Using SPSS to Obtain a Confidence Interval for Cohen's δ

You need to obtain the noncentral *t* SPSS scripts from Michael. J. Smithson's Noncentral Confidence Interval Page. For the convenience of my students, I have included these in CI-d.zip, along with this document. I have done some editing of Smithson's scripts to make them easier for my students to use.

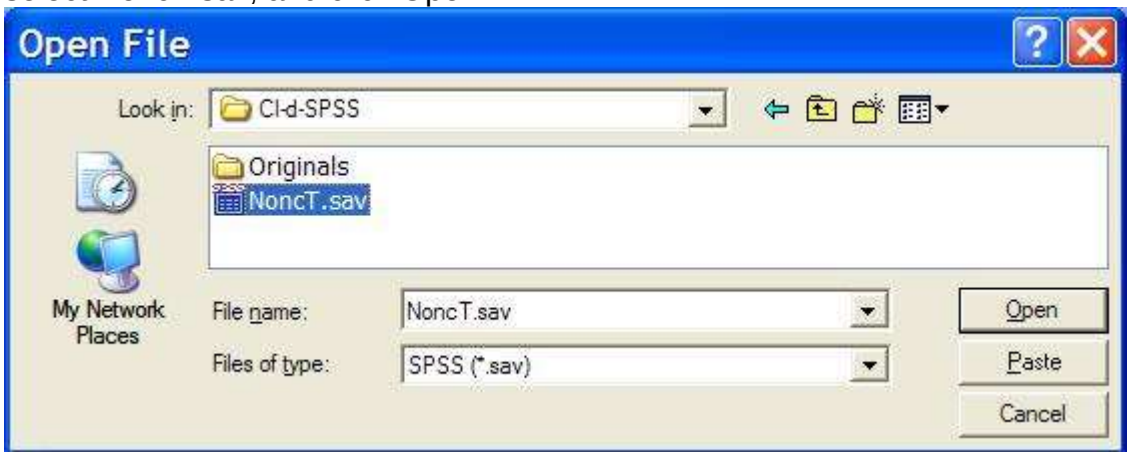
If you have not already done so, download the following files from my SPSS Programs Page:

- NoncT.sav
- T-d-1sample.sps
- T-d-2samples.sps

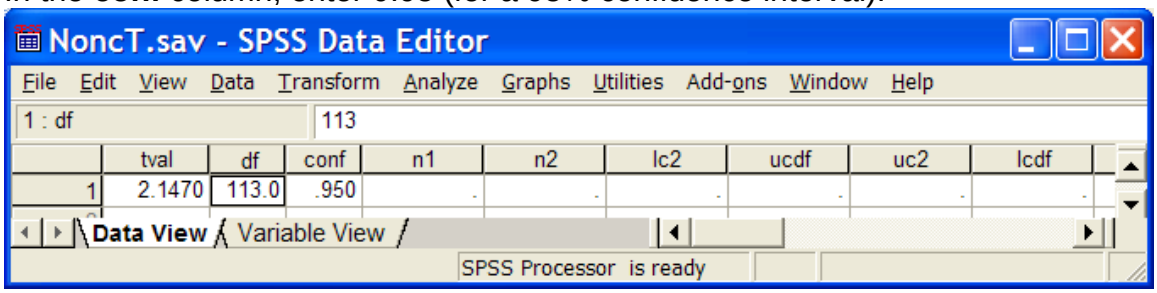
One-Sample *T*

You have conducted a one-sample *t* test and you want to report a confidence interval for Cohen's δ, the standardized difference between the true population mean and the hypothesized population mean. For example, I have found that the mean math SAT for those students who took undergraduate statistics from me between 2000 and 2004 is 534.78. For that same period the national norm is 516. A *t* test yields $t(113) = 2.147$, $p = .034$, $d = .2$.

- Open the **NoncT.sav** file – Double click on the file name or open SPSS and then click File, Open, select NoncT.sav, and click Open.

