Exploratory Analyses Discussed on the 10th of December 2018

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Are females' attacks predicting cannibalism?

here I use trials that we considered 'valid' (no spider died from another reason than cannibalism)
since the outcome in terms of cannibalism is the exact opposite for males within a trial, I use the difference in attack rate towards a randomly picked focal male and the non focal male

```
head(FocalMaleTable)
```

```
##    FID TotalWatch FocalNbFAttacks FocalConsumYN FID NonFocalNbFAttacks
## 2  102         64               0             0 102                  1
## 3  104       1465               0             0 104                  0
## 9  111       1743               0             0 111                  0
## 15 115       1679               0             0 115                  0
## 17 118        607               1             1 118                  0
## 20 119       4756               0             1 119                  0
##    NonFocalConsumYN AttackRateDifference
## 2                 1         -0.015625000
## 3                 1          0.000000000
## 9                 1          0.000000000
## 15                1          0.000000000
## 17                0          0.001647446
## 20                0          0.000000000
```

```
summary(lm(FocalConsumYN ~ AttackRateDifference,data = FocalMaleTable))
```

```
##
## Call:
## lm(formula = FocalConsumYN ~ AttackRateDifference, data = FocalMaleTable)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -0.6341 -0.5567  0.3736  0.4433  0.4870
##
## Coefficients:
##                      Estimate Std. Error t value Pr(>|t|)
## (Intercept)            0.5567     0.0565   9.854  3.6e-15 ***
## AttackRateDifference  51.8300    27.4942   1.885   0.0633 .
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.493 on 75 degrees of freedom
## Multiple R-squared:  0.04524,    Adjusted R-squared:  0.03251
## F-statistic: 3.554 on 1 and 75 DF,  p-value: 0.06329
```

Females' attack rate tend to predict cannibalism

Are females' attacks also predicting male death (for other reasons than cannibalism)?

here we compare the number of female attacks towards male that ended up dying and male that survived, within trials where one of the male died.

```
t.test(subsetTrialwhereMaleDied$NbFAttacks[subsetTrialwhereMaleDied$Died == 1],
       subsetTrialwhereMaleDied$NbFAttacks[subsetTrialwhereMaleDied$Died == 0],
       paired = TRUE)
```

```
##
##  Paired t-test
##
## data:  subsetTrialwhereMaleDied$NbFAttacks[subsetTrialwhereMaleDied$Died ==  and subsetTrialwhereMale
## t = 1.8974, df = 12, p-value = 0.0821
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -0.0342312  0.4957697
## sample estimates:
## mean of the differences
##               0.2307692
```

females' attacks tend to predict male death. Just fyi, in the paper, we present results of the confirmatory analyses excluding those tests (as preregistered), we otherwise present behavioural data for the video on all trials performed.

Male male interaction

First off, I have to say we didn't clearly identified the winner and loser, but have only tentative data on this. Here, we assumed the one male who started the aggressive interaction was the winner.

Descriptive

the number of test with male male physical interaction is all trials is 48.0392157% and 50.6493506% of the valid tests.

Does male color predict the number of aggressions received from the other male?

```
summary(lmer(NbMphysicalInter ~ Mcol+ (1|FID), data = MY_TABLE_Videos_perMale))
```

```
## Linear mixed model fit by REML ['lmerMod']
## Formula: NbMphysicalInter ~ Mcol + (1 | FID)
##    Data: MY_TABLE_Videos_perMale
##
## REML criterion at convergence: 932.9
##
## Scaled residuals:
##     Min      1Q  Median      3Q     Max
## -0.4324 -0.4324 -0.3089 -0.0124  9.6492
##
## Random effects:
##  Groups   Name        Variance Std.Dev.
##  FID      (Intercept) 0.000    0.000
##  Residual             5.667    2.381
## Number of obs: 204, groups:  FID, 102
##
```

```
## Fixed effects:
##             Estimate Std. Error t value
## (Intercept)   0.7353     0.2357   3.119
## McolZBlack    0.2941     0.3333   0.882
##
## Correlation of Fixed Effects:
##            (Intr)
## McolZBlack -0.707
```

Male color does not predict Nb of male attacks received

Excluding trials with male male interactions to remove this potential confounding factor

