PART F: Concepts of the Analysis of Vocal Frequencies

F. Vocal Analysis Sections

1. General Steps for Vocal Analysis
2. Types of "anomalous" frequencies and waveforms
3. Analyze and Correlate anomalous frequencies:
   - ? Common Frequencies
   - ? Frequency Wheels and Subsets
   - ? Harmonic Series Frequency Correlation
   - ? Resultant tones
4. Concept of Keynotes
   - ? Harmonic Overtones
   - ? Musical Relationships
   - ? Statistical Measures
5. Frequency Associations
6. Frequency scanning of the body – Fscan

References for Vocal Analysis

31/ Garfield-O'Brien, Lauren K. 2003; Bio-Resonance Workbook.
See also 4/ Bio-Resonance Therapy

32/ Meyer, William L., 2002. PROW Plus; private research paper presented at Aug. 2002 Bioacoustics Conference.

33/ Hero, Barbara, 1992. Lambdoma Unveiled – The Theory of Relationships; 1970's to 1990's presentations and papers; contains multiple references to keynotes.

34/ Titze, Ingo R., PhD, 1994. Workshop on Acoustic Voice Analysis.
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35/ Hess, W.J., 1983. Pitch determination of speech signals: Algorithms and Devices.
New York, Toronto: Springer-Verlag.

36/ Kunkel, Daniel, 2001. The Sound – Quantum Connection; paper and presentation given at the USPA 27th Annual Conference.

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38/ Goldman, Steve, 1999. Vibration Spectrum Analysis

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A new book from James Oschman; see also **5**/ Energy Medicine:

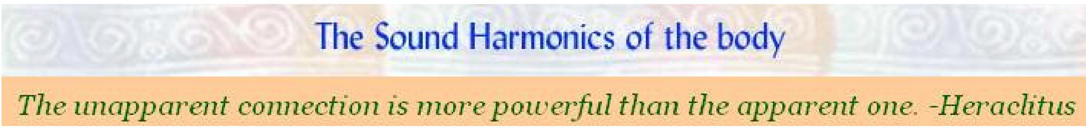
Oschman, James, 2003. Energy Medicine in Therapeutics and Human Performance.

Nature's Own Research Association, Dover, NH. Describes a high-speed communication system in the human body that senses and responds to the energetic environment, the substrate of systemic cooperation. Draws on physiology and biophysics, and reads like a detective novel, presenting clues to reveal a logical pattern when taken together. * Focusing on the wealth of information emerging in the area of energy medicine, this unique resource explores mechanisms by which mind and body processes influence the body's healing and performance potential.

PART F: Concepts of the Analysis of Vocal Frequencies

Capsule summary: Vocal analysis deals with frequencies as measured from the voice or directly from the body, generally using computer-based processes. The goal of analysis is to find the stressed or disharmonious frequencies of the client, then correlate these anomalous frequencies to known relationships and energetic remedies. Frequency analysis is performed solely to determine those energies in the body that are out of balance, and this analysis ***should not*** be confused with diagnosis performed by licensed medical practitioners.

Balancing disharmonious frequencies in the body helps re-establish the rhythm or flow of energy in the body so that the body's own natural processes can perform the real healing. ***Frequencies do not heal***, they only support the normal form and function of the body.



(graphic © by Georgia Neff)

This section is not meant to be a complete description of vocal frequency analysis, nor is it meant to be a "how to" manual of analysis. Such a manual *may be* offered in the future. There are some publicly available manuals that explain individual styles of vocal analysis.

The ideas and principles of vocal analysis, referenced from published public domain sources and personal research of the authors contained herein, are considered to be matters of general public knowledge. Also, certain computer software will be briefly referenced, and these intellectual works are copyrighted by the individual owners. Vocal analysis software is available from the following companies:

Biosonic	BioAudio and Nutritional Sounds	www.Biosonic.org
BioWaves	Sound Assistant	www.BioWaves.com
Hulda Clark	F-Scan	http://www.royalrife.com/f-scan.html
Neuroacoustic	Sound System	www.neuroacoustic.com
Quantum	QXCI / SCIO system	http://www.qxciscio.com/
Sound Energy	SER Voice Analysis	http://soundenergy.net
Sound Support	Voice BioAnalysis	http://www.voicebio.com/
VoiceSync	VoiceSync Tool / analyzer	http://www.voicesync.org/

Some proprietary software is not included in the list above, due to legal considerations and the unwillingness of certain groups to sell their products in the open market.

Where do the concepts and technology of voice analysis come from?

Acoustical analysis and Acoustics

Audiology – Dr. Alfred Tomatis

Bioacoustics – Cornell Univ. Bioacoustics Lab

Biochemistry and Biophysics

Bioenergetics

Bioinformatics and Biological computing

Biomedicine

Biometrical identification, speaker recognition

Bioresonance

Biotechnology - genomes

Cymatics – Dr. Hans Jenny and Dr. Peter Guy Manners

Digital Signal Processing - DSP

Electromedicine

Engineering analysis

Harmonic analysis and Harmonics – Ray Tomes

HemiSync technology – Monroe Institute

Lambdoma matrix theory – Barbara Hero

Layered Voice Analysis - LVA

Lie Detection and Voice Stress Analysis

Medical Resonance Therapy

Mathematics and statistics

Music theory - Helmholtz

Music therapy

NASA and vibration analysis : root cause analysis

Neuroacoustics

Spectrum analysis

Speech language pathology

Sympathetic Vibratory Physics – John Keely and Dale Pond

Vibrational Sound Medicine – Robert Sewak

Voice therapy

It should be noted that **the list above is only a partial list of sources for voice analysis!**

The two preceding pages are intended to show **the wide variety of sound analysis software** currently available **and the expanse of scientific fields** that contribute to voice analysis concepts. The Additional Information above is only a minute sampling of the information that is available, which will only be of interest those who want to "look under the hood" of sound therapy – the researchers and techies.

We will try to divide the material in the following sections into (1) brief statements of concepts and key ideas and (2) examples illustrating the concepts. Note that no software vender will have all of these concepts in one program, and some may have ideas that are not described in these concepts. Whether a concept is included or not should not be taken as an indication of the value (or lack thereof) of particular software – only the effectiveness of the software measured against the sound therapy need can indicate value. We hope to review software systems in some detail in later papers and on the TRUTHsound forum.

Voice Analysis is a technical process, and most software systems do a good job of hiding details of the calculations. Understanding how calculations are made and how the pieces fit together would seem to be fairly important knowledge in order to understand and utilize the calculation tools.

A doctor doesn't need to know the exact lab processes used on blood samples; what's important is how these results fit together for a particular client to indicate potential problems. Recognizing that a particular result may not be a good reflection of the client's health issues or that a result seems out of place would be a valuable asset, but seemingly a very rare commodity in medicine.

Recognizing that a frequency seems out of place in a voice print, as opposed to anomalous, would be an admirable talent to have in sound therapy. Essentially nothing has been said or written about looking for what is termed "outliers" in statistics and engineering.

Michael Talbots's book The Holographic Universe **37/** pp. 28-29 describes a discovery by the Russian researcher Nikolai Bernstein in the 1930s. Berstein dressed dancers in black leotards and painted white dots on their elbows, knees and other joints, then filmed them dancing against a black background. When he converted their movements into a language of wave forms, he discovered they could be analyzed using Fourier mathematics, the same mathematics used to invent the hologram and to analyze time domain vocal data.

To Bernstein's surprise, he discovered that the wave forms contained hidden patterns that allowed him to predict his subjects' next movement to within a fraction of an inch. Maybe the reason hidden patterns surfaced after the dancers' movements were Fourier-analyzed was because that is how movements are stored in the brain. Talbot's book also explains that both memory and vision are holographic, as indeed are auditory senses as well.

The analysis of vocal frequencies in Sound therapy has been in a research stage since its known beginning in the 1980's, when the pc became popular. However, much of the research and testing over the past 10-20 years has not been carried out in anything like a rigorous manner. Even data collection methods are inexact and deficient simply because computer sound cards are not always calibrated by the user. Even when calibration is performed, how often or is it ever checked? Does the user or program correct the data by applying calibration factors?

