

Correlations between User Characteristics and Activity Efforts and Scenario Ratings

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Introduction

The purpose of this file is to allow for the reproduction of our results of the Bayesian analyses of the correlations between user characteristics on the one hand and activity efforts and interaction scenario ratings on the other hand. This means that we reproduce the values from Table 1 from the paper.

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Setup

First, we load the packages that we need.

```
library(BayesianFirstAid) # For computing correlations
library(formatR)         # For formatting
library(ggplot2)         # For plots
```

Data

We load the pre-processed data.

```
df = read.csv(file = "Data/all_coded_data.csv")
```

Bayesian Analysis of Correlations

We will now conduct Bayesian analyses of the Spearman correlations between user characteristics on the one hand and participants' self-reported effort spent on the preparatory activities and ratings for the interaction scenarios on the other hand.

For this we make use of the Bayesian First Aid package (Bååth (2014)).

```
user_vars = c("Pers_Conscientiousness", "Pers_Extraversion",
              "Household.Size", "PA_Identity", "Smoking.frequency",
              "TTM_PA")

# For each user characteristics the response
# types that we want to compute correlations
# with
p_c = list(c("activity_experience1", "activity_experience2",
            "activity_experience3", "activity_experience4",
            "activity_experience5"))
p_e = list(c("discussion_so", "tell_se"), c("gp_relapse",
            "gp_start"))
hs = list(c("discussion_so", "tell_se"))
pa_id = list(c("activity_experience1", "activity_experience2",
            "activity_experience3", "activity_experience4",
            "activity_experience5"))
sf = list(c("failing_pa_goals"))
ttm_pa = list(c("activity_experience1", "activity_experience2",
            "activity_experience3", "activity_experience4",
            "activity_experience5"))

resp_types = list(p_c, p_e, hs, pa_id, sf, ttm_pa)

v_idx = 1
for (v in user_vars) {

  for (r in resp_types[[v_idx]]) {

    print(paste("User characteristic: ", v))
    print(r)

    set.seed(18) # For reproducibility

    df_temp = df[df$response_type %in% r, ]

    # To get the Spearman correlation
    # coefficient, we need to convert the
    # data to ranks.
    rank_user_var = rank(df_temp[, v], ties.method = "average")
    rank_rating = rank(df_temp$rating, ties.method = "average")

    # The Spearman correlation coefficient
    # is equivalent to the Pearson
    # correlation coefficient computed
    # based on ranked data.
    fit = bayes.cor.test(rank_user_var, rank_rating)

    print(summary(fit))
    plot(fit)
  }

  v_idx = v_idx + 1
}
```

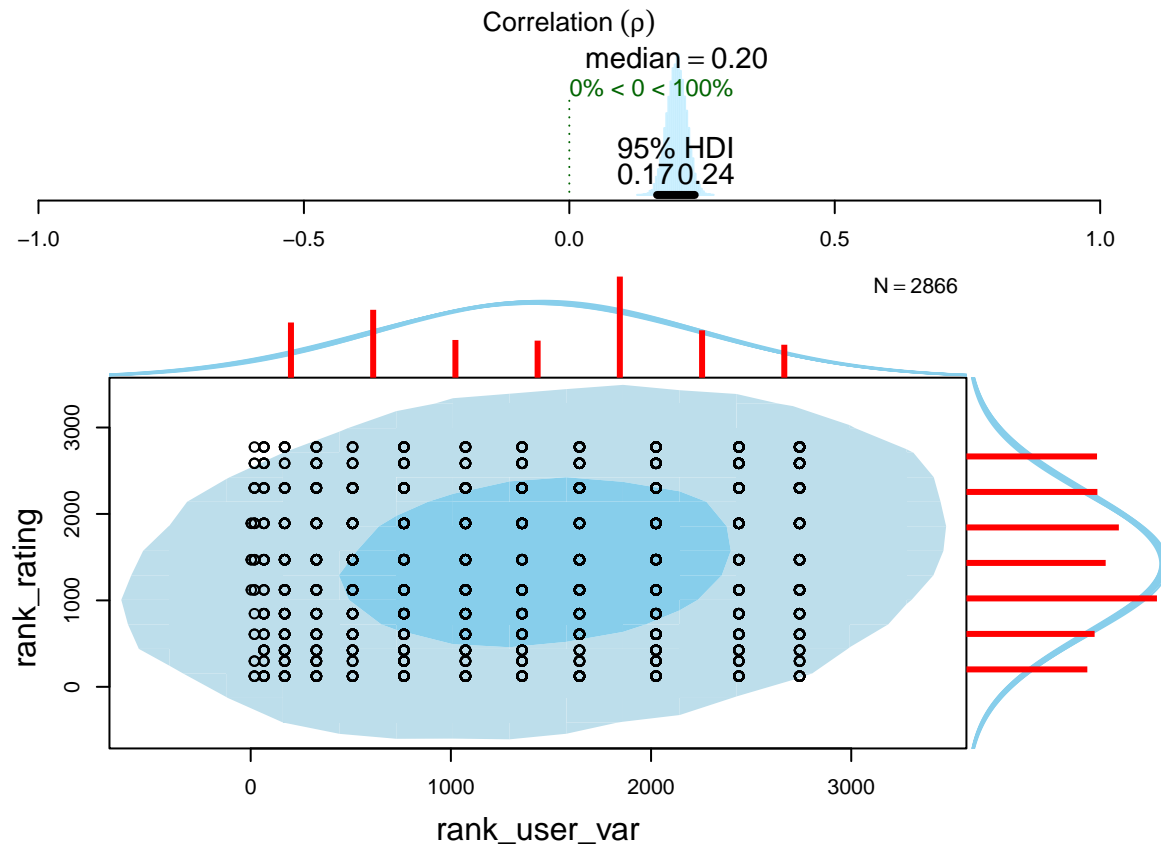
```

}

## [1] "User characteristic: Pers_Conscientiousness"
## [1] "activity_experience1" "activity_experience2" "activity_experience3"
## [4] "activity_experience4" "activity_experience5"
## |
## Data
## rank_user_var and rank_rating, n = 2866
##
## Model parameters
## rho: the correlation between rank_user_var and rank_rating
## mu[1]: the mean of rank_user_var
## sigma[1]: the scale of rank_user_var , a consistent
## estimate of SD when nu is large.
## mu[2]: the mean of rank_rating
## sigma[2]: the scale of rank_rating
## nu: the degrees-of-freedom for the bivariate t distribution
## xy_pred[1]: the posterior predictive distribution of rank_user_var
## xy_pred[2]: the posterior predictive distribution of rank_rating
##
## Measures
##          mean      sd   HDIlo   HDIup %<comp %>comp
## rho          0.202   0.018   0.165   0.236 0.000 1.000
## mu[1]       1433.293 15.585 1403.485 1464.165 0.000 1.000
## mu[2]       1433.296 15.559 1402.838 1463.358 0.000 1.000
## sigma[1]     821.484 11.015 800.423 843.318 0.000 1.000
## sigma[2]     821.246 10.972 800.097 842.782 0.000 1.000
## nu          239.589 60.951 130.312 359.974 0.000 1.000
## xy_pred[1] 1433.637 816.548 -225.491 2975.562 0.039 0.961
## xy_pred[2] 1425.781 825.698 -191.966 3023.058 0.043 0.957
##
## 'HDIlo' and 'HDIup' are the limits of a 95% HDI credible interval.
## '%<comp' and '%>comp' are the probabilities of the respective parameter being
## smaller or larger than 0.
##
## Quantiles
##          q2.5%    q25%  median    q75%    q97.5%
## rho          0.166    0.190    0.202    0.214    0.237
## mu[1]       1402.249 1422.729 1433.315 1443.960 1463.232
## mu[2]       1402.641 1422.836 1433.440 1443.689 1463.225
## sigma[1]     800.357 813.926 821.396 828.827 843.272
## sigma[2]     800.145 813.824 821.098 828.613 842.827
## nu          141.605 195.678 232.131 276.156 379.213
## xy_pred[1] -187.455 896.812 1425.297 1979.759 3020.894
## xy_pred[2] -193.048 867.166 1426.507 1987.565 3021.879
##
##          mean      sd HDI% comp      HDIlo      HDIup
## rho          0.2020956 0.0181229 95 0 0.1653174 0.2361832
## mu[1]       1433.2931407 15.5849957 95 0 1403.4850644 1464.1645882
## mu[2]       1433.2961758 15.5590877 95 0 1402.8382619 1463.3584621
## sigma[1]     821.4837449 11.0149310 95 0 800.4232033 843.3179858
## sigma[2]     821.2455789 10.9715582 95 0 800.0973825 842.7820030
## nu          239.5890144 60.9514417 95 0 130.3117904 359.9737150
## xy_pred[1] 1433.6370517 816.5475515 95 0 -225.4914892 2975.5619178
## xy_pred[2] 1425.7806468 825.6975440 95 0 -191.9661083 3023.0577389

