Fitts' Law Report

1. A description of your protocol including the independent and dependent variables and the possible confounding variables in your setting

The independent variables in our study are distance, size, and direction. For distance, we had 300, 400, 500, and 600 pixels away from the center, and for size, we had 64, 128, 196, and 256 (yes, the 196 should've been 192, that's what we get for adding in our heads). The confounding variables in our setting could be participant's attention, as if they got bored, they might've slowed down as the experiment went on.

For the protocol of our experiment, we had a participant open the program (we packaged our python project as a standalone executable with pyInstaller) and be greeted with an 'Open Consent Form' button, which took them to the GitHub repository with the updated consent form. If they agreed, they would be taken to the start screen with a button that they can click when they are ready to start the experiment. Once they do, the application goes full screen, and the buttons start appearing.

2. **An explanation of the results obtained from linear regression using Fitts' Law.**

For our linear regression, we obtained an R^2 value of 0.7792, which is a decent value on a scale from 0-1. This just puts us in a good rank according to this website (https://stephenallwright.com/good-r-squared-value/), however not necessarily a scientific experiment where you would want ~0.95 for your regression model.

3. **What difference does it make if tasks are performed in different directions?**

Somewhat counterintuitively, there was a slight 'preference' for buttons to the left:

```
key = '-1', avg = 0.8686686898632257
key = '1', avg = 0.9374313549933599
```

Time to click on the left averaged ~0.87 seconds, whereas time to click on the right was ~0.94 seconds. We would've expected the right side, but maybe this shows that people like bringing the mouse towards their body more.

4. **What differences did you observe between participants with respect to error rates, time completions and distance travelled per task?**

Unsurprisingly, when there were more errors, the longer the participant took to successfully complete the task

```
  import pandas as pd
key = '0\n' (4225 recorded), avg = 0.866685148724437
key = '1\n' (508 recorded), avg = 1.126232784094773
key = '2\n' (47 recorded), avg = 1.529093326406276
key = '3\n' (4 recorded), avg = 2.405429422855377
key = '6\n' (1 recorded), avg = 5.631101608276367
```

However, it was noticed that there wasn't that direct correlation between errors and distanced traveled:

```
  import pandas as pd
key = '0\n' (4225 recorded), avg = 121.552305247680
key = '1\n' (508 recorded), avg = 110.15089618725153
key = '2\n' (47 recorded), avg = 89.27000282308433
key = '3\n' (4 recorded), avg = 106.28151447548626
key = '6\n' (1 recorded), avg = 33.97057550292606
```

This can be interpreted as the participants could've gotten a little 'jittery' and maybe clicked a few times a bit early (the one event with 6 errors is an extreme outlier here, but for some reason was very short distance travelled

5. **A discussion of any problems you encountered during the experiment and potential limitations to the experiment.**

A potential limitation to the experiment is all participants were right-handed. We could've maybe tried to recruit left-handed people and denote which participants were right and left handed, and that could lead to cool analysis.

Initial coding problems were getting our bearings with the library wxPython, we had frequent crashes when pre-generating all of the buttons, so that had to be done one-by-one. However there is decent documentation on wxPython (and StackOverflow).