# 26 The Great “War”: Horus vs Set

One of the puzzling aspects of Egyptian mythology is the strange set of stories surrounding the great battle between Horus (Chariot) and Set (Devil). Since the gods are immortal, why would they want to fight and try to kill each other? It would seem to be a rather futile task, and indeed it was.

The first thing to note is that Young Horus comes into the world as an avatar baby. In the world he has to deal with the limitations of the physical body and the process of growing up. He has to learn by experience and gain in maturity before he can express his divine qualities through his incarnation.

As a child he heard the story that Set had killed the man he believed was his father -- Osiris. Horus is an incarnation of the Cosmic Will as a young man with a powerful will and determination. He is dynamic and skilled in the martial arts. He also has a lot of followers (Shemsu Her). So he decides he must seek revenge against Set for killing his father. There is also an additional motive in that Set, fearing vengeance from Horus, sent a team of 7 special forces scorpions to assassinate Horus when he was just a toddler. His mother, Isis was hiding in the swamps of the delta, fearing just such a circumstance. The scorpions nearly succeeded, but Isis called on Thoth to come use his medical skills to heal Horus. He not only administered an antidote to the scorpion toxins, he toughened the immune system of Horus so he could play with the scorpions like they were his toys.

As Horus grew up, he remembered this close call, and it hardened his determination to go after Set. So the fight was on. Set, being the digestive system, would vent extreme anger by blowing shit at Horus. Horus had his powerful Eye of attention that was like a laser. They fought many battles and Set wounded Horus in his Lunar Eye. Horus, on the other hand, knocked out one of Set’s testicles. Thoth showed up to heal both of them, but for a while Horus was at least partially blinded and Set was, and really always had been, sterile.

Eventually Horus began to discover that the whole business was a misunderstanding, and that he was overreacting. The anger of Set was excessive, but Osiris had started the problem by having a secret liaison with

Nephthys without letting Set or Isis know what was going on. The gods, being immortal, can have personal and sexual relations that are strange to most human societies. After all, Osiris, Set, Isis, and Nephthys were all siblings, and yet were married. However, the key issue was that Osiris broke the trust among the family members. This broke the essential wholeness that is the spirit of the universe. It introduced an element of dishonesty and deceit that broke their bond of unity. The result of the liaison was that Nephthys became pregnant and gave birth to Death. We learn from this that death is a psychological rather than a physical reality. The physical dissolution of the body is only an illusion caused by holding on to a fixed idea of an identity, a notion that a particular physical shape is "who I am".

As a result Osiris had to undergo a radical transformation of his human physical body being dismembered and eventually becoming a plant. When the case of Horus vs Set went to court, Isis and Nephthys dragged the vegetating Osiris into the room and showed that he was still alive. So murder was off the table. After discussion the court decided that Set would be banished for usurping the throne of Osiris, and Horus would take the throne. Set became in charge of the desert lands and the mountains. Horus governed the Nile lands and the delta. Both have their important roles in the safety and prosperity of Egypt, and peace was restored.

However, the problem remained to explain why such a myth would come up among the gods, above and beyond the issue of why there is death in the world. Then one day I was reading about Egyptian mathematics, and I finally understood what the "War" between Horus and Set was all about.

The true mission of the warrior Horus is to restore the unity of Egypt from the disruptions that periodically caused the country to fragment into North vs South or even more numerous splintered small kingdoms. By his nature Set has a divisive personality that is easy to anger and holds grudges. Oddly enough young Horus began to suffer from the same problem when he began to seek vengeance against Set. The lower self will operates mainly from in the belly, not in the head or the heart. This brings it easily under the influence of Set. Set's job as the digestive system is to break food down from its original structure into small particles and then separate

the nutritious part from the waste material. Finally he evacuates the waste material. This is a vital operation, but it is basically one of breaking apart and separating. The heart and blood then does the job of absorbing nutrients and sending them into the cells.

It turns out that the fundamental understanding of the issue is at the root of mathematics. Modern mathematics suffers from a major problem in that mathematicians inserted 0 as a place holder for counting and then began to consider 0 a number without any content. This violated the idea of number. A lack of something is only meaningful if the something already exists somewhere. You can not lack something that does not exist. This brought a crisis into mathematics, because, although the place holder zero made operations easy, it also made certain equations "blow up" and become meaningless. For example, try the simple operation of dividing 3 by 0. What do you get? We know that $3 \times 0 = 0$, so $3 = 0 \div 0$? or $3 \div 0 = 0$? or $3 = 0 \times 0$? The system breaks down there, although there is some agreement that maybe $0 \div 3 = 0$. The usual decision is that division by 0 is undefined.