```

```
##           %>comp      %<comp      q2.5%      q25%      median
## rho      0.9999333 6.665778e-05  0.16616    0.189953  0.2023171
## mu[1]    0.9999333 6.665778e-05 1402.24934 1422.728583 1433.3153131
## mu[2]    0.9999333 6.665778e-05 1402.64065 1422.835797 1433.4402961
## sigma[1] 0.9999333 6.665778e-05  800.35686  813.926317  821.3962172
## sigma[2] 0.9999333 6.665778e-05  800.14455  813.824482  821.0975852
## nu       0.9999333 6.665778e-05  141.60482  195.677506  232.1312222
## xy_pred[1] 0.9605386 3.946141e-02 -187.45530 896.812310 1425.2972930
## xy_pred[2] 0.9570057 4.299427e-02 -193.04818 867.166353 1426.5065446
##           q75%      q97.5%      mcmc_se      Rhat  n_eff
## rho      0.2143468    0.237227 0.000189432 1.000924 9158
## mu[1]    1443.9597088 1463.231548 0.179670752 1.000300 7523
## mu[2]    1443.6890033 1463.225035 0.174345457 1.000199 7999
## sigma[1]  828.8269808  843.271775 0.120731575 1.000309 8358
## sigma[2]  828.6134551  842.826548 0.120517151 1.000031 8303
## nu       276.1562264  379.212909 0.707734895 1.000334 7465
## xy_pred[1] 1979.7594947 3020.894106 6.666924963 1.000414 14999
## xy_pred[2] 1987.5653713 3021.879018 6.690554843 1.000625 15234
```



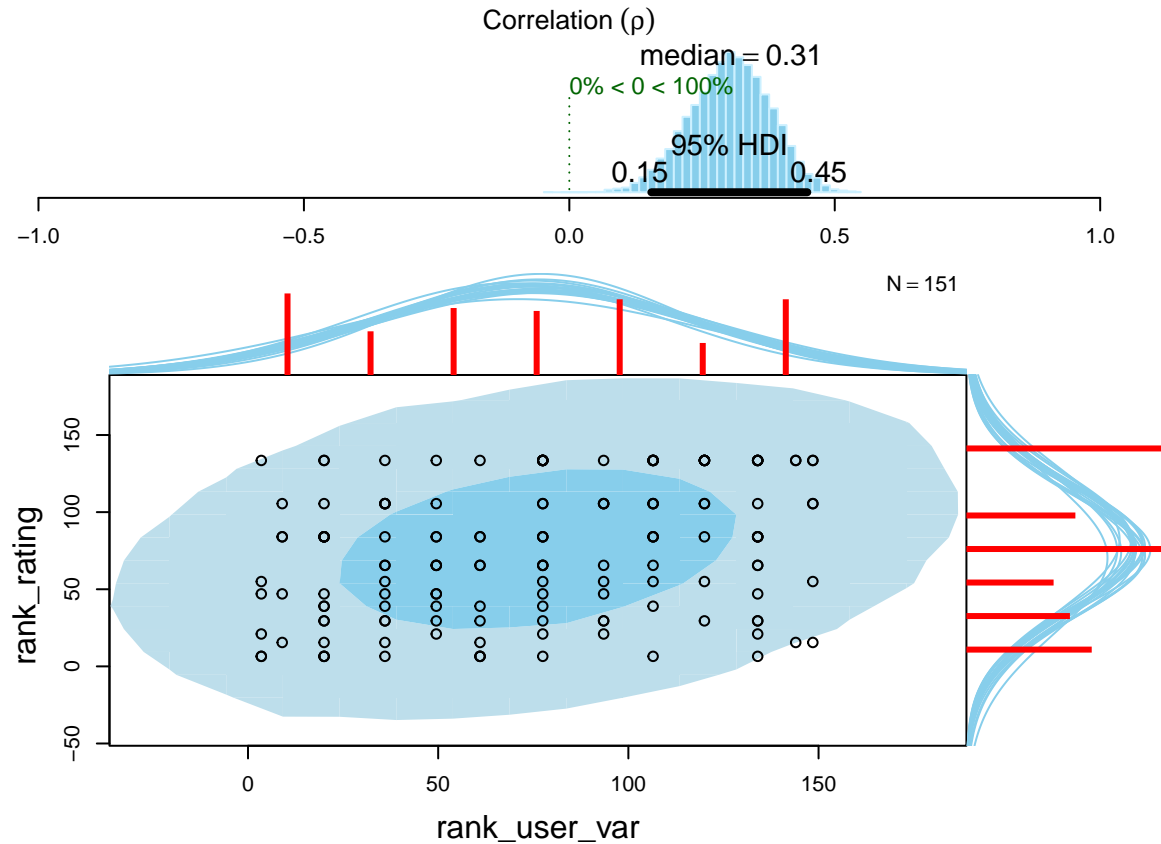
```
## [1] "User characteristic: Pers_Extraversion"
## [1] "discussion_so" "tell_se"
## |
## Data
## rank_user_var and rank_rating, n = 151
##
## Model parameters
## rho: the correlation between rank_user_var and rank_rating
```

```

## mu[1]: the mean of rank_user_var
## sigma[1]: the scale of rank_user_var , a consistent
## estimate of SD when nu is large.
## mu[2]: the mean of rank_rating
## sigma[2]: the scale of rank_rating
## nu: the degrees-of-freedom for the bivariate t distribution
## xy_pred[1]: the posterior predictive distribution of rank_user_var
## xy_pred[2]: the posterior predictive distribution of rank_rating
##
## Measures
##      mean      sd    HDIlo    HDIup %<comp %>comp
## rho      0.303  0.076   0.154   0.448  0.000  1.000
## mu[1]    75.891  3.628  68.743  82.925  0.000  1.000
## mu[2]    76.083  3.622  69.249  83.469  0.000  1.000
## sigma[1] 43.666  2.641  38.706  48.943  0.000  1.000
## sigma[2] 43.466  2.583  38.335  48.451  0.000  1.000
## nu      70.989 37.627  15.751 144.725  0.000  1.000
## xy_pred[1] 75.811 44.499 -15.577 159.911  0.046  0.954
## xy_pred[2] 75.632 44.280 -12.775 163.427  0.045  0.955
##
## 'HDIlo' and 'HDIup' are the limits of a 95% HDI credible interval.
## '%<comp' and '%>comp' are the probabilities of the respective parameter being
## smaller or larger than 0.
##
## Quantiles
##      q2.5%  q25% median  q75%  q97.5%
## rho      0.151  0.253  0.305   0.356   0.446
## mu[1]    68.753 73.435 75.931  78.319  82.968
## mu[2]    68.966 73.658 76.113  78.482  83.236
## sigma[1] 38.848 41.821 43.538  45.388  49.156
## sigma[2] 38.689 41.697 43.315  45.114  48.847
## nu      22.508 44.135 62.890  89.090 165.497
## xy_pred[1] -12.955 46.332 76.128 104.973 162.583
## xy_pred[2] -12.558 46.699 75.735 104.701 164.371
##
##      mean      sd HDI% comp    HDIlo    HDIup    %>comp
## rho      0.3033979 0.07585089  95    0  0.1544827  0.4483652  0.9997334
## mu[1]    75.8914256 3.62806324  95    0  68.7430723  82.9245386  0.9999333
## mu[2]    76.0834050 3.62164298  95    0  69.2489820  83.4686376  0.9999333
## sigma[1] 43.6655563 2.64126081  95    0  38.7055956  48.9426181  0.9999333
## sigma[2] 43.4660097 2.58255801  95    0  38.3350260  48.4514851  0.9999333
## nu      70.9888070 37.62726748  95    0  15.7511324 144.7254733  0.9999333
## xy_pred[1] 75.8113046 44.49852976  95    0 -15.5772491 159.9105225  0.9537395
## xy_pred[2] 75.6323237 44.28043006  95    0 -12.7746732 163.4267042  0.9550060
##
##      %<comp      q2.5%      q25%      median      q75%
## rho      2.666311e-04  0.1511943  0.2530035  0.3052136  0.3561754
## mu[1]    6.665778e-05  68.7531378  73.4346417  75.9314468  78.3186993
## mu[2]    6.665778e-05  68.9663296  73.6584268  76.1131939  78.4824892
## sigma[1] 6.665778e-05  38.8476085  41.8205327  43.5377995  45.3880783
## sigma[2] 6.665778e-05  38.6894719  41.6965030  43.3149193  45.1141309
## nu      6.665778e-05  22.5075491  44.1346194  62.8902166  89.0904047
## xy_pred[1] 4.626050e-02 -12.9551565  46.3321288  76.1277027 104.9728058
## xy_pred[2] 4.499400e-02 -12.5584768  46.6994113  75.7346158 104.7006363
##
##      q97.5%      mcmc_se      Rhat n_eff
## rho      0.4457634 0.0008472302 1.0017835 8015

