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Mathematical Clique of Spiders: Webs of Trigonometric Appliqué & Social Spiders' Pythagoreanism

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Abstract:

Spiders have gained prominence in recent decades with scientific value such as Spider Diagrams for mind-mapping, Spider Graphs in Graph Theory, Spider-web-like safety Crumple Zones in engineering design of Automobiles, Sociality in Spiders and of late, movie's Spiderman! At the same time, Spiders are seen in the light of unique divinely dispensation of the Creator & Nature origins options theories.

This paper, however, highlights how Spiders are a mathematical clique based on the webs of trigonometric appliqué technique deployed by spiders with a Video embedded in brief discussion on the Creator –Nature-twin-origin detective question additionally at the outset and frankly suggesting a different school of thought of Pythagoreanism on social spiders at the end.

Keywords: *Mathematical Clique, Trigonometric Appliqué, Pythagoreanism, Vibrations, Lemniscates*

Mathematical Clique of Spiders: Webs of Trigonometric Appliqué & Social Spiders' Pythagoreanism

Researchers wrote that Spider webs themselves are characterized by a highly organized geometry that optimizes their engineering function with zero scope left for any kind of improvisation by external elements such as human onlookers or curious observers watching the spider at spinning work. But, it became instantaneously a doubtful authenticity of Spiders spinning the webs throwing down a gauntlet of double questioning pattern as below according to the experimental researchers.

- Did *Nature* optimize spider webs?
- Did the *Creator* optimize spider web?

The Researchers have provided an easy answer solely non-mathematically taking into consideration both Nature and Creator being important leads to the underlying mystification of steely biochemical proteinous wet-silk-filament fabricated webs of Spiders.

Of the two leads above, the optimist-Researchers believed strongly that the second one, the Creator must be an actual Engineer having real thoughts to create Spider Webs because it is an eye-brow-exclamation as to how and who else could be otherwise pre-planning and fast programming spider webs so well of an expertness in "engineering" (Design Engineering of Spider Webs) as if the webs were designed to withstand many anticipatory attacks or breaks or delicate touches of feathers or flying hairs or a flush blow of an exhaled human breathing force. In other words, the researchers pondered on Who guided spiders to such complex appliqué "technology" (Trigonometric Appliqué in Spider Webs) other than the super-natural Almighty God!

With reference to the first lead, i.e., Nature, it has been excluded by the researchers from being an optimizer since precise experiments revealed and resulted in null and void optimization influence on the webs but at the same time established that Nature emerged as a potential destructor with threat of causing sudden break-downs of spider webs with multiple collapses unlike the Creator to preserve!

Therefore, this paper briefly deals with the Creator (Engineer) & Spider (Technologist) -- Origin & Option, respectively, as to their thespian roles, say divine as well as purposive as a matter of universal academic micro-thesis of scientific and mathematical significance of how important the taxonomical spiders are as a mathematical clique undoing a compromise made by the Researchers with the Creator and in order to repair the unintentional but sensational damage to the morale of serious pure and applied Sciences cultivators and persuaders.

The Creator Origin: ---- 1. The Greek Mythological Evidence & Greece Myths Discovery

Devoted to the traceable pre-historic times, available manuscripts suggest that Spiders are mythological weavers born with their own biochemical silk material producing glands making webs in order to be able to survive on small insects as their food supply caught in the web due to a Divine Curse. (A French Entomologist once commented, What a refinement of art for a mess of flies!)

One narration of the Divine Curse is read as follows being an outcome of blasphemy of a female human weaver vis a vis the Goddess of Weaving Art.

Arachne, the spider woman vs Goddess Athena in Greek mythology: The two Contemporaries Fight

The weaving contest: ----

Arachne being an ordinary mortal woman was quite vulnerable to human failings but arrogant about her skills as superior to even Athena's, the goddess of weaving, provoking her wrath to accept any punishment. The stage was set for a battle in which a goddess and a mortal decided the better artist. Athena at her loom and Arachne at hers, each working with golden threads and splendid colors. What unfolded next was below?

The transformation into a spider: A Curse!

