Surprise study pilot 12

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Pilot 12: changing "nervous/uncomfortable" to "relaxed"

We changed the question about anxiety in this pilot, other than that everything is the same as pilot 11.
After our last meeting we discussed 3 possible hypotheses:
1) Anxiety/discomfort may require a different cognitive process from happiness/mood
2) Starting point for anxiety is lower than it should be for us to see a change? (==> it does not seem to be the case)
3) Just a valence difference: "how relaxed do you feel?" Or "how unhappy do you feel?"; how relax someone feels may be easier to measure/observe/change on a momentary basis compared to how anxious someone feels which may require more time to change.
The Gorilla experiment is the following: https://app.gorilla.sc/admin/experiment/157680/design
The task is the following: https://app.gorilla.sc/admin/task/728998/editor?version=3

```
## [1] "It seems everyone has done all the 48 trials:"
```

```
## # A tibble: 25 x 2
##    Random_ID   Trial_Count
##    <chr>             <int>
##  1 SUPPRF06891          48
##  2 SUPPRF07128          48
##  3 SUPPRF12889          48
##  4 SUPPRF14988          48
##  5 SUPPRF23130          48
##  6 SUPPRF28201          48
##  7 SUPPRF28513          48
##  8 SUPPRF30408          48
##  9 SUPPRF35199          48
## 10 SUPPRF36491          48
## # i 15 more rows
```

# Relationship between "relaxed feeling" and SubjPE

We replaced the anxiety question with how relaxed someone feels in the moment (right now). The findings are very similar to before (similar effect sizes), when we asked "How anxious are you right now?", except in the opposite direction. It may be best to go back to the anxiety question then, since there won't be any doubt about whether or not we are measuring anxiety with the new question. Unless, in younger kids, the word "anxiety" would be more difficult, so maybe keeping how "nervous/uncomfortable" you feel?

```
## [1] "average correlation between anxiety and SubjPE: 0.186380616533899"
```
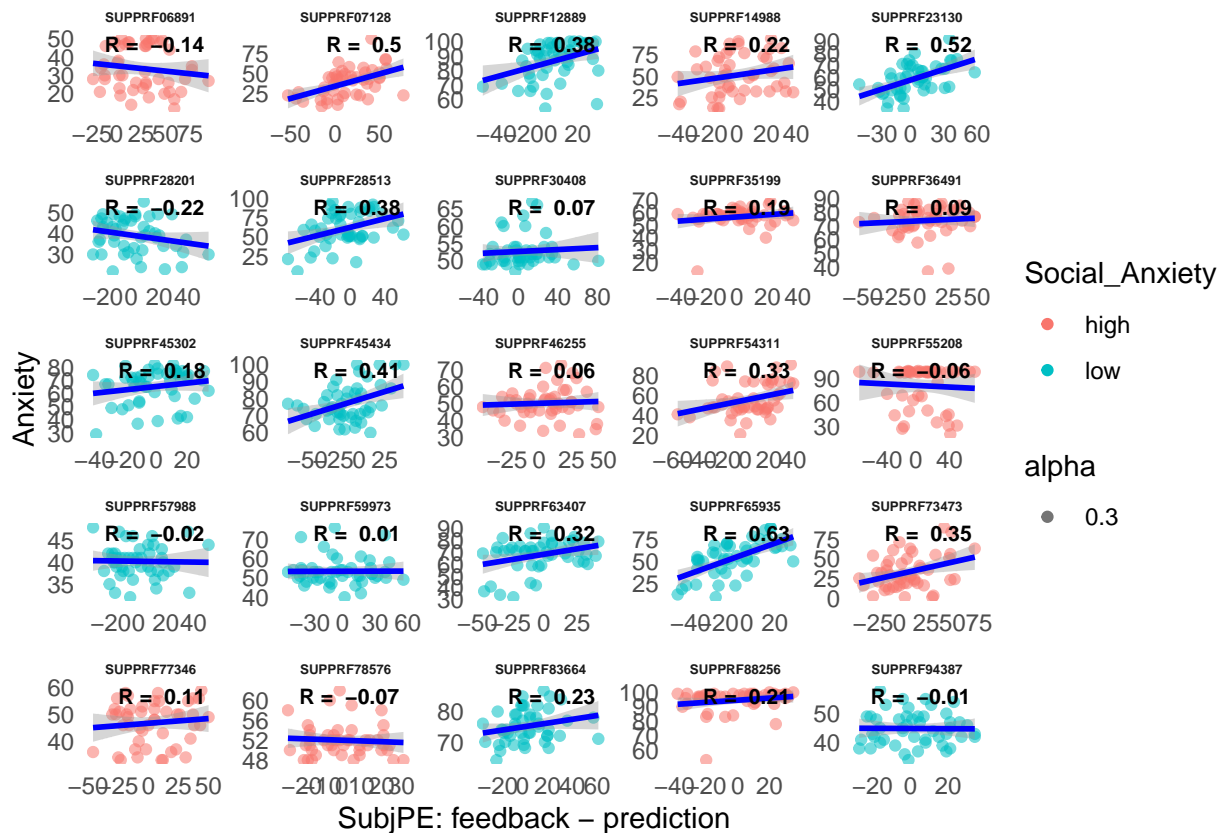
Relationship between mood and SubjPE