```

```
## mu[1]      82.9676685 0.0417749845 1.0019431 7570
## mu[2]      83.2363591 0.0423771649 1.0014020 7312
## sigma[1]   49.1564910 0.0296994069 1.0007488 7928
## sigma[2]   48.8468622 0.0294973407 1.0016077 7679
## nu        165.4968538 0.5473937838 1.0021556 4767
## xy_pred[1] 162.5826732 0.3696785873 1.0001371 14521
## xy_pred[2] 164.3710086 0.3713172028 0.9999381 14262
```

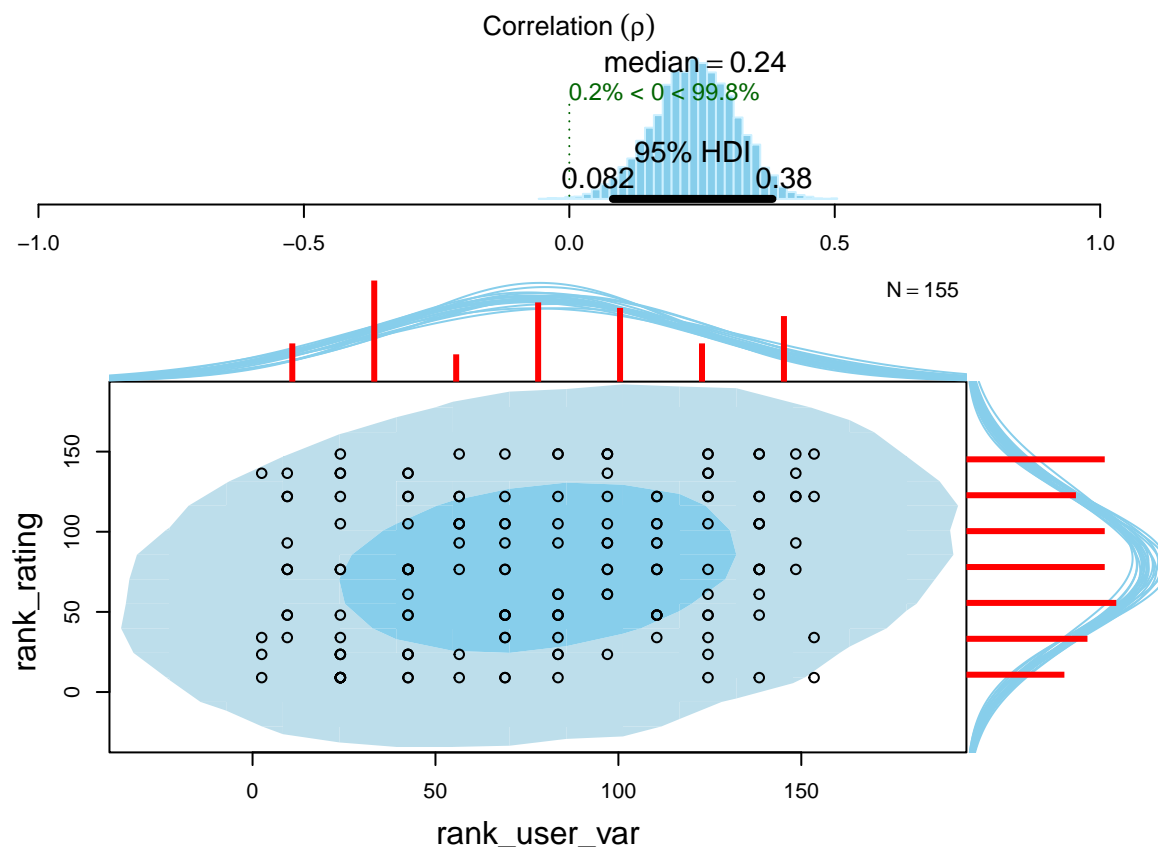


```
## [1] "User characteristic: Pers_Extraversion"
## [1] "gp_relapse" "gp_start"
## |
## Data
## rank_user_var and rank_rating, n = 155
##
## Model parameters
## rho: the correlation between rank_user_var and rank_rating
## mu[1]: the mean of rank_user_var
## sigma[1]: the scale of rank_user_var , a consistent
## estimate of SD when nu is large.
## mu[2]: the mean of rank_rating
## sigma[2]: the scale of rank_rating
## nu: the degrees-of-freedom for the bivariate t distribution
## xy_pred[1]: the posterior predictive distribution of rank_user_var
## xy_pred[2]: the posterior predictive distribution of rank_rating
##
## Measures
##          mean      sd   HDIlo   HDIup %<comp %>comp
```

```

## rho          0.236  0.077  0.082  0.383  0.002  0.998
## mu[1]        78.058  3.595  71.139  85.233  0.000  1.000
## mu[2]        77.996  3.675  70.940  85.220  0.000  1.000
## sigma[1]     44.797  2.677  39.500  49.984  0.000  1.000
## sigma[2]     44.786  2.654  39.600  49.896  0.000  1.000
## nu           71.636  36.962  16.653  145.820  0.000  1.000
## xy_pred[1]   77.629  45.806 -13.339  165.571  0.045  0.955
## xy_pred[2]   77.637  45.783 -11.168  169.062  0.045  0.955
##
## 'HDIlo' and 'HDIup' are the limits of a 95% HDI credible interval.
## '%<comp' and '%>comp' are the probabilities of the respective parameter being
## smaller or larger than 0.
##
## Quantiles
##          q2.5%  q25% median  q75%  q97.5%
## rho          0.081  0.185  0.237  0.290  0.382
## mu[1]        71.047  75.642  78.042  80.463  85.167
## mu[2]        70.814  75.514  78.019  80.483  85.107
## sigma[1]     39.930  42.953  44.681  46.528  50.464
## sigma[2]     39.935  42.925  44.677  46.503  50.359
## nu           22.810  44.850  63.816  89.678  165.350
## xy_pred[1]   -12.776  47.170  77.939  108.405  166.251
## xy_pred[2]   -11.697  47.203  77.879  107.582  168.759
##          mean          sd HDI% comp          HDIlo          HDIup          %>comp
## rho          0.2362072  0.07718019  95  0  0.08208945  0.3826977  0.9983336
