

The Grand Hourglass of Time: A Unified View of Vibrations

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Abstract

The unity of the cosmos is revealed through understanding and experiencing vibrations and cycles. Here we demonstrate a new way to help the mystical seeker unfold and understand the vast range of vibrations, and at the same time understand their commonality in simple terms when taking part in meditations. We expand upon the foundations of the Cosmic Keyboard built on harmonics, to provide a unified means of representing numerically many decades of vibrations and cycles in a simple, unified picture. In this new view, the regions we can and cannot directly sense are both clearly explained with examples. This new unified view is enabled by using a common measure of time: the second. In this approach the conventional dichotomy in the unit of measure between fast vibrations and slow cycles is resolved by simply measuring them all in the same unit of time, for which we use the familiar second. The result is a new kind of hourglass, not built on falling sand, but on the findings of recent science, which reinforce the teachings of mysticism in a way that is unified and understandable. Finally, a simple, new symbol is provided to combine the results of both scientific and mystical perspectives of the new hourglass that can be easily remembered and used in daily thought.

Keywords: time, vibrations, energy, mysticism, unified theory, Cosmic Energy, esotericism, cycles, fate, hourglass

Le grand sablier du temps : une vision unifiée des vibrations

Roger Franz

Résumé

L'unité du cosmos est révélée par la compréhension et l'expérience intérieure des vibrations et des cycles. Dans ce texte, nous présentons une manière innovante d'aider le chercheur mystique, lorsqu'il s'adonne à ses méditations, à visualiser et à comprendre la vaste gamme de vibrations, et en même temps à assimiler leurs points communs, tout cela avec des termes simples. Nous développons les fondements du Clavier Cosmique construit sur les harmoniques, et fournissons un moyen de représenter numériquement plusieurs dizaines de vibrations et de cycles en une image simple et unifiée. Dans cette nouvelle vision, les régions que nous pouvons, ou ne pouvons pas, ressentir directement, sont toutes deux clairement expliquées à l'aide d'exemples. Cette nouvelle vision unifiée est rendue possible par l'utilisation d'une mesure commune du temps : la seconde. Dans cette approche, la dichotomie conventionnelle, dans l'unité de mesure, entre vibrations rapides et cycles lents, est résolue en les mesurant simplement toutes deux dans la même unité de temps, où nous utilisons la "seconde" qui nous est familière. Le résultat est un sablier d'un nouveau genre, construit non pas sur du sable qui tombe, mais sur les récentes

découvertes de la science, qui épaulent nos enseignements mystiques d'une manière unifiée et compréhensible. Enfin, un nouveau symbole simple est proposé pour combiner les résultats des deux facettes - scientifique et mystique - du nouveau sablier, symbole qui peut être facilement mémorisé et utilisé dans la pensée quotidienne.

Mots clés : temps, vibrations, énergie, mysticisme, théorie unifiée, énergie cosmique, ésotérisme, cycles, destin, sablier.

El Gran Reloj de Arena del Tiempo: Una Visión Unificada de las Vibraciones

Roger Franz

Resumen

La unidad del cosmos se revela a través de la comprensión y la experiencia de vibraciones y ciclos. Aquí demostramos una forma nueva de ayudar al buscador místico a desarrollar y comprender la amplia gama de vibraciones y al mismo tiempo, comprender su similitud en términos simples cuando participa en meditaciones. Ampliamos los cimientos del Teclado Cósmico construido sobre armónicos, para proporcionar un medio unificado de representar numéricamente muchas décadas de vibraciones y ciclos en una imagen simple y unificada. En este nuevo punto de vista, las regiones que podemos y no podemos sentir directamente se explican claramente con ejemplos. Esta nueva vista unificada se habilita mediante el uso de una medida de tiempo común: el segundo. En este enfoque, la dicotomía convencional en la unidad de medida entre vibraciones rápidas y ciclos lentos se resuelve simplemente midiéndolas todas en la misma unidad de tiempo, para lo cual usamos el familiar segundo. El resultado es un nuevo tipo de reloj de arena, no construido sobre arena que cae, sino sobre los hallazgos de la ciencia reciente, los cuales refuerzan las enseñanzas del misticismo de una manera unificada y comprensible. Finalmente, se proporciona un símbolo nuevo y simple para combinar los resultados de ambas perspectivas científica y mística del nuevo reloj de arena que se puede recordar y usar fácilmente en el pensamiento diario.

Palabras claves: tiempo, vibraciones, energía, misticismo, teoría unificada, Energía Cósmica, esoterismo, ciclos, destino, reloj de arena

A Grande Ampulheta do Tempo: Uma Visão Unificada das Vibrações

Roger Franz

Resumo

A unidade do cosmos é revelada pela compreensão e experimentação de vibrações e ciclos. Aqui demonstramos uma nova maneira de ajudar o buscador místico a desvendar e compreender a vasta gama de vibrações e, ao mesmo tempo, entender sua semelhança em termos simples ao participar de meditações. Expandimos os fundamentos do Teclado Cósmico construído sobre harmônicos, para fornecer um meio unificado de representar numericamente muitos intervalos de vibrações e ciclos em uma imagem simples e unificada. Nessa nova visão, as faixas que podemos

e não podemos sentir diretamente são claramente explicadas com exemplos. Essa nova visualização unificada é habilitada usando uma medida comum de tempo: o segundo. Nesta abordagem, a dicotomia convencional na unidade de medida entre vibrações rápidas e ciclos lentos é resolvida simplesmente medindo-os todos na mesma unidade de tempo, para o que usamos o familiar segundo. O resultado é um novo tipo de ampulheta, construída não sobre a vazão de areia, mas sobre as descobertas da ciência recente, que reforçam os ensinamentos do misticismo de uma maneira unificada e compreensível. Finalmente, um novo símbolo simples é fornecido para combinar os resultados das perspectivas científica e mística da nova ampulheta, que pode ser facilmente lembrado e utilizado no pensamento diário.