F.1 General Steps for Vocal Analysis – reference Biosonic and BioWaves manuals

a. Record a voice print with a computer using either the Windows sound recorder or other commercial software such as Cool Edit, Sound Forge, or PRAAT. Commercial software has several advantages over the sound recorder in monitoring the voice recording and providing auxiliary functions such as frequency displays. The sampling rate and the length of the voice print can easily impact the quality of the recorded voice data – see also Part E.6 for details.

b. Use a Frequency analysis (FFT) procedure to convert the voice print into frequencies : BioWaves Sound Assistant, Cool Edit Pro, FFT Properties, Praat, or the SpectraLab program;

c. Find anomalous Frequencies and/or waveforms using one or more of the following:

(1) Pulling anomalous highs, lows and stressed frequency points from an FFT plot;
(2) Locate anomalous wave forms;
(3) Direct measurement of anomalous body frequencies.

d. Correlate and analyze the anomalous frequencies: locate common frequencies, common denominators and keynotes to be used in balancing the anomalous frequencies in the voice, plus database lookup – Biosonics program, BioWaves Sound Assistant, Nutritional Sounds Database, and/or Quantum QXCI program.

e. Generate and test the analyzed frequencies using objective feedback to determine a program of sounds to re-balance body energies;

f. Program a frequency generation device for continued sound therapy and recommend other modalities (e.g., nutrition) or practitioners (e.g., nutritionists) to provide the necessary support for the sound therapy.

It is interesting to note that both vocal analysis and Voice Stress Analysis (lie detection) use the same first four steps listed above. The following summary was taken from the web site of www.nemesysco.com .

The Nemesysco Layered Voice Analysis or LVA uses a mathematical algorithm to evaluate the presence of relatively high frequencies, relatively low frequencies (in number of ranges), and changes in their rate of occurrence. They "do the same operation for a number of layers in the voice, providing a unique view of different emotions in different levels of self-awareness."

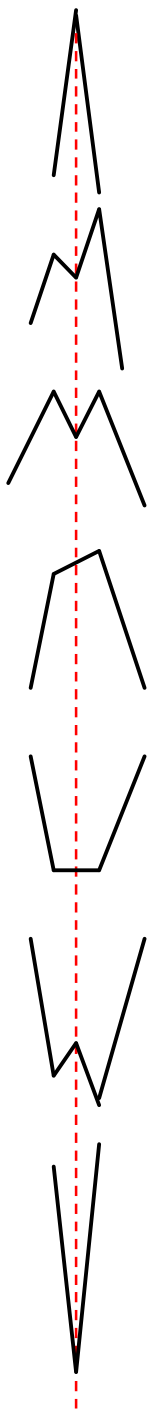
Nemsysco's main voice analysis technology has 4 built in sub-processes:

(1) Analyzing the vocal waveform itself to measure the presence of local high frequencies, low frequencies and changes in their presence within a single voice sample.
(2) A precise frequency spectrum of the vocal input is sampled and analyzed.
(3) The parameters gathered in the previous steps are used to create a base profile.
(4) The analysis is generated from correlations and templates.

The whole set of input can be further processed by statistical learning algorithms.

According to Nemsysco**,** their technology uses 129 parameters gathered from several speech segments. It goes deeper than other voice analysis technologies. It can be used to detect mental illnesses, psychological structures and other behavioral patterns, all by analyzing voice alone.

F.2 Types of "Anomalous" Frequencies and waveforms <u>31</u>/ Lauren O'Brien



Spikes — Spikes indicate a current problem and it's usually an important issue to the body. A substance can be present in a large amount, or a substance is blocked from being utilized by the body.

Rabbit Ears — Rabbit ears usually contain information about some disease process that is occurring in the body.

M 's — **M 's** show information about vitamin and mineral deficiencies, or bone and muscle injury. They tend to Point to recent issues the body has encountered.

Truncated Up — Truncated waveforms show information about vitamins, minerals, bones, muscles and toxins. These are potential Issues, but don't define whether it is current, or if either an abundance or deficiency of a substance exists.

Truncated Down — Downward truncations usually indicate that an issue has existed for a long time, and points to a chronic issue.

W 's — **W's** usually point to chronic or long-standing issues.

Stringers — Stringers often indicate a substance deficiency and/or long-standing condition in the body. They may correlate to toxins, nutrients or chemicals.

anomalous *f*requency

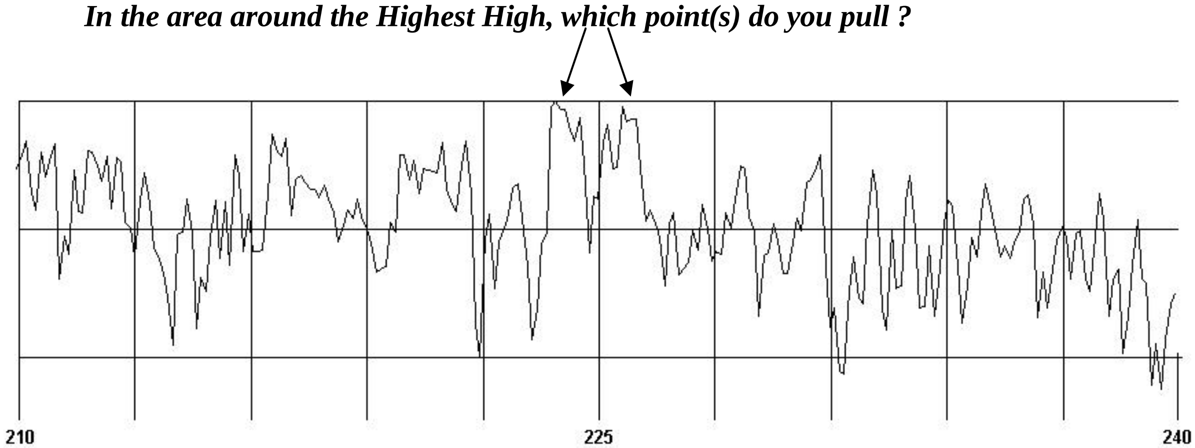
There are a few other waveforms, such as <u>change points</u>, (e.g. ☆ p. F-12) that occur less frequently than the types shown above, but these seven types are the main anomalies.

Complex Waveforms

Unique terms are generally used by each of the major systems to describe the anomalous or the stressed frequencies on which the analysis is based. Another variable between different software is the FFT calculation itself, as described in Part E.

The sound practitioner chooses which stressed frequencies to put into the analysis phase of the voice analysis process. This step currently involves a fair amount of experience as well as some art to determine the "best" or "correct" frequencies.

Anomalous Highs (spikes) and Lows (stringers) 32/

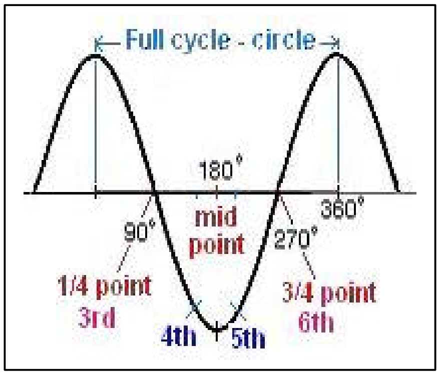


It is this author's opinion that you can't always tell before hand exactly which points from the frequency plot will be the most significant. If you have two or three points in the Highest High area, as in the example above, how do you know which point will be ***the point*** to use?

A suggested approach is to record and test each of the two or three points in the most anomalous area(s). You may not enter all of these points into the final list, but you can test the significance of each point by calculating the Beta values and entering them into harmonic series to compare against other anomalous points.

F.3 Analyze and Correlate Anomalous Frequencies

Terminology gets somewhat confusing when different people start talking about vocal analysis. Each software system or process uses different terms to describe similar concepts, which is sometimes at variance with the original terms used in the public domain publications.

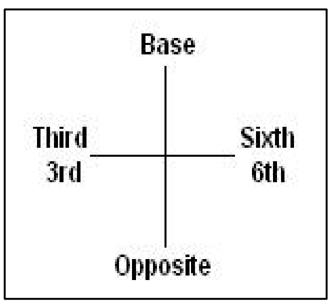


This illustration shows a sine wave starting at its peak amplitude, going through the cycle to the lowest point and then returning to the peak value. The starting and ending value would be the ***Base frequency*** or the *fundamental*. In terms of the musical wheel, there would be 12 notes contained in the full circle.

This illustration also shows the two quarter points where the trace crosses the center axis (twice) and the lowest or mid point of the cycle (circle).

The mid point of the cycle (circle) on a frequency wheel has various names such as the inverse and reciprocal (B. Hero). Mathematically, either of these terms is a little misleading, since the mid point is actually the opposite of the peak *Base frequency***.** This mid point is 180 degrees from the base, musical interval of 6 semitones, and balances it. For our use in these concepts, ***Tritone*** = *opposite* = *inverse note*.

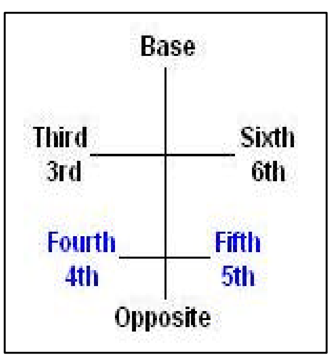
The two quarter points at 90 and 270 degrees have been called converged or square notes. They represent a minor third and a major sixth note musically. We will use the term ***third*** for the first converged note and the term ***sixth*** for the second. They are exactly opposite each other.



