THE 12 TONE MANDALA

DAVID RILEY CAMPBELL





It is highly recommended that you see the 12 Tone Mandala in action before reading this paper. You can do this by following the link below: <u>12-tone-mandala.glitch.me</u>

seecee96.github.io/12-tone-mandala/ (backup link)

youtube.com/watch?v=XroZ5PaOXao (backup backup link)

//A special thanks to Eric Heep, without whom this project would have not been possible.

Dedicated to all who have found a greater harmony in life

through the study of music.

Introduction

The 12 Tone Mandala is a geometric language to describe and teach music theory. It's goal is to harmonize the intuitive and logical understanding of music, just as music allows us to reconcile these two within ourselves.



The 12 Tone Mandala as presented originally by Marshall Lefferts [1]

The initial inspiration for this project began with a blog post by Marshall Lefferts called "The Tritone Duality of Music" [2]. Although I had been familiar with the circle of fifths for some time, I had never seen it represented as a complete graph, with all of the 12 points connected to each other. By color coordinating the various polygons to illustrate the intervallic relationships, he displayed a beautiful symmetry within the 12 tone system in such a simple form. It then dawned on me that all the music theory I had been learning in school, which I had seen as daunting and complex, was the product of a profound simplicity. Like looking into a flower and seeing the whole universe, being totally interconnected, it showed all the varying possibilities completely unified; so it should be no surprise that the first name mathematicians gave to the complete graph was the "mystic rose".

To me music has always seemed to have a spiritual power. It was like a kind of language which could bypass the part of the mind that did all the talking, and get a clear message to the part of the mind that caused any desire to speak in the first place. And even when my internal dialog seemed hellbent on having a cynical and self deprecating view of life, music brought feelings which defied this outlook, and seemed to allude to something greater, not yet seen. Like a score in a film, it enchanted the world, filling each scene with greater feeling and meaning. This spurred a curiosity as to what could be to the source of all this newfound meaning and beauty which I could not speak but could feel with such certainty. Following the breadcrumbs, I took a journey inward only to find the cause of the moving images on the (cave) wall, was a single brilliant light, shining on and giving life to all. Although it can't be spoken of, a word that comes to mind is love; a singular uniting force, as below so above.

Section I

Language Of The Nameless (Falling Through Da'at)

Attempting to Make the Spiritual Tangible

Existence is beyond the power of words

To define: terms may be used

But are none of them absolute.

In the beginning of heaven and earth there were no words

-Lao Tzu (trans. Witter Bynner) [3]



Keys 0 and 1 of the B.O.T.A Tarot Deck [4]

With an eye on the sky, I'll begin on a limb and jump in like The Fool¹. Like Tzimtzum²

(θ to I_{am}), the faithful freefalling of formless air inverts in inhalation 'n contracts, now conveyed, now contained in the concrete wor(l)d; a spell of forms cast on the breath (Al'ph'Bet). So to begin this journey of the 0, we must start by giving a voice to the chorus of ouroboros, and twist that silent circle of nothing into a symbolic representation of infinity. I will symbolize this infinite being-which-makes-being by using the word "spirit" and call the product of its being "existence", although these two are interlocked and inseparable (∞). Our participation in this existence is then by nature a spiritual act. But the only accurate depiction of the spirit of

² Tzimtzum is a very complex idea which wikipedia describes quite well with a relatively minimal use of words: "In Lurianic Kabbalah, Tzimtzum is used to describe the idea that God begins the process of creation by "contracting" it's Ain Soph Aur (Limitless Light) in order to allow for a "conceptual space" in which the finite can exist. This initial contraction forms an "empty space" into which new creative light could beam. (...) Any direct creations of the Limitless Light would be of infinite number, and would not be actual creations at all, as they would remain totally nullified to the Limitless Light, and would have no independent self-awareness. Rather it is only through the restrictions of the 10 Sephirot and the descending "Chain of Progression" that the Worlds could unfold. (...) It is understood that the concept of tzimtzum contains a built-in paradox, requiring that God be simultaneously transcendent and immanent. Viz.: On the one hand, if the "Infinite" did not restrict itself, then nothing could exist—everything would be overwhelmed by God's totality. Existence thus requires God's transcendence, as above. On the other hand, God continuously maintains the existence of, and is thus not absent from, the created universe." [5]

¹ The Fool (Tarot Key θ) is the first of 22 cards in the Major Arcana (Big Secrets) of the Tarot. It is seen as both the beginning and end of the cycle of 22 cards (known as the Fool's Journey), and is like the place where ouroboros's mouth meets its tail. It is understood as representing the initiation of the spiritual journey or pre-manifested spirit, and can be correlated with the first of the 22 hebrew letters: Aleph. A further association of both Aleph and The Fool is the element of air with it being the first of the mother letters described in the Sefer Yetzirah. Looking at the card, we can see The Fool has their head in the clouds, and does not realize (or care) that they are about to fall off of a cliff. This represents the first form of creation and the first step of the spiritual journey: the complete embrace of a fall into a formless substance. It is interesting to note that the second tarot card, The Magician (Key I) (Hebrew: Bet) has an infinity symbol above it's head, making the unity of the circle of the "0" symbol (The Fool) into duality with the sideways figure-8 symbol. Also note the term 'spell' is used to describe the methodology of magicians and is a reference to the medium of speech which is an essential component of the practice. [4]

existence is through the direct experience of it. People have struggled to find accurate ways to convey the spiritual to others since language itself was created. Telling stories and creating doctrine around them serves an important purpose, but rarely is able to transmit a direct experience of the divine. As a result, many have then sought other means to communicate this divinity and trigger that profound realization of the joy of being which accompanies it.

When a person reads a religious text, they may be confused, misinterpret, or dismiss it due to its use of symbols. But when a person walks into a great temple and gazes upward, a certain feeling of wondrous awe is often evoked. The architecture itself communicates the idea, in its design and in its use of geometry, one can peer more clearly into the conscious experience felt by those who inspired it's building. This is an experience of intuitive apprehension, and has the particular ability to inspire beyond the confines of dogma as well as the religious context which the space functions. What if we could share that awe we feel in witness of the processes of creation more readily to all? Would it not inspire us to look more deeply, to seek to understand?

