Correlation

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Title: Big Data Analytics Services for Enhancing Business Intelligence

Abstract: This article examines how to use big data analytics services to enhance business intelligence (BI). More specifically, this article proposes an ontology of big data analytics and presents a big data analytics service-oriented architecture (BASOA), and then applies BASOA to BI, where our surveyed data analysis shows that the proposed BASOA is viable for enhancing BI and enterprise information systems. This article also explores temporality, expectability, and relativity as the characteristics of intelligence in BI. These characteristics are what customers and decision makers expect from BI in terms of systems, products, and services of organizations. The proposed approach in this article might facilitate the research and development of business analytics, big data analytics, and BI as well as big data science and big data computing.

Dataset:

```
data <- read.csv('07_data.csv')
```

```
-   Gender of the participant surveyed on these topics
-   Temporality: an average score of the rated ability to adapt to change
over time 1 (not changing) to 7 (changing a lot)
-   Expectability: a rated degree of satisfaction with the BI
-   Relativity: average score rating of how much better one system is than
another in BI 1 (not very good) to 7 (very good)
-   Positive emotion: how positive participants felt about BI (higher scores
are more positive, ranges from 1 to 7).
```

```
summary(data)
```

```
##    gender     temporality     expectability     relativity        positive
##  men  :150   Min.   :1.737   Min.   :0.000   Min.   :-2.301   Min.   :-
0.9128
##  women:150   1st Qu.:2.823   1st Qu.:2.000   1st Qu.: 2.439   1st Qu.:
2.0175
##              Median :3.581   Median :3.000   Median : 3.564   Median :
3.0780
##              Mean   :3.532   Mean   :3.643   Mean   : 3.569   Mean   :
3.1446
##              3rd Qu.:4.225   3rd Qu.:5.000   3rd Qu.: 4.731   3rd Qu.:
4.2614
##              Max.   :5.184   Max.   :9.000   Max.   :10.508   Max.   :
```

```
8.2126
##                NA's   :9       NA's   :9       NA's   :9        NA's   :9
```

Data Screening:

Accuracy:

```
a.  Include output that indicates if the data are or are not accurate.
b.  If the data are not accurate, delete the inaccurate scores.
c.  Include a summary that shows that you fixed the inaccurate scores.
```

```
data$temporality[data$temporality < 1 | data$temporality > 7] = NA
data$relativity[data$relativity < 1 | data$relativity > 7] = NA
data$positive[data$positive < 1 | data$positive > 7] = NA
summary(data)
```

```
##    gender      temporality     expectability     relativity       positive
##  men  :150   Min.   :1.737   Min.   :0.000   Min.   :1.065   Min.   :1.053
##  women:150   1st Qu.:2.823   1st Qu.:2.000   1st Qu.:2.625   1st Qu.:2.337
##              Median :3.581   Median :3.000   Median :3.618   Median :3.250
##              Mean   :3.532   Mean   :3.643   Mean   :3.650   Mean   :3.423
##              3rd Qu.:4.225   3rd Qu.:5.000   3rd Qu.:4.676   3rd Qu.:4.396
##              Max.   :5.184   Max.   :9.000   Max.   :6.952   Max.   :6.918
##              NA's   :9       NA's   :9       NA's   :44      NA's   :41
```

Missing:

```
a.  Since any accuracy errors will create more than 5% missing data, exclude
all data pairwise for the rest of the analyses.
```

```
cleanData <- na.omit(data)
summary(cleanData)
```

```
##    gender      temporality     expectability   relativity       positive
##  men  :107   Min.   :1.737   Min.   :0.00   Min.   :1.065   Min.   :1.053
##  women:100   1st Qu.:2.865   1st Qu.:2.00   1st Qu.:2.634   1st Qu.:2.284
##              Median :3.522   Median :3.00   Median :3.591   Median :3.193
##              Mean   :3.511   Mean   :3.57   Mean   :3.661   Mean   :3.395
##              3rd Qu.:4.188   3rd Qu.:5.00   3rd Qu.:4.684   3rd Qu.:4.378
##              Max.   :5.102   Max.   :8.00   Max.   :6.952   Max.   :6.918
```

