

## Importing Dataframe and Math Libraries

```
In [ ]: import pandas as pd
import numpy as np
```

Reading one of my data files, lets see what we've got right now.

```
In [ ]: jbt23 = pd.read_csv('Project Data/JakeData/RTtrlJake_20-30dis.csv')
jbt23.head()
```

```
Out[ ]:
```

|   | Distance | Score |
|---|----------|-------|
| 0 | 58       | 229.0 |
| 1 | 56       | NaN   |
| 2 | 48       | NaN   |
| 3 | 48       | NaN   |
| 4 | 34       | NaN   |

Right. Thats all the distances. We can make a series with the average, the score, and add it to a main dataframe.

```
In [ ]: avg_distance = (np.average(jbt23['Distance']))
score = np.max(jbt23['Score'])
print(score)
```

229.0

Above we got the average score, now lets make a row for our dataframe.

```
In [ ]: df = pd.read_csv('Project Data/dummy.csv')
list_row = ['Jake', 'Reaction Time', '20-30', avg_distance, score, 273]
```

And replace the dummy row with real data.

```
In [ ]: df.loc[len(df)] = list_row
df = df.drop(df.index[0])
df = df.reset_index(drop=True)
df.head()
```

```
Out[ ]:
```

|   | Subject | Task          | Threshold | ObservedDistance | Score | AverageScore |
|---|---------|---------------|-----------|------------------|-------|--------------|
| 0 | Jake    | Reaction Time | 20-30     | 31.403846        | 229.0 | 273          |

Repeat for all data, the evaluate.

Average Scores: Reaction Time - 273 Aim - 400 Typing - 40

```
In [ ]: jba23 = pd.read_csv('Project Data/JakeData/aim20-30.csv')
avg_distance = (np.average(jba23['Distance']))
score = np.max(jba23['Score'])
jake_aim = ['Jake', 'Aim', '20-30', avg_distance, score, 400]
df.loc[len(df)] = jake_aim
df.head()
```

```
Out [ ]:
```

|   | Subject | Task          | Threshold | ObservedDistance | Score | AverageScore |
|---|---------|---------------|-----------|------------------|-------|--------------|
| 0 | Jake    | Reaction Time | 20-30     | 31.403846        | 229.0 | 273          |
| 1 | Jake    | Aim           | 20-30     | 29.962963        | 556.0 | 400          |

```
In [ ]: this_file = pd.read_csv('Project Data/JakeData/aim50-60.csv')
avg_distance = (np.average(this_file['Distance']))
score = np.max(this_file['Score'])
this_row = ['Jake', 'Aim', '50-60', avg_distance, score, 400]
df.loc[len(df)] = this_row

this_file = pd.read_csv('Project Data/JakeData/RTtr1Jake_50-60dis.csv')
avg_distance = (np.average(this_file['Distance']))
score = np.max(this_file['Score'])
this_row = ['Jake', 'Reaction Time', '50-60', avg_distance, score, 273]
df.loc[len(df)] = this_row

this_file = pd.read_csv('Project Data/JakeData/typ50-60.csv')
avg_distance = (np.average(this_file['Distance']))
score = np.max(this_file['Score'])
this_row = ['Jake', 'Typing', '50-60', avg_distance, score, 40]
df.loc[len(df)] = this_row

this_file = pd.read_csv('Project Data/JakeData/typing20-30.csv')
avg_distance = (np.average(this_file['Distance']))
score = np.max(this_file['Score'])
this_row = ['Jake', 'Typing', '20-30', avg_distance, score, 40]
df.loc[len(df)] = this_row
```

Yasha's Data

```
In [ ]: this_file = pd.read_csv('Project Data/YashaData/aimtrainer20-30.csv')
avg_distance = (np.average(this_file['Distance']))
score = np.max(this_file['Score'])
this_row = ['Yasha', 'Aim', '20-30', avg_distance, score, 400]
df.loc[len(df)] = this_row

this_file = pd.read_csv('Project Data/YashaData/aimtrainer50-60.csv')
avg_distance = (np.average(this_file['Distance']))
score = np.max(this_file['Score'])
this_row = ['Yasha', 'Aim', '50-60', avg_distance, score, 400]
df.loc[len(df)] = this_row

this_file = pd.read_csv('Project Data/YashaData/reaction20-30.csv')
avg_distance = (np.average(this_file['Distance']))
score = np.max(this_file['Score'])
this_row = ['Yasha', 'Reaction Time', '20-30', avg_distance, score, 273]
df.loc[len(df)] = this_row

this_file = pd.read_csv('Project Data/YashaData/reaction50-60.csv')
avg_distance = (np.average(this_file['Distance']))
score = np.max(this_file['Score'])
this_row = ['Yasha', 'Reaction Time', '50-60', avg_distance, score, 273]
df.loc[len(df)] = this_row

this_file = pd.read_csv('Project Data/YashaData/typing20-30.csv')
avg_distance = (np.average(this_file['Distance']))
score = np.max(this_file['Score'])
this_row = ['Yasha', 'Typing', '20-30', avg_distance, score, 40]
df.loc[len(df)] = this_row

this_file = pd.read_csv('Project Data/YashaData/typing50-60.csv')
avg_distance = (np.average(this_file['Distance']))
score = np.max(this_file['Score'])
this_row = ['Yasha', 'Typing', '50-60', avg_distance, score, 40]
df.loc[len(df)] = this_row
```

