In [1]:
```
import pandas as pd
import numpy as np
import scipy.stats as stats

df=pd.read_csv('./Data.csv')
df
```

Out[1]:

	Mean	SD	A1	A1A	A1B	B1	B1A	B1B	C1	C1A	...	E1B	F1	F1A	F1B	G1	G1A
0	-7.74	2.130000	4.22	4.01	4.49	4.28	4.13	4.47	4.32	4.21	...	2.28	1.58	1.51	1.68	4.17	4.18
1	-7.28	2.340000	4.23	4.25	4.21	4.28	4.23	4.35	4.29	4.29	...	2.37	1.65	1.66	1.63	4.46	4.46
2	-7.05	2.410000	4.26	4.15	4.40	4.26	4.10	4.47	4.27	4.25	...	2.24	1.65	1.67	1.64	4.41	4.41
3	-6.81	2.460000	4.20	4.02	4.44	4.16	4.07	4.28	4.33	4.22	...	2.26	1.62	1.59	1.66	4.39	4.42
4	-6.77	2.140000	4.37	4.44	4.28	4.34	4.22	4.48	4.14	4.01	...	2.15	1.76	1.80	1.72	4.24	4.11
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
95	7.05	2.364346	2.39	2.57	2.16	2.37	2.52	2.18	2.35	2.58	...	3.98	4.27	4.32	4.20	1.65	1.62
96	7.09	2.151306	2.47	2.75	2.12	2.38	2.69	1.98	2.24	2.42	...	3.98	4.16	4.13	4.19	1.65	1.56
97	7.14	2.307604	2.44	2.64	2.19	2.36	2.71	1.90	2.30	2.65	...	4.19	4.15	4.19	4.11	1.61	1.62
98	7.17	2.592670	2.20	2.47	1.86	2.43	2.63	2.18	2.24	2.46	...	4.09	4.28	4.38	4.15	1.61	1.69
99	7.28	2.443212	2.37	2.72	1.92	2.42	2.64	2.14	2.34	2.72	...	3.94	4.26	4.17	4.36	1.69	1.72

100 rows × 26 columns

In [2]:
```
# Regression Results for Recall Scores

import scipy.stats as stats

import csv
from matplotlib import pyplot as plt
import numpy as np
import statistics
import pandas as pd

import sklearn
from sklearn.model_selection import train_test_split
from sklearn.linear_model import LinearRegression

import statsmodels.api as sm
from statsmodels.sandbox.regression.predstd import wls_prediction_std

from sklearn.decomposition import FactorAnalysis, PCA
from sklearn.preprocessing import StandardScaler

from sklearn.model_selection import KFold
from sklearn.linear_model import BayesianRidge

from numpy import mean
from numpy import var
from math import sqrt

def cohend(d1, d2):
    n1, n2 = len(d1), len(d2)
    s1, s2 = var(d1, ddof=1), var(d2, ddof=1)
    s = sqrt(((n1 - 1) * s1 + (n2 - 1) * s2) / (n1 + n2 - 2))
    u1, u2 = mean(d1), mean(d2)
    return (u1 - u2) / s
```

```
q=['Appealing','Enjoyable','Pleasing','Nice','Likeable','Guided to a Conclusion','Diffic
gp=['Total','Group A','Group B']
ind=[[0,37],[37,100]]
gpx=['{I1,I2}','{I3,I4,I5}']

df=pd.read_csv('./Data.csv')

for i in range(2,26):
    X=df['Mean']
    Y=df[df.columns[i]]
    d=cohend(Y,X)
    X=sm.add_constant(X)
    model = sm.OLS(Y,X)
    results = model.fit()
    if(i%3==2):
        print('**********************************************************************************
    print(q[int((i+1)/3)-1]+' , '+gp[(i-2)%3]+' : ' + 'R2 : %.2f' %results.rsquared+ ' ,
    print(results.t_test([1, 0]))
    for j in range(len(ind)):
        X=df['Mean'][ind[j][0]:ind[j][1]]
        Y=df[df.columns[i]][ind[j][0]:ind[j][1]]
        d=cohend(X,Y)
        X=sm.add_constant(X)
        model = sm.OLS(Y,X)
        results = model.fit()
        if(i%3==2):
            print(q[int((i+1)/3)-1]+' , '+gpx[j]+' : ' + 'R2 : %.2f' %results.rsquared+
            print('  ')
```

```
**********************************************************************************
************
Appealing , Total : R2 : 0.85 , d : 0.89
                             Test for Constraints
==============================================================================
                 coef    std err          t      P>|t|      [0.025      0.975]
------------------------------------------------------------------------------
c0             3.4084      0.030    113.514      0.000       3.349       3.468
==============================================================================
Appealing , {I1,I2} : R2 : 0.82 , d : 0.73
Appealing , {I3,I4,I5} : R2 : 0.76 , d : 0.71

Appealing , Group A : R2 : 0.82 , d : 0.88
                             Test for Constraints
==============================================================================
                 coef    std err          t      P>|t|      [0.025      0.975]
------------------------------------------------------------------------------
c0             3.3785      0.033    103.176      0.000       3.313       3.443
==============================================================================
Appealing , Group B : R2 : 0.83 , d : 0.90
                             Test for Constraints
==============================================================================
                 coef    std err          t      P>|t|      [0.025      0.975]
------------------------------------------------------------------------------
c0             3.4473      0.034    102.881      0.000       3.381       3.514
==============================================================================
**********************************************************************************
************
Enjoyable , Total : R2 : 0.86 , d : 0.88
                             Test for Constraints
==============================================================================
                 coef    std err          t      P>|t|      [0.025      0.975]
------------------------------------------------------------------------------
c0             3.3841      0.029    117.393      0.000       3.327       3.441
==============================================================================
Enjoyable , {I1,I2} : R2 : 0.85 , d : 0.74
```