Although Arachne had made a mockery of the supreme deities of the Olympus, Athena had to admit that her work was brilliant and flawless. However, Athena who was incensed by Arachne's humiliating portrayal of the gods destroyed in anger Arachne's tapestry and loom. Still in anger, Athens transformed Arachne into a disgusting spider ("arachni" in Greek), cursing that Arachne and all her descendants would henceforth hang forever from threads and be skillful weavers.

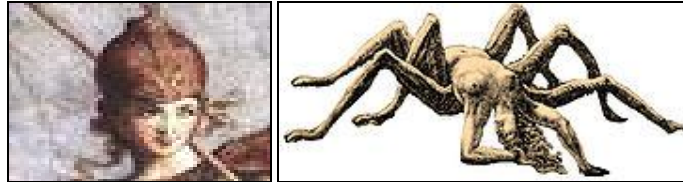


Figure 1: Athena , the Greek Goddess who cursed the female human being , Arachne .

Figure 2: Arachne depicted as half-spider half-woman

An interesting fact that relates mythology to present history is that the art of weaving which is said to have originated in Anatolia, a part of modern Turkey and spiders have been a constant source of inspiration for man to perfect his weaving skill. Arachne, the Greek lady, is honoured by Science and the taxonomical class name for spiders is Arachnida named after her and called Arachnidism in technical literature. Arachnophobia is of webs or spider-like shapes and some statistics show that 50% of women and 10% of men show. It formed a genetic response that helped early humans to survive or a cultural phenomenon that is most common in predominantly European families .Of late, an adoration in the adult mathematical research efforts is applied as Arachinomatics ! A Journal of Arachnology is made available for publications of research on the social spiders since they are not like insects, especially born with so called 'Book Lungs'.

2. The main source of the Islamic Faith: The Qur'an believed by Muslims -- Al-Qur'an of the Divine Origin The Qur'an mentions in Surah Al-'Ankabut as Al-Qur'an 29:41 that Spider's Web / Home is fragile .



Figure 3

The Qur'an stresses on the flimsiness of the relationship in the Spider's house , where the female spider many a time kills its mate , the male Spider. Also, the physical description of the Spider's web as being very flimsy , delicate and weak, was made a mention of.

In the year of 1984, a worldwide known German magazine of science named Kosmos published an exclusive issue about spiders. One will be very surprised to witness another Quranic certification from that interesting issue of the magazine:

“The capability of building nets and catching food is valid only for female spiders. That is to say, the net covering the entrance of the cave where the Prophet of Islam hid was built by a female spider. And also, not much information on the lives of male spiders. All we know is that they are incapable of building nets (building houses)”

3. Spiders in Hinduism & India.

In Hinduism, Spider in India is associated with Maya. Maya is the Sanskrit root "Ma" meaning no form or limit & infinity. Maya describes the illusory nature of appearances just as the spider brings forth the thread from its mouth to weave its web and withdraws it again into its mouth. The Spider's association with Maya brings about understanding that not all things are as they appear to be as depicted below in photo .The ways a member of the human species perceive what they call ' Spy-der ' (read as spider) is in no way the same as how spiders appeal & appear to other species . A human being is in no way perceived in the same ways & manners by a spider as by other human beings!



Figure 4

Maya - Virgin aspect of the triple Hindu Goddess, symbolized by a Spider, spinner of magic, fate and earthly appearances. The spider's web was likened to the Wheel of Fate and the spider to the Goddess as a Spinner, sitting at the hub of Her Wheel. The Mother of the Enlightened One, Buddha. Her colors were white, red and black. Hawthorne is her tree. She is the creative force, weaving the designs of life and fate .

The Vedas compare creation to a spider's web implying that the spider weaves and then lies within. Paralel to Creator is both the container of the universe and what is contained in it !



Figure 5

4. In Russian legend , spider is blessed and humanity was saved by driving plague insects into spider's web and the Chinese have a high regard for spiders who call them " good luck " or " happiness spiders " because they descend from heaven above . In Southwestern America , spider was the creator goddess and weaving was an honoured art. Spider was also credited with giving humanity the very first alphabet and writing was equated with feminine wisdom associated with words and communication imparted to children by mothers because on a Freudian level spider embodies woman .