Jerry Data

```
In [ ]: this_file = pd.read_csv('Project Data/JerryData/aim20-30.csv')
avg_distance = (np.average(this_file['Distance']))
score = np.max(this_file['Score'])
this_row = ['Jerry', 'Aim', '20-30', avg_distance, score, 400]
df.loc[len(df)] = this_row

this_file = pd.read_csv('Project Data/JerryData/aim50-60.csv')
avg_distance = (np.average(this_file['Distance']))
score = np.max(this_file['Score'])
this_row = ['Jerry', 'Aim', '50-60', avg_distance, score, 400]
df.loc[len(df)] = this_row

this_file = pd.read_csv('Project Data/JerryData/reaction20-30.csv')
avg_distance = (np.average(this_file['Distance']))
score = np.max(this_file['Score'])
this_row = ['Jerry', 'Reaction Time', '20-30', avg_distance, score, 273]
df.loc[len(df)] = this_row

this_file = pd.read_csv('Project Data/JerryData/reaction50-60.csv')
avg_distance = (np.average(this_file['Distance']))
score = np.max(this_file['Score'])
this_row = ['Jerry', 'Reaction Time', '50-60', avg_distance, score, 273]
df.loc[len(df)] = this_row

this_file = pd.read_csv('Project Data/JerryData/typing20-30.csv')
avg_distance = (np.average(this_file['Distance']))
score = np.max(this_file['Score'])
this_row = ['Jerry', 'Typing', '20-30', avg_distance, score, 40]
df.loc[len(df)] = this_row

this_file = pd.read_csv('Project Data/JerryData/typing50-60.csv')
avg_distance = (np.average(this_file['Distance']))
score = np.max(this_file['Score'])
this_row = ['Jerry', 'Typing', '50-60', avg_distance, score, 40]
df.loc[len(df)] = this_row
```

Johnathon Data

```
In [ ]: this_file = pd.read_csv('Project Data/JonathanData/aim20-30.csv')
avg_distance = (np.average(this_file['Distance']))
score = np.max(this_file['Score'])
this_row = ['Johnathon', 'Aim', '20-30', avg_distance, score, 400]
df.loc[len(df)] = this_row

this_file = pd.read_csv('Project Data/JonathanData/aim50-60.csv')
avg_distance = (np.average(this_file['Distance']))
score = np.max(this_file['Score'])
this_row = ['Johnathon', 'Aim', '50-60', avg_distance, score, 400]
df.loc[len(df)] = this_row

this_file = pd.read_csv('Project Data/JonathanData/reaction20-30.csv')
avg_distance = (np.average(this_file['Distance']))
score = np.max(this_file['Score'])
this_row = ['Johnathon', 'Reaction Time', '20-30', avg_distance, score, 273]
df.loc[len(df)] = this_row

this_file = pd.read_csv('Project Data/JonathanData/reaction50-60.csv')
avg_distance = (np.average(this_file['Distance']))
score = np.max(this_file['Score'])
this_row = ['Johnathon', 'Reaction Time', '50-60', avg_distance, score, 273]
df.loc[len(df)] = this_row

this_file = pd.read_csv('Project Data/JonathanData/typing20-30.csv')
avg_distance = (np.average(this_file['Distance']))
score = np.max(this_file['Score'])
this_row = ['Johnathon', 'Typing', '20-30', avg_distance, score, 40]
df.loc[len(df)] = this_row

this_file = pd.read_csv('Project Data/JonathanData/typing50-60.csv')
avg_distance = (np.average(this_file['Distance']))
score = np.max(this_file['Score'])
this_row = ['Johnathon', 'Typing', '50-60', avg_distance, score, 40]
df.loc[len(df)] = this_row

In [ ]: print(df)
```