Palavras-chave: tempo, vibrações, energia, misticismo, teoria unificada, Energia Cósmica, esoterismo, ciclos, destino, ampulheta

Die große Sanduhr der Zeit: eine vereinheitlichte Betrachtung der Schwingungen

Roger Franz

Zusammenfassung

Die kosmische Einheit offenbart sich über das Verständnis und die Erfahrung von Schwingungen und Zyklen. Wir werden in dieser Abhandlung dem mystischen Sucher einen neuen Weg zeigen, der ihn helfen wird, den umfangreichen Bereich der Vibrationen zu entdecken und zu verstehen, wobei zugleich ihre Gemeinsamkeiten mit einfachen Worten verstanden werden, dies mittels der teilgenommenen Meditationen. Weiterhin werden die Grundlagen der kosmischen Tastatur, die auf der Harmonielehre beruhen, besprochen. Ziel ist, ein einheitliches Mittel, das viele Dekaden Schwingungen und Zyklen in ein einfaches einheitliches Bild numerisch darstellt, zu finden. Die Bereiche, die wir unmittelbar oder auch nicht wahrnehmen, sind in dieser Darstellung deutlich mit Beispielen dokumentiert. Eine gemeinschaftliche Zeitmessung, die Sekunde, ermöglicht diese neue einheitliche Darstellung. Die übliche Dichotomie in der Messung zwischen schnelle Schwingungen und langsame Zyklen ist in diesem Vorgehen gelöst indem man sie alle einfach in derselben Zeiteinheit messen. Hierzu wird die uns allen vertraute Sekunde benutzt. Das Ergebnis ist eine neue Sanduhr ohne herabfallenden Sand sondern gegründet auf den Ergebnisse der modernen Wissenschaft. Sie bekräftigen gewissermaßen die mystischen Lehren auf eine vereinheitlichte und verständliche Art. Schließlich ist nun ein einfaches neues Symbol bereitgestellt, um die Ergebnisse der wissenschaftlichen und mystischen Perspektiven durch die neue Sanduhr so zu kombinieren, dass man sich einfach daran erinnern kann und sie auch täglich benutzen kann.

Schlüsselworte: Zeit, Schwingungen, Energie, Mystik, Vereinheitlichte Theorie, Kosmische Energie, Esoterik, Zyklen, Schicksal, Sanduhr

Introduction

The teachings of AMORC and other ancient mystical traditions provide rich understanding about our connections to vibrations and natural cycles. Some of the faster vibrations are directly experienced through the senses of hearing and sight. Slower cycles are evident in the rhythms of

Earth, the moon, and the sun. The rhythmic pulse of one's own heartbeat lies in between these extremes. Between these regions we can directly sense are a multitude of other natural events occurring without our direct awareness. This paper presents a way to visualize the vast range of vibrations and cycles within us and around us, both logically and symbolically, as well as explains the real content of these vibrations and cycles whether directly sensed or made known only through scientific instruments. The vast variation of types of vibrations and cycles when compared all together reveals a fundamental unity.

Vibrations are those phenomena that repeat on a rapid time scale. We experience certain vibrations directly with the senses, including sight and sound. Many other vibrations are out of the reach of our direct senses, whether very slow or very fast. Awareness of all vibrations regardless of our ability to sense them directly with the senses is important to the seeker. But while this article is tied closely to measurable physical phenomena, the benefits of this new understanding reach well beyond that realm. *Liber 777* states: "It is crucial that you lose consciousness of your physical body and surroundings, for this is the condition for you to receive the influx of the most subtle vibrations from the Cosmic."¹

Vibrations are commonly considered as a repetition of many times per second, while the slower kinds of vibrations occurring less than once per second are generally called cycles. Human cycles can be affected by the daily and yearly cycles of Earth, the cycles of the moon, and the cycles of movement of the planets, as explored in H. Spencer Lewis's *Self Mastery and Fate with the Cycles of Life*.² What this paper attempts to do is to tie the extremes in cycles and vibrations together to more clearly represent their fundamental unit.

Both fast vibrations and slow cycles can be understood in scientific terms that greatly expand our senses and enhance the teachings of various mystical disciplines and ancient traditions. In this paper we provide a detailed map to extend our understanding and awareness of the range of all known vibrations and cycles. This information is compatible with the basic teachings of AMORC and other traditions, and with scientific facts as well, but provides a new level of unified understanding that we hope is useful in your journey. Integrating ancient teachings with modern science offers a more powerful perspective than either one alone.

Since vibrations and cycles are phenomena that repeat in some period of time, vibrations are tied to time itself. Rapid vibrations such as radio waves and x-rays are understood by science and utilized in familiar technologies. Very slow cycles beyond our direct experience have been revealed in studies in geology and astronomy and similarly deserve our awareness and understanding.

Prior Work

Credit for much of the groundwork combining mystical yet scientific views of cycles is due to the work of seventeenth-century astronomer and mathematician Johannes Kepler.^{3,4} Kepler not only had a strong belief in the harmonious nature of the motion of the planets in a musical sense, but further applied geometry, arithmetic, and astronomy to explain these phenomena.

When studying any large problem, it is often useful to consider many avenues in order to find simple means to resolve conflicts. A series of steps that is called the Seven Liberal Arts (and sciences) provides such guidance. Known to ancient Greece and Rome and to Western Europe of medieval times, these areas remain in the teachings of orders like Freemasonry.⁵ The seven arts are (1) grammar, (2) logic, (3) rhetoric, (4) geometry, (5) arithmetic, (6) music, and (7) astronomy.