Figure 6

>>>> She-Spider Goddess of Feminine-Wisdom

The Victorian view was more pragmatic to seeing the fly-eating spider as a part of the animal economy.

5. In Ancient Egypt , the goddess Neith was associated with the spider as the spinner and weaver of destiny . As a deity, the goddess Neith wove the entire world into being with her loom. It is said she reweaves the world daily much like a spider that consumes and reweaves its own web. The spider connection comes from Neith weaving or spinning a woven design, like a spider's web as part of her role in Creation.



Figure 7

6. We have Spider symbol meaning from ancient symbol of infinity.
 Infinity symbol seen below if we observe most Spiders have 8 eyes and all have 8 legs.

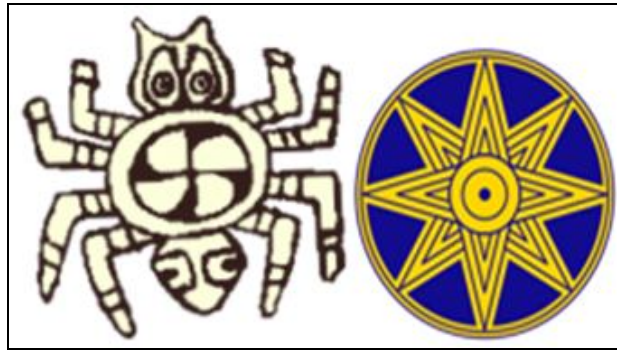


Figure 8

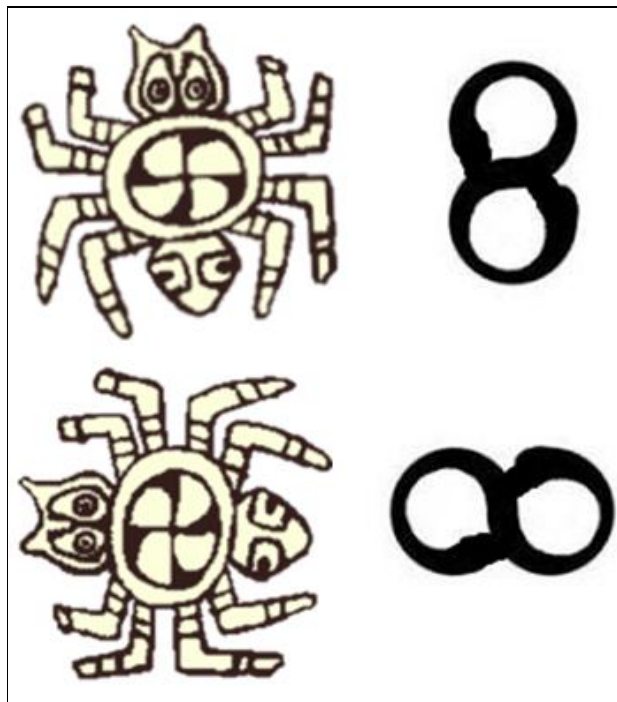


Figure 9

7. The Jesus Christian Catholic Faith followers trust spider because it has been referred to in the Psalm in Common English Bible at 33:11 that the Lord’s plan stands forever. What he intends to do lasts from one generation to the next. The trust of the hypocrite is compared to the spider’s web.

“The plans of the Lord stand firm forever, the purposes of his heart through all generations.”
 — Psalm 33:11

Figure 10

The Targum tells us that a spider spun its web over the door of the cave where David was concealed while Baby Jesus with Mother Mary were inside the cave.



Figure 11

The trust of the hypocrite is compared to the spider's web or house (Job 8:14). It is said of the wicked by Isaiah that they “weave the spider's web” (59:5), i.e., their works and designs are, like the spider's web, vain and useless. The Hebrew word here used is *akka-bish*, a swift weaver, the spider, about seven hundred species in Israel alone!

