DISCOVERING STATISTICS

Discovering Statistics: Portfolio Assignment 1

Learning Outcomes

This assignment tests the following:

- Your ability to explain a statistical procedure of your choice.

- Your ability to identify statistical procedures used in real published research.

- Your ability to invent a research scenario requiring analysis with the test of your choice.

Your Task

→ For this assignment I want you to write an 'advert', magazine 'feature', story, song, poem video, or whatever you like about a statistical concept/test that we have covered at some point on *Discovering Statistics*. You have a complete free reign to present the assignment however you want: in the past we've had fairy tales, songs and poems. Maybe one day someone will do a small movie and post it on YouTube? You do not have to do anything as wacky or creative as a musical or some form of expressive dance, we equally welcome you writing the assignment more formally in the style of a dictionary/encyclopaedia entry or a review (like a book review but for a statistical test).

→ Whatever you chose to do, you must explain something about the aspect of statistics that you have chosen. Within your assignment (advert/feature/review/ballet/concept album) you should include:

  o Information about what the concept/test is.

  o Information about what it is all about or how it is done (but not using equations, just a brief conceptual explanation of what is going on).

  o 1 actual research example where the concept is relevant or if it's a test, where the test has been used (this example must be cited and referenced). I don't want a massive explanation of the research, just a couple of sentences saying what was being researched and why the statistical concept is relevant or how the test was used.

  o 1 made up example of how the procedure could be applied. As with the real example, I don't want masses of detail, just briefly describe a scenario in which the statistical procedure could be applied. You can be as flippant or as serious as you like with your example.

→ Which procedure should I choose?

  o Choose anything we have covered on *Discovering Statistics*.

  o You CANNOT choose something from Research Skills in Psychology (so, Chi-square, *t*-tests, Mann-Whitney etc. are **not** acceptable). If something has been covered on both *Discovering Statistics* and Research Skills in Psychology (for example histograms) then feel free to choose it. The exception to this rule is *t*-tests which you are forbidden from doing because I've done an example advert for the *t*-test to give you an idea of what to do – and I don't want people copying it!

  o You can choose something quite general (e.g. ANOVA, Regression etc.), or something quite specific (e.g. Levene's test, Mauchley's test, a post hoc test, Kolmogorov-Smirnov test, Greenhouse-Geisser correction, Sphericity, homoscedasticity, collinearity etc.).

→ Your assignment should be about 500 words (certainly no more than 750).

→ Style

  o This assignment is supposed to get you thinking about how the test/concept you chose is done and applied, but I also want it to be fun. You can use pictures, audio, video or whatever. You can write in a formal or informal style. I'm perfectly happy for people to be flippant and do whatever they want

to keep themselves amused (provided it is not obviously going to offend someone who might have to mark it). So, be creative, express yourself and try to have a bit of fun with it.

→ How will the assignment be assessed?

    o Mainly I want to see whether you are able to explain a statistical concept or procedure at a conceptual level, describe how it has been applied in a real piece of research and think up a scenario in which it could be used to analyse the data. These are the main points on which you will be assessed (i.e., the technical accuracy of what you say about the test that you choose).

    o Obviously though, it cannot hurt to enter into the spirit of the task and those showing innovation and creativity in how they explain things will get credit for doing so provided what they write is factually accurate.

How to get good marks

→ There is an example below to guide you about what we're looking for.

→ There is annotated example on the course website of previous years' student who got 95% on this assignment. This should give you a very clear idea of what we are looking for – if she could get 95%, so can you☺.

Example

I suspect this task is quite different to anything you might have done before and to help you get some ideas about what you could do on the next couple of pages I have included my own version of an advert/feature for the *t-test*. Following this example, there is an annotated version of the same example which points out how I've included all of the features that are required for this assignment. I hope this will clarify what I'm expecting.

✓ It is not obligatory to be flippant, if you prefer to do it as a serious feature then that's fine – as I mentioned earlier, you could do a review or dictionary entry instead.