## mu[1]        78.0581787  3.59455710  95  0  71.13891801  85.2325121  0.9999333
## mu[2]        77.9962971  3.67451964  95  0  70.93952034  85.2199572  0.9999333
## sigma[1]     44.7972347  2.67724506  95  0  39.49956864  49.9844481  0.9999333
## sigma[2]     44.7860515  2.65397540  95  0  39.59973126  49.8963183  0.9999333
## nu           71.6361961  36.96165042  95  0  16.65311785  145.8203753  0.9999333
## xy_pred[1]   77.6294131  45.80633743  95  0 -13.33909836  165.5711882  0.9553393
## xy_pred[2]   77.6369891  45.78274006  95  0 -11.16751978  169.0617790  0.9546727
##          %<comp          q2.5%          q25%          median          q75%
## rho          1.666444e-03  0.08054288  0.1852069  0.2372859  0.2895929
## mu[1]        6.665778e-05  71.04692062  75.6418334  78.0420136  80.4630383
## mu[2]        6.665778e-05  70.81424838  75.5144245  78.0185010  80.4831780
## sigma[1]     6.665778e-05  39.92988428  42.9526614  44.6811250  46.5284837
## sigma[2]     6.665778e-05  39.93468179  42.9248602  44.6768712  46.5028417
## nu           6.665778e-05  22.80953673  44.8497261  63.8155547  89.6781525
## xy_pred[1]   4.466071e-02 -12.77636872  47.1703842  77.9393018  108.4048410
## xy_pred[2]   4.532729e-02 -11.69735966  47.2034891  77.8786677  107.5821569
##          q97.5%          mcmc_se          Rhat n_eff
## rho          0.3817854  0.000809868  1.000181  9098
## mu[1]        85.1673483  0.038971279  1.000774  8515
## mu[2]        85.1074447  0.041336413  1.001437  7943
## sigma[1]     50.4640560  0.028992561  1.000289  8529
## sigma[2]     50.3591373  0.028522576  1.000561  8672
## nu           165.3495558  0.549556320  1.002921  4794
## xy_pred[1]   166.2513580  0.378518889  1.000183  14648
## xy_pred[2]   168.7587682  0.379679140  1.000184  14549

```



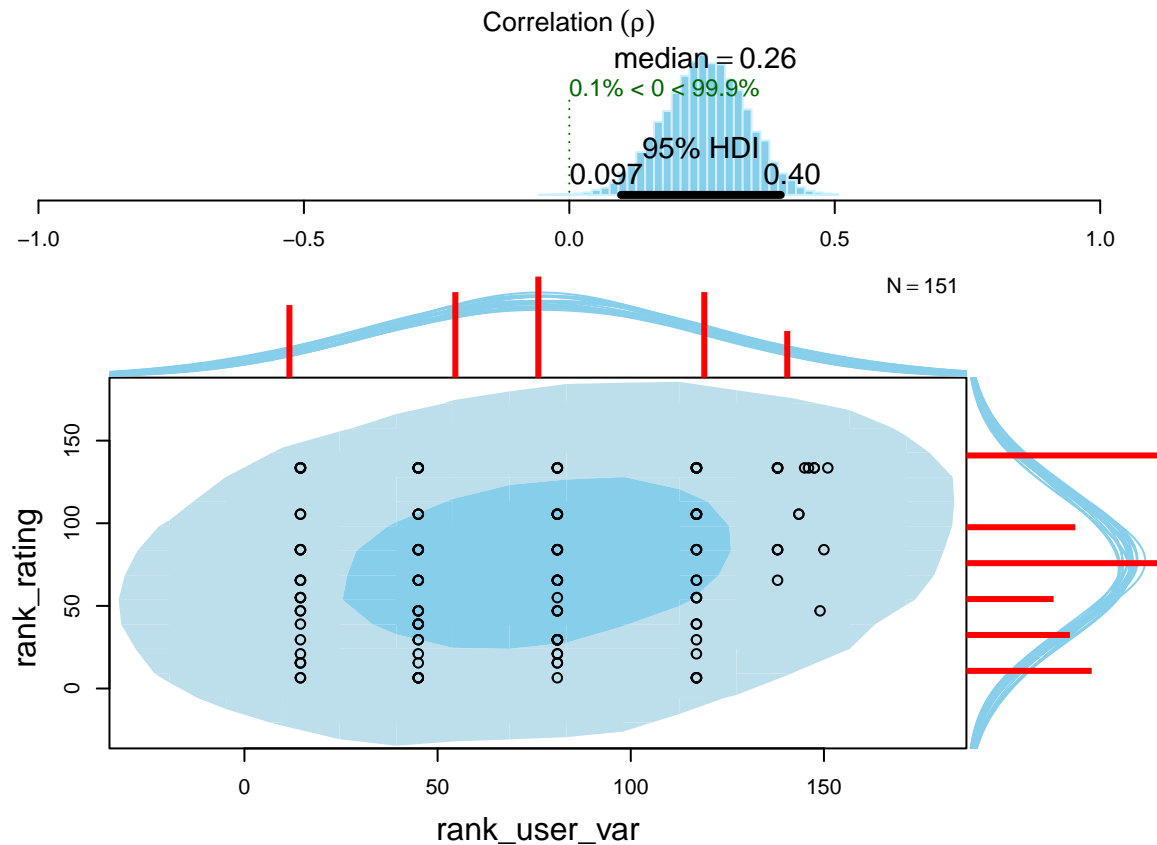
```
## [1] "User characteristic: Household.Size"
## [1] "discussion_so" "tell_se"
## |
## Data
## rank_user_var and rank_rating, n = 151
##
## Model parameters
## rho: the correlation between rank_user_var and rank_rating
## mu[1]: the mean of rank_user_var
## sigma[1]: the scale of rank_user_var , a consistent
## estimate of SD when nu is large.
## mu[2]: the mean of rank_rating
## sigma[2]: the scale of rank_rating
## nu: the degrees-of-freedom for the bivariate t distribution
## xy_pred[1]: the posterior predictive distribution of rank_user_var
## xy_pred[2]: the posterior predictive distribution of rank_rating
##
## Measures
```

