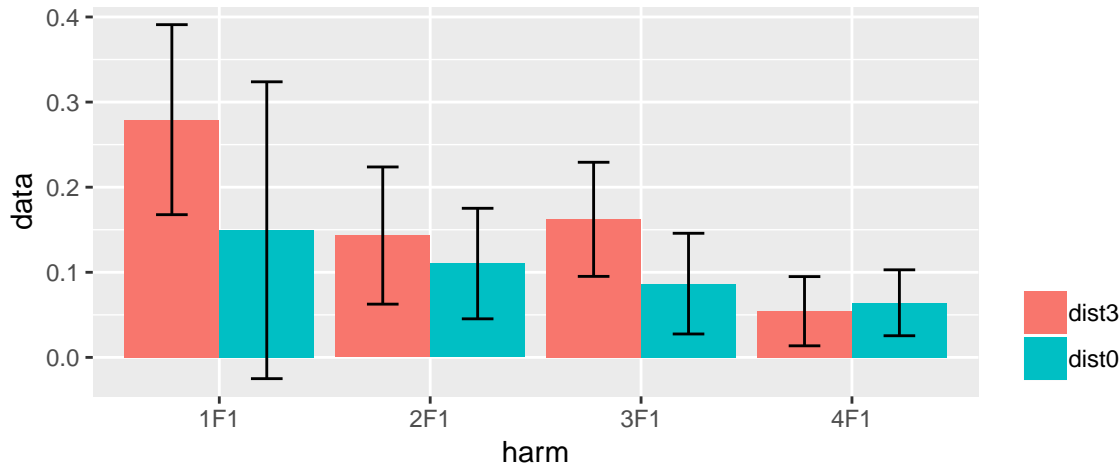


NUMEROSITY ANALYSIS RESULTS

```
top_folder = '/Users/kohler/Google Drive/Dropbox/WRITING/Articles/2019_KohlerNumerositySSVEP/figures/results/exp
counter = 0
for (f in c(1,2,3)) {
  for (q in c(1,2,3,4)) {
    cur_file = switch(q, "RLS_oddball_rc1_freq", "RLS_carrier_rc1_freq", "RLS_oddball_rc2_freq", "RLS_carrier_rc2_freq")
    cur_csv <- sprintf('%s/%s%d_full_projected_all_trials.csv', top_folder, cur_file, f)
    cur_data <- data.frame( read.csv(file = cur_csv) )
    cur_data$cond <- factor(cur_data$condition, levels(cur_data$condition)[c(2,1)])
    cur_data$harm <- cur_data$harmonic
    cur_data$harm_alt <- factor(cur_data$harmonic, levels(cur_data$harmonic)[c(2,1,3,4)])
    g <- ggplot(cur_data, aes(harm, data, fill = cond)) +
      stat_summary(geom = "bar", fun.y = mean, position=position_dodge()) +
      stat_summary(geom = "errorbar", fun.data = mean_se, width=.3, position=position_dodge(.9))
    g <- g + theme(legend.title=element_blank(),
      legend.justification=c(1,0),
      legend.background = element_blank() +
      ggtitle(toupper(sprintf('%s%d\n', cur_file, f))))
    if (q == 1 && f == 1) {
      cat("RESULTS BELOW\n ")
      cat("\n ")
    }
    print(g)
    m1 <- lmer(data ~ cond * harm + (1|subject), cur_data)
    emm = emmeans(m1, ~ cond * harm, lmer.df = "satterthwaite")
    m2 <- lmer(data ~ cond + harm + (1|subject), cur_data)
    if (isSingular(m1)) {
      if (isSingular(m2)) {
        cat("WARNING: BOTH MODELS ARE SINGULAR! ")
      } else {
        cat("WARNING: MODEL1 IS SINGULAR, BUT MODEL2 IS NOT! ")
      }
    } else {
      cat("LOVELY: NONE OF THE MODELS ARE SINGULAR! ")
    }
    if (!converge_ok(m1)) {
      if (!converge_ok(m2)) {
        cat("WARNING: BOTH MODELS DID NOT CONVERGE!\n\n")
      } else {
        cat("WARNING: MODEL1 DID NOT CONVERGE, BUT MODEL2 DID!\n\n")
      }
    } else {
      cat("LOVELY: BOTH MODELS CONVERGED!\n\n")
    }
    cat("ANOVA TEST FOR MAIN EFFECTS AND INTERACTIONS\n")
    print(anova(m1), type='pdf')
    cat("\nSUMMARY AND POST-HOC TESTS, harm1 baseline \n")
    print(prettify(summary(m1)), type='pdf')
    cat("\nESTIMATED MARGINAL MEANS, SIMPLE MAIN EFFECTS OF CONDITION WITHOUT CORRECTION\n")
    print(prettify(summary(pairs(emm, simple = "cond", adjust = "none"))))
    cat("\nTEST OF WHETHER OR NOT THE INTERACTION PROVIDES A BETTER FIT\n")
    print(anova(m1, m2))
  }
}
```

```
## RESULTS BELOW
##
##
```

RLS_ODDBALL_RC1_FREQ1



```
## LOVELY: NONE OF THE MODELS ARE SINGULAR!    LOVELY: BOTH MODELS CONVERGED!
```

```
##
## ANOVA TEST FOR MAIN EFFECTS AND INTERACTIONS
## Type III Analysis of Variance Table with Satterthwaite's method
##      Sum Sq Mean Sq NumDF DenDF F value Pr(>F)
## cond      0.09788  0.097884      1    98  0.8545 0.3576
## harm      0.36494  0.121647      3    98  1.0619 0.3689
## cond:harm  0.08039  0.026798      3    98  0.2339 0.8725
```

```
##
## SUMMARY AND POST-HOC TESTS, harm1 baseline
##      Estimate CI (lower) CI (upper) Std. Error      df      t value Pr(>|t|)
## 1      (Intercept)  0.27934057  0.1075994  0.45108174  0.08995827 109.5711  3.1052240  0.002 **
## 2      cond: dist0 -0.12991475 -0.3660875  0.10625794  0.12358880  98.0000 -1.0511855  0.296
## 3      harm: 2F1   -0.13616544 -0.3723381  0.10000726  0.12358880  98.0000 -1.1017619  0.273
## 4      harm: 3F1   -0.11709571 -0.3532684  0.11907699  0.12358880  98.0000 -0.9474622  0.346
## 5      harm: 4F1   -0.22506834 -0.4612410  0.01110436  0.12358880  98.0000 -1.8211063  0.072 .
## 6 cond:dist0:harm2F1  0.09700227 -0.2369964  0.43100091  0.17478096  98.0000  0.5549934  0.58
## 7 cond:dist0:harm3F1  0.05434280 -0.2796558  0.38834143  0.17478096  98.0000  0.3109194  0.757
## 8 cond:dist0:harm4F1  0.13982982 -0.1941688  0.47382845  0.17478096  98.0000  0.8000289  0.426
```

```
## ESTIMATED MARGINAL MEANS, SIMPLE MAIN EFFECTS OF CONDITION WITHOUT CORRECTION
```

```
##      contrast harm      estimate      SE df      t.ratio  p.value
## 1 1 dist3 - dist0 1F1  0.129914754  0.1235888 98  1.05118549 0.2957586
## 2 2 dist3 - dist0 2F1  0.032912481  0.1235888 98  0.26630634 0.7905628
## 3 3 dist3 - dist0 3F1  0.075571958  0.1235888 98  0.61147902 0.5422984
## 4 4 dist3 - dist0 4F1 -0.009915065  0.1235888 98 -0.08022624 0.9362209
```

```
## TEST OF WHETHER OR NOT THE INTERACTION PROVIDES A BETTER FIT
```

```
## Data: cur_data
```

