Difference between Male and Female Reaction Time

Introduction

Males and females are very different in many aspects of life. As kids they are bought different types of toys, where many females had dolls, many males had toy trucks. When being dressed as a young child, females tend to wear more pink where males where more blue. In a physical competitive setting, males tend to be pushed further than females. Do these differences in youth, or the sheer difference in gender cause males and females to have different reaction times?

Method

To obtain valid and significant results, the most important part of this experiment was to have a very large sample population. To do this, a simple web application was built using HTML, JavaScript, and PHP on a Linux server with use of a MySQL database. This site was hosted at http://www.pawlak.ws/reaction. Because the web application was hosted on the internet, it was able to be run by any person at any time. However, due to the fact that most websites don’t generate much traffic without any advertisement, a link to the site needed to be given out to people. Going to FaceBook (http://www.facebook.com), I created a group titled: ‘Help me gather data for my experiment… Test your reaction time!’ I then proceeded to invite everyone that I am friends with through FaceBook to the group, which are approximately 269 people. These people were shown a link to the group which contained a link to the test. I also asked these people to send the link to their friends as well to create a pyramid effect.

Data was archived into a MySQL (version 4.1) database called reaction that was comprised of the following elements.

- Tables
  - time_tbl
- Rows (time_tbl)
  - ID (timestamp)
  - TIME (bigint[20])
  - SEX (varchar[6])

Procedure

The web application (Figure 1) started out by listing instructions for the entire experiment. By following instructions, the user would select their gender, and then click a large button to start the reaction time test (Figure 2). The user then waited a randomly generated time between 3 and 8 seconds for the background of the webpage to turn from green to red. When the background turned red, the text on the button also changed to ‘CLICK NOW!’ (Figure 3). When the user clicked the button, the reaction time in milliseconds was calculated and saved to the database along with their gender and a timestamp for when...
the test was taken (Figure 4). If the user clicked too early, before the screen turned red, they were given an error message (Figure 5), and the test was reset.

Figure 1: Welcome page with instructions for how to take reaction time test

Figure 2: After selecting gender, prompts to click the big button to start the reaction time test
Figure 3: The screen turns red and user is told to click the big button

Figure 4: After clicking the button, reaction time is calculated and saved to the database

Figure 5: Error message displayed when user clicks the big button before screen turns red
Results

After five days of collecting data, all the rows from the time_tbl in the reaction database were exported in a comma delimited file, and opened in Microsoft Excel 2007. After data analysis on the reaction times imported, the following data was derived (Table 1 and 2)

<table>
<thead>
<tr>
<th>Female</th>
<th>Male</th>
</tr>
</thead>
<tbody>
<tr>
<td># of trials</td>
<td>398</td>
</tr>
<tr>
<td>mean</td>
<td>517.0</td>
</tr>
<tr>
<td>median</td>
<td>365.5</td>
</tr>
<tr>
<td>Std Error</td>
<td>45.1</td>
</tr>
</tbody>
</table>

Table 1: Female calculations

Table 2: Male calculations

These calculations tend to show that males do have a faster reaction time than females. However, depending on whether the comparison is made with the mean or the median, determines the results. Using the standard equivalency test and the standard error calculation as the uncertainty value for each male and female collection of data, it is found that when using the mean, 517.0 ms for females and 383.2 ms for males, they are not statistically equivalent. However, if using the median of 365.5 ms for females and 312 ms for males, the values are statistically equivalent.

The data was also distributed every 50 milliseconds to obtain a visual representation (Figure 6).
Discussion

This experiment suggests two separate conclusions depending on what type of analysis seems best fit. If using the mean as measurement of male and female reaction times, the experiment suggests that males do have a faster reaction time than females. If using the median as measurement of male and female reaction times, the experiment suggests that males and females have the same reaction time. The difference in which value should be used should be determined on the range of the data. For the most part the data does create a normal distribution in a bell shaped curve; however, there are a number of outliers that do not quite fit the form. These outliers are from users that did not read the instructions and were not sure how to perform the reaction time test. All of the trials were completed unsupervised which does create an extended level of uncertainty. With the majority of the outliers being in the positive direction above the mean/median, it skews the value of the mean more than it does the median. This is why the median should be used as the measurement of reaction time.

If this experiment were to be recreated, the main change in procedure would be to supervise the users taking the reaction time test. Users are not held accountable for the truth when selecting gender. It is assumed that most data has been collected in a valid and truthful manner due to the definite shape of the graph.

In conclusion, with using the median as the best known value for male and female reaction times, this experiment tends to suggest that there is no difference between male and female reaction times.