	mean	sd	HDIlo	HDIup	%<comp	%>comp
## rho	0.255	0.077	0.097	0.398	0.001	0.999
## mu[1]	76.073	3.598	69.138	83.267	0.000	1.000
## mu[2]	75.859	3.608	68.894	82.920	0.000	1.000
## sigma[1]	42.953	2.564	38.111	48.060	0.000	1.000
## sigma[2]	43.452	2.565	38.457	48.497	0.000	1.000
## nu	72.484	37.355	17.362	148.076	0.000	1.000
## xy_pred[1]	75.648	44.078	-11.349	160.898	0.042	0.958
## xy_pred[2]	76.021	44.535	-14.454	162.580	0.043	0.957


```

##
## 'HDIlo' and 'HDIup' are the limits of a 95% HDI credible interval.
## '%<comp' and '%>comp' are the probabilities of the respective parameter being
## smaller or larger than 0.
##
## Quantiles
##      q2.5%  q25% median  q75%  q97.5%
## rho      0.101  0.203  0.256  0.309  0.403
## mu[1]    69.006 73.674 76.057 78.471 83.178
## mu[2]    68.866 73.392 75.888 78.308 82.903
## sigma[1] 38.304 41.163 42.837 44.589 48.362
## sigma[2] 38.740 41.671 43.353 45.120 48.825
## nu      23.816 45.587 64.600 90.716 166.402
## xy_pred[1] -10.787 46.452 75.625 104.715 161.558
## xy_pred[2] -12.486 46.019 75.714 105.445 165.035
##      mean      sd HDI% comp      HDIlo      HDIup      %>comp
## rho      0.2551007 0.07746524 95 0 0.09748049 0.3983042 0.9988668
## mu[1]    76.0734118 3.59761170 95 0 69.13830270 83.2671844 0.9999333
## mu[2]    75.8589071 3.60841599 95 0 68.89436358 82.9204872 0.9999333
## sigma[1] 42.9525098 2.56402831 95 0 38.11097540 48.0601005 0.9999333
## sigma[2] 43.4523704 2.56489123 95 0 38.45699674 48.4968862 0.9999333
## nu      72.4844731 37.35520241 95 0 17.36249922 148.0761960 0.9999333
## xy_pred[1] 75.6483617 44.07842917 95 0 -11.34940046 160.8982865 0.9578723
## xy_pred[2] 76.0209749 44.53539904 95 0 -14.45419773 162.5795886 0.9572724
##      %<comp      q2.5%      q25%      median      q75%
## rho      1.133182e-03 0.1006192 0.2032176 0.2559657 0.3089615
## mu[1]    6.665778e-05 69.0059373 73.6737490 76.0572654 78.4712138
## mu[2]    6.665778e-05 68.8661652 73.3918039 75.8878628 78.3079501
## sigma[1] 6.665778e-05 38.3037327 41.1628629 42.8370851 44.5888944
## sigma[2] 6.665778e-05 38.7404013 41.6705321 43.3530977 45.1203255
## nu      6.665778e-05 23.8163898 45.5872537 64.6003475 90.7160147
## xy_pred[1] 4.212772e-02 -10.7865379 46.4519753 75.6250024 104.7149635
## xy_pred[2] 4.272764e-02 -12.4855818 46.0187438 75.7141703 105.4454157
##      q97.5%      mcmc_se      Rhat n_eff
## rho      0.4025682 0.0008395377 1.0005792 8527
## mu[1]    83.1776478 0.0412914648 1.0003588 7597
## mu[2]    82.9032924 0.0406507615 1.0004203 7914
## sigma[1] 48.3621436 0.0286778175 1.0004701 8111
## sigma[2] 48.8245352 0.0283917354 1.0002011 8219
## nu      166.4024146 0.5291363345 1.0049968 5133
## xy_pred[1] 161.5576676 0.3631205796 0.9998488 14862
## xy_pred[2] 165.0354653 0.3718404415 1.0003675 14359

```



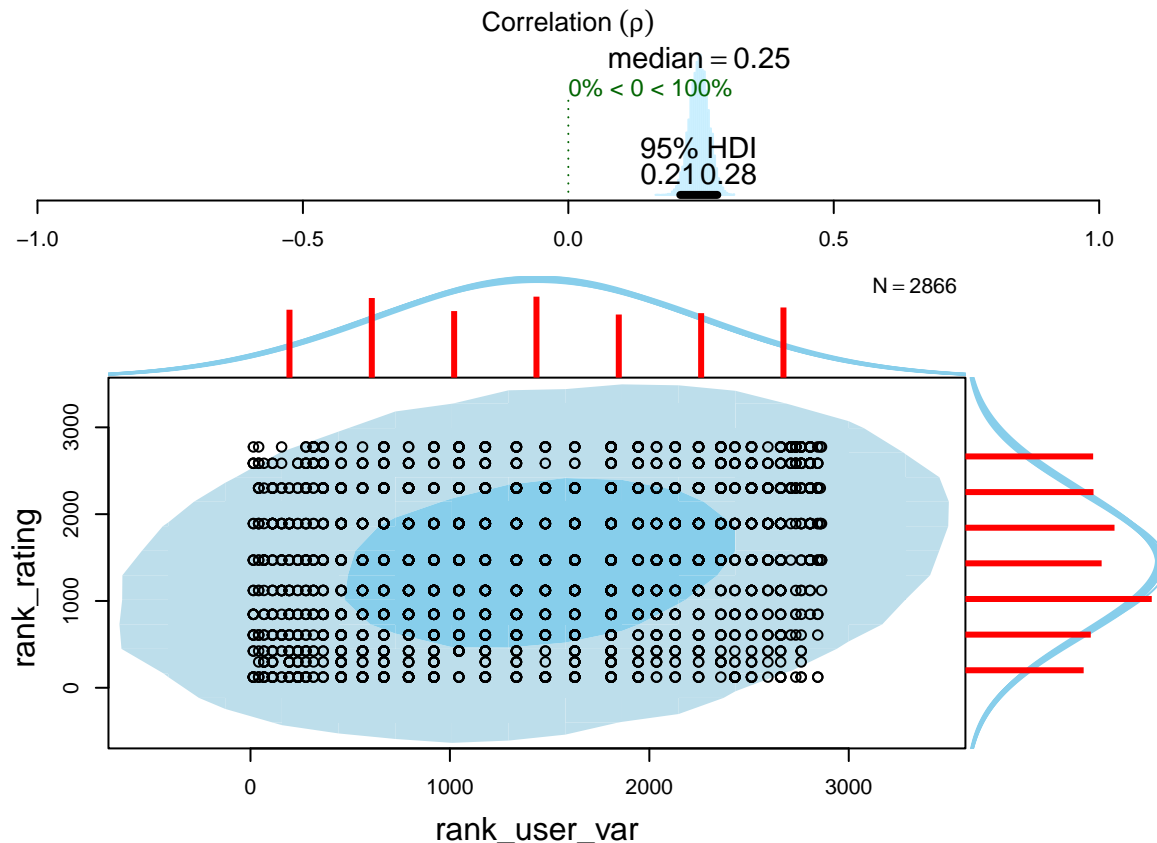
```
## [1] "User characteristic: PA_Identity"
## [1] "activity_experience1" "activity_experience2" "activity_experience3"
## [4] "activity_experience4" "activity_experience5"
## |
## Data
## rank_user_var and rank_rating, n = 2866
##
## Model parameters
## rho: the correlation between rank_user_var and rank_rating
## mu[1]: the mean of rank_user_var
## sigma[1]: the scale of rank_user_var , a consistent
## estimate of SD when nu is large.
## mu[2]: the mean of rank_rating
## sigma[2]: the scale of rank_rating
## nu: the degrees-of-freedom for the bivariate t distribution
## xy_pred[1]: the posterior predictive distribution of rank_user_var
## xy_pred[2]: the posterior predictive distribution of rank_rating
##
## Measures
```