[1] "average correlation between mood and SubjPE: 0.283457503711388"
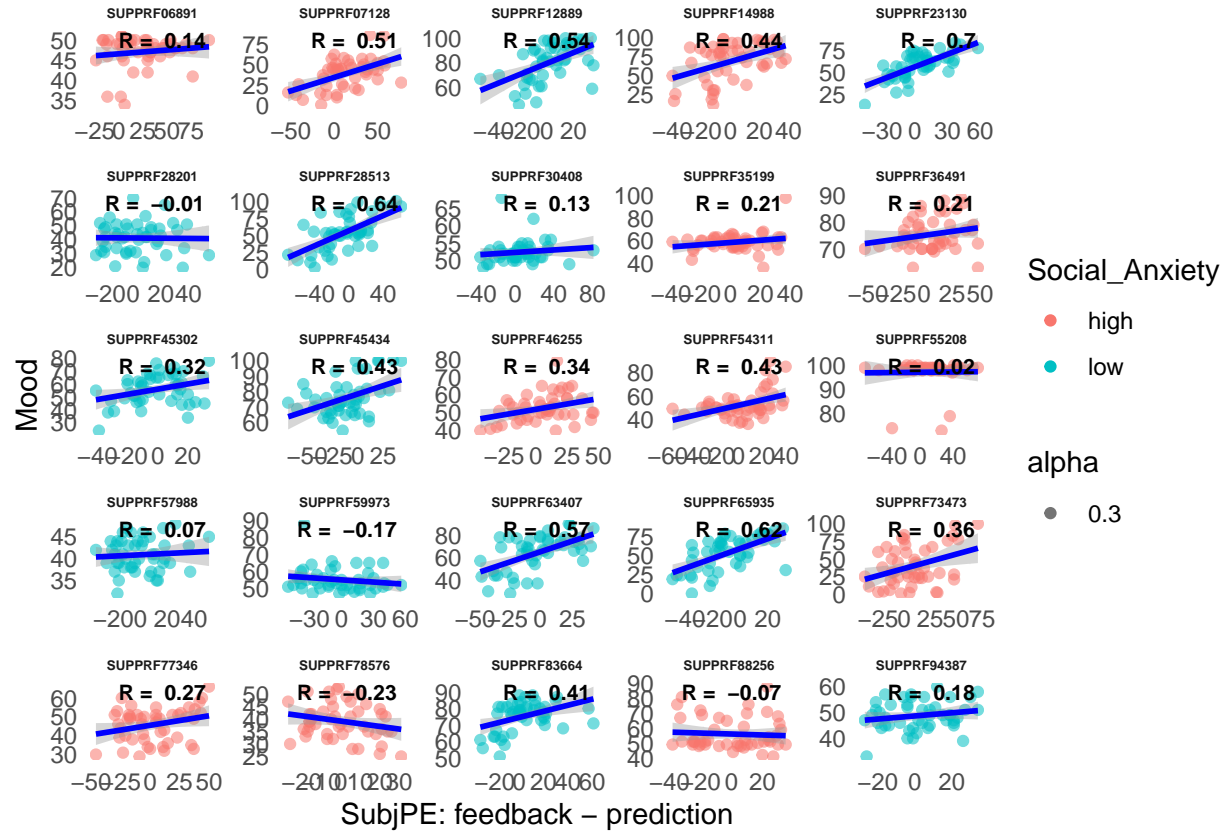
LME models for Mood and SubjPE