A further crisis in mathematics came in the 19th century when men like Georg Cantor started playing with the idea of infinity, and came up with the notion that there can be infinite hierarchies of infinities. This sounds nice in a philosophical sense, but again takes mathematics into a realm of meaningless games, because the "real world" is based on "real objects", and you can not have a universe function with an infinity of real objects. You can have very many, but there is always a limit in the world of "things" that have mass as objects. So zero and infinity in modern mathematics has been a problem, because mathematics is an orderly mental system that can be used to model real world conditions. You can play in the imagination, but engineering needs real answers.

Through study of a bit of Egyptian mathematics I found an insight into the wisdom of the ancients that may be of use to our modern scientists. This next part of the article is excerpted from my book, **The Cosmic Game**.

**A Brief Introduction to Ancient Egyptian Mathematics**

Now we are ready to penetrate into one of the secrets of ancient Egyptian mathematics that contains the key to their understanding of Unified Field Physics. Once you understand it, the myths of Egypt become clearer as does the significance of Maat's Scale of Justice and something we will call the Senet Spiral and discuss in detail later.

First we will look at the usual way Egyptians multiplied numbers. For example, if you want to multiply 37×65, write the two numbers at the top of two columns. Then write the powers of 2 under 37 up to the largest result that does not exceed 37. Opposite each power of 2 under the 65 heading write that power of 2 times 65 -- in other words first write 65 and then double it for each power of 2 in the left column. Then start with the largest power of 2 that does not exceed 37 (i.e. the bottom number in the left column and subtract that power of 2 from 37. Then subtract from the remainder the largest power of 2 that does not exceed the remainder. Continue until you have subtracted away all of 37. The powers of 2 that you used are the components of your answer, so check off those particular items in the power of 2 column. Then add up the corresponding numbers in the doubles of the 65 column. The sum will be your answer.

| | |
|---|---|
| 37 | 065 |
| *1 | 065 |
| 2 | 130 |
| *4 | 260 |
| 8 | 520 |
| 16 | 1040 |
| *32 | 2080 |

37 - 32 = 5; 5 - 4 = 1; 1 - 1 = 0.

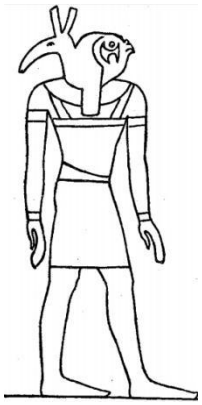
So we star 1, 4, and 32 and add the corresponding numbers in the right-hand column: 2080 + 260 + 65 = 2405, which is the correct answer. As an exercise you can switch the order of the multiplier and multiplicand and see if you get the same answer. You can also try multiplying other numbers this way until the process is easy and natural for you. From this example it is clear that the Egyptians wrote numbers with base 10 but did calculations with base 2. For most daily calculations they did not have to go

over 64 in the powers of 2, so this naturally comprised the Egyptian "Book of Changes".

Now we will turn to the problem of scaling in mathematics. According to Egyptian mythology, after Set murdered Osiris, Horus wanted to avenge his father Osiris and went to war with Set. The battle went back and forth, and during the struggle Horus made use of something mysterious called a "Na'r" from which he shot a harpoon at Set and wounded him in the testicles. Later Set injured an eye of Horus with a beam of fire (a laser?). Finally an accord was reached under which Horus ruled Upper and Lower Nilotic Egypt and Set ruled the desert lands.

Later after a long period of disunity a king called Mena (written with the Senet Oracle Game Board glyph) and also called by his Horus *serekh* name, Na'r Mer  unified Egypt and became the first ruler of the first dynasty of classical Egypt. The word "na'r" is generally taken to mean a cuttle fish or a catfish. However, the glyph was often borrowed to mean a baboon. Presumably from the association of the baboon with the scribal totem as a form of Thoth-Baba, the glyph was also associated with a reed pen. "The Harpooner" is one of the epithets of Horus. This can refer to the weapon that Horus uses against Set when he castrates him. On the other hand it can be a reed pen provided by Baba the Baboon as an even more powerful weapon than a harpoon. Perhaps Thoth in the guise of Horus' elder brother Baba convinced him that the pen is mightier than the sword, and a well-put epigram is more effective than a well-won battle.