	mean	sd	HDILo	HDUp	%<comp	%>comp
## rho	0.247	0.018	0.211	0.281	0.000	1.000
## mu[1]	1434.008	15.438	1404.755	1464.903	0.000	1.000
## mu[2]	1433.255	15.255	1402.275	1462.319	0.000	1.000
## sigma[1]	825.682	10.941	804.467	846.474	0.000	1.000
## sigma[2]	821.092	10.941	800.052	842.623	0.000	1.000
## nu	234.730	60.974	127.782	357.460	0.000	1.000
## xy_pred[1]	1438.902	831.074	-198.112	3051.514	0.043	0.957

```

## xy_pred[2] 1431.033 828.363 -264.402 2980.862 0.043 0.957
##
## 'HDIlo' and 'HDIup' are the limits of a 95% HDI credible interval.
## '%<comp' and '%>comp' are the probabilities of the respective parameter being
## smaller or larger than 0.
##
## Quantiles
##          q2.5%    q25%   median    q75%   q97.5%
## rho          0.211    0.235    0.247    0.258    0.281
## mu[1]        1404.229 1423.578 1434.055 1444.338 1464.445
## mu[2]        1403.363 1423.030 1433.183 1443.517 1463.530
## sigma[1]      804.917 818.155 825.630 833.196 847.013
## sigma[2]      799.653 813.727 821.051 828.531 842.313
## nu           136.733 191.405 227.373 270.241 374.724
## xy_pred[1] -198.987 883.858 1443.348 1995.281 3051.294
## xy_pred[2] -212.280 869.447 1438.591 1973.760 3044.142
##          mean          sd HDI% comp      HDIlo      HDIup
## rho          0.2465205 0.01776401 95 0 0.2108993 0.2806513
## mu[1]        1434.0081915 15.43828536 95 0 1404.7554292 1464.9031716
## mu[2]        1433.2546837 15.25543805 95 0 1402.2749563 1462.3188309
## sigma[1]      825.6822112 10.94125073 95 0 804.4674773 846.4737559
## sigma[2]      821.0920489 10.94069213 95 0 800.0523330 842.6225745
## nu           234.7298957 60.97400064 95 0 127.7821274 357.4599912
## xy_pred[1] 1438.9023967 831.07403726 95 0 -198.1115972 3051.5138920
## xy_pred[2] 1431.0334758 828.36302881 95 0 -264.4022948 2980.8622624
##          %>comp    %<comp    q2.5%    q25%    median
## rho          0.9999333 6.665778e-05 0.2112088 0.2345678 0.2465485
## mu[1]        0.9999333 6.665778e-05 1404.2286682 1423.5777910 1434.0547516
## mu[2]        0.9999333 6.665778e-05 1403.3629224 1423.0300108 1433.1829373
## sigma[1]      0.9999333 6.665778e-05 804.9172899 818.1551625 825.6302967
## sigma[2]      0.9999333 6.665778e-05 799.6534800 813.7269933 821.0514000
## nu           0.9999333 6.665778e-05 136.7331179 191.4046173 227.3730556
## xy_pred[1] 0.9570057 4.299427e-02 -198.9866680 883.8578163 1443.3476140
## xy_pred[2] 0.9566724 4.332756e-02 -212.2797878 869.4468888 1438.5905189
##          q75%    q97.5%   mcmc_se   Rhat n_eff
## rho          0.2584734 0.2810581 0.0001954395 1.000058 8353
## mu[1]        1444.3380005 1464.4452986 0.1727292442 1.000572 8021
## mu[2]        1443.5167670 1463.5300094 0.1706490224 1.000081 8009
## sigma[1]      833.1962000 847.0133224 0.1230622383 1.000546 7945
## sigma[2]      828.5308945 842.3133254 0.1177374972 1.000288 8665
## nu           270.2410824 374.7235161 0.6954979966 1.001188 7769
## xy_pred[1] 1995.2809358 3051.2937391 6.9406674372 1.000632 14356
## xy_pred[2] 1973.7597223 3044.1418784 6.8188562477 1.000015 14772