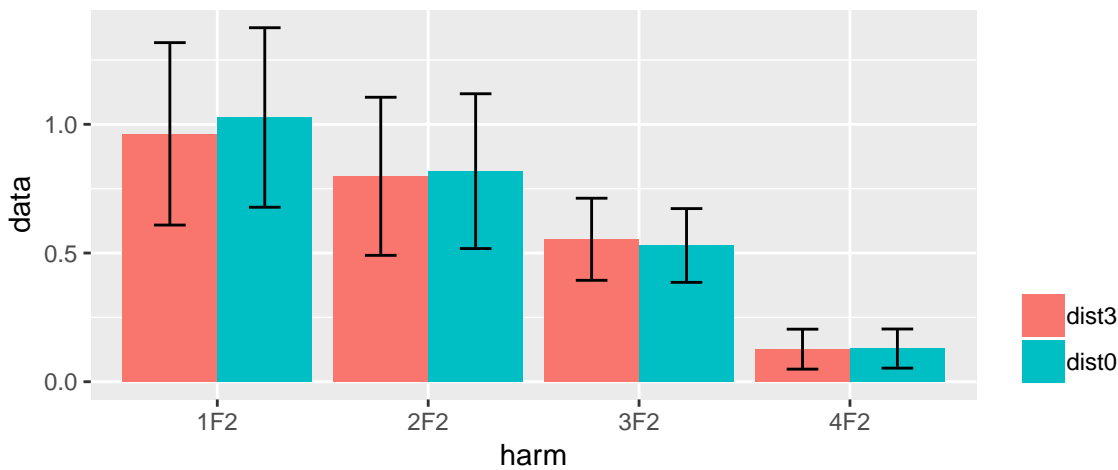
```
## Models:
```

```
## m2: data ~ cond + harm + (1 | subject)
```

```
## m1: data ~ cond * harm + (1 | subject)
```

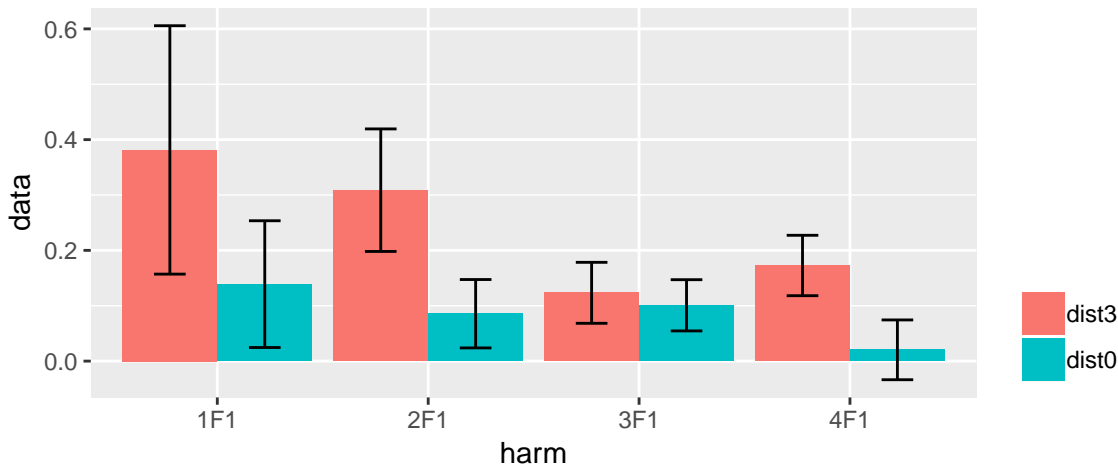
```
##      Df      AIC      BIC logLik deviance Chisq Chi Df Pr(>Chisq)
## m2  7  92.863 112.38 -39.432  78.863
## m1 10  98.114 125.99 -39.057  78.114 0.7492      3      0.8616
```

RLS_CARRIER_RC1_FREQ1



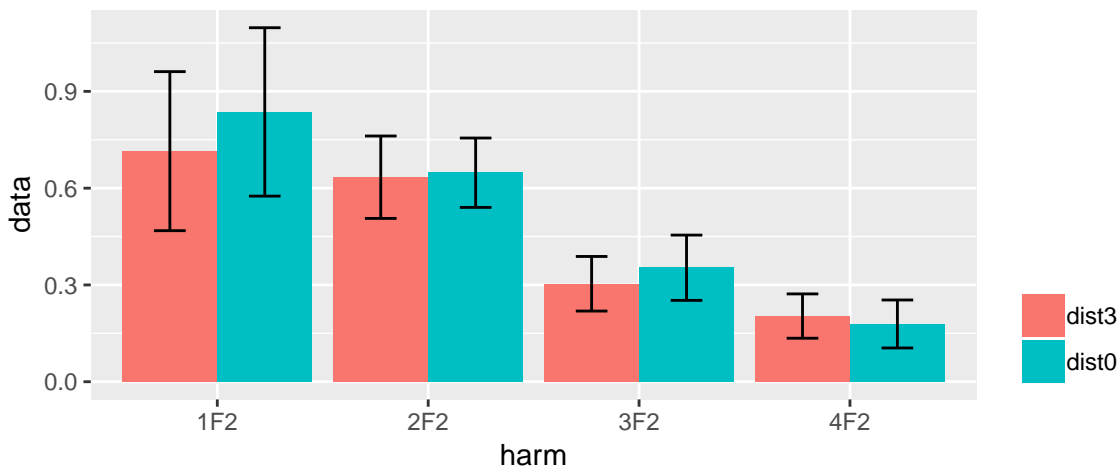
```
## LOVELY: NONE OF THE MODELS ARE SINGULAR!    LOVELY: BOTH MODELS CONVERGED!
##
## ANOVA TEST FOR MAIN EFFECTS AND INTERACTIONS
## Type III Analysis of Variance Table with Satterthwaite's method
##          Sum Sq Mean Sq NumDF DenDF F value    Pr(>F)
## cond          0.0071  0.0071     1    98   0.0095 0.922643
## harm        12.7300  4.2433     3    98   5.6478 0.001302 **
## cond:harm    0.0306  0.0102     3    98   0.0136 0.997829
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## SUMMARY AND POST-HOC TESTS, harm1 baseline
##          Estimate CI (lower) CI (upper) Std. Error    df    t value Pr(>|t|)
## 1 (Intercept)  0.96298678  0.4898412  1.4361323  0.2473815  91.00598  3.89271989 <0.001 ***
## 2 cond: dist0  0.06353203 -0.5412967  0.6683608  0.3165059  98.00000  0.20072935  0.841
## 3 harm: 2F2   -0.16495070 -0.7697794  0.4398780  0.3165059  98.00000 -0.52116148  0.603
## 4 harm: 3F2   -0.40954496 -1.0143737  0.1952838  0.3165059  98.00000 -1.29395670  0.199
## 5 harm: 4F2   -0.83643821 -1.4412670 -0.2316095  0.3165059  98.00000 -2.64272527  0.01 **
## 6 conddist0:harm2F2 -0.04355086 -0.8989079  0.8118062  0.4476070  98.00000 -0.09729711  0.923
## 7 conddist0:harm3F2 -0.08769742 -0.9430544  0.7676596  0.4476070  98.00000 -0.19592506  0.845
## 8 conddist0:harm4F2 -0.06125273 -0.9166097  0.7941043  0.4476070  98.00000 -0.13684490  0.891
##
## ESTIMATED MARGINAL MEANS, SIMPLE MAIN EFFECTS OF CONDITION WITHOUT CORRECTION
##          contrast harm estimate      SE df    t.ratio  p.value
## 1 1 dist3 - dist0  1F2 -0.063532028 0.3165059 98 -0.200729348 0.8413262
## 2 2 dist3 - dist0  2F2 -0.019981164 0.3165059 98 -0.063130456 0.9497912
## 3 3 dist3 - dist0  3F2  0.024165395 0.3165059 98  0.076350528 0.9392959
## 4 4 dist3 - dist0  4F2 -0.002279296 0.3165059 98 -0.007201433 0.9942688
##
## TEST OF WHETHER OR NOT THE INTERACTION PROVIDES A BETTER FIT
## Data: cur_data
## Models:
## m2: data ~ cond + harm + (1 | subject)
## m1: data ~ cond * harm + (1 | subject)
##      Df    AIC    BIC logLik deviance Chisq Chi Df Pr(>Chisq)
## m2   7 327.31 346.82 -156.65  313.31
## m1  10 333.26 361.14 -156.63  313.26 0.0436    3    0.9976
```