In the following sections we will mostly focus on arithmetic, music, and astronomy, with some discussion of the other Seven Liberal Arts and Sciences. This approach, of course, is not totally new, as clearly introduced by Ralph M. Lewis in his article “The Practical Application of Mysticism.”

Hertzian or high frequency waves act as a carrier of electrical impulses which are produced by the voice at the transmitting station. As they pass through the air, they are nothing more than electrical waves. At your radio receiver they are detected when it is properly tuned to them. Then they are stepped down by transformers to produce through your receiver various impulses which, when acting upon the air, become sound once again. Thus, in meditation, the original impulse may not have been of a visual or auditory nature. It may have been just those vibrations of a higher psychic octave which have a harmonic of correspondence in a lower scale to one of our senses and by which we experience it. If it were not for this harmonic relationship of the subconscious and psychic and the cosmic octaves as a whole, we would never have any experiences but those of our objective sensations. In other words, we would know or realize the material world only.⁶

Octaves (double the frequency, as found in a musical octave or keys on a piano) and harmonics (any multiple of the frequency) are quite correct terms technically, while the range of all possible vibrations includes everything in between these discrete multiples of a frequency. It is useful to think of the visible rainbow, which is a continuum of light frequencies from red through violet and everything in between. Red does not just stop while orange appears; any number of small intervals measure the states between colors we have conveniently named red, orange, yellow, green, blue, indigo, and violet.

Light below the frequency of red (infrared) and above the frequency of violet (ultraviolet) we cannot see with our eyes. But we do indirectly sense heat as radiated in the infrared and are sensitive to the ultraviolet, for example as related to sunburn. The radio receiver as mentioned above is one means to virtually extend our senses to frequencies we cannot directly sense.

Consider this image of the standard Electromagnetic Spectrum (Figure 1). Highest frequency gamma rays are at the left, with lower frequency radio waves on the right. The human visible light range is but a small slice in between, highlighted by the rainbow of colors.

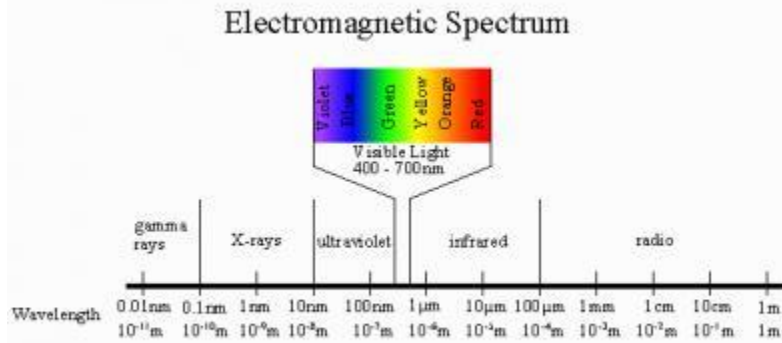


Figure 1. Electromagnetic Spectrum. Image from NOAA.

One studying the ancient arts is likely to encounter diagrams that are dated in terms of today’s knowledge. Figure 2, for example, is titled “Harmonious Conception of the Light of Nature.” Note the extensive use of basic symbols like the triangle and circle. Figures like this are inspirational and remain as a good source from which to begin a time of reflection and meditation. But we may now update such artwork and unify the critical concept of vibrations and waves with more current understanding. A further goal is to provide such an update in easy-to-understand symbolic form while keeping it based on scientific and mathematical information available today. Achieving this goal can truly enhance our appreciation of the unified nature of all vibrations taught by the ancient traditions.

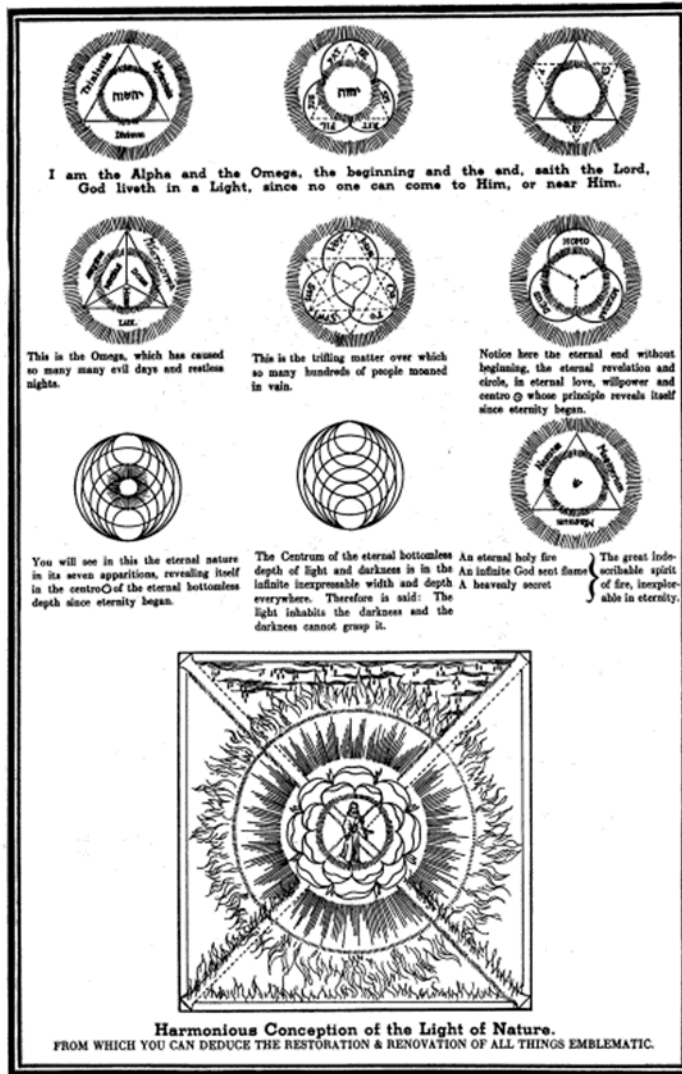


Figure 2. “Harmonious Conception of the Light of Nature.” Image from *Secret Symbols of the Rosicrucians of the 16th and 17th Centuries*.