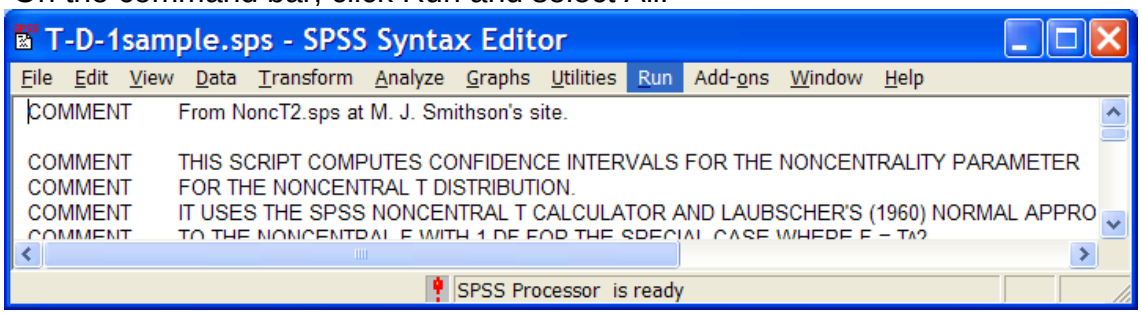


- You should see a one-row data sheet with 13 variables.
- In the column for **tval**, enter the obtained *t* value, 2.147. See the warning below.
- In the ***df*** column, enter the degrees of freedom, 113.
- In the **conf** column, enter 0.95 (for a 95% confidence interval).

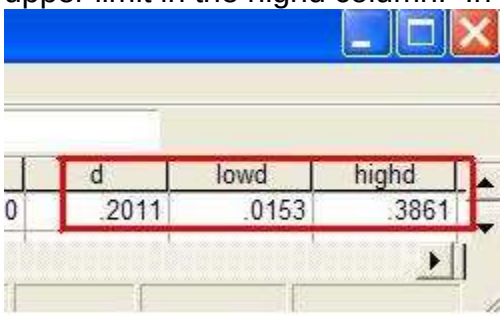


- Open the **T-D-1sample.sps** syntax file by double-clicking on it. If this does not work, then click file, open, syntax, then select that file and click Open.

- On the command bar, click Run and select All.



- Look back at **Nonct.sav**. The lower limit of the confidence interval is in the lowd column and the upper limit in the highd column. In the *d* column is the point estimate of δ.

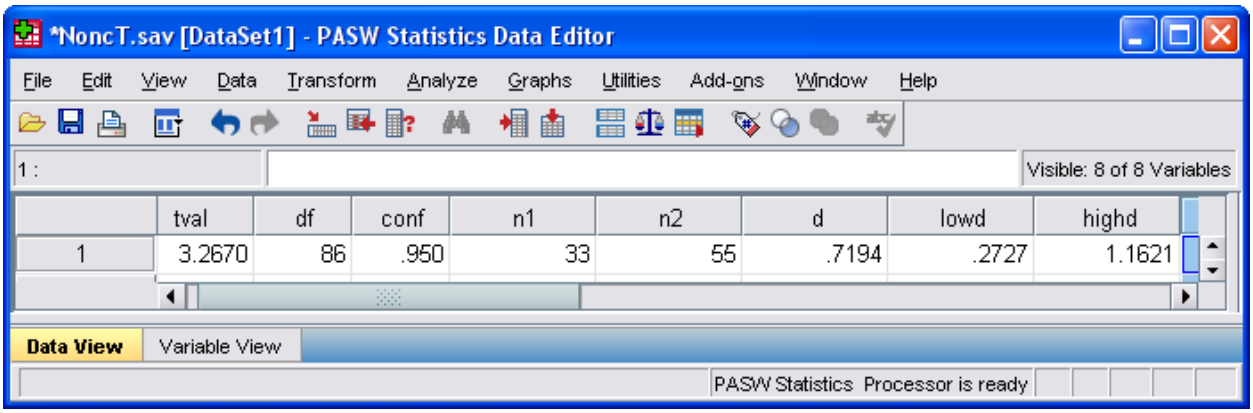


Two-Sample Independent *T*

You have conducted a two independent samples *t* test and you want to report a confidence interval for Cohen's *d*, the standardized difference between the two population means. For example, I have compared grade point averages of boys girls and found that girls' GPA (M = 2.82, SD = .83, N = 33) was significantly higher than boys' GPA (M = 2.24, SD = .81, N = 55), $t(65.9) = 3.24$, $p = .002$, d = .72, 95% CI [.27, 1.16]. Note that I have employed a separate variances *t* but that I have used the pooled *t* and *df* when estimating δ and the confidence interval about δ. Why? See Confidence Intervals, Pooled and Separate Variances T.

- Open the **NoncT.sav** syntax file. You see a one-row data sheet with 13 variables.
- In the column for **tval**, enter the obtained *t* value, 3.267. See the warning below.
- In the ***df*** column, enter the degrees of freedom, 86.
- In the **conf** column, enter 0.95 (for a 95% confidence interval).
- In the ***n1*** column, enter 33.
- In the ***n2*** column, enter 55.
- Open the **T-D-2sample.sps** syntax file.