RLS_ODDBALL_RC2_FREQ1



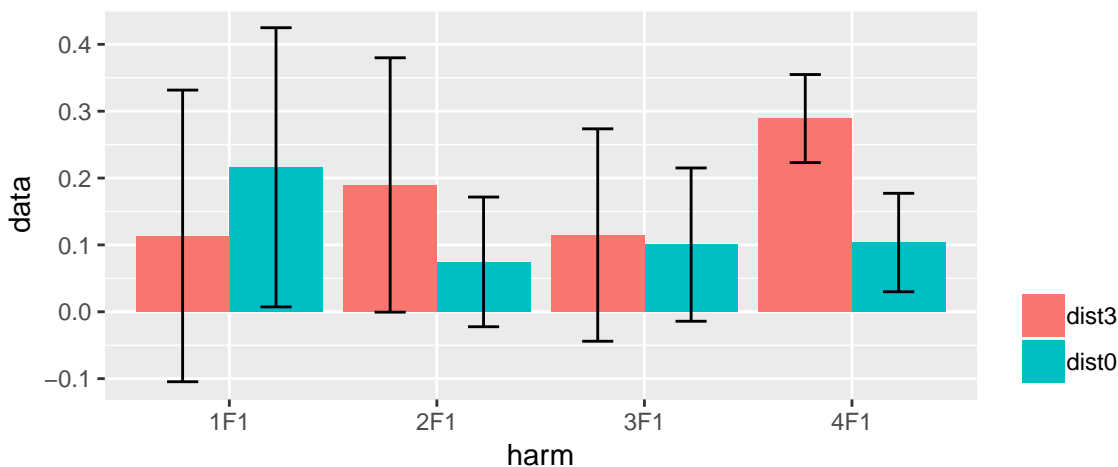
```
## LOVELY: NONE OF THE MODELS ARE SINGULAR!    LOVELY: BOTH MODELS CONVERGED!
##
## ANOVA TEST FOR MAIN EFFECTS AND INTERACTIONS
## Type III Analysis of Variance Table with Satterthwaite's method
##           Sum Sq Mean Sq NumDF DenDF F value  Pr(>F)
## cond           0.76906  0.76906      1    98   5.0914 0.02627 *
## harm           0.52733  0.17578      3    98   1.1637 0.32761
## cond:harm      0.22286  0.07429      3    98   0.4918 0.68879
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## SUMMARY AND POST-HOC TESTS, harm1 baseline
##           Estimate CI (lower) CI (upper) Std. Error      df      t value Pr(>|t|)
## 1 (Intercept)  0.38141068  0.1782062  0.58461521  0.1063809 103.22972  3.58532918  0.001 ***
## 2 cond: dist0 -0.24240057 -0.5135967  0.02879553  0.1419165  98.00001 -1.70805083  0.091 .
## 3 harm: 2F1 -0.07270034 -0.3438964  0.19849576  0.1419165  98.00001 -0.51227550  0.61
## 4 harm: 3F1 -0.25804336 -0.5292395  0.01315274  0.1419165  98.00001 -1.81827614  0.072 .
## 5 harm: 4F1 -0.20870907 -0.4799052  0.06248704  0.1419165  98.00001 -1.47064707  0.145
## 6 conddist0:harm2F1  0.01927391 -0.3642553  0.40280311  0.2007002  98.00001  0.09603333  0.924
## 7 conddist0:harm3F1  0.21980930 -0.1637199  0.60333851  0.2007002  98.00001  1.09521206  0.276
## 8 conddist0:harm4F1  0.09007617 -0.2934530  0.47360538  0.2007002  98.00001  0.44880954  0.655
##
## ESTIMATED MARGINAL MEANS, SIMPLE MAIN EFFECTS OF CONDITION WITHOUT CORRECTION
##           contrast harm estimate      SE      df t.ratio  p.value
## 1 1 dist3 - dist0  1F1 0.24240057 0.1419165 98.00001 1.7080508 0.09079278
## 2 2 dist3 - dist0  2F1 0.22312666 0.1419165 98.00001 1.5722392 0.11911820
## 3 3 dist3 - dist0  3F1 0.02259127 0.1419165 98.00001 0.1591871 0.87384909
## 4 4 dist3 - dist0  4F1 0.15232440 0.1419165 98.00001 1.0733383 0.28575521
##
## TEST OF WHETHER OR NOT THE INTERACTION PROVIDES A BETTER FIT
## Data: cur_data
## Models:
## m2: data ~ cond + harm + (1 | subject)
## m1: data ~ cond * harm + (1 | subject)
##      Df    AIC    BIC logLik deviance Chisq Chi Df Pr(>Chisq)
## m2   7 131.34 150.86 -58.672  117.34
## m1  10 135.78 163.65 -57.888  115.78 1.569    3    0.6664
```

