

INTERNATIONAL BIOCENTRIC FOUNDATION

Thesis for a Biodanza Facilitator certificate

Sharon Summer Shapira



SISTEMA ROLANDO TORO

From Chaos to Harmony

The Mathematical Magic of Biodanza

ABSTRACT

What is the connection between Mathematics and Biodanza? This work suggests looking at mathematics in a different light, one that I feel Rolando perceived.

Personally, I see mathematics in many unexpected places in life - taking a walk on the beach, looking into starry skies and in biodanza.

Writing this monography led me to reread and rethink some of Rolando's theoretical and methodological descriptions.

My method of research is an in depth reflective comparative study based on chosen conceptual cases. I present a proper mathematical definition and a personal observative description of their reflection in biodanza.

Biodanza works with our bodies and our souls but what does this have to do with mathematics? Dancing chaos in a non-linear manner seems the exact opposite of math. Yet chaos theory is a branch of mathematics which delves in areas that we don't understand but motivates us to try. People who love math love an unexplainable mess and will spend much time and effort trying to make sense of it.

Biodanza has led me to dance myself from chaos into harmony while releasing familiar rationalizations and aesthetic efforts. With the help of mathematical models, I enjoy understanding in retrospect what the *bleep* just happened.

Rolando presented us with specific mathematical models that I feel were overlooked and built a system that correlates perfectly with others that I present here.

Mathematic models can help us on the journey of trying to understand the power of biodanza. The noise and chaos around us reach us through sinewaves that enter our bodies and souls through different logarithmic spirals, both physical and metaphorical. These waves of information move toward our inner and outer infinities, empowering our essence and releasing us from unhealthy tendencies. This often leads us away from depression and towards the motivation to live.

Through biodanza we strive to return to our natural movements such as sine wavelike motion. Understanding how we affect our frequency and amplitude in life, presents us with tools to help our growth. The role of our sinuous (inflection) points as a reflection of synchronization with humanity and with nature, can induce in us a sense of harmony of the spheres that bring us a sense of joy and well-being.

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Introduction

The term 2E or twice-exceptional learners is a term for students who demonstrate talent in certain fields such as mathematics which is perceived as positive, along with a behavioral, learning or attention disorder, such as ADHD (an attention disorder referring to people who are either over or under focused), which is perceived as negative (Klingner, 2022). These individuals, whose gifts and disabilities often mask one another, are difficult to identify. A profound negative effect of unidentified **2E** is a high correlation to self-medication and drug abuse (Molina & Pelham 2014). As an experienced Math teacher, I've seen identified ADHD often treated with Ritalin. In both cases ADHD and narcotics are often connected. I now realize that I am 2E: I was identified as mathematically gifted at a young age of 7, I was diagnosed with ADHD at a late age of 52. I used narcotic substance from age 12 – 58. I love and see math in everything. It calms me and the world make sense. I first encountered biodanza at the age of 54. I immediately felt at home. From my first session up until today I experienced mathematical concepts. I never felt this way with any other type of dance that I experienced. This connection of dance and math felt new and exciting to me. At the biodanza school we study life sciences, natural sciences, philosophies and mythologies. We always leave room for mysticism but I never heard anyone speak of the mathematical models used in biodanza. Therefore, I was quite surprised to read about a variety of mathematical models in the biodanza theoretical units. I personally experienced a deep and essential healing process through Biodanza. My goal in this work is to recognize, discover and describe mathematical models in biodanza and understand their impact on well being

Research question:

What is the mathematical basis of Biodanza?

How can mathematical models recognized in the theoretical units and methodologies of biodanza help us in real life?

In the 2nd chapter I will describe my motivation, my diagnosed ADHD and my mathematical and musical upbringing;

In the 3rd chapter I will detail my research method;

In the 4th chapter I will present mathematical models I found in the theoretical units and the methodologies: chaos and order, harmony of the spheres, the logarithmic spiral, the powers of infinity, the sinus wave and sinuous points;

In the 5th chapter I will elaborate on my findings;

In the 6th chapter I will draw conclusion and suggest further research.

My motivation - personal story

My father dreamed of being a pianist but in practice he was an electrical engineer. He loved math and always prepared calculations and logic games for us as fun activities. I remember family trips spent planning strategies how to meet up with my cousins A.S.A.P based on given speeds, directions and other constraints. Math was embedded in my everyday life as an enjoyable way of dealing with different situations. On the other hand, my father was a very talented piano player, choir conductor and synagogue cantor. My parents loved to dance and did so on a regular basis. My house was always full of music. My father, sister and I had a strong connection to mathematics and music. Both of these fields bring me joy. Throughout elementary school I was restless and had behavior issues. I remember being thrown out of class very often. But all was excused because of my high marks in math. As I grew into adolescence my behavior became more complexed.

