In [1]:

```
import pandas as pd
import numpy as np
```

# load files from data folder

In [2]:

```
log = pd.read_csv(r"C:\Users\s.goodroe\Dropbox\PhD\Teaching\exampleproject\data\log.csv")
response = pd.read_csv(r"C:\Users\s.goodroe\Dropbox\PhD\Teaching\exampleproject\data\response.csv")
correct = pd.read_csv(r"C:\Users\s.goodroe\Dropbox\PhD\Teaching\exampleproject\data\correct.csv")
```

# create copy of response data and add metrics from the log file you want to use

In [3]:

```
data = response
```

In [4]:

```
data['female'] = log.gender
data['age'] = log.age
data['exp'] = log.experience
data['native'] = log.native_speaker
```

In [5]:

```
log
```

Out[5]:

| | ppid | date | time | age | gender | native_speaker | experience |
|---|---|---|---|---|---|---|---|
| **0** | P_01 | 30/01/2020 | 10:20 | 18 | m | y | 24 |
| **1** | P_02 | 30/01/2020 | 10:40 | 20 | f | y | 36 |
| **2** | P_03 | 30/01/2020 | 11:00 | 21 | f | y | 20 |
| **3** | P_04 | 30/01/2020 | 11:20 | 21 | m | y | 14 |
| **4** | P_05 | 30/01/2020 | 11:40 | 29 | m | y | 10 |
| **5** | P_06 | 30/01/2020 | 12:40 | 21 | m | n | 40 |
| **6** | P_07 | 30/01/2020 | 13:40 | 20 | f | y | 19 |
| **7** | P_08 | 30/01/2020 | 14:40 | 22 | f | y | 20 |
| **8** | P_09 | 30/01/2020 | 15:40 | 24 | m | n | 26 |
| **9** | P_10 | 31/01/2020 | 16:40 | 25 | f | y | 15 |

# replace non-numeric values with coded values (i.e. F = 1, Y = 1)

In [6]:

```
data = data.replace({'m':0,'f':1, 'y':1, 'n':0})
```

In [7]:

```
data #view dataset
```

Out[7]:

| | ppid | RQ | ES | CG | TS | HP | RP | LS | CT | SP | female | age | exp | native |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **0** | P_01 | 289 | 105 | 112 | 315 | 119 | 219 | 190 | 26 | 218 | 0 | 18 | 24 | 1 |
| **1** | P_02 | 33 | 250 | 143 | 358 | 298 | 137 | 215 | 81 | 10 | 1 | 20 | 36 | 1 |
| **2** | P_03 | 266 | 299 | 6 | 20 | 146 | 233 | 182 | 81 | 348 | 1 | 21 | 20 | 1 |
| **3** | P_04 | 26 | 105 | 302 | 86 | 165 | 160 | 280 | 78 | 103 | 0 | 21 | 14 | 1 |
| **4** | P_05 | 94 | 52 | 67 | 173 | 296 | 300 | 277 | 65 | 320 | 0 | 29 | 10 | 1 |
| **5** | P_06 | 151 | 143 | 115 | 274 | 157 | 197 | 233 | 287 | 248 | 0 | 21 | 40 | 0 |
| **6** | P_07 | 241 | 17 | 330 | 252 | 79 | 169 | 214 | 225 | 180 | 1 | 20 | 19 | 1 |
| **7** | P_08 | 336 | 177 | 60 | 178 | 59 | 74 | 199 | 222 | 103 | 1 | 22 | 20 | 1 |
| **8** | P_09 | 351 | 159 | 156 | 171 | 168 | 217 | 112 | 5 | 253 | 0 | 24 | 26 | 0 |
| **9** | P_10 | 104 | 165 | 143 | 201 | 336 | 319 | 264 | 0 | 6 | 1 | 25 | 15 | 1 |

# create output frame where you can log values such as stats you want

In [8]:

```
output = pd.DataFrame(columns = ['mean','sd'])
```

In [9]:

```
output['mean'] = data.mean()
output['sd'] = data.std()
```

In [10]:

```
output
```

Out[10]:

| | mean | sd |
|---|---|---|
| **RQ** | 189.1 | 122.512993 |
| **ES** | 147.2 | 84.688711 |
| **CG** | 143.4 | 101.978429 |
| **TS** | 202.8 | 102.057500 |
| **HP** | 182.3 | 95.615027 |
| **RP** | 202.5 | 73.221506 |
| **LS** | 216.6 | 50.933944 |
| **CT** | 107.0 | 101.061038 |
| **SP** | 178.9 | 120.297271 |
| **female** | 0.5 | 0.527046 |
| **age** | 22.1 | 3.142893 |
| **exp** | 22.4 | 9.500877 |
| **native** | 0.8 | 0.421637 |