In this quest to understand, theory may be one of the seeker's greatest assets. Proper theory provides the individual with a set of tools, not rules. Therefore a good theory should not be seen as some set of ideas to contemplate then move on to the next chapter, but rather as a living and evolving entity. In Qabalah, the diagram of the Tree of Life is a sort of hyper-distilled theory, taking incredibly complex ideas and depicting them as simply as possible. Texts on Qabalah can span thousands of pages and be outright perplexing to even the most learned scholars, but the Tree of Life can take up a fraction of a page and yet express great depths of this dense theory. [6] The secret is in the continuous unfolding of the information contained in the diagram. As the student learns more, they can return again and again to this image to explore and test their ideas. Although seemingly simple at first, at any level of knowledge the diagram proves to be a useful tool; new revelations spring from old ones like the blossoming petals of a rose. So when teaching any theory, a practical tool for exploration must be given from the beginning, as these moments of coming to awareness through our own self discovery are of great importance. Not only are these moments incredibly stimulating to the intuitive and logical functions of the mind, but they create a deep rooted foundation for both the emotional and rational modes of knowledge, in whose union the true beauty of knowing is realized.



Artist unknown, Qabalistic Tree of Life with various correspondences [7]

A common feature of both the Tree of Life and many temples are their geometric orientation. They utilize a symmetrical structure to tap into deeper levels of pattern recognition, which words alone seem unable to access. They provide a simple map to help the individual navigate the overwhelmingly vast and complex relationships of existence. Meditation, ritualization, contemplation, and visualization of these and other geometric figures are said to produce altered states of consciousness, whereby a spiritual experience can be attained [8]. These practices are often described as magick³ as they seem to produce results so effectively it defies common logic. But magick is not some supernatural fantasy as hollywood would have you believe. It is rather a perfectly natural method of becoming more intimate with our own conscious processes. Through meditative introspection and the use of symbolic association, the practitioner enters a kind of flow-state where they can move between and combine the intellectual (Δ), inspirational (Δ), emotional (∇) and physical (∇) aspects of themselves to create change and harmony within their consciousness (). [9]

Music too has been a reliable tool to alter consciousness toward a more harmonic state and is utilized by countless spiritual traditions to express that which words cannot. As we can see from cymatics, the tones used in music also contain inherent symmetrical geometries. This idea of music as geometry has ancient origins, and may have inspired Johann Wolfgang von Goethe when he said "Music is liquid architecture; architecture is frozen music." [10]

³ The spelling of magick with the letter "k" is used to make a distinction between the spiritual practices of ceremonial magickians, and the rabbit from the hat illusions of stage magicians. [11]

Whatever method is used, those who seek this direct experience of the spirit of existence are most often called mystics. Often dismissed as foolish by "intellectuals", the mystic's by-any-means-necessary attitude may seem insane to those who do not understand their practices. But in reality the mystic and the intellectual share the same goal: to experience knowing; and the search for that experience is very much a spiritual quest indeed.

"The hearer must be of one mind with the speaker, and of one spirit as well; the hearer must possess a hearing subtler than the speech of the speaker."



• Hermes Trismegistus, Corpus Hermeticum (trans. G.R.S. Mead) [12]

(top) Cymatic waves of the 12 tones [13]

(bottom) Ceilings of various sacred buildings

(left to right) Selimiye Mosque [14], Shaykh Lotfollah Mosque [15], St. Stephen's Basilica [16],

Akshardham Temple [17]

Section II

<u>A Delusion From Polarity (Making A Crutch Of The</u> <u>Pillar Of Severity)</u>

Problems in our Musical Language and in the Way That We Teach

"Understand with Wisdom Be wise with Understanding Examine with them and probe from them Make each thing stand on its essence And make the Creator sit on It's base."

- Sefer Yetzirah 1:4 (trans. Aryeh Kaplan) [18]

How odd is it that in our modern age, most think of the "rational" and the "mystical" as so diametrically opposed? How incredibly strange this would seem to those thinkers who so influenced our modern ways of thinking. People like Plato and Pythagoras drew incredibly rational conclusions from even more incredible mystical experiences [19]. For them, the intuitive and the logical were merely two sides of a single rational coin. But after the period of the enlightenment, a (potentially necessary) process of demystification of the world took place. Although this brought many amazing things, it caused the intuitive to take a backseat to the logical. Now we could describe in great detail the many laws of nature, but often began to overlook the silent awe at the beauty of the processes. Like a long range hiker with their eyes at their feet, we concentrate so heavily on the step-by-step in front of us, that we forget to take a moment to look around at the beautiful scene which we journey through. Completely disenchanted, the world becomes an object alone, cold and lifeless matter, something to take and exploit as we please. But when we take a look around, we see that the valley is full of life, overflowing with spirit like an alpine spring. Many quickly come to reason that the world is then to be cherished and protected. Yet the rationale of this isn't worked out in words, but in a silent mystical wonder.

Music has always been a reliable tool to bring about this wonder in a not so silent way. (Unless you really like the i-ching and do it for about four and a half minutes. [20]) But again, in our modern age, in order to be viewed as legitimate education, the way music is taught has fallen victim to the curse of disenchantment. Our current way of representing music (using notes and staff) comes from a very long tradition of notation [21]. Although it was not completely standardized until somewhat recently, an agreed upon system of writing music on paper was extremely important. Until the invention of the radio, the only way one could hear music was if somebody played it, so this system had to be particularly designed so that it could be quickly and accurately read by *a player*. This is very important for this project, as the staff and note format is designed to be of greatest use for the performer -- it is a system which everybody agrees upon so we can play together more easily. This format serves an important purpose, but because it is so biased toward being most useful for the performer, the analysis of theory with this system is much less intuitive.