One can maximum say in view of the above 7 attributes of the creation-impact of the creator which being an answer to the “Nature & Creator” based twin-origin detective questions aforementioned that it took precedence over human life meaning that the spiders divination is an archaic perception by the Researchers in these days of the 21st Century of all-round scientific and mathematical concepts with land and space Labs’ experiments and proofs of human reason and logic. Besides, a contradiction in itself to modern Science and could block human desire to discover innovatively knowledge of science & technology inventions by evolved current and peer generations of Researchers, Scientists, Mathematicians, Engineers and Technologists by means of hard human efforts and quest for exploration of the Space, Outer Space and beyond. We are modern rational men living in an age where human reason, logic and science are given primacy. Scientists have already proved that the spider’s web has great qualities such as strength, elasticity and shock absorbency. Spiders’ thread is also five times stronger than steel of the same thickness and can stretch four times its own length as confirmed by Scientists with the help of modern equipment. Thus, Science & Mathematics are about the world around us to explore by investigations and experimental- activities including the spider web and its like-operation of influence since Spiders are already recognized as social spiders (Spiders are believed to have existed for more than 300 million years) with typical social applications such as spider diagrams for mapping of mind-spinning ideas in human-brains and still more of a recent point of time in History that the Spiders inspired mathematicians acting as catalysts to the invention of Spider Graphs in the field of Applied Mathematics while spider webs provoked

significantly the theory and practice of inbuilt safety-zones or accident-free crumple zones in the designs of various types of automobiles in road traffic including secret military vehicles involved in road transportation.

Turning back to social spiders, all travel around their immediate territory on foot while tiny spiders can travel for many miles being carried through the air by a breeze. This method of travel is called ballooning with spider in a position of the breeze drawing out a line long and delicate carried high up into the air with spider suspended at its end and according to me, this state is the pendulous effect in which the spider moves to and fro in an arc subjected to the gravitational force as if the spider regulates like a pendulum in Physics the speed of a hypothetical universal clock-timer mechanism since spiders are said to be divine with the creative force of weaving the designs of life and fate from while to while because they descend from heaven above. Of course, that longevity is a prerequisite to social life!

Furthermore, this paper attempts to present the videoed observations on the trigonometric appliqué in the spider web spinning technique as noticed and detected by the author. The trigonometric appliqué can be defined as the Sine- Cosine-Tan-Association (SCTA) in the spider web spinning activity whereby the spider energetically stretches the elastic wet silk filament making a hypotenuse of a right angled triangle creating the variable SCTA at its own random will and the end point of the elastic hypotenuse is laced into the immediate bottom line filament thereby progressively succeeding in achievement of area – growth - repetitions to widen its web. To measure the whole perimeter of a spider web making use of properties inside web progressions such as right angles, equilateral triangles, quadrilaterals and pentagons in actuality is feasible and obviously datamatic but kept out of the scope of this paper without necessarily having an immediate application in my mind and without any necessary reference to physical applications in the real world. The most interesting is the right angled triangle with its longest side called the Hypotenuse which is the side opposite the right angle in a right angled triangle.