|    | Subject   | Task          | Threshold | ObservedDistance | Score | AverageScore |
|----|-----------|---------------|-----------|------------------|-------|--------------|
| e  |           |               |           |                  |       |              |
| 0  | Jake      | Reaction Time | 20-30     | 31.403846        | 229.0 | 27           |
| 3  |           |               |           |                  |       |              |
| 1  | Jake      | Aim           | 20-30     | 29.962963        | 556.0 | 40           |
| 0  |           |               |           |                  |       |              |
| 2  | Jake      | Aim           | 50-60     | 57.480519        | 598.0 | 40           |
| 0  |           |               |           |                  |       |              |
| 3  | Jake      | Reaction Time | 50-60     | 56.853503        | 235.0 | 27           |
| 3  |           |               |           |                  |       |              |
| 4  | Jake      | Typing        | 50-60     | 47.975000        | 47.0  | 4            |
| 0  |           |               |           |                  |       |              |
| 5  | Jake      | Typing        | 20-30     | 25.625000        | 53.0  | 4            |
| 0  |           |               |           |                  |       |              |
| 6  | Yasha     | Aim           | 20-30     | 32.421053        | 567.0 | 40           |
| 0  |           |               |           |                  |       |              |
| 7  | Yasha     | Aim           | 50-60     | 53.923077        | 465.0 | 40           |
| 0  |           |               |           |                  |       |              |
| 8  | Yasha     | Reaction Time | 20-30     | 25.080000        | 318.0 | 27           |
| 3  |           |               |           |                  |       |              |
| 9  | Yasha     | Reaction Time | 50-60     | 57.641892        | 303.0 | 27           |
| 3  |           |               |           |                  |       |              |
| 10 | Yasha     | Typing        | 20-30     | 28.789474        | 37.0  | 4            |
| 0  |           |               |           |                  |       |              |
| 11 | Yasha     | Typing        | 50-60     | 55.363636        | 35.0  | 4            |
| 0  |           |               |           |                  |       |              |
| 12 | Jerry     | Aim           | 20-30     | 30.731092        | 580.0 | 40           |
| 0  |           |               |           |                  |       |              |
| 13 | Jerry     | Aim           | 50-60     | 53.973451        | 533.0 | 40           |
| 0  |           |               |           |                  |       |              |
| 14 | Jerry     | Reaction Time | 20-30     | 29.546218        | 249.0 | 27           |
| 3  |           |               |           |                  |       |              |
| 15 | Jerry     | Reaction Time | 50-60     | 53.079646        | 322.0 | 27           |
| 3  |           |               |           |                  |       |              |
| 16 | Jerry     | Typing        | 20-30     | 28.240385        | 32.0  | 4            |
| 0  |           |               |           |                  |       |              |
| 17 | Jerry     | Typing        | 50-60     | 54.215054        | 42.0  | 4            |
| 0  |           |               |           |                  |       |              |
| 18 | Johnathon | Aim           | 20-30     | 31.134328        | 483.0 | 40           |
| 0  |           |               |           |                  |       |              |
| 19 | Johnathon | Aim           | 50-60     | 51.202128        | 490.0 | 40           |
| 0  |           |               |           |                  |       |              |
| 20 | Johnathon | Reaction Time | 20-30     | 27.333333        | 214.0 | 27           |
| 3  |           |               |           |                  |       |              |
| 21 | Johnathon | Reaction Time | 50-60     | 53.489583        | 223.0 | 27           |
| 3  |           |               |           |                  |       |              |
| 22 | Johnathon | Typing        | 20-30     | 28.320000        | 62.0  | 4            |
| 0  |           |               |           |                  |       |              |
| 23 | Johnathon | Typing        | 50-60     | 54.276596        | 62.0  | 4            |
| 0  |           |               |           |                  |       |              |

