loading the data called afsal.csv

In [6]: import pandas as pd

defining the file path

In [7]: file_path = 'D:\\data science exam\\afsal.csv'
 data = pd.read_csv(file_path)

you can find the data here

In [8]: data

Out[8]:	Dat	e Time	Reporter	Farmlet	Active	Relaxed	Fearful	Agitated	Calm	Content	Indifferent	Frustrated

1 08001/2023 15:00 CM		Date	Time	Reporter	rarmiet	Active	Relaxed	rearrui	Agitated	Caim	Content	Indifferent	Frustrated
2 06/01/2023 15:00 CM B 10.0 7.5 0.0 0.0 8.7 9.2 0.5 1 3 06/01/2023 15:00 T R 9.5 9.5 0.6 0.6 10.4 9.8 0.6 0 4 06/01/2023 15:00 T G 8.5 8.5 0.8 0.8 10.0 8.7 1.0 1 5 06/01/2023 15:00 T B 9.0 9.0 1.2 1.2 9.6 9.2 1.3 1 6 13/01/2023 12:20 CM R 10.0 7.7 0.0 1.3 8.3 6.6 2.0 0 7 13/01/2023 12:20 CM B 8.5 2.3 2.3 4.3 5.9 2.2 1.4 0 8 13/01/2023 12:20 CM B 9.3 8.8 0.0 1.3 9.0 8.3 3.8 0 9 19/01/2023 14:50 CM R 9.5 9.7 0.0 0.0 10.7 9.9 4.1 0 10 19/01/2023 14:50 CM G 5.1 9.9 0.0 0.0 10.7 9.9 4.1 0 11 19/01/2023 14:50 CM B 8.5 8.5 8.4 0.0 0.0 8.1 7.7 2.7 0.0 11 19/01/2023 14:50 CM B 8.5 8.4 0.0 0.0 8.1 7.7 2.7 0.0 11 19/01/2023 14:50 T R 7.1 9.4 0.4 1.0 11.4 11.4 5.7 1.7 2.7 0.0 12 19/01/2023 14:50 T B 5.1 9.9 0.4 2.1 11.9 11.9 0.3 0.0 15 19/01/2023 14:50 T B 5.1 9.7 0.6 0.6 11.2 11.2 11.2 1.6 0.0 15 19/01/2023 14:50 T B 5.1 9.7 0.6 0.6 11.2 11.2 11.2 1.6 0.0 15 19/01/2023 14:50 T B 5.1 9.7 0.6 0.6 11.2 11.2 1.6 0.0 15 19/01/2023 14:50 T B 5.1 9.7 0.6 0.6 11.2 11.2 1.6 0.0 17 19/01/2023 14:50 T B 5.1 9.7 0.6 0.6 11.2 11.2 1.6 0.0 17 19/01/2023 14:30 T B 5.1 9.7 0.6 0.6 11.2 11.2 1.6 0.0 18 27/01/2023 14:30 T B 5.1 9.7 0.6 0.6 11.2 11.2 1.6 0.0 19 27/01/2023 14:30 T B 5.1 9.7 0.6 0.6 11.2 11.2 1.6 0.0 19 27/01/2023 14:30 T B 5.1 9.7 0.6 0.6 11.2 11.2 1.6 0.0 19 27/01/2023 14:30 T B 7.2 5.3 1.7 1.8 8.1 6.8 1.8 2.0 21 27/01/2023 14:30 T B 7.2 5.3 1.7 1.8 8.1 6.8 1.8 2.0 21 27/01/2023 14:30 T B 7.2 5.3 1.7 1.8 8.1 6.8 1.8 2.0 21 27/01/2023 14:30 T B 7.0 5.0 2.1 2.1 8.1 6.4 2.0 2.2 22 