



## Are males better drivers? Answers

<http://topdrawer.aamt.edu.au/Statistics/Good-teaching/Statistical-investigations/Semi-structured-statistical-investigations/Are-males-better-drivers>

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### Instructions

Billy, one of the males in your class, has made an observation that the reaction times of males are faster than that of females. He went on to say, “For driving a car, quick reactions are important. Males will be better drivers than females because they have faster reaction times.” Needless to say, this created some controversy in your class.

With a partner, discuss what you think about the accuracy of Billy’s claim.

### Task 1: Comparing the reaction times of males and females

You, Sammi and Jasmine are unsure about the accuracy of Billy’s claim, so you decide to investigate if males do have faster reaction times than females.

Data from the CensusAtSchool questionnaire could be used to investigate the reaction times of females and males.

Sammi suggests that a simple calculation of the mean reaction time for females and for males will give us the answer. Jasmine is not sure. She thinks that median should be used to measure the middle of a set of data. “They always use the median house price, don’t they?”

Sammi also thinks it might be best to use functions in Excel. It will be easy to calculate both. Then it might be easier to decide which is better. He is also uncertain about which reaction time to use.

1. In a group, discuss how to investigate the claim and record the steps you need to carry out your investigation.

It would be a good idea to test your own reaction and concentration times before you analyse the results so you understand what is being measured. These data were collected in the 2006 survey (questions 11, 12 and 32) and the 2008 survey (questions 9, 10 and 31).

You can go to the CensusAtSchool website and obtain a sample from the random sampler or you can ask your teacher for a copy of a prepared sample from the web pages.



2. Carry out and record your investigation. Include any tables you used.

Table of reaction times (seconds) and concentration showing + and – comparison between male and female results.

Gender		Hand				Concentration	
		Dominant (dom)		Non-dominant (non)		Activity (conc)	
Females (f)	Mean	0.45	(0.01+)	0.50	(0.5+)	43.52	(0.96+)
	Median	0.39	(0.07+)	0.43	(0.8+)	42.50	(4.50+)
Males (m)	Mean	0.44	(0.01-)	0.45	(0.5-)	42.66	(0.96-)
	Median	0.32	(0.07-)	0.35	(0.8-)	38.00	(4.50-)

**Teacher note:** This table has headings for Males and Females, and the results for the reaction times for both hands and for the concentration activity. For ease of comparison a column has been included to show the difference between the mean and median for both sexes. A percentage difference column would provide more detail for older students.

3. What can you conclude from your investigation?

It is clear that when looking at measures of centre that males performed the tasks more quickly than the females. In particular, males performed much more quickly in the concentration activity. This appeared more evident when the median score was used.

## Task 2: Does one number tell you enough?

Jasmine is not happy with a conclusion that is based on just one number, such as a mean or median. She says that this only gives a limited picture. The mean tells you nothing about the rest of the data. Sammi wants to know about all the data and suggests that a graph such as a histogram would give a more complete picture.

Jasmine has seen box-and-whisker plots and stem-and-leaf plots and thinks they are good. They could be clearer than a histogram. She thinks that drawing parallel box plots or back-to-back stem-and-leaf plots of males' reaction times with females' reaction times will enable a better comparison to be made. You can draw a box plot using the quartile function in MS Excel and then drew the box plot by hand. You can also draw a box plot in Excel if the Add-in has been added to the tools menu.

*The Add-In for the 5 number summary, histogram and box plot in Excel can be downloaded as detailed below.*

- Follow the link or copy and paste into your Internet browser:  
<http://www.censusonline.net/downloads/StatisticsTools.xla>
- Select Save
- Choose a location then save the file as xla (not xls).
- Open from location> Choose enable Macros  
*If you get a run time error just click End*
- Open new Excel document
- Go to File>Options>Add-Ins>Analysis ToolPak>Go
- Select Analysis Tool Pack>OK
- Statistical Tools under Add-Ins and you will see Statistical Tools in the Menu Commands

*Please note this Add-In is from a site external to the ABS and therefore the ABS does not guarantee or accept any liability whatsoever arising from its use.*

*The Add-In does not allow for parallel box-and-whisker plots to be drawn.*

4. Decide on a way you can show 'all the data' and carry out the task.  
Record the results of your method.

Table showing reaction times and concentration for males and females.

	Female dom.	Male dom.	Female non-dom.	Male non-dom.	Female conc.	Male conc.
minimum	0.26	0.2	0.26	0.23	22	22
q1	0.37	0.31	0.34	0.28	36	30
median	0.425	0.35	0.39	0.32	42.5	38
q3	0.5	0.4	0.45	0.37	49.75	48
maximum	1.88	3.57	2.23	3.96	74	119

5. Comment on any additional information you have gained from examining 'all the data'.

*We can make comments on the range when we have access to all the data. The most obvious observation is that the range in the results for males was higher in all tasks. Both the maximum reaction and concentration time for males significantly exceeded that for females.*

*In this example, the scale on a box-and-whisker plot will make it difficult to read the data due to the inclusion of outliers. In particular, we can notice the maximum times in all data sets were significantly higher than the Q3 value and much more than double the median. It is usual to discard extreme values from the data as they could be due to sampling errors or extreme values that we do not want to influence our interpretation.*

*The interquartile ranges are higher for females in the reaction times but higher for males in the concentration task.*

*To summarise, while the mean and median scores for males were better than those for females, the slower (maximum) scores were for males in both tasks. This additional information **is** important in answering the question. It could be argued that while males have better reaction and concentration times as measured by the mean and median, the fact that the data indicate that the slowest males are significantly slower than the females balances this.*

### **Task 3: Can you say that driving ability is related to reaction time?**

6. What makes a good driver? You might like to do some research on this question to support your presentation.  
Reaction times and the ability to concentrate are both important driving skills. However, they are not the only skills needed. Other skills include good eyesight, knowledge of, and obeying, the road rules, not taking risks, etc.

### **Extension**

7. Prepare a short presentation to your class addressing the claim that males make better drivers than females.  
Any conclusions you draw must be based on the CensusAtSchool data or other research you have conducted. Remember that people generally find graphs and diagrams easier to understand than tables of data.