Surprise study pilot 14

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Study description

This study has the same version of PE's as pilots 10 and 11, also having video and audio only. In this pilot we 1) replaced the judge pictures with cartoon images to see whether it becomes more believable as many people believed those images were AI generated, 2) we allow participants to also choose their own avatar, again to make it more believable that the others are also real, 3) we have created a new narrative around public speaking and what is the goal of this task and added criteria they will be judged open to make them more nervous but also make it more believable if they get a rating that they cannot guess what they were judged upon at each trial (they are told the judges will receive a new criterion per trial), 4) lastly, we changed two feedback questions to inquire about believability, one of them being a scale asking "How stressful was this as a social situation?"

The Gorilla experiment is the following: https://app.gorilla.sc/admin/project/120255 The task is the following: https://app.gorilla.sc/admin/task/741126/editor?version=13

I will write this here as well for us to have, if we forget again:
Positive PE: we selected numbers from a normal distribution ranging from 12-20, added this number to the mean of the histogram.
Negative PE: we selected numbers from a normal distribution ranging from 12-20, subtracted this number to the mean of the histogram.
Big positive PE: Per judge, we added 10 to the biggest positive feedback we had generated before.
**Neutral PE:** we added -1, 0, 1 to the mean of the histograms

In this sample, only 17 people out of 41 had high social anxiety.

```
## # A tibble: 41 x 2
##    Random_ID    Trial.Number
##    <chr>               <int>
##  1 SUPPRF01407            48
##  2 SUPPRF02465            48
##  3 SUPPRF05137            48
##  4 SUPPRF05583            26
##  5 SUPPRF05702            48
##  6 SUPPRF06407            48
##  7 SUPPRF08160            39
##  8 SUPPRF08392            48
##  9 SUPPRF08503            48
## 10 SUPPRF11118            48
## # i 31 more rows
```
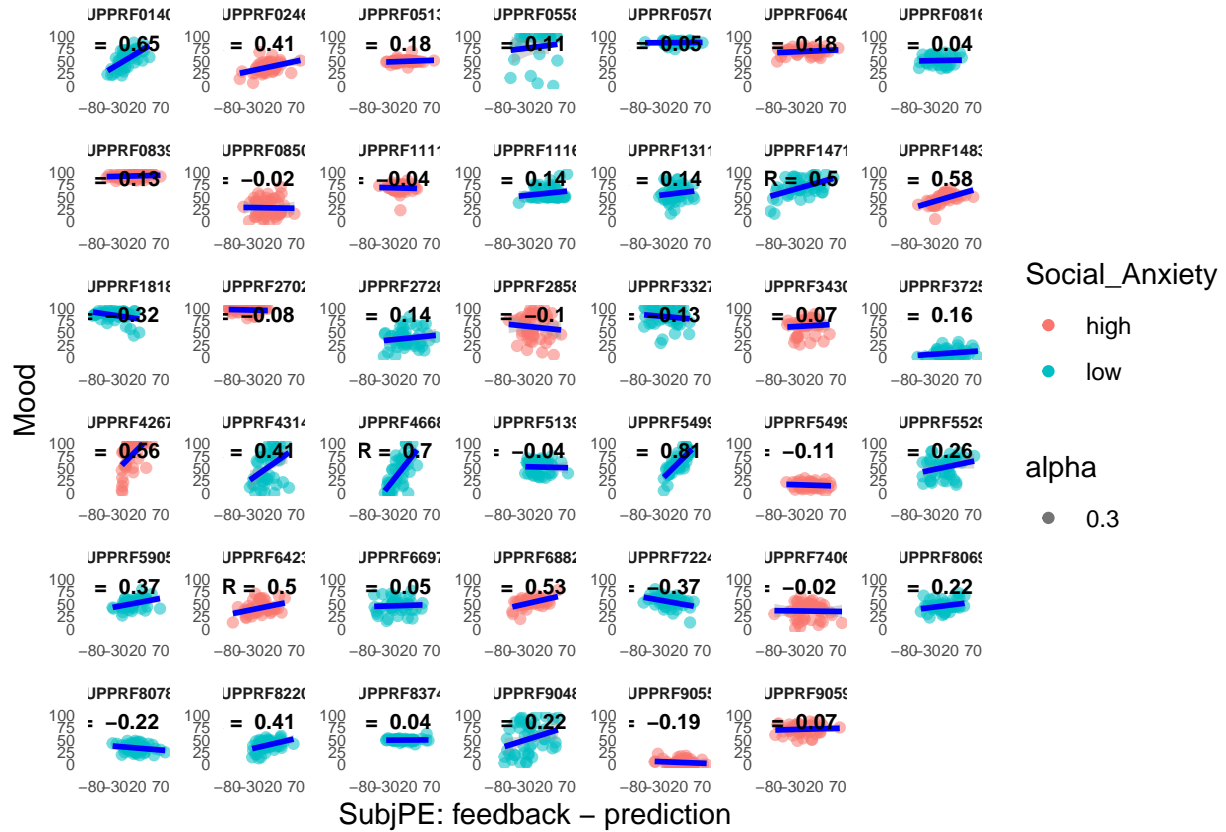
Relationship between Anxiety and SubjPE