These were some of my characters:

- A gift and love for problem-solving especially in the Mathematics
- Above average sensitivity, causing intense reactions physically and emotionally
- **Extremely low level of self-regulation**
- Low self-esteem due to perfectionism
- Poor social skills leading to anxiety, frustration and impatience
- **Strong ability to concentrate deeply** in areas of interest, curiosity
- **Noise - internal and external**
- Habit of jumping from one topic to another "all over the place"

My life experience is of very high expectations regardless of other complexities, a reality that made it difficult for me to live a balanced and integrated life.

Longitudinal studies of young children, not diagnosed with ADHD but followed into adolescence and adulthood, provide compelling evidence that early occurring behaviors, of the type that overlap with symptoms of ADHD, are signals of substance disorder risk (Molina,B & Pelham,W. 2014).

From the age of 12-58 I lived with a deep addiction to drugs.

Between 12- 52 I self-medicated, from age 52- 58 I was prescribed a large amount of Ritalin I found Biodanza at the age of 54.

Today I am nearly 62. I do not use or crave narcotics in any form.

The most important people in my life, my family, suffered from my imbalance.

I have lived most of my life between these extremes.

Between ADHD and mathematics. Between chaos and order.

Research Method

I sensed a mathematical basis of Biodanza in a personal and unique way. Being that this is an unexplored area, I felt a need to discover and expose this aspect of biodanza.

This required building from scratch an acceptable foundation of information.

I chose a comparative study since I found mathematical models in the theoretical modules of Biodanza that were described very differently than text book definitions I was familiar with. This study suggests a bridge between two very different types of attitudes and relations to these models. I compared the mathematical dry precise definitions to other possibilities of meaningful applications and metaphors related to biodanza.

Any type of survey or observation method, would assume that people knew what the mathematical foundation was thence be able to describe how they related to it.

In a future study, after this foundation is well defined, there will be an existing basis for reference.

My method of research is an in depth reflective comparative study based on chosen conceptual cases.

Comparative Research

Chaos Theory

We talk about, dance and celebrate chaos and order in Biodanza. Where did this concept come from? In everyday language "chaos" implies the existence of unpredictable or random behavior. However, in the scientific realm as in biodanza unpredictable behavior is not necessarily undesirable.

Chaos is an interdisciplinary scientific theory and a branch of mathematics.

- In the early 17th century, Johannes Kepler laid the foundations for modern celestial mechanics by discovering and formulating the laws of planetary motion.
- Isaac Newton then formulated a further simplification using the basic laws of motion and the law of universal gravitation. Newton published his laws in 1687 (Alain, 2019)
- In the beginning of the 20th century Albert Einstein showed, within the framework of the theory of relativity, that Newton's laws of motion are only approximately correct, because occasionally something unexpected happens.
- In the second half of the 20th century Dr. Edward N. Lorenz, an American meteorologist and mathematician, recognized what is now called chaotic behavior. Lorenz realized that small differences in a dynamic system could trigger vast and often unsuspected results, what is known as the butterfly effect (Szabó, 2010).

If we examine this history we notice a shift from the theories that stressed the absolute, the permanent character of knowledge, to theories that emphasize the relativity, the situation-dependence, the evolution of knowledge and its active interference with the physical world. In Newton's deterministic world the complex and unpredictable parts that did not fit the formula were called **noise** and treated as negligible. The noise shouldn't spoil the formula. Chaos theory puts an end to this suggestion because the noise is important, it is an essential part of the system and can initiate vast changes in our paths of life

For many years I experienced myself as noise. Unpredictable, complex and inconvenient; I tried to minimize myself most of my life and even that was too much.

Biodanza for me was the first place where my uniqueness was welcomed and I was encouraged to bring my whole chaotic self. Therefore, I find it surprising that the whole theory is based on a very simple and deterministic template:

Invitation A+ Dance B + Music C = Feeling D.

These feelings restore our vitality and genetic potentials, they heal us

They have the power to transform chaos into a creation that resonates harmonically with the spheres and converges into a sense of wholeness and joy,

Without this simple template, the system wouldn't work.

Rolando suggests moving from chaos to order through creativity.

"Creativity is an integral part of cosmic transformation, the path from chaos to order.

In humans this is expressed as a drive for innovation in the face of reality." (Toro R. creativity). Toro often mentions chaos and order in his theoretical model and in his dance methodologies. However, the similarities and correspondences between the exercises and mathematics have not been fully explored.

Harmony of the Spheres

The first concrete argument for a fundamental connection between mathematics and music was made by the philosopher and mathematician **Pythagoras** (569-475 BC), known as the "father of numbers" and also the "father of harmony". He discovered that certain specific ratios of string lengths created pleasant combinations ("harmonies") and others did not. Based on careful observations, Pythagoras identified the physics of intervals, or distances between notes, that form the harmonic system still used today (Sanders, 2015).

