**Abstract**

Complex systems exhibiting rapid regime shifts have been observed in many different fields like economics, medicine, ecology and geology. Some demonstrate early warning signals, or predictors, of incoming transition. Epileptic brain is often used as an example of such system, however very little proof of this claim is given. This thesis presents results of systematic research on this topic. By an analysis of mathematical model of seizures, investigation of EEG recording of epileptic rats, and a study of over 300 EEG recordings of seizures from human subjects we aim at answering the question whether epilepsy seizures exhibit early warning signals, thus showing that epileptic transition can be described using critical transition theory. Because of the large number of examined signals a novel, automatic method of analysis is devised. Three predictors commonly discovered in other fields, are investigated: variance, lag-1 autoregressive coefficient (AR(1)), and skewness. In the case of theoretical model and signals from rats, there is a strong indication of existence of early warning signals. About 23% of rat signals display expected behavior in all three predictors at the same time, while 65% showed agreement with the the theory with respect to AR(1) coefficient and variance increasing simultaneously. In human subjects only 8% of subjects showed statistically significant increase in variance and AR(1) coefficients and no patient exhibited changes in all three preditors consistently. The discrepancies between theoretical and animal models, and human data indicate that complexity may be a fundamental issue in transferring theoretical concepts to complex systems such as human brain.