

ACOUSTICAL COMPLEXITY DEPENDENT RESPONSE OF PLANTS AND ANIMALS TO AUDIBLE SOUND STIMULI - A QUANTITATIVE CHAOS BASED ASSESSMENT

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SYNOPSIS

In this thesis a study on effect of music stimuli on seed germination, plant growth and also effect of music stimuli on animal growth taking fish samples is presented. This study is an exhaustive one and assessment of dependence of growth on nature of music is the ultimate objective, in the perspective of acoustical complexity of music sample. This study is not available in literature till date.

In recent years complex systems have been studied in different domains of sciences including economics and also humanities studies in general. In this respect music is also a complex system which evokes emotion or some effect in human which is also a complex system. Several approaches have been documented by different scientists for tackling complex systems. In this context chaos and fractals play a dominant role. Many researchers are also interested in studying fractal properties of plants and animals. Last decades have witnessed exhaustive research on effect of music on human beings acoustically and from neuroscience standpoint utilizing chaos based quantitative parameters. The scenario of research on effect of music on plants and animals is still in its infancy. In the present investigation we have attempted to address the effects from a deeper scientific footing.

This study includes a comparison with random control design in each case. This study uses *Pisum sativum* (pea) and *Cicer arietinum* (chickpea or gram) as plant

samples and *Oreochromis niloticus* (Nile Tilapia) as animal sample. The types of music stimuli used are Indian Classical music, Natural music, Contemporary music and Epic Horror music.

The acoustical complexity of each type of music samples have been obtained using a standard nonlinear chaos based parameters using the methodology of fractal analysis namely Detrended Fluctuation Analysis.

In this study different music samples were used as stimuli to both *Pisum sativum* and *Cicer arietinum* seeds during the germination period. The number of sprouted seeds was counted every 12- hour intervals over 72 hour long runs because music stimulated seed samples were completely germinated. Germination kinetics was evaluated in terms of Germination Percentage and Mean Germination Time. In case of plants the morphological changes observed in terms of heights of the plants (resolution of 1 mm) after every 48 hours till 336 hours. Thereafter no significant phenotypic changes were seen in plant height. For Nile Tilapia individual fish length and weight was measured and blood cortisol level was also determined.

These data are new and interesting observations have been revealed towards understanding the relation between growth and complexity of music stimuli.