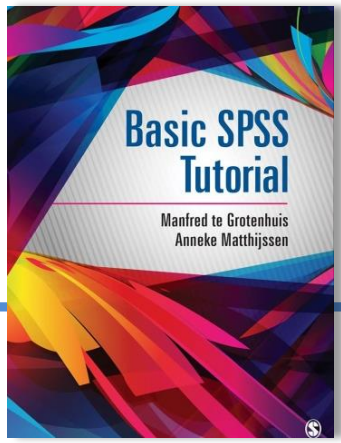
Basic SPSS Tutorial: chapter 5 Inferential Statistics, extra assignments



This is a first set of extra assignments (1-5) related to inferential statistics in *Basic SPSS Tutorial*. All computer related operations are placed in a blue-shaded box with the 💻 symbol. References to Basic SPSS Tutorial are indicated with BST.

The questions 1-6 are about the t-test for a mean. People may differ profoundly in their political orientation: from extreme right-wing to extreme left-wing. To measure this orientation social scientists typically use a set of questions or items that all relate to aspects of political orientation. One example is the item (or statement) that 'differences in income should be decreased by governmental intervention'. It is customary to use a restricted set of answers to such statement like: 'disagree strongly' (code 1), 'disagree' (2), 'neither agree nor disagree' (3), agree (4) and strongly agree (5). When many (at least 2) of these items are used, the answers mostly are summed into one variable (called a Likert scale (http://en.wikipedia.org/wiki/Likert_scale)). This new scale is in most cases a more reliable measurement compared to all items separately. Suppose we sum the answers (or responses) to five items with the disagree-agree order we described above. The highest possible score then is 25 (5 times strongly agree (code 5)). The lowest possible is 5 (5 times disagree strongly (code 1)). In the example below the highest possible score of 25 represents left-wing and 5 is right-wing. We assume that in the Netherlands (West-Europe) the average political orientation is 13.5. In the questions below it will be tested whether the mean for democrats in the Netherlands is larger (more left-wing) than this mean. Note that we test a directional hypothesis here.

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Download the data set DEMOCRATS.SAV from: http://study.sagepub.com/basicspss.
Start SPSS and open DEMOCRATS.SAV (BST: section 2.2).
Open also a text file in the program Word or any other word processor where you store your answers to the questions below.

1. What is the mean, the standard deviation and the standard error (SE mean) for the variable Polorientation (it measures current political orientation (5= right-wing ….. 25= left-wing). Suggestion: to answer this question you may use a frequency table with the requested statistics (see BST: section 4.2).

On the basis of the mean and standard error you found, it is possible to calculate how many standard errors lie between the observed mean and the mean of 13.5

2. How many standard errors lie between the observed sample mean and the assumed mean of 13.5? The value you calculated is called a *t*-value. The only thing you have to do is find out whether this *t*-value is an outcome you might expect when in the population the mean is 13.5. For this, one may use a application on the internet: http://danielsoper.com/statcalc3/calc.aspx?id=41. Just type the number of observations – 1 (here: 355 – 1 = 354) and the t-value you found (should be a positive number). What you will get is a number very near to 1. This gives you the probability that you will find sample means of 13.91 or lower when in the population the mean is actually 13.5. Because we hypothesized the mean political orientation to be higher than 13.5, we are interested in the opposite: what are the chances to find 13.91 OR HIGHER if 13.5 is the true mean. This probability is rather low. How low is it?

Of course researchers do not have to compute standard error, t-values, and probabilities. Statistical software packages, like SPSS can do this very easily.

Test whether the sample mean of the variable *Polorientation* is significantly higher than 13.5. See BST: section 5.4

The probability that SPSS gives you is from a two-tailed test, i.e., the probability that the population mean is 13.9155 or higher AND the probability that the population mean is 13.0845 (calculation: 13.5 – (13.9155 – 13.5)) or lower. We have a directional hypothesis (mean was supposed to be higher than 13.5) so as a consequence we need only half of the probability (see BST: top of p. 81).

3. Calculate the correct p-value and verify that it is virtually equal to the probability you calculated in question 2.

4. What is the outcome of this test? Is the null hypothesis rejected and the research hypothesis corroborated or not? You may use a level of significance (α) of 0.05 (see BST: top of p. 77). Please explain how you reached to your answer.

The last question relates to a statistical test on the mean difference between two dependent (or paired) groups. The research question is whether democrats were more orientated to the political left in their pre-adult years (around 15-18 years) compared to their current political standpoints. In the data set we included the variable *Polyouth* which holds the scores on political orientation around the age of 15-18.[1] When the idea is correct that people tend to shift from left to right in their political orientation as they grow older, the mean difference between the variables *Polyouth* and *Polorientation* will be positive.

Check whether this indeed is the case (see BTS: section 5.5.2) and if yes, test whether this positive difference is significantly larger than 0. Note: this is a directional hypothesis so use a one sided test.

5. What is the outcome of this test? Is the null hypothesis rejected and the research hypothesis corroborated or not? Please explain how you reached your answer.

Note 1:
It is open for debate whether people can recollect from their memory what their exact political attitude was when they were around 18 years old. It might be true that they tend to give an answer that is socially desirable (namely a more 'leftist' attitude). In fact we do not know because the question was not even part of the survey! We took the liberty to simulate the data (the only time we did so!) For this simulation we used the following statement: **"**If you are young and not liberal, then you have no heart**;** but if you are old and not conservative, then you have no brain". This statement has been attributed to the English statesman Winston Churchill and seems to be confirmed in Liberal Hearts, Conservative Brains. See: http://home.comcast.net/~ronlipsman/synopsis.html.