27/01/2023 14:30 T B 7.0 5.0 2.1 2.1 8.1 6.4 2.0 2.2 22 27/01/2023 14:30 T B 7.0 5.0 2.1 2.1 8.1 6.4 2.0 2.2 24 20/01/2023 11:45 T B 7.8 7.5 1.3 1.4 8.1 7.8 1.4 2.2 25 27/01/2023 11:45 T B 7.8 7.5 1.3 1.4 8.1 7.8 1.4 1.2 26 20/02/2023 11:45 C M R 9.8 8.2 0.0 0.0 0.0 10.1 9.2 3.0 0.0 29 02/02/2023 11:45 C M R 9.8 8.2 0.0 0.0 0.0 10.1 9.2 3.0 0.0 20 03/03/2023 13:45 C M R 6.4 8.8 0.0 0.0 0.9 9.8 8.8 1.0 0.0 20 03/03/2023 13:45 C M B 3.8 8.8 0.6 0.6 8.9 8.9 7.0 0.0 31 03/03/2023 13:45 C M R 6.4 8.8 0.0 0.0 0.0 10.4 10.2 8.0 0.0 31 03/03/2023 13:45 C M	0	06/01/2023	15:00	CM	R				0.0	8.7	8.0		0.5
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4 06/01/2023 15:00 T G 8.5 8.5 0.8 0.8 10.0 8.7 1.0 1 5 06/01/2023 15:00 T B 9.0 9.0 1.2 1.2 9.6 9.2 1.3 1 6 13/01/2023 12:20 CM R 10.0 7.7 0.0 1.3 8.3 6.6 2.0 0 7 13/01/2023 12:20 CM G 8.5 2.3 2.3 4.3 5.9 2.2 1.4 0 8 13/01/2023 14:50 CM B 9.3 8.8 0.0 1.3 9.0 8.3 3.8 0 9 19/01/2023 14:50 CM G 5.1 9.9 0.0 0.0 10.7 9.9 4.1 1 10 19/01/2023 14:50 CM G 5.1 9.9 0.0 0.0 10.7 9.9 4.1 1 11 19/01/2023 14:50 T R 7.1 9.4 0.4 1.0 11.4 11.4 5.7 1 13 19/01/2023 14:50 T G 5.8 11.9 0.4 2.1 11.9 11.9 0.3 0.0 1 14 19/01/2023 14:50 T R 7.1 9.4 0.4 1.0 11.4 11.4 5.7 1 15 19/01/2023 14:50 T R 8.5 8.5 0.9 1.1 10.1 8.8 1.4 1 16 19/01/2023 14:50 T R 8.5 8.5 0.9 1.1 10.1 8.8 1.4 1 16 19/01/2023 14:50 T R 8.5 8.5 0.9 1.1 10.1 8.8 1.4 1 16 19/01/2023 14:50 T B 7.2 5.3 1.7 1.8 8.1 6.8 1.8 2 18 27/01/2023 14:30 CM G 9.1 11.1 10.9 0.0 0.0 10.5 9.7 2.4 0.0 19/21/2023 14:30 CM B 8.5 8.5 0.0 0.0 8.9 8.8 2.8 0.0 2.7 01/2023 14:30 T R 8.5 8.5 0.0 0.0 10.5 9.7 2.4 0.0 2.7 01/2023 14:30 T R 8.5 8.5 0.0 0.0 10.5 9.7 2.4 0.0 2.7 01/2023 14:30 T R 8.5 8.5 0.0 0.0 10.5 9.7 2.4 0.0 2.7 01/2023 14:30 T R 8.5 8.5 0.0 0.0 10.4 10.4 4.4 0.0 4.4 0.0 1.0 10.4 10.4	2		15:00	CM	В	10.0	7.5	0.0	0.0		9.2	0.5	1.2
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52 10 11 12 12	•		23.00	'	5	0	0.2	1.0	1, 1		7.2	1.0	1.7