We recall that the glyph for a harpoon has an alternate reading (w*a*') with the meaning of One. Egyptians often represented the battle between Horus and Set with an image of their two heads on a single body. The more they fight as enemies the more they simply harm themselves and demonstrate the inseparable unity of all phenomena. The subtle connection between the Council of Thirty Divine Judges and the concept of Unity expressed by the harpoon glyph (and the 30 Houses on the Senet Board), brought to mind the idea that Horus was bound to win the war because he fought for the Unity of Egypt. The Universe is a Unity at its Foundation, no matter how diverse it may seem to be. Set is the archetype for the illusion of diversity.



**Horus and Set on a Single Body**

This mythical drama suggests a clue as to how the Egyptians described the Universe mathematically. We have seen that they expressed numbers in a base 10 system. They also expressed fractions as portions of a wholeness. In other words, with a couple of special exceptions, fractions always had a numerator of 1. This tells us that they considered fractions to be the reciprocals of whole numbers. The notation for a fraction was simply to place the mouth glyph over a whole number and that transformed the whole number into its reciprocal fraction.

If we think of this as a symbolic representation of the struggle between Horus and Set, we realize that if Horus, the restorer of wholeness, represents whole numbers, Set, who fragmented relations and dismembered Osiris, represents fractions. The irony is that no matter what fraction Set removes to destroy wholeness, Horus simply chooses to respond multiplying by the reciprocal whole number that restores wholeness. For example, if Set chooses 1/27th of wholeness, then Horus chooses 27 as his weapon against that fraction and unity returns when they "clash" in multiplication. Thus the reciprocal multiplication of ratios in Egyptian was easy.

Originally Horus ruled the North and Set ruled the South. Horus rules numbers above the mouth glyph, and Set ruled numbers below the mouth glyph. The fulcrum point of the battle was at Hermopolis, the city of Thoth where the Baboon lives. On the Scale of Justice we find the Na'r, a little golden baboon, sitting right over the fulcrum. The formula for the operation of the Scale expresses the mathematics of the reciprocal operations. If the weight on one arm is 3, and the length of the arm is 1, then the Scale

balances when the other arm has a weight of 1 and an arm with a length of 3. The formula for the lever expressed by Maat’s Scale of Balanced Justice is that the weight times the length on one side equals the weight times the length on the other side. The little lead weight makes sure the formula comes out to keep the scale always even across the fulcrum.

3 kg × 1 m = 1 kg × 3 m.
(3 kg / 1 kg) × (1 m / 3 m) = 1.

The result forms a dimensionless unity. This is the secret of Egyptian mathematical myth. The Truth of Maat is always unity. There is no zero or infinity involved. The notion of zero means that something is not present locally, but still exists somewhere else. The notion of infinity is simply one of indeterminacy. No limitation or boundary is present. Modern quantum mechanics has found that a particle exists as a probability pattern that is present everywhere. Its behavior is described by a probability wave distributed over space-time non-locally, although there may be a very high probability for the particle to be present in a certain local region.

At the founding of the first dynasty a great leader ruled for the first time over a unified Egypt and greatly extended her influence. Egyptologists usually read his name as Na'r Mer. The first glyph depicts a cuttlefish, and the second glyph depicts a branding iron. 
Neither of those interpretations makes much sense as the name of a pharaoh. I suspect that the glyphs were homophones for other words. I would pronounce the name Na'r-Ab. My interpretation is that this is a name that honors Baba-Thoth. "Na'r" stands for the baboon scribal totem and the Trump of the Fool. "Ab" may stand for the leopard totem of Baba and the shaman priest, and may also encode for the heart and the heart's desires, since Baba-Thoth's sacred domain was in the Heart Chakra, known to the Greeks as Hermopolis, City of Hermes. "Ab" was the word for heart in Egyptian.

In terms of the physics of light we discover hidden in Einstein’s declarations that light has a constant velocity and that objects with mass may not travel

faster than light a great secret about the universe. Light carries its energy in its frequency. When Einstein made his discovery, Max Planck also made a discovery that there is a constant relation between energy and time, and there is also a constant relation between momentum and distance. Heisenberg later formalized these relationships in his uncertainty principle. Momentum and position are inextricably entangled, so that one can not know both at once. Observation of the position of a particle requires energy that disturbs the particle's momentum and changes its position. Observation of momentum also requires a certain space to do that, thereby blurring the position of the particle.

