Frequency and Anticipation in Bio-Systems

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Abstract
Bio-systems need a computing function at many levels of biological activity. The problem is how does it work? It is proposed that frequency is the language of bio-computing activity and that these frequencies are coherent to the theoretical limit. Frequency has a duality with chemical structure and as an expression of energy level change it can provide a control function. All bio-systems are water based and can use the coherent properties of water to implement basic arithmetic operations and basic reversible logic gates. Strong anticipation is imbedded chemically in nucleotides, chemicals and their frequency signatures and water memory. Weak anticipation derives from a need for future chemicals and activities predicted from within a self-model.
Keywords Frequencies – Coherence - Water – Anticipation – Bio-Cybernetics

1 Introduction

The basic problem is to determine how bio-systems anticipate at each of the many levels of biological activity. Patterns of coherent frequencies have a syntax and are able to provide control functions on their own as well as being identifying labels for chemicals which only undergo bonding interactions at short range. Many operations involving frequencies work with frequency on an analog basis. The digital aspect of frequency appears as a consequence of coherence whereby a frequency becomes an entity within the limits of its bandwidth for purposes of cybernetic transformations. The basic concepts of cybernetics in respect of biological systems have been developed systematically by Ashby (1957). Nerve impulses have sufficient amplitude to operate logic gates and arithmetic operations and can modify the frequencies themselves. A bio-system needs to have knowledge of its "Past" fed into its "Present" and in Strong Anticipation to retain information this for future activities. In Weak Anticipation it must model a frequency pattern to represent its "Present" self and possible "Future" states as

summarised in Figure 1. The following Sections explain the language and syntax available for Anticipation in Bio-Systems.

2 Past State

A system comes from its "Past" state with embedded data and dynamic data in the form of coherent frequencies which are either stored in water memory or as the frequency signatures of the chemicals comprising the organism structure. Chemical structure represents embedded data and Strong Anticipation but, on-going dynamic chemical activity also feeds in as Weak Anticipation.