Pythagoras had access to information about the exact measurements of the Earth's dimensions and its distance from the Sun, the stars and the other planets. He knew how to describe the distances in distance units. But sometimes using musical theory, he would call the distance from the Earth to the Moon a whole tone, from the Moon to Mercury a half tone, from Mercury to Venus a half tone, from Venus to the Sun a three half tones, from the Sun to Mars a tone, from Mars to Jupiter a half tone, from Jupiter to Saturn a half tone and from Saturn to the fixed stars (zodiac) three half tones. Thus, he creates seven complete tones, which are called harmony of the spheres (Godwin 1992).

"Pythagoras established mathematical relationships between the musical notes and the orbits of the planets. "Music of the Spheres, also known as *Musica universalis* (lit. universal music), is a philosophical concept of Pythagoras that regards proportions in the movements of celestial bodies; the Sun, Moon, and planets, as a form of music. This 'music' was said by Pythagoras to be audible, but it was primarily a harmonic and mathematical concept. He proclaimed the unity of the universe and of the human being is conceived by this 'music of the spheres " (Toro, *Mythical & Philosophical origins of biodanza*).

***"Some of the central beliefs held by Pythagoras were
that at its deepest level, reality is mathematical in nature
that the soul can rise to union with the divine;
and that harmonious music was a mathematical purity with the potential to heal"
(Toro, creativity)***

The inherent properties of physics and mathematics in music, perceived long ago by Pythagoras, may help explain why many physicists and mathematicians are also musicians. This point is illustrated by a well-known quote from Einstein: "The theory of relativity came to me by intuition, and music was the driving force behind that intuition... My new discovery was the result of a musical perception" (Courson 2016).

The Logarithmic spiral

From chaos to order via a logarithmic spiral

What is a spiral?

A circular curving line that goes around a central point while getting closer to or farther away from it. (Britannica 2022)

Arithmetic Spiral (Archimedes spiral):

The equation of the spiral of Archimedes is $r = a + b\theta$, in which a and b are real numbers, r is the length of the radius from the center, and θ is the angular position of the radius

the distances between the turnings of an Archimedean spiral are constant

(Mathsbyagirl 2016).

The logarithmic spiral

The equation of the logarithm spiral is $\theta = \frac{1}{b} \ln\left(\frac{r}{a}\right)$

Any line segment drawn through the origin always intersects a logarithmic spiral at a constant angle

A spiral where the distance from the center increases in geometric procession.



Figure 1: the Archimedean spiral (left) and Logarithmic spiral (right)

A specific and very interesting case of the logarithmic spiral is the Fibonacci spiral, based on the Fibonacci sequence of numbers: 0, 1, 1, 2, 3, 5, 8, 13, 21, 34, each number is the sum of the two preceding it.

In this link we can observe how the golden spiral is formed ; [Fibonacci spiral](#) (mathing 2021).



Figure 2 : *the Fibonacci spiral in nature* Mirocha Paul (2021)

Rolando presents us with the Logarithmic spiral in more than one module

"Also known as the 'marvelous' or 'growth spiral' it is a shape found throughout nature. Examples where it appears include the shape and growth of shells, the spirals of galaxies, the flight patterns of hawks and numerous other places (Toro, *the vivencia*). It is a very efficient way of plants to organize themselves in order to maximize the use of the sun and rain.

DANCE OF CREATION

"We have taken the most universal elements in order to reproduce, in a dance, the personal vivencia of the creation of the world, the series of movements that lead from chaos to the cosmos. This process, in our conception, does not unfold in a closed or linear cycle; it corresponds to an evolutive model in a logarithmic spiral. The universe, therefore, is perfected through successive processes of integration of vital circuits, each time more differentiated. The integrative mechanism is communal love, the connection with life."
(Toro, *creativity*)

Integrating the lines of vivencia (Toro, *the vivencia*)

"The integration of the lines of vivencia, which express the genetic potential, represents the expression of the identity. The process of integration of the five lines is produced through the combinations of the lines with each other. A person's difficulty with integrating the lines produces different forms of dissociation and disorganization.

26 different combinations of the different lines. Rolando lists all 26 possibilities and claims that you can determine the level of integration of a person according to the number of combinations that he or she has "

(A, B, C, D, E)	minimum integration	5 singular lines	
AB, AC, AD, AE, BC, BD, BE, CD, CE, DE		10 Sets of 2	LEVEL 1
ABC, ABD, ABE, ACD, ACE, ADE, BCD, BCE, BDE, CDE		10 Sets of 3	LEVEL 2
BCDE, ACDE, ABDE, ABCE, ABCD		5 Sets of 4	LEVEL 3
ABCDE	maximum integration	1 Set of 5	LEVEL 4

The Joy of Living

The development of each line of vivencia and the degree of integration among the lines determines the enjoyment of life. When some lines are blocked or when there is no integration among them, the desire to live can decrease to the point of depression.