Run our confirmatory analyses in this new subset

```r
summary(glm (CannibalizedRedYN ~ Trt+ DeltaMsize + DeltaMcondition
                              , family = "binomial"
                              , data = MY_TABLE_MaleTest_NoMaleMaleFight))
```

```
##
## Call:
## glm(formula = CannibalizedRedYN ~ Trt + DeltaMsize + DeltaMcondition,
##     family = "binomial", data = MY_TABLE_MaleTest_NoMaleMaleFight)
##
## Deviance Residuals:
##     Min       1Q   Median       3Q      Max
## -1.2403  -1.0221  -0.7106   1.1515   1.8878
##
## Coefficients:
##                   Estimate Std. Error z value Pr(>|z|)
## (Intercept)        -0.1276     0.4752  -0.269    0.788
## TrtRedPreference   -1.0878     0.7518  -1.447    0.148
## DeltaMsize         -3.9143     8.4148  -0.465    0.642
## DeltaMcondition    59.0413   127.2749   0.464    0.643
##
## (Dispersion parameter for binomial family taken to be 1)
##
##     Null deviance: 50.016  on 37  degrees of freedom
## Residual deviance: 46.930  on 34  degrees of freedom
## AIC: 54.93
##
## Number of Fisher Scoring iterations: 4
```

Red preference females are (non significantly) less likely to cannibalise the red male, even more so in this subset that exclude male male competiion as a confounding factor

Are females' attacks more likely on specific males depending on their training diet?

In all the data

```r
summary(lmer(NbFAttacks~  Mcol*GroupName + (1|FID),data = MY_TABLE_Videos_perMale, REML =FALSE))
```

```
## Linear mixed model fit by maximum likelihood  ['lmerMod']
## Formula: NbFAttacks ~ Mcol * GroupName + (1 | FID)
##    Data: MY_TABLE_Videos_perMale
##
```

```
##      AIC      BIC   logLik deviance df.resid
##    599.0    618.9   -293.5    587.0      198
##
## Scaled residuals:
##     Min      1Q  Median      3Q     Max
## -0.9660 -0.2987 -0.1817 -0.0962  8.1237
##
## Random effects:
##  Groups   Name        Variance Std.Dev.
##  FID      (Intercept) 0.1080   0.3287
##  Residual             0.9381   0.9686
## Number of obs: 204, groups:  FID, 102
##
## Fixed effects:
##                                  Estimate Std. Error t value
## (Intercept)                        0.2549     0.1432   1.780
## McolZBlack                         0.3333     0.1918   1.738
## GroupNameRedPreference            -0.1176     0.2025  -0.581
## McolZBlack:GroupNameRedPreference  -0.1373     0.2712  -0.506
##
## Correlation of Fixed Effects:
##             (Intr) MclZBl GrpNRP
## McolZBlack  -0.670
## GrpNmRdPrfr -0.707  0.473
## MclZBl:GNRP  0.473 -0.707 -0.670
```

In the valid tests

```
summary(lmer(NbFAttacks~  Mcol*GroupName + (1|FID)
             ,data = MY_TABLE_Videos_perMale[MY_TABLE_Videos_perMale$ExcludeYN == 0,], REML =FALSE))
```

```
## Linear mixed model fit by maximum likelihood  ['lmerMod']
## Formula: NbFAttacks ~ Mcol * GroupName + (1 | FID)
##    Data: MY_TABLE_Videos_perMale[MY_TABLE_Videos_perMale$ExcludeYN ==
##     0, ]
##
##      AIC      BIC   logLik deviance df.resid
##    491.7    509.9   -239.8    479.7      148
##
## Scaled residuals:
##     Min      1Q  Median      3Q     Max
## -0.8341 -0.3106 -0.1848 -0.1075  7.1893
##
## Random effects:
##  Groups   Name        Variance Std.Dev.
##  FID      (Intercept) 0.1284   0.3583
##  Residual             1.1969   1.0940
## Number of obs: 154, groups:  FID, 77
##
## Fixed effects:
##                                  Estimate Std. Error t value
## (Intercept)                        0.2927     0.1798   1.628
## McolZBlack                         0.4390     0.2416   1.817
## GroupNameRedPreference            -0.1260     0.2629  -0.479
## McolZBlack:GroupNameRedPreference  -0.2168     0.3534  -0.614
```

```
##
## Correlation of Fixed Effects:
##             (Intr) MclZBl GrpNRP
## McolZBlack  -0.672
## GrpNmRdPrfr -0.684  0.459
## MclZBl:GNRP  0.459 -0.684 -0.672
```