Outliers:

```
a.  Include a summary of your mahal scores.
b.  What are the df for your Mahalanobis cutoff?
c.  What is the cut off score for your Mahalanobis measure?
d.  How many outliers did you have?
```

```
noMiss <- cleanData[,-c(1)]
mahalScores = mahalanobis(noMiss, colMeans(noMiss, na.rm = TRUE), cov(noMiss,
use = "pairwise.complete.obs"))
mahalScores
```

```
##         3         4         5         6         7         8 
9 
##  4.9995676  7.7528981  3.4928848  2.8482000  2.1121758  9.0196110 
2.7785428 
##        12        13        16        17        18        19 
20 
##  4.0151669  9.6081393  8.1755024  5.2475559 11.2900110  2.9232378 
3.3700619 
##        22        24        28        29        30        31 
32 
##  9.4295298  7.9294934  2.4968146  3.6749320  4.2856946  8.3638500 
2.2227511 
##        34        37        38        39        40        42 
43 
##  6.7993885  1.3100589  0.3517478  8.6130777  9.9905082  3.6773014 
6.1931893 
##        44        45        46        49        50        51 
52 
##  3.4494180  3.5773830  0.8675374  0.3334311  3.6147266  9.3815495 
3.3335206 
##        53        55        56        59        60        62 
63 
##  2.4320038  3.2579986  1.8985941  2.3810604  5.9115020  8.6528501 
0.5204975 
##        64        65        67        68        69        70 
71 
##  2.8870370  3.7149859  1.9060051  1.7955915  6.8169888  0.8373976 
5.8860736 
##        73        74        75        76        77        78 
81 
##  5.9871045  3.7436519  1.2377745  3.6873824  3.6379470  6.1606333 
1.7554671 
##        82        83        85        86        88        90 
97 
##  6.5803737  8.4432518  4.3106671  1.7894347  5.7204345  4.1863734 
2.4839408 
##        98       100       101       102       104       105 
106 
##  4.4697295  5.1250418  2.4749193  2.2301882  4.0613730  4.1151160 
4.6082655 
##       107       108       110       112       113       114 
116 
##  2.7759276  4.1529765  8.1095076  3.5660510  3.8097153  4.6284445 
1.8070772 
##       118       119       121       122       124       126 
127 
## 10.5342902  5.7619392  4.1070443  3.4844882  4.5348788  3.9246492 
5.5076890 
##       129       130       131       132       133       135 
137 
```

```
##  2.4983191  4.4431081  5.7777735  2.3261948  1.2202746  3.2217760
4.6863715
##        139        142        143        144        146        147
148
##  5.8057381  5.4417299  1.6583857  1.9234562  2.3883633  8.5028548
2.3913462
##        149        150        151        152        153        154
155
##  1.9439762  1.7205863  6.3168498  1.4229752  5.7672969  1.7062730
6.9954663
##        157        158        159        160        162        163
164
##  6.3092421  1.5238410  8.5513133  2.9414767  1.4604493  1.5367560
4.6798505
##        166        167        171        172        173        174
175
##  1.2078748 10.1958360  2.6983768  0.1628773  0.9232773  1.9758751
5.3312994
##        178        179        180        181        182        183
184
##  2.3860644  1.9442042  3.7431914  2.6740206  3.0777747  5.3991064
7.5768331
##        187        188        190        191        194        195
196
##  3.1434331  1.2793994  3.9667099  7.4172474  2.7536696  3.2561614
5.7222224
##        198        199        201        202        203        204
206
##  2.2749307  4.7663118  3.2205634  5.6399895  2.9426663  1.4221475
4.9542651
##        207        208        209        210        212        213
216
##  0.5290791  2.3579975  5.5376682  2.6545010  5.6929771  2.7118265
1.0298209
##        217        218        220        221        222        223
224
##  5.0186512  3.0412746  1.1129561  6.9554058 10.5638923  4.1655858
2.1790288
##        225        226        227        229        230        231
232
##  2.2113229  2.1417774  1.8637116  3.6151409  4.9296574  0.9738669
3.5685284
##        233        234        235        236        239        240
241
##  1.5043300  2.7375489  3.8930982  4.8382047  3.5167003  3.5008299
3.9180309
##        244        246        248        249        250        251
252
##  3.6101413  4.3154217  2.6978315  2.9742802  5.5079217  7.6045754
1.3583994
```

```
##       255       256       257       258       259       260 
261 
## 3.3696235 3.5574126 1.7051520 3.7657469 2.5077374 4.7538616 
3.6087123 
##       262       263       265       268       269       270 
271 
## 2.3318945 3.8043452 2.2711964 2.9097699 3.2509074 2.4744362 
3.1190776 
##       274       275       276       278       279       280 
282 
## 4.1625853 4.7214993 5.0006462 5.1647829 0.4777734 1.4532629 
1.8331003 
##       283       286       287       288       289       290 
292 
## 0.7790014 6.9994368 6.0580823 6.6685918 3.3198625 1.2496108 
4.6216365 
##       294       295       296       298 
## 2.4496549 4.7525092 6.5243098 2.3416289
```

```
cutOff <- qchisq(1-.001, ncol(noMiss))
cutOff
```

```
## [1] 18.46683
```

```
summary(mahalScores < cutOff)
```

```
##    Mode    TRUE 
## logical     207
```

```
noOut <- subset(cleanData, mahalScores < cutOff)
noOut
```

```
##     gender temporality expectability relativity positive
## 3    women    4.586402             3   2.572868 1.223659
## 4    women    4.331763             1   1.347142 1.795185
## 5    women    4.259832             2   2.446816 2.202066
## 6    women    4.660960             5   3.775775 2.552891
## 7    women    4.036579             5   5.454099 3.019725
## 8    women    4.530757             0   4.198125 2.614516
## 9    women    3.208714             5   2.967409 4.861072
## 12   women    4.165093             6   4.306817 4.648106
## 13   women    3.238961             0   4.171403 5.985619
## 16   women    4.571096             5   1.432909 1.774882
## 17   women    3.982522             7   3.970333 2.305769
## 18   women    4.938608             0   4.389296 2.700692
## 19   women    4.549474             5   3.377292 2.378240
## 20   women    4.369895             5   4.693000 1.380504
## 22   women    5.102181             7   3.414720 1.606853
## 24   women    4.386829             2   6.226048 4.115312
## 28   women    4.172433             3   5.044878 3.939312
## 29   women    3.956321             5   3.369465 1.156475
```

```
## 30   women    4.711761             2   3.904243 2.516802
## 31   women    4.453575             3   6.823700 1.903434
## 32   women    3.902674             3   5.126074 2.473248
## 34   women    3.774439             5   6.890952 1.996212
## 37   women    3.756984             5   4.735555 2.660313
## 38   women    3.580643             4   3.427767 2.766761
## 39   women    4.880203             5   1.708481 3.702972
## 40   women    4.497580             8   5.794069 1.332978
## 42   women    3.357322             3   2.929358 1.053080
## 43   women    4.489371             1   4.012190 4.108021
## 44   women    4.510224             6   4.307027 3.368739
## 45   women    4.107657             6   4.572920 1.766861
## 46   women    3.532016             5   4.294086 3.482421
## 49   women    3.697138             3   3.931719 3.546228
## 50   women    4.429213             2   3.470736 1.941459
## 51   women    4.501909             0   2.048414 4.014267
## 52   women    3.827140             2   5.053673 2.672276
## 53   women    4.017592             6   4.237871 3.008700
## 55   women    4.575270             3   5.000347 2.568674
## 56   women    4.351336             4   5.061722 2.861471
## 59   women    3.942428             2   3.759540 2.082552
## 60   women    3.677005             2   5.420026 5.265431
## 62   women    4.814168             6   2.093971 1.992358
## 63   women    3.923024             3   3.638681 3.072078
## 64   women    4.230702             3   5.229934 2.386120
## 65   women    4.304208             6   4.446851 4.264415
## 67   women    4.161915             5   3.176782 3.078182
## 68   women    3.965989             2   3.154534 3.717381
## 69   women    3.625076             2   3.567371 6.496277
## 70   women    3.687233             5   4.262741 3.502236
## 71   women    4.847632             3   5.849361 3.078863
## 73   women    4.478682             1   3.302405 1.780330
## 74   women    4.379877             3   3.479904 4.891106
## 75   women    4.196348             3   3.940425 2.645100
## 76   women    4.850326             3   4.403256 2.836303
## 77   women    4.534421             3   2.627935 1.929732
## 78   women    3.751175             7   2.983053 3.529162
## 81   women    3.664787             5   4.769536 4.388264
## 82   women    4.825495             6   2.832920 3.352723
## 83   women    4.796455             4   1.601453 4.412049
## 85   women    4.317156             3   2.636163 1.119419
## 86   women    3.994235             4   3.611095 1.663199
## 88   women    3.611191             5   1.334881 4.056140
## 90   women    3.944988             6   4.291311 4.961690
## 97   women    4.219107             3   2.589417 3.997488
## 98   women    4.269762             6   5.605873 1.819293
## 100  women    4.450653             4   3.438885 5.382597
## 101  women    3.930155             6   4.812154 3.020127
## 102  women    4.064349             3   4.853484 2.164687
## 104  women    3.854926             1   4.018477 2.433384
```

