Power based analysis in the hypnotic condition versus resting state eyes closed

Jaime Gomez-Ramirez*[1] and [2]

[1] *The Hospital for Sick Children, Department of Neuroscience and Mental Health, University of Toronto, Bay St. 686, Toronto, (Canada)*
[2]

Abstract

1 Introduction

2 Methods

2.1 Tests of significance

For a set of p variables $\{X_1...X_p\}$ obtained by measurements over a set of n individuals, if the individuals (patients) belong to two different groups, in our case, high and low hypnotizability, a question of interest is whether the mean of some variable is the same for either of the two groups. Thus, we have now two samples, n_1 and n_2 for the high and low hyponotizability patients respectively, the question is whether the two samples are significantly different in the sense that the observed mean difference is so large that is unlikely that to have occurred if the population means are equal (t-test). A test to detect the to sample means (for groups H and L) involves calculating the t-statistic.This test is very robust if the variable is normally distributed and for sample sizes sufficiently big (e.g. 20) (note that the test is particularly robust if the samples have equal or very similar size (**?**),(**?**) ,

*Corresponding author jaime.gomez-ramirez@sickkids.ca

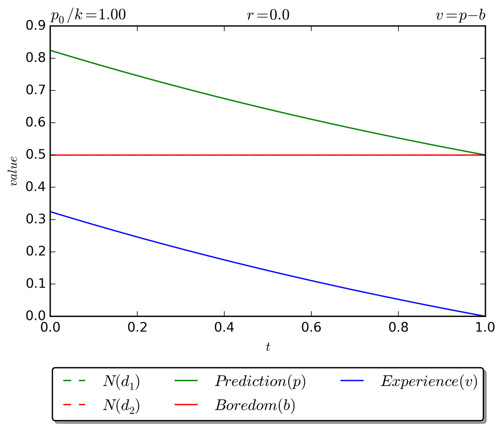
this is not our case, so caveat t-test). The t-test can be done for each of the p variables $\{X_1...X_n\}$ or measurements and decide which of these variables have different mean values for the 2 groups (samples).

2.1.1 Tests of significance

Here we address the question of whether there is any difference between the H and the L hypnotizability patients with respect to the mean values of variables (power correlation of each electrode with the other electrodes). Since the patients (samples) have a different number of variables or measurements (electrodes) we need to take a subset of samples that share those measurements. (bi temporal, monto temporal or hippocampal). Let us assume that patients 1 and 2 are H and patients 3 to 10 are L. The variables are $\{X_1...X_p\}$ which are the electrodes that the 10 patients have in common. For each variable x (e.g. LHD1) , we calculate the mean for each group (x_H) and (x_L) and the sample variances s_H^2 and s_L^2. The pool variance is $s^2 = ((n_H - 1)s_H^2 + (n_L - 1)s_L^2)/(n_H + n_L - 1)$ and the t-statistic is $t = ((x_H) - (x_L))/\sqrt{(}s^2(n_H^{-1} + n_L^{-1}))$, if the t statistics is not significantly different from 0 there is no justification to separate the population in those two groups for that variable.

More interesting is to study whether all the variables taken together justify splitting the population (the n patients) in two sample groups (high and low). To that end we needa multivariate test, e.g. Hotelling's T^2-test which is the square of the t-test. In general there will be p variables $\{X_1...X_n\}$ two samples of n_1 and n_2 elements with two sample mean vectors $(x) = (x_1)...(x_p)$ and two sampe covariance matrixes C_1 and C_2. A large Hotelling's T^2-test means that the two population mean vectors are different.

3 Results



(a)

Figure 1: .