✓ The example here is not supposed to be a template. As far as I'm concerned you have the freedom to do whatever you like given the remit of the assignment and the information you have about how it will be assessed. Use your imagination.

Statistics Headache?

Have some T and Biscuits!

Need to compare some means? Think your means are different but are not sure whether the difference is simply due to sampling variation? Do members of the opposite sex run screaming at the sight of you? Thousands of people have turned to the *t-test* from Gossett Inc. to solve their statistical headaches, relieve their stress and make them more attractive to the opposite sex[1]. Before the *t*-test there was uncertainty, but after it came illumination. Developed by William Gossett while working for the Guinness brewing company, the *t*-test has become the test of choice in the social sciences for comparing two means. By comparing the difference between two sample means with the sampling variation (standard error of those differences) the *t*-test allows researchers to ascertain whether the observed differences are likely to be due to sampling variation, or reflect a real difference. *T-test Standard®* comes in two forms to serve all of your experimental needs: the *related t-test®* can be used when data have been collected on the same participants, whereas the *independent t-test®* can be used when samples contain different entities.

Satisfied Customers

Since Gossett developed the test, the *t*-test has been used by thousands of researchers to test differences between means. Here are just a few of their endorsements.

"Without the **related t-test** I could not have analyzed the difference between reaction times for compatible and incompatible trials in an Implicit Association Task (Greenwald et al., 1988). Indirectly, this test established my reputation as a leading psychologist, bringing with it fame, fortune, and wealth beyond my wildest dreams. Without the **t-test** I'm sure I would have become a smelly tramp, living off of rotting fish carcasses and injecting heroin into my eyeballs" Prof. R. Sole.

"I used the **t-test** to establish that eating baked beans makes you fart. By counting the number of times people broke wind after eating baked beans compared to after they had drunk water, I was able to conclusively prove that beans increase bowel gas. Without this test I would have had no choice but to use confidence intervals to establish whether my experiment had worked. Confidence intervals are quite complicated in repeated measures designs, and frankly I'm a bit stupid, but I do know how to look for a *p*-value. Consequently, the *t*-test was ideal: I could test my hypothesis without really knowing what I was doing and even with my peanut brain I was subsequently able to win the Nobel prize." Prof. N. O. Brain.

"Without the *t*-test I would be a crack-whore by now. Of that I am certain. At my lowest ebb, the *t*-test came along like a particularly shiny knight (or possibly a tin man) and allowed me to demonstrate that there really is no place like home. The wicked witch defeated, I threw my crack pipe to the floor, clicked my red leather heels together and found it was all just a dream" Prof. J. Garland.

New t-test Professional

For those with more complex needs than provided by *T-test standard®*, Gossett Inc. are proud to announce *t-test professional®*. The **T-test** can also be used to test things other than differences between means. With *t*-test

---

[1] Beardy-Weardy, I. (2002). How the t-test helped me to find a wife. *Annals of Statisticians' Social Lives, 34,* 345-355.

professional you can harness the true Thor-like power of the t-statistic. Amaze your friends, impress your tutor, watch people spontaneously buy you drinks and ask for your phone number, and feel a pleasant tingling in your groin area as you use *t-test professional®* to:

- ✓ Test whether beta-coefficients in regression differ from zero.
- ✓ Test whether a correlation coefficient is different from zero.
- ✓ Test differences between multiple pairs of means using the amazing Bonferroni and Tukey procedures too.
- ✓ Easily convert to an effect size such as *r* or *d*.

Buy it NOW!!!

Reference

Greenwald, A. G., McGhee, D. E., & Schwartz, J. L. K. (1998). Measuring individual differences in implicit cognition: The implicit association test. *Journal of Personality and Social Psychology*, *74*, 1464–1480.

DISCOVERING STATISTICS

Statistics Headache?

Have some T and Biscuits!