```
## 105  women    3.769718             4   5.294288 5.446013
## 106  women    3.722240             6   6.140299 3.965083
## 107  women    4.241797             6   4.772485 3.192741
## 108  women    4.328969             2   3.879007 4.646513
## 110  women    4.743356             1   1.771300 2.589870
## 112  women    4.602453             6   4.553060 2.942572
## 113  women    3.747071             3   5.952156 3.062766
## 114  women    4.458603             4   6.146362 2.246621
## 116  women    3.699054             4   5.403625 3.818490
## 118  women    4.406552             8   6.952331 2.437226
## 119  women    4.179697             6   2.852232 1.400704
## 121  women    4.052246             2   1.668263 2.358009
## 122  women    3.520630             4   5.317935 5.238084
## 124  women    3.803345             1   1.731494 2.586268
## 126  women    3.637311             1   2.632513 2.028701
## 127  women    4.940459             5   4.825002 4.469485
## 129  women    4.533000             4   5.122298 2.694319
## 130  women    3.915179             6   6.203989 3.148667
## 131  women    4.437800             2   5.324121 1.846499
## 132  women    4.201867             2   3.033992 3.108088
## 133  women    3.370932             4   4.925695 2.921602
## 135  women    3.837700             5   4.943528 1.438993
## 137  women    3.927346             6   5.796859 1.865389
## 139  women    4.386522             2   1.414181 3.492809
## 142  women    4.307427             7   5.113893 2.161609
## 143  women    4.320685             4   4.713258 3.690872
## 144  women    4.210081             5   3.455504 3.674238
## 146  women    4.409023             3   4.286366 3.954879
## 147  women    3.927122             8   4.289237 2.033583
## 148  women    4.238844             3   2.375924 2.846238
## 149  women    3.507742             5   2.726591 3.761112
## 150  women    3.713487             3   2.452957 2.200834
## 151    men    2.336727             2   5.294903 3.772522
## 152    men    2.726785             3   3.069251 4.496115
## 153    men    3.106870             3   1.520510 1.180436
## 154    men    2.534931             3   2.857508 3.847856
## 155    men    3.815084             2   6.271164 2.500474
## 157    men    1.989499             4   4.668152 2.936548
## 158    men    2.690661             3   3.093465 4.529629
## 159    men    2.793906             6   5.175555 6.302868
## 160    men    3.100414             2   2.054146 2.179032
## 162    men    3.225676             5   4.675207 3.505386
## 163    men    3.396440             4   2.356302 2.766210
## 164    men    2.237072             3   2.507146 2.242218
## 166    men    2.956398             4   3.387720 2.719957
## 167    men    2.128099             0   2.504722 1.623457
## 171    men    3.409561             3   3.849424 5.523582
## 172    men    3.521942             3   3.334153 3.498738
## 173    men    3.591058             4   4.358191 2.316429
## 174    men    3.074163             4   3.794276 5.188459
```

```
## 175    men    2.786789            3   1.484051 5.677937
## 178    men    3.068317            4   5.371776 3.528376
## 179    men    3.556170            5   5.361251 3.249898
## 180    men    2.392952            2   3.695500 5.093878
## 181    men    2.816046            2   2.237057 2.545074
## 182    men    3.168144            3   3.860453 5.712322
## 183    men    3.300704            3   1.168180 1.607464
## 184    men    2.061124            6   3.112401 3.968311
## 187    men    3.444325            5   5.115539 1.845404
## 188    men    3.050001            4   4.664999 3.232131
## 190    men    3.991960            3   2.512196 5.232465
## 191    men    2.612402            1   1.197637 1.666395
## 194    men    2.816316            2   1.739012 4.215709
## 195    men    3.221441            3   3.527149 5.813175
## 196    men    2.238792            4   5.359369 3.461063
## 198    men    3.326545            3   2.307952 1.969035
## 199    men    2.728919            2   1.065340 4.761410
## 201    men    3.009388            2   1.754372 2.372983
## 202    men    1.822843            3   2.431565 3.109280
## 203    men    2.365260            3   4.251906 3.829847
## 204    men    4.018225            4   3.624222 4.416546
## 206    men    2.559531            2   1.322553 2.396667
## 207    men    3.069821            4   3.408699 3.415337
## 208    men    2.932070            3   2.510986 2.133501
## 209    men    2.900932            4   5.919196 2.226729
## 210    men    2.408588            3   2.702978 2.996351
## 212    men    2.599196            3   1.478144 1.765139
## 213    men    2.893652            5   4.982687 3.327594
## 216    men    2.828903            4   3.584666 3.443160
## 217    men    2.693676            5   3.019242 1.746532
## 218    men    2.653215            3   1.616944 4.095464
## 220    men    3.415689            3   2.693594 2.419690
## 221    men    3.034004            3   2.945140 6.917850
## 222    men    1.737005            2   1.166226 1.729102
## 223    men    3.330804            3   4.492552 5.908982
## 224    men    3.434845            3   3.564123 5.313472
## 225    men    2.500352            3   3.361036 2.953067
## 226    men    2.861364            4   2.884833 4.930289
## 227    men    3.477868            4   5.004304 2.261938
## 229    men    2.673674            2   4.475379 2.856397
## 230    men    2.579059            5   4.132823 5.673863
## 231    men    2.976619            3   3.077592 4.450620
## 232    men    2.319537            4   4.320963 3.221564
## 233    men    2.581890            3   3.097525 3.995890
## 234    men    2.708071            2   1.763934 3.899858
## 235    men    2.775622            2   3.807071 5.604616
## 236    men    2.898672            1   1.443664 2.470409
## 239    men    2.870655            2   4.725485 4.632785
## 240    men    2.422825            5   3.636333 3.527521
## 241    men    2.480026            2   2.362665 5.384554
```

```
## 244     men     2.623366             4    3.999557 2.006255
## 246     men     2.217544             2    3.182469 2.660570
## 248     men     2.755291             3    4.807695 3.077961
## 249     men     3.532593             6    3.262747 3.423234
## 250     men     2.499757             5    4.448056 1.972448
## 251     men     3.204959             4    1.550434 6.255282
## 252     men     3.356991             3    3.129086 2.057760
## 255     men     2.907395             4    5.579760 4.059044
## 256     men     3.627211             5    2.330340 4.558613
## 257     men     2.889013             4    2.690931 4.436595
## 258     men     3.388204             4    3.511552 5.936271
## 259     men     2.567475             4    2.650998 3.075368
## 260     men     3.449674             5    3.424650 5.920239
## 261     men     2.757023             2    2.867790 1.880720
## 262     men     2.476768             2    3.108310 3.861350
## 263     men     2.836130             4    1.534532 4.294841
## 265     men     2.868961             5    3.992758 4.494895
## 268     men     3.143223             1    3.542089 3.165685
## 269     men     3.085682             2    4.202921 5.218222
## 270     men     3.355050             3    2.218999 4.954981
## 271     men     2.911627             2    1.446835 4.038551
## 274     men     2.905948             2    3.868879 5.760789
## 275     men     2.905350             2    2.164807 5.869336
## 276     men     2.703809             3    1.410999 2.005636
## 278     men     3.325057             2    4.459036 1.151065
## 279     men     3.472604             4    3.744902 4.233559
## 280     men     3.817198             5    3.475110 4.035084
## 282     men     2.519300             3    3.268659 4.368698
## 283     men     3.481826             3    2.510573 3.576451
## 286     men     3.621432             4    6.878332 2.128341
## 287     men     2.672530             3    4.852248 6.190165
## 288     men     2.375195             2    2.614499 6.507269
## 289     men     2.885393             4    2.232491 5.147775
## 290     men     3.179726             4    3.085760 4.639073
## 292     men     2.566394             5    3.591400 5.539623
## 294     men     2.794594             4    4.190815 5.107869
## 295     men     2.281292             2    4.191726 5.108889
## 296     men     2.648135             3    5.229720 1.622311
## 298     men     2.773299             4    2.159914 3.692774
```

