specific comparisons

```
## $emmeans
## ResponseType = Control:
##  Phase emmean   SE  df lower.CL upper.CL
##  1       19.5 2.60 190     14.3     24.6
##  2       19.6 2.98 324     13.8     25.5
##  3       20.2 3.68 738     13.0     27.5
##
## ResponseType = Target:
##  Phase emmean   SE  df lower.CL upper.CL
##  1       97.4 2.60 190     92.3    102.6
##  2       29.9 2.98 324     24.0     35.8
##  3       40.0 3.68 738     32.8     47.3
##
## Degrees-of-freedom method: kenward-roger
## Confidence level used: 0.95
##
## $contrasts
## ResponseType = Control:
##  contrast estimate   SE   df t.ratio p.value
##  1 - 2      -0.154 2.04 6541 -0.075  0.9402
##  1 - 3      -0.775 2.98 6541 -0.260  0.7948
##  2 - 3      -0.622 3.31 6541 -0.188  0.8512
##
## ResponseType = Target:
##  contrast estimate   SE   df t.ratio p.value
```

```
##  1 - 2      67.526 2.04 6541 33.023  <.0001
##  1 - 3      57.388 2.98 6541 19.252  <.0001
##  2 - 3     -10.138 3.31 6541 -3.060  0.0022
##
## Degrees-of-freedom method: kenward-roger

## $emmeans
## Phase = 1:
##  ResponseType emmean   SE  df lower.CL upper.CL
##  Control        19.5 2.60 190     14.3     24.6
##  Target         97.4 2.60 190     92.3    102.6
##
## Phase = 2:
##  ResponseType emmean   SE  df lower.CL upper.CL
##  Control        19.6 2.98 324     13.8     25.5
##  Target         29.9 2.98 324     24.0     35.8
##
## Phase = 3:
##  ResponseType emmean   SE  df lower.CL upper.CL
##  Control        20.2 3.68 738     13.0     27.5
##  Target         40.0 3.68 738     32.8     47.3
##
## Degrees-of-freedom method: kenward-roger
## Confidence level used: 0.95
##
## $contrasts
## Phase = 1:
##  contrast         estimate   SE   df t.ratio p.value
##  Control - Target    -77.9 1.45 6541 -53.910 <.0001
##
## Phase = 2:
##  contrast         estimate   SE   df t.ratio p.value
##  Control - Target    -10.3 2.50 6541  -4.101 <.0001
##
## Phase = 3:
##  contrast         estimate   SE   df t.ratio p.value
##  Control - Target    -19.8 3.96 6541  -4.997 <.0001
##
## Degrees-of-freedom method: kenward-roger
```

Conclusion: No statistically significant increases in control responses from Phase 2 to Phase 3. Control responses remained low throughout the experiment.