In 1924 a young scientist named Louis de Broglie pointed out that elementary particles of matter such as electrons also have characteristic frequencies and are always vibrating The electron has "mass" and therefore moves slower than the velocity of light, but is made up of a group of interacting wave packets of energy. It turns out with simple arithmetic that these interacting waves of energy have associated phase velocities that are without mass and move faster than light. The simple formula is as follows:

The group velocity of the particle times the phase velocity of its wave packet equals the speed of light squared. If we call the constant velocity of light 1, then, if an electron moves at 1/3 of light velocity (a "group" velocity we will call $v_g$), its associated phase waves ($v_p$) move at 3/1 or three times the velocity of light (at what we will call the phase velocity $v_p$). The same information that is in the electron particle is also spread out as phase waves over a broad area of space although those waves have no mass. $(v_g)(v_p) = c^2$. Here "c" stands for the velocity of light that we will treat as 1 unit of velocity. Each component of the equation is a velocity, so mass is not directly involved. Here is a perfect reciprocal relation. The only problem is that we do not know how to "read" the phase wave component of the equation, so scientists simply disregard that aspect of the equation and focus on the impossibility of "massive" objects moving faster than light, which the equation shows to be true, despite the fact that the information in the local electron is also in its associated non-local phase waves if the velocity of light is constant. Ancient Egyptian science gives full weight to every component of the equation and finds unity holding the universe

together in the Balance of Maat. As our ability to perceive things in a non-local manner improves, we will discover how the Egyptians could so easily probe the past and future and spread their civilization around the galaxies without any local citizens even being aware of the game.

Below for study is one way of calculating what I call the Planck/Einstein/de Broglie Velocity Equation. (Excerpted from an article "The ABCs of Awareness" in a series of essays I wrote called **Observer Physics**, and [at the end is] an excerpt from an article by me called "Popcorn Time" with another simple form of the calculation below.

The relation between electromagnetic local (group) waves that form a "particle" and their corresponding non-local phase waves is as follows.

* $(v_g)\ (v_p) = c^2$.

We derive the relation as follows, where $E$ is energy, $h$ is Planck's constant, $f$ is frequency, and the particle, for example, may be an electron, but also may include atoms and molecules.

* $E = hf$ (Einstein's postulated quantization of electromagnetic (EM) energy)
* $\lambda = h/p$ (De Broglie's wavelength $\lambda$ and momentum $p$ of a particle)
* $f = E/h$ (De Broglie's frequency $f$ and Einstein's total energy $E = mc^2$ of a particle.)
* $E = mc^2$ (total energy of a particle by Einstein's special relativity)
* $v_p = \lambda f = E/p$ (The phase velocity of EM waves in free space or for a particle.)
* $v_g = pc^2/E$ (The group velocity according to special relativity; $p = mv_g$)
* $v_g\, v_{p\,=}\, c^2$ (The velocity equation -- see **Wikipedia**, "Matter Wave" for details)

Since $p = mv$, the mass times the velocity, and $f = E / h$, then

$v_p = \lambda f = E/p = mc^2 / mv = c^2 / v.$

This last $v$ is the velocity of the particle ($v_g$).

Therefore, $(v_g)\ (v_p) = c^2$. Including relativistic effects still gives the same result, but with a bit more math. More details of the calculation are in the

"Matter Wave" article on **Wikipedia**. [I added $E = mc^2$ and $p = mv_g$ to the above for more clarity.]

"Group velocity (equal here to an electron's velocity) should not be confused with phase velocity (equal to the product of the electron's frequency multiplied by its wavelength). Both in relativistic and non-relativistic quantum physics, we can identify the group velocity of a particle's wave function with the particle velocity. Quantum mechanics has very accurately demonstrated this hypothesis, and the relation has been shown explicitly for particles as large as molecules.

"Since the particle speed $v < c$ for any particle that has mass (according to special relativity), the phase velocity of matter waves always exceeds $c$, i.e.

$$v_{\mathrm{p}} > c,$$

and as we can see, it approaches $c$ when the particle speed is in the relativistic range. The superluminal phase velocity does not violate special relativity, as it carries no information. See the article on *signal velocity* for details."
("Matter Wave" article in **Wikipedia**.)

There are more details in the article, but this gives us the basic equation strictly in terms of measurable velocity rather than energy and mass which are abstract. If the velocity of light $c$ is constant, and the group velocity is always less than $c$, then the phase velocity must always be faster than light. We are told in the last sentence quoted that the superluminal phase velocity carries no information -- only the sub-luminal (slower-than-light) group wave carries information. However, the equation shows that the same information the group velocity carries also must be present in the phase velocity. The phase velocity is merely the reciprocal of the group velocity. To see this, set $c = 1$, a common practice in particle physics. If $v_g = .1$, or one tenth of $c$, then $v_p$ must be 10 times $c$. Whatever value the group velocity has, the phase velocity mirrors that at a reciprocal value -- **if** we accept Einstein's assertion that the velocity of light (and all EM phenomena) is a universal constant. Is there a contradiction, or is there something we are missing? If we can find a way to read the phase waves, we can run the velocity equation to figure out the corresponding group wave velocity and calculate the position of the associated particle. As the