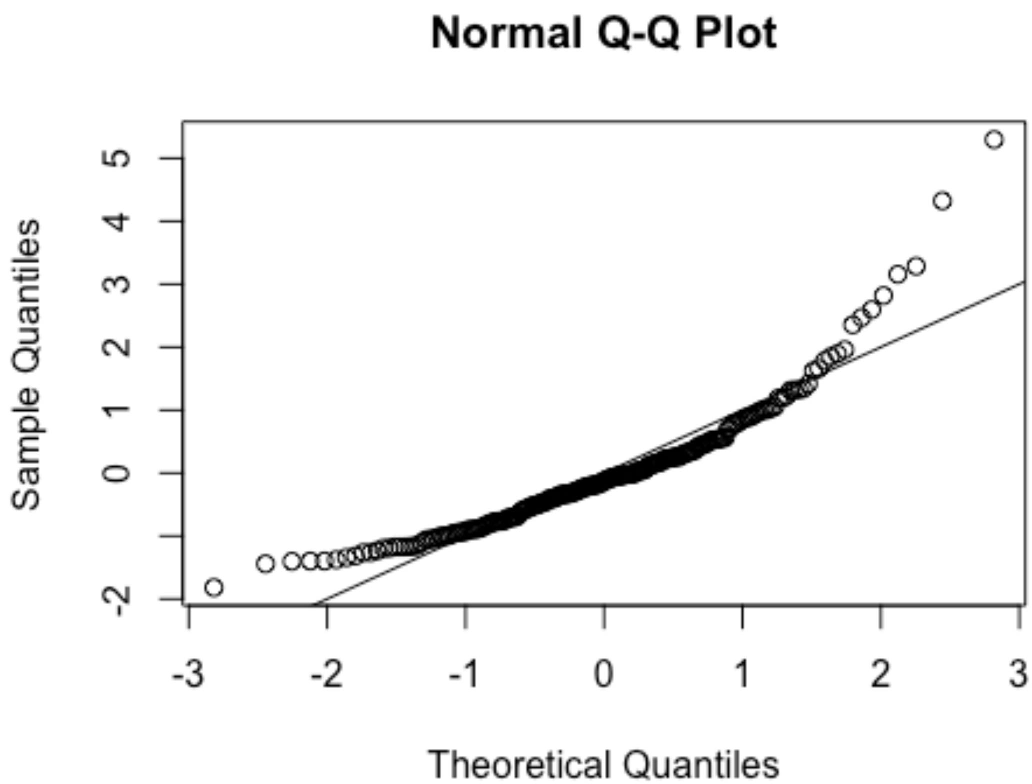
Assumptions:

Linearity:

```
a.  Include a picture that shows how you might assess multivariate linearity.
b.  Do you think you've met the assumption for linearity?

random = rchisq(nrow(noOut), 7)
fake = lm(random~., data = noOut)
```

```
standardized = rstudent(fake)
fitvalues = scale(fake$fitted.values)
qqnorm(standardized)
abline(0,1)
```

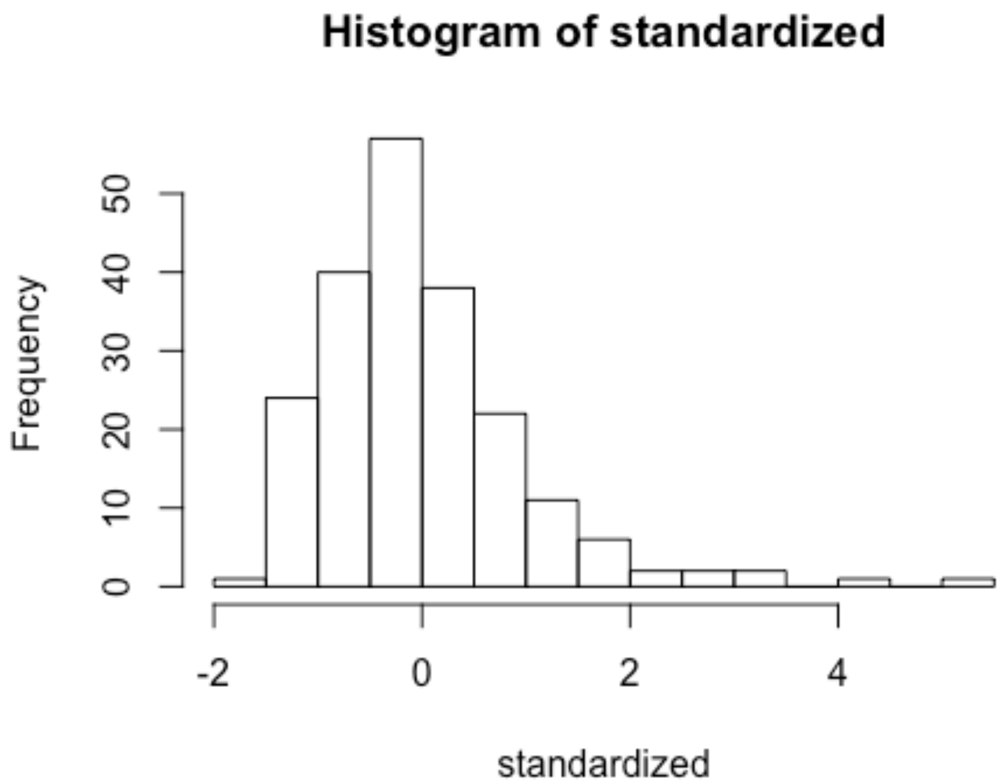


Normality:

```
a.   Include a picture that shows how you might assess multivariate normality.
b.   Do you think you've met the assumption for normality?

    From below picture it is we can confirm that the assumption has met the
normality

hist(standardized, breaks=15)
```



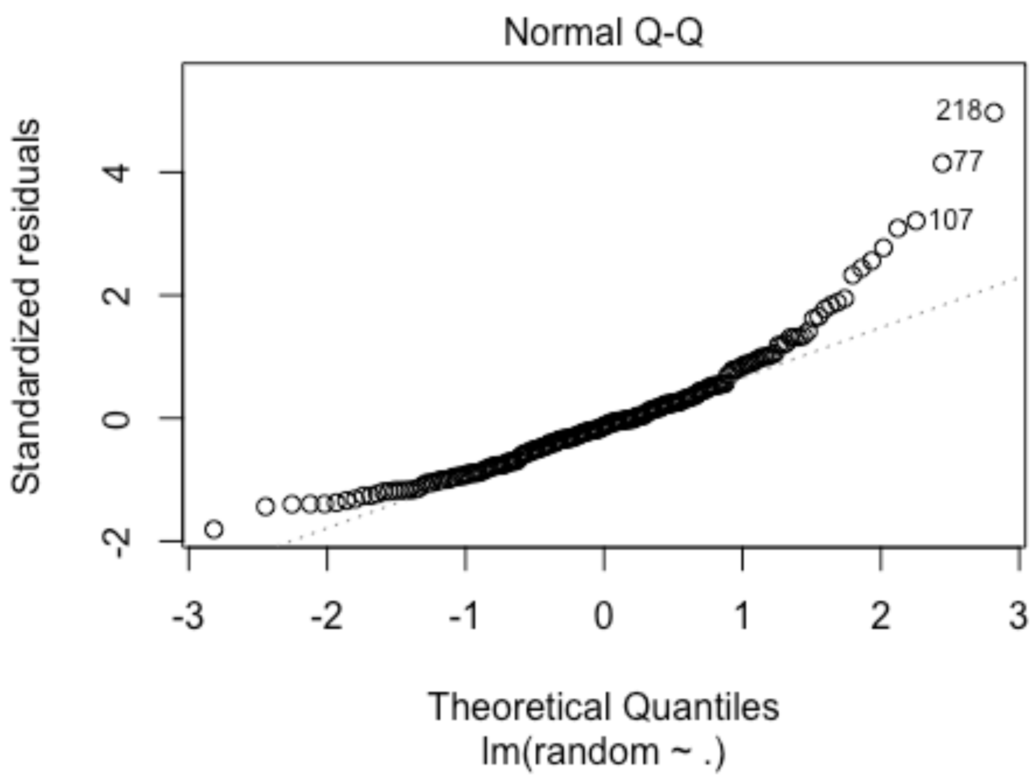

```
library(moments)
skewness(noOut[,-c(1)], na.rm=TRUE)

##   temporality expectability    relativity      positive
##   -0.03251117    0.27131476    0.11609442    0.42983894

kurtosis(noOut[,-c(1)], na.rm=TRUE)

##   temporality expectability    relativity      positive
##      2.001327      2.894151      2.399474      2.331996

plot(fake, 2)
```