## how do you want to measure things such as accuracy / deviation from correct angle?

In [11]:

```
deviation = pd.DataFrame(columns = data.columns[0:10])
deviation['ppid'] = data.ppid
```

In [12]:

```
def get_dev(ppid,location):
    a = correct[location]
    resp = data[location].where(data.ppid == ppid).dropna()
    dev = resp.values - a
    return dev.values[0]
```

In [13]:

```
for i in range(len(data.ppid)):
    for location in correct.columns:
        deviation['ppid'][i] = data['ppid'][i]
        deviation[location][i] = get_dev(data.ppid[i],location)
```

In [14]:

```
deviation['av_dev'] = deviation.iloc[:,1:].mean(axis = 1)
deviation['sd_dev'] = deviation.iloc[:,1:].std(axis = 1)
```

In [15]:

```
deviation
```

Out[15]:

| | ppid | RQ | ES | CG | TS | HP | RP | LS | CT | SP | av_dev | sd_dev |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **0** | P_01 | 230 | -12 | -196 | -14 | 42 | 48 | 68 | -177 | 20 | 1.000000 | 121.137204 |
| **1** | P_02 | -26 | 133 | -165 | 29 | 221 | -34 | 93 | -122 | -188 | -6.555556 | 131.198841 |
| **2** | P_03 | 207 | 182 | -302 | -309 | 69 | 62 | 60 | -122 | 150 | -0.333333 | 186.263255 |
| **3** | P_04 | -33 | -12 | -6 | -243 | 88 | -11 | 158 | -125 | -95 | -31.000000 | 110.125181 |
| **4** | P_05 | 35 | -65 | -241 | -156 | 219 | 129 | 155 | -138 | 122 | 6.666667 | 152.760524 |
| **5** | P_06 | 92 | 26 | -193 | -55 | 80 | 26 | 111 | 84 | 50 | 24.555556 | 90.024825 |
| **6** | P_07 | 182 | -100 | 22 | -77 | 2 | -2 | 92 | 22 | -18 | 13.666667 | 79.677126 |
| **7** | P_08 | 277 | 60 | -248 | -151 | -18 | -97 | 77 | 19 | -95 | -19.555556 | 143.851861 |
| **8** | P_09 | 292 | 42 | -152 | -158 | 91 | 46 | -10 | -198 | 55 | 0.888889 | 144.458717 |
| **9** | P_10 | 45 | 48 | -165 | -128 | 259 | 148 | 142 | -203 | -192 | -5.111111 | 161.563503 |

# add the mean deviation and sd for each location to your output

In [16]:

```
output['dev_mean'] = deviation.iloc[:,1:].mean(axis = 0)
output['dev_sd'] = deviation.iloc[:,1:].std(axis = 0)
```

In [17]:

```
output
```

Out[17]:

| | mean | sd | dev_mean | dev_sd |
|---|---|---|---|---|
| **RQ** | 189.1 | 122.512993 | 130.1 | 122.512993 |
| **ES** | 147.2 | 84.688711 | 30.2 | 84.688711 |
| **CG** | 143.4 | 101.978429 | -164.6 | 101.978429 |
| **TS** | 202.8 | 102.057500 | -126.2 | 102.057500 |
| **HP** | 182.3 | 95.615027 | 105.3 | 95.615027 |
| **RP** | 202.5 | 73.221506 | 31.5 | 73.221506 |
| **LS** | 216.6 | 50.933944 | 94.6 | 50.933944 |
| **CT** | 107.0 | 101.061038 | -96.0 | 101.061038 |
| **SP** | 178.9 | 120.297271 | -19.1 | 120.297271 |
| **female** | 0.5 | 0.527046 | NaN | NaN |
| **age** | 22.1 | 3.142893 | NaN | NaN |
| **exp** | 22.4 | 9.500877 | NaN | NaN |
| **native** | 0.8 | 0.421637 | NaN | NaN |