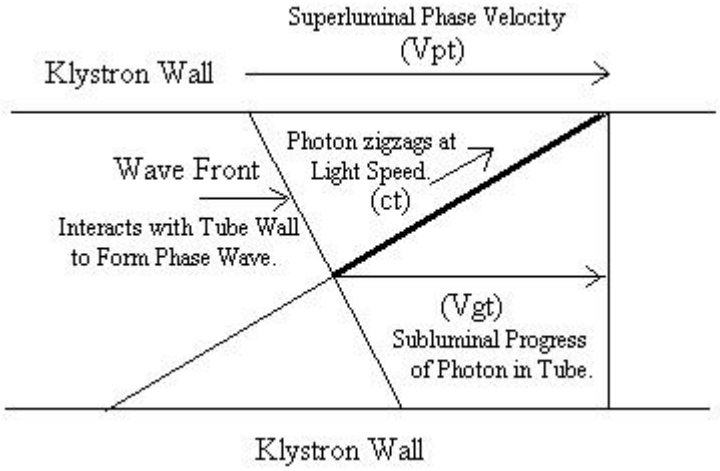
phase waves modulate, the group waves will also modulate, and we can calculate a particle’s behavior and any information that behavior contains.

We can see the role of the velocity equation in ordinary life experience and understand the observer viewpoint transformation that we do when we switch from observing group wave information to observing phase wave information -- as well as the role of light speed. For example, you probably use a cell phone to speak to friends or to text them. When you speak or type your message into the device, you operate at the group velocity. When you transmit the message, it goes at the velocity of light. However, if you take a photo with your cell phone, the device captures the total light field image that you point the lens at onto its chip in a single operation by guiding the light through a lens onto the light sensitive chip. The light travels to and through the lens at *c*, but hits the light sensitive device in the cell phone, transferring the total image to the device in one shot as non-local superluminal (instantaneous) data capture spread over the surface of the light sensitive chip. You may then transmit the image to a friend from your phone at light speed. When your friend sees the display or prints it out, the image enters her eye, passes through a lens (at light speed), but the whole image arrives onto her retina in one instantaneous shot. The optic nerves and brain then process the information at the slower-than-light group velocity. Optical processing of capturing a field of information in a single image via photography is “superluminal”.

Thus we find that hearing processes group waves, and vision processes phase waves. Group waves are serial and phase waves are parallel. For group waves you are at the end of a communication channel and get data in individual chunks. For phase waves you expand your observer perspective to take in an entire communication channel (or field, or space) and process the entire message as a single chunk. You may then slow down and peruse the details one by one at leisure, processing the data in other ways. For phase wave operations you must shift your viewpoint 90 degrees and expand your viewpoint to include the entire communication system. You must somehow transcend the data field, sender, and receiver. In a sense, there is no communication, because you already know it all. It is like clairvoyance. You have the whole picture in one shot, but you may have to sort out the details in order to use the data in "group wave" mode.

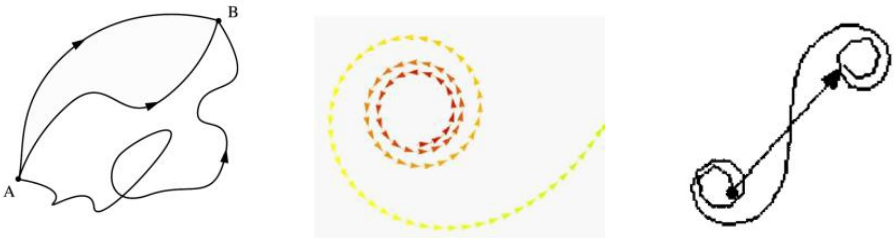
We have always been able to operate in the superluminal phase-wave mode as well as the limited group-wave mode and also light-speed mode. What we see here in the "Matter Wave" article is a strange obfuscation of scientific "interpretation". The equation is presented and speaks out in its totality loud and clear, but the commentator for some reason throws out half of the equation. The half-blind interpretation of a high school level equation is the "establishment" viewpoint that is standard in all the media and textbooks.

The "velocity" equation is a general principle of nature and appears in many places. Here is a sketch of a klystron wave guide used in microwave technology. It shows the relationships of the three wave types in a special medium. In the drawing we convert velocities into relative distances by multiplying each velocity by a constant unit of time (*t*) which we can then cancel out of the equation.