Octaves and other harmonics of vibrations, cycles, and waves are all well-known not only in music and astronomy but across all branches of science. Besides the harmonic movement of Earth and the planets in our own solar system, slow mechanical oscillations and movements are also well understood in scientific and mathematical terms as waves. As stated in the physics textbook *The Physics of Vibrations and Waves*: “The transmission of energy by wave propagation is fundamental ... demonstrating to the student the pattern of and unity of a large part of physics.”⁷

This basic concept of waves, whether fast or slow, is fundamental both physically and philosophically. What is needed is a way to visualize them all together. The Cosmic Keyboard has been one way to visualize vibrations using the analogy of a piano keyboard, where successive octaves are a doubling of the lower note. This visualization is powerful but tends to ignore the lower vibrations, which we call here cycles.

Developing the New Unified Numerical View

Since vibrations as they are known today have measurable values of number of cycles per some unit of time, we may begin by considering just pure numbers. (Arithmetic is listed as number five among the seven arts and sciences.) Radio frequencies are commonly measured in cycles per second, designated by the unit of Hertz (abbreviated Hz), named after the German scientist Heinrich Rudolf Hertz (1857–1894). Some common examples may help show how these measurements of vibrations in Hz are widely known to most people, whether experienced directly or through some apparatus like a radio receiver:

- Orchestra tuning note “A 440” (440 Hz, in the audible regions)⁸
- Electrical power outlet, AC (alternating current) 60 Hz in the US, 50 Hz in other countries⁹
- AM radio station 1000 KHz (K = kilo = thousand)¹⁰
- FM radio station 100 MHz (M = mega = million)¹¹

and these are common examples of slower cycles we all know:

- 24 hours per day
- 28 days per lunar cycle
- 365 days per year.

Unfortunately, there is a problem standing in the way of a more unified view of vibrations. The published literature is split on how slow and fast vibrations are measured. Fast vibrations are conventionally measured in cycles per second (Hz), and slower vibrations are measured in normal time, whether seconds, days, months, years, or even millennia. It turns out that the two extremes are easily unified if all vibrations from the slowest to the fastest are all expressed in terms of the same units of time. To this end we only need to express all vibrations and all cycles in terms of the same units of time: seconds.

Because the word “per” arithmetically means “divide by,” the actual units of Hz are the inverse of seconds (1 divided by seconds). To get frequency in the common units of seconds is an easy calculation such that 10 Hz or 10 cycles per second is exactly the same as one tenth = $1/10 = 0.1$ second per cycle. But therein lies the problem: to unify our understanding of vibrations in the universal language everyone understands more easily than Hz, which is simply seconds per cycle, or just plain seconds.

To put all the known vibrations on one page we need to use one mathematical shortcut beyond octaves (doubling, or twice the fundamental) and harmonics (any other multiples), which is the scientific notation of powers of ten, or decades. Each power of ten is the previous number multiplied by itself ten (10) times to get the next decade. This shortcut allows us to put an enormous range of numbers all in one figure. Shown in Figure 3 is a numerical view of all the slowest to fastest cycles and vibrations in one figure, in decades of one thousand, showing the commonly used prefix. The next few sections of this paper will make this table of numbers clear when we add examples to each numerical region, along with a mystical perspective when considered holistically. Some of the prefixes assigned to the powers of ten may be more familiar than others, but most readers will recognize at least a few.

Seconds (per cycle)	Prefix	Power of 10
0.000000000000000001	atta	-18
0.000000000000001	femto	-15
0.000000000001	pico	-12
0.00000001	nano	-9
0.000001	micro	-6
0.001	milli	-3
1		0
1000	kilo	3
1000000	mega	6
1000000000	giga	9
1000000000000	tera	12
1000000000000000	peta	15
1000000000000000000	exo	18

Figure 3. A chart showing the slowest cycles to the fastest vibrations in seconds. Chart by the author.

The Hourglass

Figure 3 above shows the equivalence of cycles per second and seconds per cycle in terms of pure numbers. The similarity of the digits to the shape of an hourglass is not accidental or without significance since the hourglass has been a mystical symbol for some time. The hourglass symbol as shown in Figure 4 is combined with wings to give it further meaning beyond the realm of the numerical and physical world. In a metaphorical sense, wings provide a powerful symbol of ascension to higher planes, which are enabled by the physical movement of the falling sands.



Figure 4. “The Hourglass” from *Behold the Sign: A Book of Ancient Symbolism* by Ralph M. Lewis.

The hourglass, mechanical clock, and other tools that have enabled small measurements of time are relatively recent in human history. Ancient populations would have measured time in days by the cycles of light and dark, lunar months by phases of the moon, and seasons repeating year after year. The sundial provided some finer resolution but of course functioned only during daylight. The invention of the hourglass itself has been attributed to a monk named Liutprand living in the eighth century CE.¹² The winged hourglass shown in Figure 4 could be tied to the expression “time flies” (in Latin, *tempus fugit*). The central neck between the upper and lower sections of the hourglass both literally and figuratively represents the present, where the future passes down into the past. The hourglass, though an improvement in measuring time, still lacked specificity to measure very short times like a single second.