[1] "average correlation between anxiety and SubjPE: -0.0570621407466249"
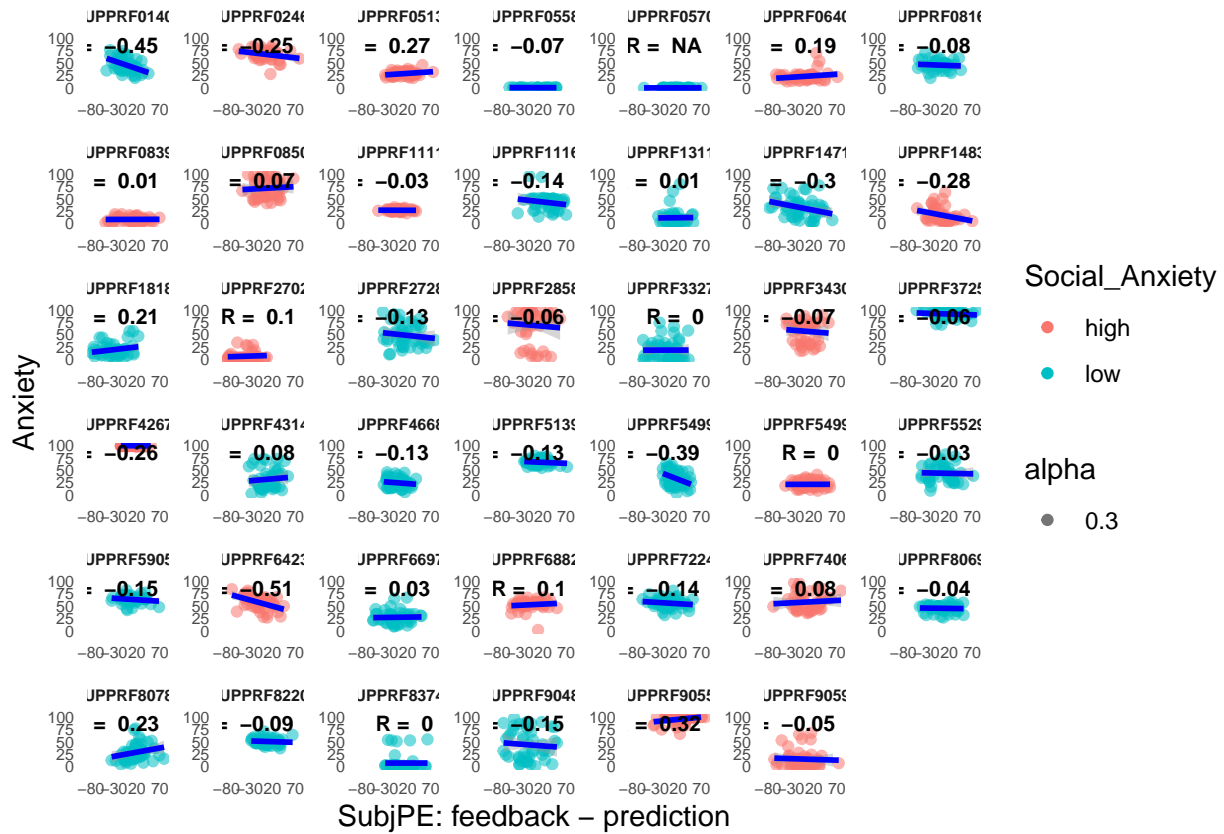
Relationship between Mood and SubjPE

```
## [1] "average correlation between mood and SubjPE: 0.169860303615549"
```
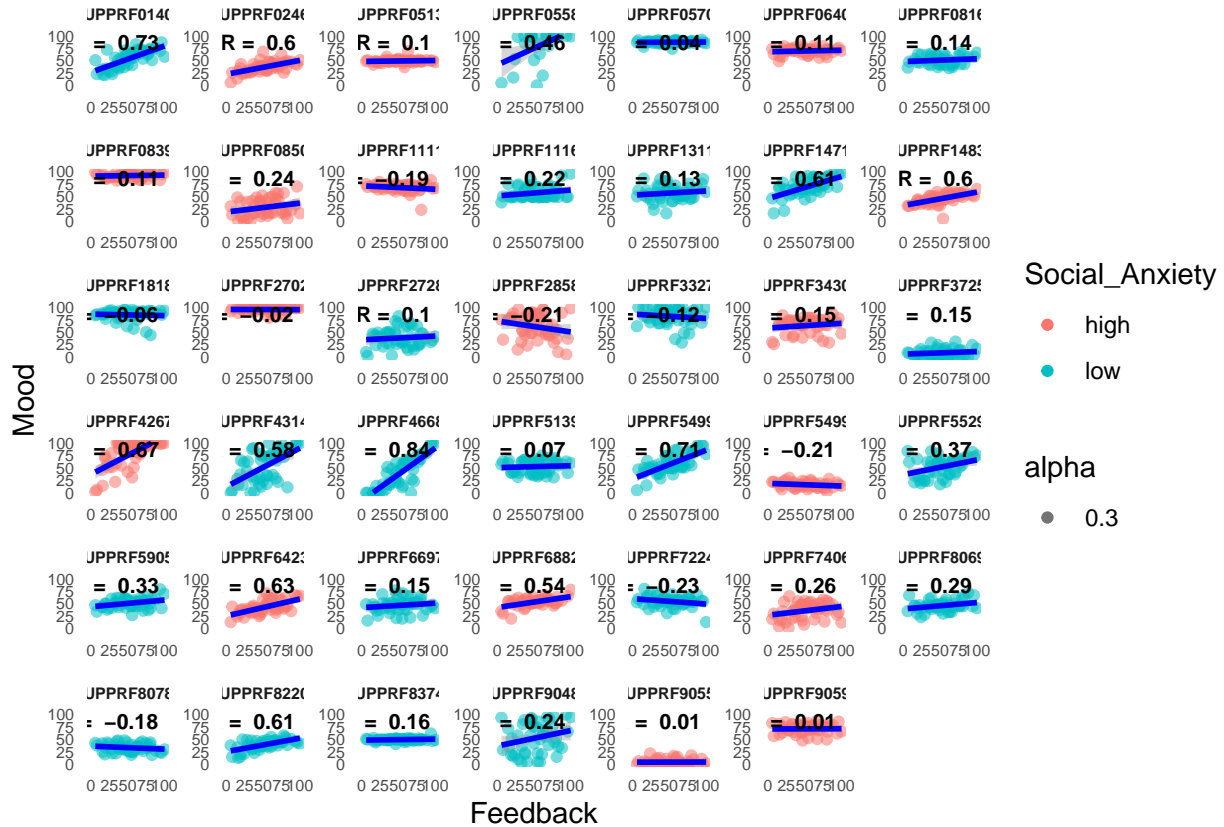
Relationship between Mood and feedback