New Column for Analysis: % difference from average (absolute value)

```
In [ ]: df['ComparedToAverage'] = ((df['Score'] - df['AverageScore'])/df['AverageScore'])

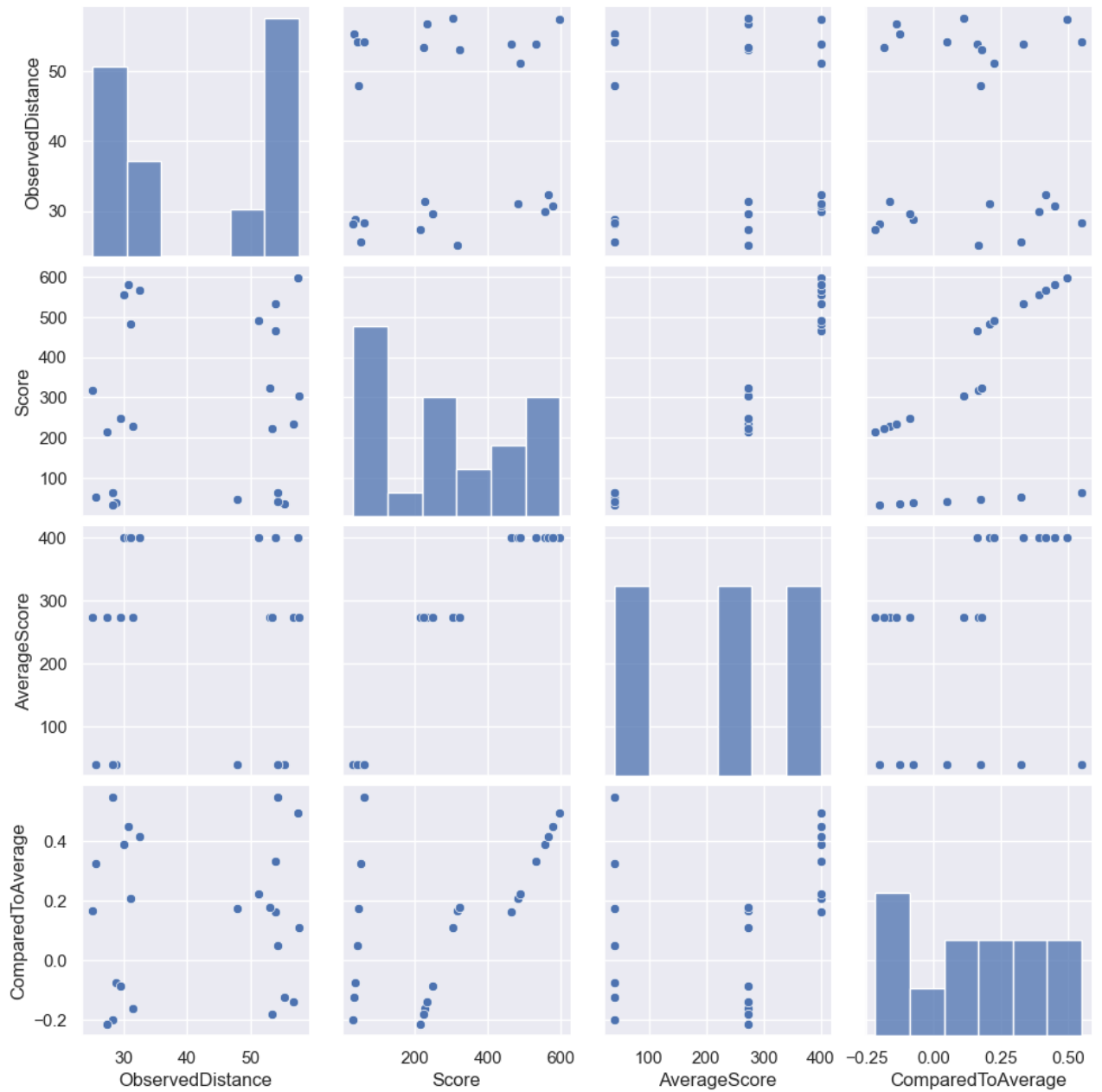
print(df['ComparedToAverage'])
```

|    |           |
|----|-----------|
| 0  | -0.161172 |
| 1  | 0.390000  |
| 2  | 0.495000  |
| 3  | -0.139194 |
| 4  | 0.175000  |
| 5  | 0.325000  |
| 6  | 0.417500  |
| 7  | 0.162500  |
| 8  | 0.164835  |
| 9  | 0.109890  |
| 10 | -0.075000 |
| 11 | -0.125000 |
| 12 | 0.450000  |
| 13 | 0.332500  |
| 14 | -0.087912 |
| 15 | 0.179487  |
| 16 | -0.200000 |
| 17 | 0.050000  |
| 18 | 0.207500  |
| 19 | 0.225000  |
| 20 | -0.216117 |
| 21 | -0.183150 |
| 22 | 0.550000  |
| 23 | 0.550000  |

Name: ComparedToAverage, dtype: float64

TODO: Compare within subjects between distances. Create table row, graphics.

```
In [ ]: import seaborn as sns
sns.set(style="darkgrid", color_codes=True)
g = sns.pairplot(df)
import matplotlib.pyplot as plt
plt.show()
#describe dataframe
df.describe()
```