This is the best model: Mood ~ SubjPE + (SubjPE | Random_ID)

```
## Data: final_df12
## Models:
## model1: Response_H ~ Response_SubjPE + (1 | Random_ID)
## model2: Response_H ~ Response_SubjPE + (Response_SubjPE | Random_ID)
##        npar    AIC    BIC  logLik deviance  Chisq Df Pr(>Chisq)
## model1    4 9659.6 9679.9 -4825.8   9651.6
## model2    6 9561.3 9591.8 -4774.6   9549.3 102.28  2  < 2.2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1


## Linear mixed model fit by REML ['lmerMod']
## Formula: Response_H ~ Response_SubjPE + (1 | Random_ID)
##    Data: final_df12
## Control: lmerControl(optimizer = "bobyqa")
##
## REML criterion at convergence: 9653.9
##
## Scaled residuals:
##     Min      1Q  Median      3Q     Max
## -4.1882 -0.4770  0.0271  0.5233  3.8321
##
## Random effects:
##  Groups    Name        Variance Std.Dev.
##  Random_ID (Intercept) 222.3    14.91
##  Residual              167.3    12.93
## Number of obs: 1200, groups:  Random_ID, 25
##
## Fixed effects:
##                 Estimate Std. Error t value
## (Intercept)     56.57237    3.00587   18.82
## Response_SubjPE  0.20371    0.01669   12.20
##
## Correlation of Fixed Effects:
##             (Intr)
## Rspns_SbjPE -0.014


## Linear mixed model fit by REML ['lmerMod']
## Formula: Response_H ~ Response_SubjPE + (Response_SubjPE | Random_ID)
##    Data: final_df12
## Control: lmerControl(optimizer = "bobyqa")
##
## REML criterion at convergence: 9549.7
##
## Scaled residuals:
##     Min      1Q  Median      3Q     Max
## -4.1799 -0.4574  0.0181  0.4887  3.8677
##
## Random effects:
##  Groups    Name            Variance  Std.Dev. Corr
```
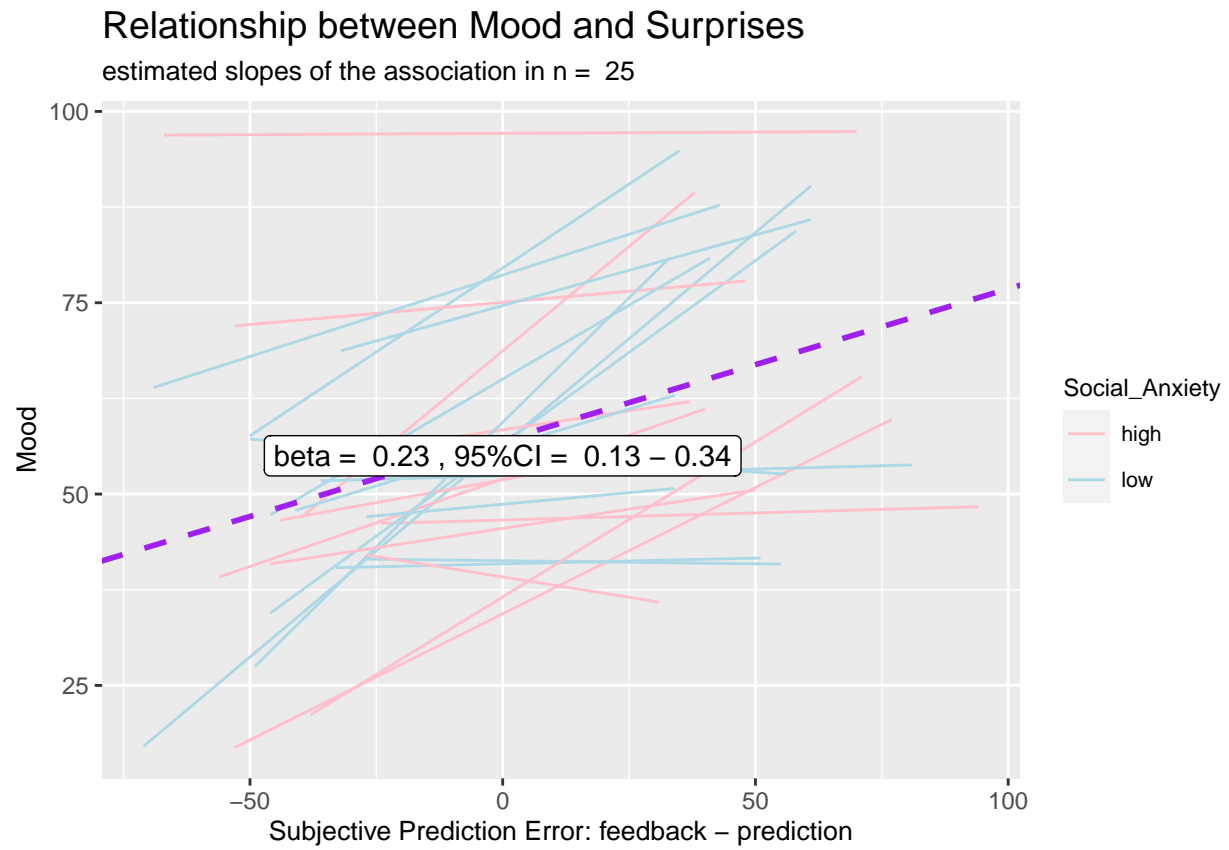
```
##  Random_ID (Intercept)      227.64790 15.0880
##           Response_SubjPE    0.04063  0.2016  0.13
##  Residual                   146.98904 12.1239
## Number of obs: 1200, groups:  Random_ID, 25
##
## Fixed effects:
##               Estimate Std. Error t value
## (Intercept)   56.98974    3.03939  18.750
## Response_SubjPE 0.19830    0.04355   4.554
##
## Correlation of Fixed Effects:
##            (Intr)
## Rspns_SbjPE 0.118


## Data: final_df12
## Models:
## model2: Response_H ~ Response_SubjPE + (Response_SubjPE | Random_ID)
## model3: Response_H ~ Response_SubjPE * mini_SPIN_total + (Response_SubjPE | Random_ID)
##        npar    AIC    BIC  logLik deviance  Chisq Df Pr(>Chisq)
## model2    6 9561.3 9591.8 -4774.6   9549.3
## model3    8 9562.4 9603.2 -4773.2   9546.4 2.8334  2     0.2425


## # A tibble: 2 x 5
##   effect term           estimate std.error statistic
##   <chr>  <chr>             <dbl>     <dbl>     <dbl>
## 1 fixed  (Intercept)       57.0      3.04      18.8
## 2 fixed  Response_SubjPE   0.198     0.0435     4.55
```