The relationship between mood and feedback seems to be stronger than mood and subjective PE (0.24 vs 0.17), so it seems people may care more about the feedback as receiving reward or punishment, rather than social PE? The relationship between subjective PE with both anxiety and mood has been the weakest across all pilots. We need to make sure it is only because of changing the pictures of virtual players, maybe by changing the narrative they would assume that the other players are also learning how to do public speaking (less intimidating than someone who is an expert?).
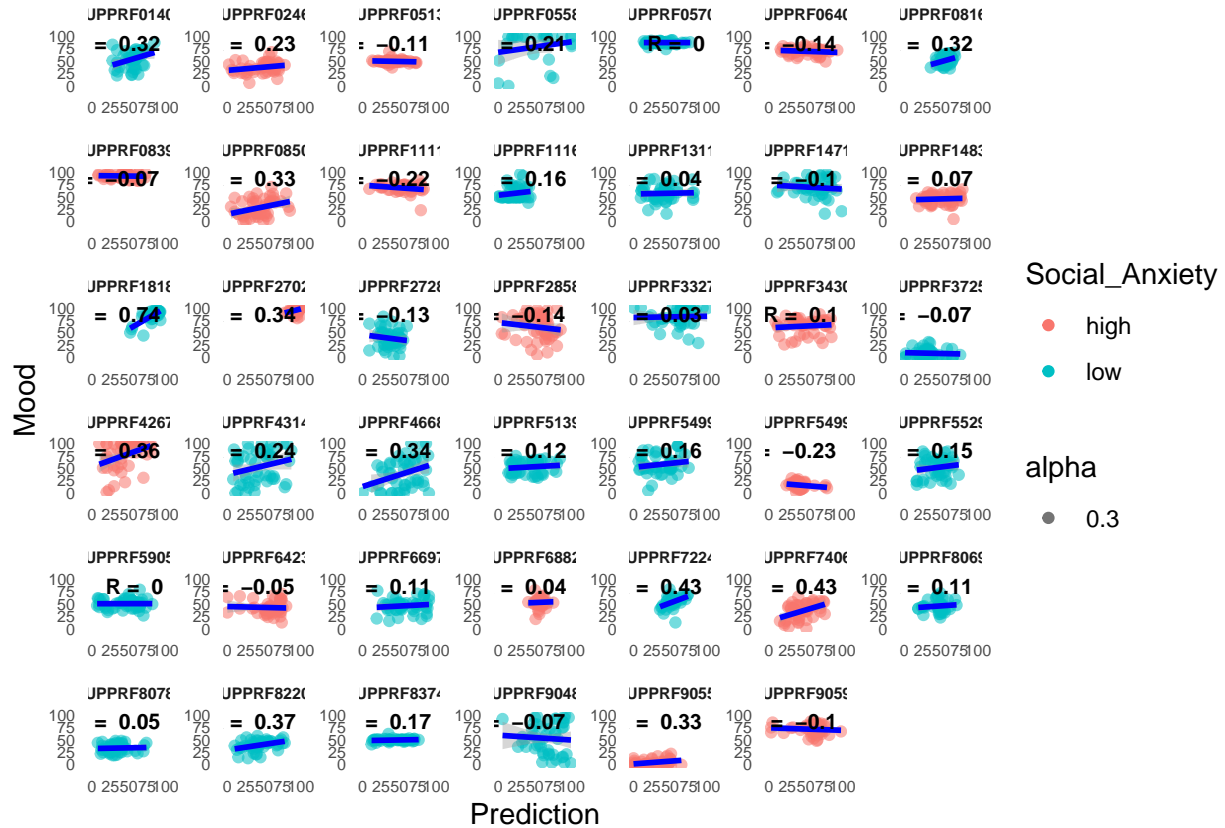
To be sure, I wonder if we want to repeat the pilot and just replace the images?

```
## [1] "average correlation between mood and feedback: 0.237770542807818"
```
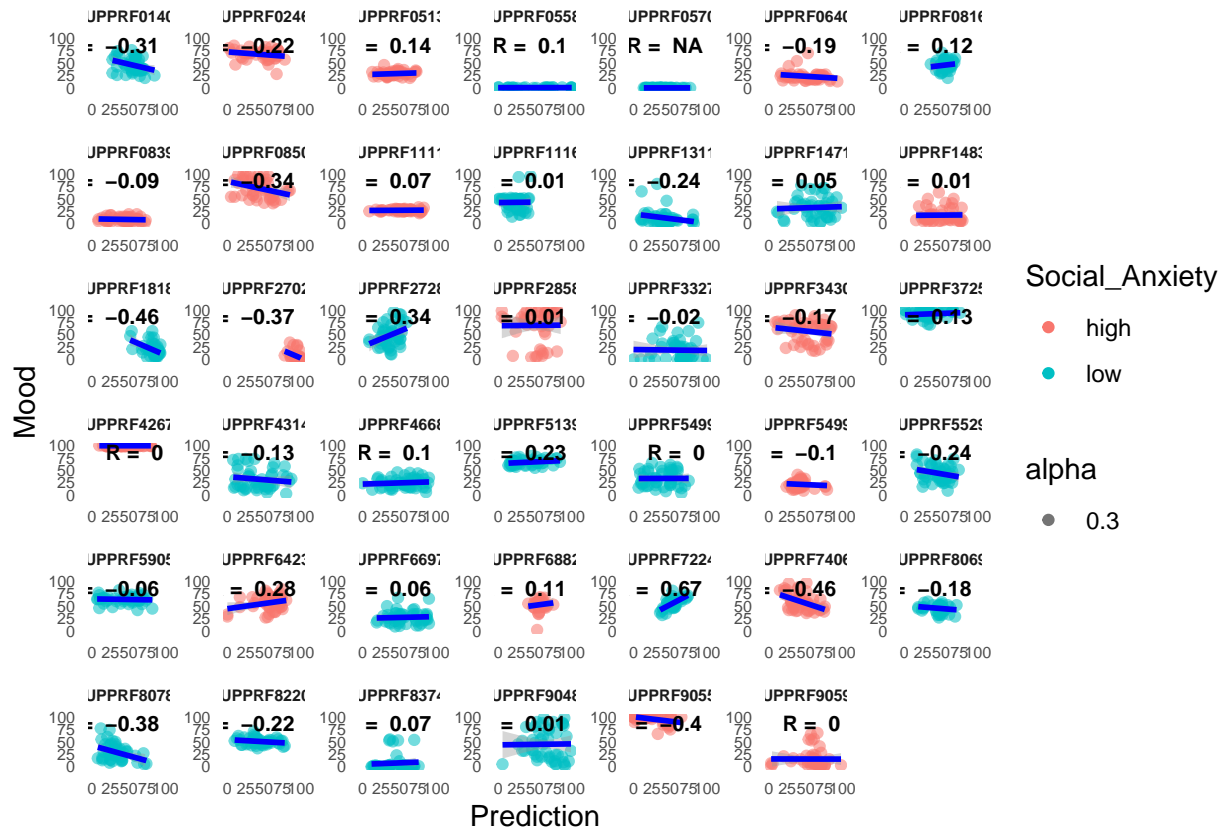
Relationship between Mood and prediction

[1] "average correlation between mood and prediction: 0.119584769789578"
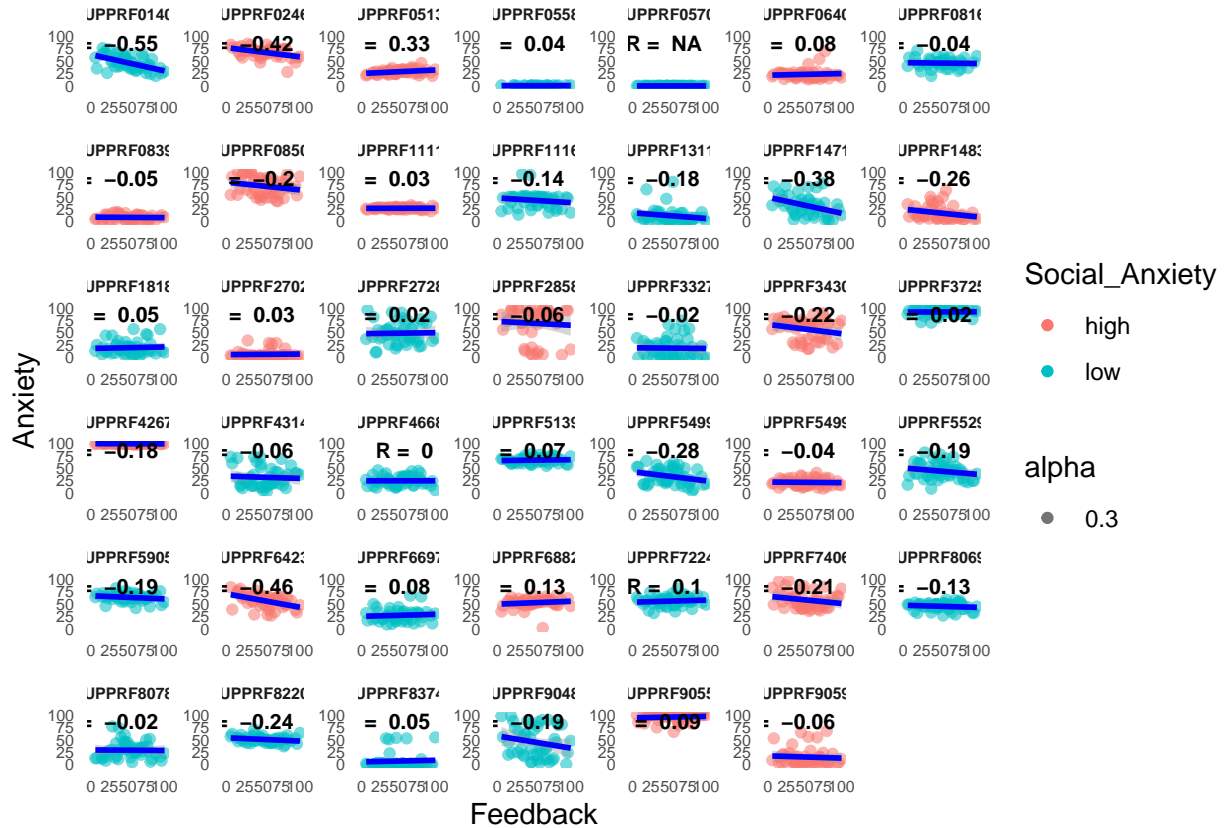
Relationship between Anxiety and prediction

