

# More than half learner drivers fail new test

Learner drivers are flunking a tough new practical driving test, with fewer than half now making it through.

The restricted test was changed late last month to make it more of a challenge. With nearly 1500 tests completed in Auckland since then, the overall pass rate for Auckland has dropped sharply from about 80 per cent under the old system to 39 per cent.

The New Zealand Transport Agency issued the figures today, with chief executive Geoff Dangerfield making no apology for the plummeting pass rate.

Such a drop was expected in the initial stages, though no specific targets had been set, he said.

"The new test is much more challenging, and a much higher standard of driving is needed to pass. That is the whole point, and we make no apologies for that.

"The new test demands more practice and more preparation, and it will take some time for that message to filter through."

There was a similar initial drop in pass rates from 77 per cent to 40 per cent when computerised theory testing for learner driver licence tests was introduced in November 2009. The current pass rate is 63 per cent.

Stuff.co.nz (http://www.stuff.co.nz/national/6569666/More-than-half-learner-drivers-fail-new-test) (Abridged)

14/3/13

**Question 1**

The report states that “half of learner drivers fail new test”. Identify the survey percentage. Construct a confidence interval for the true population percentage for New Zealand and determine whether the confidence interval can be used to support a claim that most (over half) of New Zealand learner drivers fail the new test.

**Question 2**

Determine the highest survey percentage that would allow the author of this report to claim that most of learner drivers in New Zealand fail the new driving test.

The NZTA is considering implementing online theory testing for learner driver license tests in schools. They conducted a poll of learner license holders coming in to take the test.

The table below shows the survey percentages of the respondents from cities in New Zealand with respect to whether they approved of the new online theory test. (These values were originally presented further on in the report.)

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Auckland** | **Hamilton** | **Taupo** | **Wellington** | **Whanganui** | **Christchurch** | **Dunedin** | **Whangarei** |
| 93% | 66% | 36% | 74% | 40% | 67% | 61% | 9% |

1. Identify which city in the table above should not be compared with other cities using the ‘rule of thumb’ 1/√n and explain why.
2. Discuss possible reasons for some of the differences in these cities’ survey percentages.
3. One component to consider when evaluating statistically-based reports is survey method. Explain if the survey method for the research is a potential issue with this study.



# Women still behind in gender equality

Kiwis like to think we're ahead of the pack when it comes to gender equality in society, business and politics, but the reality is a little different.

A survey of 1000 New Zealanders, to mark the recent launch of the Women of Influence awards, shows that women's perceptions more accurately reflect the current situation compared with those of men.

In the survey conducted by Westpac, a joint partner with Fairfax Media in the awards programme, 76% of women respondents felt they had too little influence in business, while only 53% of men thought the same.

A majority of both men and women agreed that their workplace didn't have as many women senior managers as men. A majority of women also didn't think they had the same opportunities as men to be leaders, but men disagreed.

While 81% of women thought we needed more women leaders, men were divided on that. Some 7% of men thought there were already too many, compared to just 1% of women.

However, the men surveyed said they saw women leaders as equal or better in some ways to their male counterparts, with a more empathetic, less egotistical approach and better communication skills.

19% of the men saw women leaders as worse than men, citing reasons such as ruthlessness, bullying, emotions getting in the way or weakness.

**Herald NZ, Fairfax NZ News (Abridged)**

**www.stuff.co.nz (**http://www.stuff.co.nz/business/women-of-influence/8860246/Women-still-behind-in-gender-equality)

**1/7/13**

**Question 1**

Identify the target population for this survey. Describe some of the key characteristics that the sample of 1000 respondents should have so that this sample can be used to make inferences about this target population.

**Question 2**

One component to consider when evaluating a statistically-based report is the exact nature of the questions asked. Identify a potential difficulty with asking a question which uses the terms ‘ruthlessness’, ‘bullying’, ‘emotions getting in the way’ or’ weakness’.