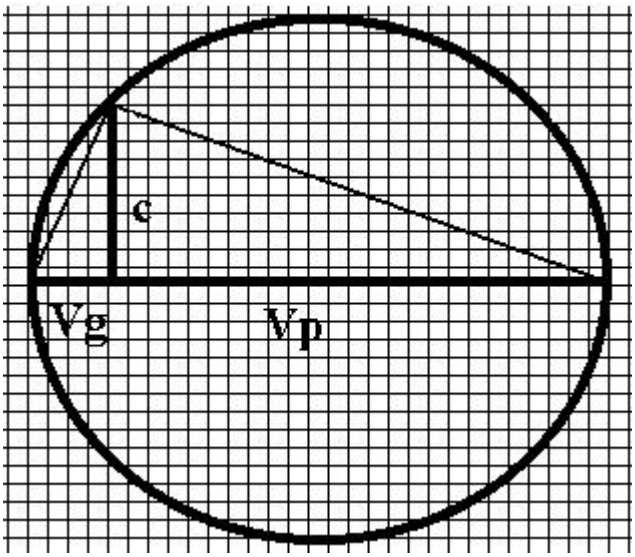

In the klystron tube, ($v_g$) and ($v_p$) are parallel motions along the direction of the tube, but (*c*) zigzags reflecting back and forth from wall to wall as the photon proceeds down the tube. The group velocity represents the photon's net forward progress and carries the information down the tube and out the end to a receiver, whereas the phase velocity represents the interaction of the photon's wave front with the tube wall as it sweeps along through the tube. The wave-front interaction is a phase-wave phenomenon that sweeps back and forth along the tube surface faster than light. The wave front is always normal to the photon trajectory. You can

see from the geometry that in the tube ($v_p$) is always greater than ($c$), and ($c$) is always greater than ($v_g$) -- except at the moment when the photon bounces off the tube wall. In the infinitesimal instant of the photon's interaction with the wall, ($c$) drops to 0 because the photon is momentarily absorbed and then re-emitted by an electron in the tube wall. At that moment the phase wave becomes infinite and the group wave is indeterminate. An important principle for electromagnetic wave guides is that all of these velocities are interactive and can not stand alone. The phase velocity depends on the interaction of the wave front and the tube wall, the group velocity depends on the interaction of the photon with the tube wall, and the speed of light depends on the interaction between two terminal points such as electrons, an emitter and an absorber at either end of the tube. Without terminals a photon can not move or even manifest. The curious thing about the relationship between the photon and its terminals is that it always moves at ($c$) relative to its terminals, regardless of their positions or any other relative motions. It balances the differences by shifting its apparent wavelength rather than its speed. The sketch I made is only a rough rendering of the resultant of a quantum electrodynamic (QED) process described by Feynman in which the photon radiates from its emitter source in ALL directions. The photon path and wave front are the resultants of wave interference in the gap between emitter and absorber as the photon follows all possible paths. The schematic diagrams below suggest this notion. The one on the left shows three possible paths, the middle one shows little arrows that go in all directions, and the third shows the resultant path that appears to be a straight line. Close to the terminals the arrows are in all directions that mutually cancel. In the gap they also are omnidirectional, but cancel out to form a beam. The interaction is actually bidirectional, going both ways between the terminals. This is why, when you observe a star 100 light-years away, you see it as it was 100 years ago but in your present earth moment. The conjugate photon beam of attention (from you as the observer) goes "backwards" in time. The photon from the emitter and anti-photon from the observer as if shake hands across time and space and generate the perception event. That is why the observer as an absorber (anti-emitter) is so critical to all of physics. He collapses the light wave that shines in all directions everywhere into a finite event that occurs between a perceiver and an object of perception.




(See **Wikipedia**, "Path Integral Formulation")

Another way of schematically representing the velocity relationship is to imagine a circle centered at the origin and divided into an upper and lower half by a horizontal diameter along the *x*-axis. Any position on the circumference of the circle can represent a set of values in the Velocity Equation. (See diagram below.)

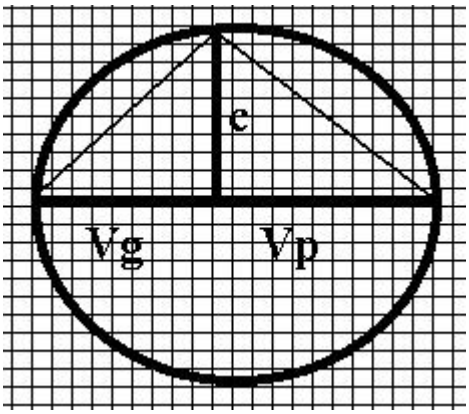



$v_g = .4\ c$ $v_p = 2.5\ c$ $c = 1$ (unit distance on grid = .1*c*)