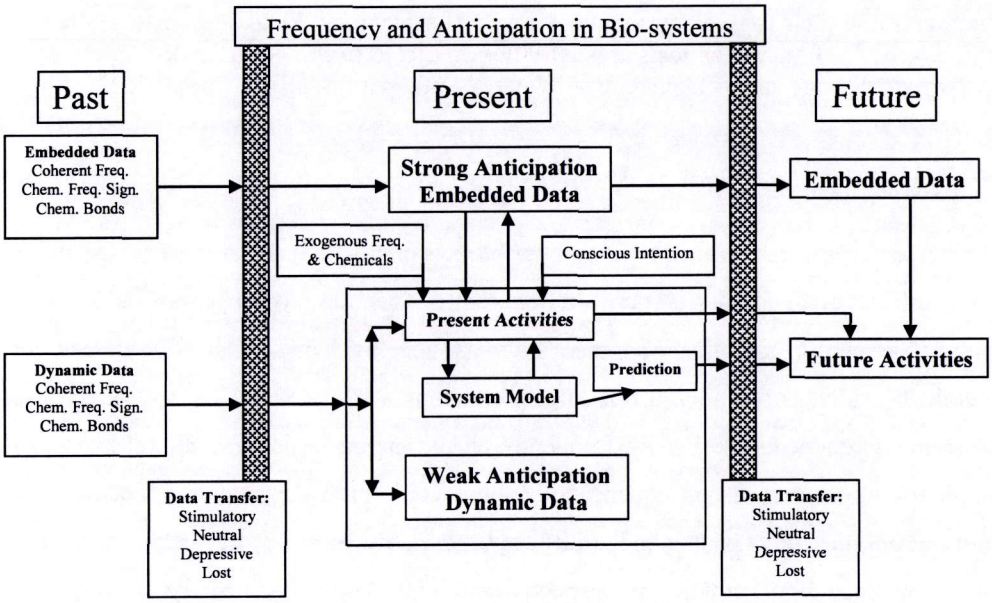

Figure 1: Frequency and Anticipation in Bio-Systems

2.1 Domains of Coherent Frequency

Del Giudice and Preparata and co-workers (Arani et al., 1995) have shown that the exchange of resonance radiation can result in the formation of domains of coherence in water. A consequence of coherence is that frequency may become a fractal-like quantity having no absolute value. The constant parameter becomes the coherence length, the distance over which phase coherence persists, replacing velocity of propagation. This generates a set of frequencies each proportional to a velocity that the system will support. One such velocity is the velocity of light, another is the velocity with which the coherence propagates by diffusion, usually of the order of metres per second. Here, the whole coherence domain is involved in the interaction. This gives a fractal ratio of the order of 10^8 and enables the optical and infra-red frequencies of chemical bonds to interact with microwave frequencies and in another jump with biological (ELF) frequencies and vice-versa.

2.2 Dirac Equation and Frequency

Rowlands (2007) has described a form of expression for the 'Dirac Equation' which contains purely physical information so that mathematics becomes an intrinsic part of physical structure. Furthermore, the equation contains three terms which separately express the "energy", "momentum" and "mass" in the physical system. He postulates that the most general form of the wave function is 'nilpotent' (= the square root of zero) (Diaz & Rowlands, 2004) and the operator ($\pm\boldsymbol{kE} \pm \boldsymbol{ii}\mathbf{p} + \boldsymbol{ij}$m) which contains the physical information about the system is also a nilpotent in which $\boldsymbol{k}$ represents energy, $\boldsymbol{i}$ represents momentum and $\boldsymbol{j}$ represents mass.

He points out that nilpotent quantum mechanics includes quantum coherence and that living systems acting as hierarchies of quantum Carnot engines could show a boundary between fractal and wave structures and evidence of chaotic working. He does not specifically write the nilpotent Dirac equation in terms of frequencies.

This can be done using the relationships $E = h\nu$ and $E = mc^2$.

The momentum term could be represented by a wavelength λ for the coherence length in a coherent system, or by a third frequency ν_3.

The term then becomes:

$(\pm \boldsymbol{k}h\nu_1 \pm \boldsymbol{ii}h/\lambda + \boldsymbol{ij}h\nu_2/c^2)$ or $(\pm \boldsymbol{k}h\nu_1 \pm \boldsymbol{ii}h\nu_3/c + \boldsymbol{ij}h\nu_2/c^2)$

and cancelling Planck's constant gives:

$(\pm \boldsymbol{ik}\nu_1 \pm \boldsymbol{ii}/\lambda + \boldsymbol{j}\nu_2/c^2)\ (\pm \boldsymbol{ik}\nu_1 \pm \boldsymbol{ii}/\lambda + \mathbf{j}\nu_2/c^2) = 0$

which are equations in coherence length and two frequencies which may be the lower and upper fractals.

2.3 Water Memory for Frequency

The writer has described a mechanism for a frequency memory in water (Smith, 2008) which involves coherence in the precession of the spin of protons in water. Given a critical number of protons in phase coherence, the precession can generate a local magnetic field such as to satisfy proton NMR conditions at any frequency. Electron spin precession can acquire similar properties for ESR conditions and would apply to frequencies imprinted into metals as well as to those in water. These imprints need the presence of the geomagnetic field and can be erased by placing the specimen in a closed steel (mu-metal) box. The size of a coherence domain is determined experimentally by finding the critical magnetic field at which memory erasure occurs. The assumption that at this point the magnetic energy is equal to thermal energy kT gives the required volume. The coherence of an imprint in water is ultimately limited by the statistical fluctuation of the number of particles involved in the coherence and may be less than parts per million; it is just measurable with a high performance waveform generator (Agilent 33250A).

The frequency information is in the magnetic vector potential component of an alternating magnetic field (**A**-field) such as that near a toroidal coil, the **B**-field has a formatting property equivalent to mechanical succussion. A Caduceus coil has distinctive properties, the windings cancel the **B**-fields. The tangential **A**-fields cancel

(although they may retain "Torsion Field" properties), the radial **A**-field components add. The Caduceus coil couples to frequency resonances different from those measured using the field of a toroid. It usually only detects a single frequency which is of the order of 0.1 Hz. The frequency resonance measured with imprinted water (or other specimen) in a toroidal coil will be 'nilpotent' to that imprint if in the D-chirality (Section 2.4).

There seems to be further source of memory capability involving the imprinting and measuring of frequencies using an electric field (E-field) or an acoustic field as discussed by Partheil (1903). This must involve dielectric coherence among water dipoles. This imprint is not erased by shielding the geomagnetic field with a steel box but is erased by exposure to 1.42 GHz, the microwave resonance of molecular hydrogen. Partheil found that acoustic mode frequencies could be related to atomic weights. The Rydberg Constanttaken with the fractal ratios links frequencies and atomic mass. The ability to respond to coherent frequencies gives living systems the capability of identifying atomic isotopes.

2.4 Chirality and Frequency

Marcer and Schempp (1998) have shown the quantum coherence and phase conjugation conditions necessary for a holographic memory system. This is the only memory system which satisfies a living system's need for an image of the actual location of the object in space and time. While there seems to be a continuum of frequencies available for constructing such a system, only two 'phases' - Yin and Yang have been encountered so far. These may be expressions of a chirality rather than phase.

The frequency references for living systems seem to be stabilised through fractal-like coupling to coherent resonances in the far-infra-red rotational spectrum of water. There are hundreds of lines in this part of the water spectrum so, to limit the choice it was decided to do the calculations solely on the basis of those lines which could become coherent enough to make a water-laser (Smith CW, 2008).

The **A**-field component of the geomagnetic field provides the chirality reference. Imprinting water on the North side of a toroid gives a laevo-rotatory (L-) imprint,

imprinting on the South side gives a dextro-rotatory (D-) imprint. In general, the L-imprint is stimulatory of biological activity while the D-imprint is depressive. Fractality of frequency inter-links this to chirality in the optical region. Solutions of L-fructose pass L-frequencies and block D-frequencies while a D-sucrose solution has the opposite effect.

Chemicals which can H-bond to water acquire characteristic frequency signatures. Elements have a single frequency, molecules have more frequencies and these usually alternate in L- and D- chirality. Among exceptions are water imprints made from single crystals of silicon and quartz which only contain L-frequencies and these repeat at precise decade intervals from 10^{-4} Hz to 10^{+9} Hz.

An important chirality effect of frequency is that amino acid isomerisation is changed from L- to D- following exposure in a microwave cooker (2.45 GHz) (Lubec et al., 1989). There is another frequency which will effect the D- to L- transformation.

3 Data Transmission

The "Past" state's data has four possibilities in its passage to the "Present" state. The frequency data may be stimulatory (L-frequency), depressive (D-frequency) or neutral in respect of biological activity or it may become lost in transit. Certain combinations of frequencies acquire a 'nilpotency' which results in total erasure of the imprinted information. This occurs in the "Courses" of acupuncture meridians and provides an anticipatory feature in as much as a non-zero value implies an error or fault in the frequency data and what it represents in a bio-system where chemical structures may deteriorate and the data held in their frequency signatures become corrupted.

4 Present State

Not only are the "Present" activities informed by the embedded data and the dynamic data but also by endogenous frequencies and by chemicals entering the system from the environment. Conscious intention can also generate frequencies (EEG expectancy waves) and chemical activity.

4.1 Present Activities

The Laws of Life used by Nature must involve the application coherent frequencies and the effects of frequency in biocommunication must eventually be limited at the quantum level through integer related quantum transitions between chemical states. Water, H-bonded to chemicals gives characteristic frequency patterns which living systems can recognise and this extends as far as isotopes. Living cells can respond to the addition of a single quantum of magnetic flux linking the cell and thus have the Josephson effect available giving a frequency/voltage inter-conversion. They are sensitive to the magnetic vector potential (**A**-field) which can affect the phase of wave functions. The endogenous frequencies in living systems such as those on acupuncture meridians and chakra points must be 'eigen' states of these wave functions.