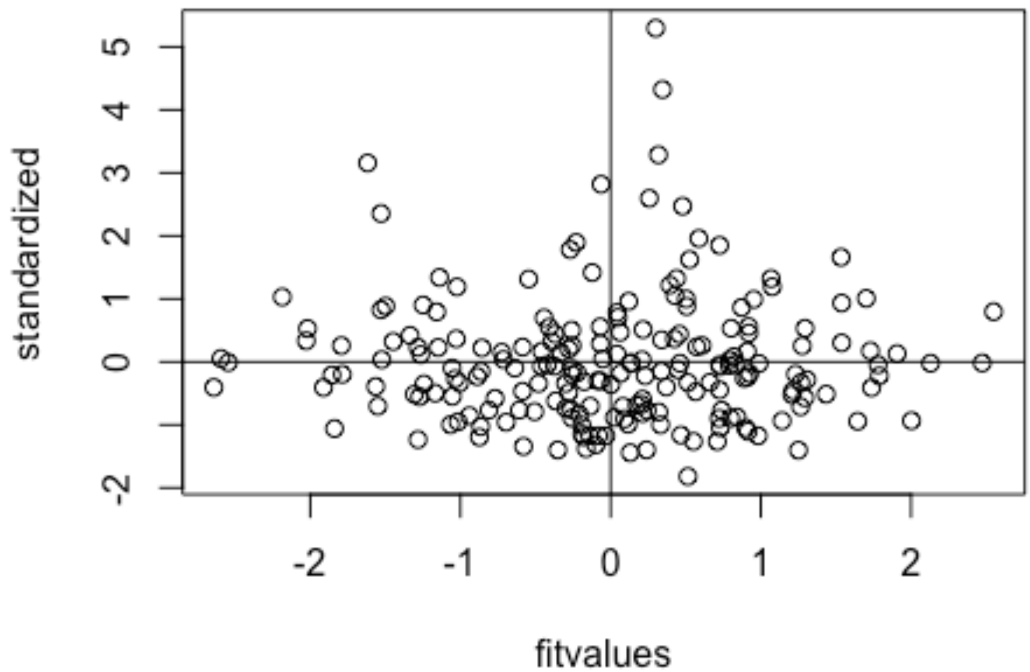
##

Homogeneity and Homoscedasticity:

```
a.  Include a picture that shows how you might assess multivariate
homogeneity.
b.  Do you think you've met the assumption for homogeneity?
c.  Do you think you've met the assumption for homoscedasticity?

    Both the assumption of homogeneity and homoscedasticity are met from
looking at graph.

{plot(fitvalues, standardized)
    abline(0,0, v = 0)}
```



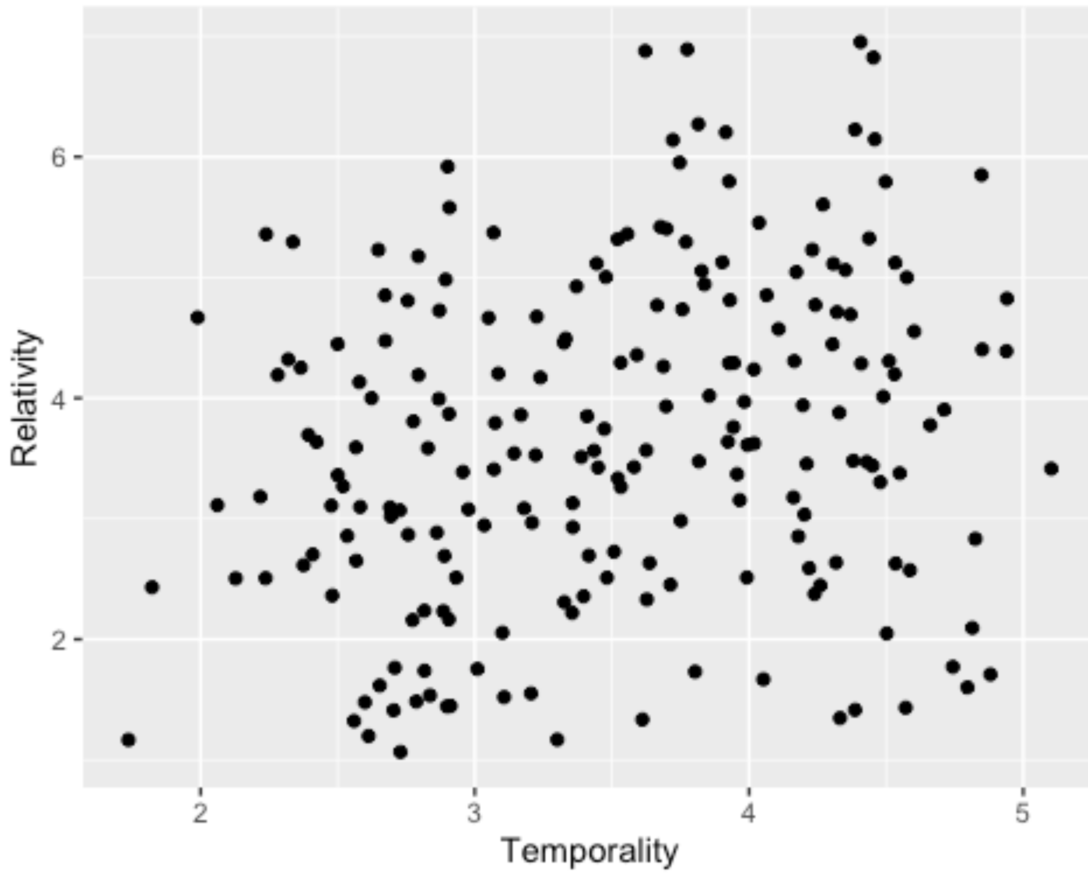
Hypothesis Testing / Graphs:

Create a scatter plot of temporality and relativity.

```
a.  Be sure to check x/y axis labels and length.
b.  What type of relationship do these two variables appear to have?

    Positive relationship.

library(ggplot2)
scatter = ggplot(cleanData, aes(temporality, relativity))
scatter + geom_point() +  xlab("Temporality") +  ylab("Relativity")
```

