1047-62-15 **Amir H Assadi*** (ahassadi@wisc.edu), Department of Mathematics, 480 Lincoln Drive, Madison, WI 53706, **Hesam Torabi Dashti** (dashti@khayam.ut.ac.ir), Department of Computer Science, Tehran University, Tehran, Iran, and **Fatemeh Miri** (ipmars@yahoo.com), Department of Computer Science, Tehran University, Tehran, Iran. *Combinatorial Local-to-Global PCA and an Application to Statistical Analysis of the Human Auditory Evoked Response.* Preliminary report.

Humans are continually subject to diverse stimuli from their environment. The brain must process massive neuronal spike data distributed among local and large-scale neuronal networks, while avoiding waste of resources except for a small fraction of the "relevant stimuli". How is such a complex task performed? This article develops a combinatorial refinement of the senior author's earlier fMRI research to formulate a model for nonlinear feature extraction by the brain in auditory attention. Our model is illustrated using electrophysiology data from human patient brains with normal hearing. The data consists of the evoked response potentials collected by 8x8 intracranial sensor grids. The global features are extracted via combinatorial optimization of the nonlinear features "glued together" from local information, in turn computed by variants of PCA applied to subsets of data from topographically organized sensor channels. The biological prior knowledge is expressed as an information-theoretic heuristic argument for sparse coding, supported by numerous neurophysiology experiments. The outcome is a model for extraction of the dynamic brain patterns carrying significant information during auditory attention. (Received November 02, 2008)