Individual plots with LME for Mood

Relationship between Mood and Surprises
estimated slopes of the association in n = 25

beta = 0.23 , 95%CI = 0.13 − 0.34

Mood (y-axis)

Subjective Prediction Error: feedback − prediction (x-axis)

Social_Anxiety
- high
- low

LME models for Anxiety (~relaxed) and SubjPE

This is the best model: Anxiety ~ SubjPE + (SubjPE | Random_ID)

```
## Data: final_df12
## Models:
## model1: Response_Ax ~ Response_SubjPE + (1 | Random_ID)
## model2: Response_Ax ~ Response_SubjPE + (Response_SubjPE | Random_ID)
##        npar    AIC    BIC  logLik deviance  Chisq Df Pr(>Chisq)
## model1    4 9735.1 9755.5 -4863.6   9727.1
## model2    6 9708.0 9738.6 -4848.0   9696.0 31.105  2  1.761e-07 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1


## Linear mixed model fit by REML ['lmerMod']
## Formula: Response_Ax ~ Response_SubjPE + (1 | Random_ID)
##    Data: final_df12
## Control: lmerControl(optimizer = "bobyqa")
##
## REML criterion at convergence: 9729.2
##
## Scaled residuals:
##     Min      1Q  Median      3Q     Max
## -4.8666 -0.4772  0.0384  0.5402  3.9245
##
## Random effects:
##  Groups    Name        Variance Std.Dev.
##  Random_ID (Intercept) 282.0    16.79
##  Residual              177.5    13.32
## Number of obs: 1200, groups:  Random_ID, 25
##
## Fixed effects:
##                 Estimate Std. Error t value
## (Intercept)      57.3996     3.3807  16.979
## Response_SubjPE   0.1281     0.0172   7.449
##
## Correlation of Fixed Effects:
##             (Intr)
## Rspns_SbjPE -0.013


## Linear mixed model fit by REML ['lmerMod']
## Formula: Response_Ax ~ Response_SubjPE + (Response_SubjPE | Random_ID)
##    Data: final_df12
## Control: lmerControl(optimizer = "bobyqa")
##
## REML criterion at convergence: 9696.8
##
## Scaled residuals:
##     Min      1Q  Median      3Q     Max
## -4.6621 -0.4334  0.0262  0.5421  3.7277
##
## Random effects:
##  Groups    Name            Variance  Std.Dev. Corr
```

8

```
##  Random_ID (Intercept)      282.56394 16.8096
##           Response_SubjPE    0.01793  0.1339  0.04
##  Residual                    168.40348 12.9770
## Number of obs: 1200, groups:  Random_ID, 25
##
## Fixed effects:
##                 Estimate Std. Error t value
## (Intercept)     57.70065    3.38415  17.050
## Response_SubjPE  0.12631    0.03197   3.951
##
## Correlation of Fixed Effects:
##             (Intr)
## Rspns_SbjPE 0.024


## Data: final_df12
## Models:
## model2: Response_Ax ~ Response_SubjPE + (Response_SubjPE | Random_ID)
## model3: Response_Ax ~ Response_SubjPE * mini_SPIN_total + (Response_SubjPE | Random_ID)
##        npar    AIC    BIC  logLik deviance  Chisq Df Pr(>Chisq)
## model2    6 9708.0 9738.6 -4848.0   9696.0
## model3    8 9710.4 9751.1 -4847.2   9694.4 1.6201  2     0.4448


## # A tibble: 2 x 5
##   effect term            estimate std.error statistic
##   <chr>  <chr>              <dbl>     <dbl>     <dbl>
## 1 fixed  (Intercept)        57.7       3.38     17.1
## 2 fixed  Response_SubjPE     0.126     0.0320    3.95
```

Individual plots with LME for Anxiety

Relationship between Anxiety (~relaxed) and Surprises
estimated slopes of the association in n = 25

beta = 0.14 , 95%CI = 0.07 − 0.21

y-axis: How relaxed do you feel right now (0–100)?

x-axis: Subjective Prediction Error: feedback − prediction

Social_Anxiety
— high
— low