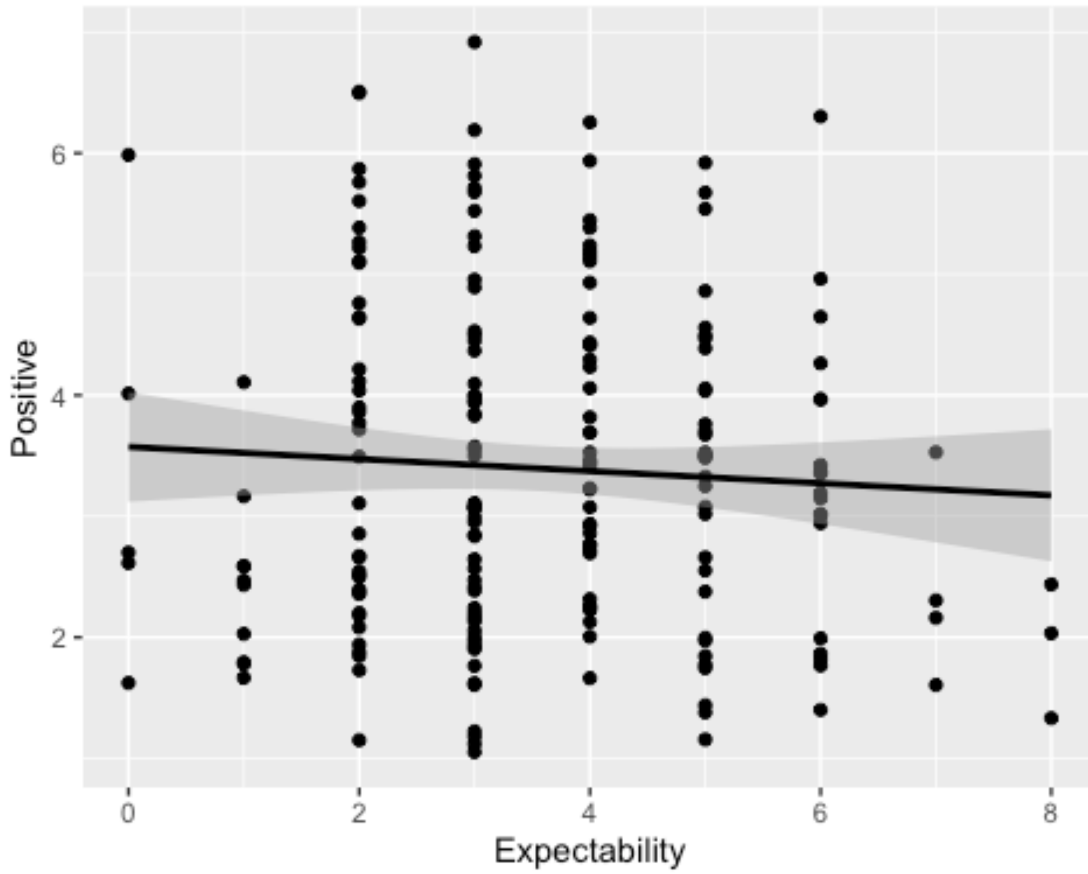


Create a scatter plot of expectability and positive emotion.

```
a.  Include a linear line on the graph.
b.  Be sure to check x/y axis labels and length.
c.  What type of relationship do these two variables appear to have?

    Expectability and Positive have no relationship.

scatter2 = ggplot(cleanData, aes(expectability, positive))
scatter2 + geom_point() + geom_smooth(method = "lm", color = "black") +
xlab("Expectability") +  ylab("Positive")
```

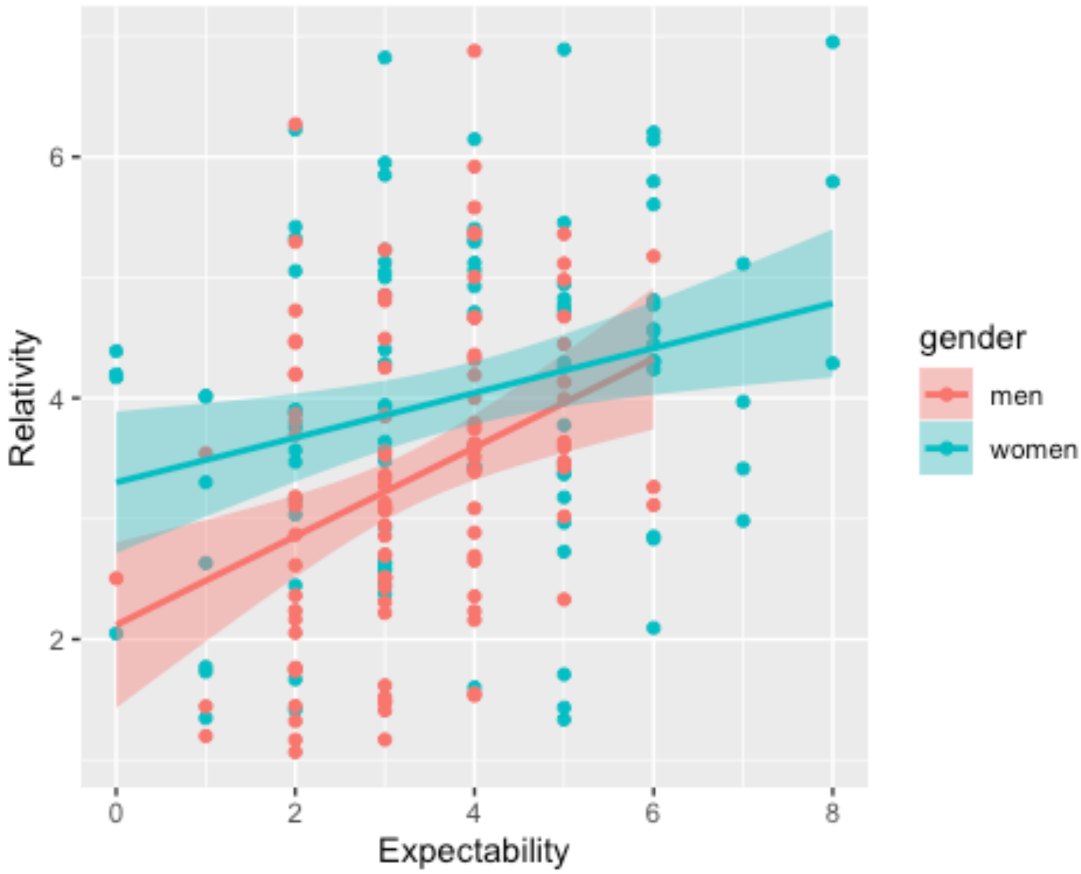


Create a scatter plot of expectability and relativity, grouping by gender.

```
a.  Include a linear line on the graph.
b.  Be sure to check x/y axis labels and length.
c.  What type of relationship do these two variables appear to have for each group?

    Men and women has postive relationship based on the below graph.
```

```
scatter3 = ggplot(cleanData, aes(expectability, relativity, color = gender))
scatter3 + geom_point() + geom_smooth(method = "lm", aes(fill = gender)) +
xlab("Expectability") +  ylab("Relativity")
```