RLS_CARRIER_RC2_FREQ1



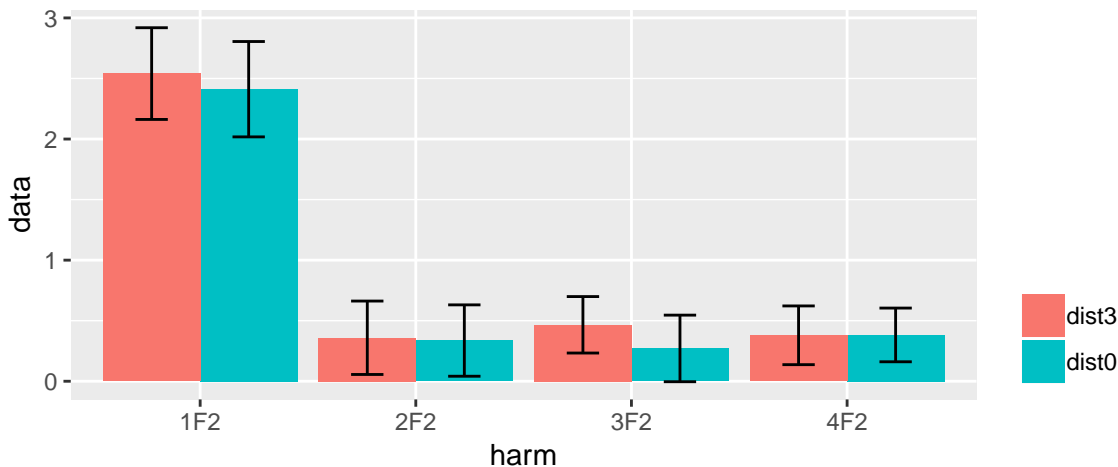
```
## LOVELY: NONE OF THE MODELS ARE SINGULAR!    LOVELY: BOTH MODELS CONVERGED!
##
## ANOVA TEST FOR MAIN EFFECTS AND INTERACTIONS
## Type III Analysis of Variance Table with Satterthwaite's method
##           Sum Sq Mean Sq NumDF DenDF F value    Pr(>F)
## cond           0.0485  0.04845     1    98  0.2443    0.6223
## harm           6.5835  2.19452     3    98 11.0628 2.558e-06 ***
## cond:harm    0.0870  0.02900     3    98  0.1462    0.9319
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## SUMMARY AND POST-HOC TESTS, harm1 baseline
##           Estimate CI (lower) CI (upper) Std. Error    df    t value Pr(>|t|)
## 1 (Intercept)  0.71467301  0.4215977  1.0077483  0.1518050 49.31469  4.7078373 <0.001 ***
## 2 cond: dist0  0.12164053 -0.1891423  0.4324233  0.1626321 98.00000  0.7479489  0.456
## 3 harm: 2F2   -0.08075299 -0.3915358  0.2300298  0.1626321 98.00000 -0.4965377  0.621
## 4 harm: 3F2   -0.41099479 -0.7217776 -0.1002120  0.1626321 98.00000 -2.5271438  0.013 *
## 5 harm: 4F2   -0.51114395 -0.8219267 -0.2003612  0.1626321 98.00000 -3.1429456  0.002 **
## 6 conddist0:harm2F2 -0.10768145 -0.5471947  0.3318318  0.2299966 98.00000 -0.4681872  0.641
## 7 conddist0:harm3F2 -0.07197366 -0.5114869  0.3675396  0.2299966 98.00000 -0.3129336  0.755
## 8 conddist0:harm4F2 -0.14615290 -0.5856661  0.2933603  0.2299966 98.00000 -0.6354569  0.527
##
## ESTIMATED MARGINAL MEANS, SIMPLE MAIN EFFECTS OF CONDITION WITHOUT CORRECTION
##           contrast harm estimate      SE df    t.ratio    p.value
## 1 1 dist3 - dist0  1F2 -0.12164053 0.1626321 98 -0.74794889 0.4562821
## 2 2 dist3 - dist0  2F2 -0.01395908 0.1626321 98 -0.08583222 0.9317749
## 3 3 dist3 - dist0  3F2 -0.04966687 0.1626321 98 -0.30539393 0.7607139
## 4 4 dist3 - dist0  4F2  0.02451237 0.1626321 98  0.15072281 0.8805042
##
## TEST OF WHETHER OR NOT THE INTERACTION PROVIDES A BETTER FIT
## Data: cur_data
## Models:
## m2: data ~ cond + harm + (1 | subject)
## m1: data ~ cond * harm + (1 | subject)
##      Df    AIC    BIC logLik deviance Chisq Chi Df Pr(>Chisq)
## m2   7 181.68 201.19 -83.840  167.68
## m1  10 187.21 215.09 -83.606  167.21 0.4688    3    0.9257
```

RLS_ODDBALL_RC1_FREQ2



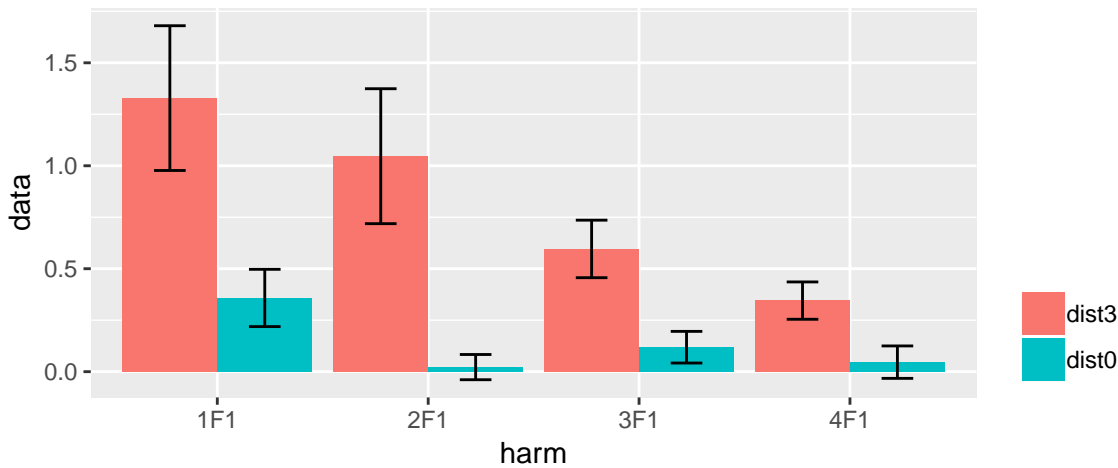
```
## WARNING: BOTH MODELS ARE SINGULAR!   LOVELY: BOTH MODELS CONVERGED!
##
## ANOVA TEST FOR MAIN EFFECTS AND INTERACTIONS
## Type III Analysis of Variance Table with Satterthwaite's method
##      Sum Sq  Mean Sq NumDF DenDF F value Pr(>F)
## cond      0.08441  0.084410     1   112   0.2435  0.6227
## harm      0.13419  0.044729     3   112   0.1290  0.9427
## cond:harm  0.35327  0.117756     3   112   0.3397  0.7967
##
## SUMMARY AND POST-HOC TESTS, harm1 baseline
##      Estimate CI (lower) CI (upper) Std. Error  df      t value Pr(>|t|)
## 1 (Intercept)  0.113480433 -0.1766880  0.4036488  0.1520193 112   0.746486770  0.457
## 2 cond: dist0  0.102632942 -0.3077271  0.5129930  0.2149878 112   0.477389555  0.634
## 3 harm: 2F1   0.076183523 -0.3341766  0.4865436  0.2149878 112   0.354362033  0.724
## 4 harm: 3F1   0.001323907 -0.4090362  0.4116840  0.2149878 112   0.006158057  0.995
## 5 harm: 4F1   0.175495648 -0.2348644  0.5858557  0.2149878 112   0.816305053  0.416
## 6 conddist0:harm2F1 -0.217681293 -0.7980181  0.3626555  0.3040387 112  -0.715965742  0.476
## 7 conddist0:harm3F1 -0.116970189 -0.6973070  0.4633666  0.3040387 112  -0.384721383  0.701
## 8 conddist0:harm4F1 -0.288055818 -0.8683926  0.2922810  0.3040387 112  -0.947431427  0.345
##
## ESTIMATED MARGINAL MEANS, SIMPLE MAIN EFFECTS OF CONDITION WITHOUT CORRECTION
##      contrast harm estimate      SE df      t.ratio  p.value
## 1 1 dist3 - dist0 1F1 -0.10263294 0.2149878 112 -0.47738956 0.6340150
## 2 2 dist3 - dist0 2F1  0.11504835 0.2149878 112  0.53513891 0.5936147
## 3 3 dist3 - dist0 3F1  0.01433725 0.2149878 112  0.06668864 0.9469485
## 4 4 dist3 - dist0 4F1  0.18542288 0.2149878 112  0.86248082 0.3902660
##
## TEST OF WHETHER OR NOT THE INTERACTION PROVIDES A BETTER FIT
## Data: cur_data
## Models:
## m2: data ~ cond + harm + (1 | subject)
## m1: data ~ cond * harm + (1 | subject)
##      Df      AIC      BIC logLik deviance Chisq Chi Df Pr(>Chisq)
## m2   7 220.22 239.73 -103.11 206.22
## m1  10 225.13 253.01 -102.57 205.13 1.0869      3      0.7802
```