There are so many musicians who learn their craft by intuition alone, some of the greatest could barely read sheet music. Intuition is essential in any creative act, and music specifically has a peculiar way of moving us so deeply that it has been called a universal language, being able to bypass the conscious, "talking mind" and speak directly to the subconscious, "feeling mind". The creation of great music is so often triggered by some deep emotion and the piece flows out intuitively. Yet music is just various frequencies of air particles vibrating, its foundation is purely mathematical. If one approaches this dialect with the modern tendency to view the intuitive and logical as mutually exclusive, you run into quite the paradox of these existing simultaneously in the form of music. But, if we can do away with that false dichotomy, and take a moment to step into the sandals of the Pythagoreans, I think we may find a way to *connect* these *two lines* of thinking. _ | **4**

Most people's experience with Pythagoras is this: $a^2+b^2=c^2$ (the Pythagorean theorem). And the feeling which is stirred from the memory of this equation is probably one of a dreaded, monotonous math class and is likely not a pleasant one. What a shame it is that such a truly beautiful topic such as math is presented in such an uninspiring way. When the Pythagoreans learned math, it was considered to be sacred [22]. They could see it as sacred because when they learned math it was heavily emphasized why they were learning it in the first place. When they thought of geometry, they didn't think of calculations and exams, they thought of flowers and trees, and the shapes of stars whirling through the heavens. To them, math was the foundation for all existence, so learning it was learning of the root of life itself. And when you realize what you're learning is all around you, you start to see how similar things really are.

One of the greatest shames in the teaching about Pythagoras may be that math classes often leave out another great contribution he made which we still utilize today: the diatonic scale. How often do people say "How is this information useful" when learning math? Well every piece of music you have ever heard that came from a string was just a fancy way of finding the hypotenuse. The Pythagoreans saw harmony in the world, and in the seven oscillating objects in the sky, and used their mathematical studies to create music⁴.

The second biggest shame of all is that virtually no math class will ever even mention how these ideas could be arrived at in the first place. The experience of witnessing the overarching rational interplay of the parts of life is a mystical experience. This interaction with life surrounds and penetrates the subject, in turn blurring the line between subject and object. In that moment of "oh wait...everything is connected" lies the essential first step in wanting to connect the dots and understanding their interaction. If we don't recognize the importance of this

⁴ The Pythagoreans viewed the motions of the heavenly bodies as a form of music. They assigned the seven notes of the musical scale to the seven classical planets (the ones visible to the naked eye). They also believed that each planet produced an inaudible tone corresponding to the frequency of its orbit, and subsequently the entire universe was then seen as a one great musical instrument. [22] [23]

moment of wonder, we get tunnel vision. If we don't realize the importance of what we're learning, then we lose the subsequent joy that comes from learning it. And that is the biggest shame of all, that we could somehow share knowledge in a way that doesn't inspire joy and a love of knowing.

Now moving over to music theory class, we have much the same problem. Theory is often taught in much the same way as math. Compare the assessment of a core requirement class in the fine art department verses the music department at Calarts. In fine art there are rarely (if ever) assessments in the form of traditional tests. Rather knowledge is assessed by creating a work of art. Now contrast this with a theory or aural skills class in the music department, which is almost exclusively assessed with traditional testing methods. I've never been moved by a test on music nor have I heard it move someone to feel anything other than dread, so I question how effective this can be. Furthermore, if a composition is created as a form of assessment, it's grade is dependent on how accurately it follows certain rules. Again, virtually no musicians think of writing music as an act of following rules, so again I have to question how useful this really is in assessing one's knowledge.

Any music theorist worth their salt will acknowledge these "rules" are just common patterns or tendencies we often see in music. For some reason (likely due to a cultural bias toward a purely logically format), we describe them as rules. Yet this presentation of the beautiful patterns of music theory as cold, boring rules sucks the life from the craft, so it's no wonder so many give up the study of theory with logic to study it with intuition alone. There has to be a way to marry these two, as music itself is proof this can be done. Stepping back to ancient Greece again, the Pythagoreans relied heavily upon the use of geometry to explain and explore their mathematical endeavors. It proved very useful in making the abstract concepts of pure math into concrete, observable things. In music we have the same problem. Music is abstract, often beyond words, potentially to the point of complete subjectivity, yet there undoubtedly are patterns in its workings. Like math, the problem lies in the presentation. When you represent something merely as abstract symbols, the mind has little to hold onto. And so is it any surprise that the use of graphs to depict data is so widespread? People understand more quickly and on a more intuitive level when they can see something abstract visually represented, and so the same must be true for music.

If we move from ancient Greece to medieval Spain we find another person with a similar desire to combine the rational and the mystical: Abraham Abulafia. A lover of both the mysticism of the Sepher Yetzirah and the rationalism of Maimonides, Abulafia developed his own unique form of Kabbalah [24]. Through meditation on the permutations of the Hebrew letters, one could achieve a mystical experience by exploring the possible combinations of a limited set of variables. To me, this bears a striking similarity to music. Through permutations of just 12 tones, one can express a seemingly limitless amount of experience through music.

Whether the system uses 12, 22, or 1,000,000 variables, their interrelationships create a language: they express, they describe, they speak to us. Language has a logic, rules of grammar and definition, but simultaneously it is malleable, intuitive, and poetic. In both the language of letters and of tones, you might have the best ideas and techniques of presentation, but if you don't

play with heart, very few will listen. Language then must be a messenger between the two, a way to coalesce the logical and intuitive. Definitions and syntax can be used to create profound logical proofs, while the flowery use of words can produce landscapes of emotion through the twisting of the roots of definition and transmute language itself. So if language can display the union of the mystical and rational, should it be any surprise that the place where we speak and sing from lies between our heart and head?