**Question 3**

Could the claim that a higher percentage of women felt they had too little influence in business than men be supported by evidence presented in the report? Construct a confidence interval and interpret this interval as part of your answer. You can assume that within the sample of 1000, there are two women for every man.

**Question 4**

Identify and discuss **two** potential non-sampling errors, biases, or issues that could be problems in this survey.



# Zap brain, get better at maths - research

By zapping brains in maths lessons, scientists claim to have boosted students' abilities by a third. Participants became quicker at calculating and learned up to five times faster, they said. The Oxford University team gave maths training to 51 students. Around half of them had a light electrical current passed through their brains as they learned.

After five sessions, those who used the treatment learned new sums and recalled figures, such as times tables, much better than those who did not. They also calculated 30% faster - and the skill gap remained in tests six months later. Lead researcher Dr Roi Cohen Kadosh, of Oxford University's department of experimental psychology, said he hoped to help people who are bad at maths. "The study suggests a safe and cheap way we can improve people's maths with limited intervention," he said.

"We are stimulating the part of the brain that deals with maths, because low numeracy is a problem for many people." The treatment is painless and non-invasive, he added. An estimated one in five of us struggles with basic arithmetic, while one in 15 suffers from dyscalculia, which can make tasks such as counting change impossible. It is unclear how the electrical stimulation works, but brain scans suggest it increases the brain's supply of oxygen and nutrients. The research, published in journal *Current Biology*, involved five 45 minute maths sessions, with 25 of the participants given brain stimulation for 20 minutes.

NZ Herald (http://www.nzherald.co.nz/lifestyle/news/article.cfm?c\_id=6&objectid=10884322)

17/5/13

**Question 1**

Identify the explanatory and response variables for the study. Discuss any potential issues with the measurement of the explanatory variable.

**Question 2**

Explain whether this study is an observational study or an experiment. Give an implication of using this type of study for the relationship investigated.

**Question 3**

The report begins with the statement “Zap brain, get better at maths”. Comment on the quality of this statement.

**Question 4**

The report states that after discounting lifestyle factors, the study showed that "It is unclear how the electrical stimulation works, but brain scans suggest it increases the brain's supply of oxygen and nutrients".

Give examples of two related lifestyle factors that may need to be taken into account for this study, and explain how these may be confounding variables.

# More than half learner drivers fail new test

**Question 1**

The survey percentage of learner driver who fail the new test is 61%.

The margin of error is 1 / √1500 = 2.58% (using the rule of thumb 1 / √n)

The 95% confidence interval for the survey percentage of 61% [ 58.41%, 63.58% ].

As this confidence interval does not include 50% and the entire interval is above 50%, the claim that more than half learner driver fail the new test is supported.

**Question 2**

The survey percentage would need to be at least 52.58% to have evidence to support the claim that more than half learner drivers have failed the new test. This is because this would provide a 95% confidence interval of [50%, 55.16%].

**Question 3**

The rule of thumb should only be used as an estimate of the m.o.e. with survey percentages between 30% and 70% which excludes Auckland and Whangarei. For Auckland and Whangarei the survey percentages (93% and 9% respectively) are well outside the ranges. The m.o.e. for both cities would be much smaller than the ‘rule of thumb’ of 1/ √n.

As Auckland, Wellington and Christchurch are the biggest metropolitan cities in New Zealand, there would be more infrastructure set up for online services. In the more rural areas of New Zealand; Taupo, Whanganui and Whangarei there is less accessibility to these services. As well, the socio-economic backgrounds of young people in rural areas may prevent them from having access to internet-enabled devices.

# Women still behind in gender equality

**Question 1**

The target population for this survey are New Zealand (NZ) men and women who are involved in running a business. This sample should be a randomly selected sample of NZ business-men and women which is representative of all NZ business-men and women to make correct inferences about the population of New Zealanders involved in running a business.