RLS_CARRIER_RC1_FREQ2



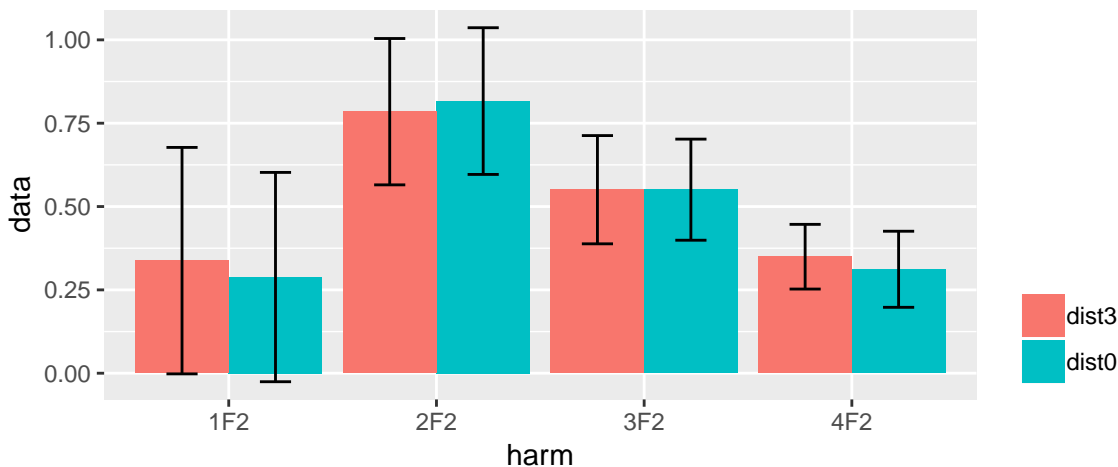
```
## LOVELY: NONE OF THE MODELS ARE SINGULAR!    LOVELY: BOTH MODELS CONVERGED!
##
## ANOVA TEST FOR MAIN EFFECTS AND INTERACTIONS
## Type III Analysis of Variance Table with Satterthwaite's method
##           Sum Sq Mean Sq NumDF DenDF F value Pr(>F)
## cond           0.222   0.222     1    98  0.3592 0.5503
## harm        100.210  33.403     3    98 54.1051 <2e-16 ***
## cond:harm    0.193   0.064     3    98  0.1040 0.9575
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## SUMMARY AND POST-HOC TESTS, harm1 baseline
##           Estimate CI (lower) CI (upper) Std. Error    df    t value Pr(>|t|)
## 1 (Intercept)  2.54038011  1.9592824  3.1214778  0.2989531 36.87571  8.4975886 <0.001 ***
## 2 cond: dist0 -0.12893911 -0.6772103  0.4193320  0.2869094 98.00000 -0.4494070  0.654
## 3 harm: 2F2   -2.18135869 -2.7296298 -1.6330875  0.2869094 98.00000 -7.6029523 <0.001 ***
## 4 harm: 3F2   -2.07425738 -2.6225285 -1.5259862  0.2869094 98.00000 -7.2296592 <0.001 ***
## 5 harm: 4F2   -2.16095017 -2.7092213 -1.6126790  0.2869094 98.00000 -7.5318200 <0.001 ***
## 6 conddist0:harm2F2  0.10601906 -0.6693534  0.8813916  0.4057512 98.00000  0.2612908  0.794
## 7 conddist0:harm3F2 -0.06625006 -0.8416226  0.7091224  0.4057512 98.00000 -0.1632775  0.871
## 8 conddist0:harm4F2  0.13206878 -0.6433037  0.9074413  0.4057512 98.00000  0.3254920  0.746
##
## ESTIMATED MARGINAL MEANS, SIMPLE MAIN EFFECTS OF CONDITION WITHOUT CORRECTION
##           contrast harm estimate      SE df    t.ratio  p.value
## 1 1 dist3 - dist0 1F2  0.128939112 0.2869094 98  0.44940702 0.6541304
## 2 2 dist3 - dist0 2F2  0.022920056 0.2869094 98  0.07988603 0.9364908
## 3 3 dist3 - dist0 3F2  0.195189173 0.2869094 98  0.68031635 0.4979083
## 4 4 dist3 - dist0 4F2 -0.003129672 0.2869094 98 -0.01090822 0.9913188
##
## TEST OF WHETHER OR NOT THE INTERACTION PROVIDES A BETTER FIT
## Data: cur_data
## Models:
## m2: data ~ cond + harm + (1 | subject)
## m1: data ~ cond * harm + (1 | subject)
##      Df    AIC    BIC logLik deviance Chisq Chi Df Pr(>Chisq)
## m2   7 323.81 343.33 -154.91  309.81
## m1  10 329.48 357.35 -154.74  309.48 0.3338     3    0.9535
```

RLS_ODDBALL_RC2_FREQ2



```
## LOVELY: NONE OF THE MODELS ARE SINGULAR!    LOVELY: BOTH MODELS CONVERGED!
##
## ANOVA TEST FOR MAIN EFFECTS AND INTERACTIONS
## Type III Analysis of Variance Table with Satterthwaite's method
##      Sum Sq Mean Sq NumDF DenDF F value    Pr(>F)
## cond      14.3998  14.3998     1    98 36.6689 2.587e-08 ***
## harm       6.9221   2.3074     3    98  5.8757 0.0009885 ***
## cond:harm   2.9160   0.9720     3    98  2.4752 0.0659709 .
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## SUMMARY AND POST-HOC TESTS, harm1 baseline
##      Estimate CI (lower) CI (upper) Std. Error    df    t value Pr(>|t|)
## 1      (Intercept)  1.32856811  0.96082060  1.6963156   70.9628  6.9313215 <0.001 ***
## 2      cond: dist0 -0.97070204 -1.40797106 -0.5334330   0.2288222 98.0000 -4.2421676 <0.001 ***
## 3      harm: 2F1 -0.28212313 -0.71939215  0.1551459   0.2288222 98.0000 -1.2329361  0.221
## 4      harm: 3F1 -0.73255725 -1.16982627 -0.2952882   0.2288222 98.0000 -3.2014259  0.002 **
## 5      harm: 4F1 -0.98347598 -1.42074500 -0.5462070   0.2288222 98.0000 -4.2979923 <0.001 ***
## 6 cond:dist0:harm2F1 -0.05369338 -0.67208516  0.5646984   0.3236034 98.0000 -0.1659234  0.869
## 7 cond:dist0:harm3F1  0.49344775 -0.12494403  1.1118395   0.3236034 98.0000  1.5248533  0.131
## 8 cond:dist0:harm4F1  0.67179545  0.05340367  1.2901872   0.3236034 98.0000  2.0759837  0.041 *
##
## ESTIMATED MARGINAL MEANS, SIMPLE MAIN EFFECTS OF CONDITION WITHOUT CORRECTION
##      contrast harm estimate      SE df  t.ratio    p.value
## 1 1 dist3 - dist0 1F1 0.9707020 0.2288222 98 4.242168 5.024774e-05
## 2 2 dist3 - dist0 2F1 1.0243954 0.2288222 98 4.476819 2.048437e-05
## 3 3 dist3 - dist0 3F1 0.4772543 0.2288222 98 2.085699 3.960385e-02
## 4 4 dist3 - dist0 4F1 0.2989066 0.2288222 98 1.306283 1.945138e-01
##
## TEST OF WHETHER OR NOT THE INTERACTION PROVIDES A BETTER FIT
## Data: cur_data
## Models:
## m2: data ~ cond + harm + (1 | subject)
## m1: data ~ cond * harm + (1 | subject)
##      Df    AIC    BIC logLik deviance Chisq Chi Df Pr(>Chisq)
## m2  7 263.39 282.9 -124.69  249.39
## m1 10 261.72 289.6 -120.86  241.72 7.6689    3  0.05337 .
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```


RLS_CARRIER_RC2_FREQ2