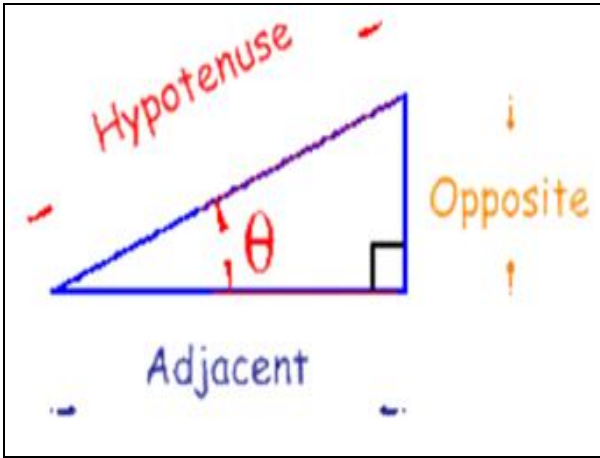


Figure 12

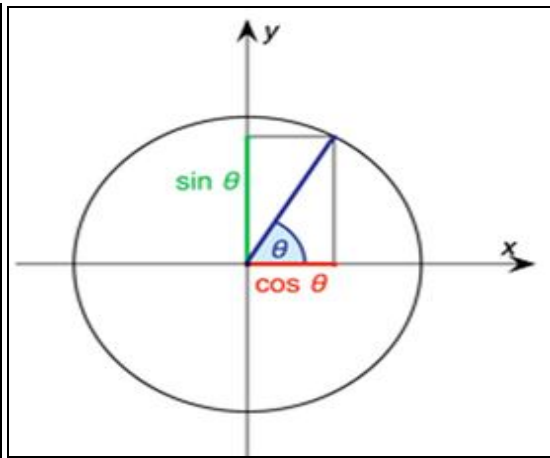


Figure 13

Right Angle displayed as blackish- corner box

The longest side is the Hypotenuse which the spider uses as a lever for movement in effective web-area-growth as per its instinct.

Adjacent angle to the right angle is θ ,

the adjacent side is called Adjacent, and

the Opposite side is opposite to the angle θ .

Sine, Cosine, Tangent Association (SCATA): A side / Another Side for any angle " θ " shown in above drawing

Sine Function: $\sin(\theta) = \text{Opposite} / \text{Hypotenuse}$;

Cosine Function: $\cos(\theta) = \text{Adjacent} / \text{Hypotenuse}$

Tangent Function: $\tan(\theta) = \text{Opposite} / \text{Adjacent}$;

3 additional sub-trigonometric SCATA functions which exist involving the hypotenuse also prevail as seen in the tabulation herewith.



Figure 14

SCATA TABULATION OF QUICK REFERENCE		
Function	Angle(θ)	Hypotenuse Effect & Movement
Sine	sin	Opposite / Hypotenuse
Cosine	cos	Adjacent / Hypotenuse
Tan	tan	Opposite / Adjacent
Cosecant	csc	Hypotenuse / Opposite
Secant	sec	Hypotenuse / Adjacent
Cotangent	cot	Adjacent / Opposite

Table 1

Below given are a few camera captures of a live spider in action on the hypotenuse manipulations reproduced with the help of digital video camera.

At each fixation, a new pull of hypotenuse is made, and it is connected to existing nearest web-lining with a probability that depends upon no disturbance/obstruction. As a consequence, spiders are more likely to receive more fixations/weaving-connections, increasing their centre of activity even further. This is an example of positive feedback from videoing the quicker-spiders. The most interesting feature is the assured hub of its own as long as there is no hubbub! After sufficient time of enoughness instinct of its natural self obviously, the spread-area widens to become spider web. This power of a spider with a powerful initial-hub progressively turning to enlarging to construct spider web is virtually scale-free. This video shows sample of knowledge of trigonometry can make an important contribution that it helps us think clearly about the weaving in action-dynamics of spiders and thus, a wonderful natural thing about the mathematical clique of spiders!

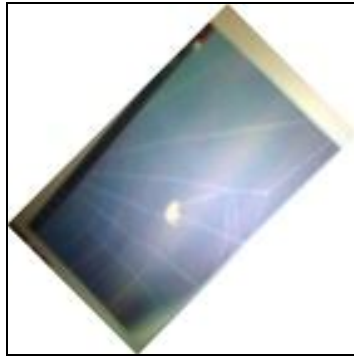


Figure 15

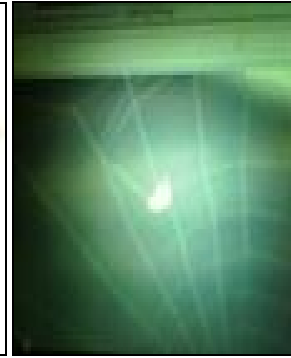


Figure 16

The internet address @

www.youtube.com/watch?v=pBkhQOYArxg for this video to watch on one's own computer with internet