[1] "average correlation between anxiety and prediction: -0.0520117558366197"
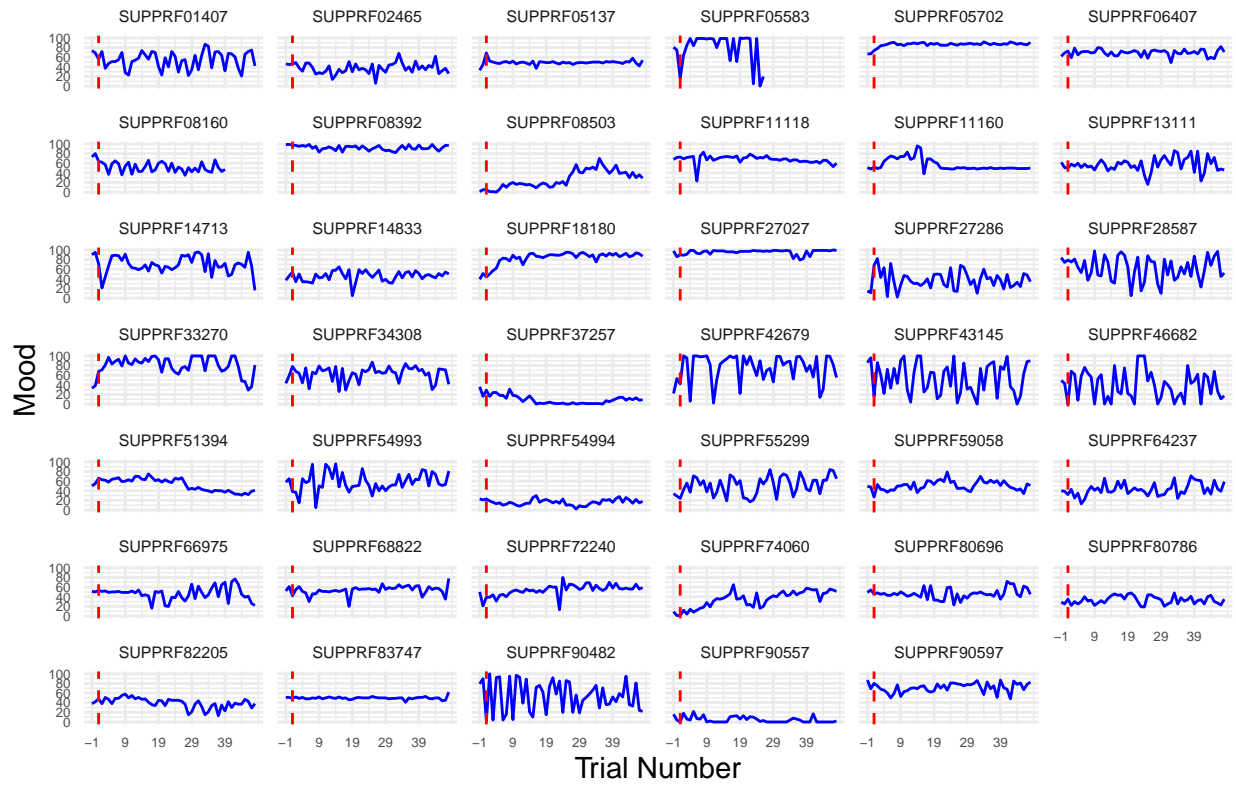
Relationship between Anxiety and feedback

[1] "average correlation between anxiety and feedback: -0.0912289783912545"

Mood over time

Mood across time

Anxiety over time

Anxiety across time
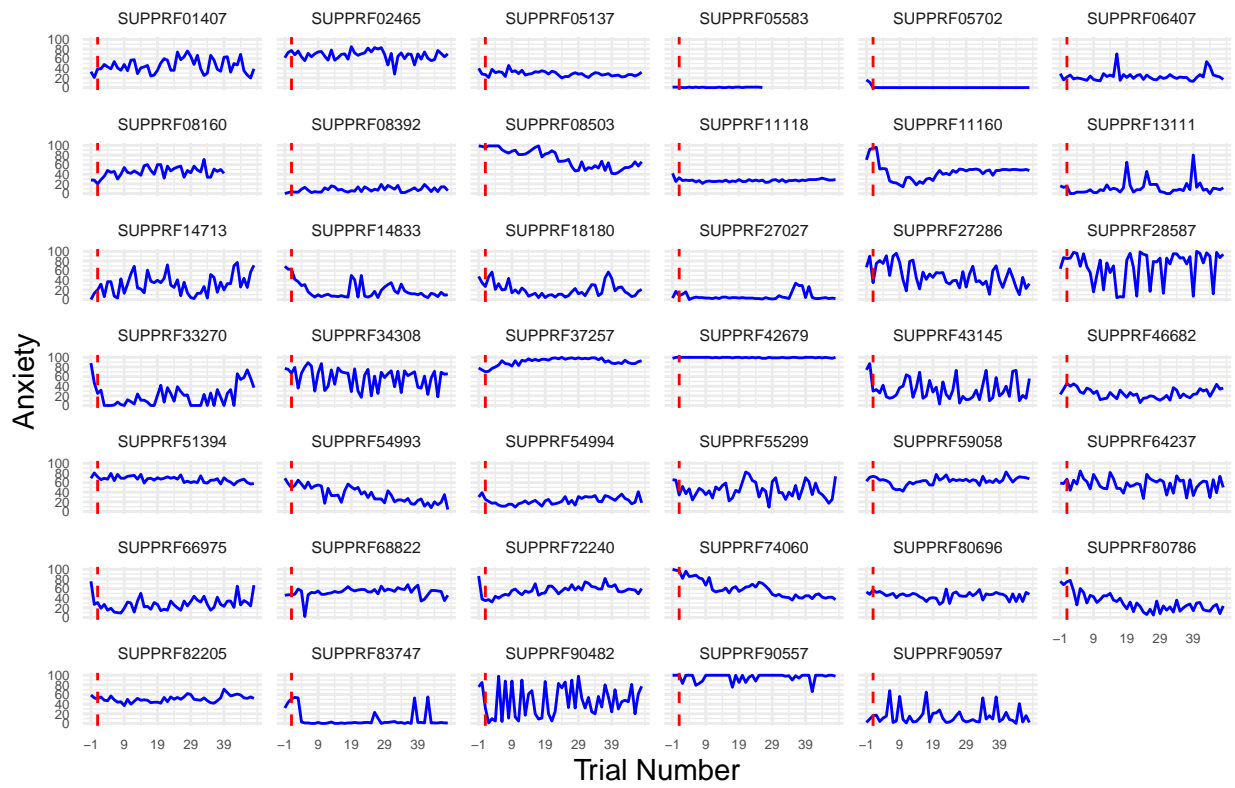
Participants' feedback