```
## LOVELY: NONE OF THE MODELS ARE SINGULAR!    LOVELY: BOTH MODELS CONVERGED!
```

```
##
```

```
## ANOVA TEST FOR MAIN EFFECTS AND INTERACTIONS
```

```
## Type III Analysis of Variance Table with Satterthwaite's method
```

```
##      Sum Sq Mean Sq NumDF DenDF F value Pr(>F)
## cond      0.0057  0.00569      1    98   0.0108  0.91727
## harm      4.6929  1.56429      3    98   2.9821  0.03504 *
## cond:harm  0.0308  0.01027      3    98   0.0196  0.99626
```

```
## ---
```

```
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
##
```

```
## SUMMARY AND POST-HOC TESTS, harm1 baseline
```

```
##      Estimate CI (lower) CI (upper) Std. Error    df    t value Pr(>|t|)
## 1      (Intercept)  0.33771659 -0.08142948  0.7568627  74.47794  1.54481859  0.127
## 2      cond: dist0 -0.04926225 -0.55463799  0.4561135  98.00000 -0.18627321  0.853
## 3      harm: 2F2   0.44682303 -0.05855271  0.9521988  98.00000  1.68955270  0.094
## 4      harm: 3F2   0.21281250 -0.29256324  0.7181882  98.00000  0.80469874  0.423
## 5      harm: 4F2   0.01184858 -0.49352716  0.5172243  98.00000  0.04480254  0.964
## 6 conddist0:harm2F2 0.08110874 -0.63360049  0.7958180  98.00000  0.21686468  0.829
## 7 conddist0:harm3F2 0.04933100 -0.66537822  0.7640402  98.00000  0.13189889  0.895
## 8 conddist0:harm4F2 0.01152326 -0.70318597  0.7262325  98.00000  0.03081034  0.975
```

```
##
```

```
## ESTIMATED MARGINAL MEANS, SIMPLE MAIN EFFECTS OF CONDITION WITHOUT CORRECTION
```

```
##      contrast harm      estimate      SE df    t.ratio  p.value
## 1 1 dist3 - dist0  1F2  4.926225e-02  0.2644623  98  0.1862732143  0.8526156
## 2 2 dist3 - dist0  2F2 -3.184649e-02  0.2644623  98 -0.1204197613  0.9043972
## 3 3 dist3 - dist0  3F2 -6.875734e-05  0.2644623  98 -0.0002599892  0.9997931
## 4 4 dist3 - dist0  4F2  3.773899e-02  0.2644623  98  0.1427008163  0.8868195
```

```
##
```

```
## TEST OF WHETHER OR NOT THE INTERACTION PROVIDES A BETTER FIT
```

```
## Data: cur_data
```

```
## Models:
```

```
## m2: data ~ cond + harm + (1 | subject)
```

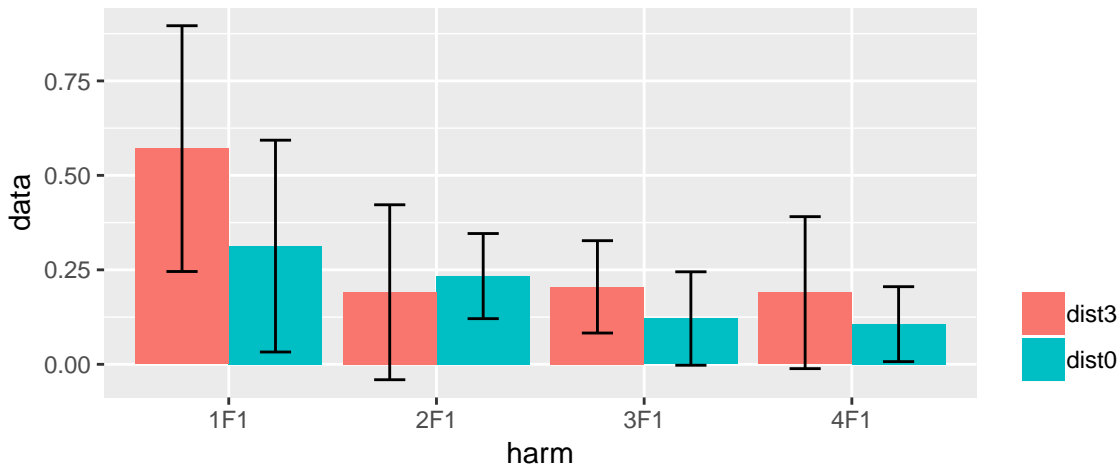
```
## m1: data ~ cond * harm + (1 | subject)
```