perfroming ANOVA test to analyse the stastical difference

In [9]: import scipy.stats as stats

hut[]]]; F_onewayResult(statistic=344.3235146480699, pvalue=3.079537718646044e-159)

perfroming Tukey's HSD test

Results

```
In [13]: print (res)
```

```
Tukey's HSD Pairwise Group Comparisons (95.0% Confidence Interval)
Comparison
             Statistic
                         p-value Lower CI Upper CI
 (0 - 1)
              -0.062
                           1.000
                                     -0.974
                                                 0.849
 (0 - 2)
                                      6.558
               7.469
                           0.000
                                                 8.380
 (0 - 3)
               7.223
                           0.000
                                      6.312
                                                 8.134
 (0 - 4)
              -0.962
                           0.030
                                     -1.874
                                                 -0.051
 (0 - 5)
              -0.556
                           0.579
                                     -1.467
                                                 0.355
               5.392
 (0 - 6)
                           0.000
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              -0.494
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                           0.992
                                                 0.665
              -0.246
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              -8.431
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              -2.077
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              -8.183
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                                     -8.688
                                                -6.866
 (7 - 6)
              -1.829
                           0.000
                                     -2.740
                                                -0.918
```

Need to plot the data in a bar diagram

Out[34]:		Date	Time	Reporter	Farmlet	Active	Relaxed	Fearful	Agitated	Calm	Content	Indifferent	Frustrated
_	0	06/01/2023	15:00	CM	R	9.2	8.4	0.0	0.0	8.7	8.0	1.2	0.5
	1	06/01/2023	15:00	СМ	G	8.5	10.6	0.0	0.0	10.5	10.5	2.5	0.5
	2	06/01/2023	15:00	СМ	В	10.0	7.5	0.0	0.0	8.7	9.2	0.5	1.2
	3	06/01/2023	15:00	Т	R	9.5	9.5	0.6	0.6	10.4	9.8	0.6	0.6
	4	06/01/2023	15:00	Т	G	8.5	8.5	0.8	0.8	10.0	8.7	1.0	1.0
	5	06/01/2023	15:00	Т	В	9.0	9.0	1.2	1.2	9.6	9.2	1.3	1.3
	6	13/01/2023	12:20	CM	R	10.0	7.7	0.0	1.3	8.3	6.6	2.0	0.6
	7	13/01/2023	12:20	CM	G	8.5	2.3	2.3	4.3	5.9	2.2	1.4	0.6
	8	13/01/2023	12:20	CM	В	9.3	8.8	0.0	1.3	9.0	8.3	3.8	0.0
	9	19/01/2023	14:50	CM	R	9.5	9.7	0.0	0.0	10.7	9.9	4.1	0.0
	10	19/01/2023	14:50	CM	G	5.1	9.9	0.0	0.0	11.9	8.5	6.4	0.0
	11	19/01/2023	14:50	CM	В	8.5	8.4	0.0	0.0	8.1	7.7	2.7	0.6
	12	19/01/2023	14:50	Т	R	7.1	9.4	0.4	1.0	11.4	11.4	5.7	1.6
	13	19/01/2023	14:50	Т	G	5.8	11.9	0.4	2.1	11.9	11.9	0.3	0.3
	14	19/01/2023	14:50	Т	В	5.1	9.7	0.6	0.6	11.2	11.2	1.6	0.7
	15	19/01/2023	14:50	Т	R	8.5	8.5	0.9	1.1	10.1	8.8	1.4	1.4
	16	19/01/2023	14:50	Т	G	7.1	5.3	0.1	0.1	7.2	6.2	0.4	0.4
	17	19/01/2023	14:50	Т	В	7.2	5.3	1.7	1.8	8.1	6.8	1.8	2.7
	18	27/01/2023	14:30	CM	R	9.1	10.5	0.0	0.0	10.4	10.4	4.4	0.0
	19	27/01/2023	14:30	CM	G	11.1	10.9	0.0	0.0	10.5	9.7	2.4	0.0
:	20	27/01/2023	14:30	CM	В	8.5	8.5	0.0	0.0	8.9	8.8	2.8	0.0
:	21	27/01/2023	14:30	Т	R	8.5	8.2	1.8	2.0	9.9	8.2	2.0	2.0
;	22	27/01/2023	14:30	Т	G	8.5	5.4	1.4	1.6	10.2	8.8	1.8	2.0
:	23	27/01/2023	14:30	Т	В	7.0	5.0	2.1	2.1	8.1	6.4	2.0	2.3
;	24	02/02/2023	11:45	Т	R	7.8	7.7	1.4	1.7	7.0	8.0	1.8	1.7
:	25	02/02/2023	11:45	Т	G	7.4	7.4	1.3	1.3	7.5	7.5	1.3	1.3
	26	02/02/2023	11:45	Т	В	7.8	7.5	1.3	1.4	8.1	7.8	1.4	2.6
:	27	02/02/2023	11:45	CM	R	9.8	8.2	0.4	1.6	8.8	8.7	1.7	0.7
:	28	02/02/2023	11:45	CM	G	7.7	9.8	0.0	0.0	10.1	9.2	3.0	0.0
:	29	02/02/2023	11:45	CM	В	7.4	10.8	0.7	0.3	9.4	9.5	4.5	0.4
:	30	03/03/2023	13:45	Т	R	3.7	7.4	0.9	0.9	8.7	8.7	1.3	1.3
:	31	03/03/2023	13:45	Т	G	8.7	8.2	0.9	0.9	8.1	8.1	1.0	1.0
:	32	03/03/2023	13:45	Т	В	8.5	5.4	1.0	1.0	8.5	8.2	1.0	1.1
:	33	03/03/2023	13:45	CM	R	6.4	8.8	0.0	0.0	9.2	9.8	8.1	0.4
;	34	03/03/2023	13:45	CM	G	8.7	10.4	0.0	0.0	10.4	10.2	8.0	0.6
:	35	03/03/2023	13:45	CM	В	3.8	8.8	0.6	0.6	8.9	8.9	7.0	0.3
;	36	14/03/2023	09:45	CM	R	9.2	8.8	0.0	0.3	10.9	10.5	7.8	0.1
:	37	14/03/2023		CM	G	8.7	8.9	0.0	0.3	8.5	8.2	8.0	0.0
;	38	14/03/2023	09:45	CM	В	9.1	8.7	0.0	0.3	9.2	9.1	1.8	1.1
	39			Т	R	8.7	7.2	1.0	1.0	9.2	9.4	1.0	1.0
	40	14/03/2023		Т	G	8.1	8.1	1.1	1.4	8.5	8.5	1.6	1.6
		14/03/2023		Т	В	8.7	8.4	0.9	0.9	8.8	8.4	0.9	0.9
	42			CM	R	7.7	8.8	0.0	0.0	8.2	9.2	2.8	0.0
		23/03/2023		CM	G	9.7	7.1	0.4	1.8	3.6	8.1	2.0	0.4
	44	23/03/2023		CM	В	8.0	8.8	0.0	0.0	9.4	9.2	5.0	0.0
	45	23/03/2023	09:30	Т	R	8.7	5.7	0.9	1.0	8.7	8.7	1.3	1.6