The level of integration of the five lines of vivencia is a profound reference related to the motivation to live. The desire to live, an essential category of existence, increases in logarithmic proportion to the degree of integration of the five lines of vivencia. We can extrapolate this mathematical metaphor to existential growth organized from the process of integration of the genetic potentials." (Toro, *the vivencia*)

These mathematical concepts integrated into the biodanza system fill me with happiness and a deeper understanding of who I am.

The Powers of Infinity

What is infinity? Used in everyday language we usually mean something very big without a limit. How does this definition hold up in exact science?

Is it random or an orderly structured? Is it really limitless?

Is there only one type of infinity.... The one and only?

In mathematics there are different sizes of infinity (Ben-Yaakov, 2012)

There is an infinity that is smaller than another infinity. The size of a group is called "the power" of the group.

- What is the power of the countable group of natural numbers 1, 2, 3, 4...

It was named aleph zero \aleph_0 at the end of the 19th century, by the German mathematician Georg Cantor. Any set that can be paired to the set of natural numbers so that every element in each set has one—and only one—"partner" is said to be countable and to have the same power \aleph_0 .

1,000,000, 1,000,001,it seems limitless, maybe something chaotic. But it is really very orderly. I know exactly who is next in line, like counting the stars in the sky

This type of infinity is orderly and unlimited. It grows at the end of the line.
- What is the power of the set of real numbers (for example between 0 and 1). Cantor gave them the name \aleph (aleph) Nowadays the tendency is to call it the power of the continuum and mark it with the letter c. Cantor proved that the real numbers are not countable and even proved that their power is given by the formula $c = 2^{\aleph_0}$ which means much greater than that of the natural numbers. What happens when I look between 0 and 1 on the x axis? Whatever formula someone offers, it can be proven wrong. In general, between every 2 decimal fractions you can always find one more. There is no system or order for the real numbers on the continuum x axis

This type of infinity is limited and chaotic.
- So actually, where is the chaos, inside or outside?

Are we coming or going? [Which way to infinity the golden spiral?](#) Jahobr (2017)

Examples from 2012 and 2018 catalogues

1. GENERATIVE POSTURES: Connection to Infinite

...The arms rise slowly, without lifting the shoulders, the palms facing each other as if trying to reach with your fingertips an imaginary point in the sky. The eyes are open throughout the dance.

2. COSMIC AFFILIATION

The individual dance begins with a deep connection with oneself, from which very slowly the arms and the head are gently raised towards the infinite. We are entering an experience of expansion of our identity and of feeling part of the totality.

3. CONNECTION WITH THE ANCESTORS

... From our parents to the first human beings we have a relationship with that we can extend to animals, nature and the cosmos... We continue in a dance with sensitive gestures of opening of chest and arms, raising them to infinity with a slight movement towards back, since we're diving into the memory of time.

These 3 dances are directed to the infinity in the sky , what I see as \aleph_0

4. Dance of the seed

"To reconnect with the infinite possibilities of growing and evolve from our own potential. The exercise of growth leads to a vivencia of exceptional strength."

5. Expression of Infinite Love

.... This attitude represents devotion to ***all humanity. Go within yourself and connect with love, awaken the love within you.*** It is a part that belongs to us; that no one controls."

6. DANCE OF THE IMAGINATION

Moreover, imagination develops its power in our inner world. . The dance is without known forms, outside the familiar patterns of movement. New and Infinite possibilities of richness of being.

These 3 dances are an invitation to explore the inner infinite possibilities. A connection between creativity and infinity. what I see as C or \aleph

Sine waves

- In a right angled triangle – remember high school ?

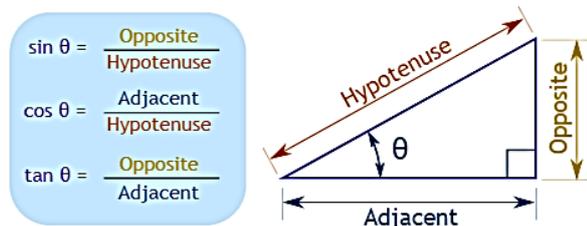


Figure 3 : [Math is fun](#)

- From a triangle to a circle

[definition of sine in the unit circle](#) (Mitchell 2011)

- [From a circle to the sine wave](#) (Etkin, A. 2015)

The concept of sinus started out as a very right angular yangy thing, that turned into a circle and then into a wave (yin) .

- [Fourier Analysis](#) (Wikipedia [טור פורייה](#))

In mathematics, **Fourier analysis** is the study of the way general functions may be represented or approximated by sums of simpler trigonometric functions. Fourier analysis grew from the study of Fourier series, and is named after Joseph Fourier, who showed that representing a function as a sum of trigonometric functions greatly simplifies the study of heat transfer.

For every mathematical action there is an opposite action. Fourier proved that almost any function can be dismantled into the sine function

The sinewave is a smooth, periodic undulation, a mathematical idealization of waves (*Merriam-Webster* 2022) found in all movement beyond and within us e.g ocean and sound waves, heart rhythms.