```

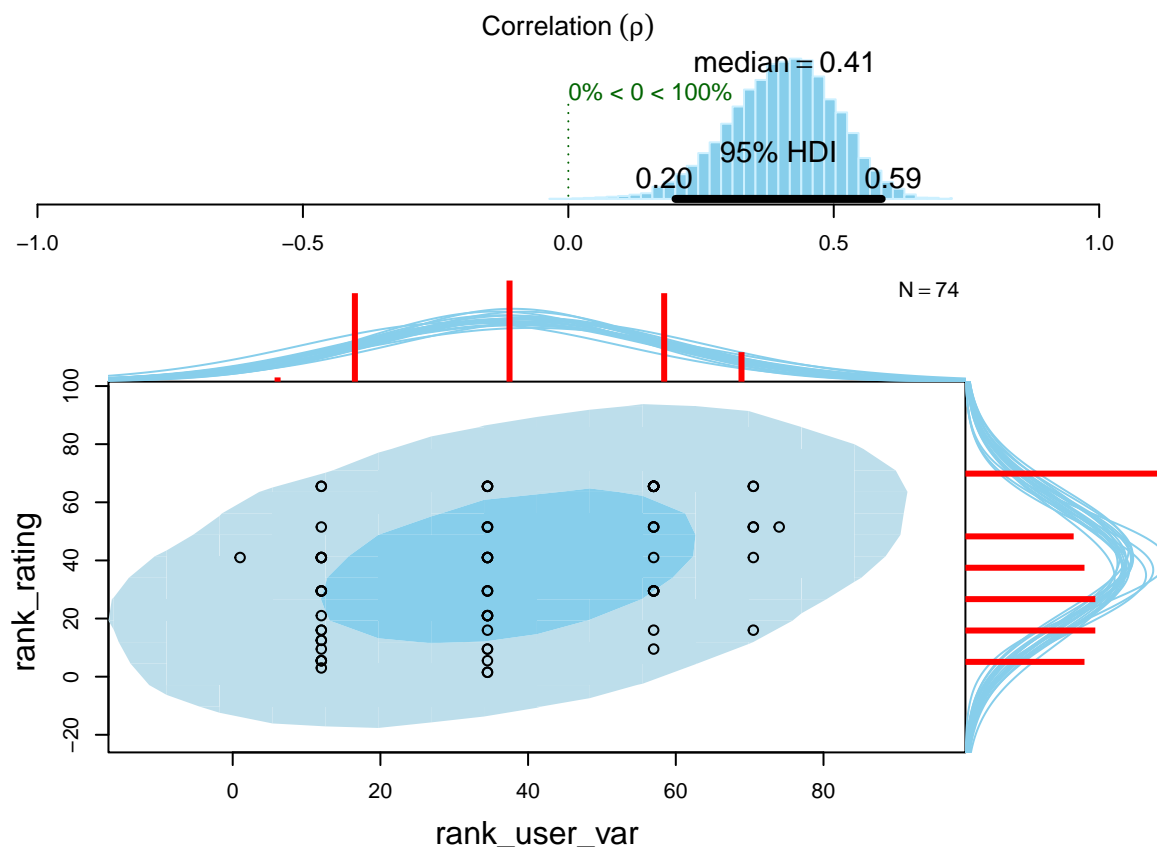


```
## [1] "User characteristic: Smoking.frequency"
## [1] "failing_pa_goals"
## |
## Data
## rank_user_var and rank_rating, n = 74
##
## Model parameters
## rho: the correlation between rank_user_var and rank_rating
## mu[1]: the mean of rank_user_var
## sigma[1]: the scale of rank_user_var , a consistent
## estimate of SD when nu is large.
## mu[2]: the mean of rank_rating
## sigma[2]: the scale of rank_rating
## nu: the degrees-of-freedom for the bivariate t distribution
## xy_pred[1]: the posterior predictive distribution of rank_user_var
## xy_pred[2]: the posterior predictive distribution of rank_rating
##
## Measures
##          mean      sd  HDIlo  HDIup %<comp %>comp
## rho         0.403  0.100  0.202   0.590  0.000   1.000
## mu[1]       37.486  2.497 32.604  42.503  0.000   1.000
## mu[2]       37.479  2.581 32.205  42.360  0.000   1.000
## sigma[1]    20.939  1.803 17.522  24.543  0.000   1.000
## sigma[2]    21.594  1.853 18.102  25.307  0.000   1.000
## nu         58.852 34.028 10.010 126.210  0.000   1.000
## xy_pred[1]  37.217 21.807 -5.038  80.987  0.042  0.958
## xy_pred[2]  37.140 22.393 -6.007  82.079  0.047  0.953
```

```

##
## 'HDIlo' and 'HDIup' are the limits of a 95% HDI credible interval.
## '%<comp' and '%>comp' are the probabilities of the respective parameter being
## smaller or larger than 0.
##
## Quantiles
##      q2.5%  q25% median  q75%  q97.5%
## rho      0.193  0.338  0.408  0.472  0.584
## mu[1]    32.519 35.841 37.476 39.127 42.421
## mu[2]    32.351 35.761 37.502 39.216 42.548
## sigma[1] 17.707 19.679 20.835 22.080 24.774
## sigma[2] 18.309 20.280 21.491 22.775 25.564
## nu      15.531 34.061 50.980 75.963 143.873
## xy_pred[1] -5.852 22.930 37.150 51.296 80.443
## xy_pred[2] -6.823 22.404 37.122 51.693 81.543
##      mean      sd HDI% comp      HDIlo      HDIup      %>comp
## rho      0.4025519 0.09987925 95 0 0.2019451 0.5902977 0.9998000
## mu[1]    37.4861826 2.49651988 95 0 32.6041759 42.5029072 0.9999333
## mu[2]    37.4790908 2.58082612 95 0 32.2046383 42.3604506 0.9999333
## sigma[1] 20.9391086 1.80323065 95 0 17.5219157 24.5426193 0.9999333
## sigma[2] 21.5942922 1.85292167 95 0 18.1020123 25.3073343 0.9999333
## nu      58.8522928 34.02811708 95 0 10.0096988 126.2104913 0.9999333
## xy_pred[1] 37.2173466 21.80681059 95 0 -5.0378455 80.9867789 0.9575390
## xy_pred[2] 37.1399993 22.39288366 95 0 -6.0066450 82.0789937 0.9530063
##      %<comp      q2.5%      q25%      median      q75%      q97.5%
## rho      1.999733e-04 0.1933148 0.3382118 0.4081572 0.4717612 0.5843595
## mu[1]    6.665778e-05 32.5190353 35.8413920 37.4756948 39.1273045 42.4206903
## mu[2]    6.665778e-05 32.3514372 35.7610509 37.5019833 39.2158855 42.5484032
## sigma[1] 6.665778e-05 17.7072349 19.6793463 20.8350542 22.0801712 24.7741549
## sigma[2] 6.665778e-05 18.3090205 20.2800409 21.4905615 22.7752334 25.5640505
## nu      6.665778e-05 15.5312592 34.0610157 50.9802997 75.9634073 143.8725848
## xy_pred[1] 4.246101e-02 -5.8515716 22.9298939 37.1495093 51.2956803 80.4425112
## xy_pred[2] 4.699373e-02 -6.8230364 22.4039070 37.1221075 51.6925371 81.5428073
##      mcmc_se      Rhat n_eff
## rho      0.001175729 1.0004350 7223
## mu[1]    0.032243775 1.0004127 6029
## mu[2]    0.031663394 1.0006560 6658
## sigma[1] 0.020093171 1.0003967 8052
## sigma[2] 0.021993528 1.0006738 7105
## nu      0.508454286 1.0008979 4488
## xy_pred[1] 0.182078414 1.0000584 14355
## xy_pred[2] 0.188223920 0.9999802 14161