- On the command bar, click Run and select All.
- Look back at **Nonct.sav**. The lower limit of the confidence interval is in the **lowd** column and the upper limit in the **highd** column. In the **d** column is the point estimate of *d.*

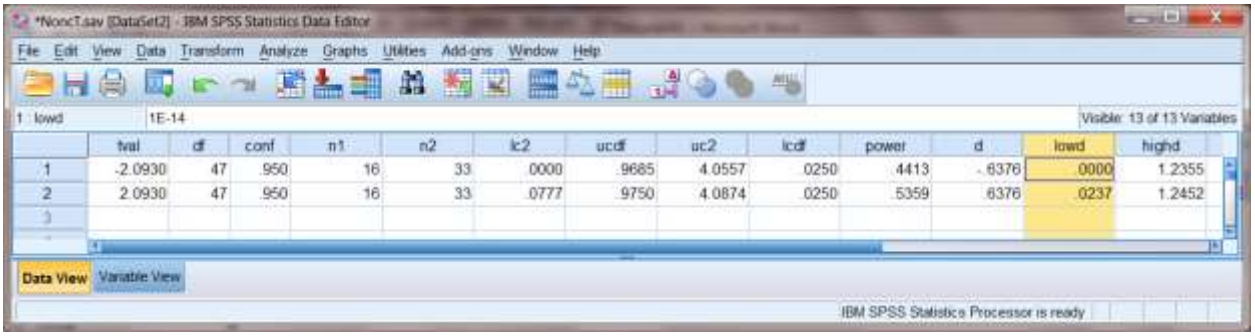


Want to learn more?

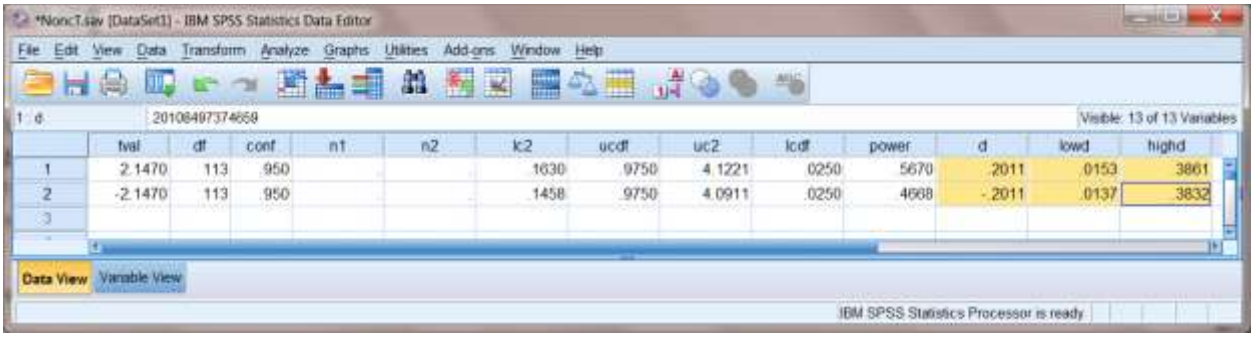
- Read Smithson's workshop document.
- Student's *t*: More on confidence intervals and related topics.

WARNING

In June of 2012 I noticed something funny – when my students entered a negative value of *t*, the script produced an incorrect lower boundary to the confidence interval. I never saw this problem earlier, so I infer that it is due to some change in the latest release of SPSS (19). I have confirmed that the computation is done correctly if the *t* is entered as positive. If you obtain a negative value for *t*, simply drop the negative sign when you enter it into Nonct.sav.



Then I found a similar problem with the one-sample script. When a negative *t* was entered, both ends of the confidence interval were incorrectly computed.



If you have access to SAS, my recommendation is that you use SAS rather than SPSS to construct confidence intervals. That said, one advantage of the SPSS solution is that it can compute *d* and the confidence intervals for more than one test in a single invocation.

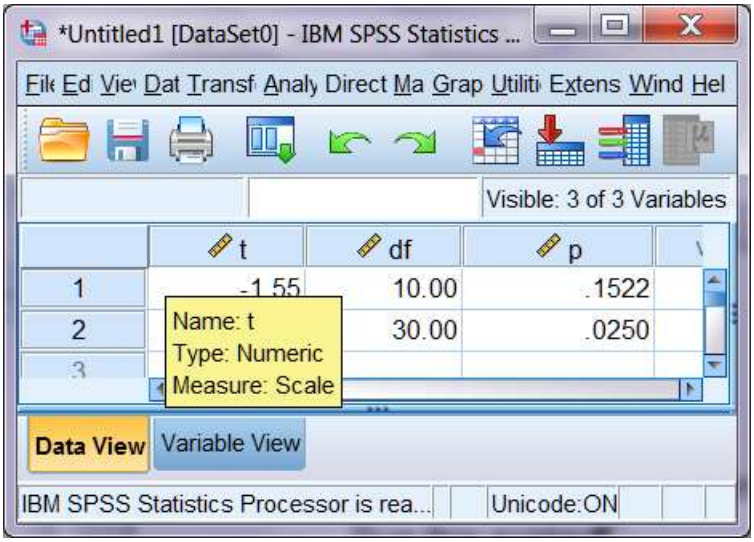
t(*df*) to *p, d,* & CI for multiple values

For each case, enter in the datasheet value of *t* and *df*.