Need to compare some means? Think your means are different but are not sure whether the difference is simply due to sampling variation? Do members of the opposite sex run screaming at the sight of you? Thousands of people have turned to the *t-test* from Gossett Inc. to solve their statistical headaches, relieve their stress and make them more attractive to the opposite sex[1]. Before the *t*-test there was uncertainty, but after it came illumination. Developed by William Gossett while working for the Guinness brewing company, the *t*-test has become the test of choice in the social sciences for comparing two means. By comparing the difference between two sample means with the sampling variation (standard error of those differences) the *t*-test allows researchers to ascertain whether the observed differences are likely to be due to sampling variation, or reflect a real difference. *T-test Standard®* comes in two forms to serve all of your experimental needs: the *related t-test®* can be used when data have been collected on the same participants, can be used when samples contain different entities.

Satisfied Customers

Since Gossett developed the test, the *t*-test has been used by thousands of researchers to test differences between means. Here are just a few of their endorsements.

"Without the **related t-test** I could not have analyzed the difference between reaction times for compatible and incompatible trials in an Implicit Association Task (Greenwald et al., 1988). Indirectly, this test established my reputation as a leading psychologist, bringing with it fame, fortune, and wealth beyond my wildest dreams. Without the **t-test** I'm sure I would have become a smelly tramp, living off of rotting fish carcasses and injecting heroin into my eyeballs" Prof. R. Sole.

"I used the **t-test** to establish that eating baked beans makes you fart. By counting the number of times people broke wind after eating baked beans compared to after they had drunk water, I was able to conclusively beans increase bowel gas. Without this test I would have had no ch use confidence intervals to establish whether my experiment ha Confidence intervals are quite complicated in repeated measures frankly I'm a bit stupid, but I do know how to look for a *p*-value. Co my hypothesis without really kno nut brain I was subsequently able

This section has some factual information about what the *t*-test does, the different types of *t*-test and some history behind it (i.e. who invented it).

A brief conceptual explanation of the *t*-test.

This quote includes an actual research example of when the *t*-test was used and how it was used. I've spiced up the quote a bit, and changed the name so I didn't get sued, but otherwise it describes a real experiment (Greenwald et al.) where a *t*-test was used.

This section contains a hypothetical experiment that someone has done using a *t*-test.

[1] Beardy-Weardy, I. (2002). How the t-test helped me to find a wife. *Annals of Statisticians' Social Lives, 34,* 345-355.
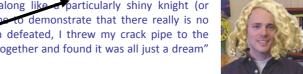
© Prof. Andy Field, 2012   *www.discoveringstatistics.com*   Page 3

DISCOVERING STATISTICS

"Without the *t*-test I would be a crack-whore by now. Of that I am certain. At my lowest ebb, the *t*-test came along like a particularly shiny knight (or possibly a tin man) and allowed me to demonstrate that there really is no [...] defeated, I threw my crack pipe to the [...] together and found it was all just a dream"

> This section is just bloody nonsense, but you are free to express yourself☺

New t-test Professional

For those with more complex needs than provided by *T-test standard®*, Gossett Inc. are proud to announce *t-test professional®*. The **T-test** can also be used to test things other than differences between means. With *t*-test professional you can harness the true Thor-like power of the t-statistic. Amaze your friends, impress your tutor, watch people spontaneously buy you drinks and ask for your phone number, and feel a pleasant tingling in your groin area as you use *t-test professional®* to:

- ✓ Test whether beta-coefficients in regression differ from zero.
- ✓ Test whether a correlation coefficient is different from zero.
- ✓ Test differences between multiple pairs of means procedures too.
- ✓ Easily convert to an effect size such as *r* or *d*.

Buy it NOW!!!

> Finally, we round off with some more statistical details about what you can do with a *t*-test.

Reference

Greenwald, A. G., McGhee, D. E., & Schwartz, J. L. K. (1998). Measuring individual differences in implicit cognition: The implicit association test. *Journal of Personality and Social Psychology*, *74*, 1464–1480.

> Remember to include a reference for the 'real' study that you have described.