Out [ ]:

|              | ObservedDistance | Score      | AverageScore | ComparedToAverage |
|--------------|------------------|------------|--------------|-------------------|
| <b>count</b> | 24.000000        | 24.000000  | 24.000000    | 24.000000         |
| <b>mean</b>  | 41.585907        | 280.625000 | 237.666667   | 0.149861          |
| <b>std</b>   | 13.037748        | 207.282586 | 152.284250   | 0.253271          |
| <b>min</b>   | 25.080000        | 32.000000  | 40.000000    | -0.216117         |
| <b>25%</b>   | 29.357032        | 59.750000  | 40.000000    | -0.097184         |
| <b>50%</b>   | 40.198026        | 242.000000 | 273.000000   | 0.169918          |
| <b>75%</b>   | 54.033852        | 484.750000 | 400.000000   | 0.346875          |
| <b>max</b>   | 57.641892        | 598.000000 | 400.000000   | 0.550000          |

In [ ]: `jake = df[df["Subject"] == 'Jake']`  
`print(jake)`

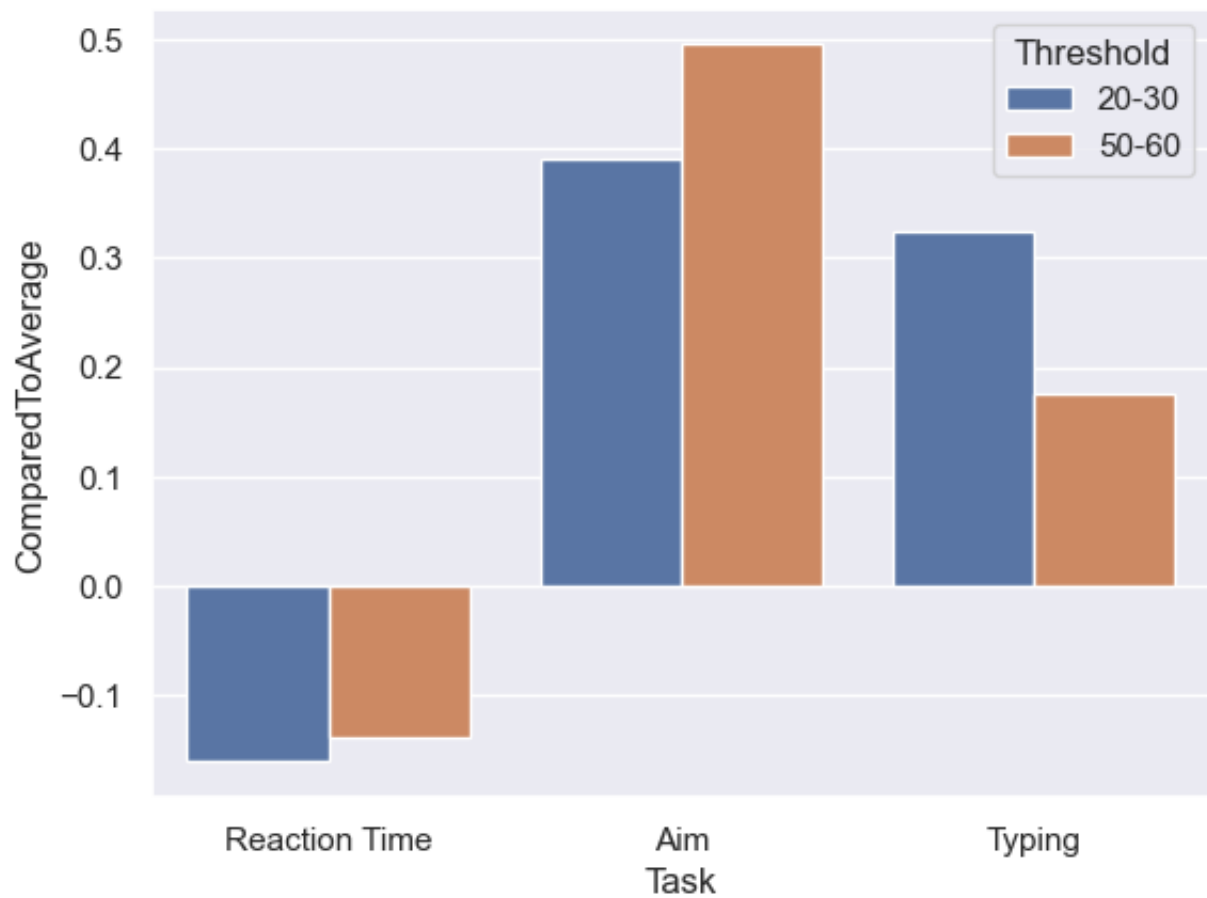
|   | Subject | Task          | Threshold | ObservedDistance | Score | AverageScore | \ |
|---|---------|---------------|-----------|------------------|-------|--------------|---|
| 0 | Jake    | Reaction Time | 20-30     | 31.403846        | 229.0 | 273          |   |
| 1 | Jake    | Aim           | 20-30     | 29.962963        | 556.0 | 400          |   |
| 2 | Jake    | Aim           | 50-60     | 57.480519        | 598.0 | 400          |   |
| 3 | Jake    | Reaction Time | 50-60     | 56.853503        | 235.0 | 273          |   |
| 4 | Jake    | Typing        | 50-60     | 47.975000        | 47.0  | 40           |   |
| 5 | Jake    | Typing        | 20-30     | 25.625000        | 53.0  | 40           |   |