The four primary notes of the musical wheel form a cross, with each arm at 90 degrees away from its neighbors. These values are related mathematically under equal temperament as follows:

Opposite or Tritone = Base * v2 -or- = Base * 1.4142
(note that v2 = square root of 2)

the Sixth = Third * v2 ;   Third = vv2 * Base   vv2 = 1.1892



The musical notes represented by the ***fourth*** and the ***fifth*** round out the primary notes of interest from the musical wheel. They are one step before and after the *opposite note*. These notes are shown on the full cycle illustration above with short diagonal lines.

This six note structure is called a Pod (see section D.5 and Svpvril message #5536), and it is a subset of the full musical 12-note wheel. As used here, ***Wheel subset = Pod.***

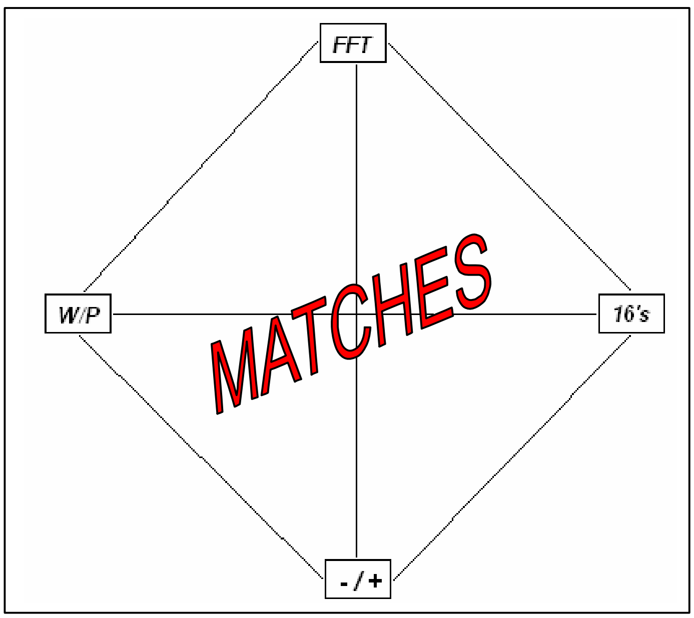
Biological computing, Bioinformatics and our area of Sound Informatics draw on mathematical and statistical concepts with origins to the beginning of recorded history predating Pythagoras over 2500 years ago. A number of these concepts were implemented in engineering computer programs by Bill Meyer starting in the 1960's, and this development continued through the 1990's. Some of the common concepts used in the previous development are the tabulation of data and finding correlations (patterns and trends) within the data.

This prelude to Sound Informatics is a highly abbreviated background to show part of the genesis of the following analytical concepts, which have been adapted from logic and analyses which are a standard part of engineering and mathematical techniques used in many fields from astronomy to forensics to physics and rocket science. The good thing is you don't have to be a rocket scientist to understand the concepts or apply them to sound therapy.

The Concept of Common Frequencies 32/

The concept of commonality is to ***find patterns*** (frequencies) that appear in several ways in a ***set of data.*** In forensics, for example, this concept is applied to surveillance photos to enhance the common features which don't change between successive frames.

The figure below summarizes the idea of Commonality for sound informatics: ***Finding the Matching Frequencies between the following data sets*** (sound parametrics) which were introduced in Concepts book I.



FFT = FFT Beta octave points

W/P = Frequency **W**heels and **P**ods

16's = 16-based Harmonic series for anomalous FFT Points

- / + = Resultant tones; Differences and Summations (Averages)

The reason you look for matches and common frequencies is to determine underlying relationships in the anomalous FFT points and to find frequencies that you may want to test on a client.

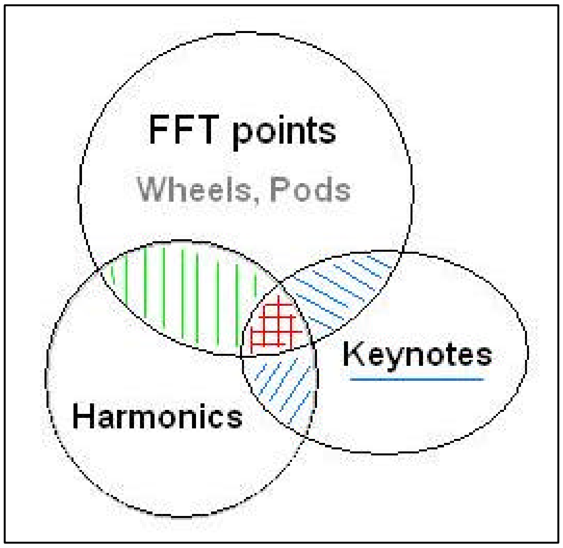
The concept of commonality is one way to determine the relative importance of selected FFT point data. Commonality indicates those frequencies that seem to be more applicable than others in the vocal spectrum using the idea that ***the more often a frequency appears, the more likely that it will be significant.***

We may not know the manner in which that a common frequency is significant, nor exactly how to apply the frequency, but we can suspect that a "strong" common frequency is somehow a key to balancing the stressed energies of the body.

One of the many technical fields in music theory is call atonal music. Allen Forte is a leading musical theorist and has been a professor in the Yale Department of Music since 1959. Forte, the Battell Professor of the Theory of Music, is a specialist in 20th-century atonal music, or music analysis by Schenkerian methods. One of the more important topics in atonal music analysis is that of **Invariants**. {*It's worthwhile looking up professor Forte and atonal music on the Internet.*}

The idea of ***Invariants*** can be paraphrased here to mean ***the intersection between two or more frequency sets.*** In set analysis, this would amount to a subset of frequencies that are the same between the sets (the matching frequencies) –or– the ***Common Frequencies*** as defined herein. The main "sets" in sound informatics are the FFT points, Frequency **W**heels or **P**od subsets, 16-based Harmonic series, and Resultant tones.

Each of these ***frequency sets*** will be discussed below.



This illustration graphically shows the idea of the union of different sets of frequencies. If we can find those few frequencies that are common to all of the different sets, the Red cross-hatch area, then we should have the values that are most related to the voice data and musical relationships (pods, etc).

The bigger areas of union between two sets, e.g. FFT points and Harmonics, would be of interest, but would usually contain more frequencies. They could be of special interest, just somewhat less definitive of primary values we would like to find.

The concept of Keynotes will be introduced in the next section. By definition, keynotes include any common frequencies which might be correlated to a client's health issues.

(1) FFT Beta octave pairs

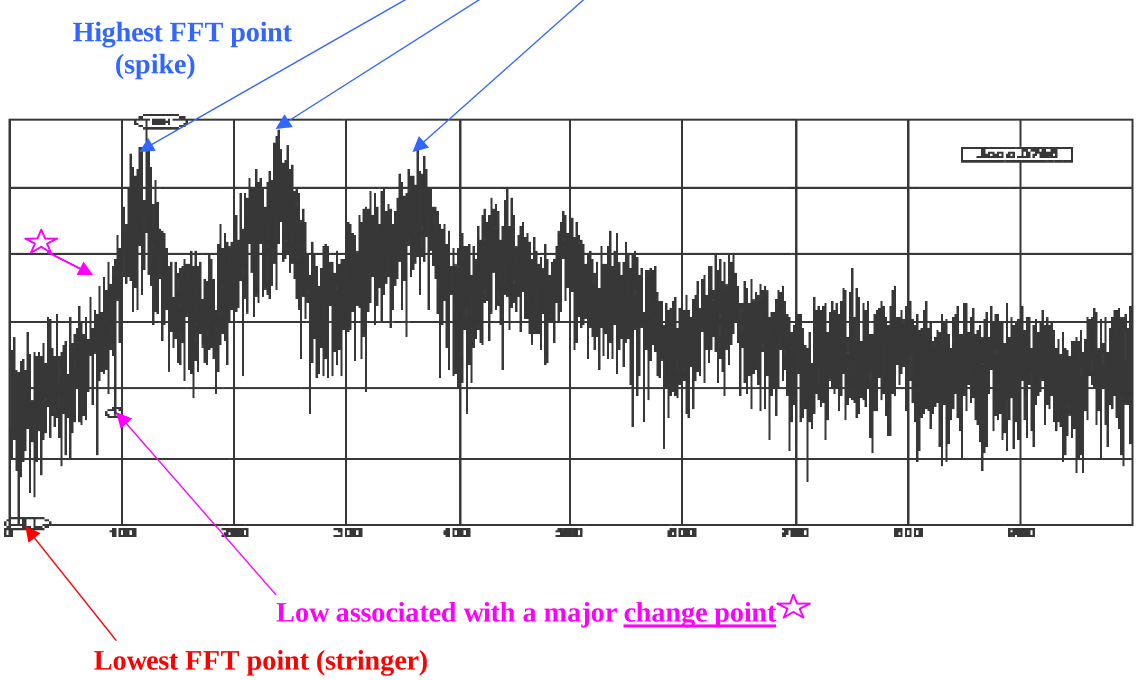
From Lauren O'Brien, 31/ p.3 : ***Rhythms are defined as "anything repeating itself in time". Everything in nature is comprised of rhythms, some simple, some more complex.***

The simplest type of rhythm or commonality would be a pair of selected FFT points whose frequencies are quite close (e.g. within +/- .04), when reduced to the *base* or Beta brainwave octave. This idea could be extended to those FFT points that are in a *base – opposite* or perhaps in a *base – fifth* relationship.