Important concepts (Urone & Hinrichs, 2020)

Amplitude—distance between the resting position and the maximum displacement of the wave

Frequency—number of waves passing by a specific point per second

Use [desmos](#) to show different amplitudes ($a \cdot \sin x$) and frequency $\sin(b \cdot x)$

Sinuuous points

What is a sinuous point or an inflection point in Mathematics?

When we talk about graphs a sinuous point is flipping from a concave up to down or the opposite. This is really a description of a wave. The sine wave is a perfect model

These are examples

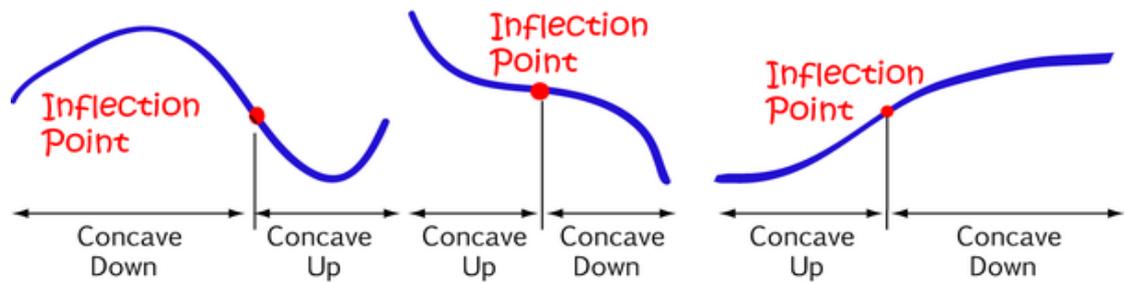


Figure 4: Sambrini (2022)

Sinuuous sine waves in biodanza

The vivencia curve is a sine wav

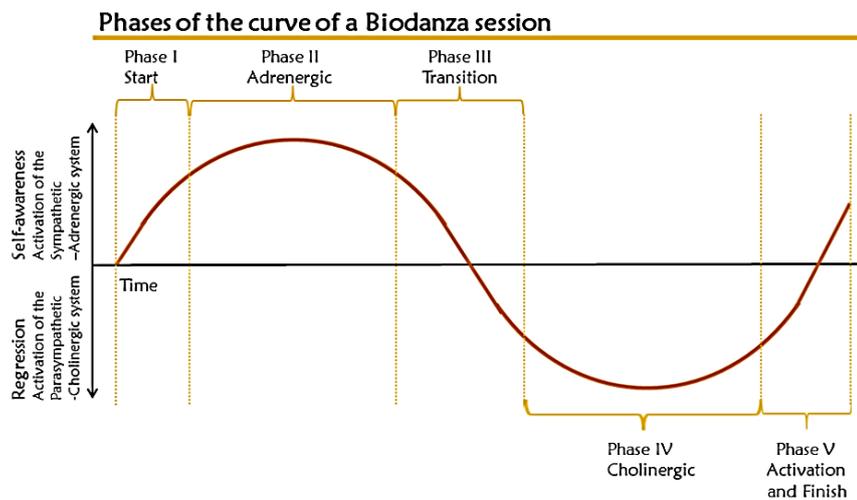


Figure 5: curve of a biodanza session

Phases of a typical biodanza session

This is a great example of the importance of a mathematical model as a practical tool ' as an estimation. We don't measure our dances or vivencias with a ruler or a protractor but we do ensure the basic form of the sine curve. This model consists of physiological coherence to a degree of order, harmony, and stability in the various rhythmic activities within our living systems over any given time period.

Dances with sinuous/sensuous wavelike movements

sinuous and sinus : There is an *etymological* connection between sinuous and sinus .
Having curves in different directions , wavelike .

Sensuous : pertaining or having pleasure through sense (online Etymology Dictionary)

**I didn't find a connection between sinuous and sensuous though I feel that there should be
These two terms are used alternately in our 2012 catalog.**

[Sand Pendulum at the Exploratorium](#) *Physicsfun (2018)* This short video shows how a right left movement (of the pendulum) turns into a sine wave as we move forward.

Now let's look at some of the sinuous exercises:

1. Physiological or sinuous walk (sensual)

Restoring the natural walk by integrating the movement of the buttocks and the hip joints. If we imagine the Sand pendulum in the video we just saw, we realize that in this walk, our hips move like the pendulum from right to left (which in itself is not sinuous). The fact that we are moving forward, gives us the sinuous wavelike movement. The inflection points are at the sides of our hips .

2. Soft rhythmic synchronization in pairs

Standing facing each other and holding hands, the two people dance in a harmonious way by following the melody of the music.