In the feedback we received from people, some people mentioned they did not like being watched and some mentioned since they did not see the other person, they did not care and did not think they were real and did not influence how they felt. We did have a few people who mentioned "the observer" or "they" when trying to descrive the virtual players. But overall, seeing how weaker the relationship is, I don't think having the cartoon images helps.

But since in this new pilot we have had several changes at once, shall we repeat the pilot with the new narrative but with the old pictures we had?

Anxiety- SubjPE correlations

```
## # A tibble: 4 x 3
##   Thought_avatars_real mean_correlation sample_size
##   <chr>                          <dbl>       <int>
## 1 no                            0.0169           9
## 2 unclear                      -0.109            8
## 3 yes                          -0.0731          20
## 4 <NA>                         -0.0436           4
```

Anxiety- Feedback correlations

```
## # A tibble: 4 x 3
##   Thought_avatars_real mean_correlation sample_size
##   <chr>                          <dbl>       <int>
## 1 no                            0.0350           9
## 2 unclear                      -0.145            8
## 3 yes                          -0.151           20
## 4 <NA>                          0.0135           4
```

Mood - SubjPE correlations

```
## # A tibble: 4 x 3
##   Thought_avatars_real mean_correlation sample_size
##   <chr>                          <dbl>       <int>
## 1 no                             0.202           9
## 2 unclear                        0.106           8
## 3 yes                            0.204          20
## 4 <NA>                           0.0527          4
```

Mood-Feedback correlations

```
## # A tibble: 4 x 3
##   Thought_avatars_real mean_correlation sample_size
##   <chr>                          <dbl>       <int>
## 1 no                             0.251           9
## 2 unclear                        0.140           8
## 3 yes                            0.284          20
## 4 <NA>                           0.170           4
```

LME models for Mood and SubjPE

I will now look at the best LME models including feedback as well. But since subjective PE does include feedback, I will either only include feedback or SubjPE.