|   | ComparedToAverage |
|---|-------------------|
| 0 | -0.161172         |
| 1 | 0.390000          |
| 2 | 0.495000          |
| 3 | -0.139194         |
| 4 | 0.175000          |
| 5 | 0.325000          |

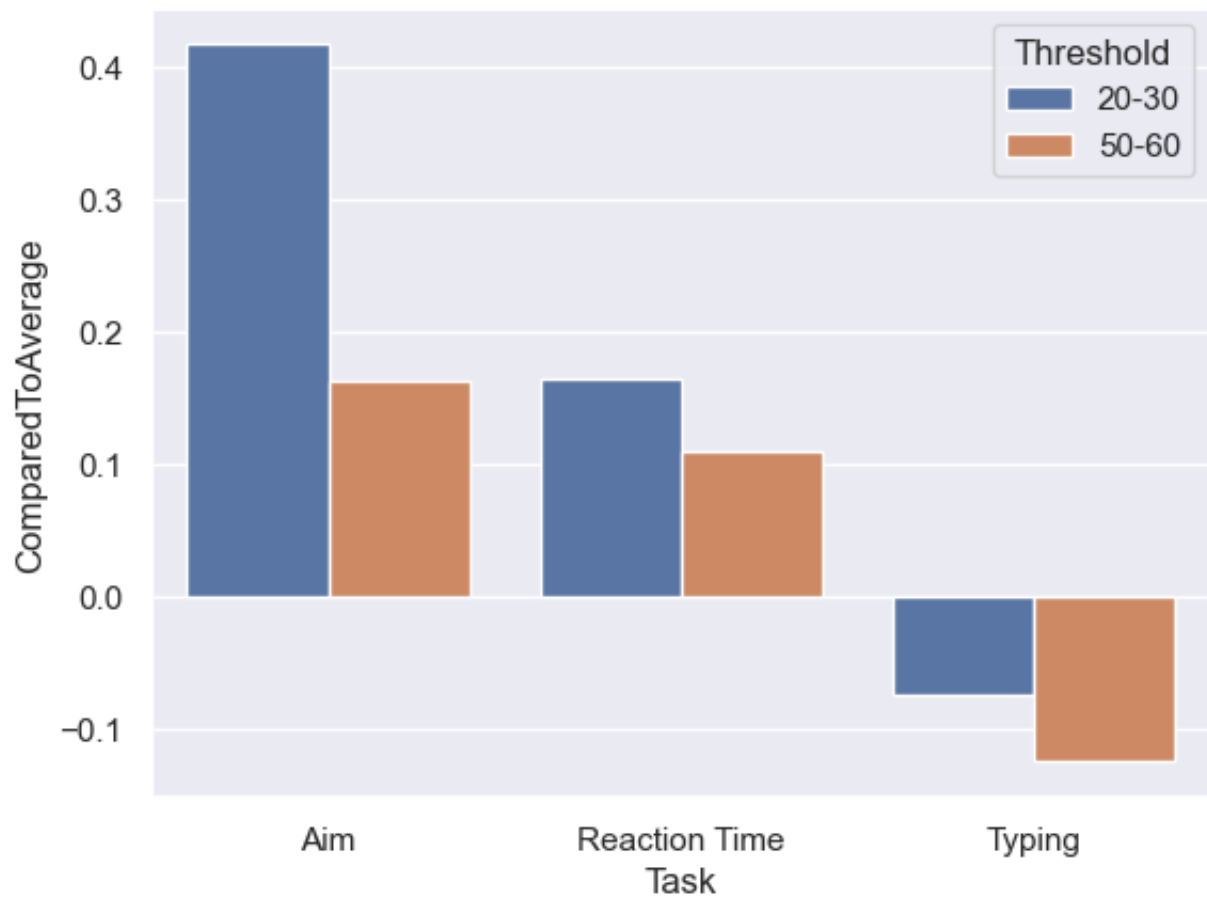
In [ ]: `sns.barplot(jake, x=jake['Task'], y=jake['ComparedToAverage'], hue=jake['Thr`