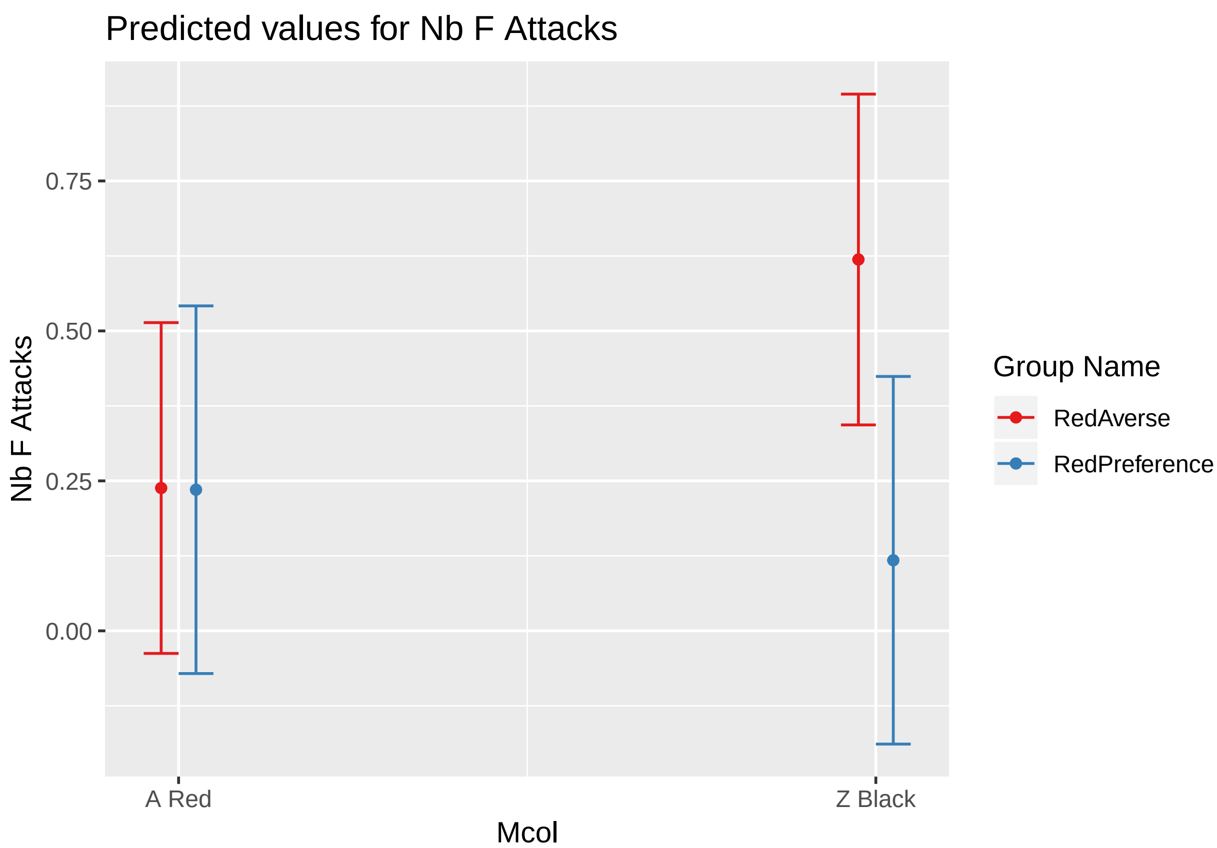
In the valid tests subset without male male competition

```
summary(lmer(NbFAttacks~ Mcol* GroupName + (1|FID)
             ,data = MY_TABLE_Videos_perMale_NoMaleMaleFight, REML =FALSE))
```

```
## Linear mixed model fit by maximum likelihood  ['lmerMod']
## Formula: NbFAttacks ~ Mcol * GroupName + (1 | FID)
##    Data: MY_TABLE_Videos_perMale_NoMaleMaleFight
##
##      AIC      BIC   logLik deviance df.resid
##    160.6    174.6    -74.3    148.6       70
##
## Scaled residuals:
##     Min      1Q  Median      3Q     Max
## -1.0264 -0.4067 -0.2712 -0.1436  5.0745
##
## Random effects:
##  Groups   Name        Variance Std.Dev.
##  FID      (Intercept) 0.03774  0.1943
##  Residual             0.37786  0.6147
## Number of obs: 76, groups:  FID, 38
##
## Fixed effects:
##                                     Estimate Std. Error t value
## (Intercept)                         0.238095   0.140678   1.692
## McolZBlack                          0.380952   0.189701   2.008
## GroupNameRedPreference             -0.002801   0.210327  -0.013
## McolZBlack:GroupNameRedPreference -0.498599   0.283619  -1.758
##
## Correlation of Fixed Effects:
##             (Intr) MclZBl GrpNRP
## McolZBlack  -0.674
## GrpNmRdPrfr -0.669  0.451
## MclZBl:GNRP  0.451 -0.669 -0.674
```

```
plot_model(modNbFAttacks_ValidTests_NoMaleMaleFight, type = "pred", terms = c("Mcol", "GroupName"))
```

```
## Argument `include.non.labelled` is deprecated. Please use `non.labelled` instead.
## Argument `include.values` is deprecated. Please use `values` instead.
## Argument `include.non.labelled` is deprecated. Please use `non.labelled` instead.
```



If we remove trials with male male fights, red preferences females tend to be less likely to attack the black male than the red averse females. Both have quite similar rates of attacks toward the red males.