In this way of graphically representing velocity relations we draw the speed of light (*c*) as a vertical line between the diameter and the circumference. The vertical line generates two similar triangles that show the Velocity Relation. The vertical distance from diameter circumference may change depending on the position of the vertical line relative to the circle's center. Thus in a sense the value of *c* is not constant. All three values can change, but the ratio in the velocity equation $v_g\, v_p = c^2$ stays constant. Vertical lines above the diameter may represent "retarded" light coming to the observer, and lines below the diameter may represent the "advanced" light of the

observer's attention going to an object (or vice-versa). The light pole divides the diameter into two sections. If the two sections are even, then the diameter represents an electromagnetic signal traveling through free space. If they are not even, the shorter portion represents a group velocity, and the longer portion represents the corresponding phase velocity. The Velocity Relation explains the tendency of the expression ($c^2$) to show up in dynamic equations, as for example in Einstein's Relativity Mass-Energy Equation.

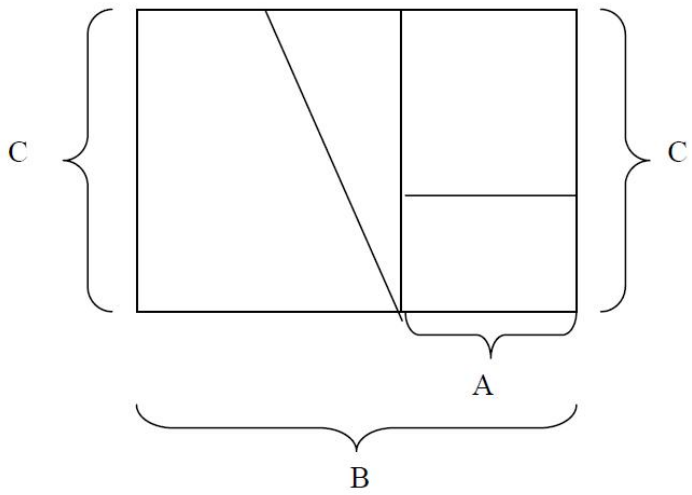
* $E = m\,c^2$.




$v_g = .9\,c \quad v_p = 1.11\,c$

Exercise: Experiment with various similar triangles. The general rule is that they must be similar and they must share two different sides in common. Right triangles are standard, but other types of triangles are simply distorted versions of the standard. For example, similar triangles [A1, B1, C1] and [A2, B2, C2] might have C1 = A2 as their equal sides. Try making pairs of similar triangles according to this rule and play with them. See what system models you may discover.

Exercise: The Golden Ratio in a Golden Rectangle is an example of the Velocity Equation and Egyptian reciprocal mathematics expressed spatially. This principle is fundamental to sacred geometry.




The above drawing shows an approximate Golden Rectangle. The larger rectangle is made from a square plus a smaller golden rectangle. The smaller one is made from a square and an even smaller golden rectangle. You can continue in this fashion making larger or smaller rectangles, and the pattern forms a Phi Spiral. The sides of the rectangles have the ratio:
(A / C) = (C / B). In other words, (A) (B) = $(C)^2$.

This is another example of the Velocity Equation represented spatially. Of course A, B, and C are also the sides of right triangles that share the side C. The smaller triangle is turned 90 degrees so that its C and the larger triangle’s C form the ends of the larger Golden Rectangle.

The $(C)^2$ actually describes the square portion of the larger rectangle. So if C = 1, B = $\varphi$, and A = ($\varphi$ – 1). Or, if C = $\varphi$, then B = ($\varphi$ + 1), and A = 1. Thus (1 / ($\varphi$ - 1)) = ($\varphi$ / 1) = (($\varphi$ + 1) / $\varphi$), where $\varphi$ = 1.618 . . . , an irrational number called the Golden Ratio. This ratio is also represented as $\varphi$ = (.5) (1 + ($5^{.5}$)). The square root of 5 is the diagonal of a 1x2 rectangle. We get that by drawing a diagonal from the midpoint of C to an opposite corner of the larger square. If we set C = 2 units, then the diagonal is the square root of 5. By rotating the diagonal so that it runs from the midpoint of C [on top of the square] on out beyond the square, we get the total length of the Golden Rectangle as (1 + ($5^{.5}$)).

For more information about the Golden Rectangle, and its remarkable properties, look up the entry by Weisstein, Eric W. "Golden Rectangle."

From *MathWorld*--A Wolfram Web Resource.
http://mathworld.wolfram.com/GoldenRectangle.html.