Invention of the mechanical clock subsequently provided capability to literally “tick off” individual seconds. During the Ottoman empire in the sixteenth century, the astronomer Taqi al-Din hoped to “build a machine and a clock that would reflect the spiritual structure of the heavens.”¹³ Others like Dutch mathematician Christiaan Huygens in the seventeenth century began to perfect the mechanical clock built around the periodic swing of a pendulum. In these devices, a pendulum swing with the right length of about a meter would repeat its motion in what would become the second.¹⁴ These mechanical devices proliferated and began to be used in many forms from the grandfather clock to tabletop clocks to the common wristwatch. Present-day digital watches employ a tiny crystal oscillator vibrating at a uniform frequency to drive the display of hours, minutes, and seconds.

Before being used in mechanical clocks and becoming internationally recognized as a fundamental unit of time, the history of the second has its origin in the numbers system based on 60 seconds in a minute, 60 minutes in an hour, and 24 hours in a day.¹⁵ The story is an interesting one that not surprisingly involves Greek and Egyptian history. While scientific systems of measurement like the metric system are built on units of 10 (decades), time is built on 60 seconds to a minute, 60 minutes to an hour, and additionally there are 360 degrees in a circle, measurements that remain with us to this day.

The modern standardization of seconds as a unit of measure is an important new example of how vibrations are still universal. For quite some time, the international second was defined as a fraction of the Earth-day cycle. Since 1967, the standard of the second has been an atomic clock. The SI (*Système International* or metric system as the International System of Units) unit of a second is defined as some 9,192,631,770 Hz, which is the frequency of radiation produced by the transition between the two hyperfine ground states of the element caesium.¹⁶

Cesium itself may not be that familiar but is one of the elements in the Periodic Table group 1, related to familiar elements like sodium, as in sodium chloride or table salt. Cesium is just a naturally occurring element that conveniently produces a very stable, repeated vibration that is well suited for an international standard of measure. The important message here is that the modern second is based on the vibrations of a naturally occurring chemical element. Of course, the very same second is still the same familiar fraction of an Earth-day, and the same time it takes for the average heartbeat.

In addition to the atomic science of seconds or the absolute nature of time, this paper considers the mystical aspect of time. To quote again from *Behold the Sign: A Book of Ancient Symbolism* by Ralph M. Lewis: “Truly, time is fleeting and the human life on earth is like the passing of the sands.... We must remember that the second, minute, and hour of time as now used, is a man-made affair.... To the Master mystic neither time nor space exist; both are artificial creations of a person’s mind to explain away, or excuse their inability to overcome seeming obstacles.”¹⁷ This is the essence of the hourglass symbol, with the present as the fleeting point between two triangles of the future and the past.

In the following sections we detail specific examples of the kind of vibrations associated with every decade (power of ten) of fast vibrations and slow cycles. Having all the smallest to largest vibrations all in one concise picture is key to achieving a unified view. It is important to note again that one second, in the very middle, is approximately the rate of the human heartbeat. Fast vibrations are above, while slower vibrations are below. What is an overwhelming range of seconds can therefore always be related to the time of our own heartbeat.

Next, we will fill in the pure numbers with some of the more familiar associated content.

Vibrations and Cycles We Experience Directly

To review, these are some vibrations and cycles we can experience directly with our senses, from fast to slow:

- Visible light
- Audible sound
- Heartbeat
- Seconds, hours, months, and years
- Human lifespan.

These vibrations we experience directly are shown in the hourglass view in Figure 5.

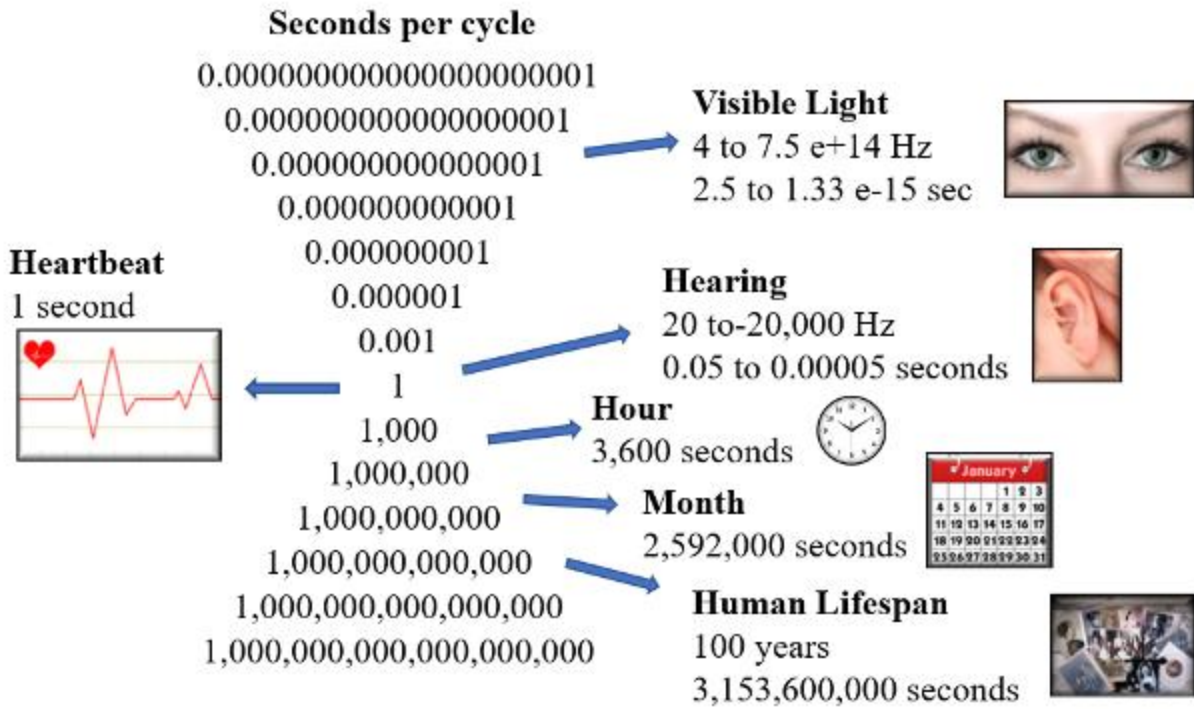


Figure 5. A chart with visuals showing the vibrations that can be sensed directly. Image by the author.