```
##      Df      AIC      BIC logLik deviance Chisq Chi Df Pr(>Chisq)
```

```
## m2  7 289.44 308.96 -137.72   275.44
```

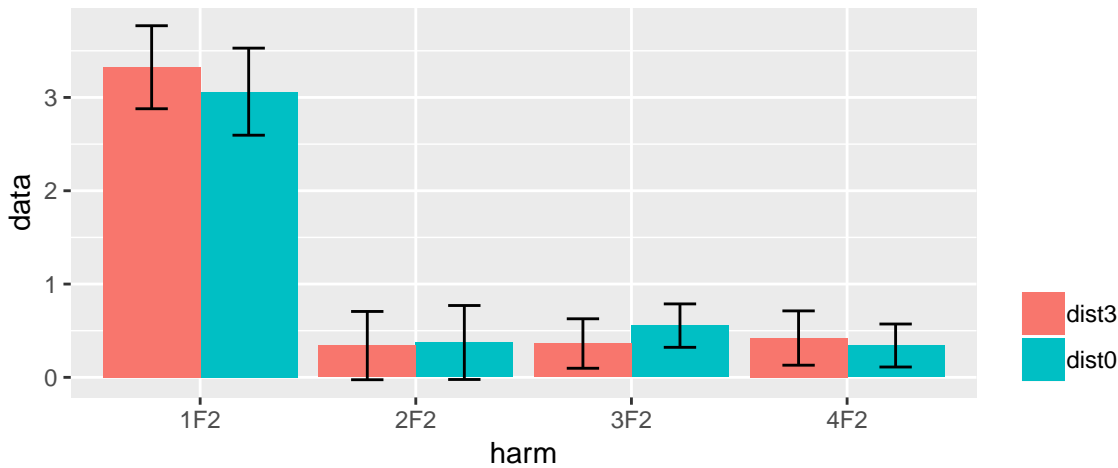
```
## m1 10 295.38 323.26 -137.69   275.38 0.0629      3    0.9959
```

RLS_ODDBALL_RC1_FREQ3



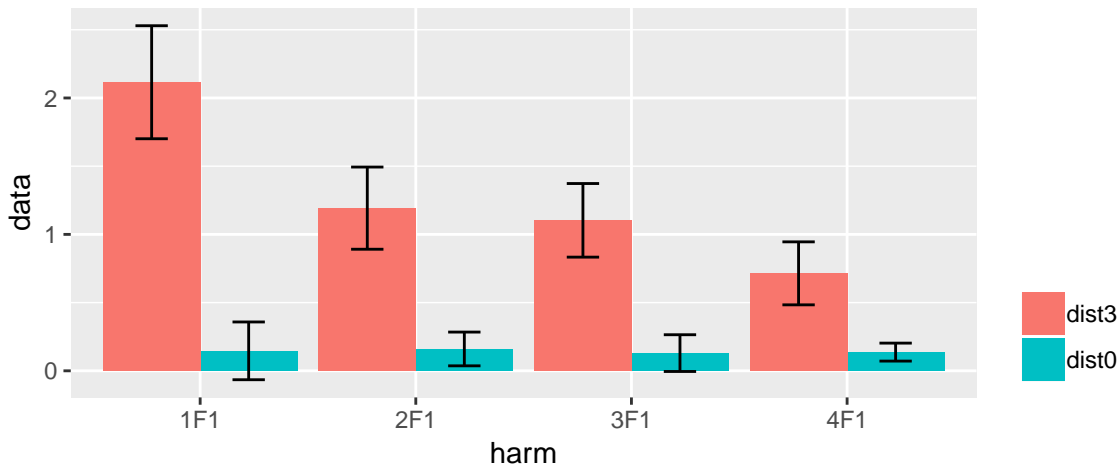
```
## LOVELY: NONE OF THE MODELS ARE SINGULAR!    LOVELY: BOTH MODELS CONVERGED!
##
## ANOVA TEST FOR MAIN EFFECTS AND INTERACTIONS
## Type III Analysis of Variance Table with Satterthwaite's method
##           Sum Sq Mean Sq NumDF DenDF F value Pr(>F)
## cond           0.27425  0.27425     1    98   0.4980  0.4820
## harm           1.67684  0.55895     3    98   1.0151  0.3895
## cond:harm      0.34356  0.11452     3    98   0.2080  0.8907
##
## SUMMARY AND POST-HOC TESTS, harm1 baseline
##           Estimate CI (lower) CI (upper) Std. Error      df    t value Pr(>|t|)
## 1 (Intercept)  0.5708103  0.1821837  0.9594370  0.2034444 102.7994  2.8057312  0.006 **
## 2 cond: dist0 -0.2579961 -0.7757877  0.2597954  0.2709595  98.0000 -0.9521575  0.343
## 3 harm: 2F1   -0.3801314 -0.8979229  0.1376602  0.2709595  98.0000 -1.4029084  0.164
## 4 harm: 3F1   -0.3658424 -0.8836340  0.1519492  0.2709595  98.0000 -1.3501736  0.18
## 5 harm: 4F1   -0.3811518 -0.8989434  0.1366398  0.2709595  98.0000 -1.4066744  0.163
## 6 conddist0:harm2F1  0.3007711 -0.4314968  1.0330390  0.3831946  98.0000  0.7849043  0.434
## 7 conddist0:harm3F1  0.1741781 -0.5580898  0.9064460  0.3831946  98.0000  0.4545421  0.65
## 8 conddist0:harm4F1  0.1745892 -0.5576787  0.9068570  0.3831946  98.0000  0.4556149  0.65
##
## ESTIMATED MARGINAL MEANS, SIMPLE MAIN EFFECTS OF CONDITION WITHOUT CORRECTION
##           contrast harm estimate      SE df    t.ratio    p.value
## 1 1 dist3 - dist0 1F1  0.25799614 0.2709595 98   0.9521575 0.3433596
## 2 2 dist3 - dist0 2F1 -0.04277496 0.2709595 98  -0.1578648 0.8748882
## 3 3 dist3 - dist0 3F1  0.08381804 0.2709595 98   0.3093379 0.7577213
## 4 4 dist3 - dist0 4F1  0.08340697 0.2709595 98   0.3078208 0.7588720
##
## TEST OF WHETHER OR NOT THE INTERACTION PROVIDES A BETTER FIT
## Data: cur_data
## Models:
## m2: data ~ cond + harm + (1 | subject)
## m1: data ~ cond * harm + (1 | subject)
##      Df      AIC      BIC logLik deviance Chisq Chi Df Pr(>Chisq)
## m2   7 285.88 305.39 -135.94  271.88
## m1  10 291.21 319.09 -135.61  271.21 0.6664    3    0.8811
```

RLS_CARRIER_RC1_FREQ3



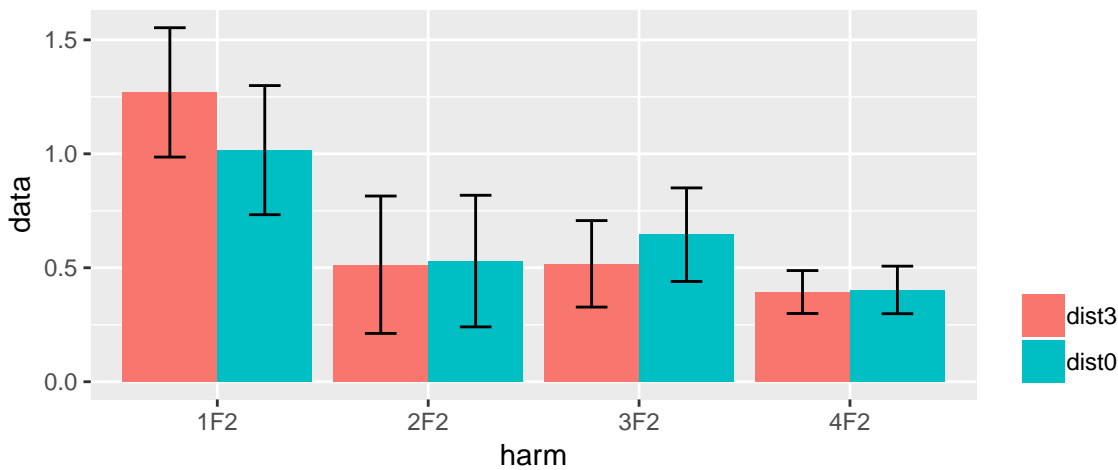
```
## LOVELY: NONE OF THE MODELS ARE SINGULAR!    LOVELY: BOTH MODELS CONVERGED!
##
## ANOVA TEST FOR MAIN EFFECTS AND INTERACTIONS
## Type III Analysis of Variance Table with Satterthwaite's method
##           Sum Sq Mean Sq NumDF DenDF F value Pr(>F)
## cond           0.026    0.026     1    98  0.0218 0.8829
## harm        175.800   58.600     3    98 50.0638 <2e-16 ***
## cond:harm     0.822    0.274     3    98  0.2341 0.8724
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## SUMMARY AND POST-HOC TESTS, harm1 baseline
##           Estimate CI (lower) CI (upper) Std. Error    df    t value Pr(>|t|)
## 1 (Intercept)  3.3238682  2.6543570  3.993379  0.3479948 59.40724  9.5514890 <0.001 ***
## 2 cond: dist0 -0.2619387 -1.0168694  0.492992  0.3950540 98.00000 -0.6630451  0.509
## 3 harm: 2F2   -2.9833836 -3.7383143 -2.228453  0.3950540 98.00000 -7.5518365 <0.001 ***
## 4 harm: 3F2   -2.9613562 -3.7162869 -2.206426  0.3950540 98.00000 -7.4960787 <0.001 ***
## 5 harm: 4F2   -2.9024774 -3.6574081 -2.147547  0.3950540 98.00000 -7.3470387 <0.001 ***
## 6 conddist0:harm2F2 0.2951744 -0.7724588  1.362808  0.5586908 98.00000  0.5283323  0.598
## 7 conddist0:harm3F2 0.4539981 -0.6136352  1.521631  0.5586908 98.00000  0.8126107  0.418
## 8 conddist0:harm4F2 0.1818761 -0.8857572  1.249509  0.5586908 98.00000  0.3255398  0.745
##
## ESTIMATED MARGINAL MEANS, SIMPLE MAIN EFFECTS OF CONDITION WITHOUT CORRECTION
##           contrast harm estimate      SE df    t.ratio    p.value
## 1 1 dist3 - dist0 1F2  0.26193867 0.395054 98  0.66304515 0.5088582
## 2 2 dist3 - dist0 2F2 -0.03323574 0.395054 98 -0.08412961 0.9331250
## 3 3 dist3 - dist0 3F2 -0.19205942 0.395054 98 -0.48615987 0.6279392
## 4 4 dist3 - dist0 4F2  0.08006260 0.395054 98  0.20266241 0.8398191
##
## TEST OF WHETHER OR NOT THE INTERACTION PROVIDES A BETTER FIT
## Data: cur_data
## Models:
## m2: data ~ cond + harm + (1 | subject)
## m1: data ~ cond * harm + (1 | subject)
##      Df      AIC      BIC logLik deviance Chisq Chi Df Pr(>Chisq)
## m2   7 391.25 410.76 -188.62  377.25
## m1  10 396.50 424.37 -188.25  376.50 0.7498      3      0.8614
```

RLS_ODDBALL_RC2_FREQ3