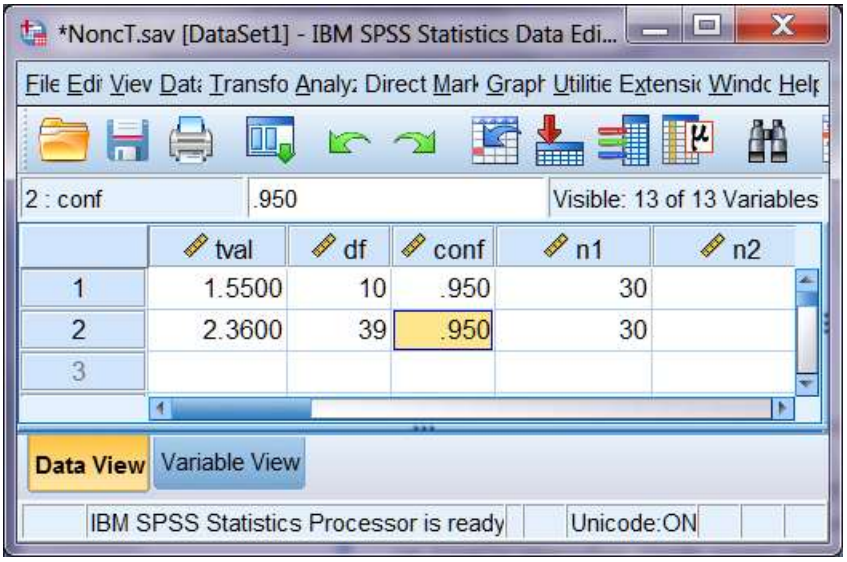
Run this syntax

```
COMPUTE p=2*CDF.T(t,df).
EXECUTE.
```

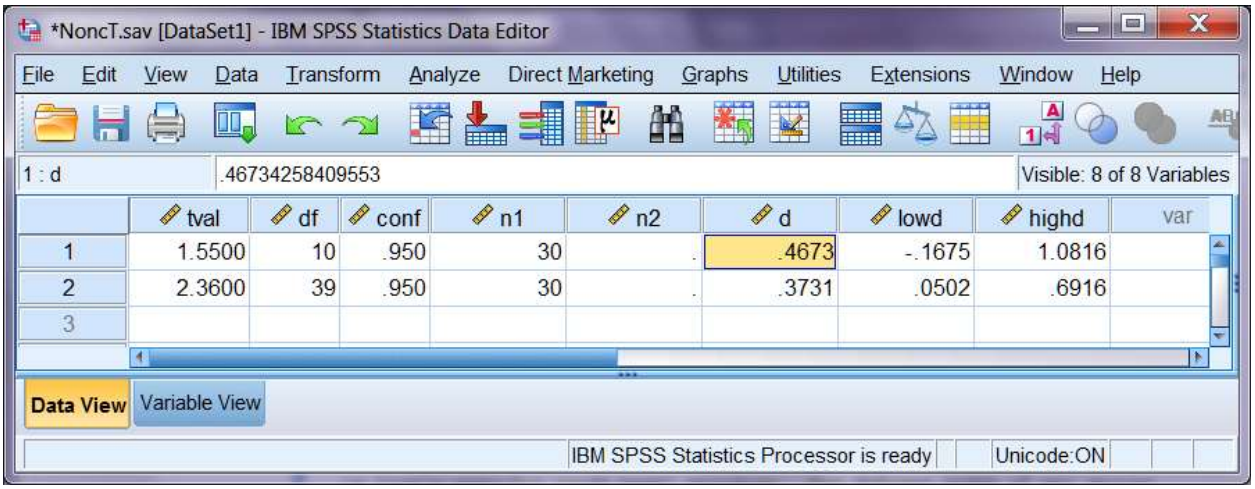
Go back to the datasheet:



So what should *d* and *C*I be given these values of *t* and *df (and N)*. See CI-d-SPSS.zip



Run the syntax file, t-D-1sample.sps



Wuensch, K. L. (2012). *Using SPSS to obtain a confidence interval for Cohen's d*. http://core.ecu.edu/psyc/wuenschk/SPSS/CI-d-SPSS.pdf .