While we are rich with ability to experience all these vastly different aspects of time, in another sense we are missing most of what is in the full range of vibrations in the universe. While the advanced mystical student may sense vibrations beyond the reach of normal senses, it is still useful to know how science has virtually expanded our senses to understand the rest of the vibrations within and all around us. Slower and faster cycles will be covered in detail in the next sections, in that order.

All the Vibrations and Cycles

We have mentioned that fast vibrations are conventionally measured in cycles per second (Hz), while slow cycles are conventionally measured in time itself, for which we have chosen the units of seconds. It may be useful to review this important concept of the equivalence with a comprehensive list of both displayed together, side by side, as shown in Figure 6. Here we have added every decade (order of magnitude, or power of ten) rather than every three decades with their conventional prefix.

Power of 10	Prefix	Cycles per second (Hz)	Seconds (per cycle)	Prefix	Power of 10
18	exo	1000000000000000000	0.000000000000000001	atto	-18
		1000000000000000000	0.000000000000000001		
		1000000000000000000	0.000000000000000001		
15	peta	1000000000000000	0.0000000000000001	femto	-15
		1000000000000000	0.0000000000000001		
		1000000000000000	0.0000000000000001		
12	tera	1000000000000	0.000000000000001	pico	-12
		1000000000000	0.000000000000001		
		1000000000000	0.000000000000001		
9	giga	1000000000	0.000000001	nano	-9
		100000000	0.00000001		
		10000000	0.0000001		
6	mega	1000000	0.000001	micro	-6
		100000	0.00001		
		10000	0.0001		
3	kilo	1000	0.001	milli	-3
		100	0.01		
		10	0.1		
0		1	1		0
		0.1	10		
		0.01	100		
-3	milli	0.001	1000	kilo	3
		0.0001	10000		
		0.00001	100000		
-6	micro	0.000001	1000000	mega	6
		0.0000001	10000000		
		0.00000001	100000000		
-9	nano	0.000000001	1000000000	giga	9
		0.0000000001	10000000000		
		0.00000000001	100000000000		
-12	pico	0.000000000001	1000000000000	tera	12
		0.0000000000001	10000000000000		
		0.00000000000001	100000000000000		
-15	femto	0.000000000000001	1000000000000000	peta	15
		0.0000000000000001	10000000000000000		
		0.00000000000000001	100000000000000000		
-18	atto	0.000000000000000001	1000000000000000000	exo	18

Figure 6. A chart showing all known vibrations – with cycles per second (Hz) and seconds. Chart by the author.

Importantly, the figure still resembles an hourglass. Next, we will go into more detail with concrete examples from human experience and the physical universe and how they are associated with each decade of seconds.

Slow Vibrations: Many Seconds per Cycle

Beginning again with the heartbeat, we can move down the hourglass of cycles and explain those which take more and more seconds to repeat. Since this may not be so familiar in the context of vibrations or waves, some commonly known numbers of seconds are first listed in Figure 7. Most should be quite familiar. Without proving right now that all these events are truly vibrations in the strict definition of repetitive events or even electromagnetic waves, some imagination may be required to grasp these long cycles in terms of the same time unit of seconds used to measure fast vibrations.

Number of Seconds	
Minute	60
Hour	3,600
Day	86,400
Lunar Month	2,419,200
Year	31,536,000
11-year Sunspot Cycle	346,896,000
100-year Human Life	3,153,600,000

Figure 7. A chart showing a simple list of familiar slow cycles. Chart by the author.

If we go back to the detailed view in the bottom half of the hourglass, we can now fill in other events that we know about which have longer time scales. The expanse of common time covers quite a range. Beyond that, this view of cycles allows us to show history beyond our own life on the same page. Figure 8 is such a list where the slow vibrations we can experience directly are in bold. Decades represent just the nearest power of ten, as used in the hourglass figures, while calculated seconds are the exact number.

Seconds (Decade)	Event	Seconds (Calculated)
1	Heartbeat, approximately every second	1
10	Minute, 60 seconds, human respiration, oceanic waves, Earth seismic vibrations	60
100	Daily activities and awareness of several minutes' duration, Earth seismic vibrations	---
1,000	Hour, 60 minutes, longer daily activities within a day	3600
10,000	Day, 24 hours, rotation of Earth around its axis, circadian rhythm	86,400
100,000	Calendar week, 7 days	604,800
1,000,000	Lunar month, 28 days, cycle of Moon's phases	2,419,200
10,000,000	Year, Earth orbits around Sun	31,536,000
100,000,000	11-year sunspot cycle	346,896,000
1,000,000,000	100-year human lifetime	3,153,600,000
10,000,000,000	Millennium, medieval period of history 1000 years ago	31,536,000,000
100,000,000,000	Human agriculture, animal domestication begins, 10,000 years ago	315,360,000,000
1,000,000,000,000	Stone Age, hominids evolve to humans, 100,000 years ago	3,153,600,000,000
10,000,000,000,000	Early humans control fire, 1 million years ago	31,536,000,000,000
100,000,000,000,000	Late Miocene period, 10 million years ago	315,360,000,000,000
1,000,000,000,000,000	Solar year, Sun travels around Milky Way, 250 million years	7,884,000,000,000,000
10,000,000,000,000,000	Age of Earth, 4.5 billion years	14,191,200,000,000,000
100,000,000,000,000,000	Age of universe, 15 billion years in Big Bang theory	473,040,000,000,000,000

Figure 8. This is a complete list of all known slow cycles, with examples of those directly experienced highlighted. Chart by the author.