This project is a process of attempting to push language further and in a geometric direction. The staff system is a set of symbols that represent sound, which sounds to me like another way of saying language. But let us think about how we associate symbols, and how much mental effort it takes to get from a symbol to the idea it represents. If I say "dog" the mental picture of a dog comes to mind pretty much immediately. Now if I see the symbol "V" (or a roman numeral 5), I must first recognize the symbol as the letter, and understand that this use of the letter is outside its most common usage and that it now represents a chord. I must then know that a chord is a set of notes and what notes create this chord, and finally I must convert all of this into a mental picture of the sound. This incredibly long mental process can become quick for long time students, but for the new learner such a process may not only be confusing but discouraging. Now compare this to the 12 Tone Mandala which could show all of this with a simple triangle composed of colored lines.



C Major Triad (chord with three notes) on the 12 Tone Mandala

Various Alchemical & Occult symbols, with symbols of traditional western music theory

overlain. [28] [29]

Like esotericists such as John Dee⁵ [25] [26] or Cornelius Agrippa⁶ [27], I wonder if it's possible to create symbols which can express the essential spirit of that which they represent to a greater degree than traditional language. Both Dee and Agrippa took great interest in bridging semiotics (representation) and ontology (being) into a single form. If this can be done, analysis with these symbols would surely be closer to a synthesis of intellect and intuition, making them more fit for music (which is a product of their combination).

Students want to study music theory because to some degree they have had the experience of music moving them on a deep emotional level, it spoke to them in a language so intuitive it didn't even need words. And yet they enter it's study and find its tools of analysis to be strange and esoteric as opposed to the very intimate and familiar experience of music itself. This is because they cannot immediately see the harmonic interplay of components, which they can so obviously hear. This is the result of the symbol being divorced from the experience of that which it represents.

⁵ John Dee [1527-1609] in his work the *Monas Hieroglyphica*, proposed a single symbol from which all knowledge can be derived, through which all disciplines could be reformed. Its explanation combined hermetic philosophy, mysticism, logic, and mathematics, and attempted to unify many of the popular theories of the day (such as Alchemy, Astrology, Kabbalah, and Geometry).

⁶ Henry Cornelius Agrippa [1486-1535] was a polymath who is most famous for his writing of *Three Books of Occult Philosophy* and is considered one the most influential occult writers of all time. The three books are concerned with Elemental, Celestial and Intellectual magick, and cover a vast range of topics from Kabbalah and Numerology to Medicine and Natural Philosophy. Amongst other things, the books contain various explanations of how to create geometric diagrams which "...by means of the sweet harmony of those celestial rays, signify according to the proportions of sigils, supercelestial intelligences which cannot be expressed other than the marks of numbers."

To this day, there are those who claim that they need not learn theory, and that they can create perfectly good music from their undefined intuition alone. While without a doubt this is true, understanding the patterns of the environment you're working in has great potential to expand the horizon of possibilities to what you can conceive. It's a tragedy that just like the occult knowledge was so often kept for the priest class alone, the knowledge of these patterns of music has most always been held in the hands of the few. Isolated to those with a tremendous sense of determination to become familiar with the symbols of music and the financial means to be educated in them. And a much greater tragedy is that those who have been initiated into the workings of music theory have had a tendency to look down upon those who have not had this privilege, deeming them unsophisticated, unimportant, or worst of all, unmusical.

Yet as the knowledge of theorists progresses, there is an eventual acknowledgment of the genius of those who formulated their ideas with their intuition. Creating a musical language with a stronger connection between semiotics and ontology would be more compatible and familiar with the intuitive function of the mind. Firstly, this would decrease the distaste of theory many musicians have, which is a product of the language and not the theory itself. It would also increase the ease of the learning process and this would in turn allow for many more people to learn music theory. This would create a more extensive and diverse community of theorists, as opposed to the historically wealthy and euro-centric community. As well as increasing the number of people familiar with music theory, a simplified learning process could be taught much more quickly, and at greater complexity to students of a younger age than is currently possible.

Imagine a musical world where the average person would be much more familiar with music theory as a result of it being able to be taught quickly and easily. Would this ease not inspire greater interest for music literacy within the education system? With increased availability, could children interested in music become acquainted with its ideas at a speed approaching that of their imagination's ability to create?

Think of how many more people composing and playing we'd have, and the untapped possibilities for musical innovation which could be harnessed in this expanded community. Think of all the music students in college, who spend so much of their limited time in school slowly digesting the ideas of western tonality, often leaving little to no time for other musical perspectives. What if they could walk into their first day of class having already been educated in these "fundamental" ideas of music theory, and could immediately begin exploration of the great diversity of music outside the 12 tone, equal tempered format.

This is not just some vision of fantasy, as so many people mistakenly believe magickal acts such as creating language to be. Language creates our perception, and therefore our reality. A Roman mathematician would be absolutely bewildered by the ability of a young child to do multiplication, as for them this would be along the lines of college level math. This is simply because the Roman conception of number existed in a less intuitive system of numerals. A mathematician using the Hindu-Arabic system, on the other hand, conceived through a much more intuitive numeral system (the one we use today). This increased the ability to explore the logic of numbers in an intuitive way. This intuitive language of numbers made knowledge of mathematics easier to learn and thereby more readily available to all, and consequently

revolutionized mathematics itself. If this can happen in math, why should it not be able to in music, which is by its nature mathematical. What holds us back is nothing more than ourselves, the paradigms we exist in and the preconceptions that come with them. They can, and must change to meet our evolving and increasing needs, and to simply accept a paradigm because it is what others have done before you is foolishly limiting. If we do not change our language, we cannot change our ideas.

"Strive to see with the inner eye, the heart.

It sees the reality not subject to emotional or personal error; it sees the essence. Intuition then is the most important quality to develop."

- The Book of Coming Forth by Day (Egyptian Book of the Dead)

(trans. Muata Ashby) [30]



Various Geometric Esoteric Diagrams.

(Left) Hermetic Order of the Golden Dawn, Philosophus Grade Lecture Excerpt [31]

(Center) John Dee, Sigillum Dei [32]

(Right) Biblewheel.com, A complete graph of the hebrew letters, as described in Sefer Yetzirah

[33]

(Bottom) Author Unknown, Kabbalistic Diagram [34]



Heinrich Jamsthaler, Viatorum spagyricum 1625 [35]

In the Alchemical process, a mysterious chaotic source material, containing opposites still incompatible and in the most violent conflict, is gradually guided towards a redeemed state of perfect harmony, known as the "Philosopher's Stone": "First we bring together, then we putrefy, we break down what has been putrefied, we purify the divided, we unite the purified and harden it. In this way is One made from male and female."