When looking at subjective PE, the best model is Mood ~ SubjPE + (SubjPE | Random_ID) with an AIC of 16192.33 When including feedback the best model is Mood ~ feedback + (feedback | Random_ID) with an AIC of 16014.14

```
## Linear mixed model fit by REML ['lmerMod']
## Formula: Response_H ~ Response_SubjPE + (1 | Random_ID)
##    Data: final_df14
## Control: lmerControl(optimizer = "bobyqa")
##
## REML criterion at convergence: 16325
##
## Scaled residuals:
##     Min      1Q  Median      3Q     Max
## -5.2795 -0.4758  0.0368  0.5210  3.7862
##
## Random effects:
##  Groups    Name        Variance Std.Dev.
##  Random_ID (Intercept) 452.6    21.28
##  Residual              241.3    15.54
## Number of obs: 1939, groups:  Random_ID, 41
##
## Fixed effects:
##                 Estimate Std. Error t value
## (Intercept)     53.48397    3.34176  16.005
## Response_SubjPE  0.11018    0.01438   7.663
##
## Correlation of Fixed Effects:
##             (Intr)
## Rspns_SbjPE -0.013


## Linear mixed model fit by REML ['lmerMod']
## Formula: Response_H ~ Response_SubjPE + (Response_SubjPE | Random_ID)
##    Data: final_df14
## Control: lmerControl(optimizer = "bobyqa")
##
## REML criterion at convergence: 16180.3
##
## Scaled residuals:
##     Min      1Q  Median      3Q     Max
## -5.6350 -0.4948  0.0411  0.5136  3.7705
##
## Random effects:
##  Groups    Name            Variance  Std.Dev. Corr
##  Random_ID (Intercept)     407.58689 20.1888
##            Response_SubjPE   0.06984  0.2643  -0.06
##  Residual                  213.60713 14.6153
## Number of obs: 1939, groups:  Random_ID, 41
##
## Fixed effects:
```

```
##                 Estimate Std. Error t value
## (Intercept)      53.14198    3.17507  16.737
## Response_SubjPE  0.14283     0.04369   3.269
##
## Correlation of Fixed Effects:
##            (Intr)
## Rspns_SbjPE -0.059


## Linear mixed model fit by REML ['lmerMod']
## Formula: Response_H ~ Response_SubjPE * mini_SPIN_total + (Response_SubjPE |
##      Random_ID)
##    Data: final_df14
## Control: lmerControl(optimizer = "bobyqa")
##
## REML criterion at convergence: 16183.4
##
## Scaled residuals:
##     Min      1Q  Median      3Q     Max
## -5.6484 -0.4944  0.0453  0.5159  3.7828
##
## Random effects:
##  Groups    Name            Variance  Std.Dev. Corr
##  Random_ID (Intercept)     417.22692 20.426
##            Response_SubjPE   0.06915  0.263   -0.06
##  Residual                  213.61567 14.616
## Number of obs: 1939, groups:  Random_ID, 41
##
## Fixed effects:
##                               Estimate Std. Error t value
## (Intercept)                   52.45925    7.07618   7.414
## Response_SubjPE                0.24286    0.09611   2.527
## mini_SPIN_total                0.12053    1.13898   0.106
## Response_SubjPE:mini_SPIN_total -0.01806    0.01548  -1.167
##
## Correlation of Fixed Effects:
##             (Intr) Rs_SPE m_SPIN
## Rspns_SbjPE -0.060
## mn_SPIN_ttl -0.891  0.052
## R_SPE:_SPIN  0.052 -0.892 -0.057


## Linear mixed model fit by REML ['lmerMod']
## Formula: Response_H ~ Response_fdbk + (1 | Random_ID)
##    Data: final_df14
## Control: lmerControl(optimizer = "bobyqa")
##
## REML criterion at convergence: 16239.6
##
## Scaled residuals:
##     Min      1Q  Median      3Q     Max
## -5.1198 -0.4919  0.0402  0.5467  3.4963
##
## Random effects:
##  Groups    Name        Variance Std.Dev.
##  Random_ID (Intercept) 418.6    20.46
```

```
## Residual                  231.1    15.20
## Number of obs: 1939, groups:  Random_ID, 41
##
## Fixed effects:
##              Estimate Std. Error t value
## (Intercept)  44.58492    3.30207   13.50
## Response_fdbk  0.17784    0.01459   12.19
##
## Correlation of Fixed Effects:
##            (Intr)
## Respns_fdbk -0.229


## Linear mixed model fit by REML ['lmerMod']
## Formula: Response_H ~ Response_fdbk + (Response_fdbk | Random_ID)
##    Data: final_df14
## Control: lmerControl(optimizer = "bobyqa")
##
## REML criterion at convergence: 16002.1
##
## Scaled residuals:
##     Min      1Q  Median      3Q     Max
## -5.5574 -0.4904  0.0469  0.5255  3.9284
##
## Random effects:
##  Groups    Name          Variance  Std.Dev. Corr
##  Random_ID (Intercept)   608.45065 24.6668
##            Response_fdbk   0.06729  0.2594  -0.56
##  Residual                194.21865 13.9362
## Number of obs: 1939, groups:  Random_ID, 41
##
## Fixed effects:
##              Estimate Std. Error t value
## (Intercept)  44.30178    3.92825   11.28
## Response_fdbk  0.18269    0.04269    4.28
##
## Correlation of Fixed Effects:
##            (Intr)
## Respns_fdbk -0.577
## optimizer (bobyqa) convergence code: 0 (OK)
## Model failed to converge with max|grad| = 0.0068302 (tol = 0.002, component 1)


## Linear mixed model fit by REML ['lmerMod']
## Formula: Response_H ~ Response_fdbk * mini_SPIN_total + (Response_fdbk |
##     Random_ID)
##    Data: final_df14
## Control: lmerControl(optimizer = "bobyqa")
##
## REML criterion at convergence: 16004.8
##
## Scaled residuals:
##     Min      1Q  Median      3Q     Max
## -5.5575 -0.4866  0.0457  0.5265  3.9442
##
## Random effects:
```

```
##  Groups    Name          Variance Std.Dev. Corr
##  Random_ID (Intercept)    614.299  24.7851
##            Response_fdbk    0.066   0.2569  -0.55
##  Residual                 194.212  13.9360
## Number of obs: 1939, groups:  Random_ID, 41
##
## Fixed effects:
##                           Estimate Std. Error t value
## (Intercept)               38.02799    8.69600   4.373
## Response_fdbk              0.29286    0.09328   3.139
## mini_SPIN_total           1.13193    1.39884   0.809
## Response_fdbk:mini_SPIN_total -0.01988   0.01500  -1.325
##
## Correlation of Fixed Effects:
##            (Intr) Rspns_ m_SPIN
## Respns_fdbk -0.568
## mn_SPIN_ttl -0.891  0.506
## Rsp_:_SPIN_  0.506 -0.891 -0.568


## [1] 16333.03


## [1] 16192.33


## [1] 16199.38


## [1] 16247.58


## [1] 16014.14


## [1] 16020.84
```
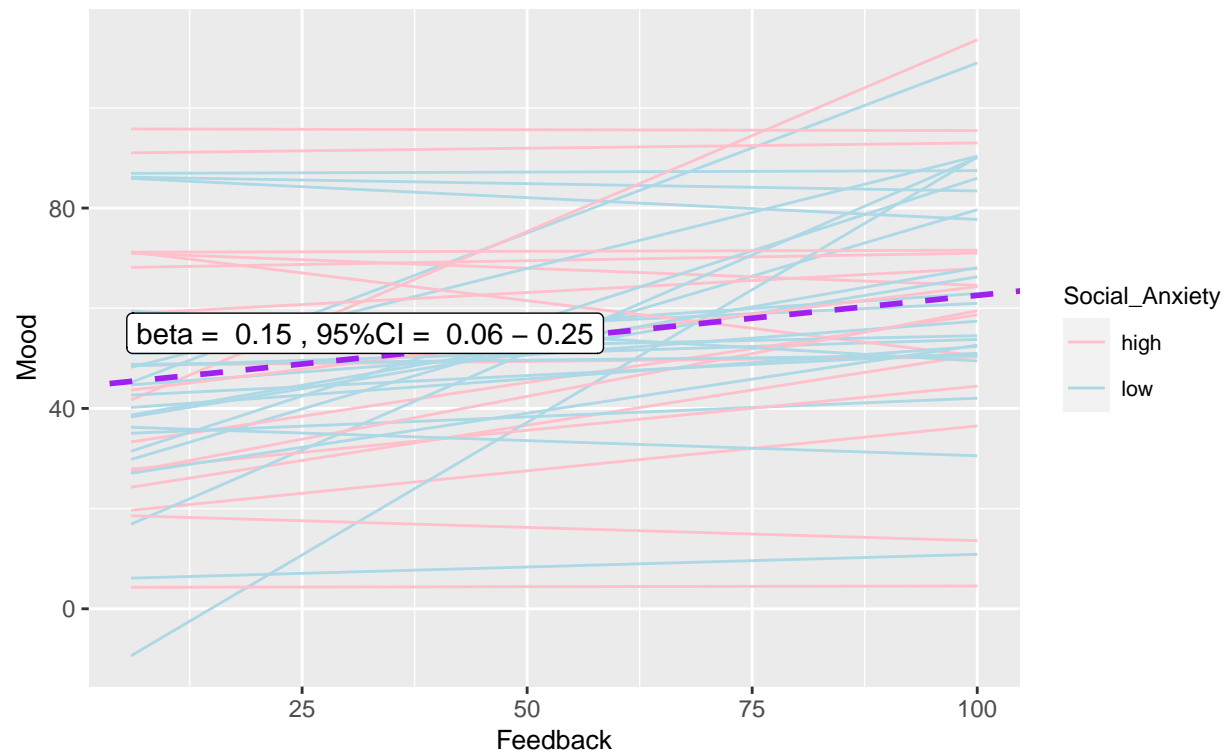
Individual plots with LME for Mood with SubjPE

When looking at subjective PE, the best model is Mood ~ SubjPE + (SubjPE | Random_ID) with an AIC of 16192.33