3. Sinuous circle, Eutony of hips (Samba for 5)

People close their eyes and surrender to the collective undulating wave

4. The sinuous train

Sinuous movement and central rhythm, and promote self-regulation

5. Abdominal breathing

...gradually reducing the amplitude of the breathing wave

6. Motor integration of the three centers

...the movement becomes a sort of wave that crosses the entire body

Findings and Discussion Points

After comparing the different definitions and basic aspects of some mathematical models, I offer my personal observation and ideas for discussion.

1. Chaos Theory

Chaos is not the opposite of determinism, it complements it. We can say in a very deterministic tone that action A + action B causes phenomena C.

We can also say that the combination of A and B might lead to an unforeseen eruption that is surely the dance of chaos. We tend to call unordered and unpredictable systems that appear to be random "chaotic" but they are not random. We don't always know the explanation of an occurrence but there might be one and it doesn't prove randomness. I find math to put things in a soothing framework for example my opening statement

Invitation A + Dance B + Music C = Feeling D.

Many times, during my internship I was told by my supervisors - don't use that music because, it's sexy and it will arouse people. At the beginning I rebelled, but as I gained experience I understood that our invitations are goal oriented and even a bit manipulative (mathematical manipulation is not a negative thing). I think that it's important to understand this because we must realize the power of what we do especially as new facilitators. If we know approximately what feelings our invitations are likely to invoke – why should we deny this? Therefore I'll try to take my statement down a notch: Invitation A + Dance B + Music C \approx Feeling D.

Dance A and Music B might initiate in each and every one of us a different vivencia but there will be some common factors. The logarithmic might have spiraled one person out of a difficult situation into a sense of harmony with the universe and spiraled another person away from a feeling of estrangement into a deep sense of harmony with ones' self. There is a correlation but we don't really know the cause. You may ask what is the point of looking for a formula if it doesn't always seem to work? I would answer that determinism is not a lost theory. Finding form gives us a sense of security. The ability to estimate properly is very important and useful. This is why Newton's basic laws of motion and gravity are still taught today in academic studies.

It is the taste of life and it's temporary. Humans tend to make form out of chaos. While dancing, we can let it go. While studying, we'll try to analyze and understand it. In the early steps we might find a useful approximation until something more precise is discovered or invented.

2. Harmony of Spheres

When I first heard the concept 'Harmony of the Spheres' in biodanza I was bewitched. The idea that there are mathematical relationships (of proportion) between the musical notes and the orbits of the planets seemed like a novel idea but instinctively it felt right. In biodanza I often experience a sense of harmony with the universe that I feel more profoundly than dancing anywhere else. I wonder if this might have to do with compatible frequencies in music or a healthier connection between the people or a better connection to myself.

3. Mathematical combinations and the logarithmic spiral

Rolando very consciously uses mathematical models to describe some important ideas: Combinations; A simplistic manner of making order of the many possible interactions between the different lines at different levels of integration. There is the quantity aspect – what determines the level of integration is the number of lines integrated. The desire to live increases logarithmically with increasing levels of integration.

We slowly flow spirally and develop the capability to integrate our life lines. we can start with one – opening blocked areas in each line separately, slowly spiraling into combining 2,3,4 and 5 lines. Biodanza is the tool we use to help us integrate the lines, the growth spiral describes this process.

Story - The Swiss mathematician Jacob Bernoulli chose the figure of a logarithmic spiral to be carved onto his gravestone. The Latin motto *Eadem mutata resurgo* “translated to “Changed and yet the same, I rise again” was intended to surround the spiral. However, when he died in 1705, the stonemasons that were responsible for the beautification of Bernoulli’s grave carved an Archimedean instead of a logarithmic spiral into it and by doing so, they made a crucial mistake. For Bernoulli, the Archimedean spiral was merely a mathematical curiosity. The logarithmic spiral, however, he held to be symbolic for a potentially endless cycle of lives. He believed that the logarithmic spiral and the way that it’s invariant under different magnifications and geometrical transformations provide a symbol of hope for the **resurrection of the dead at the end of the world.** (Aereba 2020).



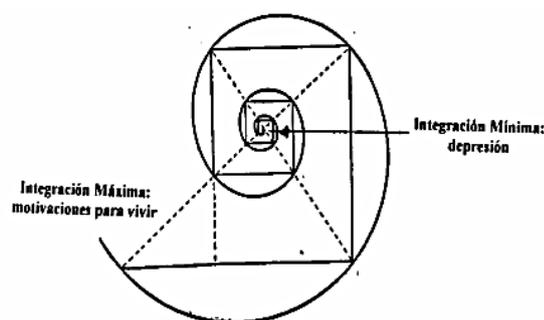
Figure 7 : [Aereba](#) (2020)

Personal observation about the addictive use of Ritalin

I found the logarithmic spiral a model that reflects my inner process of withdrawal from chemical addiction. I didn't start biodanza with any intention of detoxing. I actually thought that it might be fun to combine dancing and chemicals. During the first year, I regularly continued to use Ritalin before my biodanza sessions.