- Büchlein vom Stein der Weisen, 1778 [35]

Sun and Moon lie side by side as "two different things" in the glass coffin of the retort. After putrefaction they will be resurrected as "one thing from two" (Rebis)⁷

- D. Stolcius von Stolcenberg, 1624 [35]

⁷ Rebis (From latin meaning dual matter) is the end product of the alchemical process. In it, the previously separated opposites (Male and Female, Sun and Moon, etc.) are (re)combined into a single form. Often depicted as a divine androgenous being or two intertwined snakes, their integration is catalyzed by a transmuting agent, usually some form of Mercury (\updownarrow). Mercury is the Latin form of the Greek Hermes. Hermes/Mercury is God of communication, amongst other things, and carries the caduceus wand.

Section III

<u>The Alchemical Wedding (Dancing Up The Wand Of</u> <u>Hermes (*)</u>

A Language of Harmony for the Logical and Intuitive

I want to state very clearly that I am not attempting to create a comprehensive, exhaustive language of all music. The 12 Tone Mandala is particularly confined to the 12 tone equal tempered system of pitch classification, and does not account for other tuning systems, timbre, dynamics, rhythmic instruments, or the countless other outlooks on music theory outside the 12 tone system. However, I hope it can act as an example of how these other musical areas might potentially be more easily demonstrated through geometric models.

I propose a geometric orientation of the 12 tone musical language to be more useful for an intuitive understanding of music theory. With music and geometry being so intertwined with math, this representation is a sort of "path of least resistance", and potentially takes less mental effort to establish an association with the information contained in the symbol [36]. The symmetrical nature of the representation is also essential because of the symmetrical distribution of pitches in the equal temperament system as well as the importance of symmetry in the process of pattern recognition. This may be further backed up by the Symmetry Theory of Valence [37], in that it proposes that symmetrical geometries have a tendency to encourage neurological cohesion and increased valence. Valence is associated with how the brain represents value, and is involved with the reinforcement of learning, so an increase in this would be of huge benefit for an educational tool such as the 12 Tone Mandala.

The use of the geometric diagram to explore relational systems has long been a practice of esotericists attempting to understand the vast complexities of reality. Often attempting to fuse a wide range of disciplines and areas of thought, esotericists sought out hidden knowledge of the underlying essences and laws of existence. This use of a geometric medium to communicate and work with a large array of abstract concepts proved a very useful device to navigate their seemingly ineffable systems of relation. The crafting of sigils and talismans attempts to compress the entirety of a celestial aspect (be it a planetary energy, archangel, or any other thought-form) into a single geometric figure. These are then used as a living tool to explore and learn from the various aspects of the thought-form. They have also been used to induce altered and trance-like states of consciousness, where new relationships can be seen which are hidden from the everyday state of mind. Having its roots in the late stone age, this art is most commonly seen in the workings of medieval ceremonial magickians such as Cornelius Agrippa, as well as in modern practices such as that of the Hermetic Order of the Golden Dawn⁸. These and other geometric tools are considered to be essential components of many magickal traditions and practices.

⁸ The Hermetic Order of the Golden Dawn was a secret society in England which was active from the late 19th century to the early 20th century. Operating as an initiatory magickal order, its main focus was the education of occult theory as well as spiritual development through practices of theurgy. Although short lived, its influence on modern occultism cannot be overstated. It's ritualistic symbolism is either present in or had direct influence upon both the traditions of Thelema and Wicca. Also, the modern conception of how to depict and interpret the Tarot stems from the Rider-Waite-Smith deck, which was created through a collaboration by two of its members. [9] [38] [39]

Using the musical geometries of the 12 Tone Mandala, one can more easily recognize musical patterns for a couple of reasons. For one, it is a changing representation, moving across the dimension of time, as opposed to the static and unchanging representation of sheet music. Also, this change is happening upon a representation of the entire musical structure (or a complete graph of all 12 tones). This shows how a musical unit (note, interval, chord) relates at any given time to the 12 tone structure as a whole. Through the movements of these geometries, one can clearly see the relationships between the musical patterns and their symbolic representations through the corresponding geometries of similar colors and/or shapes. By representing a musical unit as a simple geometric form, one avoids the lengthy mental process required to analyze music theory with the complex and disassociated symbols of the staff and note form. With the process of association simplified, a greater amount of brain processing power can be spent observing and learning the musical patterns, instead of juggling semiotics. To put it another way, seeing a simple shape requires the brain to do less work in creating an association with sound than seeing "Cm/maj9add6add11(b13)(#11)/E" Even without hearing the music, one can literally see how these varied relationships of musical units interact using this geometric orientation of the 12 tone musical language. This tool allows the user to witness the order and chaos, suspense and resolution, and the structured harmony of music theory through its representation alone.

Attempts have been made at creating geometric diagrams for music in the realms of post tonal theory, and it is those attempts which have heavily inspired this project [40]. However, having a logic-bias, which if it isn't apparent yet is almost everpresent, results in the configuration of the mod-12 circle in the sequential chromatic order. (C to Db to D to E etc.) Although this can be useful for certain applications, the geometry produced by this orientation of tones is in my view less intuitive, for it neglects the dominance of the fifth (pun intended) in western music. The organization of the circle of fifths is arguably the most fundamental idea in western music theory, and when organized this way many fundamental ideas of theory, such as the diatonic scale, can be seen much more clearly. (You can find a diatonic scale by picking any seven notes in a row around the Circle of Fifths). Furthermore, there is a more clear similarity of shape in chords of similar quality, such as major and minor triads.