Include a correlation table of all of the variables (cor).

```
a.  Include the output for Pearson.
b.  Include the output for Spearman.
c.  Include the output for Kendall.
d.  Which correlation was the strongest?
e.  For the correlations with gender, would point biserial or biserial be
more appropriate?  Why?

cor(noMiss, use="pairwise.complete.obs", method = "pearson")

##                 temporality expectability relativity    positive
## temporality       1.0000000    0.20209959 0.22754039 -0.25275929
## expectability     0.2020996    1.00000000 0.32131190 -0.05948884
## relativity        0.2275404    0.32131190 1.00000000 -0.03781882
## positive         -0.2527593   -0.05948884 -0.03781882  1.00000000

cor(noMiss, use="pairwise.complete.obs", method = "spearman")

##                 temporality expectability relativity    positive
## temporality       1.0000000    0.18839790 0.22410733 -0.25005006
## expectability     0.1883979    1.00000000 0.31390642 -0.02067472
## relativity        0.2241073    0.31390642 1.00000000 -0.01305998
## positive         -0.2500501   -0.02067472 -0.01305998  1.00000000
```

```r
cor(noMiss, use="pairwise.complete.obs", method = "kendall")
```

```
##                temporality expectability relativity    positive
## temporality      1.0000000    0.14863742  0.1507903 -0.16429811
## expectability    0.1486374    1.00000000  0.2273461 -0.01704321
## relativity       0.1507903    0.22734605  1.0000000 -0.01561840
## positive        -0.1642981   -0.01704321 -0.0156184  1.00000000
```

Calculate confidence interval for temporality and relativity.

```r
cor.test(cleanData$temporality, cleanData$relativity, method = "pearson")
```

```
## 
##  Pearson's product-moment correlation
## 
## data:  cleanData$temporality and cleanData$relativity
## t = 3.3456, df = 205, p-value = 0.0009763
## alternative hypothesis: true correlation is not equal to 0
## 95 percent confidence interval:
##  0.09408996 0.35295823
## sample estimates:
##       cor 
## 0.2275404
```

Calculate the difference in correlations for 1) temporality and expectbility and 2) temporality and positive emotion.

```
a.  Include the output from the test through Pearson's test.
b.  Is there a significant difference in their correlations?

        Yes
```

```r
cor.test(cleanData$temporality, cleanData$expectability, method = "pearson")
```

```
## 
##  Pearson's product-moment correlation
## 
## data:  cleanData$temporality and cleanData$expectability
## t = 2.9546, df = 205, p-value = 0.003497
## alternative hypothesis: true correlation is not equal to 0
## 95 percent confidence interval:
##  0.06759244 0.32939147
## sample estimates:
##       cor 
## 0.2020996
```

```r
cor.test(cleanData$temporality, cleanData$positive, method = "pearson")
```

```
## 
##  Pearson's product-moment correlation
## 
## data:  cleanData$temporality and cleanData$positive
```

```
## t = -3.7404, df = 205, p-value = 0.0002384
## alternative hypothesis: true correlation is not equal to 0
## 95 percent confidence interval:
##  -0.3761634 -0.1205443
## sample estimates:
##        cor
## -0.2527593
```

Calculate the difference in correlations for gender on temporality and relativity.

```
a.  Include the output from the test.
b.  Is there a significant difference in their correlations?

    NO

library(cocor)
women <- subset(cleanData, gender = "women")
men <- subset(cleanData, gender = "men")
subsetList <- list(women, men)
cocor(~temporality + relativity | temporality + relativity, data =
subsetList)

##
##   Results of a comparison of two correlations based on independent groups
##
## Comparison between r1.jk (temporality, relativity) = 0.2275 and r2.hm
(temporality, relativity) = 0.2275
## Difference: r1.jk - r2.hm = 0
## Data: subsetList: j = temporality, k = relativity, h = temporality, m =
relativity
## Group sizes: n1 = 207, n2 = 207
## Null hypothesis: r1.jk is equal to r2.hm
## Alternative hypothesis: r1.jk is not equal to r2.hm (two-sided)
## Alpha: 0.05
##
## fisher1925: Fisher's z (1925)
##   z = 0.0000, p-value = 1.0000
##   Null hypothesis retained
##
## zou2007: Zou's (2007) confidence interval
##   95% confidence interval for r1.jk - r2.hm: -0.1831 0.1831
##   Null hypothesis retained (Interval includes 0)
```

Calculate the partial and semipartial correlations for all variables, and include the output. a. Are any of the correlations significant after controlling for all other relationships?

```
library(ppcor)

## Loading required package: MASS

pcor(cleanData[ , -c(1)], method = "pearson")
```

```
## $estimate
##               temporality expectability relativity    positive
## temporality     1.0000000    0.13170144 0.17590386 -0.24664382
## expectability   0.1317014    1.00000000 0.28896009 -0.01557263
## relativity      0.1759039    0.28896009 1.00000000  0.02450912
## positive       -0.2466438   -0.01557263 0.02450912  1.00000000
##
## $p.value
##                temporality expectability   relativity     positive
## temporality   0.0000000000  5.978787e-02 1.164039e-02 0.0003637952
## expectability 0.0597878683  0.000000e+00 2.646039e-05 0.8246126598
## relativity    0.0116403917  2.646039e-05 0.000000e+00 0.7272215415
## positive      0.0003637952  8.246127e-01 7.272215e-01 0.0000000000
##
## $statistic
##               temporality expectability relativity   positive
## temporality      0.000000     1.8929453  2.5459421 -3.6261593
## expectability    1.892945     0.0000000  4.3005021 -0.2219028
## relativity       2.545942     4.3005021  0.0000000  0.3493062
## positive        -3.626159    -0.2219028  0.3493062  0.0000000
##
## $n
## [1] 207
##
## $gp
## [1] 2
##
## $method
## [1] "pearson"
```

Theory:

```
- What are we using as our model for understanding the data in a
correlational analysis?


- How might we determine model fit?
    The Primary tool to determine model fit using graphical residual
analysis.

- What is the difference between correlation and covariance?
    Covariance: Indicates the direction of the linear relationship.
    Correlation: Measures both the strength and direction of the linear
relationship between two variables.

- What is the difference between R and r?
    r: Correlation r determines how well two variables are correlated with
each other. Basically it is defined in  numerical range between -1 to +1,
Correlation value more nearest to 1 in either direction says two strong
```

```
coefficient of determination.
    R: R square is literally the square of correlation between x and y.

- When would I want to use a nonparametric correlation over Pearson's
correlation?



- What is the distinction between semi-partial and partial correlations?
    semi-partial correlations is same as partail correlations, But variation
is:
    Partial Correlations: Partial correlation measures the strength of a
relationship between two variables, while controlling for the effect of one
or more other variables.
    Semi-partial correltions:  the semi partial correlation statistic can
tell us the particular part of variance, that a particular independent
variable explains. It explains how one specific independent variable affects
the dependent variable, while other variables are controlled for to prevent
them getting in the way.
```