

***Introduction to*** ***the*** ***Data Plasticity website***

The name given to this website, Data Plasticity, was motivated by a term found in Neuroscience, that being, Neuro-Plasticity. The goal of this website is to connect the two terms, data and neuro, through the bending of number. The connection will be made through exploiting coherency in transform. The basis for transform is communication identification, within a data stream, reflecting subtle underlying second order bending of first order observable patterns. The transform of choice is called Cepstrum which, appropriately enough, is a bending of the better known transform known as Spectrum.

The Cepstrum may be identified with Speech Processing where it is used to ‘couple’ the spacing between coherent harmonics in a (e.g., voice) signal’s Fourier Transform (Spectrum) into a single number. This ability to detect coupling is due to the voice’s glottal response, a particular feature in an individual’s idiolect.

This website will study this number from the point of view that an underlying neurological communication is bending this number through idiolect modulation based on what we call *intelligence protocol*. Specifically, in the context of neuroscience, the end result of this website is to exploit the bending of a Cepstrum based *intelligence protocol* through the concept of Striatal Beat Frequency (SBF) banks, although, we are not ready to grapple with SBF just yet.

However, we will demonstrate our process as it has so far evolved with examples taken from: a Voice, a Honey Bee, a binary linear recursive sequence, a Wasp, a computer communication, a clock arithmetic sequence, and an EKG, among others. The basis of this work comes from two ‘older guys’; Edward ‘Jim’ Cupples from the Air Force Research Lab Speech Processing Department in Rome, NY, and from Randall King from the RADAR Testing group at Avondale Shipyards in New Orleans. They are both retired, but not really.

As lagniappe, we will include two additional folders separate from the above content. The first addresses non-mainstream ways to bend number in the areas of multi-channel blind-deconvolution and associative memory matrices; the latter will describe a patent Pending based solution to optimizing LeCun’s convolutional neural network from image classification. These materials are the outcome of work performed with the Air Force Research Lab Information Directorate, DARPA, NRL, and my own undertakings with support from my wife, Denise.

The separate folder is devoted towards ‘bending a cross curriculum’ K-12 education where we have developed lesson plans whose topics include: the English language, i.e. predicate logic, old-school geometry with straight edge and compass, algebraic relationship building between number and letter, the coupling of geometry and algebra, and the ‘slicing’ of the cone. While the basic topics have been around for 100’s/1000’s of years, we think some of the classroom examples and projects offer an interesting twist. The aim is for Sixth grade +/- six grades, in a normally distributed cross-over fashion. These materials are the outcome from my work at The Louise S. McGehee School and Jesuit High School in New Orleans and from St. Amant High School in Gonzales, LA. The motivation for writing something like this comes from my tutoring experience and lessons learned from SUNY Potsdam. Tulane impressed the Algebra of Math on me, through Lazlo Fuchs. The University of New Orleans impressed upon me the Signal Processing of Physics and Engineering through the Ioup’s and Rong Li. SUNY Buffalo and LSU gave me time to think. But, Monroe Community College set a good example with Instrumentation Electronics; both analog and digital.

Incidentally, plasticity doesn’t exactly roll off the tongue, so think of it as Data-Plastic-I-T-Y with the pronunciation as Data Pla-stiss-city; even the word plasticity can bend beneficially.

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The information found in this website is based on (my) 20 years experience in real-time signal analysis, data extraction, transformation and algorithm development; 10 years at the technical level and 10 years at the research level; with an additional 10 years in teaching high school and college Mathematics. Topics include EDA visualizations of co-channel convolutional multipath adding in how it relates to Fourier transforms and high school algebra polynomials, connections between multi-layered neural networks and stabilized associative memory using singular value decomposition, exploitation of a not so random number generator using the spirograph game, along with wide applications of cepstral components applied to the EKG, Speech, and the buzz of a Honey Bee.