```



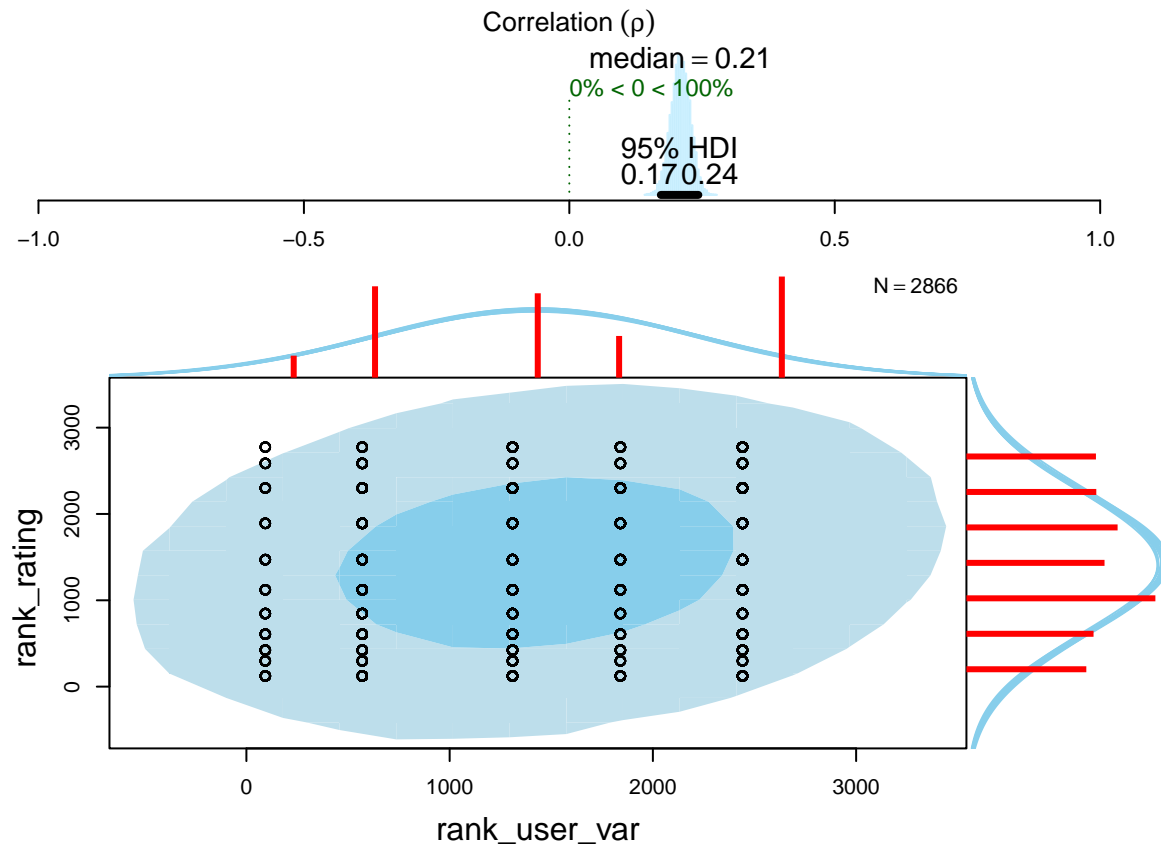
```
## [1] "User characteristic: TTM_PA"
## [1] "activity_experience1" "activity_experience2" "activity_experience3"
## [4] "activity_experience4" "activity_experience5"
## |
## Data
## rank_user_var and rank_rating, n = 2866
##
## Model parameters
## rho: the correlation between rank_user_var and rank_rating
## mu[1]: the mean of rank_user_var
## sigma[1]: the scale of rank_user_var , a consistent
## estimate of SD when nu is large.
## mu[2]: the mean of rank_rating
## sigma[2]: the scale of rank_rating
## nu: the degrees-of-freedom for the bivariate t distribution
## xy_pred[1]: the posterior predictive distribution of rank_user_var
## xy_pred[2]: the posterior predictive distribution of rank_rating
##
## Measures
```

	mean	sd	HDILo	HDIup	%<comp	%>comp
## rho	0.209	0.018	0.172	0.243	0.000	1.000
## mu[1]	1433.595	14.873	1404.988	1463.167	0.000	1.000
## mu[2]	1433.478	15.455	1402.168	1462.596	0.000	1.000
## sigma[1]	800.626	10.562	780.046	820.682	0.000	1.000
## sigma[2]	821.589	11.151	800.578	844.200	0.000	1.000
## nu	250.009	63.939	135.962	376.895	0.000	1.000
## xy_pred[1]	1428.655	805.206	-155.642	2969.486	0.039	0.961

```

## xy_pred[2] 1426.879 823.335 -165.427 3094.222 0.041 0.959
##
## 'HDIlo' and 'HDIup' are the limits of a 95% HDI credible interval.
## '%<comp' and '%>comp' are the probabilities of the respective parameter being
## smaller or larger than 0.
##
## Quantiles
##          q2.5%    q25%   median    q75%   q97.5%
## rho          0.174    0.197    0.209    0.222    0.245
## mu[1]        1404.359 1423.632 1433.595 1443.604 1462.658
## mu[2]        1402.804 1423.128 1433.493 1443.857 1463.420
## sigma[1]      780.421 793.461 800.611 807.698 821.214
## sigma[2]      800.145 813.942 821.525 828.974 843.949
## nu           147.369 204.625 242.063 287.708 396.772
## xy_pred[1] -142.203 884.926 1429.504 1968.791 2998.388
## xy_pred[2] -200.040 869.932 1424.732 1974.937 3067.961
##          mean          sd HDI% comp      HDIlo      HDIup
## rho          0.2094006 0.01806895 95 0 0.1723649 0.2430972
## mu[1]        1433.5947244 14.87287212 95 0 1404.9882845 1463.1668313
## mu[2]        1433.4781194 15.45487465 95 0 1402.1682328 1462.5958060
## sigma[1]      800.6261649 10.56200506 95 0 780.0461619 820.6818910
## sigma[2]      821.5890323 11.15087407 95 0 800.5777689 844.2000319
## nu           250.0092764 63.93859059 95 0 135.9622338 376.8951391
## xy_pred[1] 1428.6553487 805.20574998 95 0 -155.6424882 2969.4859266
## xy_pred[2] 1426.8789007 823.33492411 95 0 -165.4271847 3094.2220890
##          %>comp    %<comp    q2.5%    q25%    median
## rho          0.9999333 6.665778e-05 0.1738781 0.1974005 0.2093727
## mu[1]        0.9999333 6.665778e-05 1404.3587426 1423.6324986 1433.5948384
## mu[2]        0.9999333 6.665778e-05 1402.8035827 1423.1283706 1433.4929431
## sigma[1]      0.9999333 6.665778e-05 780.4212561 793.4608159 800.6105882
## sigma[2]      0.9999333 6.665778e-05 800.1448142 813.9424332 821.5245424
## nu           0.9999333 6.665778e-05 147.3686251 204.6245462 242.0631951
## xy_pred[1] 0.9610719 3.892814e-02 -142.2031161 884.9257399 1429.5043442
## xy_pred[2] 0.9586722 4.132782e-02 -200.0401788 869.9320273 1424.7319779
##          q75%    q97.5%   mcmc_se   Rhat n_eff
## rho          0.2216979 0.2446909 0.0001958834 1.0000454 8532
## mu[1]        1443.6044007 1462.6583181 0.1655632811 1.0008023 8099
## mu[2]        1443.8569202 1463.4202183 0.1648530350 1.0008743 8793
## sigma[1]      807.6982967 821.2136574 0.1090989600 1.0015236 9421
## sigma[2]      828.9739804 843.9490653 0.1180573870 1.0003789 8924
## nu           287.7084358 396.7724076 0.7312209687 0.9999869 7669
## xy_pred[1] 1968.7910153 2998.3876739 6.8607546898 0.9998763 13946
## xy_pred[2] 1974.9368443 3067.9611739 6.7224612843 1.0000510 14999

```



References

Bååth, Rasmus. 2014. "Bayesian First Aid: A Package That Implements Bayesian Alternatives to the Classical *.test Functions in r." In *UseR! 2014 - the International r User Conference*.