There is no point in a living system having a language and syntax in frequency if frequencies cannot effect any action. Figure 2 demonstrates that the frequency measured in a Caduceus coil corresponding to steady growth of yeast cells in a glucose nutrient can be stopped merely by the close presence of a tube of water containing a D-chirality imprint of its current 'nilpotent' frequency at 10 min.. This frequency must be quickly measured and imprinted before the cells change significantly. So long as the tube of imprinted water is within about 2 cm there is no further change in frequency. The frequency change resumed as soon as it was removed at 20 min. This was repeated at 30 min. using the new D-frequency derived from the yeast culture at the point it had then reached.

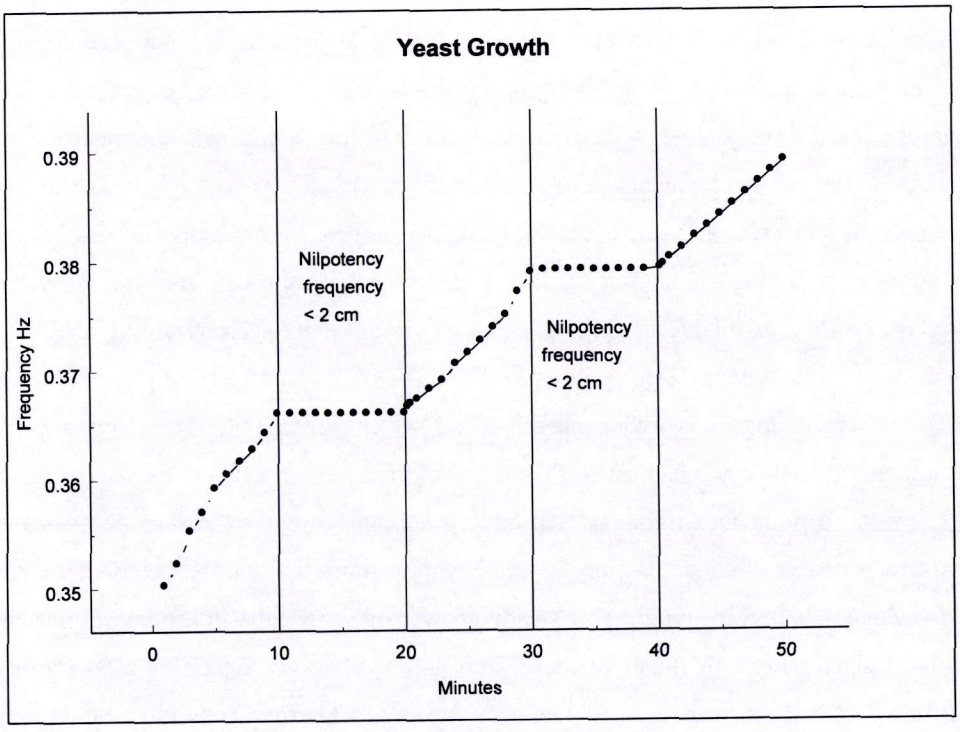

Figure 2: Proximity of 'nilpotent' frequency stops yeast growth

This 'nilpotent' frequency has a practical clinical application in that it removes all current stress frequencies from a patient when used in the manner of a homeopathic potency allowing the next layer of stress to manifest. This "Peel-Back" can be repeated showing the way that the stress built up in the body organs coupled to the meridians until the 7.8 Hz endogenous to the Heart meridian and characteristic of normal health is reached. It might be described a being both "Post- & Anti- cipatory".

4.2 Acupuncture Meridians

Humans, animals and plants have acupuncture meridians and these have characteristic coherent endogenous frequencies. They are likely to originate through coherence between cells at an early stage of the embryo development. As the organism grows this coherence persists and connects body organs to sensitive points on the

periphery. Plants have an acupuncture meridian (Smith, 2009a). Stressing an acupuncture meridian or target organ spreads its endogenous frequency into the whole body field. For 50 healthy human subjects, the mean Heart meridian was 7.802 ± 0.002 Hz (i.e. ± 260 ppm). With this precision, it provides a reference frequency within the body. Through fractal-like connections its frequency is stabilised by the 149 cm^{-1} – 127 cm^{-1} transition in the far-infra-red rotational spectrum of water.