Slow vibrations of the Earth itself occur in the 10 to 100 seconds per cycle range.¹⁸ Unless these movements become strong enough to be tremors of earthquake intensity, we are unlikely to be aware of them, but this is yet another example of the universality of vibrations right under our very feet.

Putting all these event periods on one simplified scale allows us to quickly get a feeling for the very slowest vibrations in the universe. Only the smallest decades of time are in our direct experience, and typically dominate most of our activities and thoughts. But awareness of the

even longer cycles, extending through the history of human beings and Earth itself, to the theoretical age of the universe, can improve our awareness of their existence.

The idea that the longest duration cycles are all electromagnetic in nature or necessarily governed by the known principles of electromagnetism might be an opportunity for future research. For example, as stated by H.J. Pain in *The Physics of Vibrations and Waves*, “Electromagnetic waves arise whenever an electric charge changes its velocity.”¹⁹

One can easily imagine that a body like Earth, rotating while moving in orbit, could in fact generate an electromagnetic field; the same could apply to the Moon, or the Sun as well, or any other body in space, given that changes in motion physically produce an electromagnetic field. Although these motions appear steady, they are not perfect and have some inherent variations in addition to their circular or elliptical motions in space. The energy of the slowest vibrations will be very low, since physics predicts energy to be proportional to frequency in Hz, or in other words, inversely proportional to seconds.²⁰ It is generally agreed that the common rules of physics apply to radio and light frequency vibrations, as covered in the next section.

Fast Vibrations: Fractions of a Second Per Cycle

Beginning again with the heartbeat at approximately one each second, we can also move up the hourglass of vibrations to those which are faster, that is, take less and less of a fraction of a second to repeat. Since these vibrations are not commonly measured directly in seconds, in Figure 9 we show both the conventional cycles per second (Hz) value as well as the unified unit of seconds (i.e., seconds per cycle). Again, those vibrations we can experience directly are highlighted. In terms of the vast range of decades into the upper region, is it clear that we are very limited in what our senses can experience directly. This is in fact the point of this paper: to show what we are missing if our awareness is limited only to our direct senses. Making use of the higher vibrations is one of the keys to cosmic awareness.

Power of 10	Prefix	Cycles per second (Hz)	Seconds (per cycle)	Phenomenon
19		10000000000000000000	0.0000000000000000001	Gamma rays
18	exo	10000000000000000000	0.0000000000000000001	X-rays
		10000000000000000000	0.0000000000000000001	X-rays
		10000000000000000000	0.0000000000000000001	Ultraviolet
15	peta	10000000000000000000	0.0000000000000000001	Ultraviolet
		10000000000000000000	0.0000000000000000001	Visible light
		10000000000000000000	0.0000000000000000001	Infrared
12	tera	10000000000000000000	0.0000000000000000001	Infrared
		10000000000000000000	0.0000000000000000001	Infrared
		10000000000000000000	0.0000000000000000001	Microwave
9	giga	10000000000000000000	0.0000000000000000001	Microwave
		10000000000000000000	0.0000000000000000001	Radio
		10000000000000000000	0.0000000000000000001	Radio
6	mega	10000000000000000000	0.0000000000000000001	Radio
		10000000000000000000	0.0000000000000000001	Very low frequency radio
		10000	0.0001	Human hearing
3	kilo	1000	0.001	Human hearing
		100	0.01	Human hearing
		10	0.1	Brainwaves
0		1	1	Human heartbeat

Figure 9. This is a complete list of all known fast vibrations, with examples of those directly sensed highlighted. Chart by the author.

One important source of the higher frequency vibrations is our own Sun, which emits vibrations from the middle radio frequencies, through microwave, infrared, visible, ultraviolet, and x-rays. The Sun's outer corona also emits x-ray radiations.²¹ This is true of most of the countless other stars in the universe, although they are all far away, with distances measured in light years.

In addition to human-made radio and microwaves, chemical substances within and all around us are also constantly-vibrating in the infrared and microwave regions of the spectrum. Chemists use spectroscopy to identify chemical compounds by their characteristic vibrational frequencies in chemical bonds. Spectroscopy is a broad field in its own right, with applications across multiple fields in physics, chemistry, and the life sciences.²² We can become more capable of experiencing these vibrations with the awareness that they are present and associated with verifiable phenomena. Instruments that extend our senses to detect chemical vibrations are a means to recognize physical matter itself. Outer space is not empty either; radio astronomers use specialized telescopes and other instruments based on Earth as well as those sent out in space to identify the many molecules present there. A recent finding stated: "To date, 241 individual molecular species, composed of 19 different elements, have been detected in the interstellar and circumstellar medium by astronomical observations."²³

The mystical expression “as above, so below” plays out fully here, since beginning with hydrogen, the remaining chemical elements are made in stars by nucleosynthesis. The vibrations and matter associated with the elements are built into larger molecules that have their own characteristic vibrations. In short, while we can sense a limited set of vibrations directly with the senses, we can now virtually sense many more with scientific instruments. The awareness of the wide range of vibrations should help you in your own experience of the variations (and unity) of vibrations, cycles, and time.

The Unified View

In the center of the overall range of vibrations is our own heartbeat, producing cycles at approximately one per second.

Slightly slower are our own rate of breathing and the many daily activities we experience in normal time. Even slower than the cycles of human life are the events of human history, the history of Earth, and the evolution of the universe itself.