I found myself repeating the same patterns over and over again. The pattern felt like an arithmetic spiral and not very healthy. This was the foundation of my addiction. A healthier variety had a logarithmic spiral pattern: we build patterns but there is room to grow. The patterns change. They become more complex and there is more variation. There's room for evolution of the underlying pattern.

I feel now that the growth spiral healed me: the rehabilitation of my genetic potentials and with this the ability to ease depression, exactly as Rolando intended. The desire to live, an essential category of existence, increased in me by logarithmic proportion to the degree of integration of the five lines of vivencia.



*The desire to live increases **logarithmically** with increasing levels of integration.*

Figure 8: the logarithmic spiral from the vivencia

At some point I spiraled away from chemicals. My plan is never to use Ritalin again. I drew closer to the joy of life inside of me.

We teach our children at an early age how important it is to learn mathematics. Ritalin is very helpful in keeping students focused on something specific, like studying calculus after hours of studying other subjects, without relating to a bigger picture. "When some lines are blocked or when there is no integration among them, the desire to live can decrease to the point of depression" – this is exactly what Ritalin does. I say this with a vivid and precise intention. This is my personal experience and what I experience as a teacher of teenagers who are very easily prescribed this medicine. I strongly recommend introducing biodanza in the school system and implementing it with the intention of reducing the use of Ritalin.

The Fibonacci spirals importance in biodanza might be seen as building new foundations on the former ones. we don't come and knock everything over with sudden movements, **tabula rasa**. We try to add healthy behavior in our system and so we learn how to continue the flow of our lives and when the opportunity appears e.g new birth dances, we can allow ourselves to heal, open blockage and rid ourselves of negative pathologies. We repeat this process and gradually integrate our life lines.

4. Lets talk about infinity

- When we dance the infinity outward - up to the sky, our gaze is usually very focused towards the sky \aleph_0 . We are standing or dancing in an orderly fashion. We might experience a huge endless number of possibilities but we know what to expect next.
- When dancing the inner infinity, we tend to close our eyes. inside is the unexpected, infinite possibilities \aleph or C. here within the limits of our bodies' there is no beginning or end, no chronological order.
- Since \aleph is bigger than \aleph_0 then metaphorically speaking our inner infinite is bigger than our outer infinite. we can find more untraveled paths and untried possibilities within ourselves than outside of ourselves.

5. The sine wave and sinuous points

The pendulum short video demonstrates how the sine wave is produced with a right-left hip movement whilst moving forward, the inflection points are at our hip sides. If we wish to feel the inflection point in the center of our bodies, in our reproductive area, then we can dance a figure eight with our hips seemingly like the infinity symbol.



A simple rhythmic synchronization in pairs also pins our reproductive area as sinuous points.

1. Physiological or sinuous walk (sensual)

If we take wider steps (on the x axis) it will affect the amplitude of the wave

If we take shorter steps (on the y axis) it will affect the frequency of our wave

2. Soft rhythmic synchronization and Creative dancing in pairs

a synchronization of all movements. The status of systems oscillating at the same frequency transmitting or receiving waves of the same frequency. Refers to a person whose state and behavior are in perfect harmony with its environment. In my personal experience two participants will feel synchronized if they fluctuate at the same points. **The amplitude will not affect the harmony.**

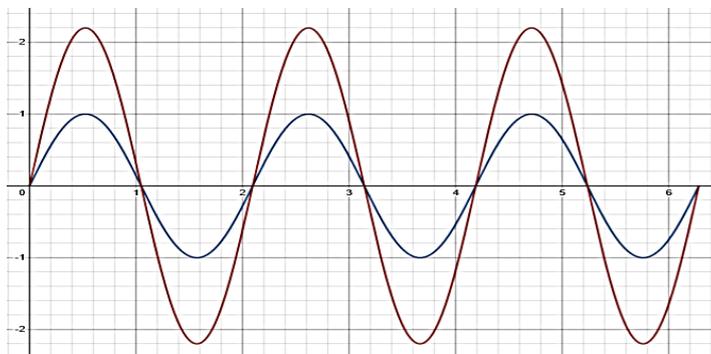


Figure 9: graph of $\sin x$ and $2 \sin x$ on desmos graph calculator

The sinewave , mother of all waves

The sine wave is one of the most important mathematical concepts in sound and movement.

"Any repeating pattern can be considered a series of sine waves added together

Circular or cyclical motion is at the heart of all things and processes.

In a metaphysical sense, it is said that the sine wave is the mother of all waves.

Symbolically it represents the 'motherless mother', since *all waves are born from it, but it is not born from any other wave.*

It is irreducible, inimitable, the only wave that cannot be decomposed to anything more fundamental.

It is a singular frequency, a perfect resonance.