Relationship between Mood and subjective PE
estimated slopes of the association in n = 41

beta = 0.15 , 95%CI = 0.06 − 0.25
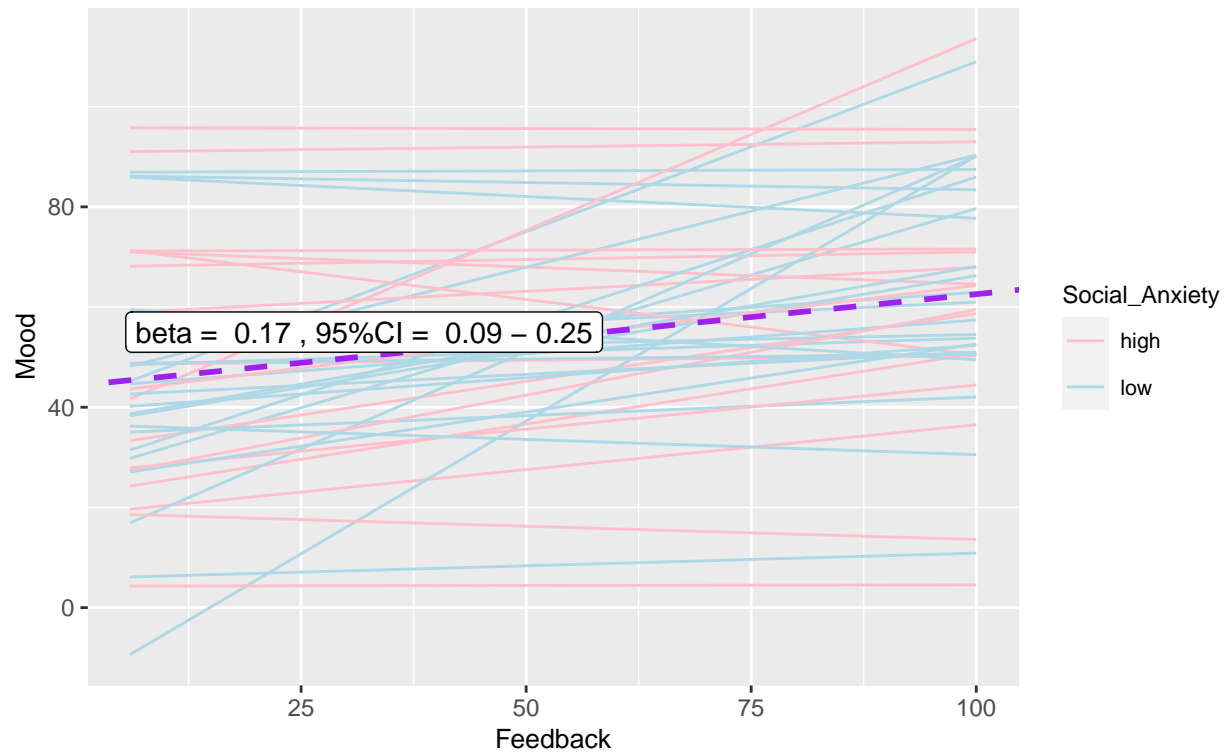
Individual plots with LME for Mood with feedback instead of Sub-jPE

When including feedback the best model is Mood ~ feedback + (feedback | Random_ID) with an AIC of 16014.14