Beginning again with the heartbeat and moving up the frequency of vibrations, or in the unified terminology, smaller fractions of a second wherein they occur, we encounter our own hearing range. Moving up the scale we encounter a limited range of direct experience due to the limits of our eyesight. Between all of those frequencies are vibrations all within and around us, not the least of which are vibrations emitted by the Sun and the very matter from which we are made. Fortunately, Earth’s atmosphere protects us from most of the damaging radiation from outer space in the ultraviolet and x-ray frequencies.

This paper puts forth that it is good to consider using the hourglass as inspiration during meditation. Beginning with the heartbeat and respiration, mentally work up or down the hourglass where you could encounter new vibrations now that you are aware of them in the unified view of seconds. While this representation in Figure 10 is a simple but strictly arithmetic view, you should now be able to attach meaning in terms of music, astronomy, and physical senses and events. Vibrational numbers are listed in seconds, with one second in the middle of the hourglass. The table format has been intentionally omitted to allow the hourglass form of the arithmetic range of seconds to stand alone. The reader may now contemplate what is associated with each region of fast vibrations and slow cycles, in unity.

0.000000000000000000000001
 0.00000000000000000000001
 0.000000000000000001
 0.000000000000001
 0.0000000001
 0.0000001
 0.00001
 0.001
 1
 1,000
 1,000,000
 1,000,000,000
 1,000,000,000,000
 1,000,000,000,000,000
 1,000,000,000,000,000,000
 1,000,000,000,000,000,000,000
 1,000,000,000,000,000,000,000,000

Figure 10. This is a summary view of unified vibrations and cycles in seconds. Image by the author.

Additional Symbols

Three more symbols may also be of value in meditation.

- **The Sun.** This symbol (Figure 11) has been used throughout the ages, from astrology to its current use where it is still found in modern astronomy and cosmology research publications. Higher vibrations (smaller seconds per vibration) may be found here, and the symbol of the sun is easy to remember. It is a symbol for the sun and atomic vibrations of Figure 3.

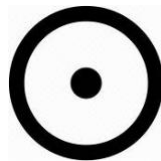


Figure 11. Sun. Image via NASA.

- **The Earth.** Here, too, the very same symbol shown in Figure 12 has been used throughout the ages, from astrology to its current use in modern astronomy and earth science. It is the symbol of Earth and earthly waves in the lower part of Figure 3. In this region of cycles are found those of longer duration, not the least of which are the day, lunar month, and human lifespan, and on out to the ages of cosmology.



Figure 12. Earth. Image via NASA.

- **The Hourglass.** As reimagined in this paper, the hourglass is a powerful way to think of not only the passage of time like a clock, but the duration of vibrations and waves as events in time. One may decide to pay less attention to the numbers themselves and just ponder the iconic image of the hourglass, made of triangles in the upright and inverted configurations joined together. From our heartbeat upward to faster and faster vibrations, measured by shorter and shorter time per vibration, we move past hearing and radio waves to visible light and the higher frequencies where we find the energy of the Sun. Moving down from the heartbeat to slower and slower vibrations or cycles, we find the cycles emanating from our own lives, human history, and the evolution of the universe itself.

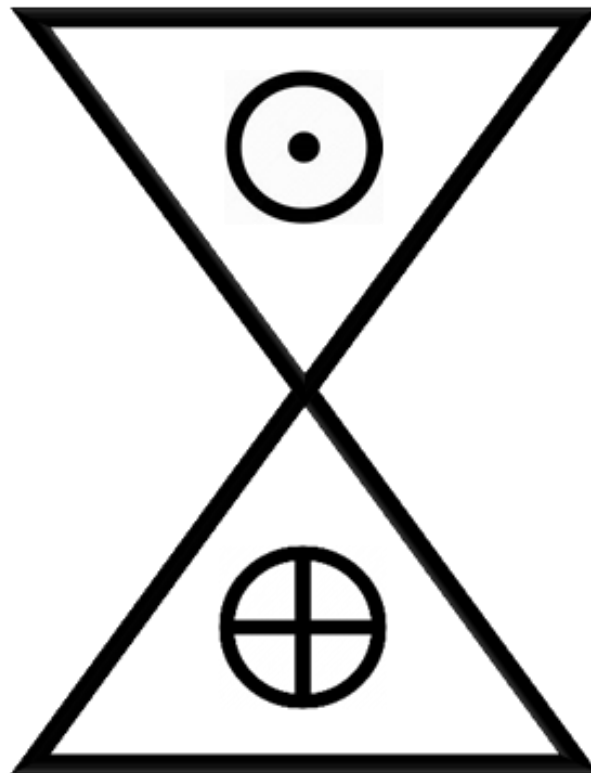


Figure 13. The Grand Hourglass. Image by the author.

The final symbol of Figure 13 is a simple yet powerful way both to visualize and feel all the cycles from low to high frequency, or shall we say from long time duration to short. The heartbeat remains in the center so one may easily begin there and work up to the higher vibrations of the sun, or down toward the cycles of Earth as desired. This is the grand hourglass of time.

Conclusion

Vibrations from short to long are all around us and within us. Being able to comprehend this vast range in terms of a single metric of time (here, we have used the second) may allow one to appreciate the power and unity of this universal energy. Some vibrations and cycles can be sensed directly, while others require additional help to extend our senses. It is suggested that one may conduct a meditation by beginning with one's own heartbeat or breath, and allowing consciousness to reach the slow or fast cycles described here. While the paper has relied on arithmetic and science as the basis, the unified picture can just as easily be understood through symbolic art such as the hourglass.

Conflict of Interest

The author declares no conflict of interest.

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