# look at potential trends by eye

In [18]:

```
import matplotlib.pyplot as plt
```

In [19]:

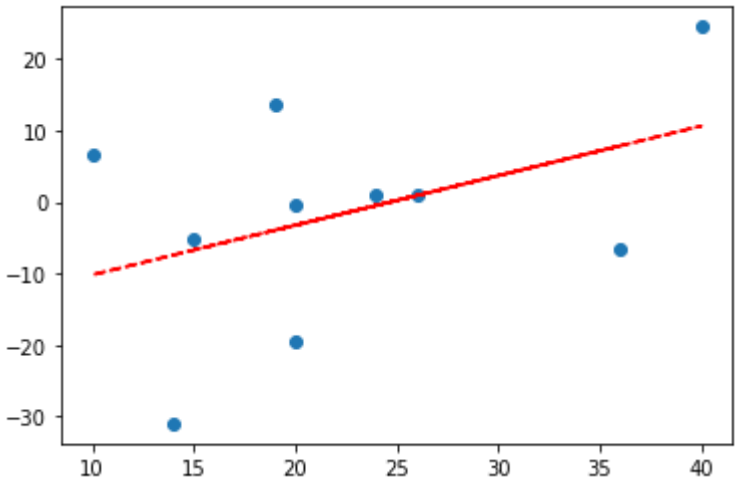
```
x = data.exp
y = deviation.av_dev

fig = plt.scatter(x, y)

z = np.polyfit(x, y, 1)
p = np.poly1d(z)
plt.plot(x,p(x),"r--")
```

Out[19]:

```
[<matplotlib.lines.Line2D at 0x27016ebce48>]
```




## fit linear regression with n predictors

In [20]:

```
import statsmodels.api as sm
```

In [21]:

```
x = data[['exp','age','female']]
y = deviation.av_dev

model = sm.OLS(y,x).fit()
predictions = model.predict(x)
x = sm.add_constant(x,has_constant = 'add')

model.summary()
```

```
C:\Users\s.goodroe\AppData\Local\Continuum\anaconda3\lib\site-packages\num
py\core\fromnumeric.py:2389: FutureWarning: Method .ptp is deprecated and
will be removed in a future version. Use numpy.ptp instead.
  return ptp(axis=axis, out=out, **kwargs)
C:\Users\s.goodroe\AppData\Local\Continuum\anaconda3\lib\site-packages\sci
py\stats\stats.py:1416: UserWarning: kurtosistest only valid for n>=20 ...
continuing anyway, n=10
  "anyway, n=%i" % int(n))
```

Out[21]:

OLS Regression Results

| | | | |
|---|---|---|---|
| **Dep. Variable:** | av_dev | **R-squared (uncentered):** | 0.145 |
| **Model:** | OLS | **Adj. R-squared (uncentered):** | -0.222 |
| **Method:** | Least Squares | **F-statistic:** | 0.3948 |
| **Date:** | Sun, 02 Feb 2020 | **Prob (F-statistic):** | 0.761 |
| **Time:** | 16:00:37 | **Log-Likelihood:** | -40.485 |
| **No. Observations:** | 10 | **AIC:** | 86.97 |
| **Df Residuals:** | 7 | **BIC:** | 87.88 |
| **Df Model:** | 3 | | |
| **Covariance Type:** | nonrobust | | |

| | coef | std err | t | P>\|t\| | [0.025 | 0.975] |
|---|---|---|---|---|---|---|
| **exp** | 0.4741 | 0.487 | 0.973 | 0.363 | -0.678 | 1.626 |
| **age** | -0.4149 | 0.554 | -0.749 | 0.478 | -1.724 | 0.895 |
| **female** | -5.0465 | 10.222 | -0.494 | 0.637 | -29.218 | 19.125 |

| | | | |
|---|---|---|---|
| **Omnibus:** | 0.935 | **Durbin-Watson:** | 2.325 |
| **Prob(Omnibus):** | 0.627 | **Jarque-Bera (JB):** | 0.582 |
| **Skew:** | -0.530 | **Prob(JB):** | 0.747 |
| **Kurtosis:** | 2.477 | **Cond. No.** | 62.4 |

Warnings:
[1] Standard Errors assume that the covariance matrix of the errors is correctly specified.