The precise nature of the Heart meridian frequency enables the body to detect changes in the natural Schuman band radiation from the ionosphere. The Nerve Degeneration meridian which describes that status of the entire autonomic nervous system should be able to detect variations in sferics radiation. This is an environmental predictive attribute.

There is noise to be contended with by the anticipatory system. Where there is stress on a meridian, target organ or the autonomic nervous system, endogenous frequencies appear in the whole body field. Table 1 (Column 1), shows frequencies measured from a subject with a long medical history and symptoms consistent with stresses as shown in Column 2. The percentage bandwidth of the resonances is shown in Column 3 and the calculated signal-to-noise ratio is given in Column 4 where it is seen that the endogenous frequency on the small intestine meridian is one tenth of the noise level and that on the sympathetic autonomic nervous system (ANS) just over half noise level.

Table 1: Signal/Noise on Meridians

Frequencies Hz	**Meridian Stresses**	**Resonance Bandwidth %**	**Signal-to-Noise Ratio**
2.413×10^{-3}	Sympathetic ANS	17	0.58
3.004×10^{-2}	Small Intestine	55	0.10
2.212×10^{-1}	Pericardium	8.3	1.18
5.212×10^{0}	Urinary bladder	3.9	2.51
7.812×10^{0}	Heart	0.6	16.33

4.3 Prediction

One "Present" activity is the need for the system to create a frequency pattern model of itself based on the information coming into "Present" activities and thence to predict "Future" status and "Future" needs.

Between the states of health and disease there may be a state of mathematical chaos (Smith, 2009b). Because of the nature of chaos, it is not possible to do double-blind trials on systems in a chaotic state. Chaos has been demonstrated in respect of the cardiac signal of a healthy human as well as in electroencephalograms, epidemics, fluid flow and oscillatory chemical reactions. Any experiment involving a system in a chaotic domain is **non-repeatable** from the same initial condition. This puts a limit on the possibilities of system modelling and prediction.

4.4 System Modelling

In CASYS'01, the writer (Smith, 2002) showed that frequency imprints in water could be subjected to all the basic arithmetical operations and in CASYS'05 (Smith, 2006) that all the basic reversible logic gates could be devised similarly and so in principle, any reversible Boolean function could be computed in any aqueous system and be clocked by pulses a small as nerve impulses.

In CASYS'07, the writer (Smith, 2008) examined interactions between coherent frequencies and chemical structures as a possible way of proceeding from a dynamic to a permanent memory. It was shown that water imprinted with the patterns of frequencies copied from mono-nucleotides could be modified to pass through the frequency patterns of DNA and RNA to the frequency pattern of the amino acid which was coded and this only using water and a specifically determined frequency. This showed that it was possible to model the frequency signatures of a chemical system. When the same procedure was carried out including traces of the actual chemical mononucleotides, the same frequency patterns were obtained. However, these would not erase in a mu-metal box so, it is possible that a chemical reaction had been catalysed by

frequency structured water implying that frequency imprinted water can act like an enzyme.

4.5 Frequency Measurements

In 1982, the writer had to devise a dowsing technique to measure frequencies affecting patients highly sensitive to their electromagnetic environment. Early attempts to measure frequency imprints in water objectively only managed to detect signals at the nanovolt level and of little practical use for instrumentation over a wide frequency range (Smith, 1994). The range of frequencies involved in biosystems extends from at least microHertz to TeraHertz.

Since the theory for memory mechanism involves moving charges, there will be a magnetic vector potential (**A**-field) component in the direction of motion. Since the currents involve charges precessing at the stored frequency there will be an alternating **A**-field at this frequency. Since $d\mathbf{A}/dt = -\mathbf{E}$, the **A**-field will generate an electric field proportional to the angular frequency ω.

A toroidal coil generates an **A**-field along its axis so, it was assumed that a wire placed axially would experience this **E**-field and acquire an electric potential proportional to the coherence length in the **A**-field. Accordingly, a 50mm length of copper wire was inserted into the input (BNC) connector of a low-noise amplifier (Brookdeal Electronics Ltd. LA350). A toroidal coil was placed with the wire along its axis. The **A**-field could be calculated from the dimensions and winding details and the current. The voltage generated at the amplifier input was measured over a range of frequencies and agreed with that calculated (Smith, 2010a).