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In [16]: import matplotlib.pyplot as plt
import numpy as np

46 23/03/2023 09:30

47 23/03/2023 09:30

```
Requirement already satisfied: fonttools>=4.22.0 in c:\users\ayooba\appdata\local\anaconda3\lib\site-packages (
               from matplotlib) (4.25.0)
               Requirement already satisfied: kiwisolver>=1.0.1 in c:\users\ayooba\appdata\local\anaconda3\lib\site-packages (
               from matplotlib) (1.4.4)
               Requirement already satisfied: numpy>=1.20 in c:\users\ayooba\appdata\local\anaconda3\lib\site-packages (from m
               atplotlib) (1.24.3)
               Requirement already satisfied: packaging>=20.0 in c:\users\ayooba\appdata\local\anaconda3\lib\site-packages (fr
               om matplotlib) (23.1)
               Requirement already satisfied: pillow>=6.2.0 in c:\users\ayooba\appdata\local\anaconda3\lib\site-packages (from
               matplotlib) (10.0.1)
               Requirement already satisfied: pyparsing<3.1,>=2.3.1 in c:\users\ayooba\appdata\local\anaconda3\lib\site-packag
               es (from matplotlib) (3.0.9)
               Requirement already satisfied: python-dateutil>=2.7 in c:\users\ayooba\appdata\local\anaconda3\lib\site-package
               s (from matplotlib) (2.8.2)
               Requirement already satisfied: six>=1.5 in c: \users\ayooba\appdata\local\anaconda3\lib\site-packages (from pytholocal\anaconda3\lib\site-packages) and the six-packages of the packages of 
               on-dateutil>=2.7->matplotlib) (1.16.0)
               Note: you may need to restart the kernel to use updated packages.
In [45]: import matplotlib.pyplot as plt
In [49]: pip install matplotlib
               Requirement already satisfied: matplotlib in c:\users\ayooba\appdata\local\anaconda3\lib\site-packages (3.7.2)
               Requirement already satisfied: contourpy>=1.0.1 in c:\users\ayooba\appdata\local\anaconda3\lib\site-packages (f
               rom matplotlib) (1.0.5)
               Requirement already satisfied: cycler>=0.10 in c:\users\ayooba\appdata\local\anaconda3\lib\site-packages (from
               matplotlib) (0.11.0)
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               from matplotlib) (4.25.0)
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                from matplotlib) (1.4.4)
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               atplotlib) (1.24.3)
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               om matplotlib) (23.1)
               Requirement already satisfied: pillow>=6.2.0 in c:\users\ayooba\appdata\local\anaconda3\lib\site-packages (from
               matplotlib) (10.0.1)
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                s (from matplotlib) (2.8.2)
               Requirement already satisfied: six>=1.5 in c:\users\ayooba\appdata\local\anaconda3\lib\site-packages (from pyth
               on-dateutil>=2.7->matplotlib) (1.16.0)
               Note: you may need to restart the kernel to use updated packages.
In [18]: data = pd.read csv('D:\\data science exam\\afsal.csv')
```

Requirement already satisfied: matplotlib in c:\users\ayooba\appdata\local\anaconda3\lib\site-packages (3.7.2) Requirement already satisfied: contourpy>=1.0.1 in c:\users\ayooba\appdata\local\anaconda3\lib\site-packages (f)