Out [ ]: `<Axes: xlabel='Task', ylabel='ComparedToAverage'>`



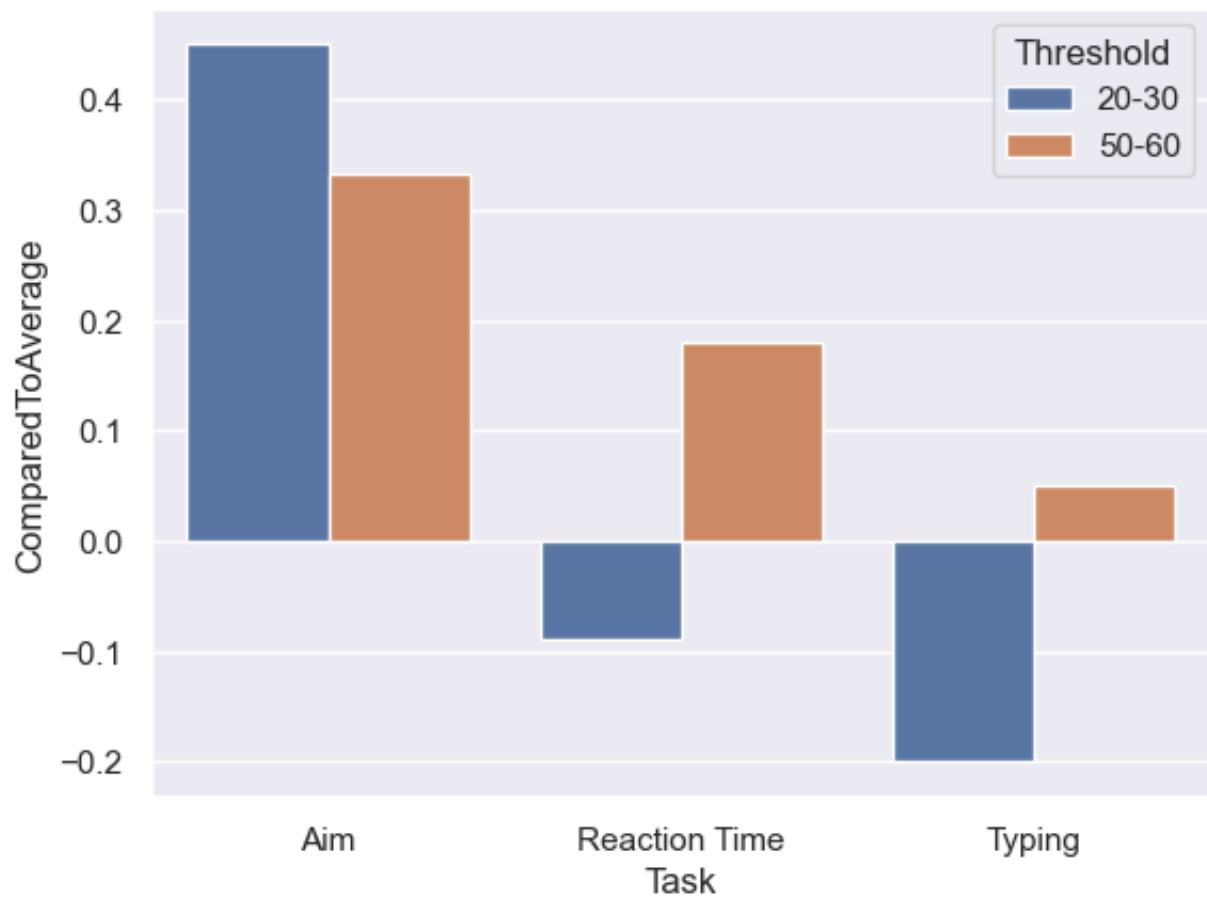
```
In [ ]: yasha = df[df["Subject"] == 'Yasha']  
sns.barplot(yasha, x=yasha['Task'], y=yasha['ComparedToAverage'], hue=yasha['Threshold'])
```

```
Out[ ]: <Axes: xlabel='Task', ylabel='ComparedToAverage'>
```