Enjoyable , {I3,I4,I5} : R2 : 0.76 , d : 0.68

Enjoyable , Group A : R2 : 0.80 , d : 0.87

Test for Constraints

	coef	std err	t	P>|t|	[0.025	0.975]
c0	3.3532	0.034	98.310	0.000	3.286	3.421

Enjoyable , Group B : R2 : 0.86 , d : 0.89

Test for Constraints

	coef	std err	t	P>|t|	[0.025	0.975]
c0	3.4230	0.030	113.274	0.000	3.363	3.483

****

Pleasing , Total : R2 : 0.86 , d : 0.88

Test for Constraints

	coef	std err	t	P>|t|	[0.025	0.975]
c0	3.3789	0.029	116.023	0.000	3.321	3.437

Pleasing , {I1,I2} : R2 : 0.77 , d : 0.73
Pleasing , {I3,I4,I5} : R2 : 0.74 , d : 0.69

Pleasing , Group A : R2 : 0.81 , d : 0.87

Test for Constraints

	coef	std err	t	P>|t|	[0.025	0.975]
c0	3.3427	0.034	99.242	0.000	3.276	3.410

Pleasing , Group B : R2 : 0.85 , d : 0.89

Test for Constraints

	coef	std err	t	P>|t|	[0.025	0.975]
c0	3.4250	0.032	108.246	0.000	3.362	3.488

****

Nice , Total : R2 : 0.78 , d : 0.91

Test for Constraints

	coef	std err	t	P>|t|	[0.025	0.975]
c0	3.3976	0.026	131.095	0.000	3.346	3.449

Nice , {I1,I2} : R2 : 0.68 , d : 0.70
Nice , {I3,I4,I5} : R2 : 0.69 , d : 0.67

Nice , Group A : R2 : 0.76 , d : 0.92

Test for Constraints

	coef	std err	t	P>|t|	[0.025	0.975]
c0	3.4251	0.025	135.958	0.000	3.375	3.475

Nice , Group B : R2 : 0.00 , d : 0.02

Test for Constraints

	coef	std err	t	P>|t|	[0.025	0.975]

```
c0             0.3838      0.010     38.617      0.000       0.364       0.403
==============================================================================
********************************************************************************
************
Likeable , Total : R2 : 0.76 , d : 0.92
                            Test for Constraints
==============================================================================
                 coef    std err          t      P>|t|      [0.025      0.975]
------------------------------------------------------------------------------
c0             3.4095      0.027    128.187      0.000       3.357       3.462
==============================================================================
Likeable , {I1,I2} : R2 : 0.74 , d : 0.71
Likeable , {I3,I4,I5} : R2 : 0.73 , d : 0.65

Likeable , Group A : R2 : 0.76 , d : 0.93
                            Test for Constraints
==============================================================================
                 coef    std err          t      P>|t|      [0.025      0.975]
------------------------------------------------------------------------------
c0             3.4347      0.026    133.292      0.000       3.384       3.486
==============================================================================
Likeable , Group B : R2 : 0.71 , d : 0.91
                            Test for Constraints
==============================================================================
                 coef    std err          t      P>|t|      [0.025      0.975]
------------------------------------------------------------------------------
c0             3.3769      0.032    106.977      0.000       3.314       3.440
==============================================================================
********************************************************************************
************
Guided to a Conclusion , Total : R2 : 0.80 , d : 0.82
                            Test for Constraints
==============================================================================
                 coef    std err          t      P>|t|      [0.025      0.975]
------------------------------------------------------------------------------
c0             3.0818      0.044     70.181      0.000       2.995       3.169
==============================================================================
Guided to a Conclusion , {I1,I2} : R2 : 0.78 , d : 0.68
Guided to a Conclusion , {I3,I4,I5} : R2 : 0.85 , d : 0.84

Guided to a Conclusion , Group A : R2 : 0.80 , d : 0.82
                            Test for Constraints
==============================================================================
                 coef    std err          t      P>|t|      [0.025      0.975]