I believe that another reason a geometric method of analysis for music theory has not yet become more widely used is because of the difficulty of depicting geometry across the dimension of time. A painting or photograph, although still existing within the dimension of time, is witnessed as a piece of art independent of time. This is opposed to other mediums of art, such as music or film, which must be witnessed over the course of a period of time. Therefore, a geometric representation of music would have to be able to change in accordance with the timing of the music. Even today with the use of computers this was no easy task, and so without the aid of modern technology, depicting music in real time would remain in the realm of idealism. But as the computer scientist Arthur Clarke's third law states, [41] "Any sufficiently advanced technology is indistinguishable from magic(k)." so what once could only be imagined, can now be seen with the eyes as something real. Indeed, magick moves or blurs the line between imagination and reality. As Lon Milo Duquette said when asked if spirits are real or not: "The spirits are both real and imaginary, but most of us do not realize how real our imagination is." [42] I have noticed the best method of study using the geometric orientation of the 12 Tone Mandala is achieved very simply (at least at first) by the mere act of watching the theory of various pieces of music play out. After watching a piece a few times, one will start to recognize patterns in the shapes in coordination with the music. This begins from a very intuitive/subconscious recognition, as if you can start to feel that a certain shape would take on a certain tonal quality. This is similar to how a musician teaching themselves from intuition alone would learn the relationships between chords, in that they discovered the theory by means of following "what feels right". This is opposed to a musician learning theory through the traditional logic based method, who may arrive at the same result by defining it as a I-IV-V-I progression. Although both methods may arrive at the same result, the ability to feel the relationship between chords is at the root of the creation of music which evokes feeling. You could be the most skilled player and know all the theory in the world, and still write the absolute dullest and emotionless music. So teaching both the analytical and intuitive sides of music is essential in creating great musicians.

The 12 Tone Mandala is useful in this pursuit in that it relies heavily on the fact that you can hear the music while reading the language of the theory. In current theory classes, although musical examples are used at points, the theory is often disconnected from the sound. This creates an abstraction in the mind between the symbol and what it represents. The logical function of the mind may be able to overcome this with relative ease (for some people). Yet the intuitive function, which produces the feeling component of the knowledge of music, has a much harder time creating a meaningful association. When the patterns are seen on the mandala in time with the music, no such obscurification occurs. This allows the logical function to recognize

patterns in a conscious manner ("that's a triangle, that's a red line" etc.), while the intuitive function can form more abstract relationships on a subconscious level ("this shape feels like this sonic quality").



Immediately looking at the 12 Tone Mandala, we see it is merely the circle of fifths with each note connected to each of the 11 other notes.

- The colored lines represent the various intervallic relationships between the notes.
- The red lines form a dodecagon and show the interval of a perfect 5th, and its inversion the perfect 4th.

- The orange lines form two hexagons. These show the interval of a Major 2nd (whole tone) and it's inversion of the Minor 7th.
- The yellow lines form three squares. These show the interval of the Minor 3rd and its inversion of the Major 6th.
- The green lines form four triangles. These show the interval of the Major 3rd and its inversion of the Minor 6th.
- The blue lines form a dodecagram. It shows the interval of a Minor 2nd (chromatic, semitone) and its inversion of the Major 7th.
- Finally, the purple lines show the interval of a Tritone.

An interesting thing to note is that the minor and major thirds are composed of four sets of 3's and three sets of 4's respectively, and are also three and four semitones away from the root (tonic).



6 of the 7 Diatonic Triads in A Major. Marshall Lefferts [1]

By dissecting the diagram in half, we can see that any seven notes in the order of the circle of fifths produces a diatonic scale. We can also see that all diatonic triads are shown by the transposing of a single shape (being a triangle which skips over two tone-points). The one exception to this is the diminished triad, which due to it being a different chord type than the other triads, has a different shape.

One can see very clearly not just the chord type via the shape produced, but also what intervals the chord is composed of via the colors of the lines which produce the shape.



A voice in motion between Ab and Gb. Due to the fact that this is taking place on an orange line, we can determine the melodic motion is a whole tone.

Each note that is being played is represented by a white circle stationed at the point which corresponds with the given tone (tone-point). Each white dot represents a single voice, and so the interval line which it moves across displays the melodic motion, and illustrates the patterns of voice leading. For example, if a circle moves along an orange line, this indicates the melodic motion was that of a Major 2nd, or its inversion, a Minor 7th. Multiple circles at a given tone point represent the same note being played at multiple octaves.



An Orange Whole Tone Interval Line between C and D

When two notes are being played simultaneously, the interval line will increase in thickness, so for example if a Whole Tone is heard the Orange line will light up.



A Bbm7, Db6, or Fm#5 add(4) chord in traditional terms, or Eb2 in the mandala system of classification (described below)

Triads will form various types of triangles, depending on their chord type. 7th chords will form a dual-triangle structure, with a quadrilateral (rectangle) encasing it. These complex chords will be described further in the next paragraph. I have noticed a correlation between the spaces between the interval lines and the consonance vs. dissonance of the chord. It seems that chords with interval lines closer together sound more consonant (pretty), while those with tones distributed more widely across the mandala sounding more dissonant (nasty).

Here I will discuss the ways by which we can analyze chords which are composed of more than three tones. In order to do this, we must look at the various points of intersection produced by the interval lines. These can be produced by the intersection of an interval line of either the same type (orange, orange) or of two different types (green, blue). There are never more than two colors in an intersection. Of these points there can be three types, having either four, six, or eight arms (or notes/tone-points which they include).

- The only example of eight armed intersections is where blue meets blue and green meets green at the same time.
- All six armed intersections are formed by a single line of one color (yellow) and the double meeting of another (green and green).
- Four armed intersections can either be of one or two colors, and must be a single four tone chord.
- The six armed intersections can be either the intersection for a four tone, five tone, or six tone chord. In the case of five, where a complete point of intersection is not applicable, it is the center of a pentagram formed by the five notes.