Having demonstrated that an amplifier could measure voltages induced from **A**-fields, a glass tube of water was imprinted with the set of frequencies corresponding to the filter settings available in the amplifier. A wire was connected to the amplifier input and the other end was inserted into this water. A very respectable signal at millivolt level was available for measurement and analysis.

Sargsyan, Karmyan and Avagyan (2010) described anexperimental technique leading to a simple device for the non-invasive assessment of physiological states of living

systems in general based on a change of the amplitude of light reflected from the sensor when a biological object is placed a short distance away.

In physics, any 'action at a distance' effect is very important since one can determine what will transmit and what will block an interaction. The writer (Smith, 2010b) set up the above authors' basic arrangement. Their "Biological System" was replaced by a glass tube of frequency imprinted water. This frequency information appeared in light scattered from a glass plate. It disappeared when the local magnetic field was reduced to about 50 nT which implies a coherence domain in a water film on the glass plate of about 166 μm diameter, the same as a coherence domain in humid air while a coherence domain in liquid water is 53 μm diameter. With various types of coils connected to an oscillator in the source position, the reflected light only carried the frequency information when a Caduceus coil was used. The fields from a solenoid or toroid gave no effect. The reflected light from a frequency imprinted tube of water contains the frequency information and if photographed, this information is retained in the image. It is the same in all parts of the image separately and since is carried on the **A**-field it must be in a quantum holographic format. The frequency information is retained if the photograph is transmitted as a file over the internet and can then be recovered from light scatted by a printout of that attached file image.

5 Future State

The same considerations for the transfer of data from "Past" to "Present" apply to transfer from "Present" into "Future state. This state draws upon the activities, model predictions and the embedded data in the "Present" state.

It is difficult to write about "Future" state without remembering Einstein's quip, "Prediction is very difficult, especially about the future!"

The biosystem's activities in a "Future" state will have the Strong Anticipation embedded data carrying any modifications made in the "Present" state together with data predicted from the System Model needed for continuation of the species. The

"Peel-Back" effect (Section 4.1) uses a stored memory of the past state of health to override acquired disease state information

6 Conclusions

If there was not a duality between frequency and chemical structure, spectroscopic analysis would be impossible. It is the fractal-like property of a coherent system that enables chemical frequency signatures from the interaction of a molecule with vicinal water to have a direct biological significance. Biological cells have in general the ability to emit a chemical in response to an electrical stimulus and to emit an electrical signal in response to a chemical stimulus. Some are specialised one way or the other. The stimulation of a nerve cell following the detection of a single light quantum requires an amplification of the order of 10^9 without instability through feedback. The catalytic-to-thermal activity ratio of an enzyme is of this order; living systems can alternate between electrical and chemical to avoid feedback instability.

There is much activity in the area of bio-cybernetics. Coherent frequencies can become a set of cybernetic transforms and behave as discrete entities within the limit set by their bandwidth and not merely be an analog parameter. Two examples are given here: first of frequencies performing a transformation are the L- to D- isomerisation by the widespread 2.45 GHz and second the inhibition of yeast growth by the proximity of a 'nilpotent' frequency as shown in Figure 2.

The concept of a chemically and biologically active frequency signature must lead to the idea that a pharmaceutical has both a chemical and a frequency activity while a homeopathic potency has only a frequency activity with no chemical content. The question then is, how much of pharmaceutical activity is chemical and how much is frequency signature related? If elaborate chemistry finishes up merely fine tuning a frequency signature, it might be better to use a generic chemical and to imprint the required additional frequencies electronically. This would make it easier to be anticipatory in respect of the problem of pathogen changes.

If a frequency can change an isomer from L- to D- or vice-versa this implies that the "balls and sticks" molecular model needs to be replaced by one in which the vicinal water acts as a shell conforming the molecule to a particular configuration.

As in the title of this paper, coherent frequency is an anticipatory force.

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