A pair of FFT points may or may not be a good indicator of a significant frequency; i.e. one we would test on a client. If a FFT pair also appears in the common frequencies or harmonic series of the highest and lowest points, it would be more likely to be a significant value to test.

EXAMPLE:

Obviously, you need to have a number of frequencies before you are likely to see pairs of the same values from the FFT. Alternately, use a graphical display to look for repeat patterns, such as the three points at approximately **120, 240 & 360 Hz** below.



It should be noted that the frequencies of 120 and 240 reduce to the same beta (or base) value, but 360 does not (360 is the fifth of 240). These frequencies are evenly spaced, so there is some kind of rhythm or pattern that is shown in this FFT plot of the voice print.

(2) Frequency Wheels and Subsets (see sections D.3 to D.5 and , 31/ pp.41-43)

Another type of commonality can be obtained by the use of frequency wheels or various subsets of it. A general process would be:

- ? Calculate the Frequency Wheels and/or subset for each FFT point
- ? Look for Frequency Wheels with the most matches to other FFT points
- ? Look for commonality between the frequencies of the wheels
- ? Use either base, opposite (tritone) or fifth for matching

Either the 12-note frequency wheel or the 6-note subset of the wheel could be used as a basis for correlation of the FFT points, matching against one of the calculated values (e.g. base). The following example was extracted from an Excel spreadsheet by Jonathan Cohen:

Example of wheel calculations with color matching on the Base frequencies (partial list):

FFT Point	Base note	opposite of base	Third	Fourth	Fifth	Sixth	Match Tolerance = +/- 0.04 to determine pairs of freqs.
136.970	**17.121**	24.213	20.361	22.857	**25.649**	28.794	
267.336	16.709	23.629	19.870	22.306	25.031	28.100	
413.090	25.818	18.256	30.703	17.234	19.339	21.710	
576.430	18.013	25.475	21.422	24.048	26.986	30.294	
289.550	**18.097**	**25.593**	21.521	24.160	27.111	30.435	
431.150	26.947	19.054	16.023	17.987	20.185	22.659	
5.010	20.040	28.341	23.832	26.754	30.022	16.851	
27.670	27.670	19.565	16.453	18.470	20.726	23.267	
25.630	**25.630**	**18.123**	30.479	**17.108**	19.198	21.552	Pod with the most matches
218.140	27.268	19.281	16.213	18.201	20.425	22.929	
711.680	22.240	31.452	26.448	29.691	16.659	18.701	
878.790	27.462	19.419	16.329	18.331	20.571	23.092	
•	•						

There is a **common frequency of 25.63** shown above, looking at only a portion of the FFT data set. The fact that this frequency is a pair (a base-opposite pair), plus the fact that it is also the pod with the most matches show that this frequency deserves more evaluation and testing for significance. Note further that there is a correlation with FFT point at 17.121, which is also a close member of the pod of this common frequency.

In this example, the two "frequency sets" are the FFT points and the calculated 6 note subset of the full note musical wheel or circle of fifths. It would then be logical to investigate the relationship of these significant subsets, to the issues of a client. One could also correlate the significant subset to the Note Correlates as described in section D.6 and Bob Sewak's original work.

This simplified use of the idea of musical invariants has shown the probable frequencies that are underlying the stressed energies in a modest number of studies (approximately 200 to date).

(3) 16-based Harmonic Series (see B. Hero and the introduction in sections C.3 and C.4)
A general process for working with harmonic series of FFT points would be:

- ? Calculate a 16-based series for each anomalous FFT point
- ? Match 16-based series to FFT points or match between harmonic series
- ? Match 16-based series to other common frequencies or factors

Either color matching or a simple statistical distribution (table) with the number of occurrences provides a visual method of finding FFT points that seem to have correlation with the Harmonic Series. A full matrix of the Harmonic Series will be shown in a later section. Color coding seems to provide one of the best ways to highlight or present information, as briefly illustrated in the following Excel spreadsheet – see also page F-22 for an explanation of Series_1 & 2.

	A	B	C	D	E	F	G	H	I	J	K
1											
2					16-based Lambdoma Harmonics						
3	Beta *f*	type		Series_1		Series_2		HH-highest		LL-lowest	
4	17.121	HH		16.11		23.22		17.12		27.67	
5	16.709	H		17.12		24.67		18.19		29.4	
6	25.818	H		18.12		26.12		19.26		31.13	
7	18.013	H		19.13		27.57		20.33		16.43	
8	18.097	H		20.14		29.02		21.4		17.3	
9	26.947	H		21.14		30.47		22.47		18.16	
10	20.040	H		22.15		15.96		23.54		19.02	
11	27.670	LL		23.16		16.68		24.61		19.89	
12	25.630	L		24.16		17.41		25.68		20.76	<--Fifth
13	27.268	L		25.17		18.14		26.75		21.62	
14	22.240	L		26.18		18.86		27.82		22.48	
15	27.462	L		27.19		19.59		28.89		23.34	
16	30.274	T		28.19		20.32		29.96		24.21	
17	17.144	L		29.2		21.04		31.03		25.08	
18	17.395	L		30.21		21.76		16.05		25.94	
19	21.545	L		31.21		22.49		16.58		26.8	
20	28.080	L		16.11		23.22		17.12		27.67	
21	16.104	L									
22	25.191	S									
23	28.823	S				18.14 CF = common frequency					
24	28.192	S									
25	17.951	S				22.48 CF = common frequency					
26	16.297	H									
27	16.771	H				See 25.63 pod					

In the example above, the FFT High point 18.10 (rounded) appears in Series_1 and _2, plus 18.14 is within tolerance of both the Highest High and the Lowest Low, and it is within 0.05 tolerance of all four harmonic series and the FFT High point, making it a strong common frequency. Note: *18.12 is the opposite of the previous 25.63 pod* (p. F-13) *with the most matches*.

The common frequency 22.48 is within a small tolerance, but does not appear in the FFT points.

(4) Resultant Tone Difference and Summation (see the introduction in section C.5)

As used in sound informatics, the summation is actually the average of the two tones, where dividing by 2 brings the calculation back into the same octave as the two tones being considered.

			Resultant Tones		Resultant Tones	
FREQUENCY	BASE	Opposite of base	Difference	Beta Diff.	Summation	Beta Avg.
136.9696	17.121	24.213	7.0916	28.366	41.3340	20.667
267.336	16.709	23.629	6.9207	27.683	40.3377	20.169
413.09	25.818	18.256	7.5621	30.249	44.0741	22.037
576.43	18.013	25.475	7.4612	29.845	43.4880	21.744
289.55	18.097	25.593	7.4957	29.983	43.6895	21.845
431.15	26.947	19.054	7.8927	31.571	46.0010	23.001
5.01	20.040	28.341	8.3006	16.601	48.3806	24.190
27.67	27.670	19.565	8.1045	16.209	47.2355	23.618
25.63	25.630	18.123	7.5070	30.028	43.7530	21.876
218.14	27.268	19.281	7.9867	31.947	46.5483	23.274
711.68	22.240	31.452	9.2118	18.424	53.6918	26.846
878.79	27.462	19.419	8.0437	16.087	46.8807	23.440
.	.	.				

The resultant tones for this example did not add to the information on common frequencies.

The common *f* requency of ~18.14 in the preceding example meets the criteria as being the value which exists in all three major categories shown in the illustration on p. F-10. Correlations of possible biochemicals/muscles should then be examined versus health issues of the client. The second common frequency should also be considered to find any correlations to the client and the primary common frequency.

The unapparent connection is more powerful than the apparent one. -Heraclitus

Finding commonalities as described above can be applied to the FFT data without regard to the order of the data: i.e., on ***unordered or nonlinear sets*** of data. The second type of data is an ***ordered or linear set***, and the general process for handling these two types of data is called set analysis. More information on set analysis is contained in Allen Forte's ***The Structure of Atonal Music*** (Yale, 1973).

F.4 Concept of Keynotes

If the premise is correct that the voice is like a hologram, then the anomalous frequencies that are observed and picked from an FFT plot should show ***related aspects*** of the current energetic condition of the body. Logically, we should look for additional relationships between the anomalous points that can be used to quantify underlying bio-energetic factors.