- The eight armed intersection is the same as previous, but with seven tone and eight tone chords as well.
- Orange lines only ever partake in four armed intersections
- Yellow lines have a six armed intersection when yellow meets itself on the purple line (yellow, yellow, purple), and when green meets itself on the yellow line (green, green, yellow), otherwise it is always four armed.
- Green lines have one six armed intersection when it meets itself on the yellow line (green, green, yellow), one when it meets itself on a purple line (green, green, purple), and two eight armed intersections when it meets blue's meeting (green, green, blue, blue). Following down the green line, the eight armed occurrence repeats. All other intersections are four armed.
- Blue has two six armed intersections when it intersects with purple (blue, blue, purple), and two eight armed intersections while meeting greens's meeting (green, green, blue, blue), the rest are four armed.
- Purple intersects all colors, two six armed with blue (blue, blue, purple), both a four armed and a six armed with green (green, green, purple) (green, purple), a six armed with yellow (purple, yellow, yellow), and four armed with orange(orange, purple), showing the reflection and inversion process described earlier.
- Finally, red conjoins all, and intersects with none.



All The 25 Intersection Points of the C Slice

This section deals with the how to name the various points of intersection. Obviously one can still use traditional names to describe chords, however it may be useful to analyze theory with a different way of naming chords specific to the 12 Tone Mandala. This is done by cutting the mandala into 12 different "slice groups" They are separated by the purple lines, and a given slice uses the name of the tone connected to that purple tritone line, and moves clockwise. A point is named by its slice group first, and then the number within the group. These numbers within the group can be seen in the above diagram of the C group. Here are the points for the C slice:

(The ordering of the notes begins on C, and moves up chromatically)

Example:

Point: (Colors) Note, Note Note, Note - Position of Notes on clock face (0 is 12oclock, 1 is 1oclock, etc.)

(OP) C, F, Gb, G - 0, 11, 6, 1
 (YYP) C, D, F, Gb, G, Bb - 0, 2, 11, 6, 1, 10
 (GGP) C, Eb, F, Gb, G, A - 0, 9, 11, 6, 1, 3
 (GP) C, D, Gb, Bb, - 0, 2, 6, 10
 (PBB) C, E, F, Gb, G, Ab - 0, 4, 11, 6, 1, 8
 (PBB) C, D, Eb, Gb, A, Bb - 0, 2, 9, 6, 3, 10
 (BB) D, Eb, E, F - 2, 9, 4, 11 (Oddity aka no tonic)
 (OB) C, F, G, B - 0, 11, 1, 5
 (YB) C, G, Bb, B - 0, 1, 10, 5

- 10: (YB) C, D, F, B 0, 2, 11, 5
- 11: (GB) C, Eb, G, B, 0, 9, 1, 5
- 12: (GGBB) C, D, F, G, Ab, A, Bb, B 0, 2, 11, 1, 8, 3, 10, 5
- 13: (OG) C, E, F, G 0, 4, 11, 1
- 14: (GY) C, E, G, Bb 0, 4, 1, 10
- 15: (GGY) C, D, Eb, E, F, G 0, 2, 9, 4, 11, 1
- 16: (GB) C, E, G, Ab 0, 4, 1, 8
- 17: (BY) D, F, G, Ab 2, 11, 1, 8 (Oddity aka no tonic)
- 18: (OY) C, F, G, A 0, 11, 1, 3
- 19: (YY) C, G, A, Bb 0, 1, 3, 10
- 20: (YG) C, Eb, G, A 0, 9, 1, 3
- 21: (YB) C, G, Ab, A 0, 1, 8, 3
- 22: (OO) C, D, F, G 0, 2, 11, 1
- 23: (OY) C, D, G, Bb 0, 2, 1, 10
- 24: (OG) C, D, Eb, G 0, 2, 9, 1
- 25: (OB) C, D, Ab, G 0, 2, 8, 1



All Intersection Points containing C, minus the 25 Points of the C Slice

Here we will look at all the intersection points or chords containing C outside the C slice. The letter refers to which of the 12 slices the point is in, and the number refers to the numbers seen in the diagram of the C slice on page 40.

- 1. F22 (START ORANGE LINE)
- 2. F18
- 3. F13
- 4. F8
- 5. F1
- 6. Bb25
- 7. Bb24
- 8. Bb23
- 9. Bb22 (END ORANGE LINE)
- 10. F23 (START YELLOW LINE)
- 11. F19
- 12. F14
- 13. F9
- 14. F2
- 15. Bb17
- 16. Bb15
- 17. Bb10
- 18. Bb2
- 19. Eb21

- 21. Eb19
- 22. Eb18 (END YELLOW LINE)
- 23. F24 (START GREEN LINE)
- 24. F20
- 25. F15
- 26. F11
- 27. F3
- 28. Bb12
- 29. Bb4
- 30. Eb12
- 31. Eb3
- 32. Ab16
- 33. Ab15
- 34. Ab14
- 35. Ab13 (END GREEN LINE)
- 36. F25
- 37. F21
- 38. F17
- 39. F16
- 40. F12
- 41. F5
- 42. Bb7

- 43. Bb6
- 44. Eb6
- 45. Ab7
- 46. Ab5
- 47. Db12
- 48. Db11
- 49. Db10
- 50. Db9
- 51. Db8 (END BLUE LINE)
- 52. Gb6 (START PURPLE LINE)
- 53. Gb5
- 54. Gb4
- 55. Gb3
- 56. Gb2
- 57. Gb1 (END PURPLE LINE)
- 58. G5 (START BLUE LINE)
- 59. G7
- 60. D6
- 61. A6
- 62. A7
- 63. E5
- 64. E12
- 65. E16

66. E17

- 67. E21
- 68. E25 (END BLUE LINE)
- 69. G3 (START GREEN LINE)
- 70. G12
- 71. D4
- 72. D12
- 73. A3
- 74. A11
- 75. A15
- 76. A20
- 77. A24 (END GREEN LINE)
- 78. G2 (START YELLOW LINE)
- 79. G10
- 80. G15
- 81. G17
- 82. D2
- 83. D21
- 84. D20
- 85. D19
- 86. D18 (END YELLOW LINE)
- 87. G1 (START ORANGE LINE)
- 88. G8

89. G13

90. G18

91. G22 (END ORANGE LINE)

This is every possible intersection point which C takes part in, besides the center point. In order to see the pattern, it is helpful to read through the above list, and follow the points on the diagram containing the 25 points of a single slice group on page 40.