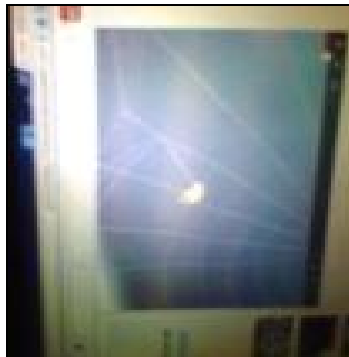


Figure 17

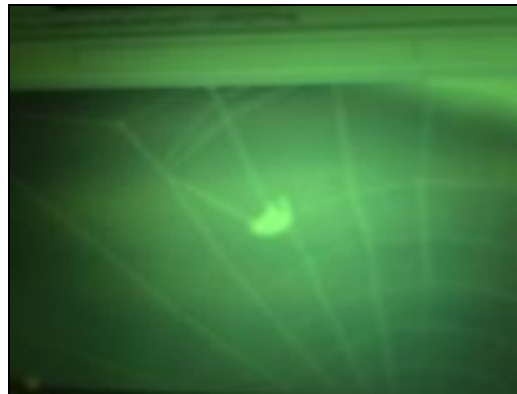


Figure 18

>>> *Spider at the right angled Hypotenuse videoed*

The length of the hypotenuse is like a flexible handle operated by the spider fixing points of connection as seen in the videoed web spinning while it changes its direction of movement enlarging the weaving area . The rule relating to the length of the hypotenuse of a right triangle that the sum of the squares of the lengths of the legs equals square of the length of the hypotenuse is virtually for a spider must have been a focal plane of biological calculus

while it engrossed in the web-progression .This application of hypotenuse by spider makes it unique along with its eight eyes of single lenses which are not compound eyes. Mathematically, the hypotenuse operator is well regarded as the Pythagorean Hypotenuse in the famous Pythagorean theorem propounded by the Greek philosopher and mathematician, Phythagoras (b.c. 570-before Christian era) which states that there is a relationship between the lengths of the sides in a right-angled triangle in that the sum of the squares of the opposite and adjacent sides equals the square of the hypotenuse. Triads of the whole numbers that satisfy it (for example, say, 3, 4, 5) were also given by Pythagoras known as Pythagorean triplets.

The Pythagoreanism reduced all meaning to numerical relationships and proposed that all existing objects fundamentally at their deepest level of reality are composed of mathematical form absolutely devoid of material substance and that in fact is why at the same time certain symbols have mystical significance with reference to the exhibit –(6) on page 4 above . The principles of Pythagoreanism contributed to the development of mathematics and Western rational philosophy and that that philosophy can be used for immortality and spiritual reincarnation of the purified soul to escape from the wheel of birth for a union with the divine.

For example, We can derive more Spider symbol meaning when we consider certain subtle characteristics that represent ancient symbols of infinity. The infinity symbol meanings occur when we consider most Spiders have eight eyes and all have eight legs. The number eight is also a symbol of infinity or lemniscate (an eight turned on its side). Also, indicates the meaning of number eight involves cycles, passage of time, and immortality, reincarnation and evolution with reference to the exhibit –(6) on page 4 above . Not only do Spiders and spider webs draw attention to our life choices, they also give us an overview of how we can diversify our thinking sometimes rooted in traditions alone to non-traditional themes and innovations. A spider does invite human awareness to the construction of spider webs. Fully functional, practical, and strong in design - Spider webs serve as homes with food storage - seemingly limitless in their functionality. When we consider this superior diversity, we can also consider the web-like construct of our own lives of decisions, choices and actions as effective tools. The Spider symbol meaning is to us to be mindful of smart life one weaves for oneself.

Spiders in eight families known to live all their life in communities and thus considered permanent-socials . Their special attributes are tolerance, inter-attraction, and cooperation. Also, found in social spiders a number of collective tasks which make these groups real entities. These collective tasks, which are called cooperation are of the fundamental phenomenon of inter-attraction. Overall behavior is clearly social because inter-attraction is accompanied by forms of communication largely based on vibrations of the spider web in the transmission of language of vibrations as it constitutes a vibratory system . Vibrations as links among social spiders were discovered in the ancient Greek cultures as the closest connections of high closeness probabilities of spiders that live in large cooperative societies which are scattered among several taxonomic groups. Social spiders provide an excellent opportunity for evaluating ideas about the evolution of sociality while these ideas have mostly generality which continues to be debated.

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