The curves of the sine wave are expressed all throughout nature, particularly in the feminine body, of which it is deeply symbolic

Consider a snake, a fish, or a bird, it is clear to see how its movement is driven by wiggling sine wave motions on different axes of the body

This is the mechanism by which spirit acts on matter" [Hedflux \(2022\)](#)

It's how all bodies move

This is the most natural movement and although we sometimes forget and move in a sharper more angular way, we can always strive to a softer, wavier motion.



Figure 10 [Hedflux \(2022\)](#)

Conclusions

Recap

- Chaos and order can easily become chaos and harmony. In biodanza as in science, chaos is seen as a creative force, a motivation to explore and understand. This is a never-ending process. Chaos is an important part of any system from human beings to the solar system.
- Harmony of the spheres is magical. It might be a musical reality or a mathematical curiosity. It might be heard by certain people or by everyone. I believe that there are certain moments in our lives that we feel in harmony with the spheres or cosmos. Biodanza encourages and facilitates those enchanted and empowering times. There seem to be two levels of harmony: same frequency harmony and the expansion of identity from personal to collective.
- The logarithmic spiral is a metaphorical fountain: effective growth, gradual layering and integration of life lines keeping true to oneself through change. The evolution of addictive tendencies and a suggestion of defusing their power.
- The two main types of mathematical infinities correlate nicely to our inner infinite possibilities and the cosmos and spherical infinity.
- The sine wave – mother of all waves, Fourier, any movement or transfer of information rides a sine wave.
Sinuous/Inflection points - where and how do you feel sinuous motion in your body?
The mathematical concept really does help understand how to be in synchronization with others and feel harmonious in our world.
These points help us keep in synch with others and in harmony with the cosmos.

My Statement

In my first biodanza session I felt the powers of infinity in my dance.

In my weekly group I felt sine waves pass through my body.

Throughout the years I danced chaos and order many times.

In biodanza school I heard the enthralling concept of Harmony of the Spheres.

While writing this monography I encountered the logarithmic spiral for the first time while reading the theoretical modules of biodanza.

Until I started to write this essay, I had no idea that all of these concepts were intertwined.

Now I understand:

There is essentially music all around us, the cosmos is musical infinity.

The same solar system that led to the chaos theory is really quite soothing.

Through our dance we bring this music into our bodies, into our cells and souls.

The music of the infinite yet countable spheres reach us through waves from the κ_0 solar system, these waves enter our bodies which are metaphorical logarithmic spirals.

Biodanza facilitates the internalization of this vital energy and enriches our experience through vivencia in a continuum manner, (the power of c) arousing the infinite possibilities within us.

We then refine and externalize this energy, resonating it upon others and back to the solar system and the cosmos. This is a never-ending process.

Rolando taught me by personal example that there is room for knowledge and room for doing and dancing with minimum cortex involvement. No contradiction there. We can appreciate, study and pass on scientific information and learn to let it go when needed.

Rolando understood instinctively and greatly respected mathematical and philosophical knowledge. After reading and rereading the vivencia module, I feel obligated to him to acknowledge the existing scientific and mathematical basis of biodanza and hope to help it flourish.

WE ARE THE MESSAGE

"The genius of the species transmits its message through thousands of sounds.

The genius of the species communicates through certain individuals to transmit, with absolute rigor, always the same thing. This message acquires the form of the Pythagoras Theorem, the melodies of Orpheus, the Sonnets of Petrarca, the Cantatas of Bach, the drawings of Leonardo da Vinci, the lamentations of Rilke, the formulas of Einstein.

It is always the same, said in a new way, the same message that something is full of meaning, that there is a unity, a melody, an extraordinary beauty in the flux of the universe.

The genius of the species is manifested in exceptional individuals, always expressing the code of harmony. Those individuals possess the eye of ecstasy, the ear that perceives cosmic music in the silence of reality."

(quote of Rolando Toro from the creativity module last page)

I am sure that Rolando was one of these individuals.

Future Fields Of Research

My work now is done. I feel that I have unfolded a new world for myself and hopefully for others and there still is so much more to learn.

I would like suggest a few fields that I find interesting to pursue

1. The effect of biodanza on addictive tendencies and/or the use of Ritalin
2. The effect of biodanza on ADHD.
3. The effect of biodanza in school systems on the well-being of teenagers
4. Self-similarity & fractals. An object is said to be self-similar if it looks "roughly" the same on any scale. Fractals are a particularly interesting class of self-similar objects
The idea of magnifying and minimizing oneself, yet still staying 'me' seems to me to the very essence of the logarithmic spiral.
5. The golden spiral and dancing. I feel that there should be a variety of spiral dances in biodanza since the spiral is found in nature and biodanza proposes to bring us closer to our natural instincts and movements.
6. Does the sense of harmony with the universe that people tend feel in biodanza have to do with compatible frequencies in the music or is it based on a healthier connection between all of humanity.
7. The 26 possible combinations of the 5 life lines of biodanza. What do the different combinations mean?

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