------------------------------------------------------------------------------
c0             3.0881      0.045     69.109      0.000       2.999       3.177
==============================================================================
Guided to a Conclusion , Group B : R2 : 0.79 , d : 0.81
                            Test for Constraints
==============================================================================
                 coef    std err          t      P>|t|      [0.025      0.975]
------------------------------------------------------------------------------
c0             3.0722      0.045     68.360      0.000       2.983       3.161
==============================================================================
********************************************************************************
************
Difficult to Understand , Total : R2 : 0.76 , d : 0.82
                            Test for Constraints
==============================================================================
                 coef    std err          t      P>|t|      [0.025      0.975]
------------------------------------------------------------------------------
c0             3.1911      0.049     65.303      0.000       3.094       3.288
==============================================================================
Difficult to Understand , {I1,I2} : R2 : 0.73 , d : 0.71
Difficult to Understand , {I3,I4,I5} : R2 : 0.84 , d : 0.84
```

```
Difficult to Understand , Group A : R2 : 0.74 , d : 0.82
                            Test for Constraints
==============================================================================
                 coef    std err          t      P>|t|      [0.025      0.975]
------------------------------------------------------------------------------
c0             3.1912      0.051     62.727      0.000       3.090       3.292
==============================================================================
Difficult to Understand , Group B : R2 : 0.77 , d : 0.82
                            Test for Constraints
==============================================================================
                 coef    std err          t      P>|t|      [0.025      0.975]
------------------------------------------------------------------------------
c0             3.1920      0.047     67.544      0.000       3.098       3.286
==============================================================================
********************************************************************************
************
Sentiment , Total : R2 : 0.88 , d : 0.84
                            Test for Constraints
==============================================================================
                 coef    std err          t      P>|t|      [0.025      0.975]
------------------------------------------------------------------------------
c0             3.2485      0.025    127.499      0.000       3.198       3.299
==============================================================================
Sentiment , {I1,I2} : R2 : 0.69 , d : 0.70
Sentiment , {I3,I4,I5} : R2 : 0.82 , d : 0.78

Sentiment , Group A : R2 : 0.81 , d : 0.81
                            Test for Constraints
==============================================================================
                 coef    std err          t      P>|t|      [0.025      0.975]
------------------------------------------------------------------------------
c0             3.1316      0.034     91.675      0.000       3.064       3.199
==============================================================================
Sentiment , Group B : R2 : 0.78 , d : 0.89
                            Test for Constraints
==============================================================================
                 coef    std err          t      P>|t|      [0.025      0.975]
------------------------------------------------------------------------------
c0             3.3994      0.036     93.655      0.000       3.327       3.471
==============================================================================
```

In [ ]: