1 Program 3dTSgen

1.1 Purpose

Program 3dTSgen provides a means of generating artificial time series data, and storing such data into an *AFNI* 3d+time dataset. The time series data is generated using the operator specified signal and noise models. Such artificial time series data is useful in several ways:

1) Testing of statistical analysis programs for significance of the results. Artificial time series can be generated corresponding to the null hypothesis under consideration. Then, when input to a statistical analysis program, one can determine how often a false positive occurs; i.e., the probability of rejecting the null hypothesis, when it is, in fact, true.

2) Calculation of the statistical power of a test. Artificial time series can be generated corresponding to the alternative hypothesis under consideration. Then, when input to a statistical analysis program, one can determine how often the signal is detected; i.e., the probability of rejecting the null hypothesis, when it is, in fact, false. This enables one to estimate the power of the test.

3) Design of experiments. Various parameters of an experiment are under the researcher's control. Program 3dTSgen can be used to determine the importance of the parameters. For example, the researcher may wish to change the length of the time series data. Using previous experience to specify the signal and noise models, the researcher could use program 3dTSgen to determine the effect of time series length upon the statistical power of the test.

1.2 Further Details

For further details, see Section 3 of *Nonlinear Regression Analysis of FMRI Time Series Data*, contained in file 3dNLfim.ps.