

PubH 5450 Homework 9 Due Nov. 29

Exercises from the text: 7.4 a-d, 7.17, 7.18.

Computer exercises

First copy the files `autExp.dat` and `hw09f01.sas` into your account from my account.

The file `autExp.dat` has (fictitious) data on children with autism spectral disorders (i.e. autism). This is a rather poorly understood illness. Those who suffer from it have extreme difficulties with social interaction. The only treatments which seem to have any impact on the illness are intensive social therapies. These are expensive treatments since a trained therapist must work one on one with the patient several hours a week (this treatment is referred to as applied behavior analysis, or ABA). Due to the high cost of the only effective treatment, alternatives are desired. One alternative is to have the children watch certain carefully designed training videos, and have the parents supplement the content of the videos with additional training. The data we have has measurements on the number of appropriate responses to social situations out of 14 trials. We record these measurements before the 6 week training period using the videos and after. One complicating factor is some children received ABA treatment while enrolled in the study. Since such treatment is likely to affect the outcome, we record for each subject if they received ABA during the experiment.

The data file `autExp.dat` has 3 columns of 20 numbers, so we have a row for each of the 20 subjects. The first column represents if the subject received ABA during the experiment (0 if not and 1 if yes). The next column has the pre-treatment measurements and the last the post-treatment measurements.

The SAS command file examines the univariate distribution of ABA and the change from baseline. Then it examines the distribution of change from baseline within ABA status. Finally, it conducts a test of the hypothesis that the change from baseline is zero, first ignoring ABA status, then within ABA status.

Questions

1. What percentage of the sample received ABA?
2. What two statistics reported by `proc univariate` give a quick idea of the symmetry of the distribution of change from baseline?
3. Does it appear that change from baseline is roughly symmetrically distributed? How about within ABA status? Explain your answer.
4. What is the p -value for the test of no change from baseline ignoring ABA status? Can we reject the null hypothesis of no difference with $\alpha = 0.05$?
5. Looking at the output you used to answer 4, show how the T statistic is calculated, and verify that the p -value seems correct. Does SAS conduct a one or two sided test? Explain your answer.
6. Repeat question 4 but within ABA status.
7. How do you reconcile the results from question 4 and question 6?

without SAS

8. Ignoring ABA status, how many subjects had a positive change from baseline? What is the probability that we would observe this many or more subjects with positive changes from baseline if the treatment did not do anything and the patients did not get any better over the 6 week study period.
The probability you find is the p -value for a test called the *sign test*. This is an alternative to the t -test which doesn't require the assumption that the measurements are normally distributed.
9. An autism researcher looks at these results and says, "Some kids just outgrow autism without any training, so I am not so convinced by your findings." Design an experiment to test the effectiveness of this training method which is not vulnerable to this criticism.