Requirement already satisfied: cycler>=0.10 in c:\users\ayooba\appdata\local\anaconda3\lib\site-packages (from

Defiing the different emotional states

```
In [19]: emotional_states = ['Active', 'Relaxed', 'Fearful', 'Agitated', 'Calm', 'Content', 'Indifferent', 'Frustrated']
In [20]: if isinstance(data, pd.DataFrame):
    # Calculate the mean and standard error for each emotional state
    means = data[emotional_states].mean()
    errors = data[emotional_states].sem() # Standard Error of the Mean (SEM)

In [21]: import matplotlib.pyplot as plt
    import pandas as pd
    import numpy as np
In [22]: data = pd.read_csv('D:\\data science exam\\afsal.csv')
```

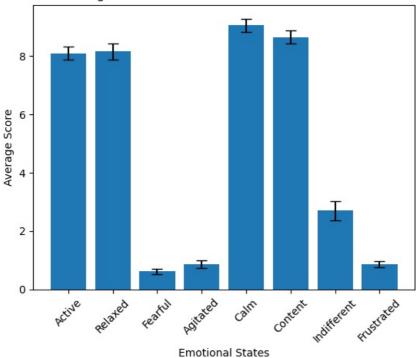
Results of Bar diagram

rom matplotlib) (1.0.5)

matplotlib) (0.11.0)

```
In [23]: plt.bar(emotional_states, means, yerr=errors, capsize=5)
    plt.xlabel('Emotional States')
    plt.ylabel('Average Score')
    plt.title('Average Scores of Emotional States with Error Bars')
    plt.xticks(rotation=45)
    plt.show()
```

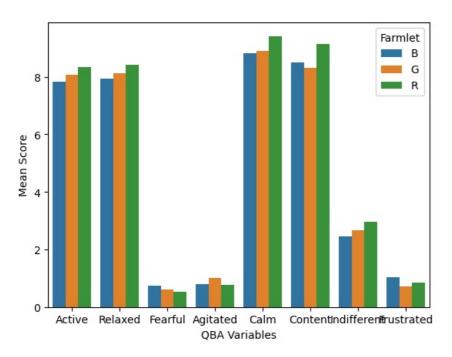
Average Scores of Emotional States with Error Bars



```
In [29]:
         import pandas as pd
         import matplotlib.pyplot as plt
         import seaborn as sns
In [30]:
         file_path = 'D:\\data science exam\\afsal.csv'
         data = pd.read_csv(file_path)
In [32]: behavioral_data = data.select_dtypes(include=[float, int])
         behavioral_data['Farmlet'] = data['Farmlet']
In [33]:
         mean_values = behavioral_data.groupby('Farmlet').mean()
In [34]:
         plt.figure(figsize=(15, 8))
In [35]:
         <Figure size 1500x800 with 0 Axes>
Out[35]:
         <Figure size 1500x800 with 0 Axes>
         melted_data = mean_values.reset_index().melt(id_vars='Farmlet', var_name='QBA Variables', value_name='Mean Scor
In [40]:
```

panning to plot the mean score of each QBA variable over the three different farmlets

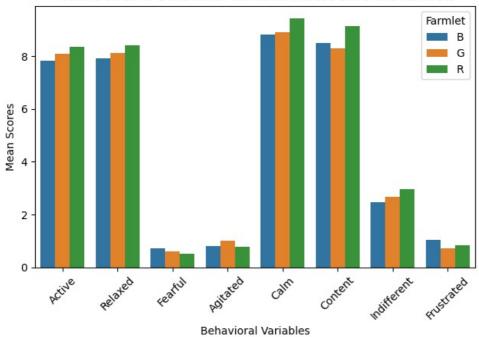
```
In [41]: sns.barplot(x='QBA Variables', y='Mean Score', hue='Farmlet', data=melted_data)
Out[41]: <Axes: xlabel='QBA Variables', ylabel='Mean Score'>
```



```
In [42]: sns.barplot(x='QBA Variables', y='Mean Score', hue='Farmlet', data=melted_data)

plt.title('Mean Scores of Behavioral Variables Across Different Farmlets')
plt.xlabel('Behavioral Variables')
plt.ylabel('Mean Scores')
plt.xticks(rotation=45)
plt.legend(title='Farmlet')
plt.tight_layout()
plt.show()
```

Mean Scores of Behavioral Variables Across Different Farmlets



In []:

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