To be representative of NZ business leaders the sample should include NZ business-men and women from both the urban and rural sectors, in proportion to the business people in these areas. The range of industries should be wide enough to be representative of the population of NZ business-men and women. This is because some industries are more male-dominant than others which can affect the viewpoints of the respondents.

Other factors to discuss could be age of respondents, education level of the respondents and survey method.

**Question 2**

A potential difficulty with this type of question is how the respondent could interpret the emotive and leading words such as “ruthlessness, bullying or weakness”. It is inappropriate to use these terms in a survey or questionnaire as they could prevent the respondent from choosing these terms for fear of causing offence or from social pressure. The survey should identify these terms in a consistent manner so that the respondents could answer truthfully.

**Question 3**

Could the claim that a higher percentage of women felt they had too little influence in business than men be supported by evidence presented in the report? Construct a confidence interval and interpret this interval as part of your answer. You can assume that within the sample of 1000, there are two women for every man.

The 100 respondents can be split into 670 women and 330 men.

Although there has been one survey the survey is split into 2 independent groups of women and men.

Margin of error for women = 1/ √670 = 3.8633%

Margin of error for men = 1/ √330 = 5.5048%

Average Margin of Error = 4.6841%

Comparing the two subgroups = 4.6841 x 1.5 = 7.261%

The difference between the two subgroups survey percentage claim is 76% - 53% = 23%

The 95% confidence interval for the difference between the two survey percentages is [ 15.739%, 30.261% ].

With 95% confidence, I estimate that the percentage of women who feel women have too little influence in business is somewhere between 15.7% and 30.3% higher than the percentage of men who feel women have too little influence in business. This means the evidence presented in the media report could be used to support the claim that a higher percentage of women feel women have too little influence in business as compared to men.

**Question 4**

The survey was conducted to mark the launch the Women of Influence awards which could bias the results as the respondents chosen could be more liberal and have more feminist views. The survey was also conducted by Fairfax who also published the article in the Herald. There is potential for the survey results to be chosen in a particular way to appear more interesting to appeal to readers of the newspaper. The survey method was not discussed which is probably cluster or convenience sampling which does not use random sampling so cannot assume that the sample is representative of the opinions of New Zealanders.

# Zap brain, get better at maths - research

**Question 1**

The explanatory variable is the light electrical current passed though the brains of 51 students. The response variable is the ability of the students to learn new sums and recall figures. The measurement of the response variable has too many confounding variables; the mathematical ability of the student, their age, the time of day of the assessment, the thickness of their skulls, their ability to conduct electricity, the time they last ate food, the difficulty of the mathematical exercise.

**Question 2**

This appears to be an experiment as the researchers gave the treatment: a light electrical current through the brain to half the group of 51 students and did not apply the treatment to the other half of the students. This means that there was a treatment and control group of participants. The students were observed over a short period of time (five 45 minute sessions) which means that this situation was not an observational study. Because this is an experiment, a causal relationship can be claimed, however this was an extremely small survey (51 students) and fraught with ethical issues for the claims should be made with care.

**Question 3**

Although the study can be deemed to be an experiment, the size of the study is small (n = 51) and the ethics of the study can be deemed to be questionable the claims that ‘zapping’ the brain to improve mathematical ability are tenuous at best. However, the causal claims can be held as there was a treatment and control group and study was conducted by a prestigious University (Oxford University's department of experimental psychology) and published in a reputable magazine, Current Biology.

**Question 4**

The age of the student was never mentioned however to participate in a survey of this kind the students would have to give their consent. Therefore it can be assumed the students are old enough to potentially have lifestyle factors which could influence the response variables and be confounding variables such as; lack of sleep, smoking, drinking alcohol, eating unhealthily, peer pressure to not perform well at school.

As well there are the intrinsic mathematical abilities of students which are very difficult to assess. The researcher stated they were interested in people with low numeracy and possibly dyscalculia which would put the target group as having low mathematical abilities to begin with. Measuring the differences in their mathematical skills will be difficult as there are many different types of skills required to do mathematics, not only times tables and faster calculations.