Dale Pond asked an interesting question in his Universal Laws book in his commentary on John Keely's Law of Atomic Pitch: **"What value has a frequency when it is not relative to another frequency? Not much and probably no value whatsoever."** **16/ p.147** We will elaborate on this in a later section.

KEYNOTE - **the resonant note, or spectral frequency**, of a tuning fork, or guitar string, or any body, ***and the resultant chord surrounding that note the "chord of life" or "matrix"****;* Svpvril posts #20099 & 20105. See also B. Hero, **33/**, pp.139-152

> What are the possible measures that could show the underlying relationships or the resonance(s) of the anomalous frequencies on a voice print? ***In theory*****, almost any of the concepts in Parts C and D could be used as a basis for Keynotes.** ***In practice*****, we need measures that reflect the fluctuation and/or variability of the voice print from a coherent pattern.**

Concepts and processes that could be used to determine keynotes:

- **Harmonic Overtones of anomalous *f*requencies**
  - 12- or 16-based Lambdoma harmonic series
  - matches between overtone series
  - simple distribution of overtones

- **Musical Relationships of anomalous *f*requencies**
  - Wheels, Pods, Triads
  - Resultant tone differences
  - Resonance Factors and PHI values

- **Statistical Measures of anomalous *f*requencies**
  - Common Frequencies
  - Factor analysis
  - Principal components

Each of the above possibilities will very likely produce different results, so we need to define the particular characteristics that are of interest -or- might favor one of the calculations as a keynote estimator (*also a topic for future discussion*). Most of these calculations can be performed in Excel spreadsheets, and several of these methods will be described below. The phrase "*set of points*" or "*FFT points*" refers to the anomalous frequencies manually picked from the FFT plot.

F.4.a HARMONIC OVERTONES as an Estimate of Keynotes

– see B. Hero and sections C.3 and C.4 for an introduction to overtones.

(1) Harmonic series can show the common frequencies that appear in the overtones and any correlation to the FFT points. These common frequencies may be related to known issues or they could just be mathematical artifacts. Comparison of frequencies to a database and templates should resolve whether there really should be a relationship or merely a math artifact.

The calculation of harmonic overtones for either a 12- or 16-based series is easily performed by applying the appropriate set of Lambdoma factors directly to the *set of FFT points*. For example, the 16th-based series would start at 1.000 (ratio of 16/16), then 1.0625 (17/16), 1.125 (18/16), etc., up to 1.9375 (31/16) as shown in C.4 and the separate Lambdoma matrix file. The result is a matrix of values as partially shown in the following spreadsheet from Nick Clark.

Table showing a partial list of harmonic overtones with color matching to FFT points.

					major tone		Major third				perfect fifth
	FFT points	dir	**1.00** n=1	1.0625 2	**1.125** 3	1.1875 4	**1.25** 5	1.3125 6	**1.375** 7	1.4375 8	**1.5** 9
	?		**ßeta**								
1	4.03	**L**	**16.10**	**17.11**	18.12	19.12	20.13	21.14	22.14	23.15	24.16
2	130.37	**H**	**16.30**	17.32	18.33	19.35	20.37	21.39	22.41	23.43	24.45
3	267.34	**H**	**16.71**	17.75	18.80	19.84	20.89	21.93	22.97	24.02	25.06
4	134.17	**H**	**16.77**	17.82	18.87	19.92	20.96	22.01	23.06	24.11	25.16
5	136.97	**HH**	**17.12**	**18.19**	19.26	20.33	21.40	**22.47**	23.54	24.61	25.68
6	548.60	**L**	**17.14**	**18.22**	19.29	20.36	21.43	22.50	23.57	24.64	25.72
7	69.58	**L**	**17.40**	18.48	19.57	20.66	21.74	22.83	23.92	25.01	26.09
8	574.43	**S**	**17.95**	19.07	20.19	21.32	**22.44**	23.56	24.68	25.80	26.93

FFT **ßeta**

Continuation of the harmonic overtones:

Lambdoma factors

1.5625					major seventh		octave	
1.5625 n=10	**1.625** 11	1.6875 12	**1.75** 13	1.8125 14	**1.875** 15	1.9375 16	**2** 17	***sqrt 2 opposite***
								Beta
25.16	**26.17**	27.18	28.18	29.19	30.20	31.20	16.10	*22.77*
25.46	26.48	27.50	28.52	29.54	30.56	31.57	**16.30**	*23.05*
26.11	27.15	28.20	29.24	30.28	31.33	16.19	16.71	*23.63*
26.21	27.25	28.30	29.35	30.40	31.45	**16.25**	16.77	*23.72*
26.75	27.82	28.89	29.96	31.03	**16.05**	16.59	**17.12**	*24.21*
26.79	27.86	28.93	30.00	31.07	**16.07**	16.61	**17.14**	*24.24*
27.18	28.27	29.35	30.44	31.53	**16.31**	16.85	17.40	*24.60*
28.05	29.17	30.29	31.41	**16.27**	16.83	17.39	17.95	*25.39*

n^{th} overtone of the harmonic series = **FFT ßeta** value * **n^{th} Lambdoma factor**

e.g., for the first **FFT ßeta** value of **16.10**, the 10^{th} overtone = **16.10** * **1.5625** = **25.16**

One useful summary of the harmonic overtones would be to count the number of matches for the *set of points*, then rank the values from the highest number of matches down. This process could be performed for the base, opposite and/or the fifth values. Another useful summary would be to find the harmonic series with the most matches to the anomalous FFT points.

(2) The common overtones (averages within a tolerance or fudge factor) that were found for values of the harmonic series for the full set of points above is:

#of Hits above =	****7**	**5**	**5**	***5**	**5**	**5**	**5**	**5**	**4**
Frequency :	**22.47**	**17.12**	**16.28**	**16.05**	**19.26**	**20.33**	**26.13**	**18.09**	**18.19**

By themselves, overtones may not give a realistic estimate of the Keynotes or the underlying factors of the anomalous FFT points because of the number of common or anomalous frequencies. Additional calculations such as averaging values within a small tolerance may be needed.

Taking the highest # of Hits from the common overtones, the following were selected:

1st Overtone *R*esonance *f* requency = 22.47

2nd Overtone *R*esonance *f* requency = 17.12 which is also the highest FFT point

3rd Overtone *R*esonance *f* requency = 18.19 strongest common *f* requency

Without having the prior information about common frequencies (see also p. F-14 example), it would be harder to pick out the important overtones from the list above. However, the common overtones do seem to confirm the previous results using only the most anomalous FFT points and 16-based series.

(3) A statistical distribution is another way to look at all of the harmonic overtones. It is a simple method that can be used to see the clustering of individual frequencies. The statistical distribution of overtones may not produce definitive estimates of the Keynotes, but it does provide a simple way to generate comparisons for other calculations.

Excel was used to perform all of the calculations for the overtones shown above. The further you take an analysis in Excel, the more complex the calculations become. Certain functions like sorting usually require user interaction in the process.

F.4.b MUSICAL RELATIONSHIPS as an Estimate of Keynotes

(1) Wheel subsets as a basis for Keynotes

FFT Point	Wheel Base	Opposite of base	Third	Fourth	Fifth	Sixth	Match Tolerance = +/- 0.04
136.970	17.121	24.213	20.361	22.857	25.649	28.794	
267.336	16.709	23.629	19.870	22.306	25.031	28.100	
413.090	25.818	18.256	30.703	17.234	19.339	21.710	
576.430	18.013	25.475	21.422	24.048	26.986	30.294	
289.550	18.097	25.593	21.521	24.160	27.111	30.435	
431.150	26.947	19.054	16.023	17.987	20.185	22.659	
5.010	20.040	28.341	23.832	26.754	30.022	16.851	
27.670	27.670	19.565	16.453	18.470	20.726	23.267	
25.630	25.630	18.123	30.479	17.108	19.199	21.552	Pod with the most matches

The matching frequencies that are found in the 17.121 and **18.097** pods are fully contained in the frequencies in the **25.63** pod, which has the most matches to the FFT base points. The matching frequencies in pods 17.121 and 18.097 would then be subsets of the frequencies in the 25.63 pod according to set theory, and **25.63 would be the union or common value** of the three pods. These three FFT base points are related by the musical relationships derived from the 12-note wheel, without regard to any possible correlation (*applicability*) to health issues.

Considering again the definition of **Keynote** as ***the resonant note, or spectral frequency and the resultant chord surrounding that note***, the question is then, How could we use the deduced relationship of the three base frequencies as an estimate of the keynote?

The simplest estimate of a keynote would be to use the **25.63** directly, since it seems to be the underlying frequency of the example above. The simplicity of this process has some practical advantage, and the pod values show possible relationships of other base frequencies, so we have established links from **25.63** to the 17.121 and **18.097** values.

Another estimate of a keynote could be to use the ***simple average*** of the three base values:

Simple Average = 60.848 / 3 = 20.283 (rounded up).

Another level of complexity in calculating an average could be to use all of the values for the common frequencies to **take into account the relative occurrence** of the values:

Average = (25.63+25.593+25.649 + 17.121+17.108 + 18.097+18.123) / 7 = **21.046**

Since there are more values around 25.63, it will have a greater influence on the average. This type of calculation gives more ***weight*** to the most common value from a mathematical viewpoint.

Obviously, there is quite a difference between 20.283 and 21.046 when we are considering beta octave frequencies. These two averages would produce quite different correlations using any of the frequency databases.

(2) Resultant Tone Differences – Nick Clark

Resultant tones were shown in the earlier section on Common Frequencies, where the base tone and opposite of the base were used. Unfortunately, that set of values did not show additional commonalities in the example or in other cases that were tried.

However, there is another set of resultants which are the differences between each FFT point. Resultants have a potential advantage over the harmonic series and frequency wheels, in that this set of data shows the direct relationship between the FFT base points.

The following partial matrix shows a simple tabulation of the resultant differences for this set of base tones. The base tones are shown down the first column and just above the diagonal for ease of reference. Blank lines and columns were added to improve readability.

The upper triangle of this matrix would duplicate the lower triangle, and it has been omitted. The difference between the same base values, e.g., 21.759 – 21.759, has also been omitted along the diagonal line.

Matrix of Differences

Base *f*	**21.759**	**22.408**	**22.698**	**23.022**	**23.415**	**23.682**	**24.613**	**24.827**
21.759								
22.408	**0.6484**							
22.698	0.9383	0.2899						
23.022	1.2628	0.6143	**0.3245**					
23.415	1.6556	1.0072	0.7173	0.3928				
23.682	1.9226	1.2742	0.9843	0.6599	0.267			
24.613	2.8535	2.2050	1.9152	1.5907	1.1979	0.9309		
24.827	3.0672	2.4188	2.1289	1.8044	1.4116	1.1446	0.2137	
24.941	3.1815	2.5331	2.2432	1.9188	1.5260	1.2589	0.3281	0.1144
26.047	4.2876	3.6392	3.3493	3.0249	2.6321	2.3650	1.4342	1.2204
26.268	4.5090	3.8606	3.5707	3.2463	2.8535	2.5864	1.6556	1.4418
26.966	5.2066	4.5581	4.2683	3.9438	3.5510	3.2840	2.3531	2.1394
27.346	5.5865	4.9380	4.6482	4.3237	3.9309	3.6639	2.7330	2.5193
27.375	5.6153	4.9669	4.6770	4.3525	3.9597	3.6927	2.7618	2.5481
27.405	5.6459	4.9975	4.7076	4.3831	3.9903	3.7233	2.7924	2.5787
27.833	6.0732	5.4248	5.1349	4.8105	4.4176	4.1506	3.2198	3.0060
29.084	7.3243	6.6758	6.3860	6.0615	5.6687	5.4017	4.4708	4.2571
29.663	7.9040	7.2555	6.9657	6.6412	6.2484	5.9814	5.0505	4.8368
30.886	9.1269	8.4784	8.1886	7.8641	7.4713	7.2043	6.2734	6.0597

The light green shading above shows two octaves of the same difference, which points out the problem with looking at raw resultant differences: these values are in several octaves which make it difficult to spot commonalities that could be keynotes.

One obvious choice to improve the appearance of the differences would be to calculate beta octave values, and this was tried. An alternate approach is to use octave shifting to standardize these values into the fundamental range or the 1.0 to 2.0 octave as shown on the next page.

Resultant differences matrix with similar values color coded:

Matrix of Fundamental Differences

	21.759	22.408	22.698	23.022	23.415	23.682	24.613	24.827	24.941	26.047
21.759										
22.408	**1.297**									
22.698	1.877	**1.160**								
23.022	1.263	1.229	**1.298**							
23.415	1.656	1.007	1.435	1.571						
23.682	1.923	1.274	1.969	1.320	1.068					
24.613	1.427	1.103	1.915	1.591	1.198	1.862				
24.827	1.534	1.209	1.064	1.804	1.412	1.145	**1.710**			
24.941	1.591	1.267	1.122	1.919	1.526	1.259	1.312	1.830		
26.047	1.072	1.820	1.675	1.512	1.316	1.183	1.434	1.220	1.106	
26.268	1.127	1.930	1.785	1.623	1.427	1.293	1.656	1.442	1.327	1.771
26.966	1.302	1.140	1.067	1.972	1.775	1.642	1.177	1.070	1.013	1.838
27.346	1.397	1.235	1.162	1.081	1.965	1.832	1.367	1.260	1.202	**1.299**
27.375	1.404	1.242	1.169	1.088	1.980	1.846	1.381	1.274	1.217	1.328
27.405	1.411	1.249	1.177	1.096	1.995	1.862	1.396	1.289	1.232	1.358
27.833	1.518	1.356	1.284	1.203	1.104	1.038	1.610	1.503	1.446	1.786
29.084	1.831	1.669	1.596	1.515	1.417	1.350	1.118	1.064	1.036	1.518
29.663	1.976	1.814	1.741	1.660	1.562	1.495	1.263	1.209	1.181	1.808
30.886	1.141	1.060	1.024	1.966	1.868	1.801	1.568	1.515	1.486	1.210

Continuation of the matrix of Fundamental Differences

26.268	26.966	27.346	27.375	27.405	27.833	29.084	29.663
1.395							
1.077	1.520						
1.106	1.635	1.846					
1.137	1.757	1.902	1.958				
1.564	1.733	1.947	1.832	**1.709**			
1.408	1.059	1.738	**1.709**	1.678	1.251		
1.697	1.349	**1.159**	1.144	1.129	1.831	**1.159**	
1.154	1.960	1.770	1.756	1.740	1.527	1.803	1.223

Note the multiple repeating values (or rhythms) that are evident in the differences matrix above.

Calculate Keynote *f* requency = common differences above * 16 :

1st Keynote *R*esonance = **1.159** and *f* requency = 18.544
2nd Keynote *R*esonance = **1.298** and *f* requency = 20.768
3rd Keynote *R*esonance = **1.709** and *f* requency = 27.344

Resultant Tone Keynotes for the example shown on page F-14 :
note that the first two keynotes below were used as Series_1 and Series_2 in that example.

1st Keynote *R*esonance = **1.007** and *f* requency = 16.114
2nd Keynote *R*esonance = **1.451** and *f* requency = 23.216
3rd Keynote *R*esonance = **1.505** and *f* requency = 24.080
4th Keynote *R*esonance = **1.647** and *f* requency = 26.353

The unapparent connection is more powerful than the apparent one. -Heraclitus

Comments on the use of Resultant Differences as keynotes:

The use of the fundamental octave seemed to make it easier to find common values for use with the Excel conditional formatting feature. The color coding that is shown on the previous page was only used on values that appeared three or more times. Particularly in the full matrix of differences, there are several pairs of common values which may make the selection of keynotes somewhat more artful and less deterministic.

The tolerance factor used to select the common differences was 0.002, which is equivalent to a value of 0.032 (16 * 0.002) in the beta octave. Increasing the tolerance factor would obviously affect the number of common differences or keynotes that could be found with this process. Other possible factors that could be used are 0.0025 (0.04 beta) and 0.003 (0.048 beta).

Since there are several resultant values within the tolerance used for matching, it seems logical to average the individual values to determine the keynote. Thus, the matching values 1.297, 1.298 and 1.299 (light green in the matrix) can be averaged to 1.298, and so on.

Once the common differences are selected, they would need to be converted into the beta octave. This, of course, is done by multiplying the fundamental values of the common differences by 16. For the example above, 1.298 x 16 = 20.768

NOTE: In keeping with our objective of giving credit where credit is due, it must be stated that this process was not developed by the authors. **It was suggested by an independent researcher, *Nick Clark, MFT*, who was trained in both mathematics and psychology**. Nick originally called these keynotes by the term ***Resultant Tones Resonant Values***.

The basis for the resultant difference keynote process shown above was also described by Ingo Titze in 1994 as the first order Finite Difference (perturbation) of a set; see **34/** page 13. There are several **finite difference calculations, *? f*** or resultant tones, suggested in this reference:

0th order : $? f_{0i} = f_i - f_{mean}$ (f_{mean} = average *f* requency of the set)

1st order : $? f_{1i} = f_i - f_{i-1}$ ✍ **the resultant tone differences above**

2nd order : $? f_{2i} = f_i - (f_{i+1} + f_{i-1}) / 2$

(3) Resonance Factors and PHI values

Considering only a ***single frequency*** of interest, the harmonics are immediately available as a 16^{th}-based series from the Lambdoma matrix as shown in previous sections. This set of values taken together will have some probable *R*esonance values which may be estimated through the use of the following two factors.

> ***1st*** Keynote *R*esonance = *f*requency * 1.107 and
>
> ***2nd*** Keynote *R*esonance = *f*requency * 1.354

Then, whatever frequency is of interest, simply multiply it by the two factors above and look up possible associations to these resonance estimates. The opposite values of these two estimates could also be looked up in a database as well.

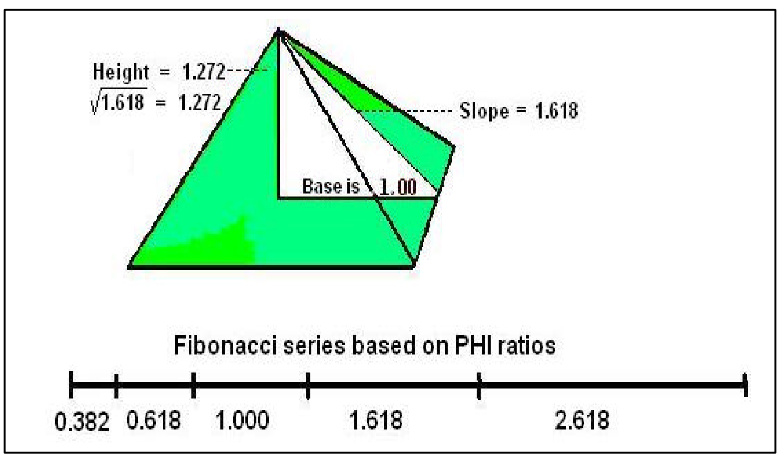
For the common *f*requency of 18.14 (equivalent to the element of germanium) determined in the example on page F-13, the estimated *R*esonance values are:

> ***1st*** Keynote *R*esonance = 18.14 * 1.107 = 20.08; opposite = 28.40
>
> ***2nd*** Keynote *R*esonance = 18.14 * 1.354 = 24.56; opposite = 17.37

Explaining the musical derivation of these two factors would require an involved discussion that would not add to or advance understanding the concept of keynotes. The factors above were also observed during the calculation of keynotes for various harmonic series of single frequencies.

– – – – – – – –

There is a singular proportion which allows wavelengths (frequencies) to add and multiply, and it is the factor of 1.618, the PHI Golden Mean ratio. The PHI ratio has been used in sophisticated art work and architecture since at least the time of ancient Egypt and possibly Summeria.



Man and nature embody the PHI ratio in countless ways; e.g. the great pyramid of Egypt. The human body incorporates the PHI ratio in a number of ways, which was illustrated by Leonardo Da Vinci.

The Fibonacci series based on PHI is additive, but it is unique in that ***each number multiplied by the PHI ratio 1.618034 equals the following value of the series.***

> ***PHI*** Keynote *R*esonance = 18.14 * 1.618 = 29.35; opposite = 20.75

F.4.c STATISTICAL MEASURES as an Estimate of Keynotes

Using averages of common values was introduced in the previous section under "Wheels, Pods and Triads as a basis for Keynotes". Averaging, or more properly the calculation of the mean, indicates the central tendency of a set of values, and it is a common and convenient statistical characteristic or parameter. The use of averages is in uncharted waters for sound informatics.

From a strict statistical viewpoint, **characteristics such as the average** or mean are technically termed ***parameters*** if it describes the population (here the entire set of FFT voice frequencies). The characteristics are termed ***statistics*** if refers to samples such as the set of anomalous FFT values chosen for analysis. An introduction to statistics can be found in many textbooks.

The Harmonic Mean was introduced in section D.8 of book I Concepts, and it is a characteristic that could be used as an estimator of Keynotes. There is also a calculation known as the Quadratic Mean which is better known in mathematics as the standard deviation. Both of these characteristics could be topics for future discussion, and they deserve some research in the practical application of sound therapy.

None of the characteristics that have been described from common frequencies to statistical measures are difficult to calculate, any more than the following processes. The difficulty in using any technical analysis process is developing a "*feel*" for the meaning of these results that are determined from the process. This *feel* comes from trying to correlate the results with the various calculated sets (wheels, pods, etc), and then testing any frequency that appears to be significant.

Titze **34/** also describes in general how to work with trends (a simple pattern) in the voice. For the 1st order finite differences calculation,

$$1^{st} \text{ order}: \quad P_{1i} = (f_i - f_{i-1}) - k,$$

where the constant k is calculated from a simple linear regression, which is a commonly used technique in statistical analysis.

Principal Components and Factor Analysis

http://www.statsoftinc.com/textbook/stfacan.html

The main applications of factor analytic techniques are: **(1) to *reduce* the number of variables** and **(2) to *detect structure* in the relationships** between variables, that is to *classify variables*. Therefore, factor analysis is applied as a data reduction or structure detection method (the term factor analysis was first introduced by Thurstone, 1931).

In correlational research we do not influence any variables, but only measure them and look for relations (correlations) between some set of variables, such as frequency and amplitude. In order to take advantage of these methods, the "FFT program" needs to record amplitude in addition to frequency at each selected point to provide a dataset with two variables.

F.5 Frequency Associations

Some introductory quotes from Ted Andrews in Sacred Sounds, page 33:

> *"It is not the number of notes within a particular scale that provides it force or impact, but rather it is the succession. The relationship between one note and the next provides the clue to the use of music for healing."*
>
> *"It is the order in which they are played, in conjunction with the rhythm, that creates the impact. Certain combinations of tones and rhythms have very specific effects upon our physical, mental, emotional and spiritual states."*

Our current operating principle is that if we can "find" the tones or energies that are appropriate for each individual, then we can learn to combine the additional related tones to link energies together and rebalance the body.

The table below shows a common frequency of **~21.30**, shared by the calcium and magnesium harmonic series, with another commonality between series 1--3. Remember that 21.29 / 30.12 are related as the *base / opposite* of each other. The **15.98** is on three series (copper, magnesium and the 21.30 series), and its opposite is on the calcium series. It seems likely that oxygen (ßeta octave of 16.00**)** is another ingredient that is needed to allow these minerals to work together, which you might have expected if you think about metabolic processes in the body.

A	B	C	D	E	F	G	H	I	J
	Series 1		Series 2		Series 3		Series 4		Series 5
	16.350		20.040		24.360		21.300		30.120
	17.372		21.293		25.883		22.631		**16.001**
	18.394		**22.545**		27.405		23.963		16.943
	19.416		23.798		28.928		25.294		17.884
	20.438		25.050		30.450		26.625		18.825
	21.459		26.303		**15.986**		27.956		19.766
	22.481		27.555		16.748		29.288		20.708
	23.503		28.808		17.509		30.619		21.649
5th	24.525		30.060		18.270		**15.975**		22.590
	25.547		31.313		19.031		16.641		23.531
	26.569		16.283		19.793		17.306		24.473
	27.591		16.909		20.554		17.972		25.414
	28.613		17.535		**21.315**		18.638		26.355
	29.634		18.161		22.076		19.303		27.296
	30.656		18.788		22.838		19.969		28.238
	31.678		19.414		23.599		20.634		29.179
	16.350		20.040		24.360		21.300		30.120
	Zinc		**Calcium**		**Magnesium**		**Common. frequency**		**Copper**

* Note that 30.12 is the approximate ßeta value of organic copper, Cuproxoline. The remaining questions are "***which of these frequencies should be used*** (20.04, 24.36, 30.12, 21.30 and/or 16.00/32.00), and ***in what order should they be used in sound therapy to support the body?"***

Harmonic Frequency Associations for a single FFT point of interest:

The following spreadsheet shows the calculation of four harmonic series based on one FFT point; the Highest High (HH) in this example. Color coding is done with conditional formats.

	A	B	C	D	E	F	G	H	I	J	K	L
1		Sort #1								Toler.=	0.04	
2		columns			Harmonic Frequency Associations					Enter Search Values :		
3		A - C								28.71	17.2	22.965
4	key on C				Base		r = 3 : 2		r = 5 : 4		r = 7 : 4	
5	65.4867	S	16.372		22.965		30.620		18.372		26.246	
6	33.1954	LL	16.598		24.400		16.267		19.520		27.886	
7	279.671	L	17.479		25.836		17.224		20.669		29.527	
8	140.255	L	17.532		27.271		18.181		21.817		31.167	
9	588.142	L	18.379		28.706		19.138		22.965		16.404	
10	295.169	L	18.448		30.142		20.095		24.113		17.224	
11	152.8369	S	19.105		31.577		21.051		25.262		18.044	
12	309.443	S	19.340		16.506		22.008		26.410		18.864	
13	633.538	H	19.798		17.224		22.965		27.558		19.684	<--5th
14	20.0228	L	20.023		17.942		23.922		28.706		20.505	
15	20.6823	S	20.682		18.659		24.879		29.855		21.325	
16	10.3795	L	20.759		19.377		25.836		31.003		22.145	
17	166.1355	H2	20.767		20.095		26.793		16.076		22.965	
18	680.796	L	21.275		20.812		27.750		16.650		23.785	
19	86.7977	L	21.699		21.530		28.706		17.224		24.606	
20	356.819	H	22.301		22.248		29.663		17.798		25.426	
21	183.7213	HH	22.965									
22	369.137	H	23.071		45.930		61.240		36.744		52.492	Octave
23	747.568	L	23.362									
24	195.1924	H	24.399		Δ *f* =		28.706	-	17.224	==>	22.965	
25	422.83	S	26.427						11.483			
26	456.669	L	28.542									
27	229.367	L	28.671		Δ *f* =		22.965	-	17.224	==>	22.965	note
28	474.615	H	29.663						1.435			
29			0.000									
30			0.000		Δ *f* =		22.965	-	28.706	==>	22.965	
31			0.000						5.741			
32			0.000									
33			0.000									
34			0.000									
35												
36	Enter FFT data											

The three harmonic series to the right of the selected base frequency are calculated from the Base frequency and the ratios that are shown at the top of the columns. The associations shown by the lines should remain the same for any Beta octave value (16 to 32).