I would also like to give names to the various interval lines for the sake of developing mandala specific language. These are the names of the interval lines according to their order drawn starting at C, moving clockwise. In the cases of colors which have multiple shapes, move clockwise to the next starting point (C Triangle is Gr1,Gr2,Gr3... G Triangle is Gr4, Gr5, Gr6...etc.

(dodecagon) R1: C-G R2: G-D R3: D-A R4: A-E R5: E-B R6: B-Gb R7: Gb-Db R8: Db-Ab R9: Ab-Eb

R10: Eb-Bb

R11: Bb-F

R12: F-C

(hexagon 1) O1: C-D O2: D-E

O3:E-Gb

O4: Gb-Ab

O5: Ab-Bb

06:Bb-C

(hexagon 2)

07: G-A

08: A-B

09: B-Db

O10: Db-Eb

011: Eb-F

012: F-G

51

(square 1)

Y1: (C-A
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Y2: A-Gb

Y3: Gb-Eb

Y4: Eb-C

(square 2)

Ү5: G-Е

Y6: E-Db

Y7: Db-Bb

Y8: Bb-G

(square 3)

Y9: D-B

Y10: B-Ab

Y11: Ab-F

Y12: F-D

(triangle 1) G1: C-E G2: E-Ab G3: Ab-C (triangle 2) G4: G-B

G5: B-Eb
G6: Eb-G
(triangle 3)
G7: D-Gb
G8: Gb-Bb
G9: Bb-D
(triangle 4)
G10: A-Db
G11: Db-F
G12: F-A

(dodecagram)

B1: C-B

B2: B-Bb

B3: Bb-A

B4: A-Ab

B5: Ab-G

B6: G-Gb

B7: Gb-F

В8: F-Е

B9: E-Eb

B10: Eb-D

B11: D-Db

B12: Db-C

(spokes)

P1:C-Gb

P2: G-Db

P3: D-Ab

P4: A-Eb

P5: E-Bb

P6: B-F



The 12 Zodiac Signs around the Mandala

As a bit of side note, but something particularly interesting to mention is that the 12 Tone Mandala is also a very useful tool for learning some of the basics of Astrology, and potentially any relational system with 12 components. I'm going to assign each sign to a note in the order of the circle of fifths, but I want to make it clear that this is not meant to be a direct correspondence of sign to note or motivated by occult meaning behind the association (although arguments can always be made). It is rather to show how the study of one 12 node system can contribute to the knowledge of another. My logic behind the association of note and sign is that Aries tends to be viewed as the start of the zodiacal circle, and C tends to be viewed as the the first in the circle of fifths.

If we look at the mandala with the Zodiac signs we can immediately see the progression of the wheel follows the red perimeter line, progressing from sign to sign in the order which the sun progresses through them.

- If we now look to the two orange hexagons, we notice that
 - Hexagon 1 contains all the projective (masculine, yang) signs, being Aries,
 Gemini, Leo, Libra, Sagittarius, and Aquarius
 - Hexagon 2 contains all the receptive (feminine, yin) signs, being Taurus, Cancer, Virgo, Scorpio, Capricorn, and Pisces.
- If we now shift our attention to the three yellow squares, we notice they represent the Quadruplicities.
 - Square 1 are the cardinal signs, being Aries, Cancer, Libra, and Capricorn.
 - Square 2 contains the Kerubic (or fixed) signs, being Leo, Scorpio, Aquarius Taurus.
 - Square 3 is the Mutable signs, being Sagittarius, Pisces, Gemini, and Virgo.
- Now the green triangles show the various triplicities.
 - Triangle 1 shows the Fire signs, being Aries, Leo, and Sagittarius.
 - Triangle 2 holds the water signs, being Cancer, Scorpio, and Pisces.

- Triangle 3 is the Air signs, being Libra, Aquarius, and Gemini.
- Triangle 4 contains the earth signs, being Capricorn, Taurus, and Virgo.
- The blue dodecagram shows the inconjunct relationships
- The purple lines represent the opposing signs.

To review, red is the Zodiacal Wheel, orange is Sextile, yellow is Quadruplicities, green is Triplicities, blue is Quincunx and purple is Opposite. [38]

Conclusion:

<u>Gazing Into A Mirror (We Ain't So Far From</u> <u>Ain Soph Aur)</u>

Self Discovery from Musical Discovery

"Knowing others is wisdom. Knowing yourself is enlightenment."

"The great path has no gates; thousands of roads enter it."

- Zen Proverbs [43]

In learning about any aspect of existence, we have great potential to become more familiar with the encompassing whole of existence itself. In every aspect of life we can find metaphors and ideas which help us live better. When two musicians learn to improvise together, are they not also learning to better communicate? When a performer struggles for ages with a piece and then finally articulates it with perfection, do they not simultaneously learn the art of persistence? When we refine our skills of listening, do we not hear what others have to say more clearly? When one gains greater skills in creativity and becomes an artist, do they not bring this to everything which they create? It seems to me that there is nothing in life that cannot teach us about life.

So in closing I'd like to say that although the 12 Tone Mandala is surely a pedagogical tool, what subject it may teach is not so clear; for in my working with it, the things I have learned stretch far beyond the realm of music. Like when the earliest chemists found an introspective method in alchemy [44], or the stargazers who found in the sky a language to describe their psyche, or the kabbalist who through thorough examination of their book found a great and hidden depth within the letters, so surely in our learning about music, we can also learn something about ourselves.

We have fallen into the place where everything is music. The strumming and the flute notes rise into the atmosphere, and even if the whole world's harp should burn up, there will still be hidden instruments playing. They derive from a slow and powerful root, that we can't see. Stop the words now. Open the window in the center of your chest And let the spirit fly in and out.

- Jalal ad-Din Rumi (trans. John Moyne & Coleman Barks) [45]

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