Relationship between Mood and Feedback

estimated slopes of the association in n = 41

beta = 0.17 , 95%CI = 0.09 − 0.25

Social_Anxiety
— high
— low

Feedback

Mood

LME models for Anxiety and SubjPE

When looking at subjective PE, the best model is Anxiety ~ SubjPE + (SubjPE | Random_ID) with an AIC of 16097.78 When including feedback the best model is Anxiety ~ feedback + (Random_ID) with an AIC of 16084.09

```
## Linear mixed model fit by REML ['lmerMod']
## Formula: Response_Ax ~ Response_SubjPE + (1 | Random_ID)
##    Data: final_df14
## Control: lmerControl(optimizer = "bobyqa")
##
## REML criterion at convergence: 16090
##
## Scaled residuals:
##     Min      1Q  Median      3Q     Max
## -4.4122 -0.4978 -0.0214  0.4007  4.6974
##
## Random effects:
##  Groups    Name        Variance Std.Dev.
##  Random_ID (Intercept) 641.0    25.32
##  Residual              211.7    14.55
## Number of obs: 1939, groups:  Random_ID, 41
##
## Fixed effects:
##                 Estimate Std. Error t value
## (Intercept)     40.60638    3.96800  10.233
## Response_SubjPE -0.03483    0.01347  -2.585
##
## Correlation of Fixed Effects:
##             (Intr)
## Rspns_SbjPE -0.010


## Linear mixed model fit by REML ['lmerMod']
## Formula: Response_Ax ~ Response_SubjPE + (Response_SubjPE | Random_ID)
##    Data: final_df14
## Control: lmerControl(optimizer = "bobyqa")
##
## REML criterion at convergence: 16085.8
##
## Scaled residuals:
##     Min      1Q  Median      3Q     Max
## -4.4263 -0.4982 -0.0235  0.3904  4.7073
##
## Random effects:
##  Groups    Name            Variance  Std.Dev. Corr
##  Random_ID (Intercept)     6.357e+02 25.21399
##            Response_SubjPE 3.349e-03  0.05787 -0.14
##  Residual                  2.097e+02 14.47931
## Number of obs: 1939, groups:  Random_ID, 41
##
## Fixed effects:
##                 Estimate Std. Error t value
## (Intercept)     40.59479    3.95299  10.269
```

```
## Response_SubjPE -0.03332    0.01638  -2.034
##
## Correlation of Fixed Effects:
##            (Intr)
## Rspns_SbjPE -0.087
## optimizer (bobyqa) convergence code: 0 (OK)
## Model is nearly unidentifiable: very large eigenvalue
##  - Rescale variables?


## Linear mixed model fit by REML ['lmerMod']
## Formula: Response_Ax ~ Response_SubjPE * mini_SPIN_total + (Response_SubjPE |
##     Random_ID)
##    Data: final_df14
## Control: lmerControl(optimizer = "bobyqa")
##
## REML criterion at convergence: 16088
##
## Scaled residuals:
##     Min      1Q  Median      3Q     Max
## -4.4369 -0.4909 -0.0228  0.3936  4.7108
##
## Random effects:
##  Groups    Name             Variance  Std.Dev. Corr
##  Random_ID (Intercept)      6.065e+02 24.62706
##            Response_SubjPE  3.448e-03  0.05872 -0.21
##  Residual                   2.097e+02 14.47988
## Number of obs: 1939, groups:  Random_ID, 41
##
## Fixed effects:
##                                Estimate Std. Error t value
## (Intercept)                   28.030648   8.508071   3.295
## Response_SubjPE               -0.059782   0.036886  -1.621
## mini_SPIN_total                2.277306   1.369166   1.663
## Response_SubjPE:mini_SPIN_total 0.004817   0.005937   0.811
##
## Correlation of Fixed Effects:
##             (Intr) Rs_SPE m_SPIN
## Rspns_SbjPE -0.130
## mn_SPIN_ttl -0.891  0.113
## R_SPE:_SPIN  0.113 -0.895 -0.122
## optimizer (bobyqa) convergence code: 0 (OK)
## Model is nearly unidentifiable: very large eigenvalue
##  - Rescale variables?


## Linear mixed model fit by REML ['lmerMod']
## Formula: Response_Ax ~ Response_fdbk + (1 | Random_ID)
##    Data: final_df14
## Control: lmerControl(optimizer = "bobyqa")
##
## REML criterion at convergence: 16076.1
##
## Scaled residuals:
##     Min      1Q  Median      3Q     Max
## -4.4537 -0.5042 -0.0314  0.4204  4.6990
```

```
## 
## Random effects:
##  Groups     Name         Variance Std.Dev.
##  Random_ID (Intercept) 633.2    25.16
##  Residual              210.2    14.50
## Number of obs: 1939, groups:  Random_ID, 41
## 
## Fixed effects:
##              Estimate Std. Error t value
## (Intercept)  43.78428    4.00926  10.921
## Response_fdbk -0.06324    0.01392  -4.545
## 
## Correlation of Fixed Effects:
##            (Intr)
## Respns_fdbk -0.180


## Linear mixed model fit by REML ['lmerMod']
## Formula: Response_Ax ~ Response_fdbk + (Response_fdbk | Random_ID)
##    Data: final_df14
## Control: lmerControl(optimizer = "bobyqa")
## 
## REML criterion at convergence: 16072.6
## 
## Scaled residuals:
##     Min      1Q  Median      3Q     Max
## -4.4765 -0.4987 -0.0323  0.4086  4.7191
## 
## Random effects:
##  Groups     Name         Variance  Std.Dev. Corr
##  Random_ID (Intercept) 6.807e+02 26.0906
##            Response_fdbk 3.283e-03  0.0573  -0.36
##  Residual              2.084e+02 14.4348
## Number of obs: 1939, groups:  Random_ID, 41
## 
## Fixed effects:
##              Estimate Std. Error t value
## (Intercept)  43.75779    4.15095  10.542
## Response_fdbk -0.06277    0.01651  -3.802
## 
## Correlation of Fixed Effects:
##            (Intr)
## Respns_fdbk -0.339
## optimizer (bobyqa) convergence code: 0 (OK)
## Model failed to converge with max|grad| = 0.00277287 (tol = 0.002, component 1)
## Model is nearly unidentifiable: very large eigenvalue
##  - Rescale variables?


## Linear mixed model fit by REML ['lmerMod']
## Formula: Response_Ax ~ Response_fdbk * mini_SPIN_total + (Response_fdbk |
##     Random_ID)
##    Data: final_df14
## Control: lmerControl(optimizer = "bobyqa")
## 
## REML criterion at convergence: 16075.8
```

```
## 
## Scaled residuals:
##     Min      1Q  Median      3Q     Max
## -4.4812 -0.4974 -0.0344  0.4075  4.7205
## 
## Random effects:
##  Groups     Name          Variance  Std.Dev. Corr
##  Random_ID (Intercept)    650.91638 25.5131
##             Response_fdbk   0.00354  0.0595  -0.35
##  Residual                 208.36419 14.4348
## Number of obs: 1939, groups:  Random_ID, 41
## 
## Fixed effects:
##                            Estimate Std. Error t value
## (Intercept)               30.482218   8.950990   3.405
## Response_fdbk             -0.052512   0.036875  -1.424
## mini_SPIN_total            2.397379   1.440059   1.665
## Response_fdbk:mini_SPIN_total -0.001848   0.005906  -0.313
## 
## Correlation of Fixed Effects:
##             (Intr) Rspns_ m_SPIN
## Respns_fdbk -0.338
## mn_SPIN_ttl -0.891  0.301
## Rsp_:_SPIN_  0.302 -0.892 -0.338
## optimizer (bobyqa) convergence code: 0 (OK)
## Model is nearly unidentifiable: very large eigenvalue
##  - Rescale variables?


## [1] 16098.03


## [1] 16097.78


## [1] 16104.05


## [1] 16084.09


## [1] 16084.61


## [1] 16091.8
```
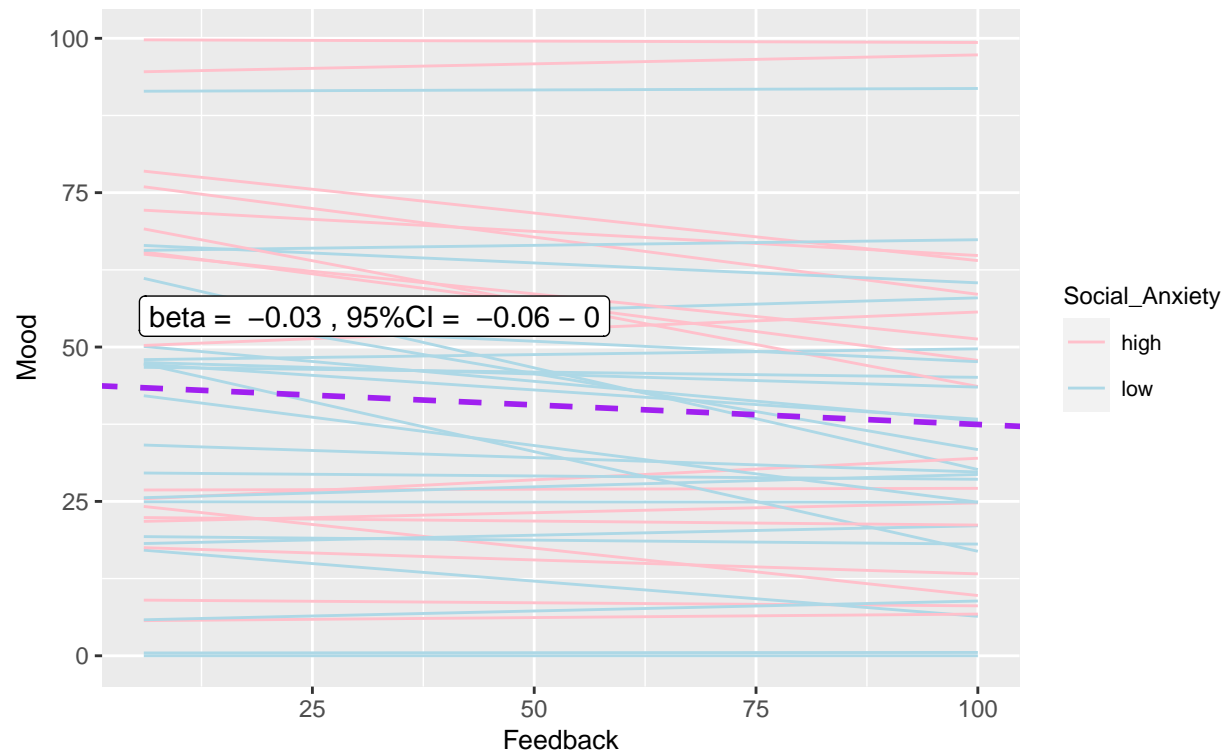
25

Individual plots with LME for Anxiety with SubjPE

When looking at subjective PE, the best model is Anxiety ~ SubjPE + (SubjPE | Random_ID) with an AIC of 16097.78

Relationship between Anxiety and subjective PE
estimated slopes of the association in n = 41

beta = −0.03 , 95%CI = −0.06 − 0

Individual plots with LME for Anxiety with feedback instead of SubjPE

When including feedback the best model is Anxiety ~ feedback + (Random_ID) with an AIC of 16084.09

Relationship between Anxiety and Feedback

estimated slopes of the association in n = 41

beta = −0.05 , 95%CI = −0.07 − −0.03