See also the articles on "Golden Ratio" and "Golden Triangle". Other good articles can be found at various sites on the web.

## The Math for the Velocity Equation
## Review for Further Study

Einstein discovered the relationship among mass, energy, and light speed: $E = m c^2$, along with the quantum (particle) wave nature of light ($E = hf = hc/\lambda$), where $E$ is energy, $h$ is Planck's constant, $f$ is frequency, $\lambda$ is wavelength, and $c$ is light speed.

$$E = hf = \frac{hc}{\lambda} = mc^2$$

Louis de Broglie extended the idea to describe the wave nature of particles, finding, for example, that the electron has a characteristic wavelength ($\lambda e$) that relates to its momentum: $\lambda e = h/p$, where $h$ is Planck's constant and $p$ is the particle's momentum (mass times velocity).

$E = pc = hc / \lambda$.
$m_\gamma c^2 = hc / \lambda_\gamma$, where $m_\gamma$ is the virtual mass of a light particle (photon).
$m_\gamma c \lambda_\gamma = h$.
$\lambda_\gamma = h / m_\gamma c$.

The insight of de Broglie was that you could then take the mass of a particle such as an electron $m_e$ and plug it into the relationship. The wavelength of the particle would be Planck's constant divided by the particle's mass times its velocity.

$\lambda_e = h / m_e v_e$, where the subscripts now represent electron properties, and $v_e$ is the velocity of the electron.

The problem with these ideas is that the mass and energy of a particle are abstract properties. Only properties like length, velocity, and constants such as $c$ are measurable by observation. So we re-interpret the relationship in terms of velocity alone, starting with the velocity of the

particle ($v_e$), which we now call the "group velocity" ($v_g$) since it is composed of a bundle of interacting probability waves that always move along as a totality at less than the speed of light and give the impression of a particle with mass.

$v_g = h / m_g \lambda_g$.

The phase velocity of light is ($v_p$) = $c = \lambda_\gamma f_\gamma$, which is the photon's wavelength times its frequency. So the phase velocity associated with an electron would be $v_{pe} = \lambda_e f_e$ and in general $v_p = \lambda_g f_g$, the phase velocity ($v_p$) that corresponds to a particle's group velocity ($v_g$). $E = h f$, and hence $E_g = h f_g$. Substitute ($h f_g / c^2$) for the particle's mass $m_g$ and cancel out the $h$'s.

$v_g = (h / \lambda_g)(c^2 / h f_g) = c^2/v_p$.

$v_g v_p = c^2$.

This reciprocal relation is what I call the Einstein/de Broglie Velocity Equation. This reciprocal relation is at the foundation of the universe, since everything is constructed of different frequencies and wavelengths of EM Light self-interacting in what we call Space and Time, which is just a memory storage device for tracking information in consciousness.

# 26 Study Questions

* Why did Horus want to fight with his uncle Set?

* Why was Horus making an immature rush to judgment?

* The wounds sustained by the two are kind of ironic, one being in the North (upper body) and the other being in the South (lower body). This hints at a deeper relationship between the two. How did Egyptians express this sometimes in their art?

* How did Set almost always express himself in fractions?

* How did Horus express himself in whole numbers?

* When the two fought how did Horus always restore wholeness?

* What was the role of zero and infinity in ancient mathematics?

* How was unitary mathematics expressed by Maat's Scale of Justice?

* Louis de Broglie noticed that particles are always vibrating, so they have frequencies, wave lengths, and thus phase velocities. Why must the phase velocities be superluminal although the "group velocity (motion of the "physical" particle) must be slower than light speed?

* Why must the same information that is in the group velocity also be in the phase velocity despite denial of this by the **Wikipedia** author?

* What must we do to "read" information in a phase velocity?

* How might we read the phase waves in a klystron?

* All EML (electromagnetic light phenomena) require two things in order to manifest. What are they?

* All EML phenomena are bidirectional interactions. What does that mean?

* According to Feynman's QED, all EML phenomena take every possible pathway. What does that mean?

* Explain the reciprocal structure of the circular diagram.

* Explain the reciprocal structure of a Golden Rectangle.

* What is the critical element of reciprocal mathematics? The scientific community is finally moving toward a metrology that favors a reciprocal system. What is the symptom of this change?

* Viewing the world from a “subluminal” (STL = one item at a time) perspective and from a “superluminal” (FTL = a whole field in one shot) perspective require different ways of using consciousness. Practice until you can feel comfortable in either mode. Both modes are vitally useful.

* How long do you think it will take until “superluminal” technology is fully restored in human civilization?

* How does this article relate to the Series Overview?