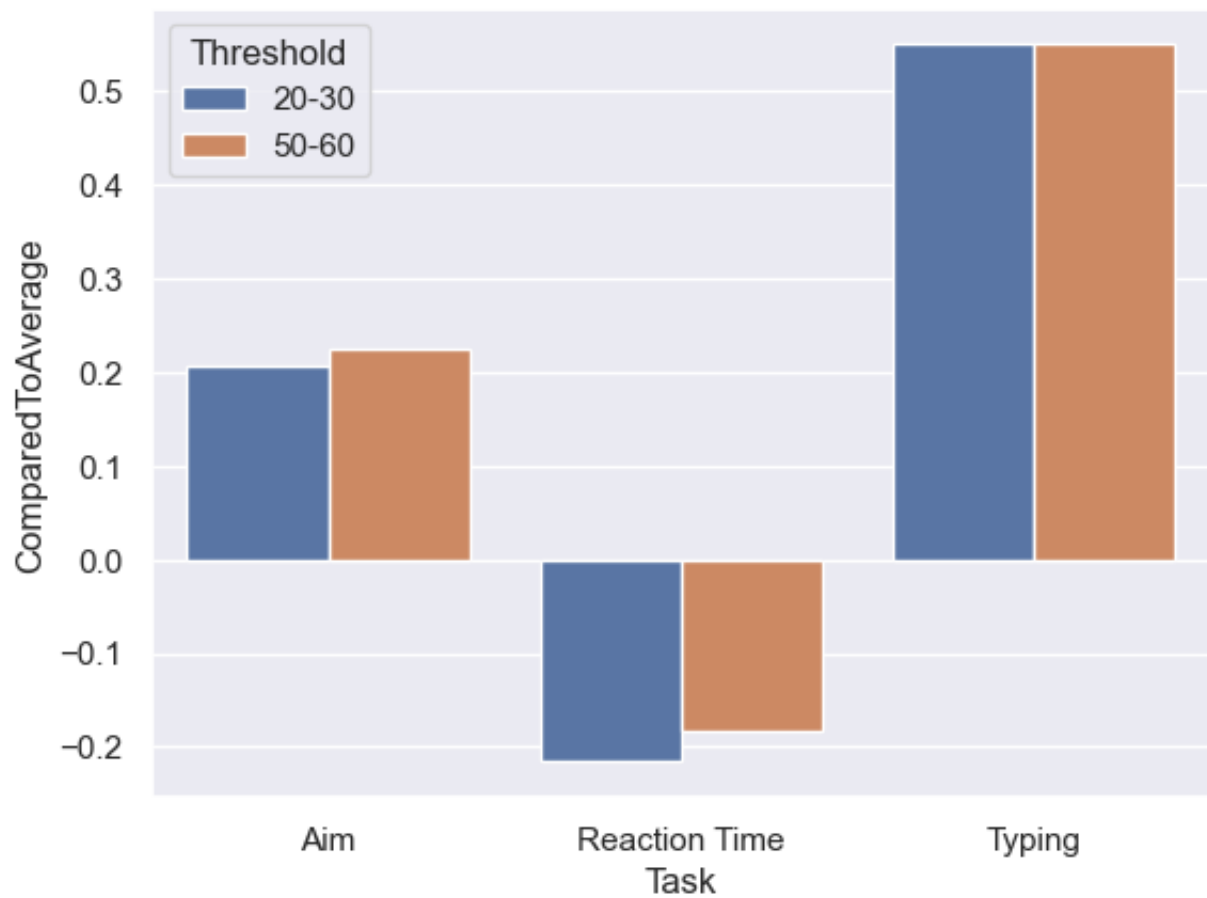
```
In [ ]: Jerry = df[df["Subject"] == 'Jerry']  
sns.barplot(Jerry, x=Jerry['Task'], y=Jerry['ComparedToAverage'], hue=Jerry['
```

```
Out [ ]: <Axes: xlabel='Task', ylabel='ComparedToAverage'>
```



```
In [ ]: Johnathon = df[df["Subject"] == 'Johnathon']  
sns.barplot(Johnathon, x=Johnathon['Task'], y=Johnathon['ComparedToAverage'])
```

```
Out[ ]: <Axes: xlabel='Task', ylabel='ComparedToAverage'>
```



```
In [ ]: sns.barplot(df, x=df['Task'], y=df['ComparedToAverage'], hue=df['Threshold'])
Out[ ]: <Axes: xlabel='Task', ylabel='ComparedToAverage'>
```