This example shows that the FFT point with Beta frequency of 28.67 is prominently associated with the selected HH point. The base values of the three harmonic series calculated from the selected HH of 22.965 would be of interest to correlate with possible health issues.

Note the relationship of the prominent frequencies shown by the finite difference ? *f* .

<u>**Frequency Associations:**</u> <u>A BIO-ENERGETIC Question</u>

How does the body distinguish between the following compounds when a frequency of 21.0, 21.01 or 21.02 is perceived? **Does it make sense that the body can know exactly what to do with a single frequency when there so many possibilities?**

Molecular Weight	***Beta Octave***	***Perfect Fifth***	***Description of biochemical compound***
84.01	**21.002**	**31.5**	**Sodium Bicarbonate; antacid; alkalizer = baking soda**
168.11	**21.014**	**31.515**	**Uric Acid; nitrogen body waste**
336.47	**21.029**	**31.545**	**Leukotriene A4 & B4**
336.48	**21.03**	**31.515**	**Fentanyl, opiate - used in Moscow theater raid**
1346.47	**21.038**	**31.560**	**Hydroxocobalamin - vitamin B12**
336.70	**21.044**	**31.566**	**Mercury Salicylate (Vaccines Preservative)**
336.74	**21.046**	**31.569**	**Phenylmercuric Acetate - Toxin**
42.1	**21.05**	**31.575**	**Cyanamide - Toxin**
1347.65	**21.057**	**31.59**	**Substance P; released during pain**

** Note that there are several other toxins in the range 21.0 to 21.06 not listed above.

Even if we restrict our considerations to the same molecular weight, there are still four compounds at a frequency of ~336.6 +/- , and they have considerably different effects on the body. Note also that there are two compounds at a frequency of ~1346.

Possible correlation to health issues, 21.03 +/- .03 :

Sodium Bicarbonate ✍ acidic condition; digestion
Uric acid ✍ Gout, if High FFT point
Leukotrienes ✍ hypersensitivity reaction, inflammations
Hydroxocobalamin ✍ Vitamin B12 issue
Substance P ✍ pain

If we wanted an antacid, should we use the molecular weight of 84.01 for Sodium Bicarbonate instead of the Beta wave value? If the person happened to be taking the thyroid medication Liothyronine sodium (synthetic T3 hormone), which has a Mol. wt = 672.96 or Beta value of 21.03, then this medication could be an issue.

> If the body wants a particular frequency, as shown through biofeedback testing, then we should use it. The possible frequency associations, as above, may not show what the body is going to do with a frequency. The issue of what additional frequencies (notes) to use will not be addressed here. Related frequencies from a wheel, pod subset, harmonic series or keynote resonances could be of use, but additional testing would be required.

F.6 Frequency scanning of the body

Introduction to the F-Scan -- **http://www.energetic-medicine.net/f-scan.html**

The F-Scan is a device that uses resonating frequencies to investigate the state of the human body. The F-Scan has the ability to detect the frequency at which infections, viruses and other forms of illness resonate. After detection of various maladies, the F-Scan is then able to zap the target at an exact frequency. The greatest advantage of the F-Scan is its ability to treat cells without damaging any surrounding tissue.

The F-Scan uses a standard desktop or laptop PC to receive and process data through a windows interface. The F-Scan can apply the frequency directly to the body, or can be used to drive a Rife/Bare (plasma tube) device. The F-Scan works through a touch pad system. The individual has two contacts attached to the middle finger of their right hand. In the left hand, the patient holds a cylinder. The F-Scan first takes a baseline reading, recording the conductivity and personal standard resonance level. All readings are compared with this and are relayed to the PC where the individual's information can be logged.

The F-Scan's scanning function allows you to automatically scan through a wide range of frequencies. The F-Scan recognizes and records resonant frequencies, which are then stored in your PC. The F-Scan recognizes and stores up to 80 frequencies in order to target them in later direct application of the frequencies.

SCENAR - cell repair and pain management - http://www.energetic-medicine.net/scenar.html

In principle the Scenar device works as a catalyst on the body's immune system. The Scenar reads the resistance level of the skin and relays this information to the brain via the skin itself. This accelerates the body's healing mechanism through stimulation of the neuropeptides in each damaged cell. The Scenar may aid the body through triggering the healing process in damaged cells. In addition the Scenar could be used to treat individuals whose bodies do not repair themselves properly as a result of chronic illness. A classic example of this is sufferers of fybromyalgia where the Scenar may act as a regeneration and pain management tool.

The SCENAR was a development of the Cold War space program. The Russian space center developed it to overcome unique problems of space travel. Pharmaceuticals were impractical due to the specificity of each drug, leading to a need to store a large variety and quantity of drugs, and also due to the introduction of toxins into the water recycling system, such that one treatment may well treat the whole crew.

A Russian team of doctors and scientists, based at Sochi University and led by Alexander Karasev in the late 1970s, developed a method of treatment that was energy efficient, multi-applicable, portable and also non-invasive. They were the first people to achieve repeatable therapeutic treatment using electrical signals to stimulate the immune system.

NOTE: the devices described above are neither recommended nor sold by the authors. These descriptions were taken from the websites and are provided for informational purposes only.

Example Spreadsheet with Resonant Frequencies from scanning the body:

	A	C	D	F	G	H	J	L	M	N
1	Sample frequency scan April 2003									
3	Enter	Scanned							Sorted	
4	Freq	Beta	Opposite	C-2 octave	C-1 octave			Beta	Opposite	final
5	1021.5	31.922	22.572	127.688	255.375		1	16.165	22.861	129.3
6	1045.9	16.342	23.111	65.369	130.738		2	16.342	23.111	130.7
7	1784.0	27.875	19.711	111.500	223.000		3	18.988	26.852	151.9
8	1931.3	30.177	21.338	120.706	241.413		4	19.036	26.921	152.3
9	2430.4	18.988	26.852	75.950	151.900		5	19.137	27.064	153.1
10	2451.1	19.149	27.081	76.597	153.194		6	19.149	27.081	153.2
11	3470.8	27.116	19.174	108.463	216.925		7	22.326	31.574	178.6
12	3521.4	27.511	19.453	110.044	220.088		8	22.378	31.647	179
13	3889.0	30.383	21.484	121.531	243.063		9	26.965	19.067	215.7
14	3961.3	30.948	21.883	123.791	247.581		10	27.116	19.174	216.9
15	5715.5	22.326	31.574	89.305	178.609		11	27.123	19.179	217
16	5728.7	22.378	31.647	89.511	179.022		12	27.511	19.453	220.1
17	6903.1	26.965	19.067	107.861	215.722		13	27.875	19.711	223
18	6943.4	27.123	19.179	108.491	216.981		14	30.177	21.338	120.7
19	8136.9	31.785	22.475	127.139	254.278		15	30.383	21.484	121.5
20	8276.6	16.165	22.861	64.661	129.322		16	30.948	21.883	123.8
21	9746.5	19.036	26.921	76.145	152.289		17	31.785	22.475	127.1
22	9798.1	19.137	27.064	76.548	153.095		18	31.922	22.572	127.7
23	0.0						19			
24	0.0						20			

This actual body scan example, shows some interesting correlations in the two Beta pairs shown in red in columns L and M above. Notice the base-opposite relationship of these two pairs, which is illustrating the harmonics in this data. There are two additional pairs above, shown in blue.

The resultant tone difference keynotes for this resonant body scan data are as follows:

***1**st* Keynote *R*esonance = **1.1488** and *f* requency = 18.381

***2**nd* Keynote *R*esonance = **1.5547** and *f* requency = 24.875

***3**rd* Keynote *R*esonance = **1.6500** and *f* requency = 26.400