```
## LOVELY: NONE OF THE MODELS ARE SINGULAR!    LOVELY: BOTH MODELS CONVERGED!
##
## ANOVA TEST FOR MAIN EFFECTS AND INTERACTIONS
## Type III Analysis of Variance Table with Satterthwaite's method
##           Sum Sq Mean Sq NumDF DenDF F value    Pr(>F)
## cond       38.845   38.845     1    98 61.7888 5.026e-12 ***
## harm        8.033    2.678     3    98  4.2594 0.007142 **
## cond:harm    7.825    2.608     3    98  4.1489 0.008190 **
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## SUMMARY AND POST-HOC TESTS, harm1 baseline
##           Estimate CI (lower) CI (upper) Std. Error      df    t value Pr(>|t|)
## 1 (Intercept)  2.1153118  1.6497130  2.5809106  0.2426701 70.80673   8.716821 <0.001 ***
## 2 cond: dist0 -1.9689590 -2.5222249 -1.4156931  0.2895232 98.00000  -6.800696 <0.001 ***
## 3 harm: 2F1   -0.9229161 -1.4761820 -0.3696502  0.2895232 98.00000  -3.187711  0.002 **
## 4 harm: 3F1   -1.0123090 -1.5655749 -0.4590431  0.2895232 98.00000  -3.496470  0.001 ***
## 5 harm: 4F1   -1.4009617 -1.9542276 -0.8476958  0.2895232 98.00000  -4.838859 <0.001 ***
## 6 conddist0:harm2F1  0.9367639  0.1543277  1.7192000  0.4094476 98.00000   2.287872  0.024 *
## 7 conddist0:harm3F1  0.9956543  0.2132182  1.7780904  0.4094476 98.00000   2.431701  0.017 *
## 8 conddist0:harm4F1  1.3917753  0.6093392  2.1742115  0.4094476 98.00000   3.399154  0.001 ***
##
## ESTIMATED MARGINAL MEANS, SIMPLE MAIN EFFECTS OF CONDITION WITHOUT CORRECTION
##           contrast harm estimate      SE df  t.ratio    p.value
## 1 1 dist3 - dist0  1F1  1.9689590 0.2895232 98  6.800696 8.259162e-10
## 2 2 dist3 - dist0  2F1  1.0321952 0.2895232 98  3.565156 5.640967e-04
## 3 3 dist3 - dist0  3F1  0.9733047 0.2895232 98  3.361751 1.105525e-03
## 4 4 dist3 - dist0  4F1  0.5771837 0.2895232 98  1.993567 4.897894e-02
##
## TEST OF WHETHER OR NOT THE INTERACTION PROVIDES A BETTER FIT
## Data: cur_data
## Models:
## m2: data ~ cond + harm + (1 | subject)
## m1: data ~ cond * harm + (1 | subject)
##      Df    AIC    BIC logLik deviance Chisq Chi Df Pr(>Chisq)
## m2   7 324.79 344.31 -155.40   310.79
## m1  10 318.24 346.11 -149.12   298.24 12.554     3  0.005706 **
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

RLS_CARRIER_RC2_FREQ3



```
## LOVELY: NONE OF THE MODELS ARE SINGULAR!    LOVELY: BOTH MODELS CONVERGED!
##
## ANOVA TEST FOR MAIN EFFECTS AND INTERACTIONS
## Type III Analysis of Variance Table with Satterthwaite's method
##      Sum Sq Mean Sq NumDF DenDF F value    Pr(>F)
## cond      0.0189  0.0189     1    98  0.0268 0.870284
## harm      9.8132  3.2711     3    98  4.6494 0.004412 **
## cond:harm  0.5880  0.1960     3    98  0.2786 0.840723
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## SUMMARY AND POST-HOC TESTS, harm1 baseline
##      Estimate CI (lower) CI (upper) Std. Error    df    t value Pr(>|t|)
## 1      (Intercept)  1.2695470  0.8250578  1.7140363  0.2326175 99.62549  5.4576582 <0.001 ***
## 2      cond: dist0 -0.2533755 -0.8386579  0.3319070  0.3062774 98.00000 -0.8272744   0.41
## 3      harm: 2F2  -0.7561837 -1.3414662 -0.1709012  0.3062774 98.00000 -2.4689505  0.015  *
## 4      harm: 3F2  -0.7522758 -1.3375582 -0.1669933  0.3062774 98.00000 -2.4561909  0.016  *
## 5      harm: 4F2  -0.8758785 -1.4611610 -0.2905960  0.3062774 98.00000 -2.8597557  0.005  **
## 6 cond:dist0:harm2F2  0.2694409 -0.5582735  1.0971553  0.4331416 98.00000  0.6220618  0.535
## 7 cond:dist0:harm3F2  0.3813538 -0.4463606  1.2090682  0.4331416 98.00000  0.8804367  0.381
## 8 cond:dist0:harm4F2  0.2624157 -0.5652987  1.0901301  0.4331416 98.00000  0.6058427  0.546
##
## ESTIMATED MARGINAL MEANS, SIMPLE MAIN EFFECTS OF CONDITION WITHOUT CORRECTION
##      contrast harm    estimate      SE df    t.ratio    p.value
## 1 1 dist3 - dist0  1F2  0.253375456 0.3062774 98  0.82727442 0.4100914
## 2 2 dist3 - dist0  2F2 -0.016065431 0.3062774 98 -0.05245386 0.9582738
## 3 3 dist3 - dist0  3F2 -0.127978346 0.3062774 98 -0.41785110 0.6769701
## 4 4 dist3 - dist0  4F2 -0.009040233 0.3062774 98 -0.02951649 0.9765127
##
## TEST OF WHETHER OR NOT THE INTERACTION PROVIDES A BETTER FIT
## Data: cur_data
## Models:
## m2: data ~ cond + harm + (1 | subject)
## m1: data ~ cond * harm + (1 | subject)
##      Df      AIC      BIC logLik deviance Chisq Chi Df Pr(>Chisq)
## m2   7 316.99 336.50 -151.50  302.99
## m1  10 322.10 349.97 -151.05  302.10 0.8917     3    0.8274
```